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THE KINETICS OF FORMATION & DECOMPOSITION OF HYDRATES FROM MIXTURES OF NATURAL GAS COMPONENTS

P.R. Bishnoi, R.B. Saeger, N.E. Kalogerakis and J. Jeje.
Dept. of Chemical & Petroleum Engineering, Univ. of Calgary.

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ABTRACT

Experimental results are presented on the kinetics of hydrates for methane and four methane-ethane mixtures. Two models of reaction are proposed and analysed. In the first, gas diffusion into the liquid is followed by conversion into hydrate within a liquid film, whereas in the second, gas diffusion was assumed to occur in parallel with reactions at the gas-liquid interface . The second model yielded better fits to the data but still showed scatter at high pressures.

RESUME

Les résultats d'expériences sur la cinétique d'hydrates de méthane et de quatre mélanges méthane-éthane sont présentés. Deux modèles de réaction sont proposés et analysés. Selon le premier la diffusion du gaz dans le liquide est suivie par la transformation en hydrate à l'intérieure d'une couche liquide mince. Le deuxième modèle suppose que la diffusion du gaz a lieu en même temps que les réactions à l'interface gaz-liquide. Les résultats du deuxième modèle s'accordent mieux avec les données, quoiqu'ils démontrent une dispersion aux hautes pressions.

THE KINETICS OF FORMATION AND DECOMPOSITION OF HYDRATES FROM MIXTURES OF NATURAL GAS COMPONENTS - EXPERIMENTAL DATA AND DEVELOPMENT OF GENERALIZED PREDICTIVE RATE EXPRESSIONS

ANNUAL REPORT

For the Period April 1984 - August 1985

by

P.R. Bishnoi, R.B. Saeger, N.E. Kalogerakis

and A. Jeje

Department of Chemical and Petroleum Engineering

The University of Calgary

Calgary, Alberta

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INTRODUCTION

Research efforts during the second year of the study of the kinetics of formation and decomposition of hydrates from mixtures of natural gas components can be summarized as follows:

i) Data gathering of experiments from pure methane and four methane-ethane binaries.

ii) Modification of experimental equipment.

iii) Modification of data acquisition and processing scheme.

iv) Analysis of formation kinetics for methane hydrates and extension to mixture analysis.

1. Data Gathering

Experimental data for four methane-ethane binaries as well as pure methane was obtained during the period covered in this report. The new experimental equipment described in the 1983-84 report (1) was used with modifications outlined in section 2 and 3 of this report. For each experiment, cumulative moles of gas consumed as a function of time were calculated using the new data processing scheme (1). Plots of moles consumed versus time for each run are shown in appendix A.

For methane and all binaries, experiments were of two types. Formation experiments were carried out in the regions of temperature and pressure where nucleation and hydrate formation could be observed. Solubility experiments were carried out at pressures slightly below the hydrate-gas-water equilibrium pressure (for a given temperature) in order to observe gas consumption due to diffusion into the reactor water sample.

A breakdown of experiments according to gas composition is as follows:

1. 80 mole % methane, 20 mole % ethane in the 275.8-276.2 K range (M80E20-T series).
2. 100% methane in the 275.8-276.2 K range (METHAN-T series).
3. 50% methane, 50% ethane for four isotherms in the 274-283 K range (M50E50 series).
4. 75% methane, 25% ethane for four isotherms in the 274-283 K range (M75E25 series).
5. 25% methane, 75% ethane for four isotherms in the 274-283 K range (M25E75 series).

6. 100% methane for four isotherms in the 274-283 K range (MTH100 series).

2. Modification of Experimental Equipment

During hydrate experiments, reactor water agitation often gives rise to vortices, leading to gas entrainment within the bulk water. This results in extra gas-liquid interfacial area which is difficult to account for during analysis of experimental data. To remedy this problem, stainless-steel baffles were installed within the reactor to prevent vortex formation. By analysis of several baffled and unbaffled runs in the M80E20-T and METHAN-T series, it was found that baffles provided improved experimental repeatability and were employed in all subsequent series.

Noting figure 3 in the 1983-84 report (1), the reactor occupied a separate temperature bath from that of the supply and bias cells (R1 and R2). Maintenance of proper coolant levels in both baths required tedious adjustment of valves in the coolant supply lines. This problem was remedied by removing temperature bath 2 and moving the two cells (R1 and R2) into the same bath occupied by the reactor. This modification was performed after completion of the M75E25 series and was kept throughout the MTH100 experiments.

3. Modification of Data Acquisition and Processing Scheme

As mentioned in the 1983-84 report (1), all process temperatures and pressures were recorded on a Doric 235 digital recorder and simultaneously stored on a cassette. Transfer of data to the computer was accomplished by playing back the tape. A substantial improvement in data processing speed was accomplished by transmitting process temperatures and pressures directly to the computer, eliminating the need for data storage on a cassette. In this scheme, analog voltages from thermocouples and DP cells were converted to digital signals through the use of an analog-to-digital (A/D) multiplexer card. Internal software was used to convert these digital signals into the temperatures and pressures used in subsequent data processing. The Doric 235 recorder was still retained as an independent check on the accuracy of the computer's new data acquisition system, which was implemented after completion of the METHAN-T series and was retained for all subsequent experiments.

After storage of the process temperature and pressures in the computer, cumulative molar gas consumption was calculated using the scheme described in the 1983-84 report (1). In order to improve data processing speed and reduce computer storage requirements, the computer software was modified to allow on-line calculations. In this scheme, calculation of moles consumed at each sampling time was executed immediately following acquisition of the corresponding process temperatures and pressures. This allowed greater flexibility in choosing a sampling interval, which was appreciated especially for long experiments in which a short sampling interval (e.g. 12 seconds) would result in computer storage overflow. This data processing scheme was implemented after RUN#M50E50-28 (see appendix A) and was used for all subsequent experiments.

4. Analysis of Formation Kinetics

4.1. Test Runs

The M80E20-T and METHAN-T series were performed in order to test various experimental techniques which would lead to the acquisition of more reliable and repeatable experimental data. Solubility experiments were performed below formation pressures in order to observe gas-liquid diffusion effects in the absence of hydrate formation. Agitation rates were varied in order to observe its effect upon formation and diffusion rates. Experiments were performed in which reactor agitation was commenced after hydrate nuclei were observed, while similar experiments employed agitation throughout the whole run. The effect of baffles upon vortex prevention, and hence repeatability of experiments through elimination of gas entrainment, was also tested.

The observations obtained during these test runs lead to the implementation of a standard procedure for all subsequent series of experiments. With respect to agitation rates, 400 RPM was chosen as a standard since higher rates yielded similar reaction rates but were subject to occasional decoupling between the magnetic stir bar and the motor-driven permanent magnet (see reference 1, figure 2). With respect to agitation commencement, it was found that agitation throughout an experiment yielded better repeatability and hence was used for all non-test runs. The placement of baffles within the reactor effectively eliminated vortex formation and resulted in better experimental repeatability. As a result, baffles were used in all subsequent non-test runs. The solubility experiments provided an effective means of measuring the gas-water mass transfer coefficient for the given reactor geometry.

4.2. Efforts in Modeling Methane Formation Kinetics

Initial modeling efforts employed data obtained from various formation and solubility experiments in the METHAN-T series which conformed to the standard experimental procedure previously described. Five formation runs (RUN#METHAN-T29, T30, T45, T46 and T47) and one solubility run (T50) were used. Later, modeling was attempted using these METHAN-T runs plus experiments in the MTH100 series. In all modeling efforts described in this report, treatment of experimental data is limited to times at which hydrates first appear, known as the nucleation time (t_o), and all times afterward. This limitation is imposed because prediction of the time when hydrate formation commences during an experiment is currently beyond the scope of this research.

4.2.1. Absorption Followed By Reaction

Cumulative gas consumption during a formation experiment can be viewed as a competition between reaction and diffusion effects. As shown in figure 1, a possible scenario involves diffusion of gas into a liquid film followed by its conversion into hydrate in the presence of excess water. In this analysis, mass-transfer resistances between the water in the reactor and hydrate particles is considered to be lumped within the reaction term. Assuming a uniform interfacial area in the liquid film and no accumulation of mass within this film, the continuity equation yields:

$$D_m \frac{d^2C_m}{dy^2} = (-r_m) \tag{1}$$

with the following boundary conditions:

$$C_m = C_{m,i} \quad (y=0)$$

$$C_m = C_{m,b} \quad (y=y_L)$$

In applying this method of analysis to modeling formation data, an empirical first-order rate expression was first used:

$$(-r_m) = k_oP^n(C_m-C_{m,e}) \tag{2}$$

Substitution of equation 2 into equation 1 coupled with a mass balance in the bulk yielded the two following differential equations:

$$\frac{dn_g}{dt} = \frac{Vk_La\gamma}{\tanh\gamma}\left[1 - \frac{(C_{m,b}-C_{m,e})}{(C_{m,e}-C_{m,e})\cosh\gamma}\right](C_{m,i}-C_{m,e}) \tag{3}$$

$$\frac{dC_{m,b}}{dt} = \frac{k_La\gamma}{\tanh\gamma}\left[\frac{1}{\cosh\gamma} - \frac{(C_{m,b}-C_{m,e})}{(C_{m,i}-C_{m,e})}\right](C_{m,i}-C_{m,e}) - k(C_{m,b}-C_{m,e}) \tag{4}$$

where:

$$k = k_oP^n$$

$$\gamma = \frac{(kD_m)^{1/2}}{k_L}$$

Use of equations 3 and 4 in modeling consumption data required previously determined values for various parameters. D_m values were obtained from Witherspoon and Bondi (2). $C_{m,i}$ and $C_{m,e}$ were calculated assuming Henry's law:

$$C_{m,i} = \frac{16.65(x_{m,i})}{V(1-x_{m,i})} \tag{5}$$

where:

$$x_{m,i} = \frac{\phi_m P}{H_m} \tag{6}$$

Henry's constants for methane in water were calculated using Himmelblau's correlation (3) with an empirical pressure correction:

$$H_m(P,T) = (26.10x10^4 - \frac{6.515x10^7}{T})\exp(0.093\frac{(P-P_e)}{RT} + 0.30) \tag{7}$$

k_La values were obtained by least-squares fit of solubility runs, which were modeled using the following equation:

$$\frac{dn_g}{dt} = k_La(n^*-n_g) \tag{8}$$

The interfacial area (a) was assumed to be equal to the reactor's cross-section area ($45.6cm^2$) in all cases. Although this is a rough estimate, modeling trends are not effected if a is assumed constant (regardless of its value) for all experiments. Initial conditions for n_g and $C_{m,b}$ were obtained directly from collected experimental data at the nucleation time t_o as shown in figure 2 for a typical run.

Equations 3 and 4 were solved by a non-linear least-squares routine for the rate constants k_o and n using the METHAN-T formation data described earlier. A variety of assumptions were used in solving these two equations. First, steady-state bulk concentrations were assumed, with steady-state slopes of n_g with respect to time used as data. Later, equations 3 and 4 were integrated numerically using the technique of Kalogerakis and Ruus (4).

Despite the various methods used to obtain optimum k_o and n values for the 275.8-276.2 K methane isotherm, numerical results indicated that most of the reaction was carried out in the film (i.e. near the gas-liquid interface). Also, parameter optimization obtained by integrating equations 3 and 4 produced a poor fit to the gas consumption profiles. Because of this and the fact that the model was purely empirical, it was abandoned.

In order to more accurately predict the hydrate formation phenomena during nucleation and early formation, a three-step reaction mechanism was proposed:

$$xH_2O \rightleftharpoons L^* \tag{9}$$

$$mL^* + nCH_4 \rightleftharpoons N_c \tag{10}$$

$$N_c + CH_4 \rightarrow H \tag{11}$$

where L^* represents an empty lattice which is incompletely filled to form a hydrate nucleus (N_c). This nucleus is subsequently completed by the addition of an extra methane molecule to form a unit of hydrate (H). Material balance equations similar in form to equations 3 and 4 were derived based on rate expressions corresponding to the scenario shown in equations 9-11. Rate expression constants were determined for the METHAN-T runs using a least-squares routine. The resulting fit gave a poor representation of the gas consumption profiles. Also, results indicated that practically all gas consumption went into the formation of N_c with negligible amounts of H formed, thus eliminating the need for the third reaction. Because of the poor performance of this model, it was abandoned.

Another semi-empirical rate expression was proposed by partitioning temperature and pressure effects upon reaction rate:

$$(-r_m) = K_1(T)K_2(P) \tag{12}$$

where:

$$K_2(P) = \overline{f}_m^L - \overline{f}_m^H \tag{13}$$

Thus, the pressure-dependent driving force for reaction was taken as the fugacity difference between methane as a dissolved gas and methane in the hydrate lattice. By the use of various thermodynamic identities, the following rate expression was derived:

$$(-r_m) = k\ \exp\left(\frac{\overline{v}_m^{\infty}\Delta P}{RT}\right)\left(C_m - C_{m,e}\exp\left(\frac{\alpha\Delta P}{RT}\right)\right) \tag{14}$$

where:

$$\alpha = \overline{v}_m^H - \overline{v}_m^{\infty}$$

$$\Delta P = P - P_e$$

$$k = k(T)$$

Noting equation 14, the concentration-dependent term resembles that in equation 2. As a result, k and α were treated as fitted parameters using a similar technique described for equation 2.

Attempts to fit these parameters for the METHAN-T data using equation 14 resulted in a poor reproduction of experimental trends. Optimized α values yielded $\overline{v}_m^{\infty}$ values which were thermodynamically inconsistent with known values. Also, these α values implied that the best fit that could be obtained for the data was to neglect consumption due to reaction and assume that all gas consumption was attributed to diffusion. Based on this observation, this model was abandoned.

4.2.2. Parallel Absorption and Hydrate Formation

Based on direct observation of experimental behavior and failure of the sequential absorption-reaction approach, gas consumption within the reactor was next envisioned as gas diffusion into the bulk liquid in parallel with hydrate formation at the gas-liquid interface. Hydrate formation or decomposition within the bulk is considered to be negligible. Using this approach, the rate of consumption by the reactor is given by:

$$\frac{dn_g}{dt} = V(-r_m) + k_L a(n^* - n_g) \qquad (15)$$

Integration of equation 15 yields the cumulative molar gas consumption as a function of time:

$$n_g(t) = V\int_{t=t_o}^{t} (-r_m)dt + n^* - (n^* - n_{g,o})\exp(-k_L a\Delta t) \qquad (16)$$

where:

$$\Delta t = t - t_o$$

$n_{g,o} = n_g(t_o)$

The interfacial reaction phenomenon was first modeled by drawing an analogy with the Langmuir adsorption model as described by Smith (5). In this model, the net adsorption rate of gas molecules onto a solid lattice is given by:

$$\text{(net rate of adsorption)} \sim (k_a f_{m,g}(1-\overline{\theta}) - k_d \overline{\theta}) \tag{17}$$

where $\overline{\theta}$ is the overall fraction of occupancy of hydrate lattice cavities by methane molecules. The Langmuir adsorption model is the basis for the Van der Waals - Platteauw (VDW-P) model (6), which is extensively used to calculate thermodynamic properties of natural gas hydrates. However, application of the Langmuir model in a kinetic rate equation requires a subtle modification. While equation 17 accurately describes the adsorption phenomena for a fixed lattice geometry, the overall reaction rate must be also a function of the number of stable hydrate cavities, which can be modeled using the following thermodynamic driving force:

$$\text{(no. of stable cavities)} \sim \frac{f_w^L - f_w^H}{f_w^H} \tag{18}$$

where, by definition:

$$\frac{f_w^L - f_w^H}{f_w^H} = e^{(\mu_w^L - \mu_w^H)/RT} - 1 = e^{\Delta\mu_w/RT} - 1 \tag{19}$$

and $\Delta\mu_w/RT$ for methane hydrate is calculated from the VDW-P model:

$$\frac{\Delta\mu_w}{RT} = \frac{\Delta v_w(P-P_e)}{RT} - \sum_{k=1}^{2} \nu_k \ln\left(\frac{1+C_{k,m}\phi_m P}{1+C_{k,m}\phi_{m,e}P_e}\right) \tag{20}$$

where $\nu_1=1/23$, $\nu_2=3/23$ for structure I hydrates, $\Delta v_w=4.6cm^3/mol$ according to Holder et. al. (7), and ϕ_m, $\phi_{m,e}$ are calculated from the Peng-Robinson (PR) equation of state (8). In equation 20, $C_{k,m}$ is the Langmuir constant for methane in cavity type k. By definition, the Langmuir constant for a given cavity type is simply the ratio of the adsorption and desorption rate constants:

$$C(T) \equiv k_a(T)/k_d(T) \tag{21}$$

In this report, Langmuir constants for methane and other hydrocarbon gases (corresponding to structure I or II as well as small or large cavities) were calculated using the temperature correlation suggested by Parrish and Prausnitz (11). The overall rate expression for methane hydrate formation is shown below:

$$V(-r_m) = a(\exp(\Delta\mu_w/RT)-1)(k_a f_{m,g}(1-\overline{\theta})-k_d\overline{\theta}) \tag{22}$$

Since structure I methane hydrate has two cavity types, modeling efforts involving equation 22 employed a single hypothetical cavity with degree of occupancy corresponding to $\overline{\theta}$. Integration of equation 22 yielded and expression for the cumulative gas consumption due to reaction:

$$V\int_{t=t_o}^{t} (-r_m)dt = \overline{\nu}n_{w,o}\overline{\theta}_e(1-e^{(-t/\tau)}) \tag{23}$$

where:

$$1/\tau = \frac{k_a f_{m,g}(e^{(\Delta\mu_w/RT)}-1)a}{\bar{\nu} n_{w,o}\bar{\theta}_e} \tag{24}$$

$\bar{\nu} = \nu_1 + \nu_2$

and $n_{w,o}$ is the number of moles of water initially present in the reactor (16.65 mol). $\bar{\theta}_e$ was derived from the VDW-P model:

$$\bar{\theta}_e = \sum_{k=1}^{2} \nu_k C_{k,m} f_{m,g}/(1+C_{k,m} f_{m,g}) \tag{25}$$

Substitution of equations 22 to 24 into equation 16 yielded an explicit expression for n_g which could be fitted to an experimental isotherm for one adjustable constant (k_a). This was done for the METHAN-T data (275.8-276.2 K) previously studied, resulting in a good representation of experimental trends. This is illustrated in figures 3-6. In applying equation 16 to a parameter estimation routine, a Henry's constant correlation is still required to obtain n^* values. For this parameter estimation and all subsequent ones described in this report, Henry's constants were calculated using a correlation which was obtained from the Ng-Robinson hydrate program (10). Comparison between H_m values calculated by this correlation and those obtained through methane solubility experiments yielded relative errors in n^* of less than 10%.

Unfortunately, upon the acquisition of methane hydrate formation data for the remaining isotherms in the 274-282 K range (MTH100 series), it was found that the rate expression in equation 22 yielded a poor fit to the 274, 276 and 282 K isotherms.

The next attempt in kinetic modeling involved a simple zeroth-order rate equation. The basis for this model is in the dependency of the net rate of adsorption upon a thermodynamic driving force and the number of moles of water present in the reactor. The amount of water is analogous to the adsorption area available for hydrate formation since the water within the reactor is constantly circulated. Since water is in excess throughout all experiments, the rate of hydrate formation is essentially a function of temperature and pressure:

$$V(-r_m) = aK_a(T,P) \tag{26}$$

Thus, K_a was treated as a single parameter and fitted for each experiment separately, assuming a constant interfacial area. For individual experiments, this assumption yielded an excellent reproduction of molar consumption trends as a function of time. A plot of K_a values fitted for all methane formation experiments is shown in figure 7.

The good prediction of experimental trends using equation 26 can be related to the good performance obtained using equation 22 in correlating the METHAN-T formation runs. Noting figures 3-6, curves representing gas consumption due to reaction as predicted using equations 23-25 are essentially linear with time, which is the same behavior obtained when equation 26 is employed.

Despite the good fit obtained for individual experiments, examination of figure 7 yields some insight as to why the previous modeling attempts have failed to produce a predictive model which can accurately describe the effects of pressure upon reaction rate. For the 274, 276 and 279 K isotherms, experiments at low pressures show discernible pressure dependencies. At higher pressures, experimental reaction rates are compressed into a morass of random points. For the 282 K isotherm, only four experiments are shown. Experiments at higher pressures may also be subject to the same degree of scatter exhibited for the other isotherms.

Based on direct experimental observation and the randomness of the high pressure rates, it is postulated that the observed scatter at high pressures may be due to a reduction of interfacial area available for gas absorption and adsorption under these conditions. In a given formation experiment, the gas-water interface is kept free of hydrates by continuous agitation of the accumulating hydrate slurry. For a given reactor geometry and agitation rate, the residence time of amorphous hydrate at the interface is dependent upon its rate of formation relative to its removal rate. The higher the rate of formation at the interface (due to high pressure driving forces), larger amounts of hydrate remain at the surface and more of the interfacial area is blocked off. The randomness is attributed to the unpredictable agglomeration of hydrates at the surface, which may enhance or retard their removal from the interface, given a fixed agitation rate and reactor geometry. This behavior is in contrast to the experiments performed by Vysniauskas (9). In these experiments, the unbaffled configuration of the reactor caused vortex formation. As previously mentioned, the presence of vortices has a detrimental effect upon the predictability of the gas-liquid interfacial area. However, the high fluid velocities associated with vortex formation probably means that the gas-liquid interface is kept free of accumulating hydrates. When baffles are introduced, fluid velocities are much lower, resulting in an enhanced accumulation of hydrates at the surface. This behavior is exacerbated by the positive buoyancy of hydrates relative to water, which necessitates high fluid velocities in the vicinity of the interface to prevent particle accumulation.

Attempts to model the data shown in figure 7 was limited to experimental runs representing the three lowest pressures in each isotherm. In the rate expression, K_a was partitioned in terms of temperature and pressure effects. For temperature dependence, a typical Arrhenius-type expression was used. For effects dominated by pressure, two thermodynamic driving forces were proposed. This resulted in two rate expressions as shown in equations 27 and 28:

$$V(-r_m) = ak(T)(e^{(\Delta\mu_w/RT)}-1) \qquad (27)$$

$$V(-r_m) = ak(T)\Delta\mu_w \qquad (28)$$

where:

$$k(T) = k_o \exp(-\Delta H_a/RT) \qquad (29)$$

and $a = 45.6\ cm^2$. In equations 27 and 28, $\Delta\mu_w$ was calculated from equation 20. k_o and ΔH_a were treated as two adjustable parameters and were determined for all low pressure runs simultaneously using a least-squares routine fit of experimental n_g data. Comparison of the experimental and predicted K_a values are shown in figure 8. The optimum values for k_o and $\Delta H_a/R$ are shown in table 1.

TABLE 1
OPTIMUM PARAMETER FITS FOR EQUATION 27, 28
METHANE HYDRATE FORMATION (274-282 K)

Equation no.	k_o	$\Delta H_a/R$ (K)
27	5.64×10^{-2} (mol/cm^2 min)	1365.8
28	1.07×10^{-5} (mol^2/cm^2 min J)	1122.5

The fits obtained using equations 27 and 28 yielded reasonably good reproducibility of experimental trends for the low pressure data in each isotherm. However, standard deviations obtained for k_o using equations 27 and 28 were large, indicating that a more accurate form for k(T) should be sought. As can be seen in figure 8, the two rate expressions are virtually indistinguishable in terms of "goodness of fit" given the data available at this time.

5. Extension of Analysis to Gas Mixtures

The simplicity of the rate expressions shown in equations 27 and 28 result in a straightforward extension into modeling hydrate formation involving mixtures of natural gas components. Since all adsorption reactions are considered to occur in parallel with each other and with the diffusion of the gases into the bulk liquid, the overall consumption of gas (as a function of time) can be described using equation 30:

$$n_g(t) = n^* - (n^* - n_{g,o})\exp(-k_L a\Delta t) + Fa\left(\sum_{j=1}^{nc} k_j(T)\right)\Delta t \qquad (30)$$

where:

$$F = e^{\Delta\mu_w/RT} - 1 \tag{31a}$$

or,

$$F = \Delta\mu_w \tag{31b}$$

and $\Delta\mu_w$ is calculated using a multicomponent version of equation 20:

$$\frac{\Delta\mu_w}{RT} = \frac{\Delta v_w(P-P_e)}{RT} - \sum_{k=1}^{2} \nu_k \ln\left[\frac{1+\sum_{j=1}^{nc} C_{k,j}y_j\phi_j P}{1+\sum_{j=1}^{nc} C_{k,j}y_j\phi_{j,e}P_e}\right] \tag{32}$$

k_j is given for each pure component by equation 29, and n^* for the gas mixture is calculated using the procedure in appendix B.

In equation 30, k_La values are obtained for each mixture from solubility experiments. The temperature-dependence parameters in the rate constant k_j are determined from pure-component formation data. All other parameters are calculated a priori. Thus, given solubility data and pure-component formation data, hydrate formation behavior for gas mixtures can be predicted directly without the need for further parameter estimation.

For the methane-ethane binary data presented in this report, it is suggested that a corresponding K_a value be fitted for each experiment in order to observe overall pressure and temperature dependence of reaction rates for each binary. These experimental K_a values could be compared with corresponding calculated values as a check for the validity of the proposed mixture rate expression. In a multicomponent case, K_a would be calculated using equation 33:

$$K_a = F \sum_{j=1}^{nc} k_j(T) \quad (33)$$

6. Discussion and Conclusions

In this report, two main reaction scenarios were proposed. In the first, gas diffusion into the liquid was proposed, followed by conversion into hydrate within a liquid film. In the second, gas diffusion into the bulk was postulated to occur in parallel with reaction at the gas-liquid interface. Of the two scenarios, only the parallel diffusion-reaction case yielded good reproductions of gas consumption profiles for individual methane experiments.

When applying the parallel diffusion-reaction scenario to modeling reaction rate trends as a function of temperature and pressure, considerable scatter is indicated for high pressures. It is possible that this behavior is due to a reduction in available interfacial area as previously discussed, or that the current models do not completely describe all phenomena associated with the formation reaction. Since computations involving the three-step reaction mechanism showed that only two equations were needed, as possible avenue for further research is to model methane hydrate formation as a two-step process and apply the resulting rate equations to the parallel diffusion-reaction scenario.

7. Nomenclature

a	gas-liquid interfacial area (cm^2), or solubility correlation parameter
b	solubility correlation parameter
C	concentration (mol/cm^3), or Langmuir constant (1/bar)
c	solubility correlation parameter
D	diffusion coefficient (cm^2/min)
e	base of natural logarithms
F	thermodynamic driving force function
f	fugacity (bar)
H	Henry's constant (bar)
ΔH_a	Arrhenius activation energy (J/mol)
K_1, K_2	temperature and pressure, respectively, partition parameters in equation 12
K_a	zeroth-order rate constant (mol/cm^2 min)
k	rate constant
k_o	pre-exponential constant
k_L	gas-liquid mass transfer coefficient ($1/cm^2$ min)
n	empirical constant in equation 2
nc	number of hydrate-forming gases
n_g	total moles of gas consumed (mol)
n^*	moles of gas in water at saturation (mol)
P	system pressure (bar)
P_e	equilibrium pressure (bar)
R	universal gas constant (8.31432 J/mol K)
$(-r_m)$	intrinsic rate of methane consumption due to reaction (mol/cm^3 min)
T	system temperature (K)
t	time elapsed from beginning of experiment (min)
t_o	nucleation time (min)
V	reactor volume ($300 cm^3$)
$\overline{v}$	partial molar volume (cm^3/mol)

Δv_w	volume expansion term (cm^3/mol)
X_1, X_2	solubility correlation parameters
x	liquid-phase mole fraction
y	vapor-phase mole fraction, or distance from gas-liquid interface (cm)
y_L	liquid film thickness (cm)

Greek letters:

γ	dimensionless parameter in equations 3,4
δ	solubility correlation parameter
$\bar{\theta}$	degree of occupancy of hyrate lattice
μ	chemical potential (J/mol)
ν	lattice constant
ϕ	vapor-phase fugacity coefficient
τ	time constant in equations 23, 24 (min)

Subscripts:

a	adsorption
b	bulk
d	desorption
e	equilibrium
g	gas
i	interface
j	component index
k	lattice type index
m	methane
o	initial or base value
w	water

Superscripts:

H	hydrate phase
L	liquid phase
∞	infinite dilution

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Figure 1: Absorption Followed by Reaction

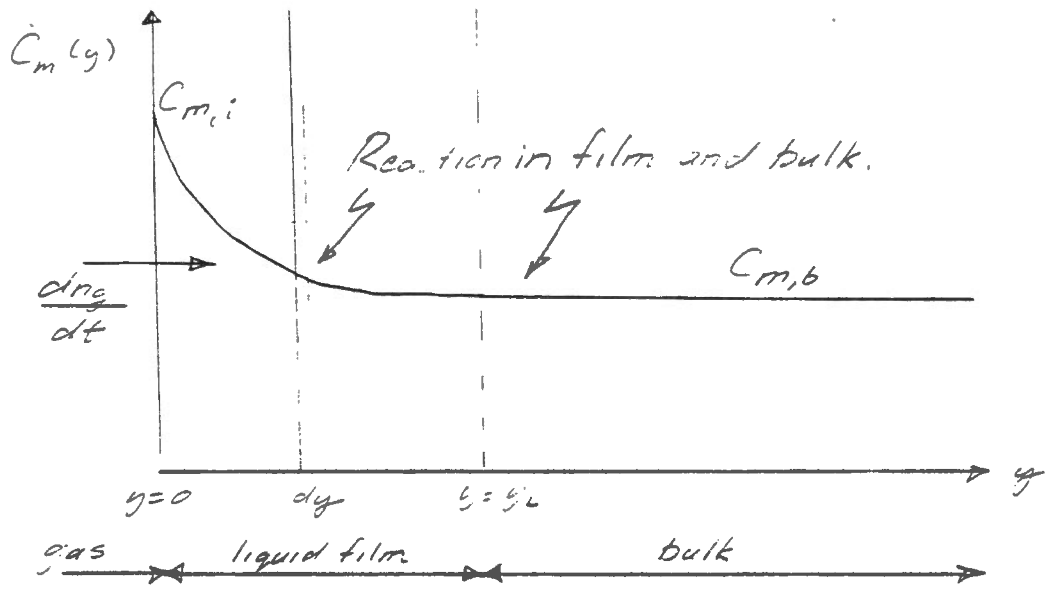


Figure 2: Schematic of Gas Consumption Trends for a Typical Formation Experiment

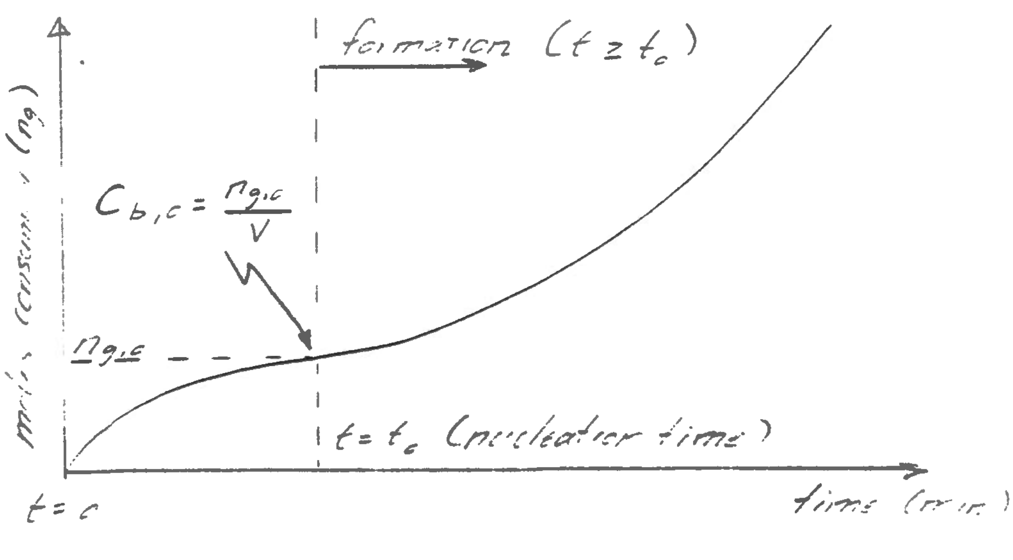
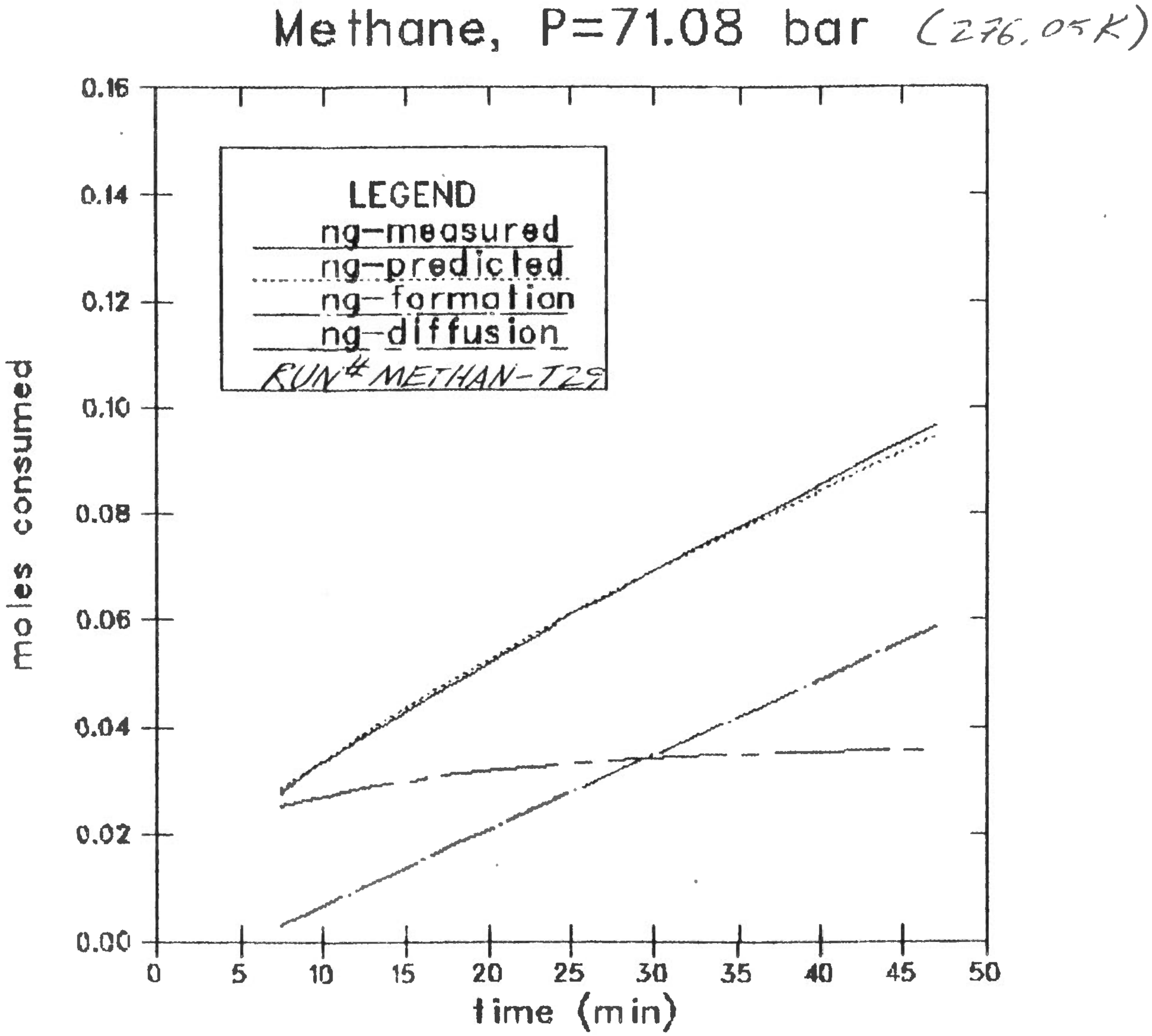
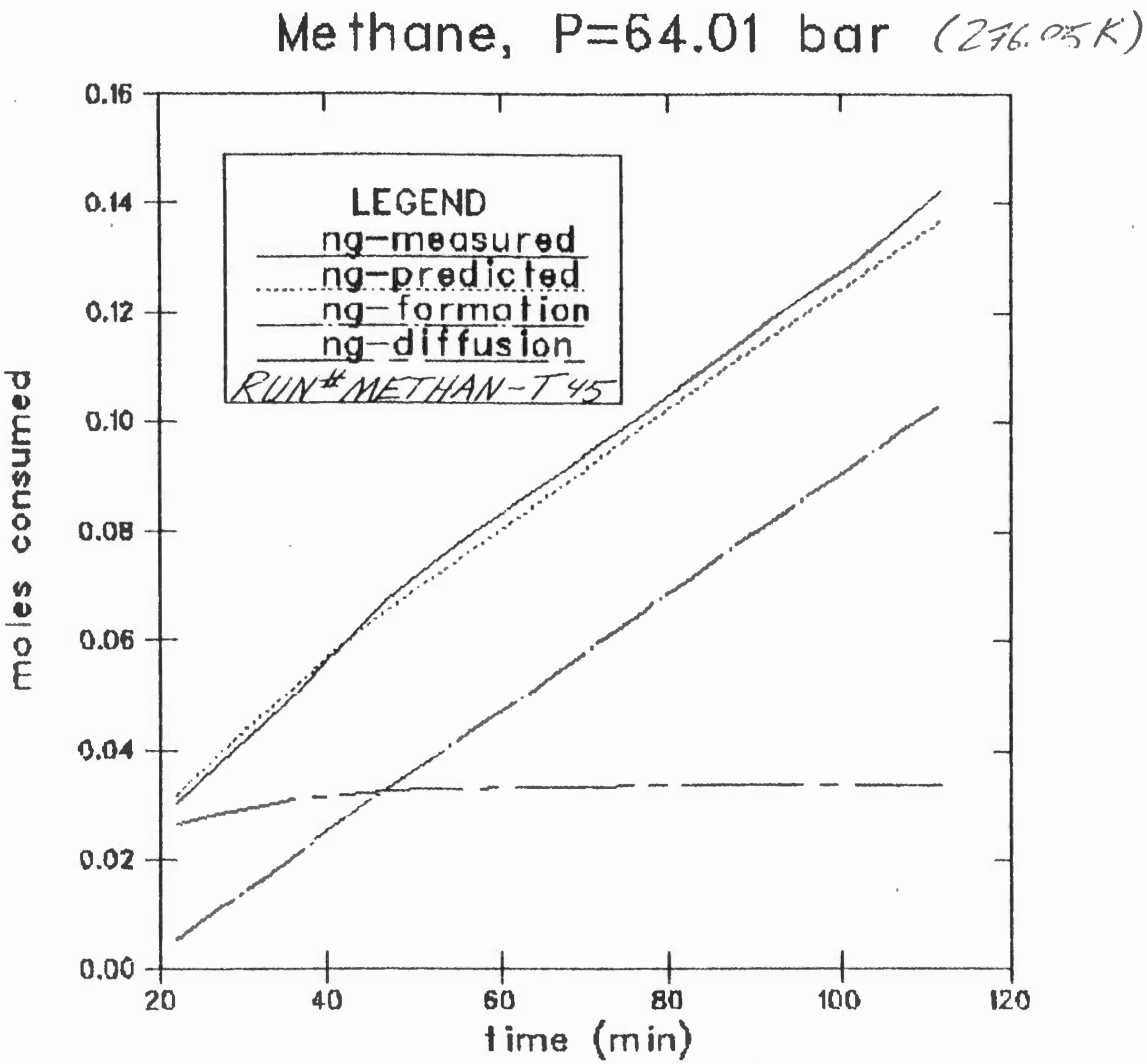


Figure 3



Methane, P=71.08 bar (276.05K)
LEGEND
ng-measured
ng-predicted
ng-formation
ng-diffusion
RUN# METHAN-T29
moles consumed
time (min)
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0
5
10
15
20
25
30
35
40
45
50

Figure 4



Methane, P=64.01 bar (276.05K)
LEGEND
ng-measured
ng-predicted
ng-formation
ng-diffusion
RUN# METHAN-T45
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
moles consumed
20
40
60
80
100
120
time (min)

Figure 5

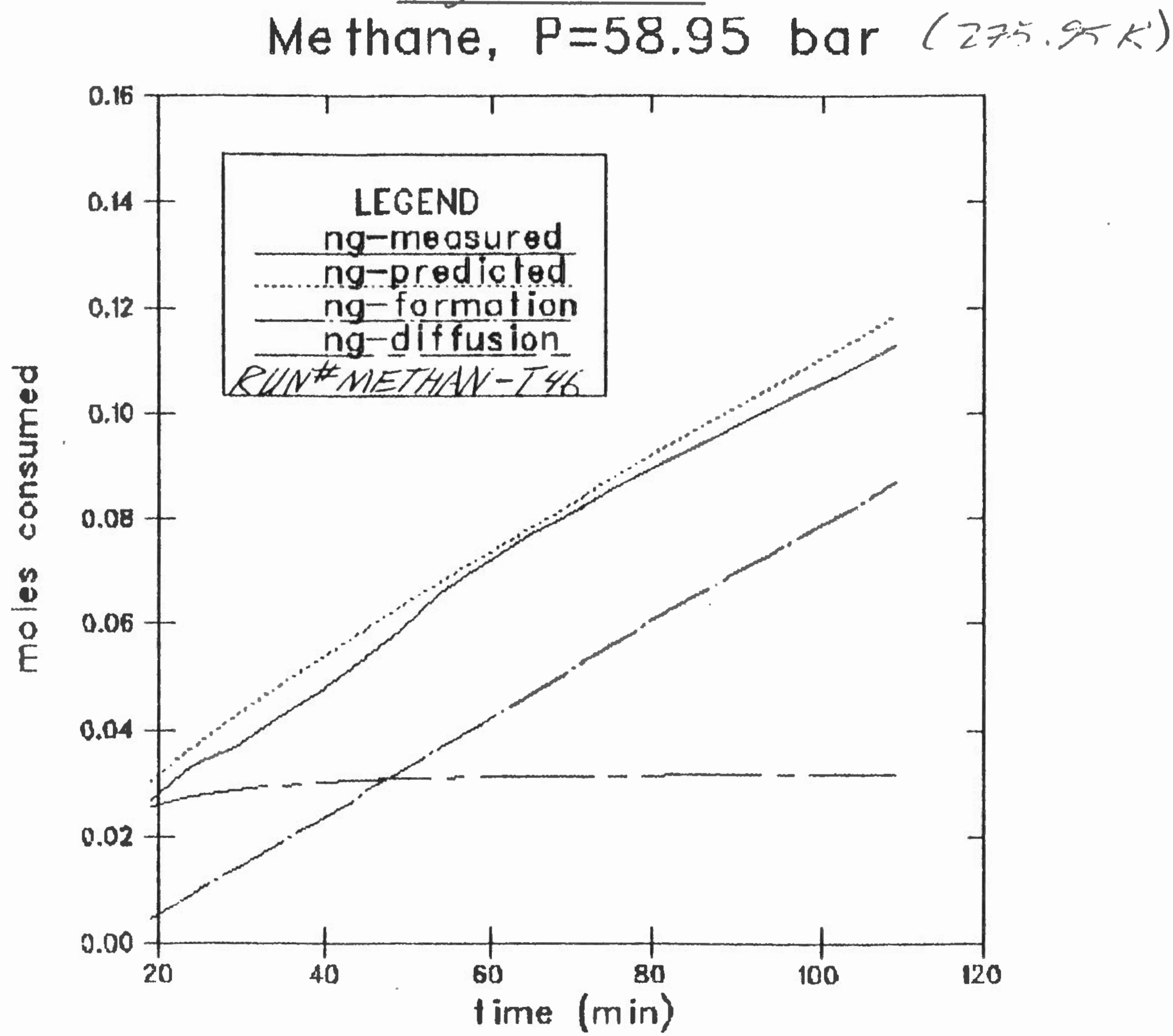
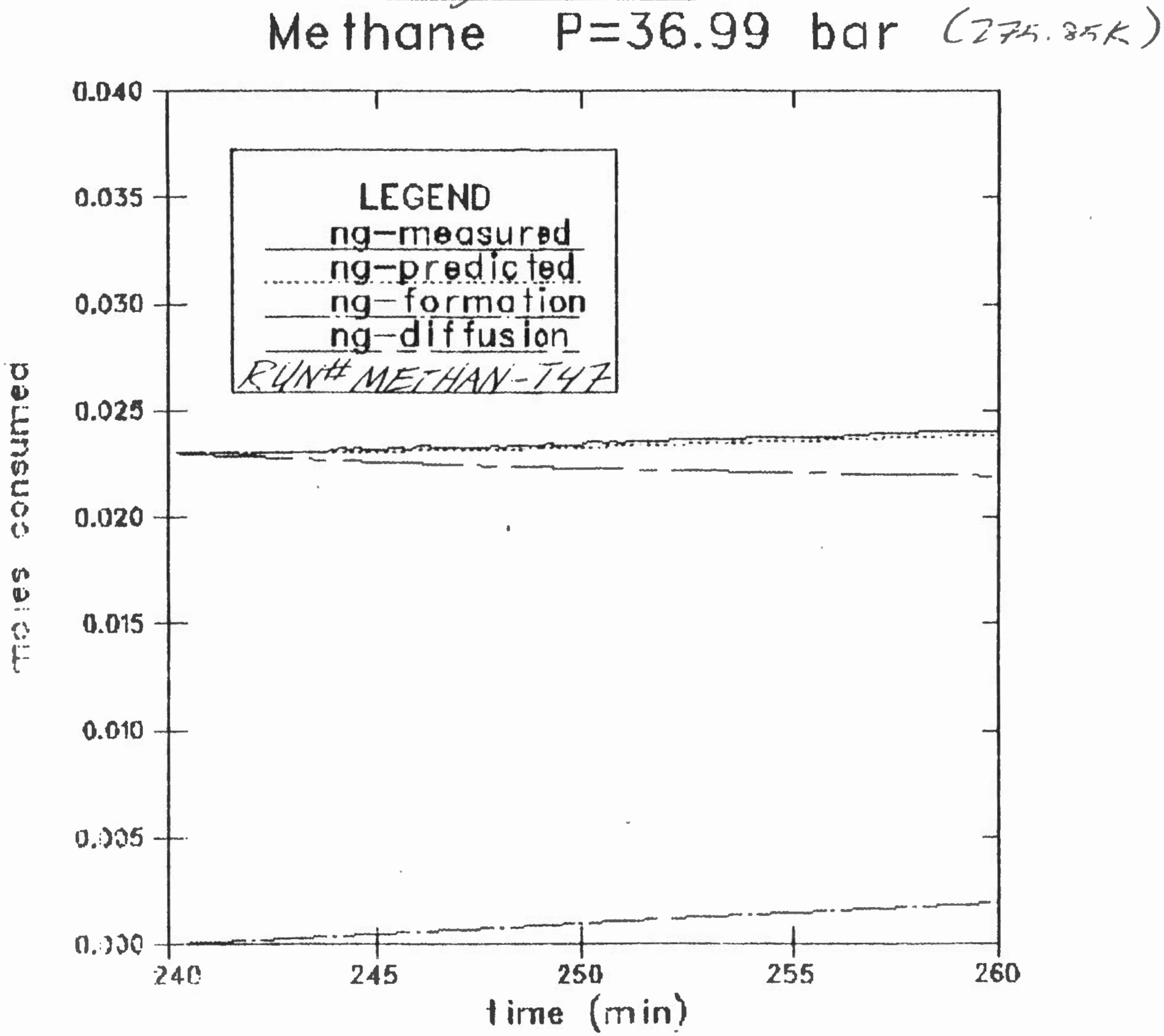

Methane, P=58.95 bar (275.95 K)
LEGEND
ng-measured
ng-predicted
ng-formation
ng-diffusion
RUN# METHAN-T46
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
moles consumed
20
40
60
80
100
120
time (min)

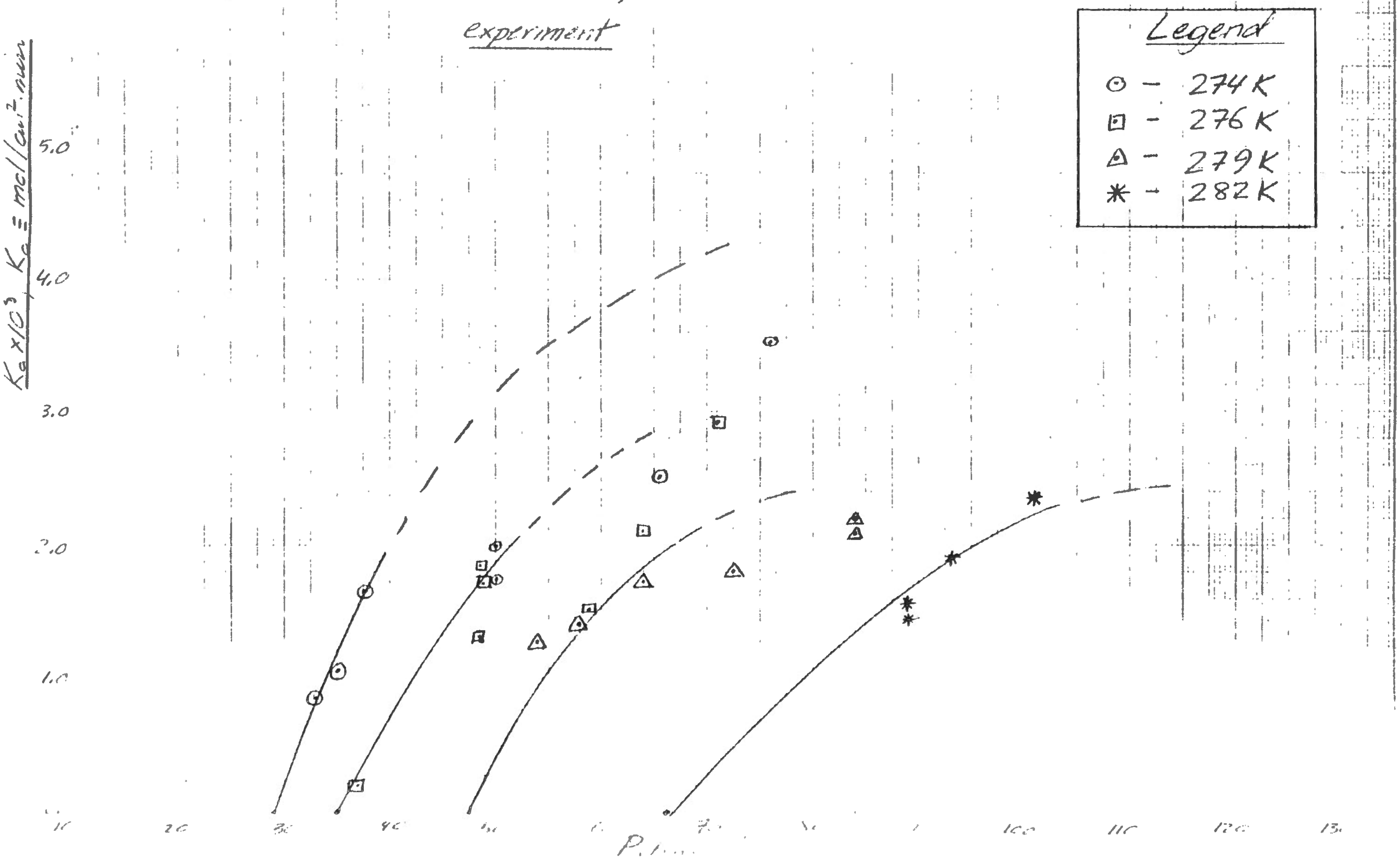
Figure 6



Methane P=36.99 bar (275.85K)
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
moles consumed
240
245
250
255
260
time (min)
LEGEND
ng-measured
ng-predicted
ng-formation
ng-diffusion
RUN# METHAN-T47

METHANE HYDRATE FORMATION

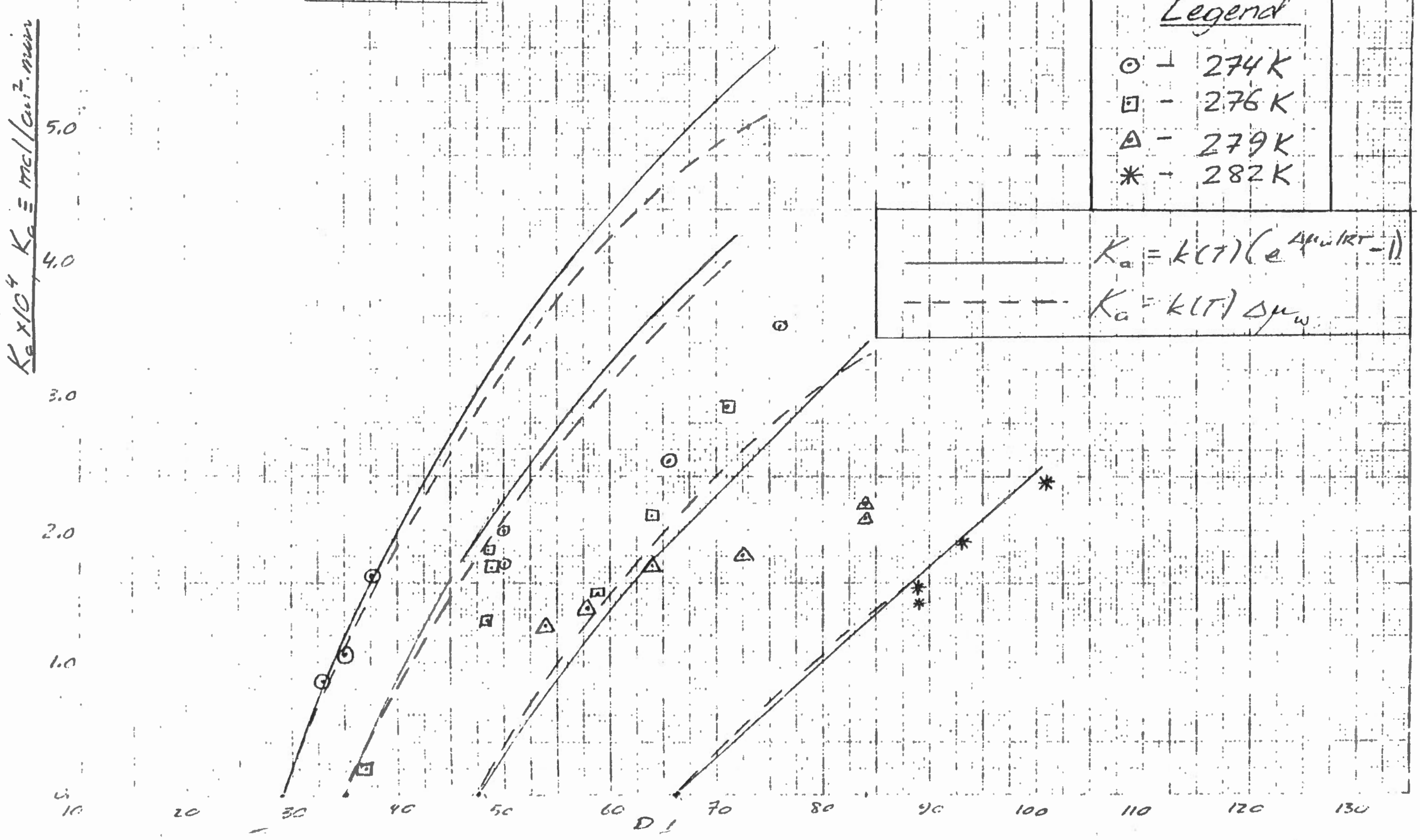
Figure 7: Experimental K_a values obtained by least-squares fit of each experiment



METHANE HYDRATE FORMATION

Figure 8: Predicted vs. Experimental K_a Values

Predicted values obtained using equations 27 and 28.



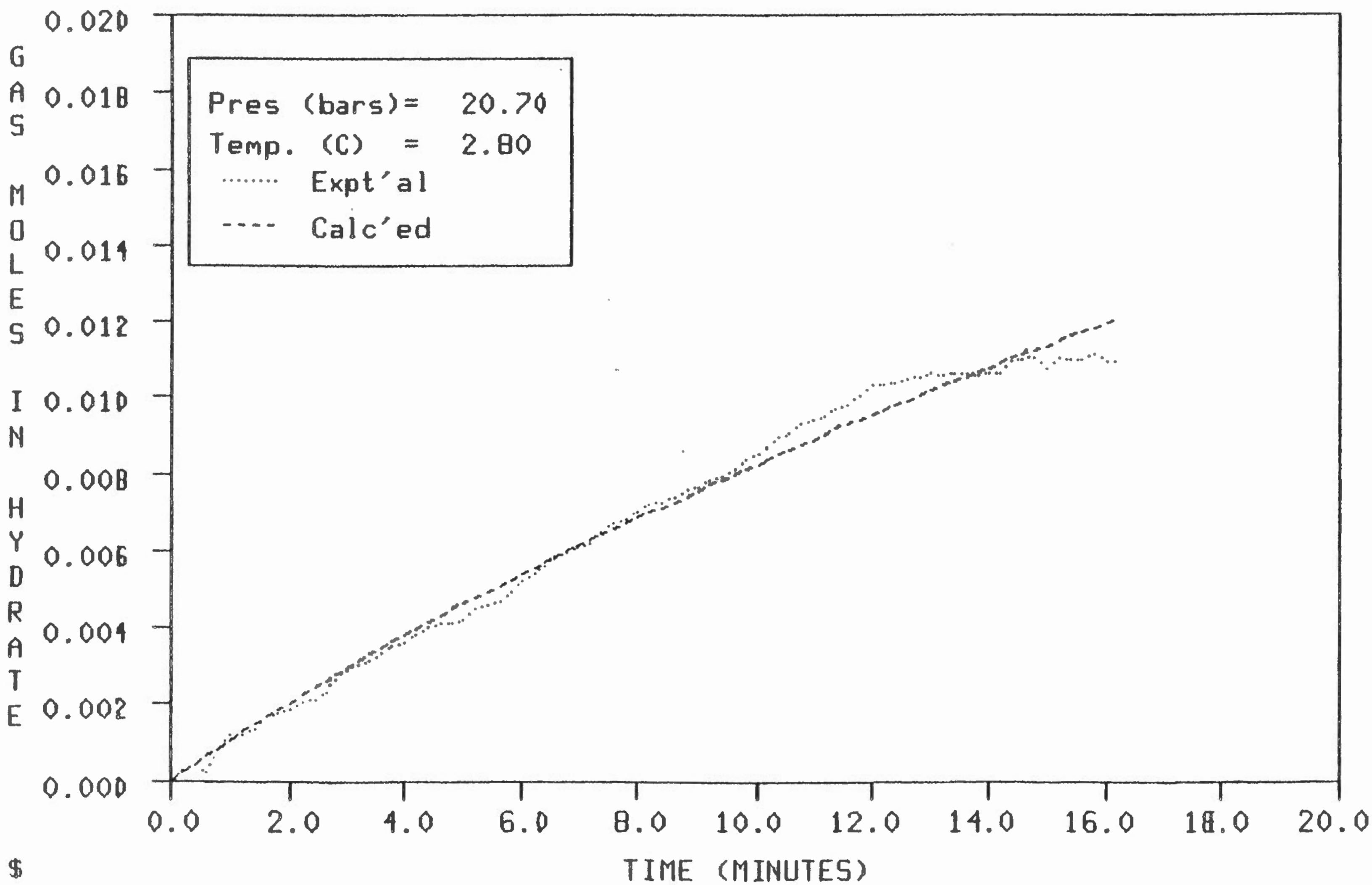
Appendix A:

Experimental Gas Consumption Profiles

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN HYDRATE VERSUS TIME

RUN#M80E20-T8__07/19/84

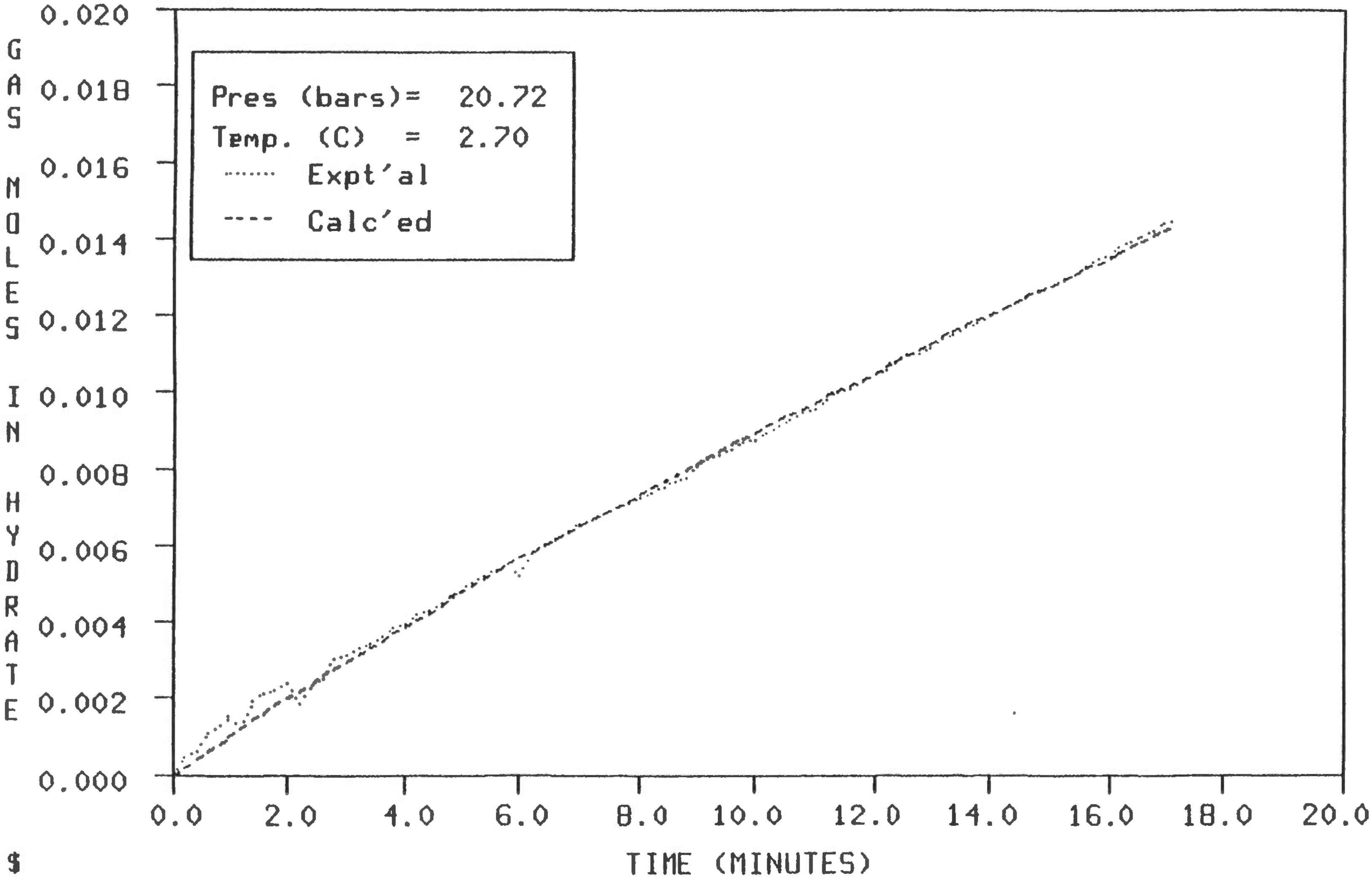


RPM = 4??

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN HYDRATE VERSUS TIME

RUN#M80E20-T9__07/20/84



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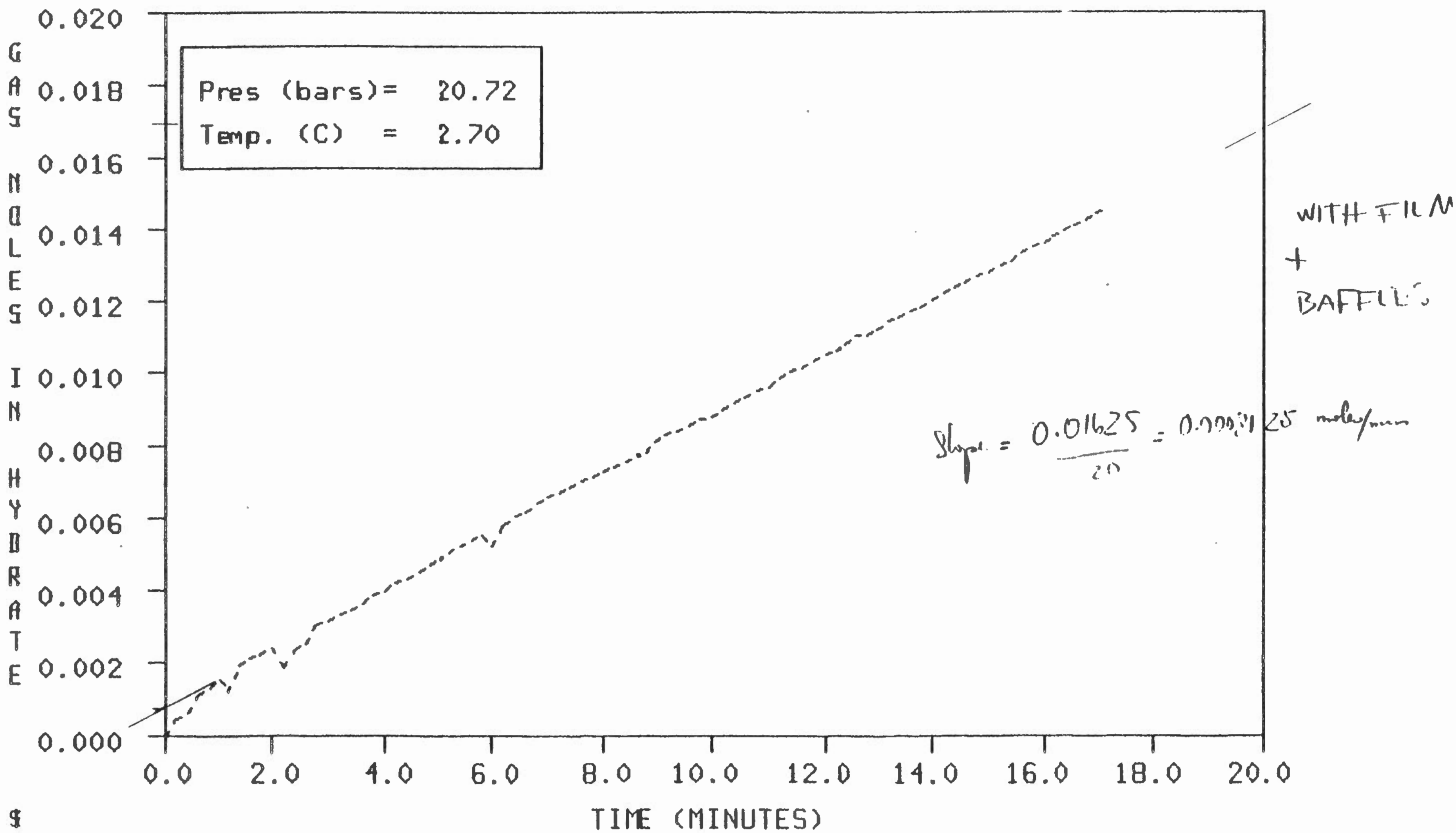
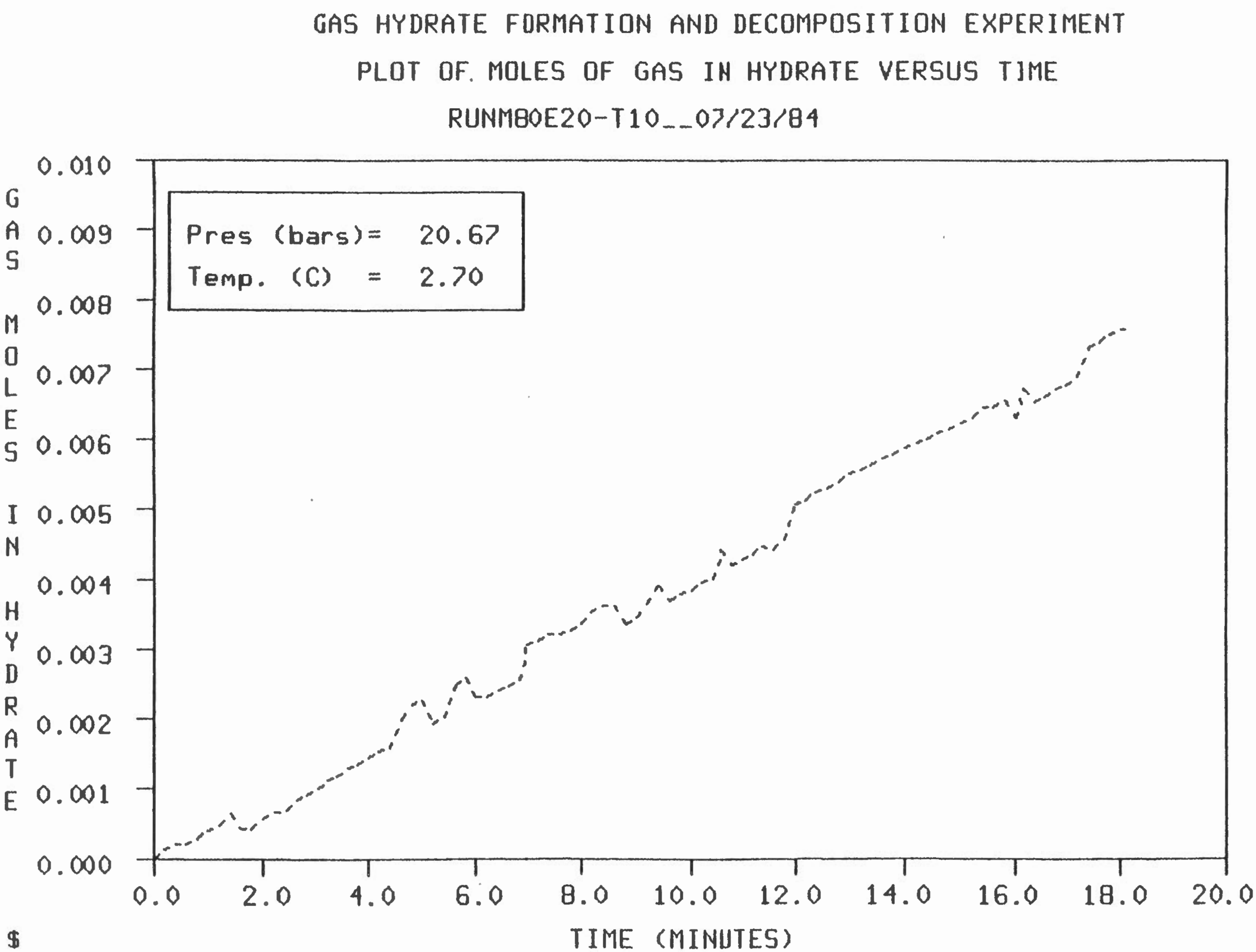
GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN HYDRATE VERSUS TIME

RUN#M80E20-T9__07/20/84

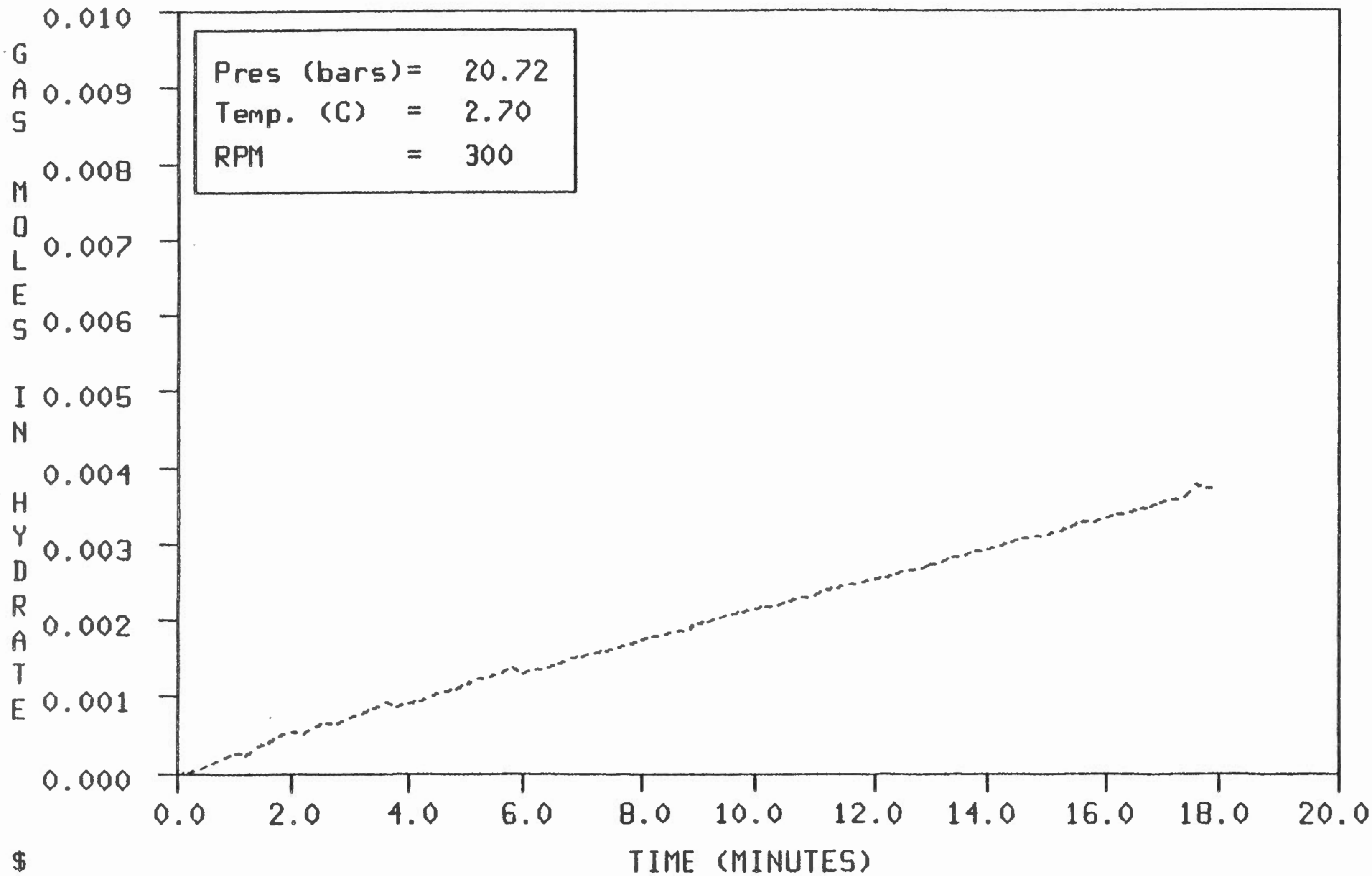



GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN HYDRATE VERSUS TIME
RUNM80E20-T10__07/23/84
Pres (bars)= 20.67
Temp. (C) = 2.70
GAS MOLES IN HYDRATE
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN HYDRATE VERSUS TIME

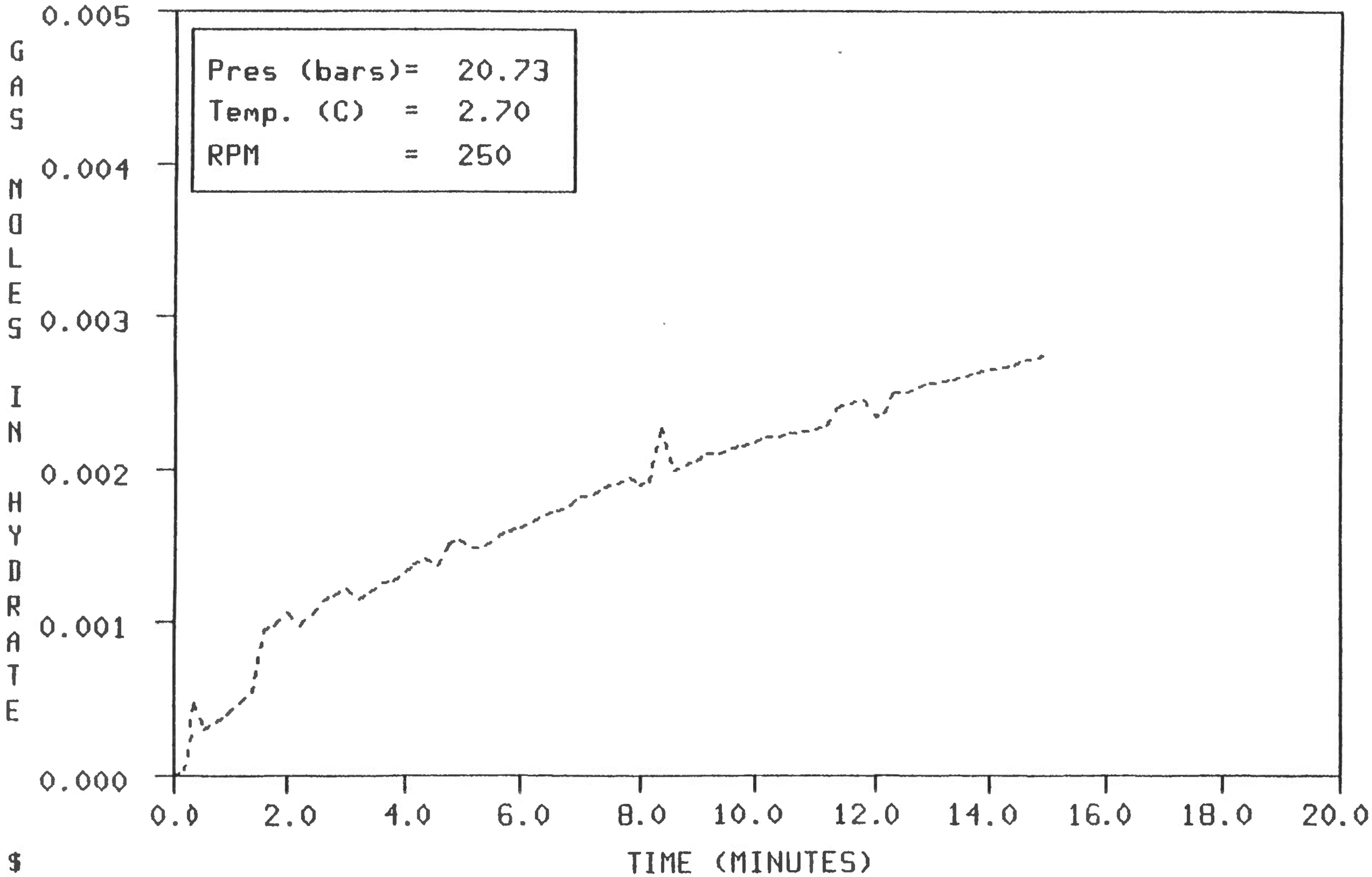
RUNM80E20-T11__07/24/84



GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN HYDRATE VERSUS TIME

RUNM80E20-T12__07/25/84



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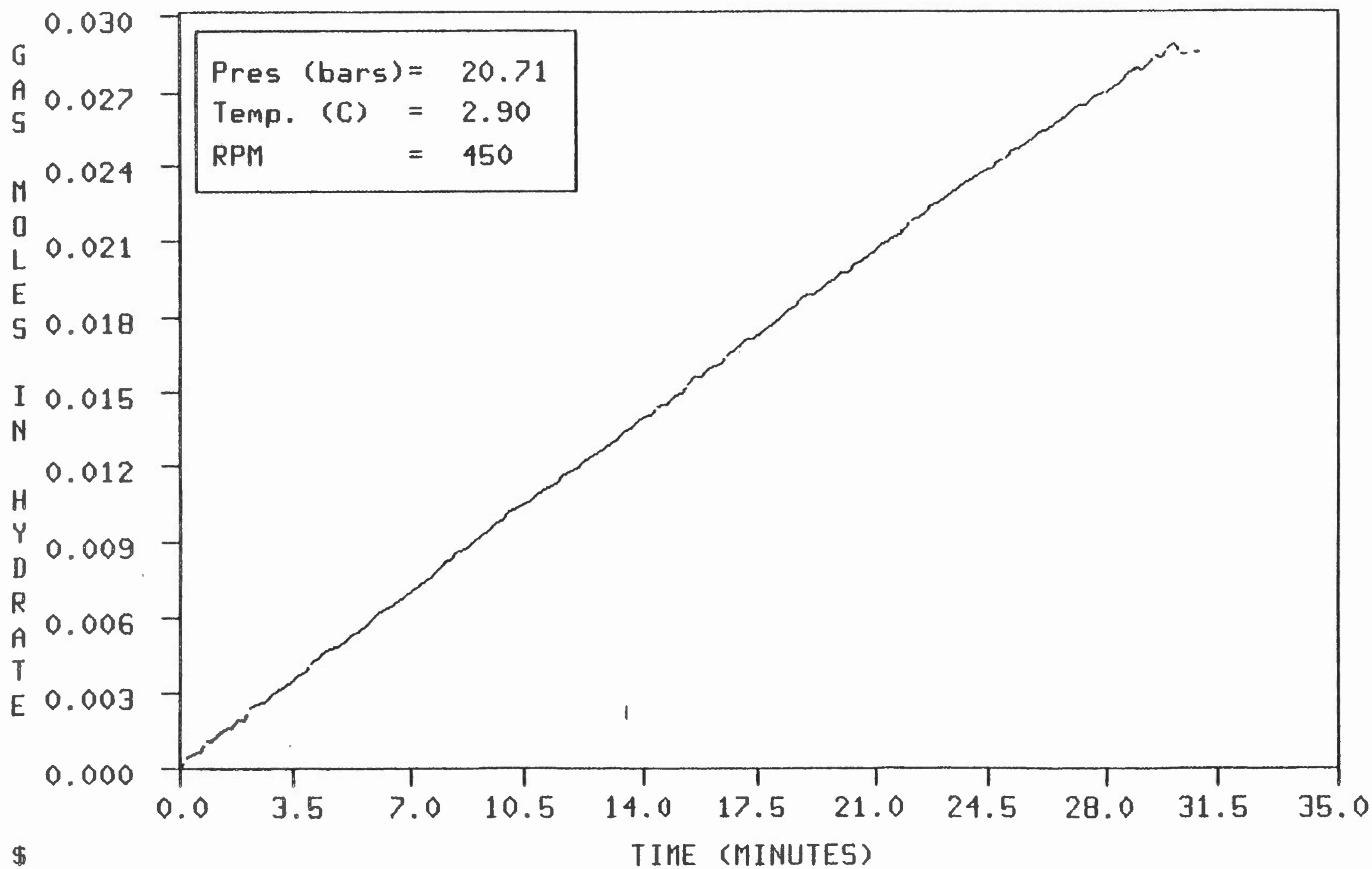
GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN HYDRATE VERSUS TIME

RUNM80E20-T13__07/27/84



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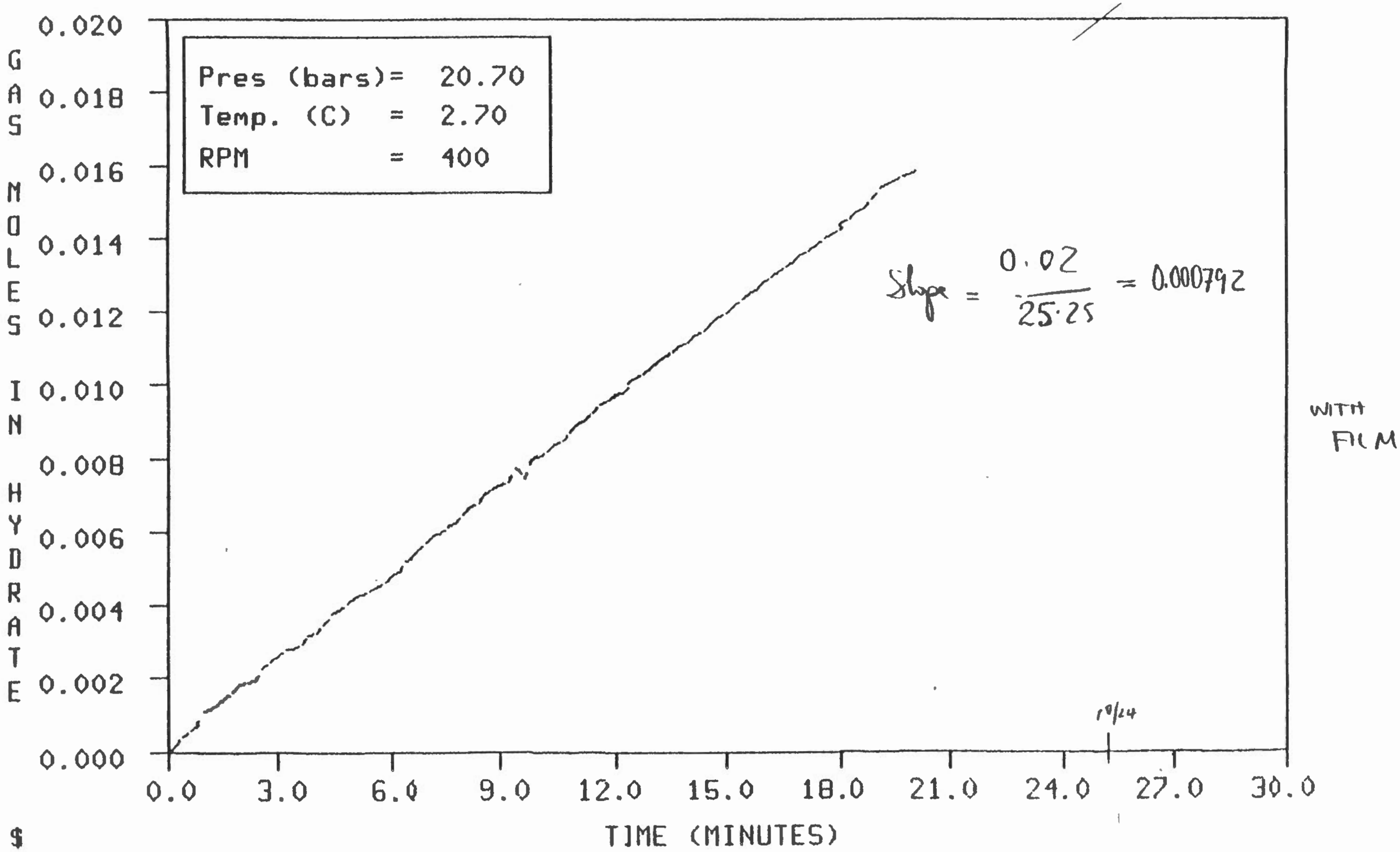
GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN HYDRATE VERSUS TIME

RUNM80E20-T14__07/31/84



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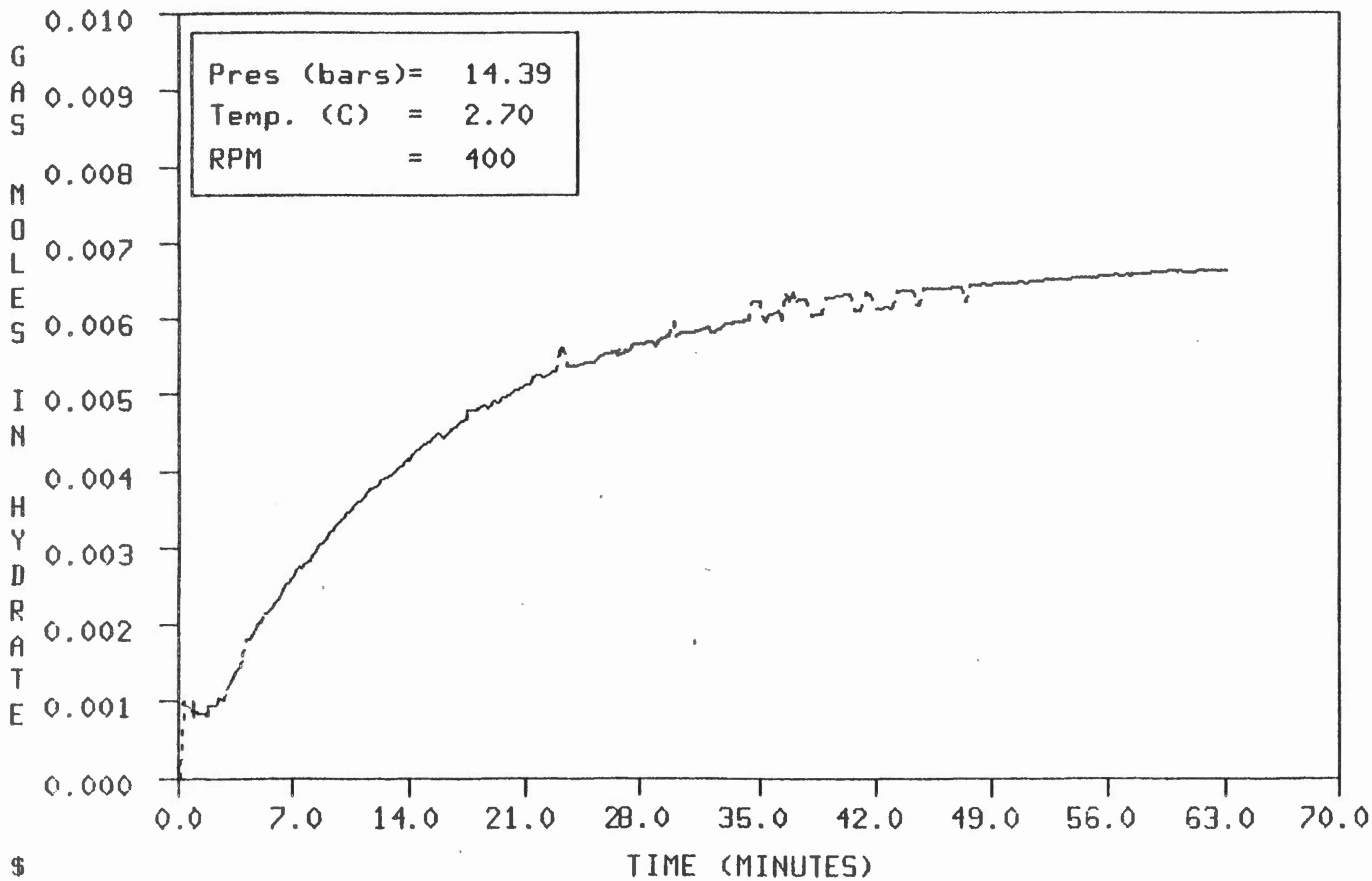
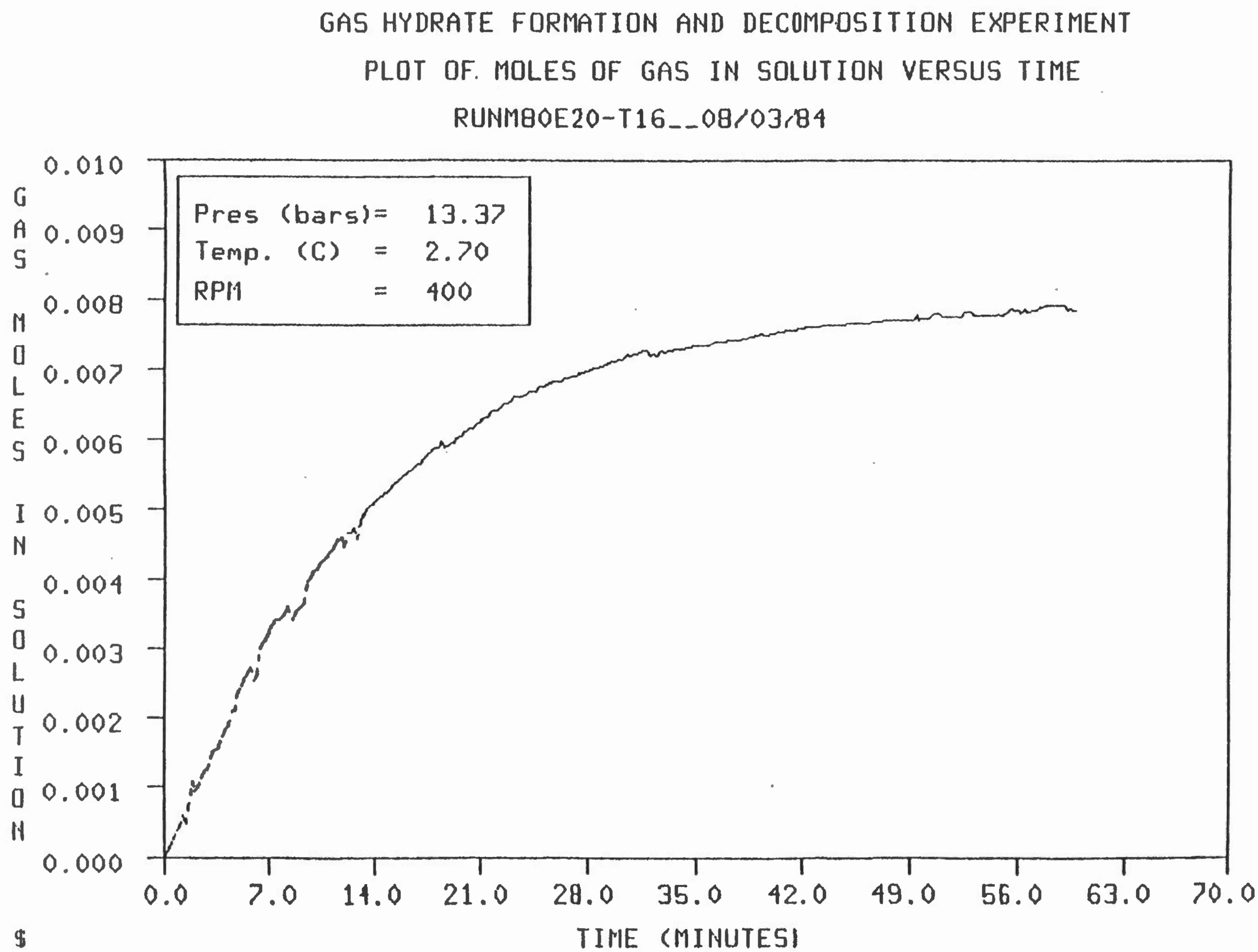
1

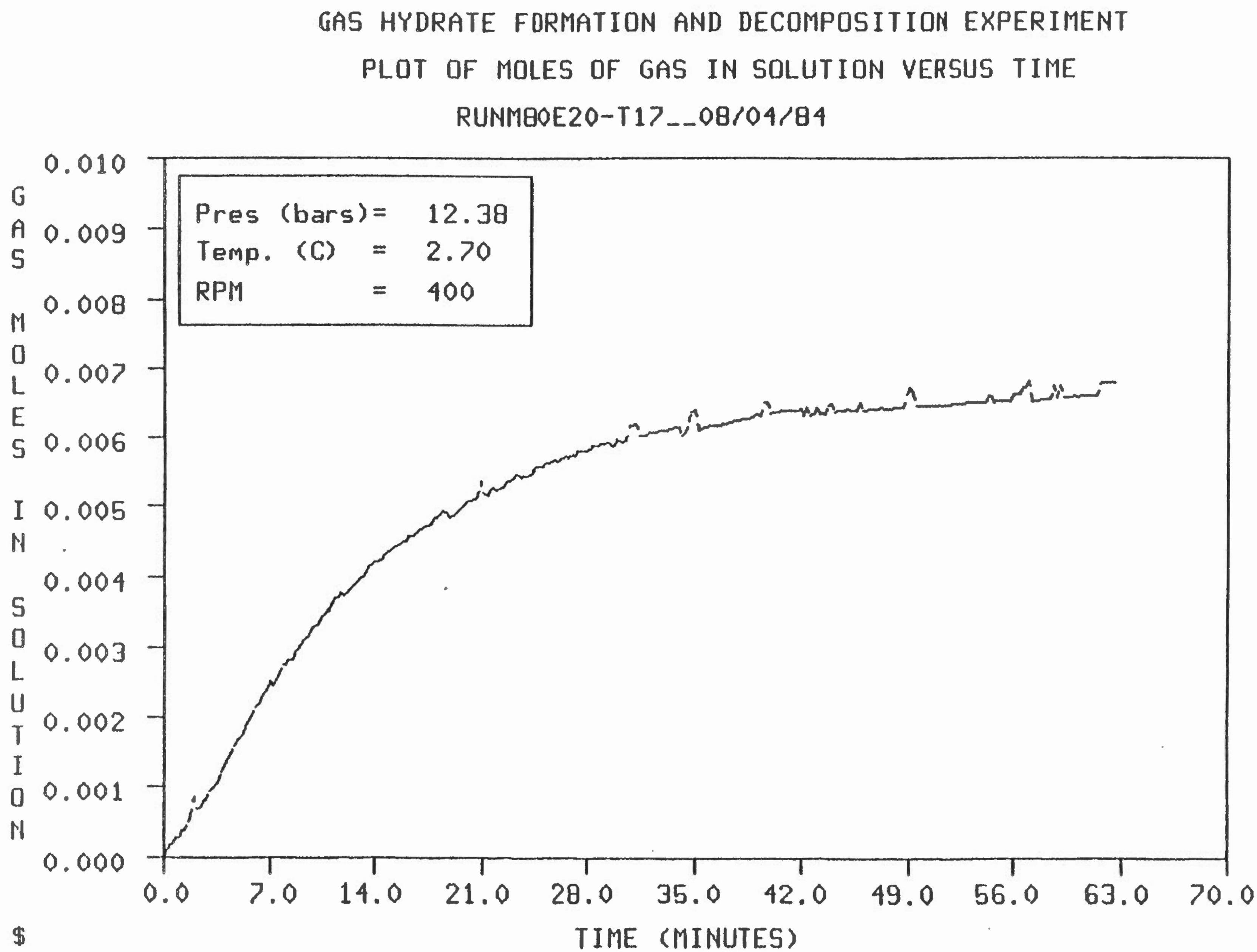
GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN HYDRATE VERSUS TIME

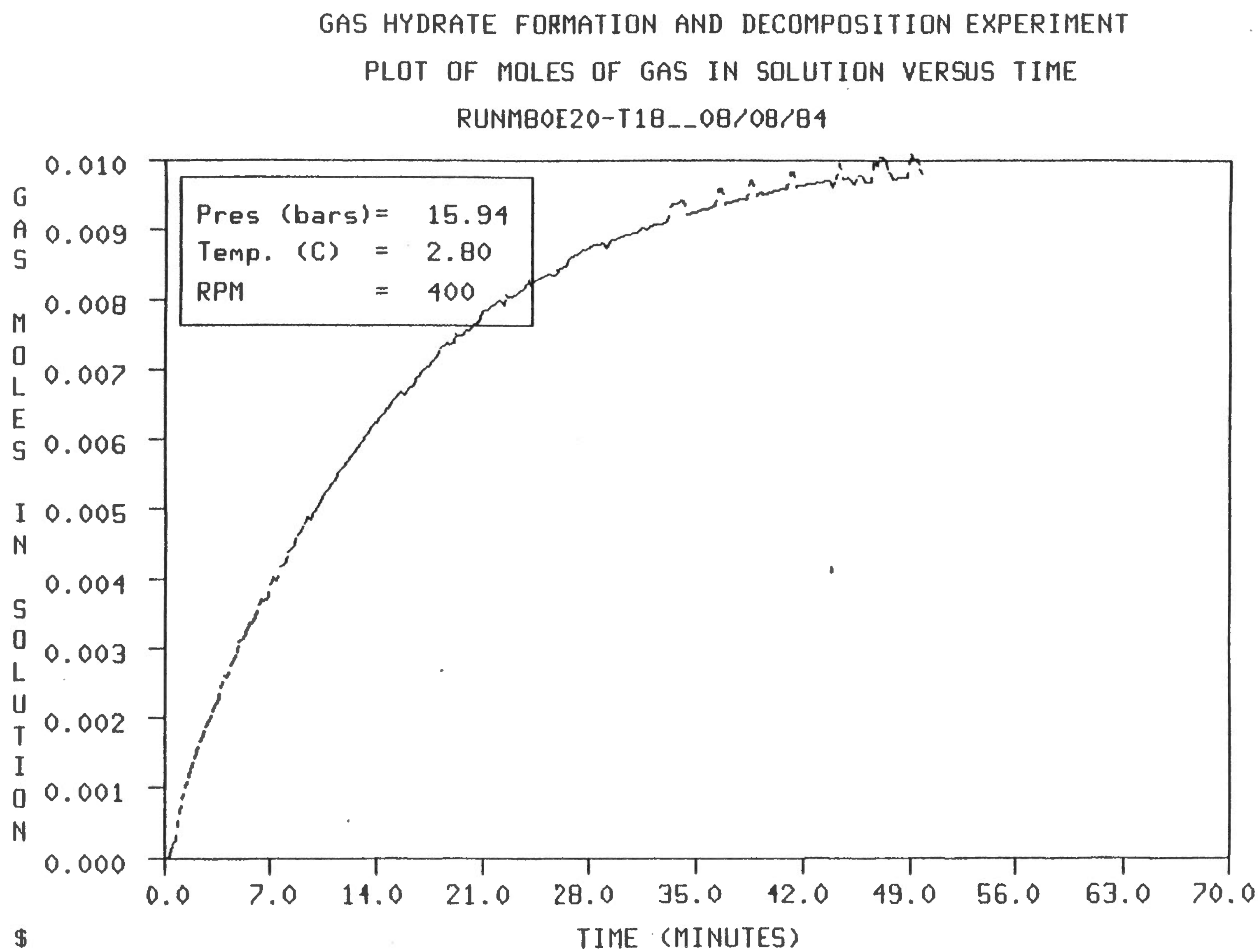
RUNM80E20-T15__08/02/84




GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF. MOLES OF GAS IN SOLUTION VERSUS TIME
RUNM80E20-T16__08/03/84
Pres (bars)= 13.37
Temp. (C) = 2.70
RPM = 400
GAS MOLES IN SOLUTION
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
0.0
7.0
14.0
21.0
28.0
35.0
42.0
49.0
56.0
63.0
70.0
TIME (MINUTES)
$



GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNM80E20-T17__08/04/84
Pres (bars)= 12.38
Temp. (C) = 2.70
RPM = 400
GAS MOLES IN SOLUTION
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
0.0
7.0
14.0
21.0
28.0
35.0
42.0
49.0
56.0
63.0
70.0
TIME (MINUTES)
$

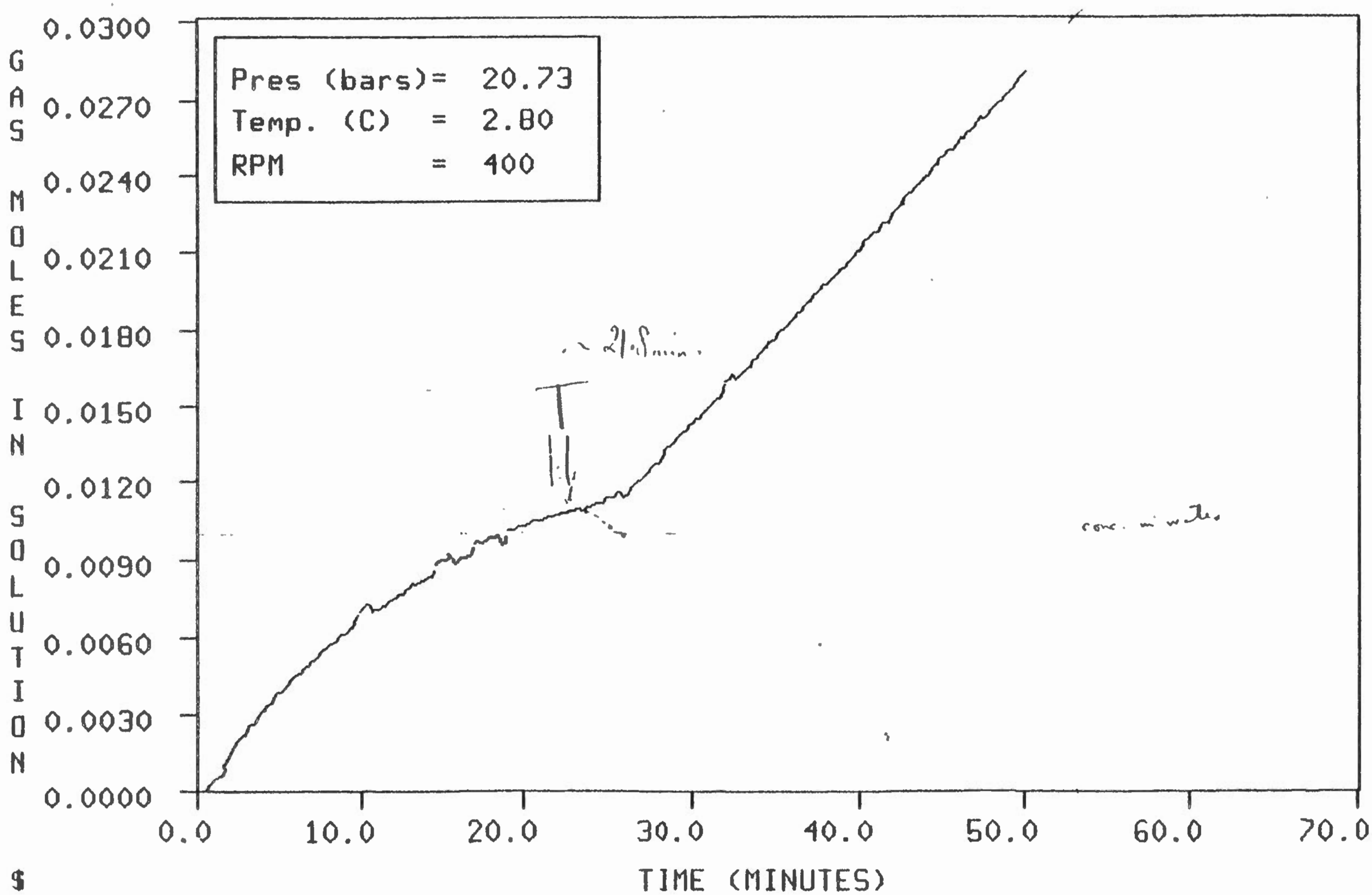


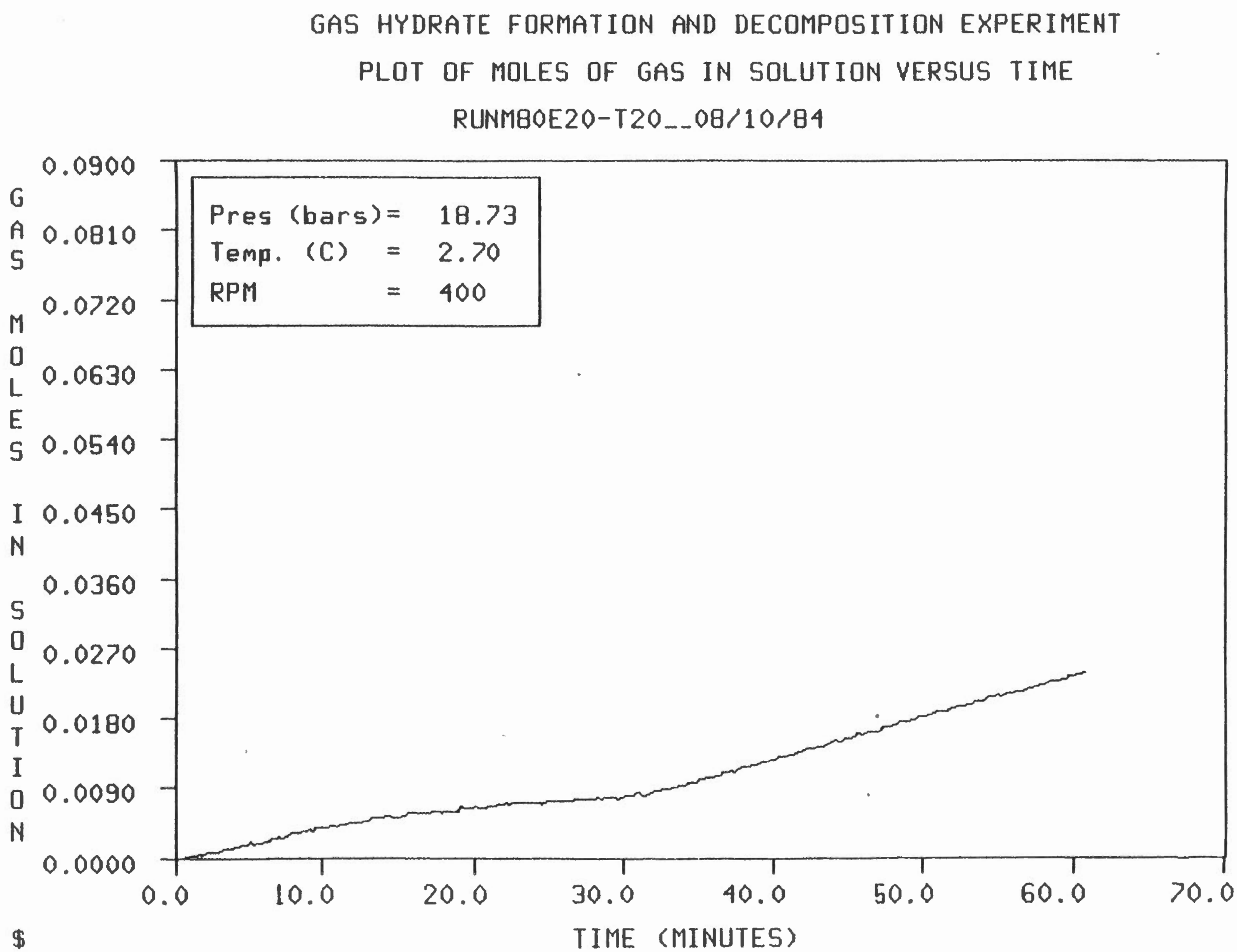
GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNM80E20-T18__08/08/84
Pres (bars)= 15.94
Temp. (C) = 2.80
RPM = 400
GAS MOLES IN SOLUTION
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
0.0
7.0
14.0
21.0
28.0
35.0
42.0
49.0
56.0
63.0
70.0
TIME (MINUTES)
$

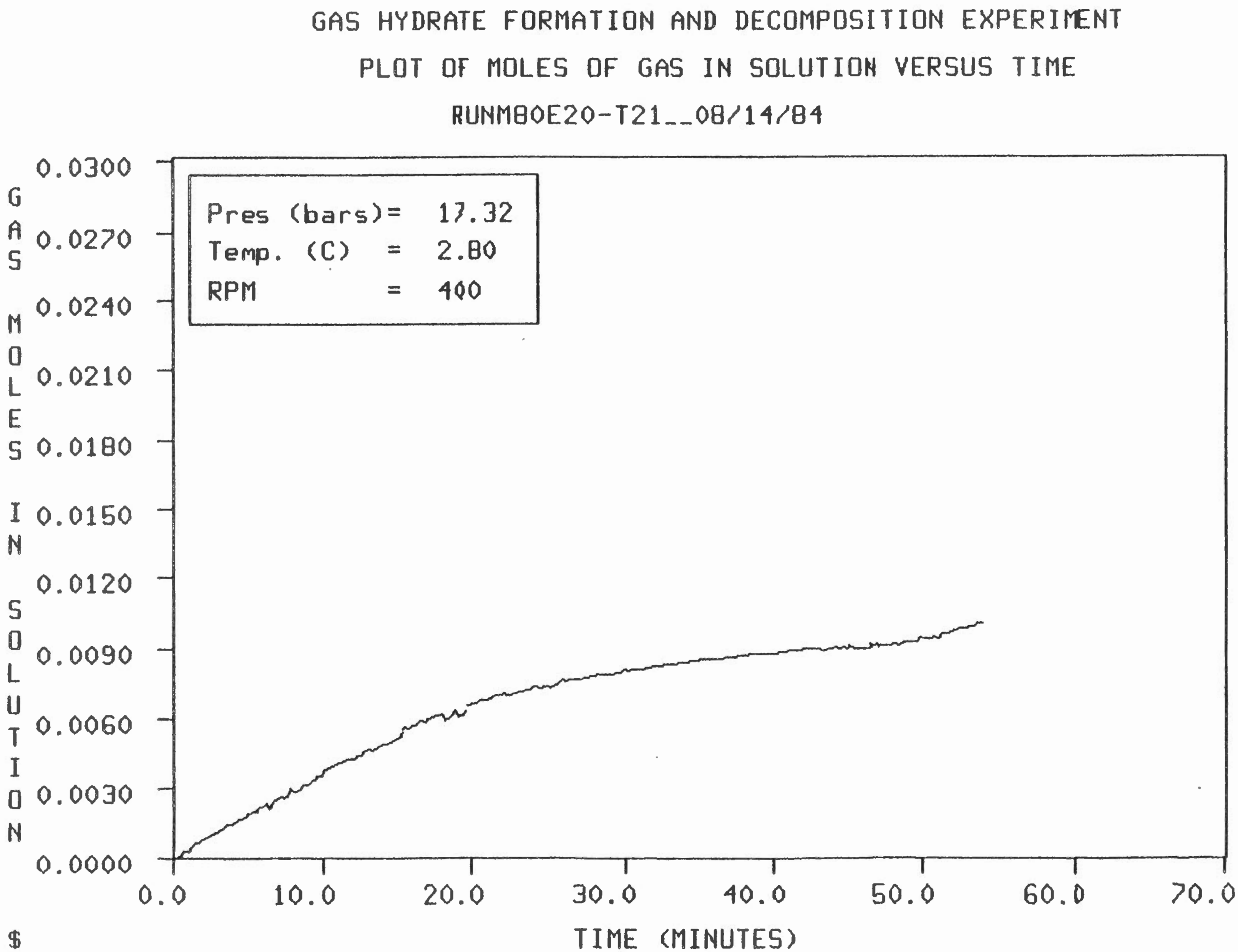
GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

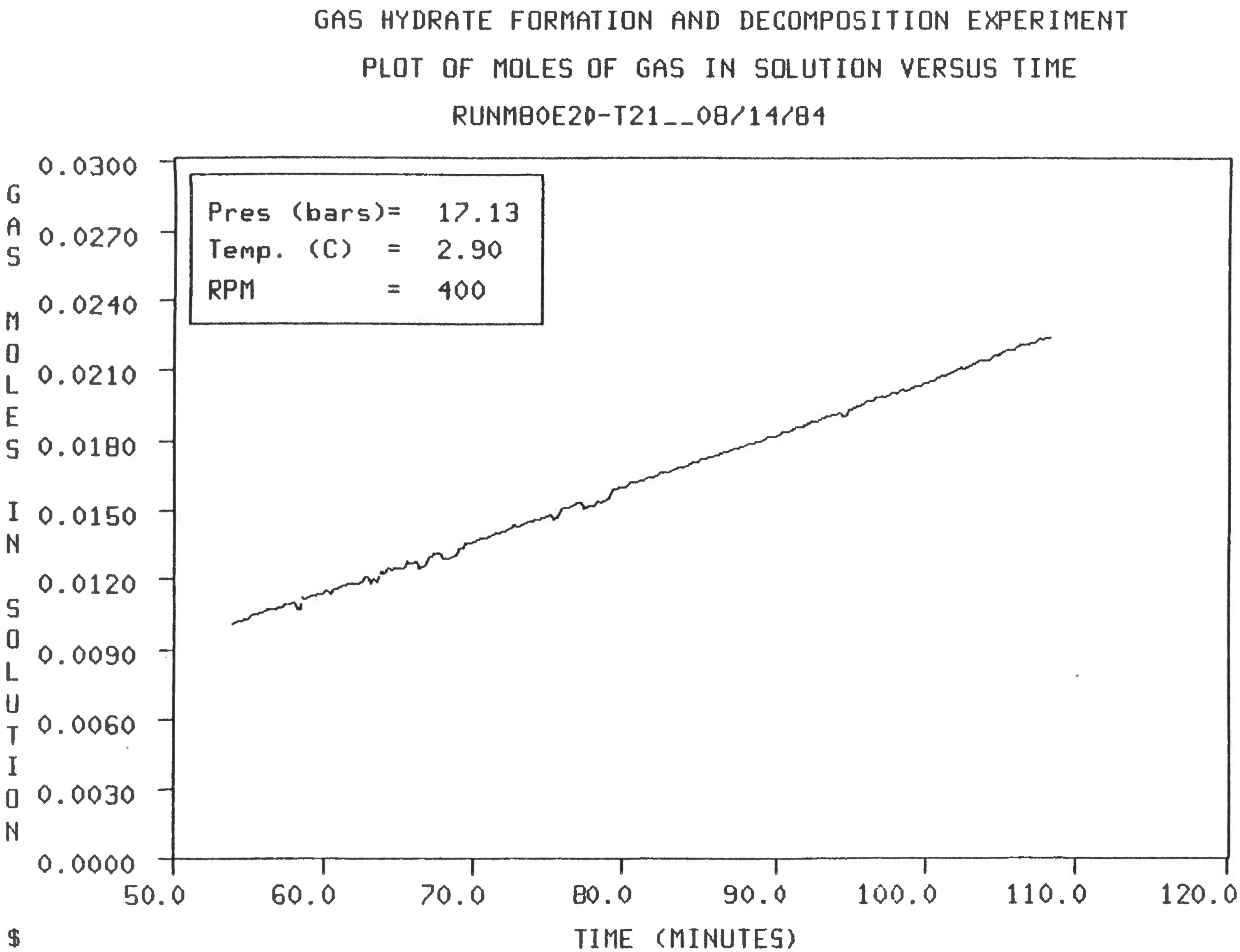
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

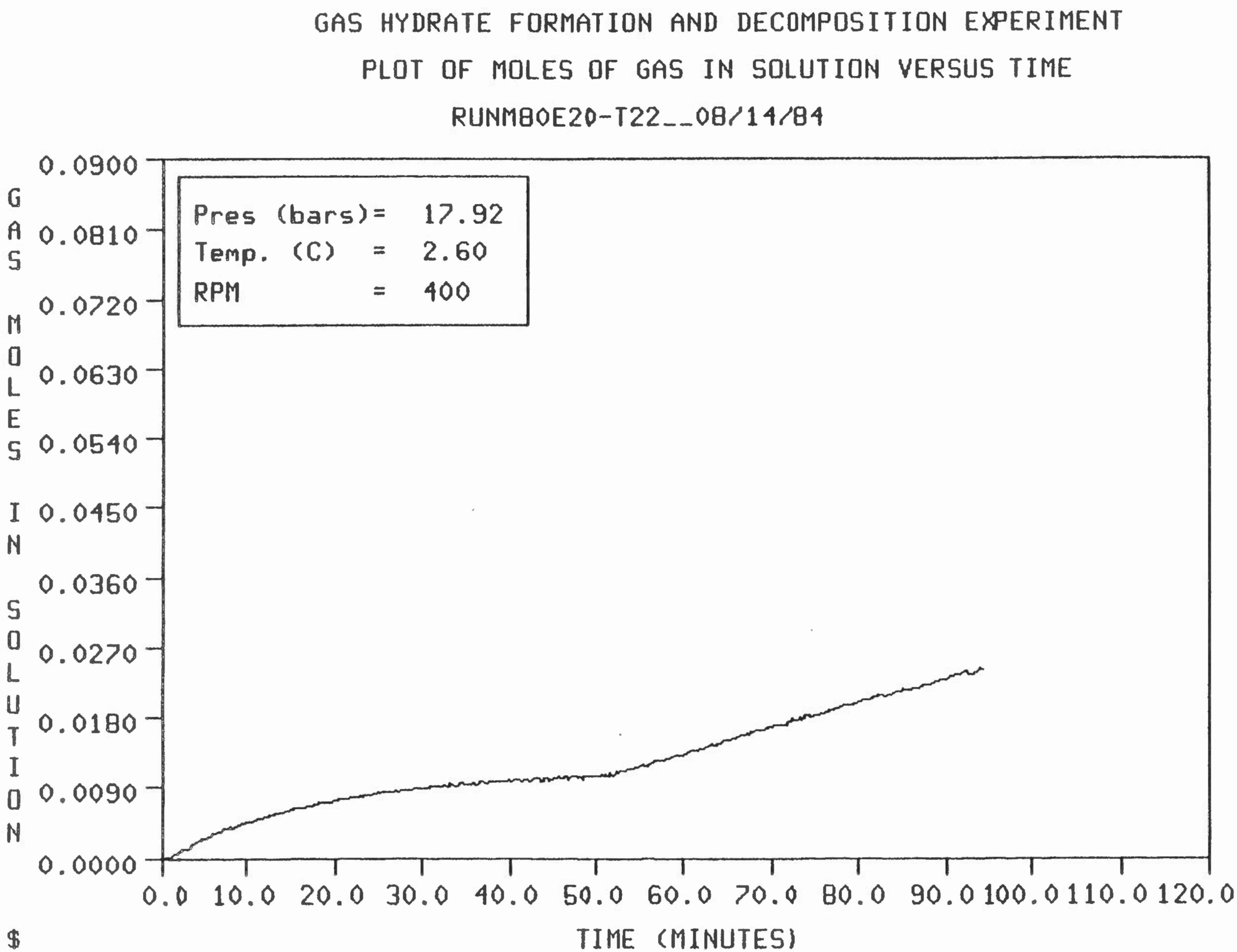
RUNM80E20-T19__08/09/84

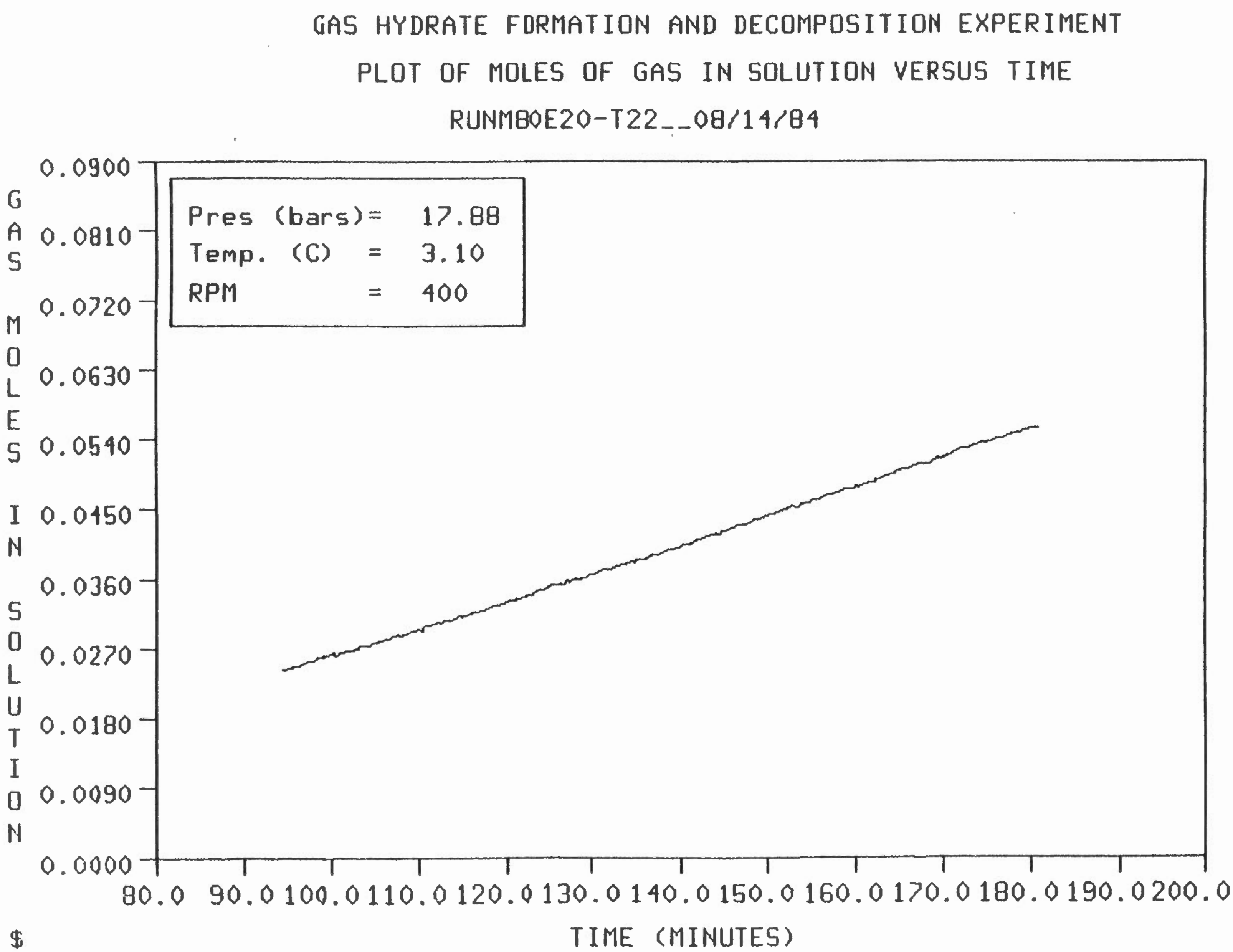



GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNM80E20-T20__08/10/84
Pres (bars)= 18.73
Temp. (C) = 2.70
RPM = 400
GAS MOLES IN SOLUTION
0.0900
0.0810
0.0720
0.0630
0.0540
0.0450
0.0360
0.0270
0.0180
0.0090
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNM80E20-T21__08/14/84
Pres (bars)= 17.32
Temp. (C) = 2.80
RPM = 400
GAS MOLES IN SOLUTION
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNM80E20-T21__08/14/84
Pres (bars)= 17.13
Temp. (C) = 2.90
RPM = 400
GAS MOLES IN SOLUTION
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNM80E20-T22__08/14/84
Pres (bars)= 17.92
Temp. (C) = 2.60
RPM = 400
GAS MOLES IN SOLUTION
0.0900
0.0810
0.0720
0.0630
0.0540
0.0450
0.0360
0.0270
0.0180
0.0090
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

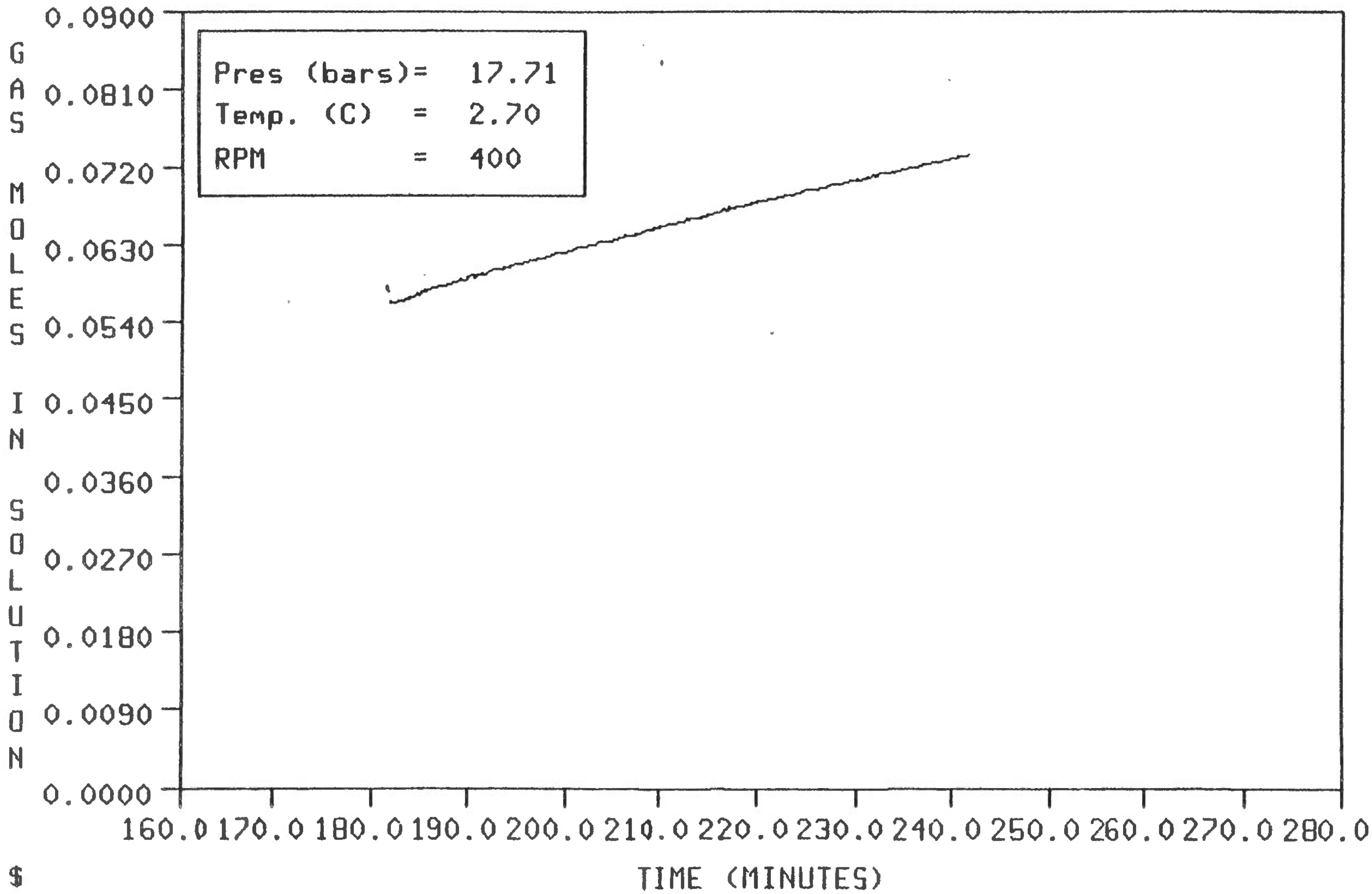


GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNM80E20-T22__08/14/84
Pres (bars)= 17.88
Temp. (C) = 3.10
RPM = 400
GAS MOLES IN SOLUTION
0.0900
0.0810
0.0720
0.0630
0.0540
0.0450
0.0360
0.0270
0.0180
0.0090
0.0000
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
190.0
200.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

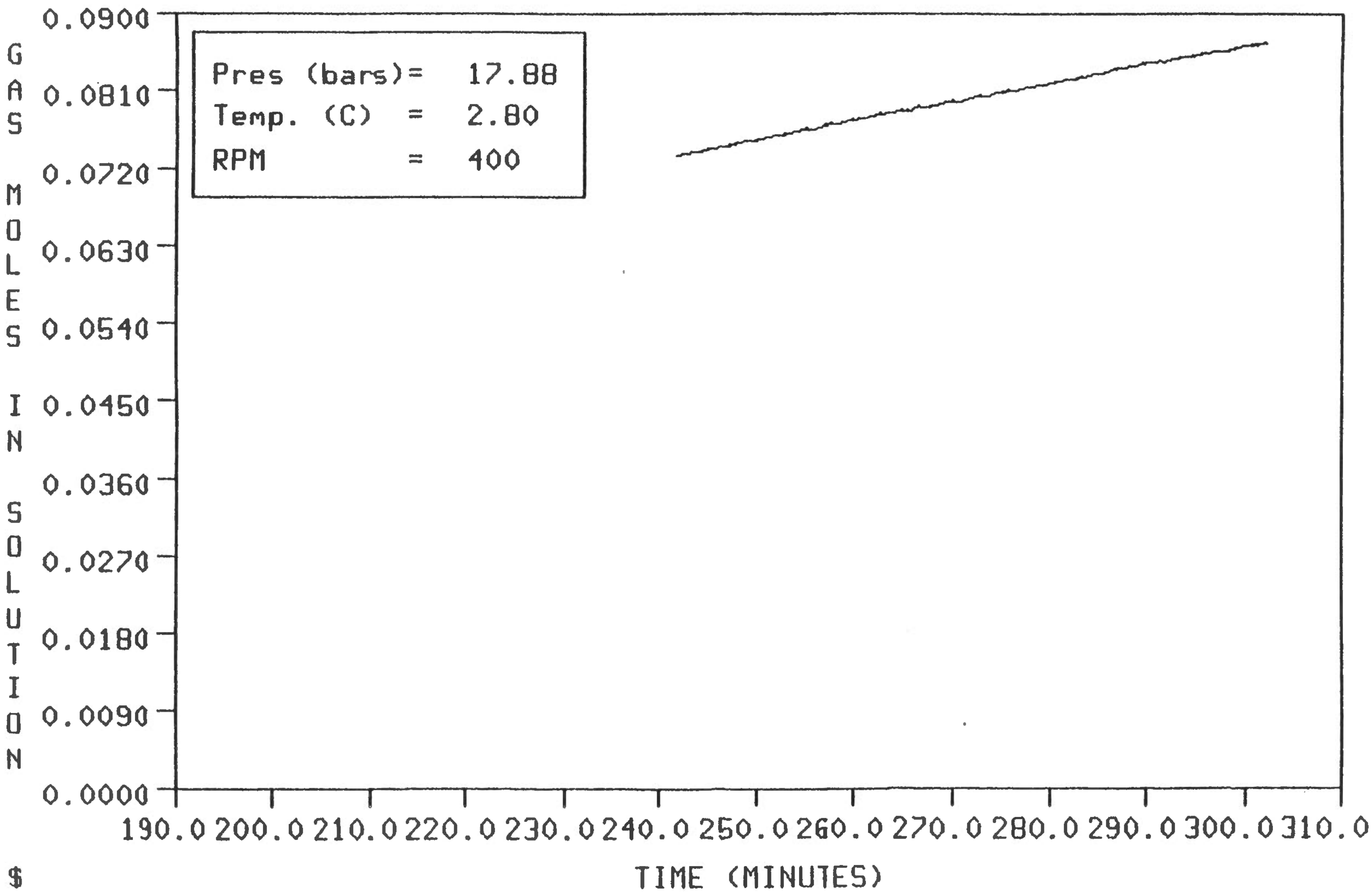
RUNM80E20-T22__08/14/84



GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

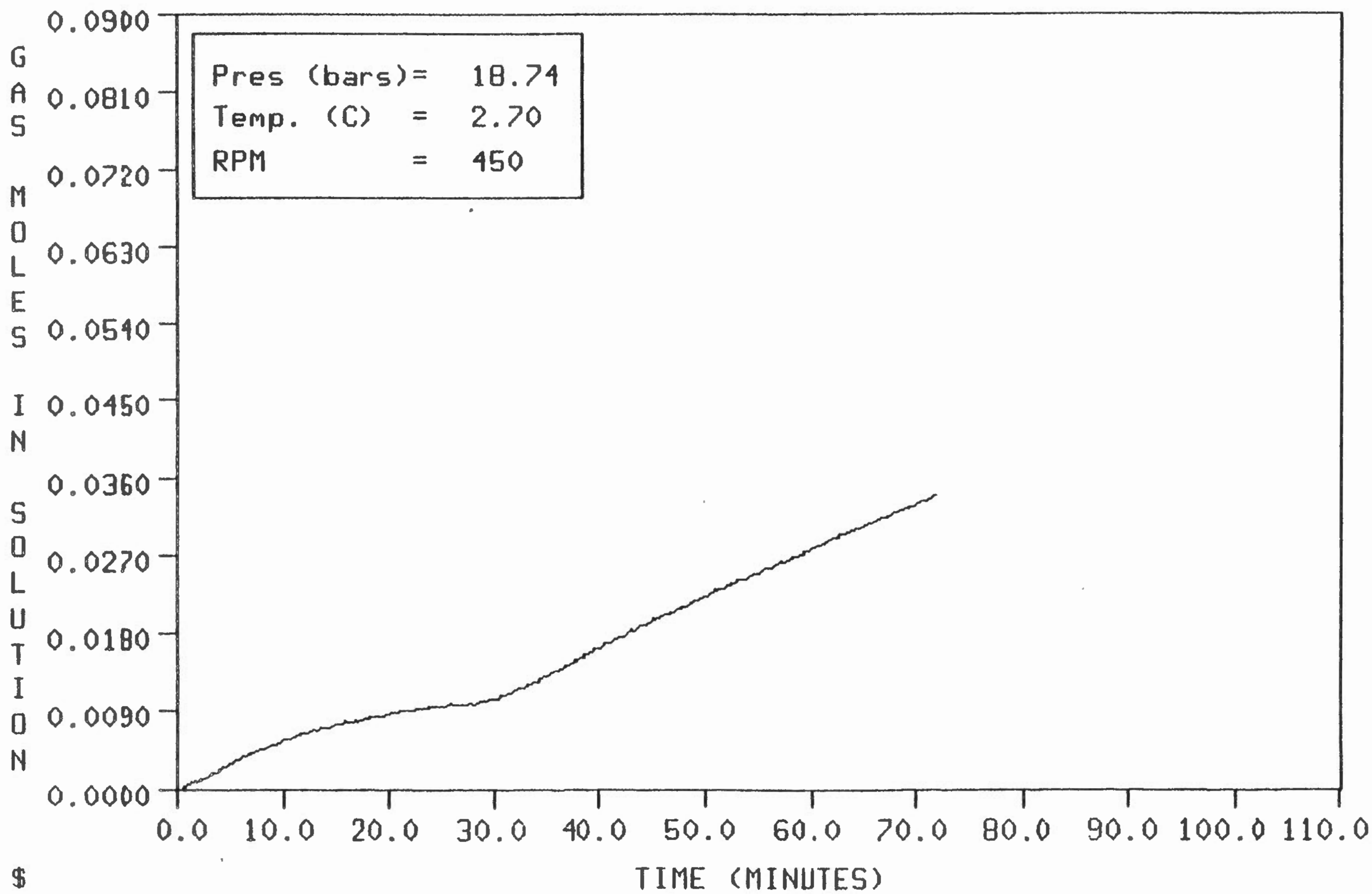
RUNM80E20-T22__08/14/84



GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

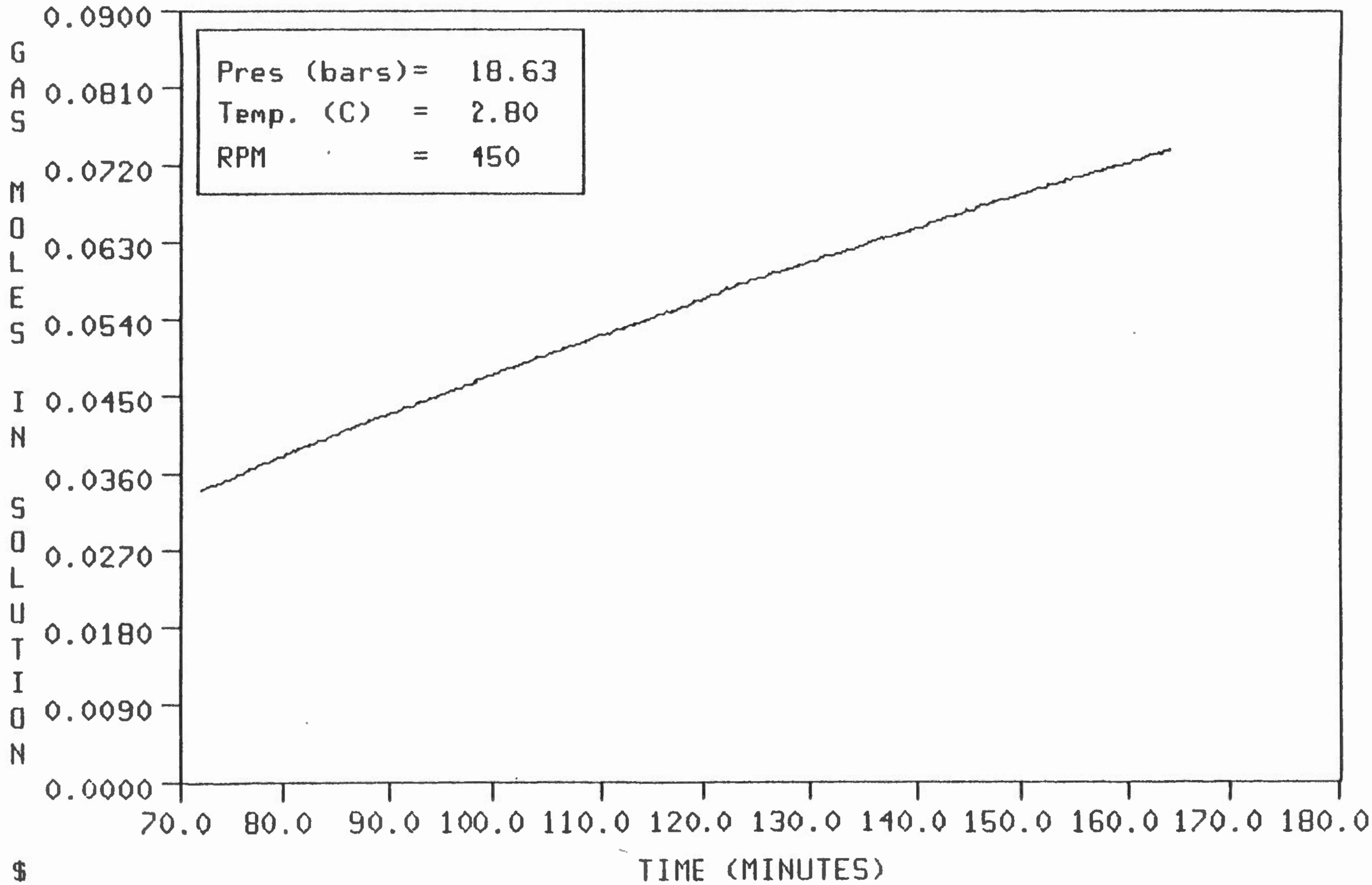
RUNM80E20-T23__08/16/84



GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

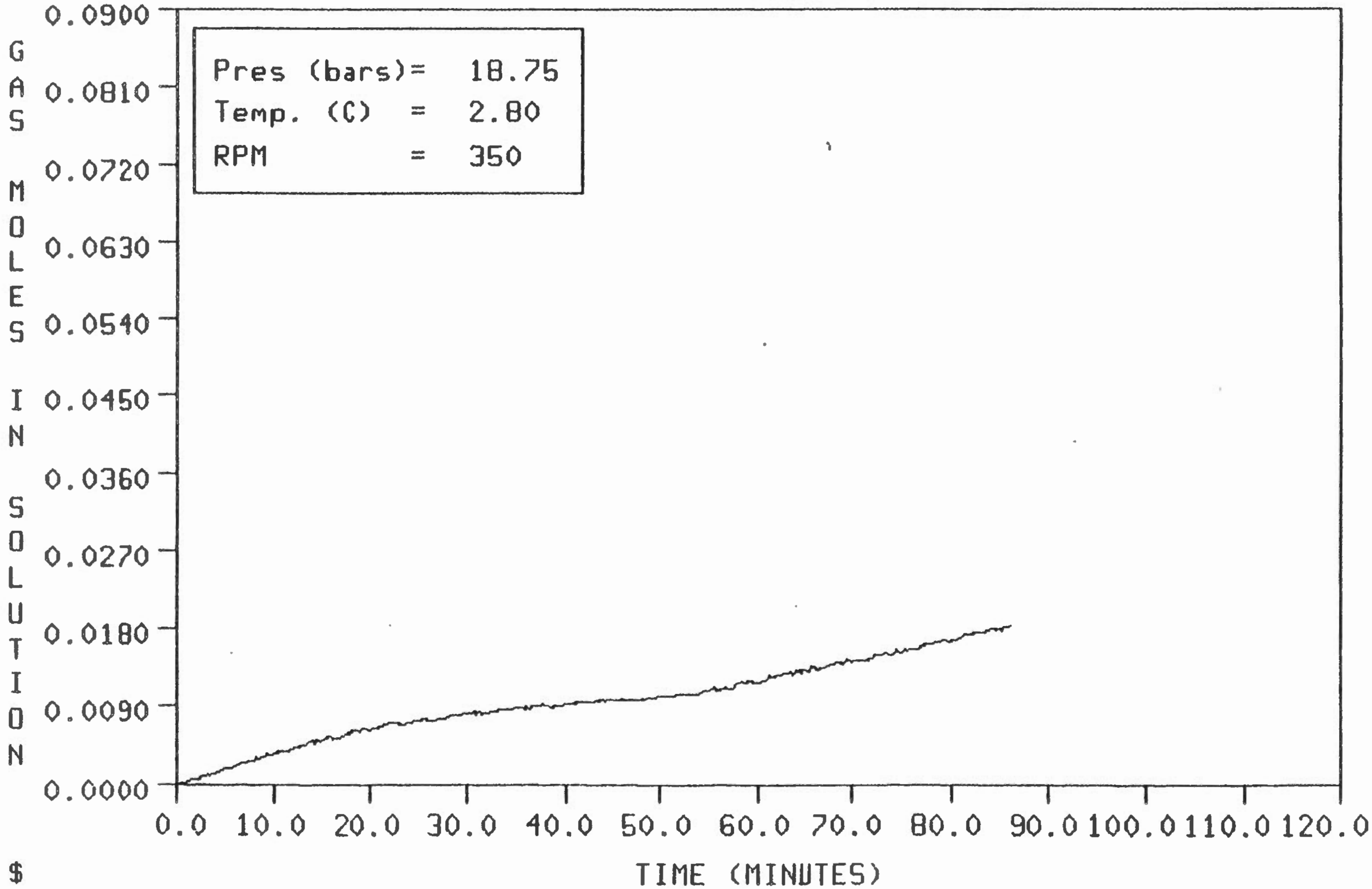
RUNM80E20-T23__08/16/84



GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

RUNM80E20-T24__08/17/84



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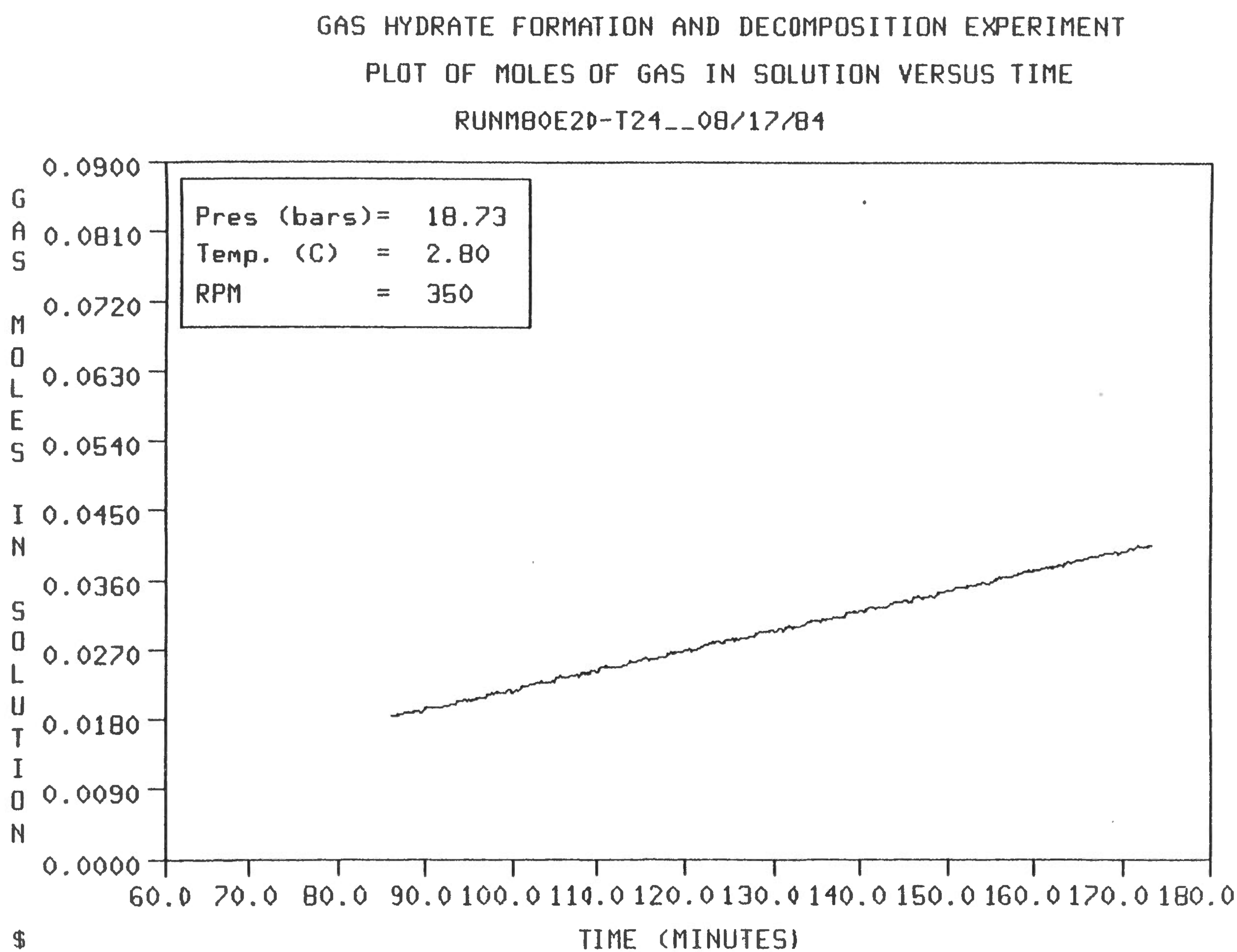
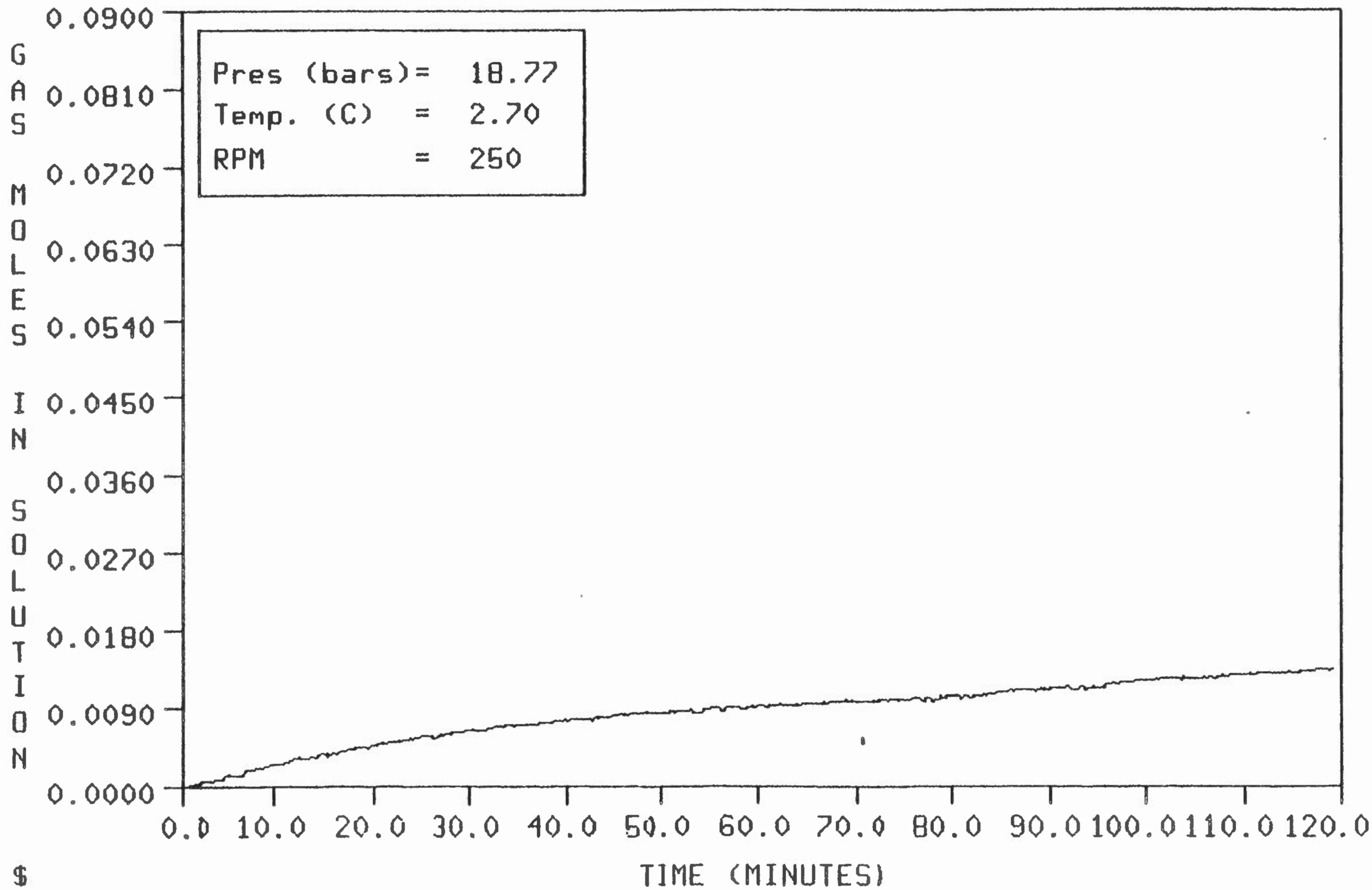


GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNM80E20-T24__08/17/84
Pres (bars)= 18.73
Temp. (C) = 2.80
RPM = 350
GAS MOLES IN SOLUTION
0.0900
0.0810
0.0720
0.0630
0.0540
0.0450
0.0360
0.0270
0.0180
0.0090
0.0000
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

RUNM80E20-T25__08/20/84



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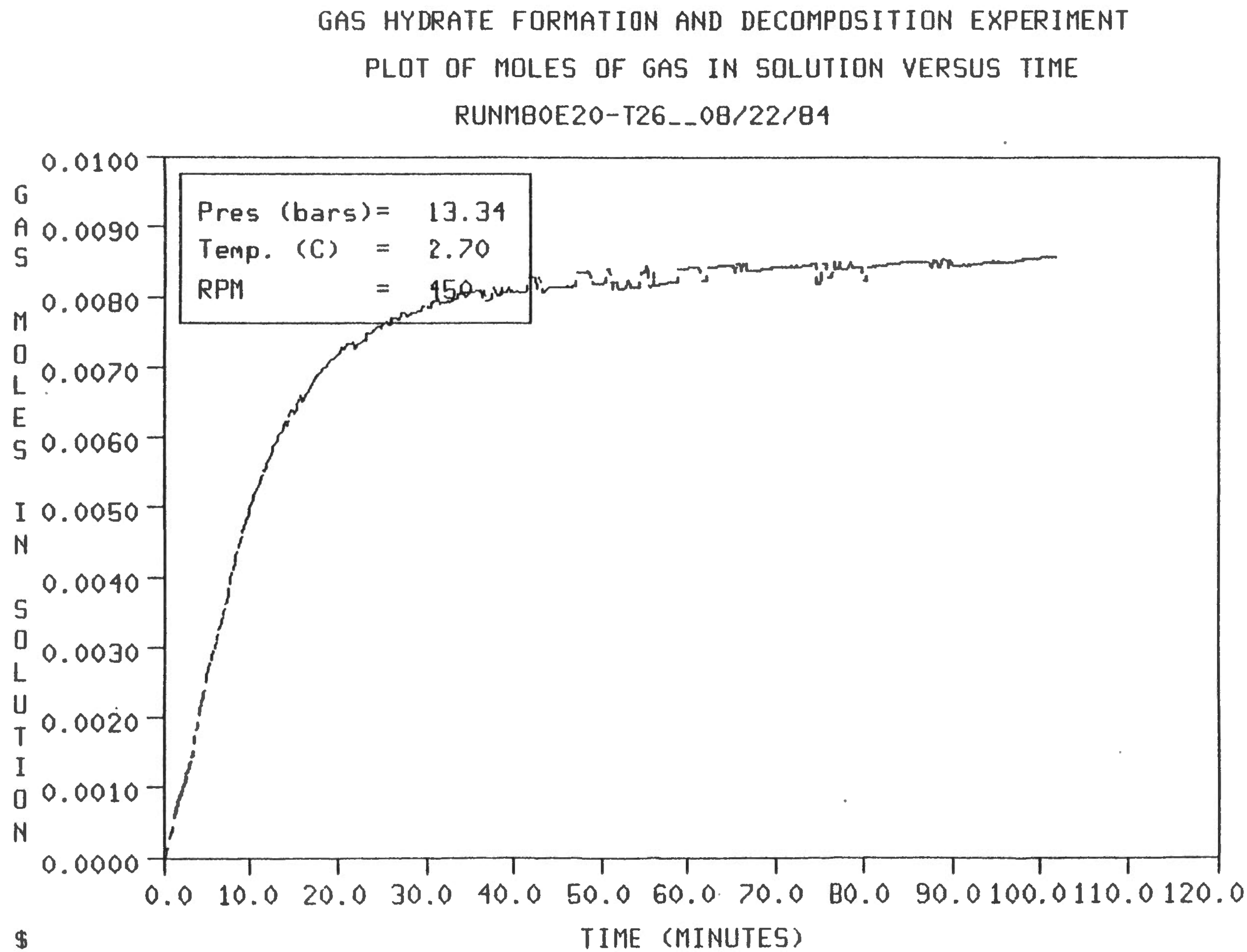
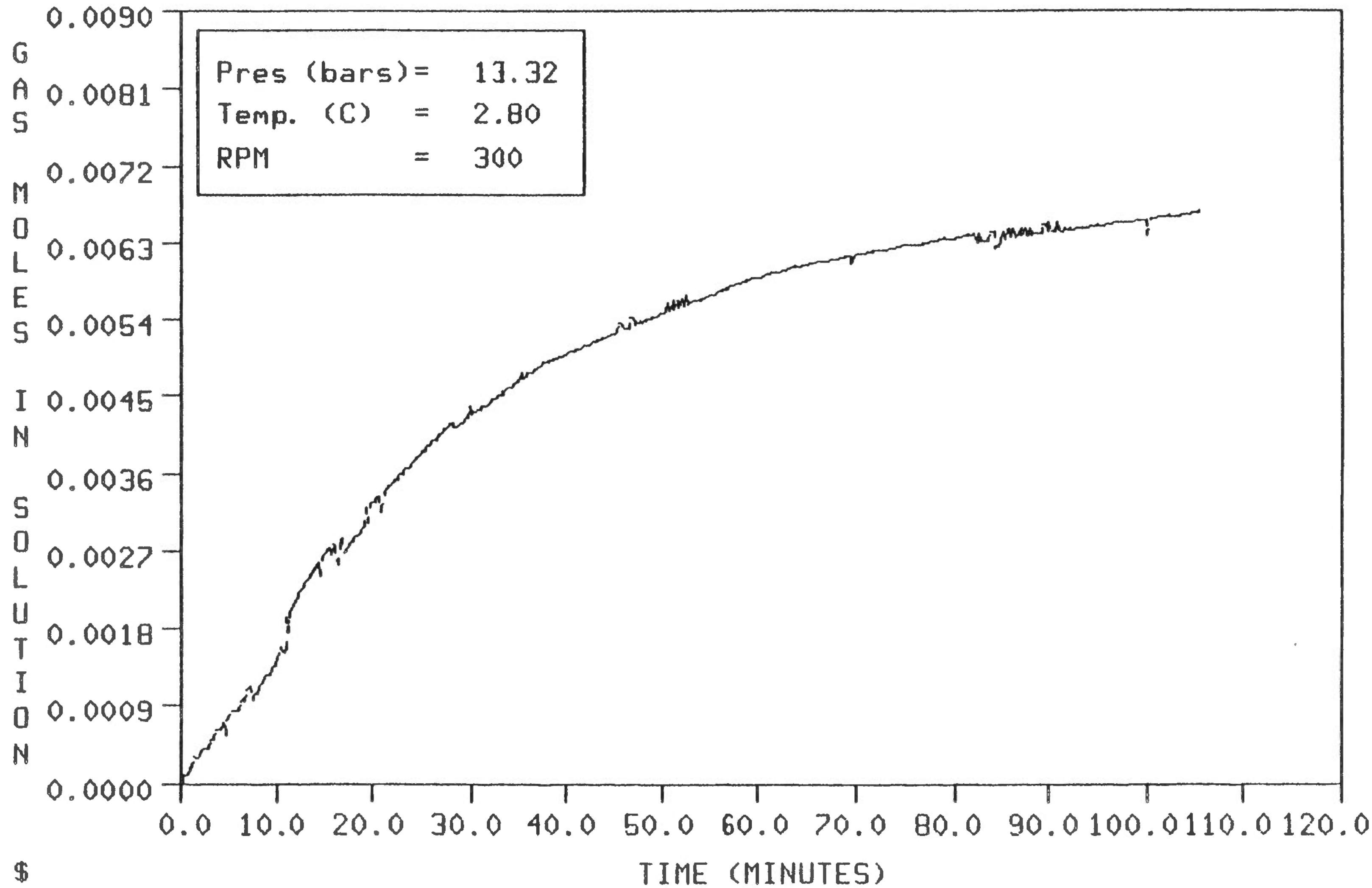

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNM80E20-T26__08/22/84
Pres (bars)= 13.34
Temp. (C) = 2.70
RPM = 450
GAS MOLES IN SOLUTION
0.0100
0.0090
0.0080
0.0070
0.0060
0.0050
0.0040
0.0030
0.0020
0.0010
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

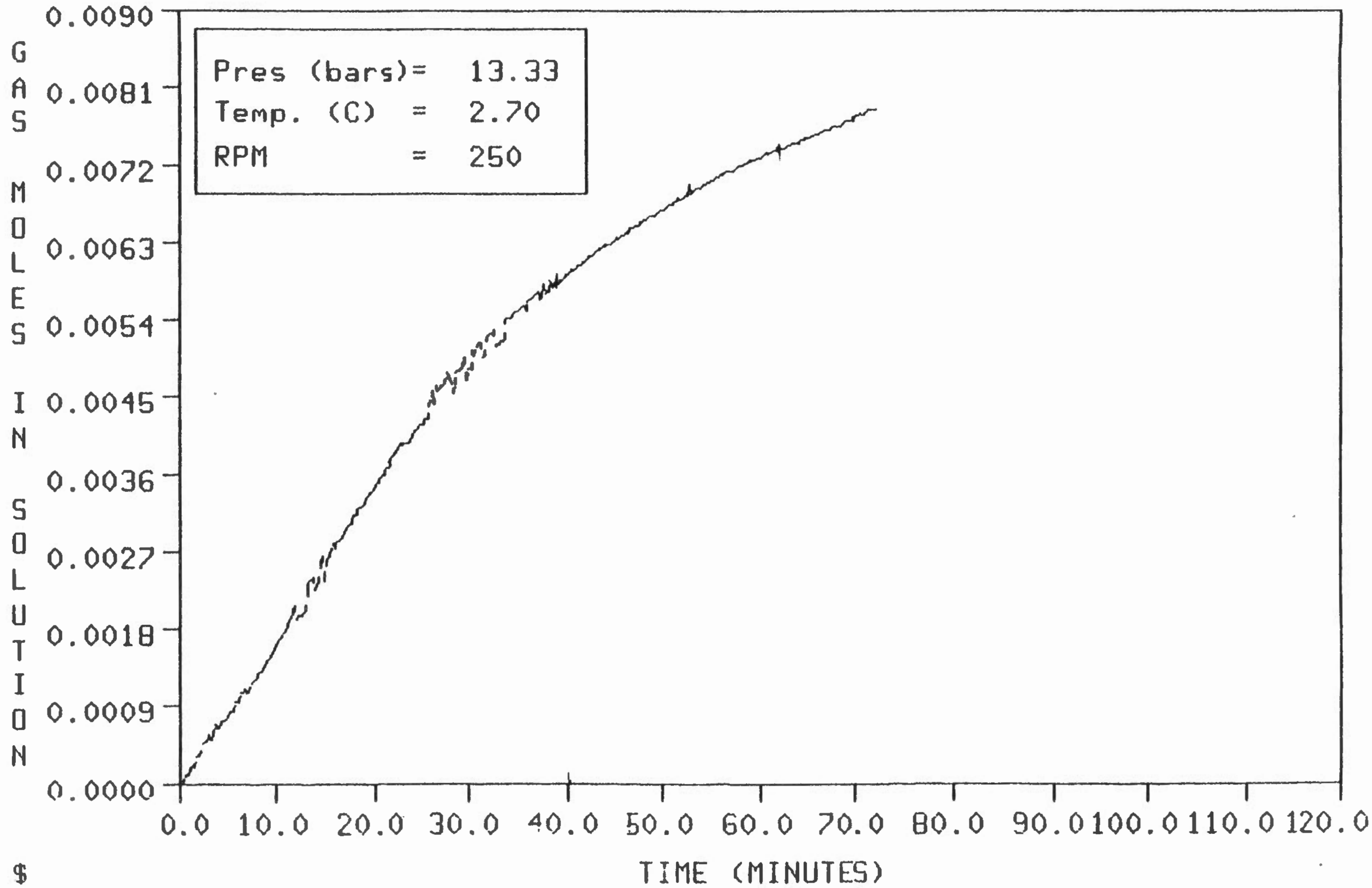
RUNM80E20-T27__08/23/84



GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

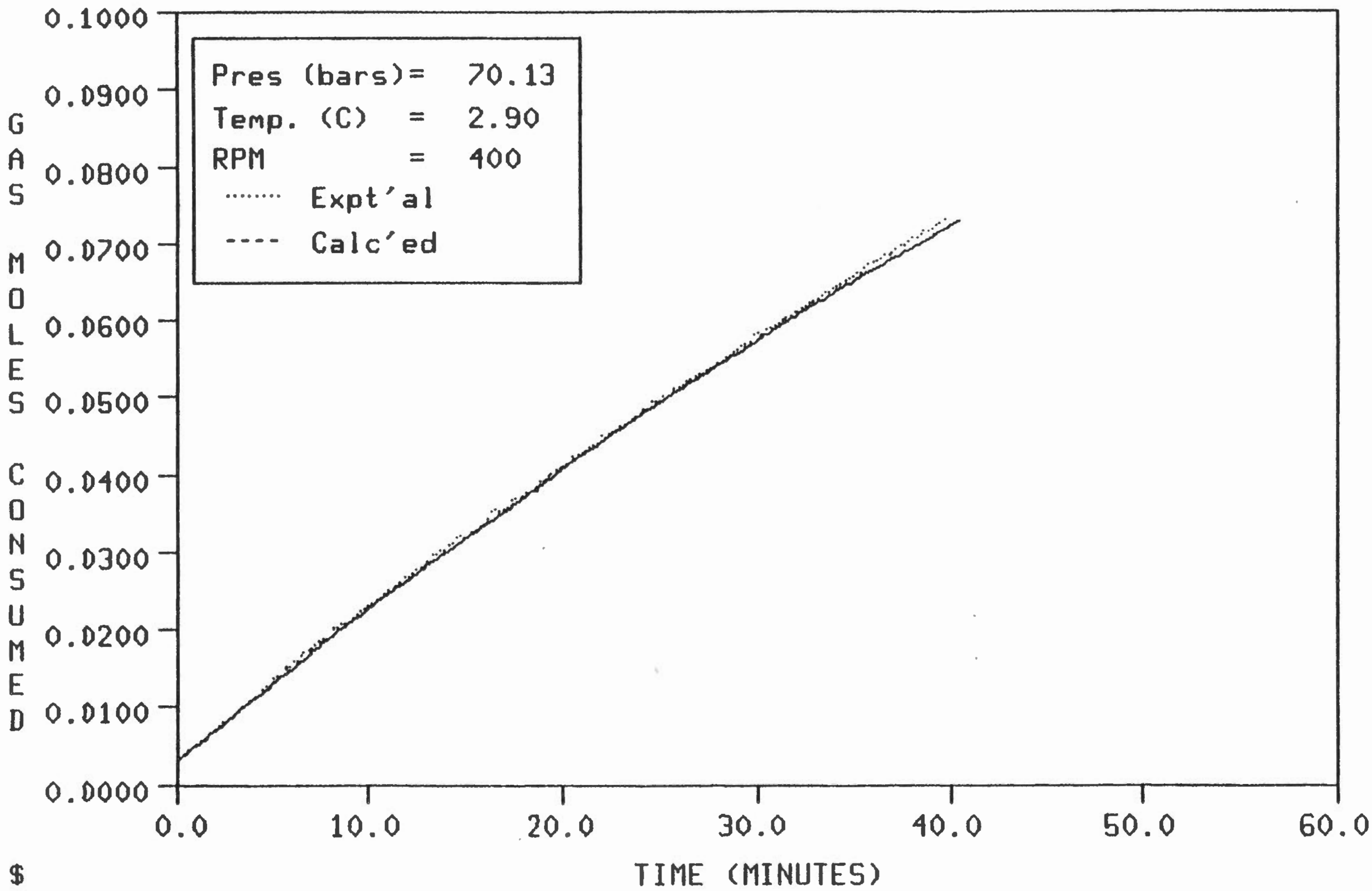
RUNM80E20-T28__08/27/84



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

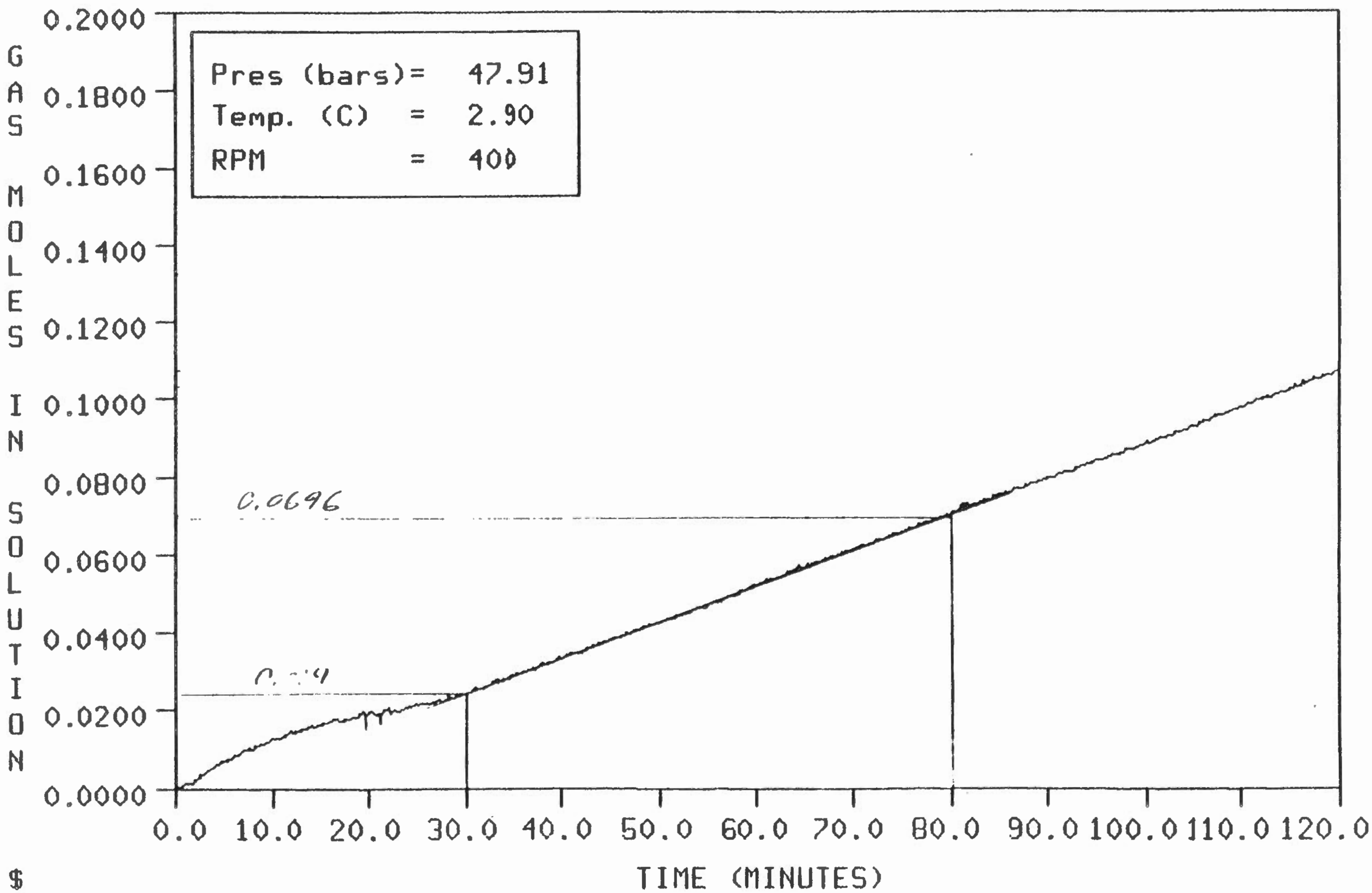
RUNMETHAN-T29__08/28/84

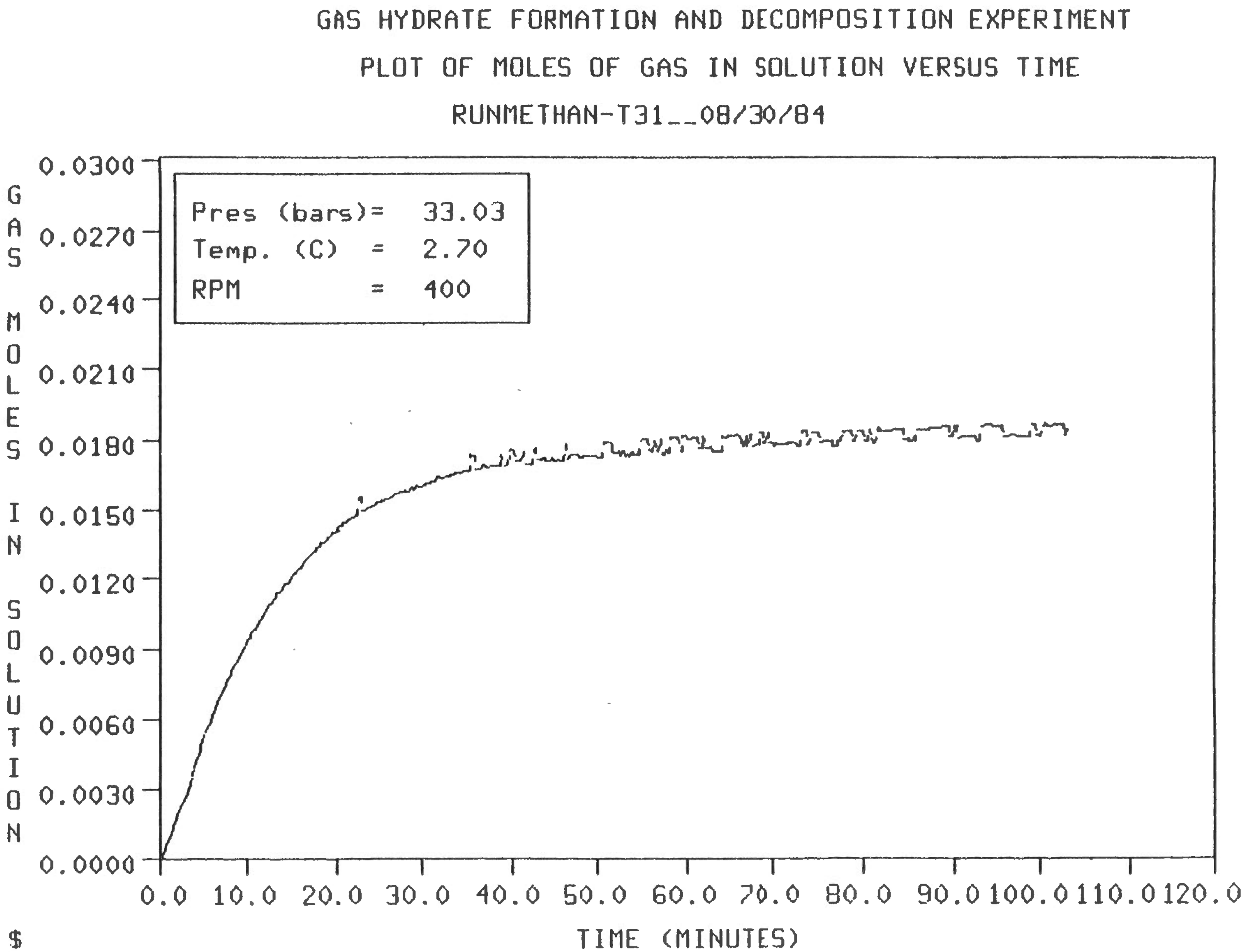


GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

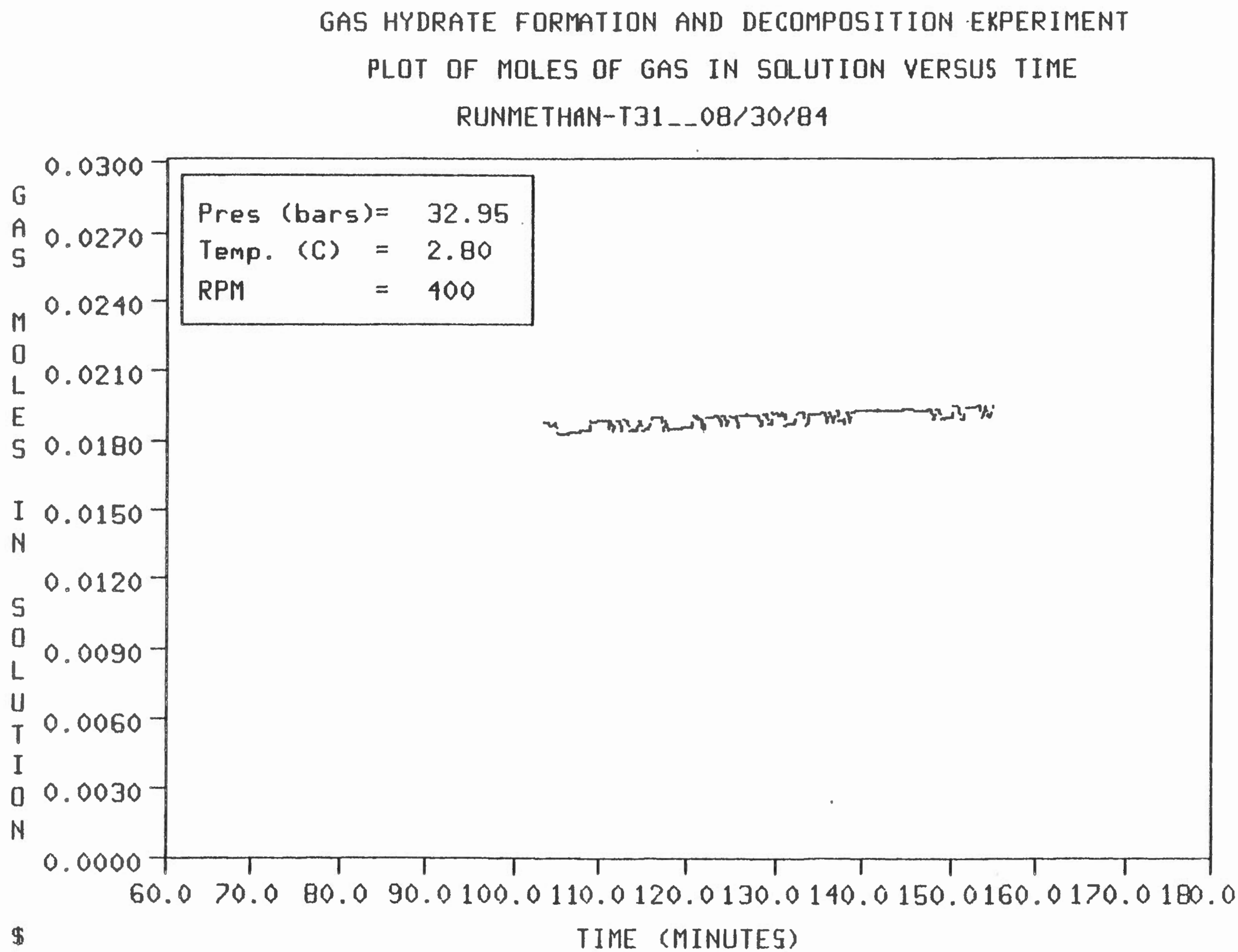
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

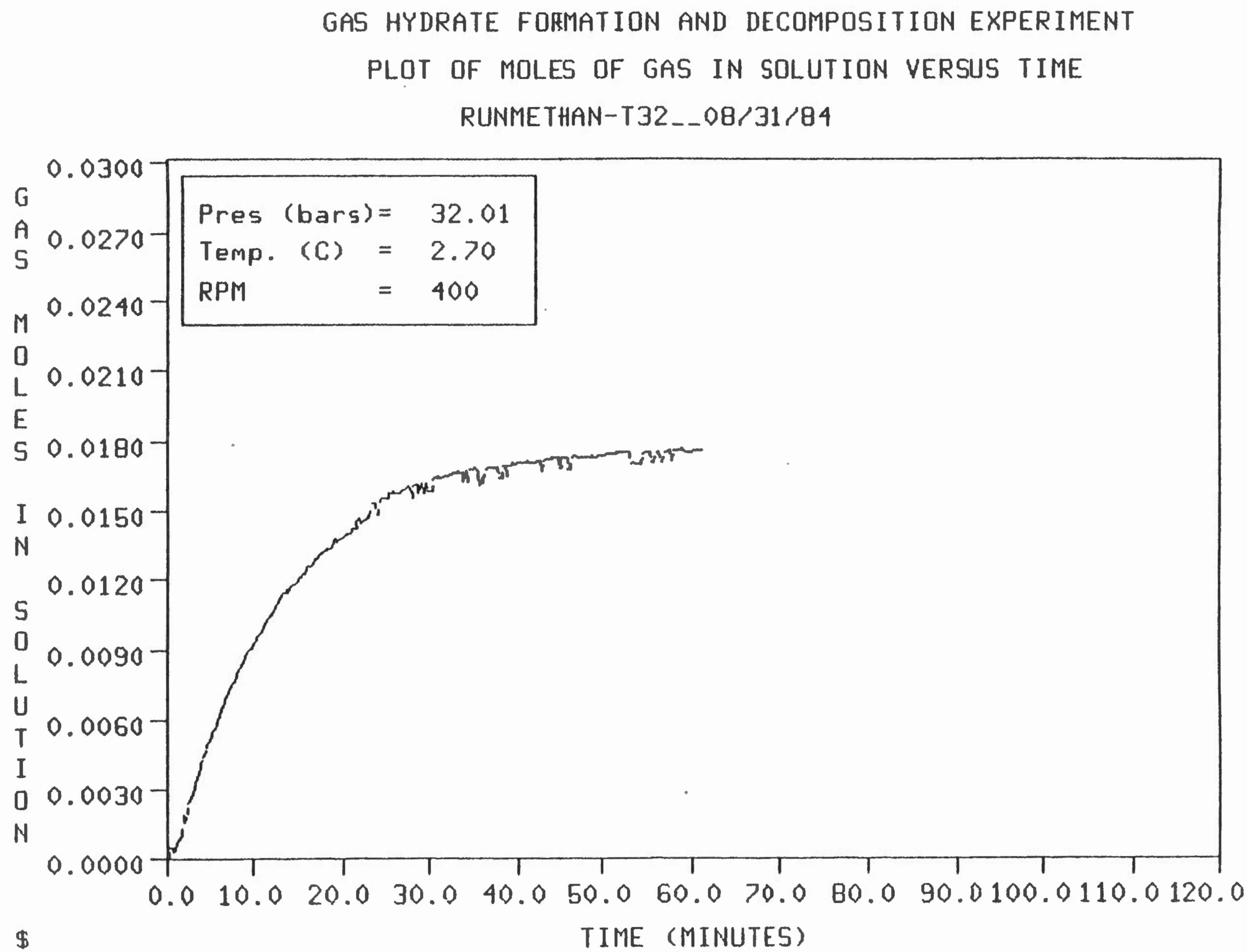
RUNMETHAN-T30__08/29/84





GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNMETHAN-T31__08/30/84
Pres (bars)= 33.03
Temp. (C) = 2.70
RPM = 400
GAS MOLES IN SOLUTION
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

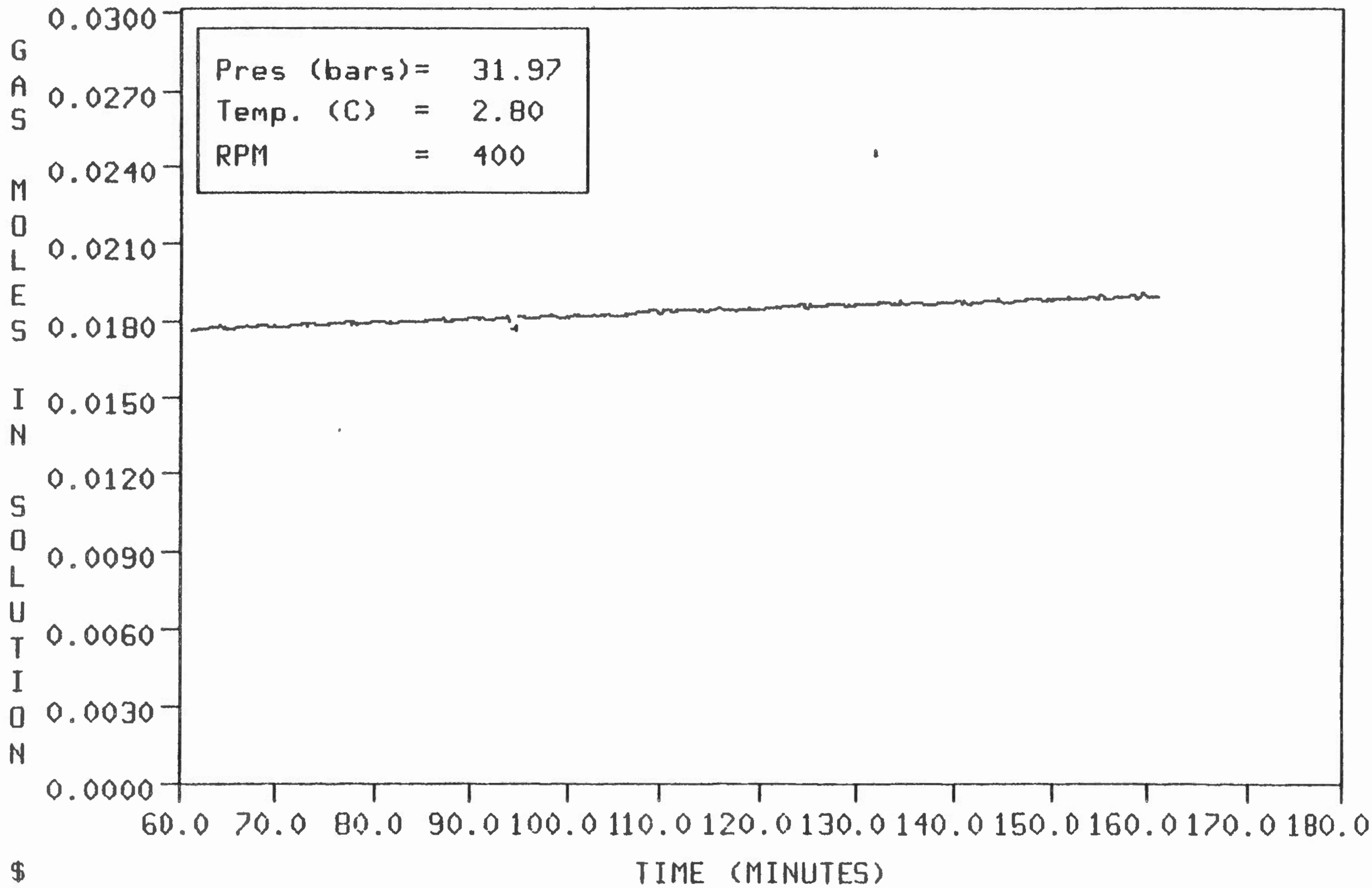

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNMETHAN-T31__08/30/84
Pres (bars)= 32.95
Temp. (C) = 2.80
RPM = 400
GAS MOLES IN SOLUTION
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0
TIME (MINUTES)
$

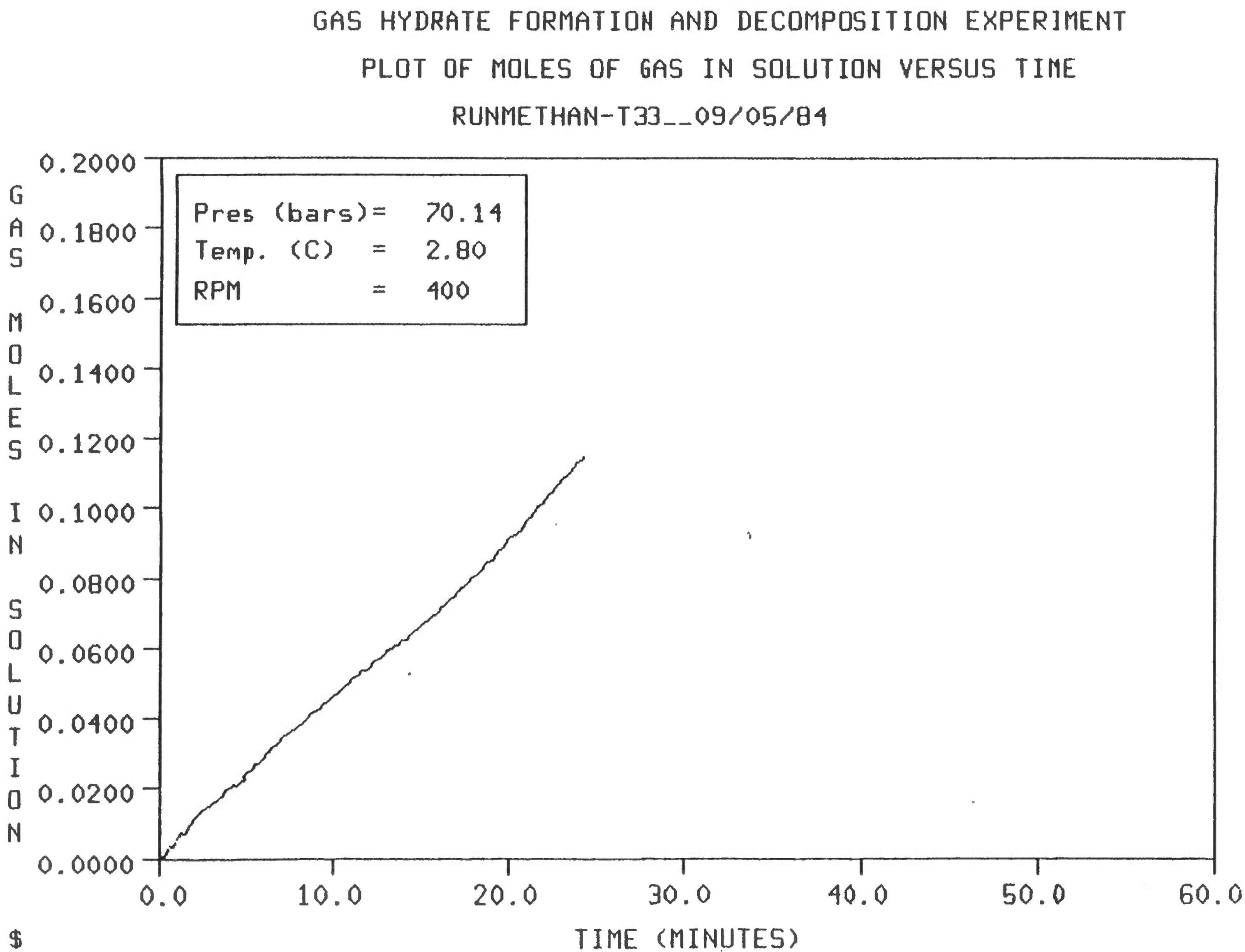

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNMETHAN-T32__08/31/84
Pres (bars)= 32.01
Temp. (C) = 2.70
RPM = 400
GAS MOLES IN SOLUTION
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

RUNMETHAN-T32__08/31/84

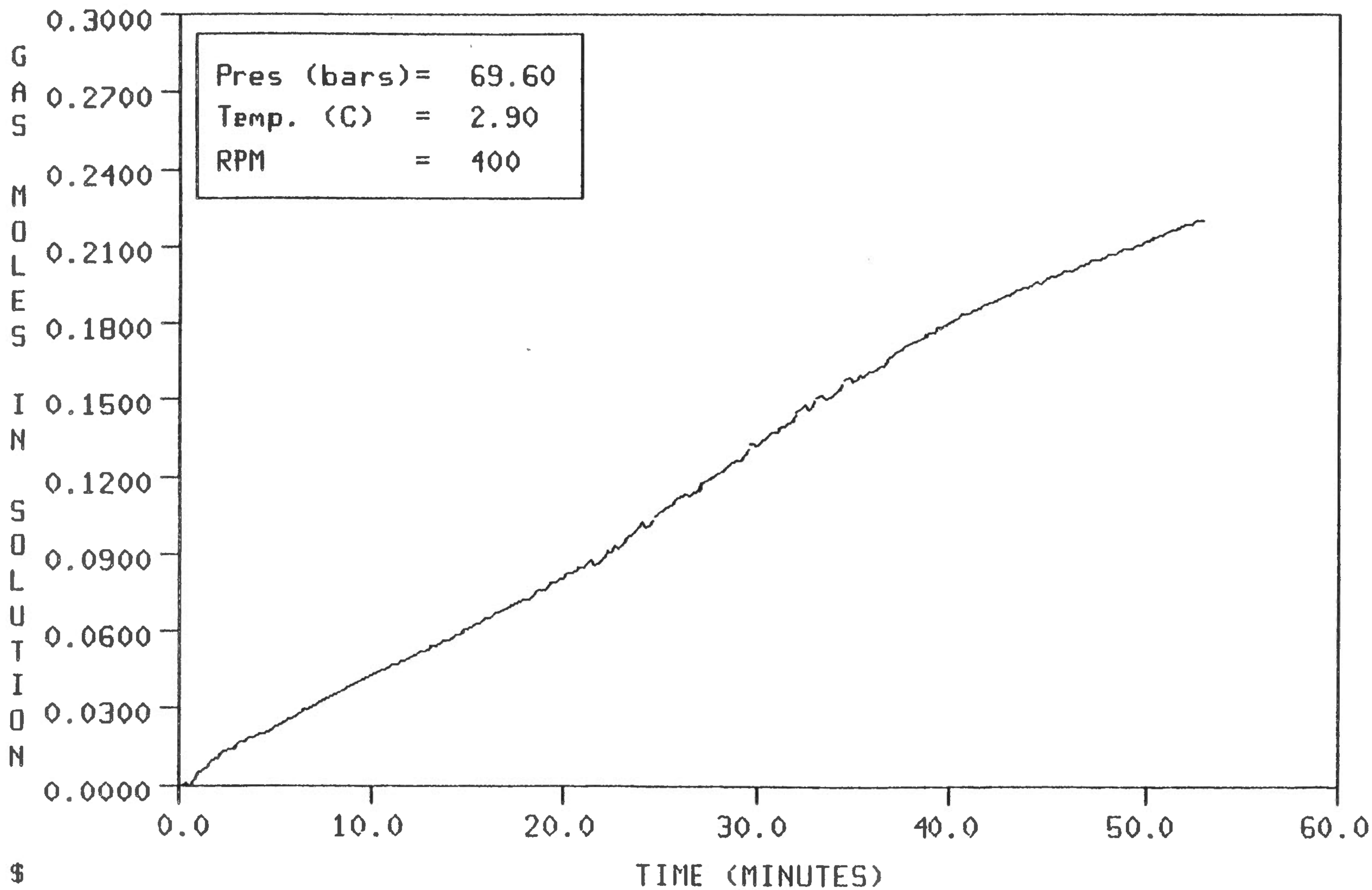



GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNMETHAN-T33__09/05/84
Pres (bars)= 70.14
Temp. (C) = 2.80
RPM = 400
GAS MOLES IN SOLUTION
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

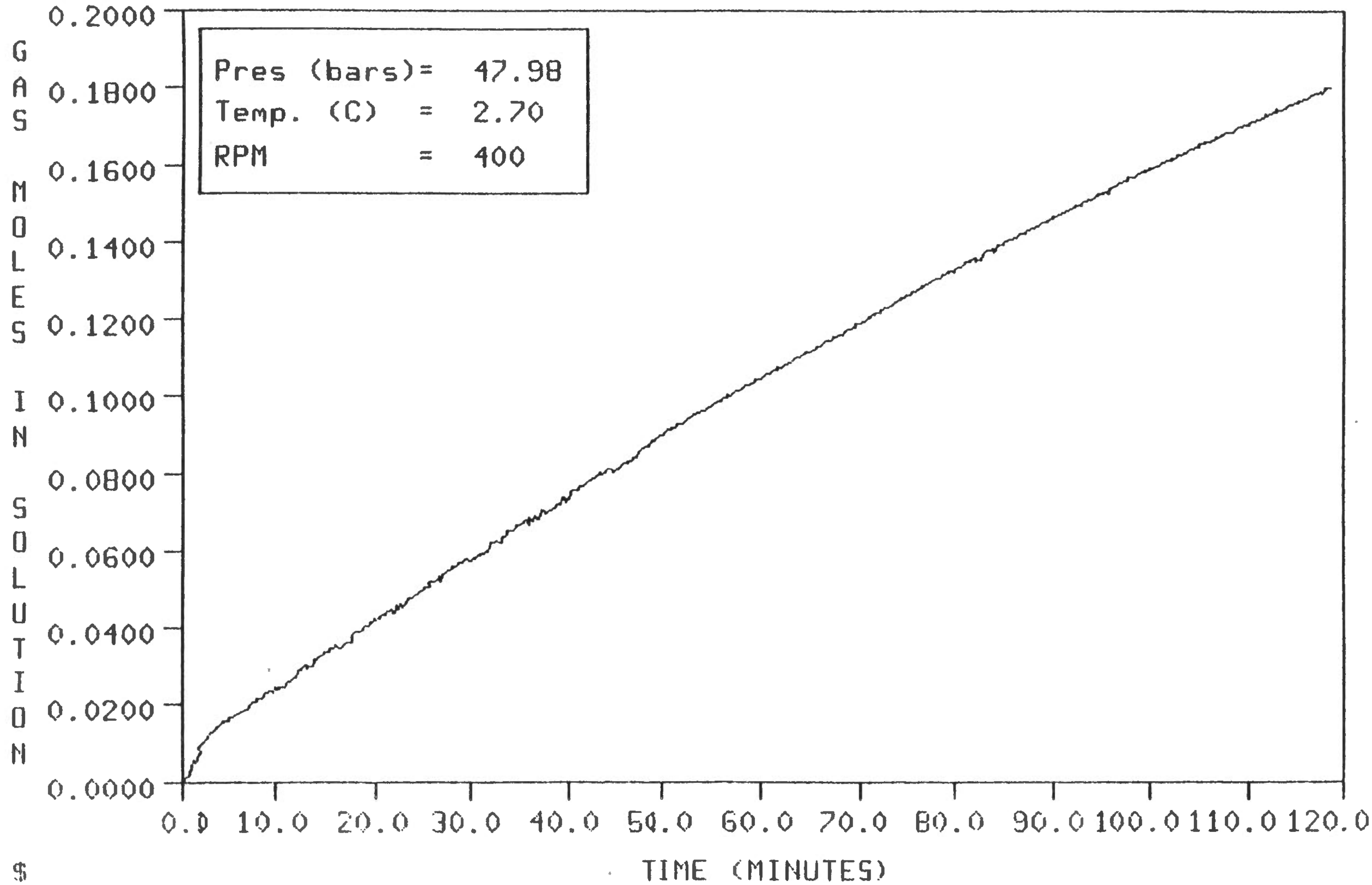
RUNMETHAN-T34__09/06/84



GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

RUNMETHAN-T35__09/07/84



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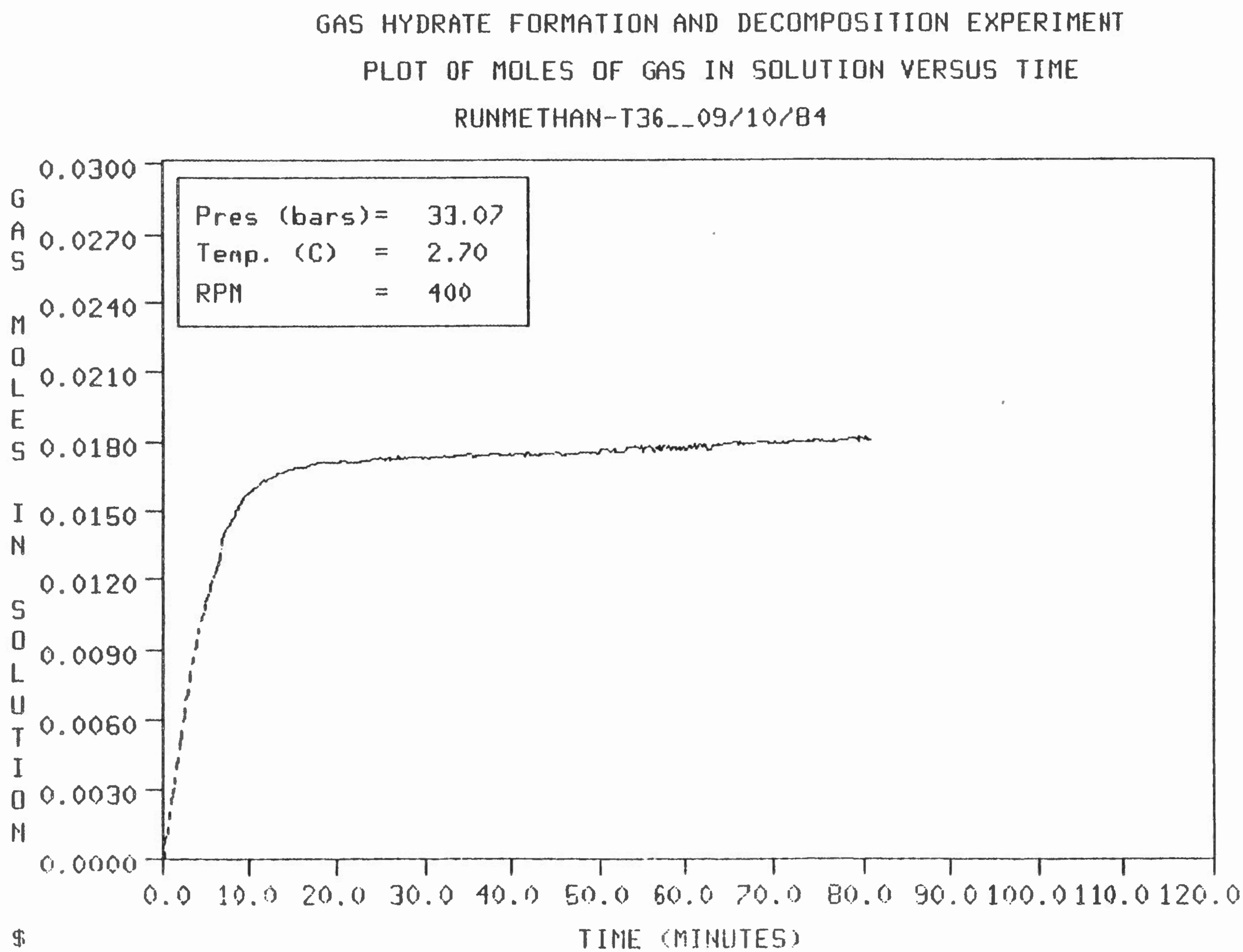
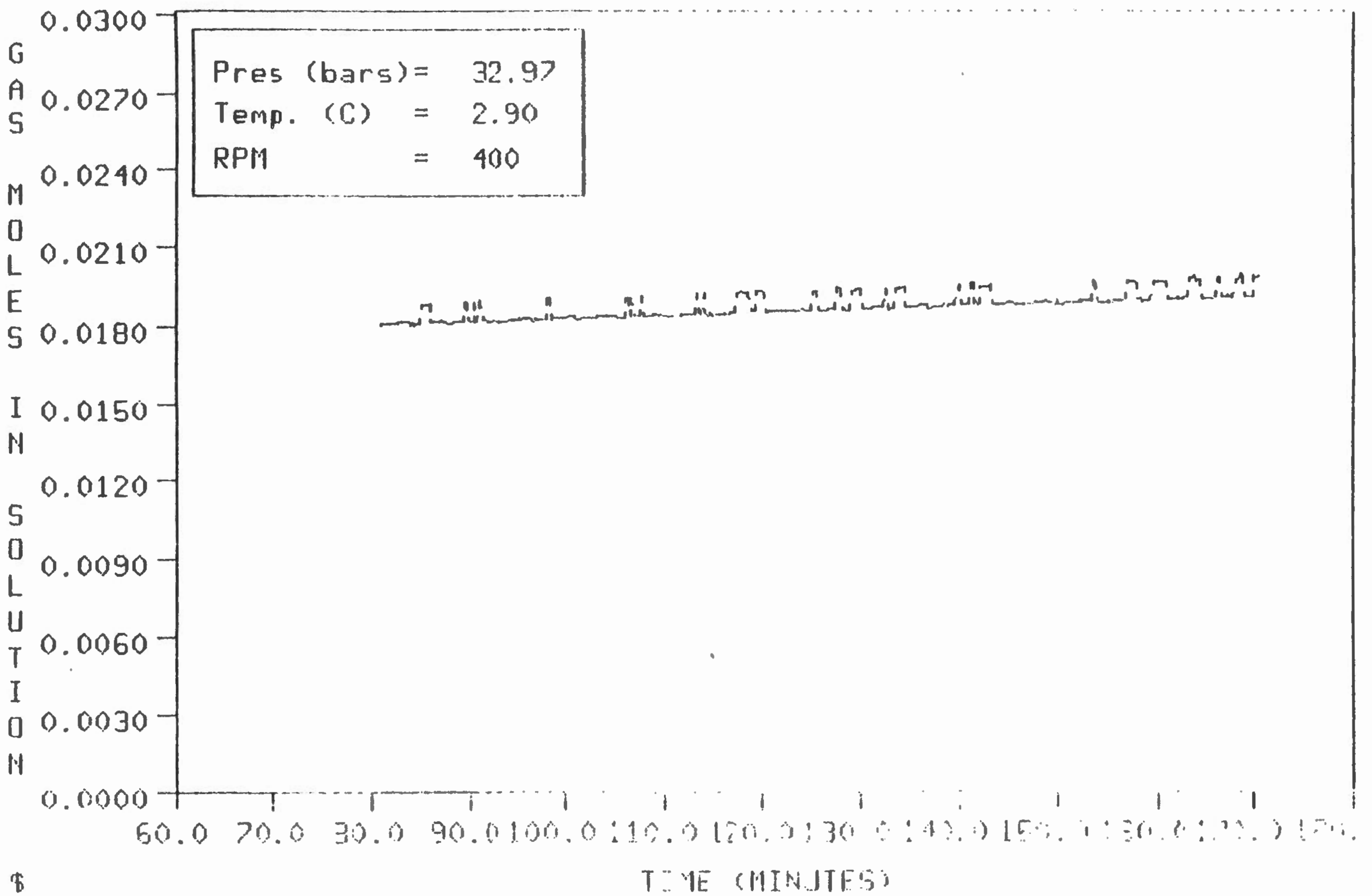

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME
RUNMETHAN-T36__09/10/84
Pres (bars)= 33.07
Temp. (C) = 2.70
RPM = 400
GAS MOLES IN SOLUTION
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION AND DECOMPOSITION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION VERSUS TIME

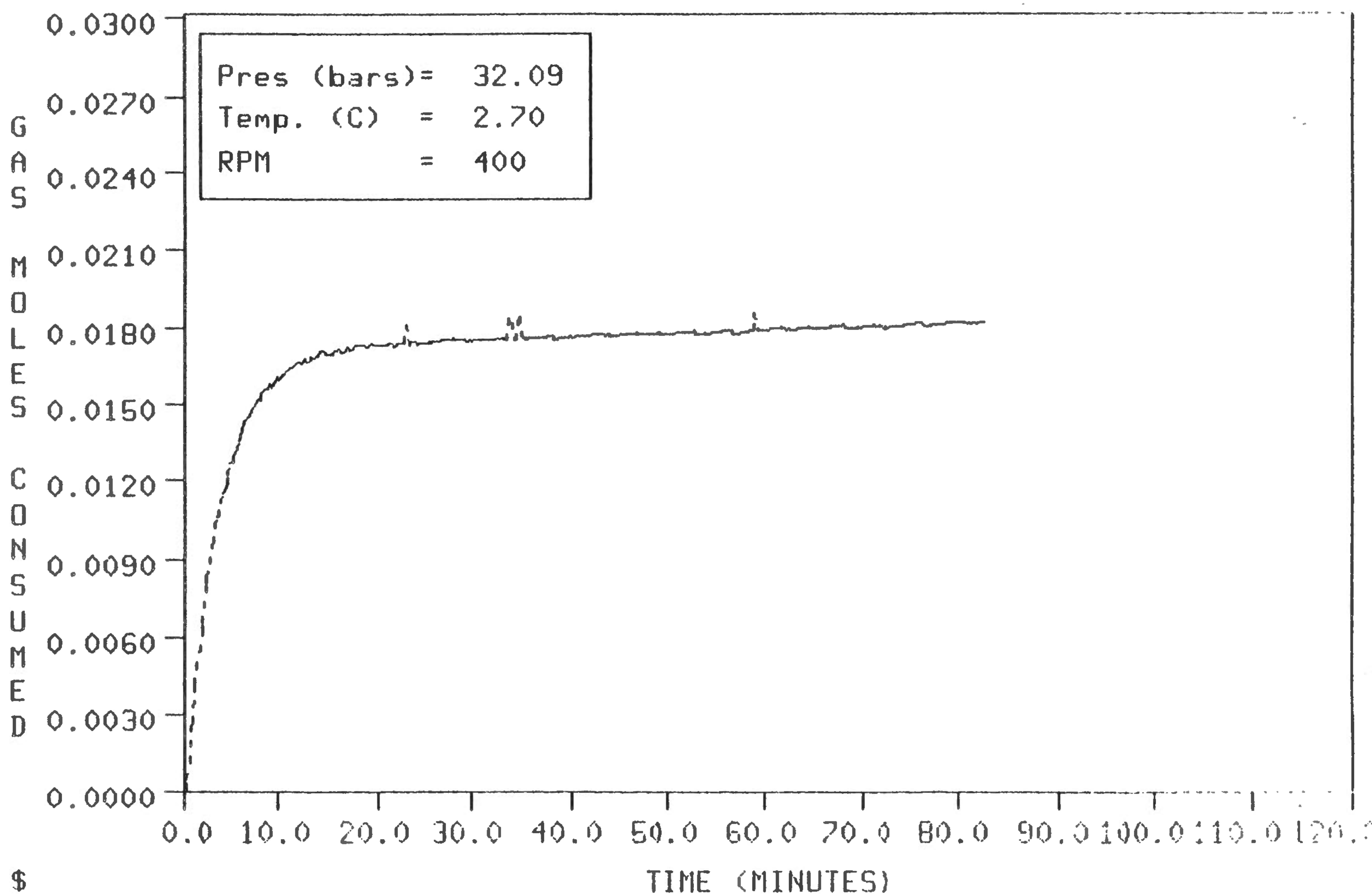
RUNMETHAN-T36__09/10/84



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T37__09/11/84



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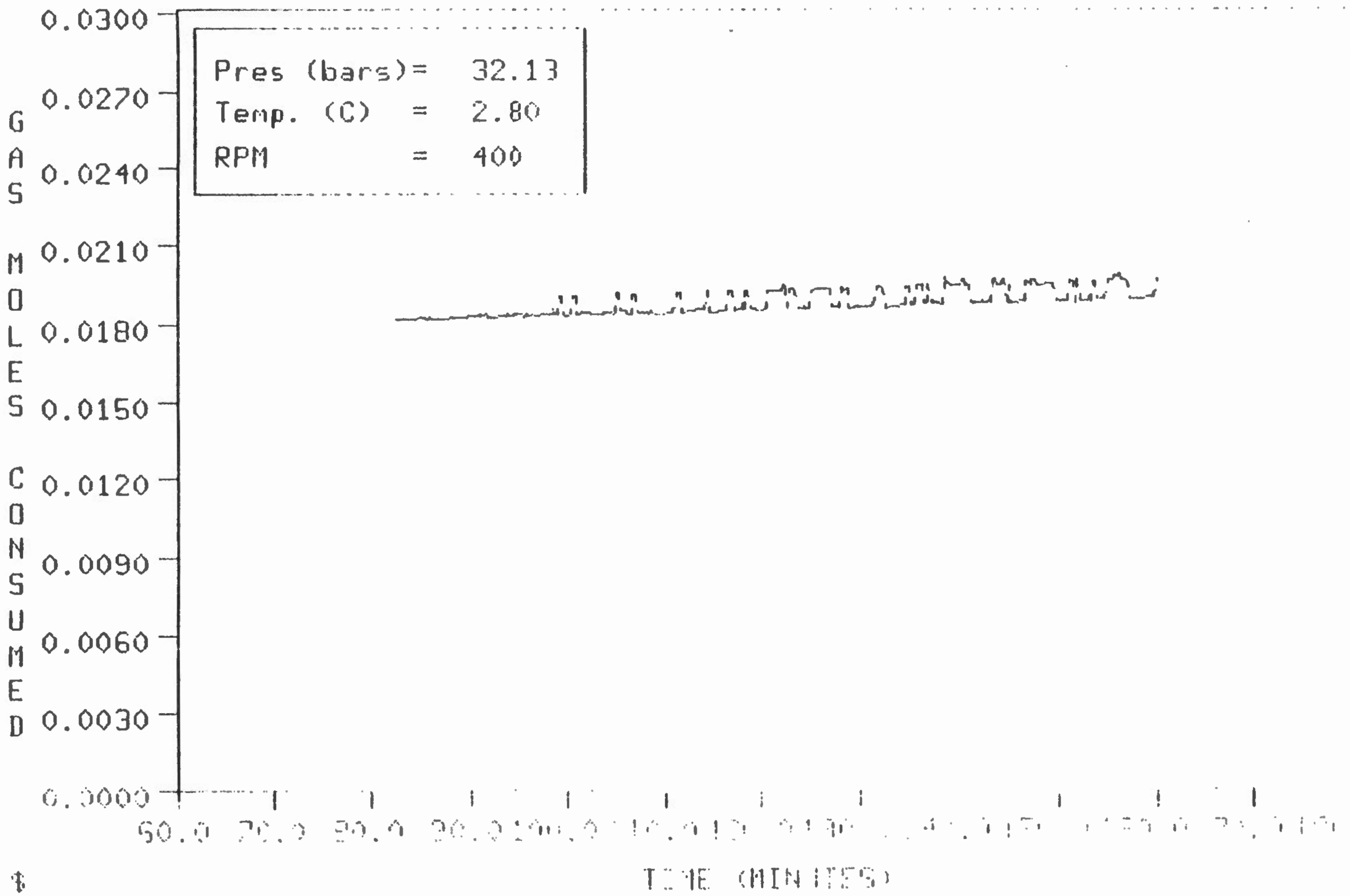
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

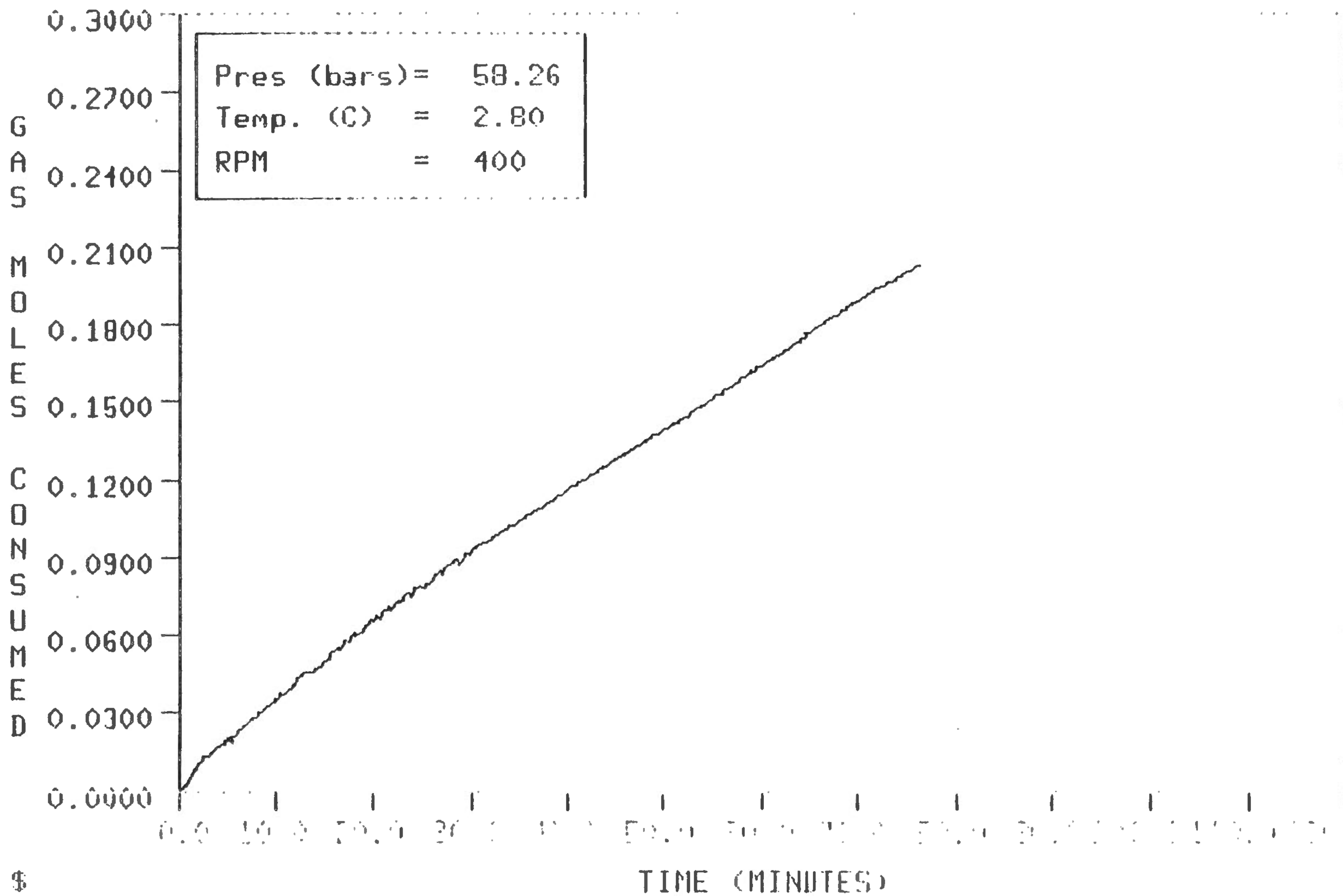
RUNMETHAN-T37__09/11/84

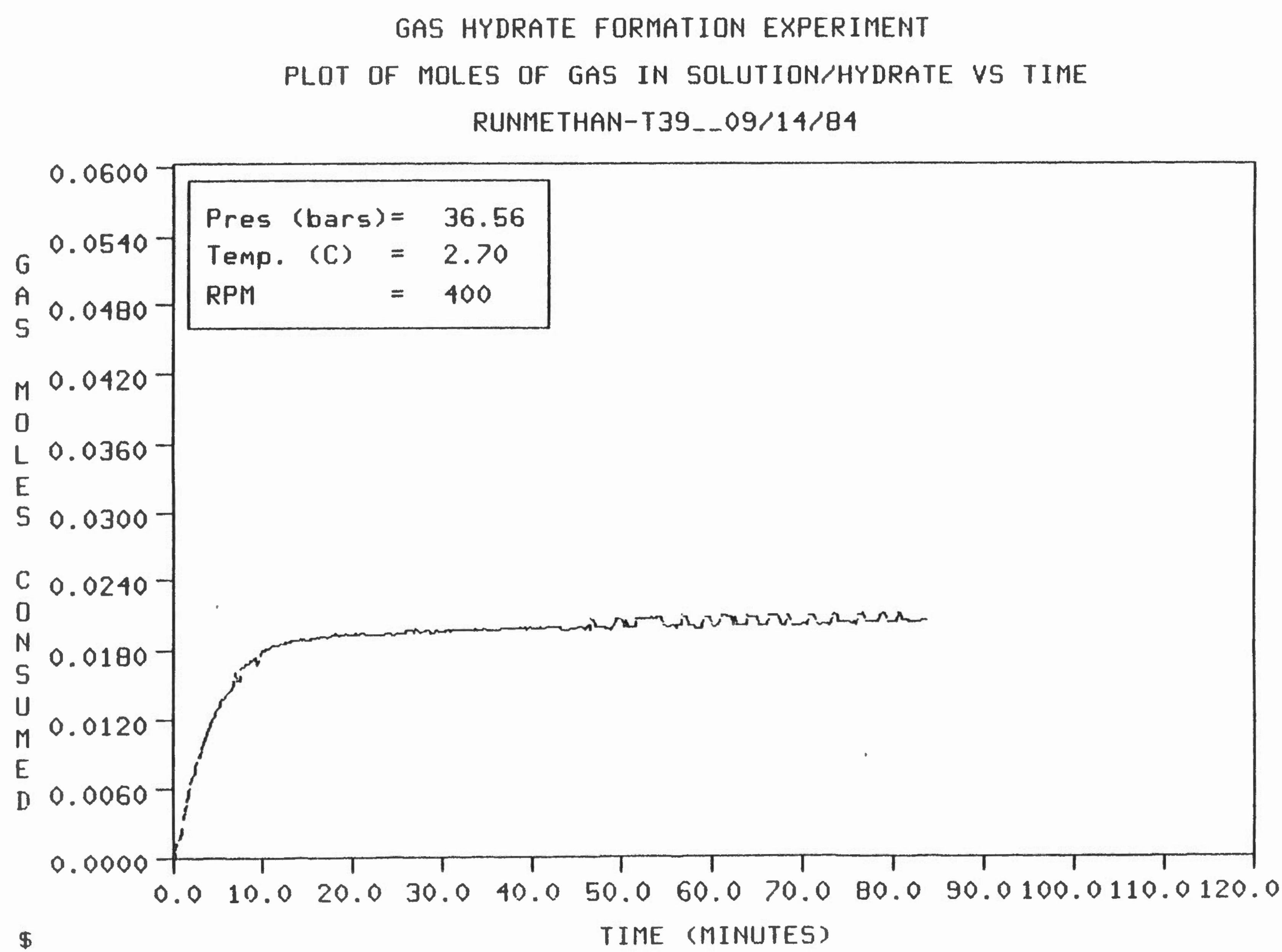


GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T38__09/13/84

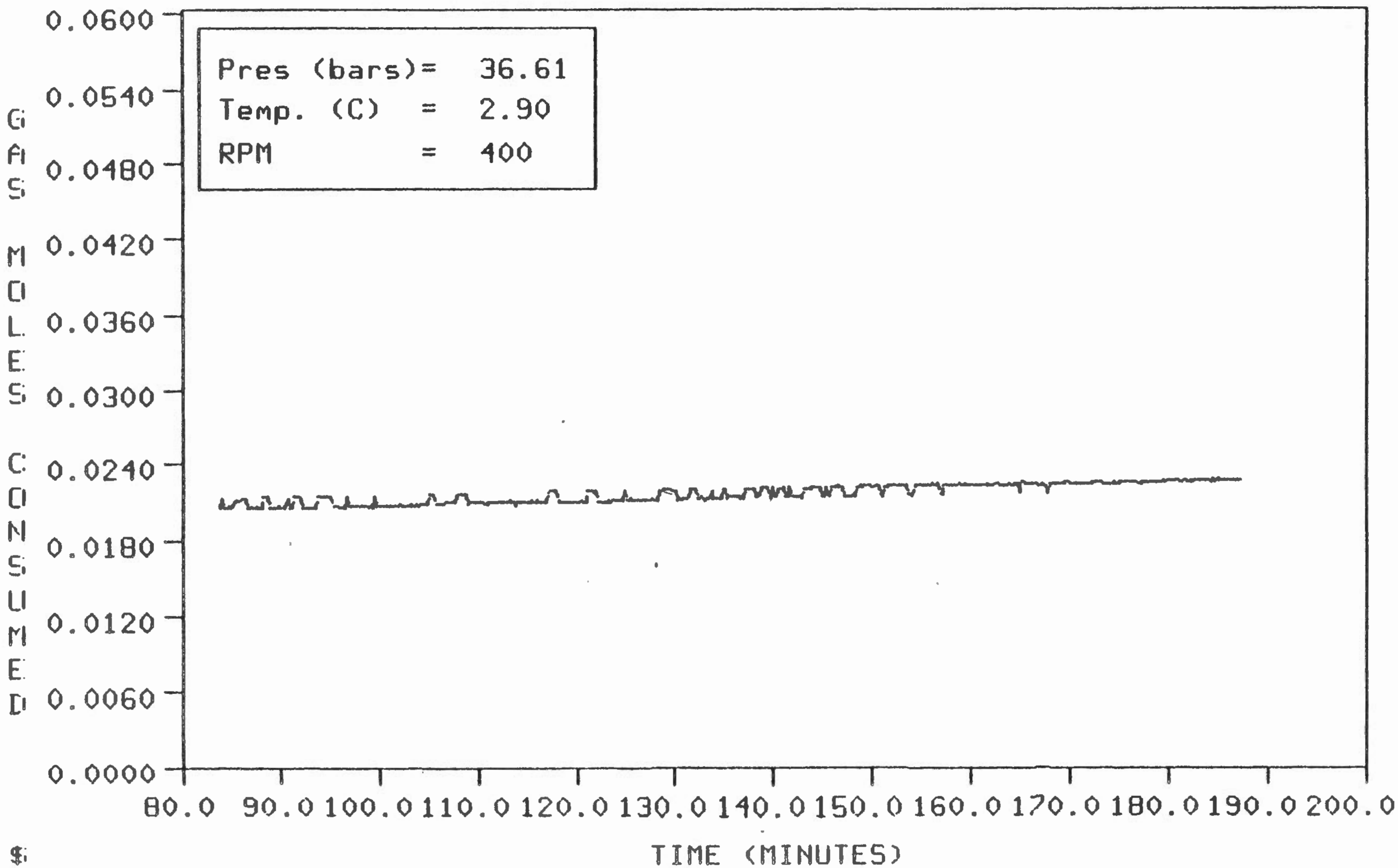



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T39__09/14/84
Pres (bars)= 36.56
Temp. (C) = 2.70
RPM = 400
GAS MOLES CONSUMED
0.0600
0.0540
0.0480
0.0420
0.0360
0.0300
0.0240
0.0180
0.0120
0.0060
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

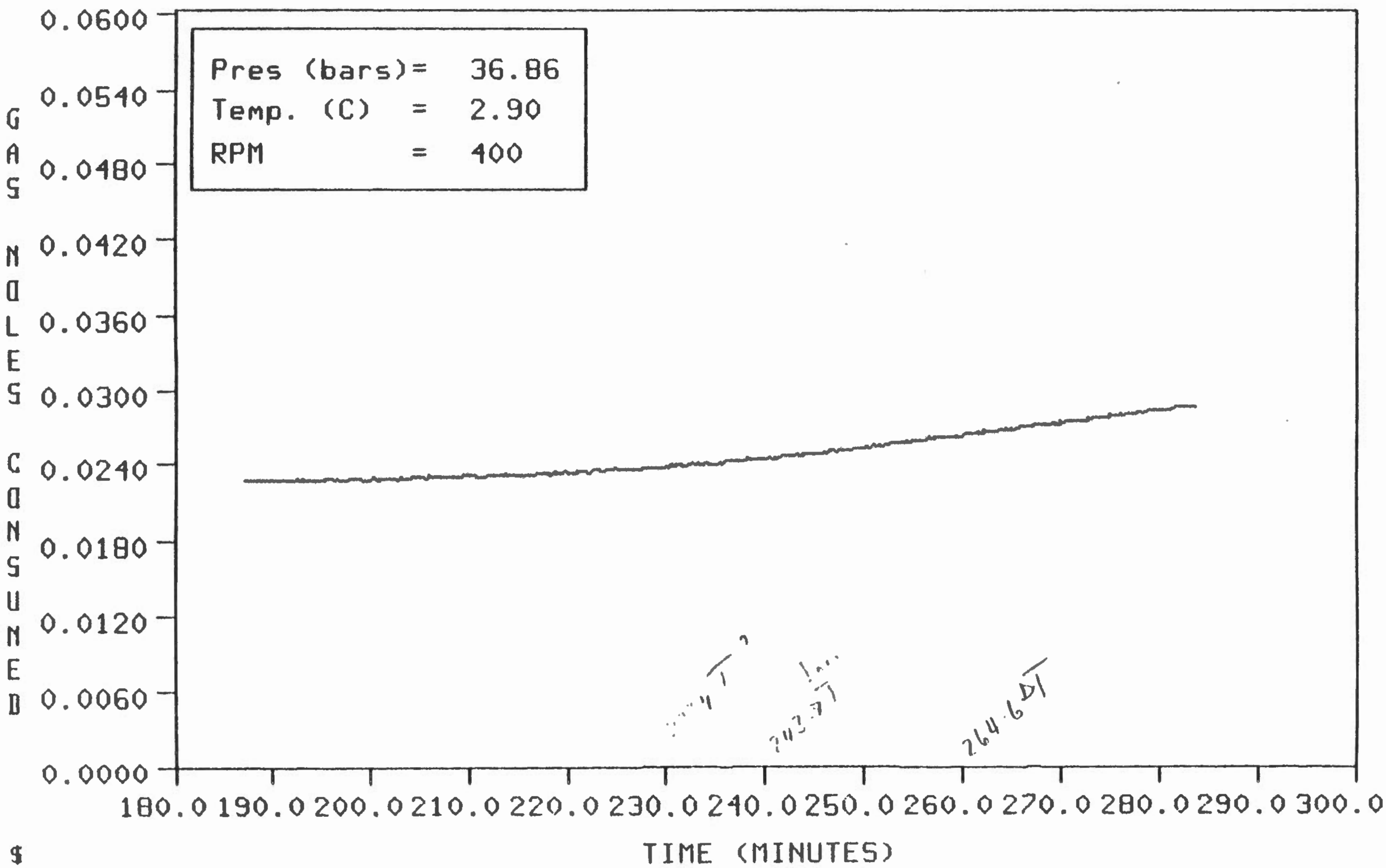
RUNMETHAN-T39__09/14/84



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

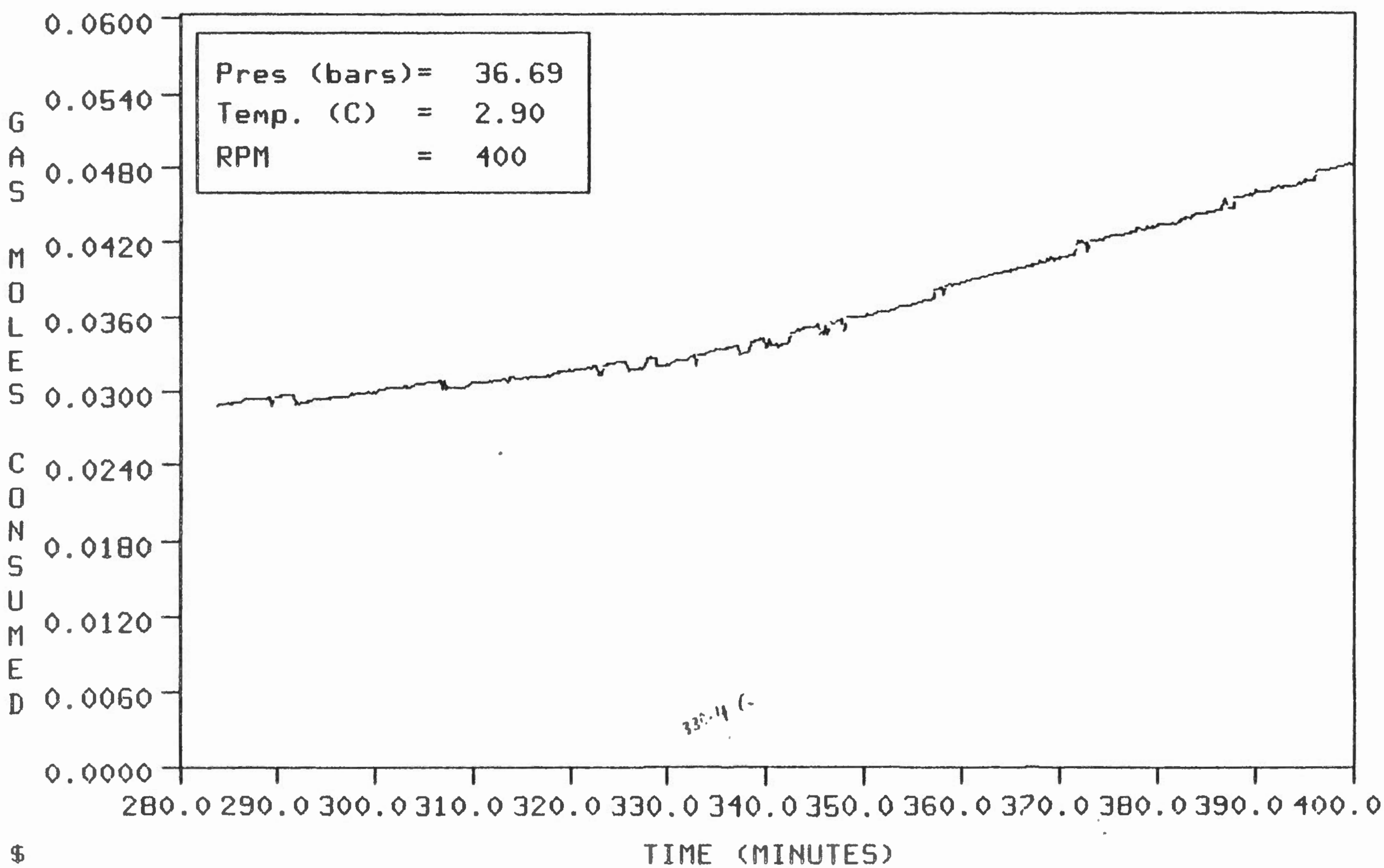
RUNMETHAN-T39__09/14/84



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T39__09/14/84



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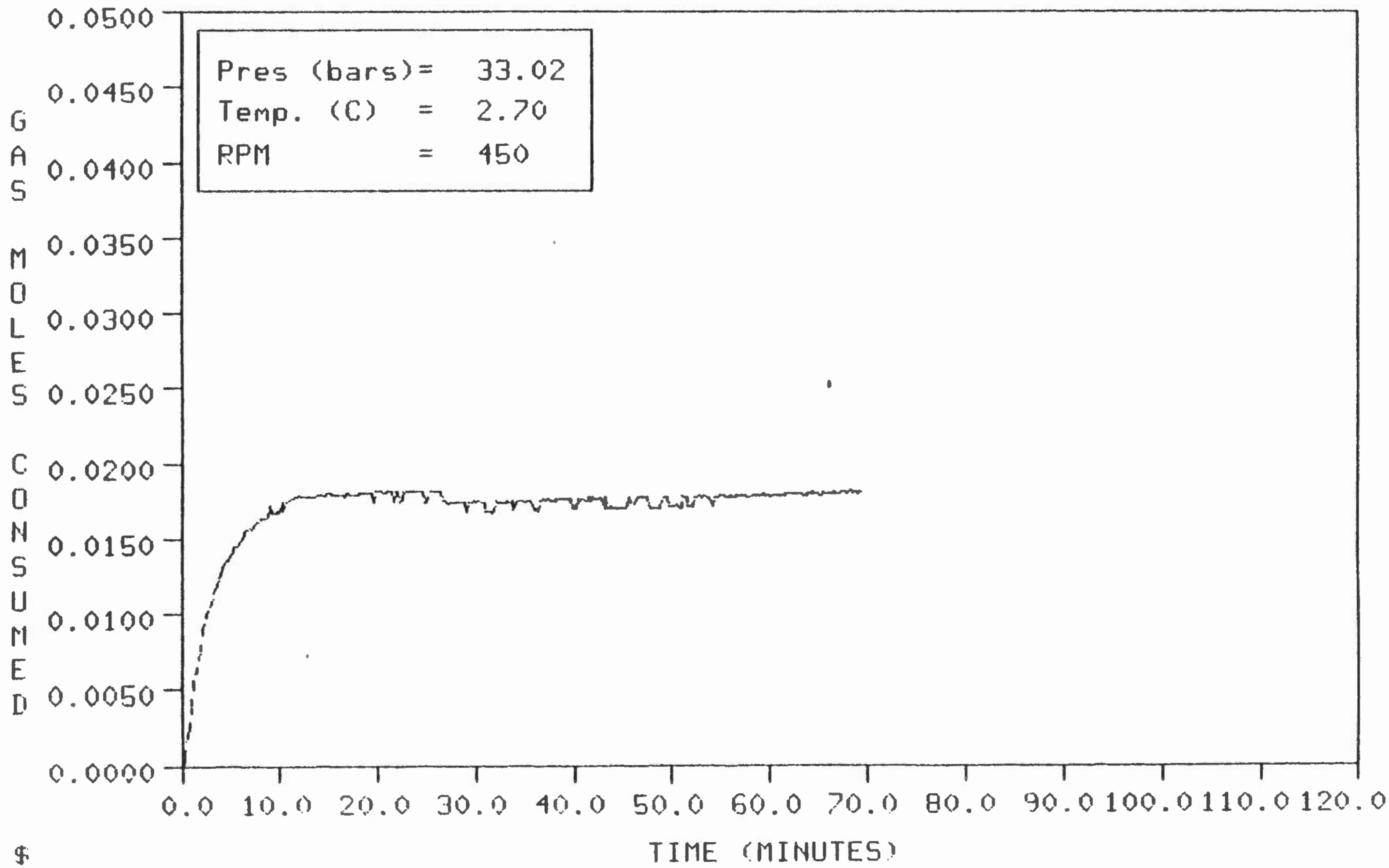
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T40__09/17/84



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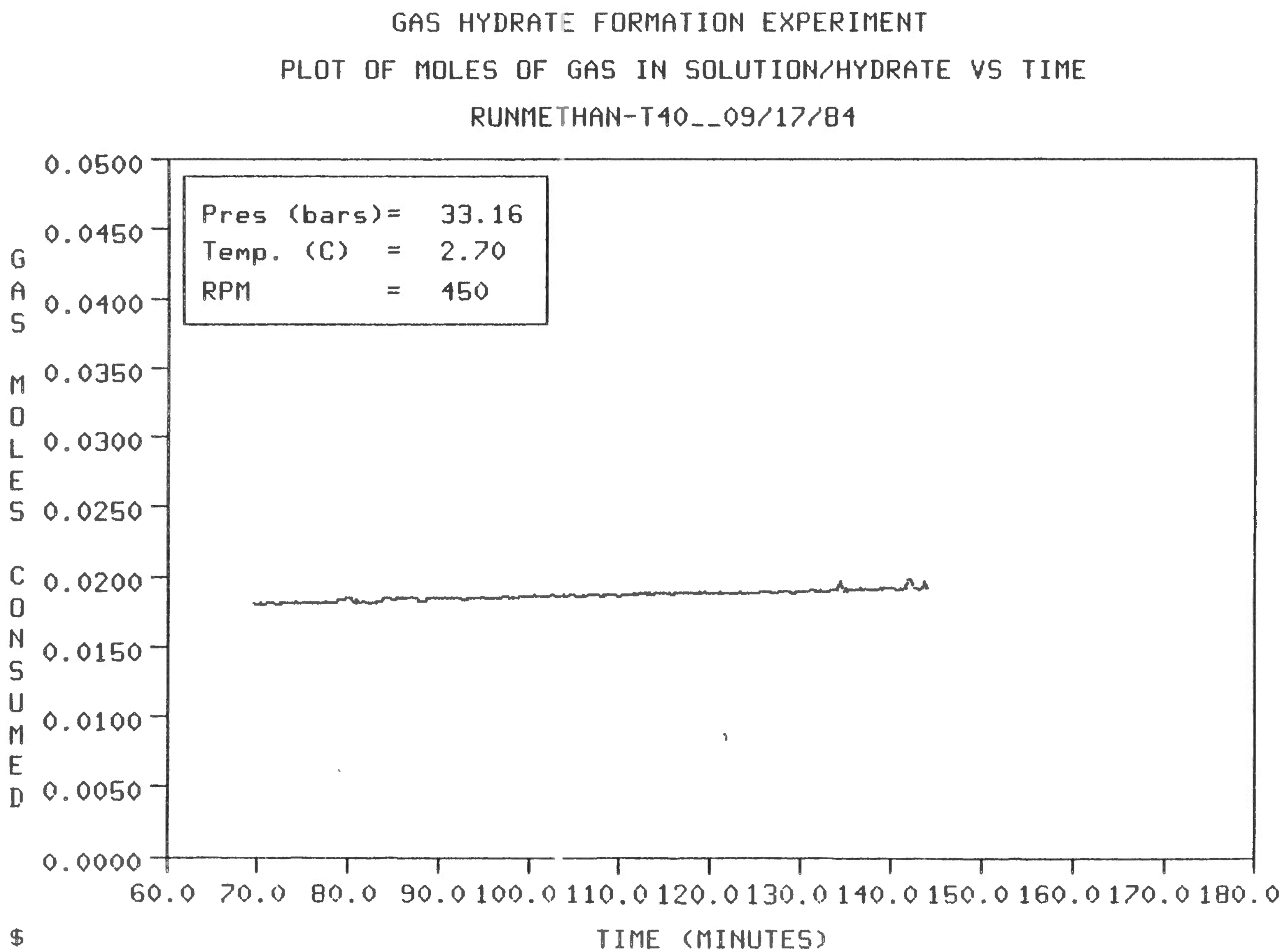
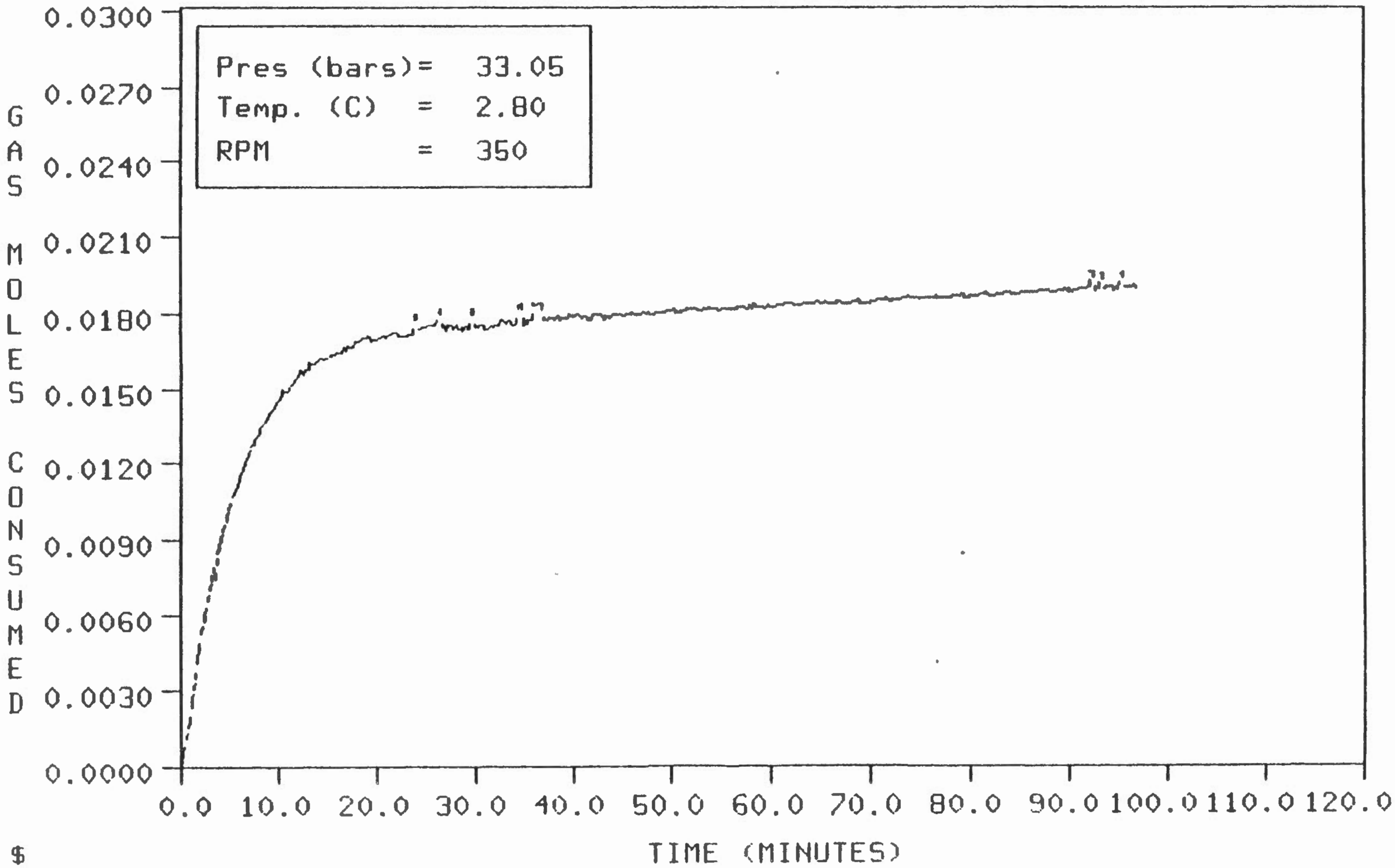


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T40__09/17/84
Pres (bars)= 33.16
Temp. (C) = 2.70
RPM = 450
GAS MOLES CONSUMED
0.0500
0.0450
0.0400
0.0350
0.0300
0.0250
0.0200
0.0150
0.0100
0.0050
0.0000
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T41__09/18/84



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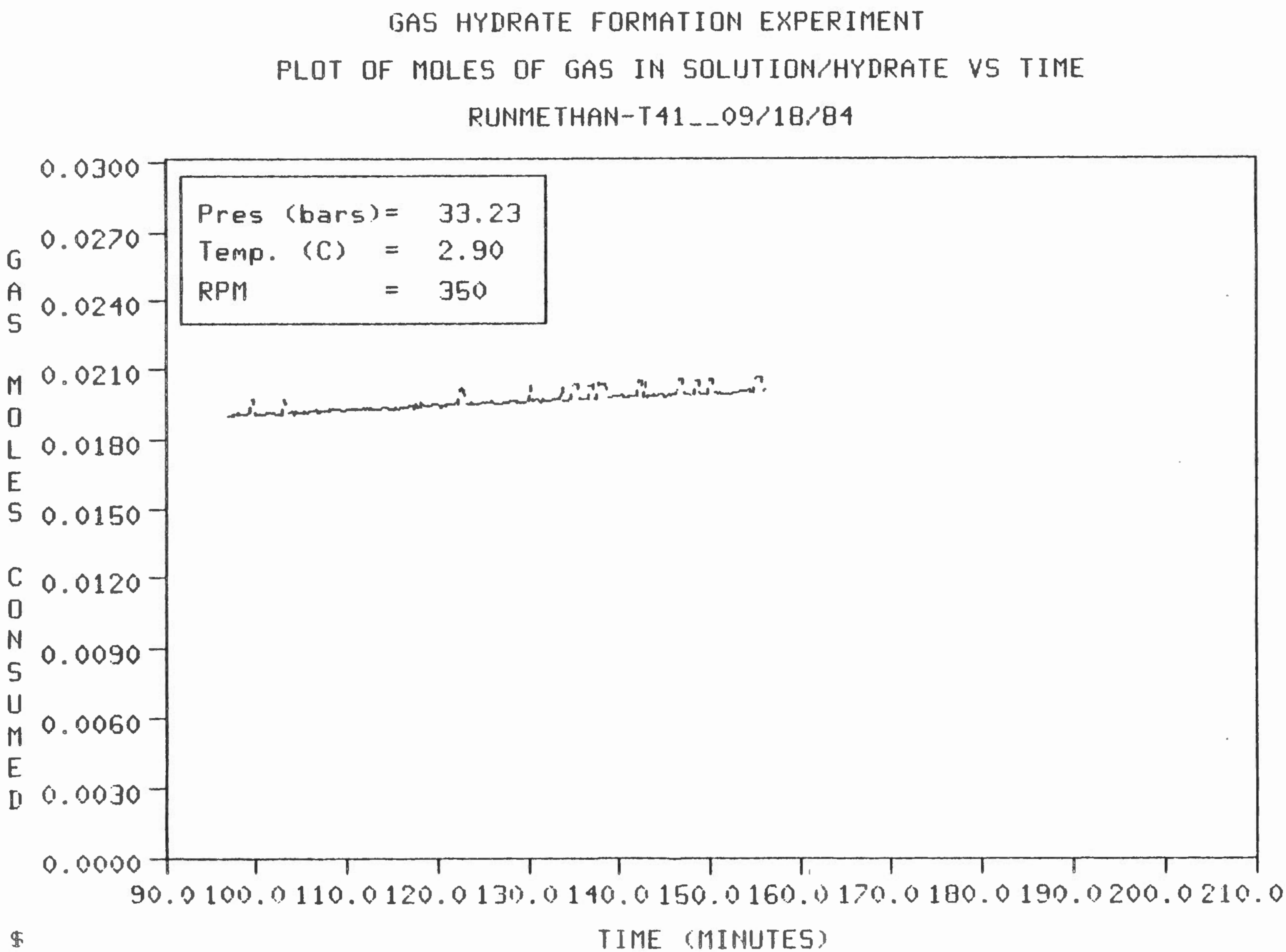
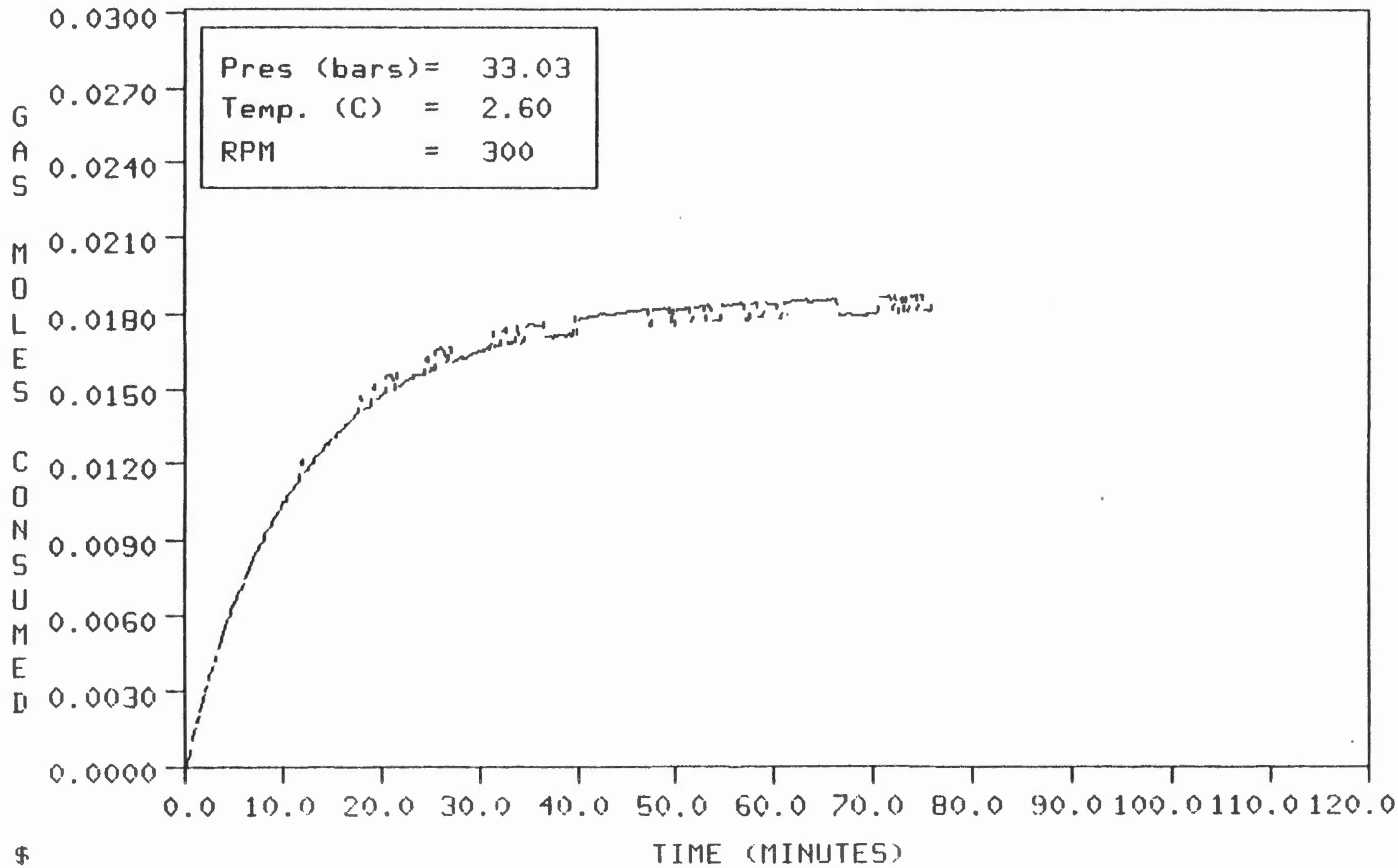

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T41__09/18/84
Pres (bars)= 33.23
Temp. (C) = 2.90
RPM = 350
GAS MOLES CONSUMED
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0
TIME (MINUTES)

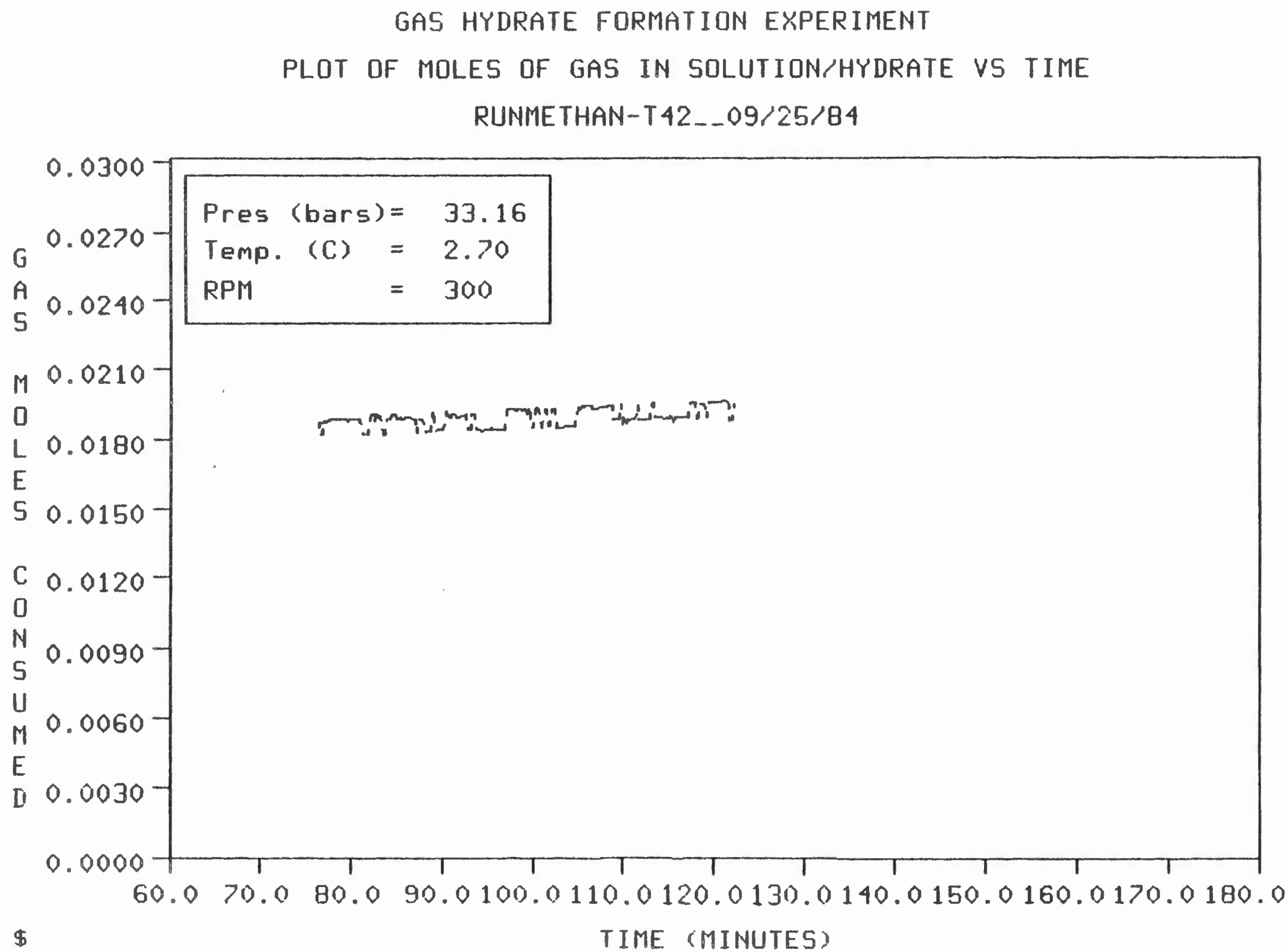
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T42__09/25/84



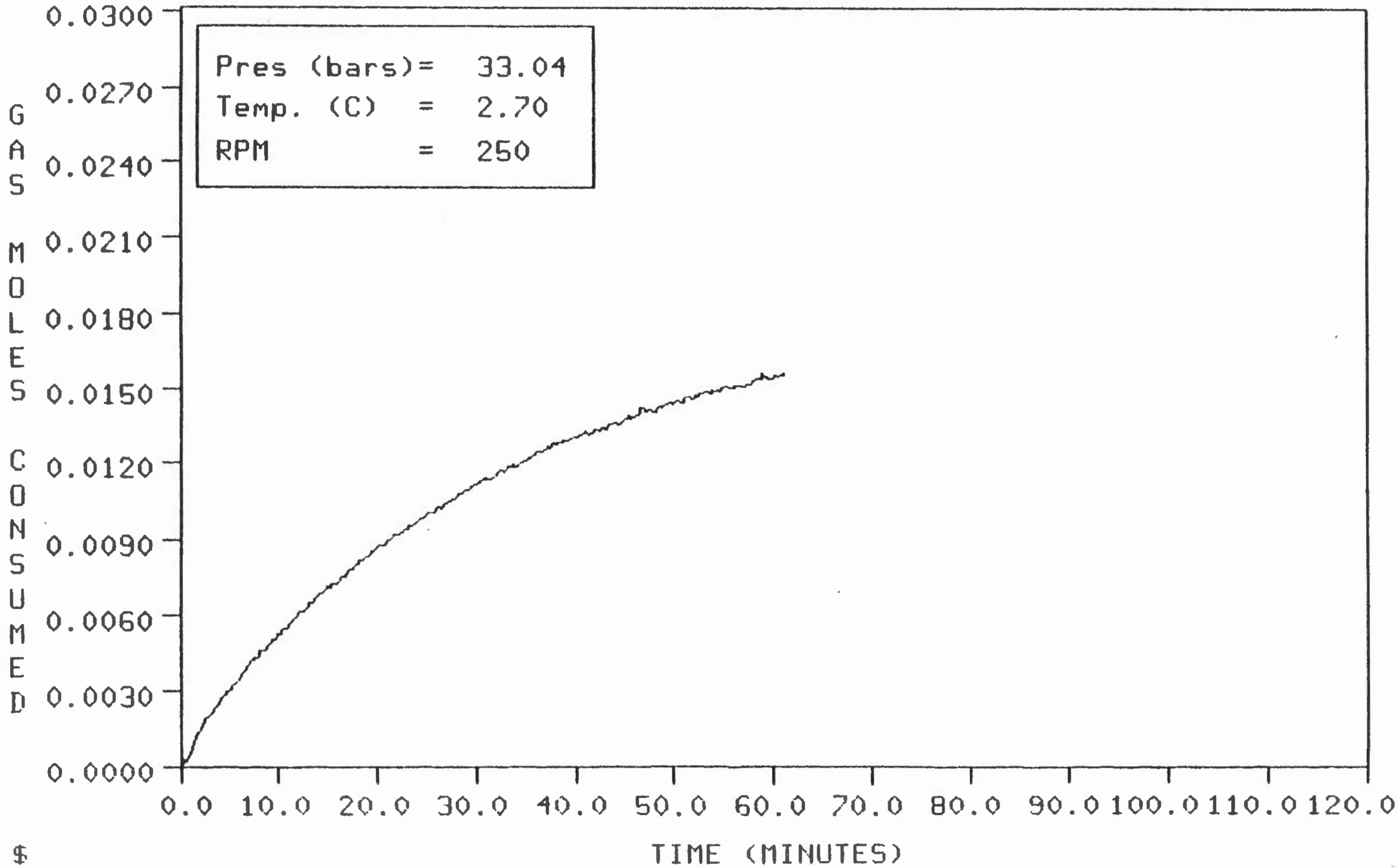

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T42__09/25/84
Pres (bars)= 33.16
Temp. (C) = 2.70
RPM = 300
GAS MOLES CONSUMED
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
TIME (MINUTES)
$

$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T43__09/26/84



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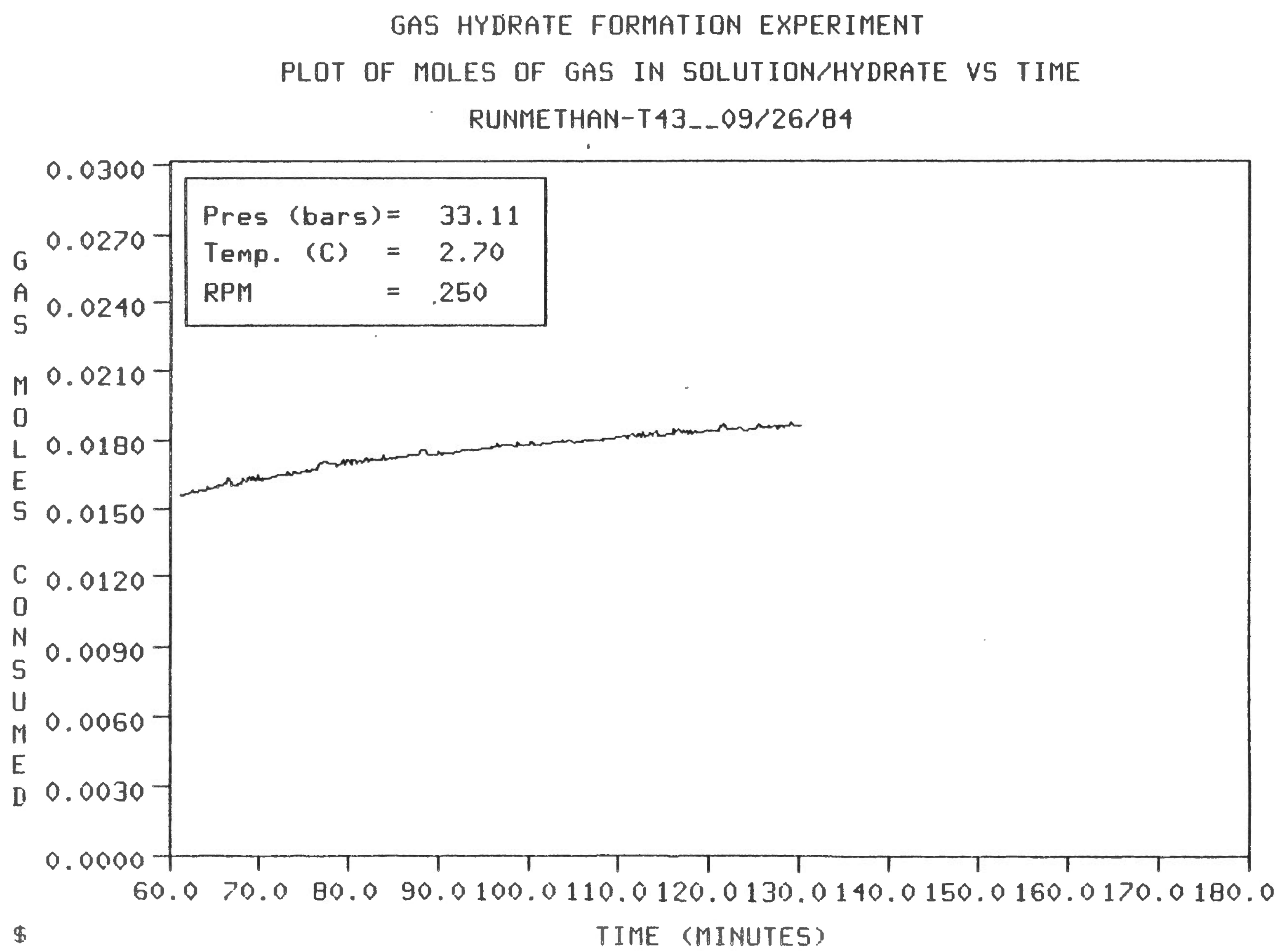
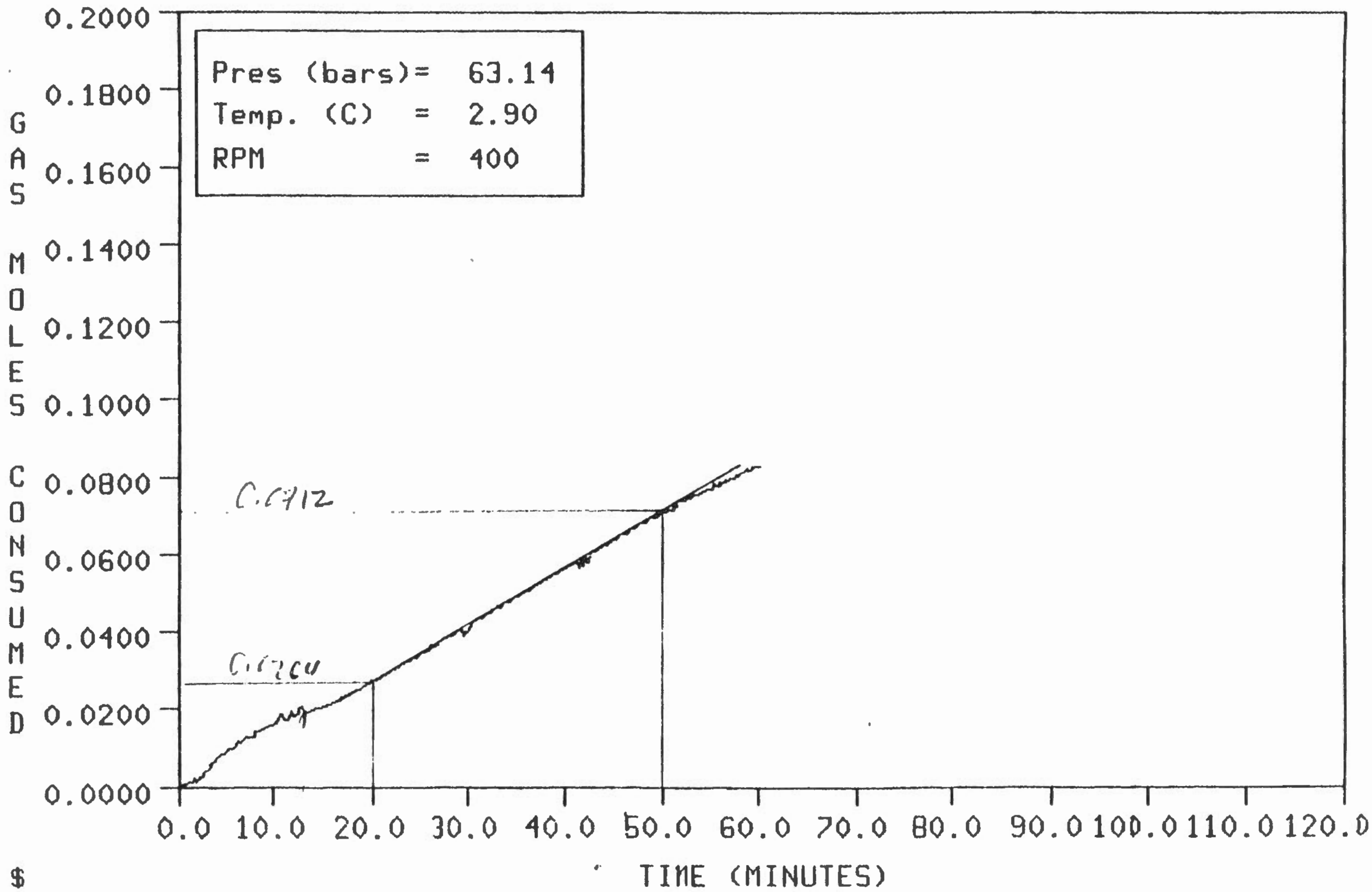

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T43__09/26/84
Pres (bars)= 33.11
Temp. (C) = 2.70
RPM = 250
GAS MOLES CONSUMED
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T45__03/10/84



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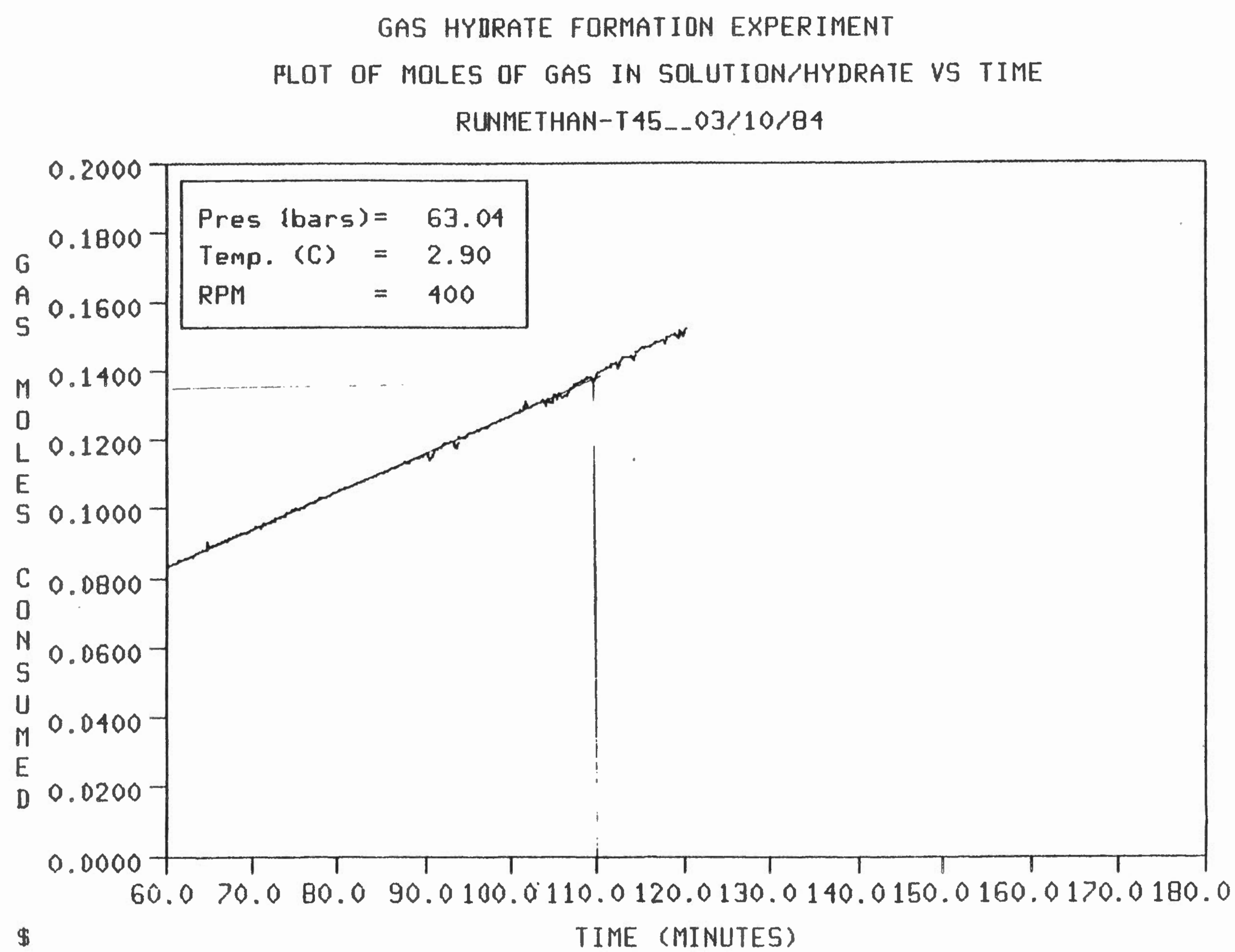
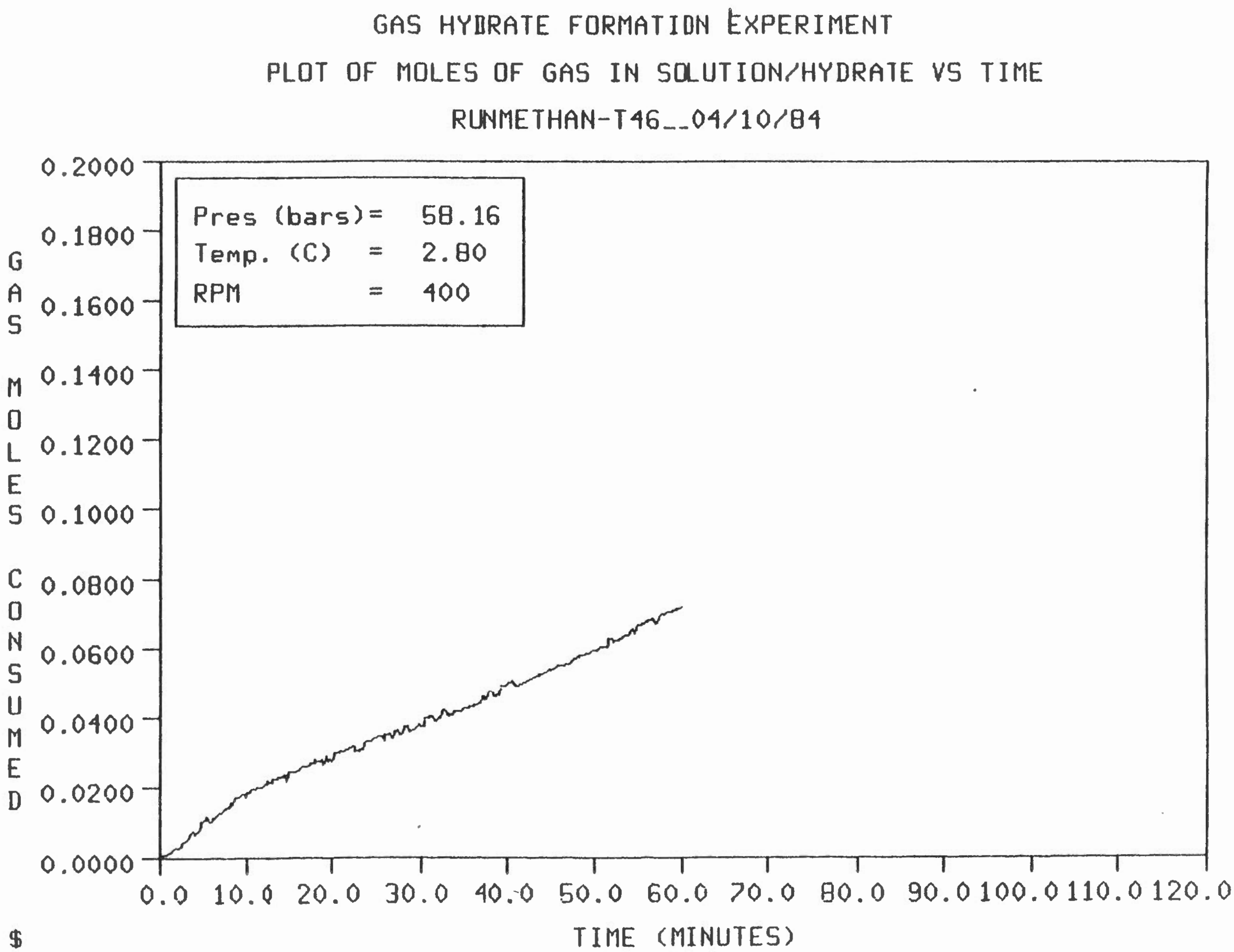
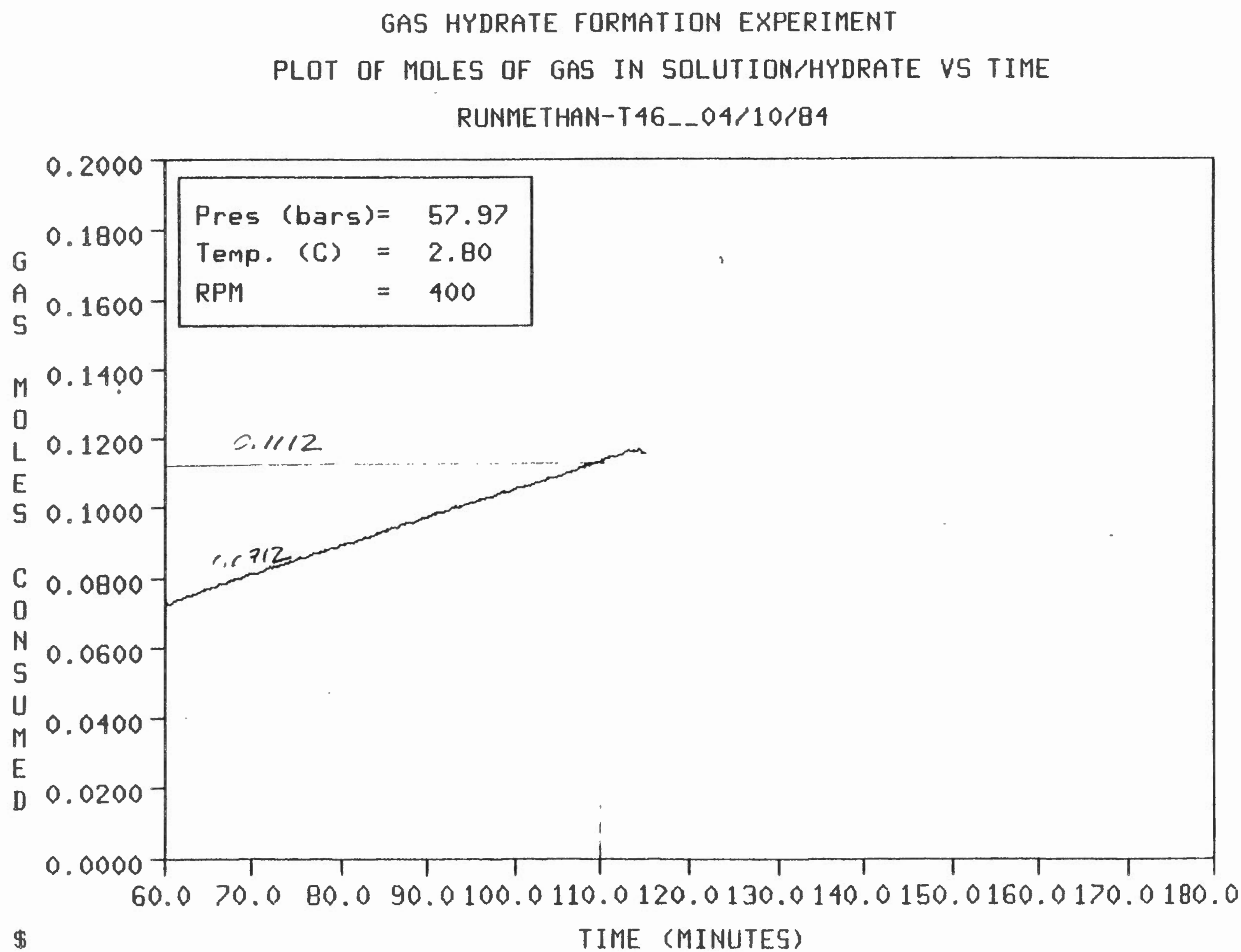
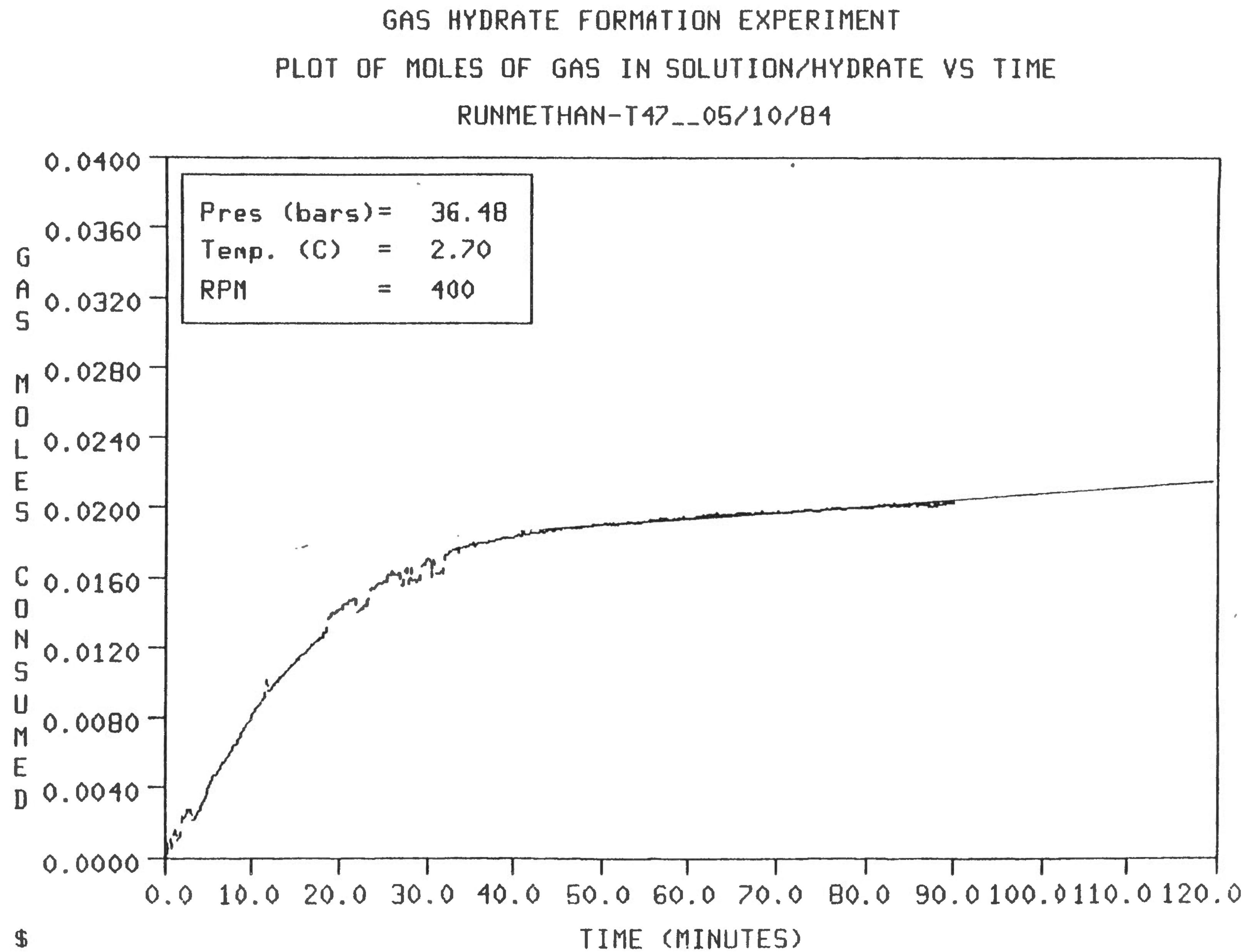

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T45__03/10/84
Pres (bars)= 63.04
Temp. (C) = 2.90
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T46__04/10/84
Pres (bars)= 58.16
Temp. (C) = 2.80
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)
$

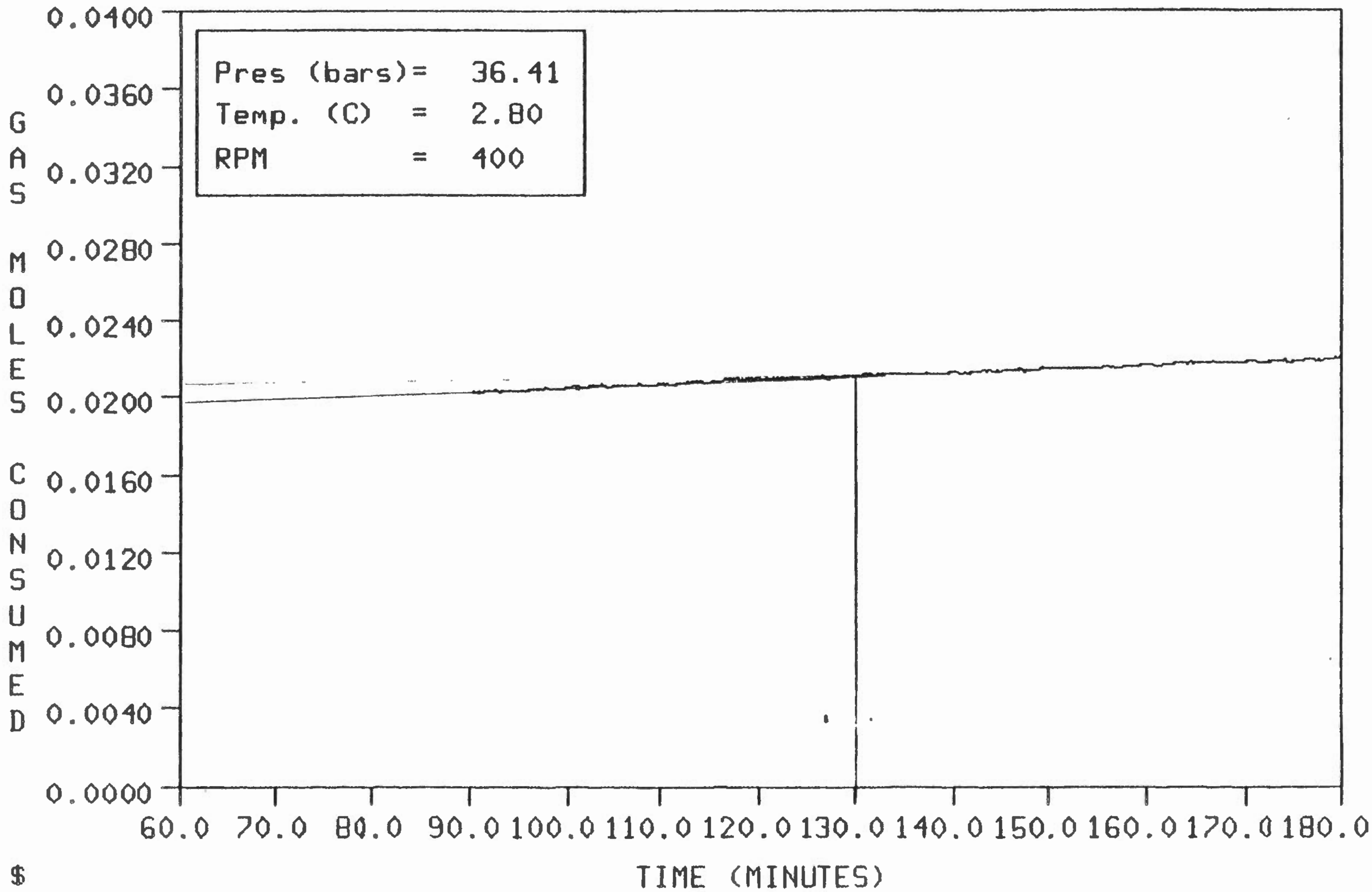

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T46__04/10/84
Pres (bars)= 57.97
Temp. (C) = 2.80
RPM = 400
0.1112
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T47__05/10/84
Pres (bars)= 36.48
Temp. (C) = 2.70
RPM = 400
GAS MOLES CONSUMED
0.0400
0.0360
0.0320
0.0280
0.0240
0.0200
0.0160
0.0120
0.0080
0.0040
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T47__05/10/84



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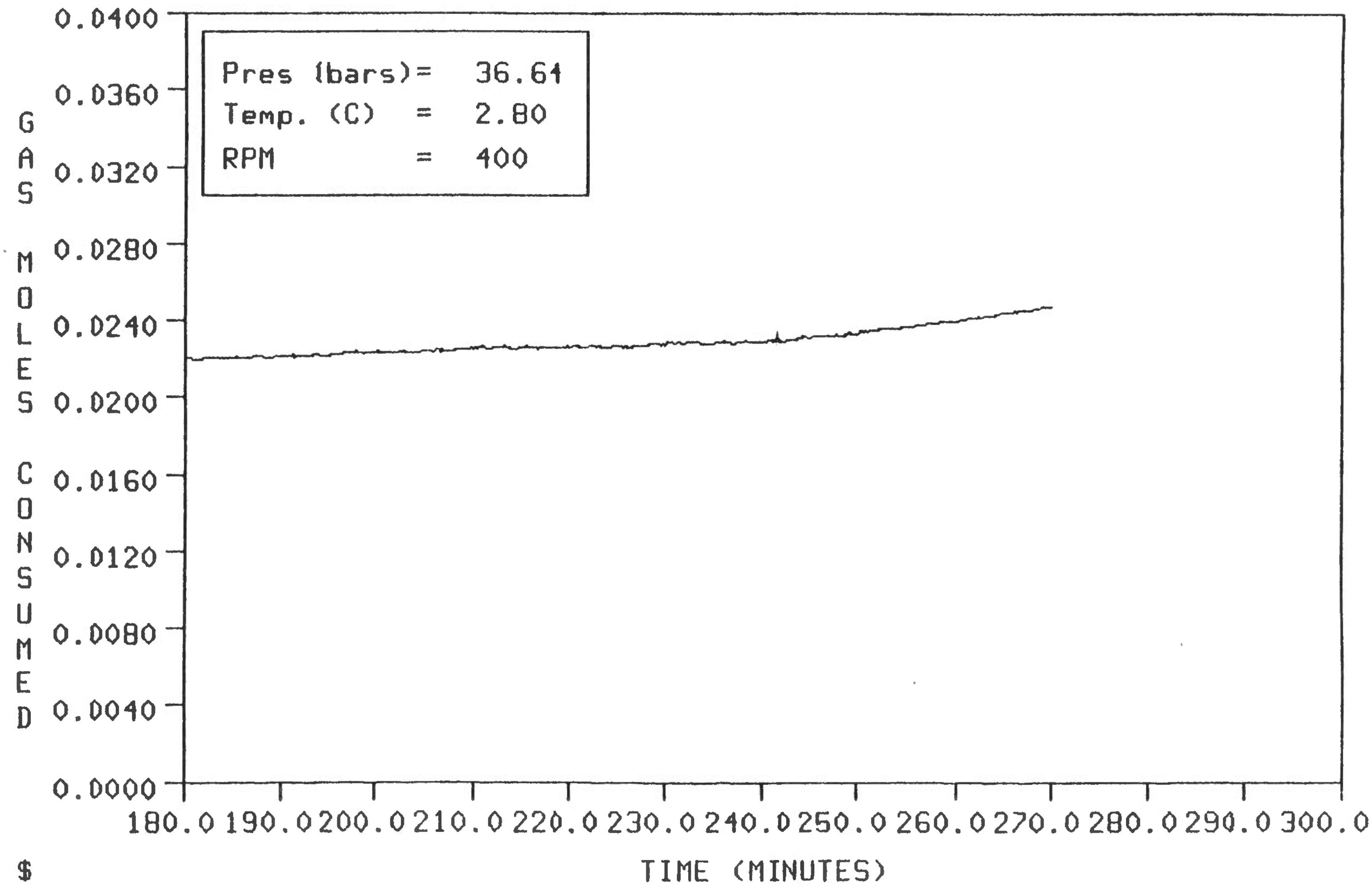
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T47__05/10/84



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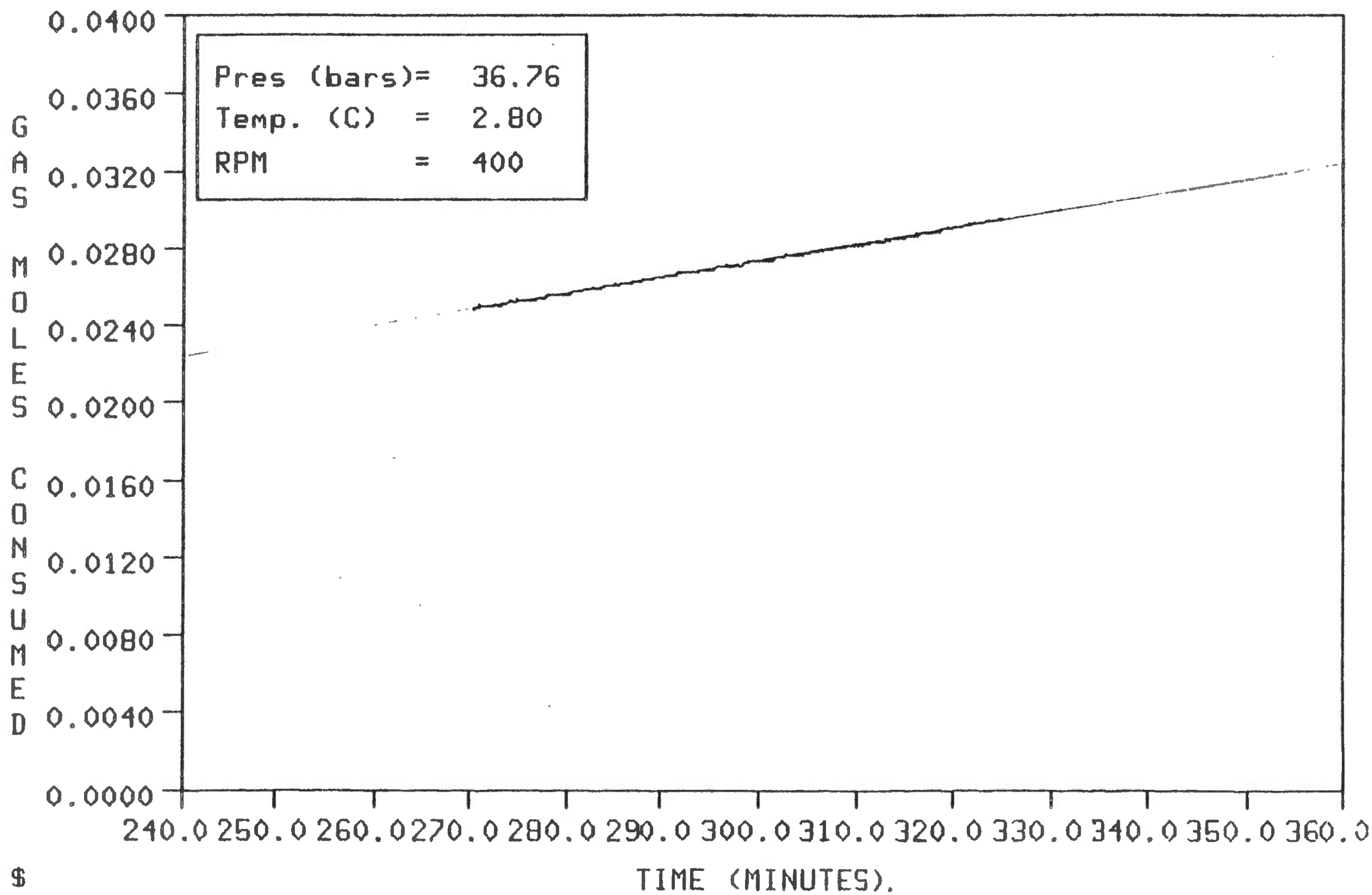
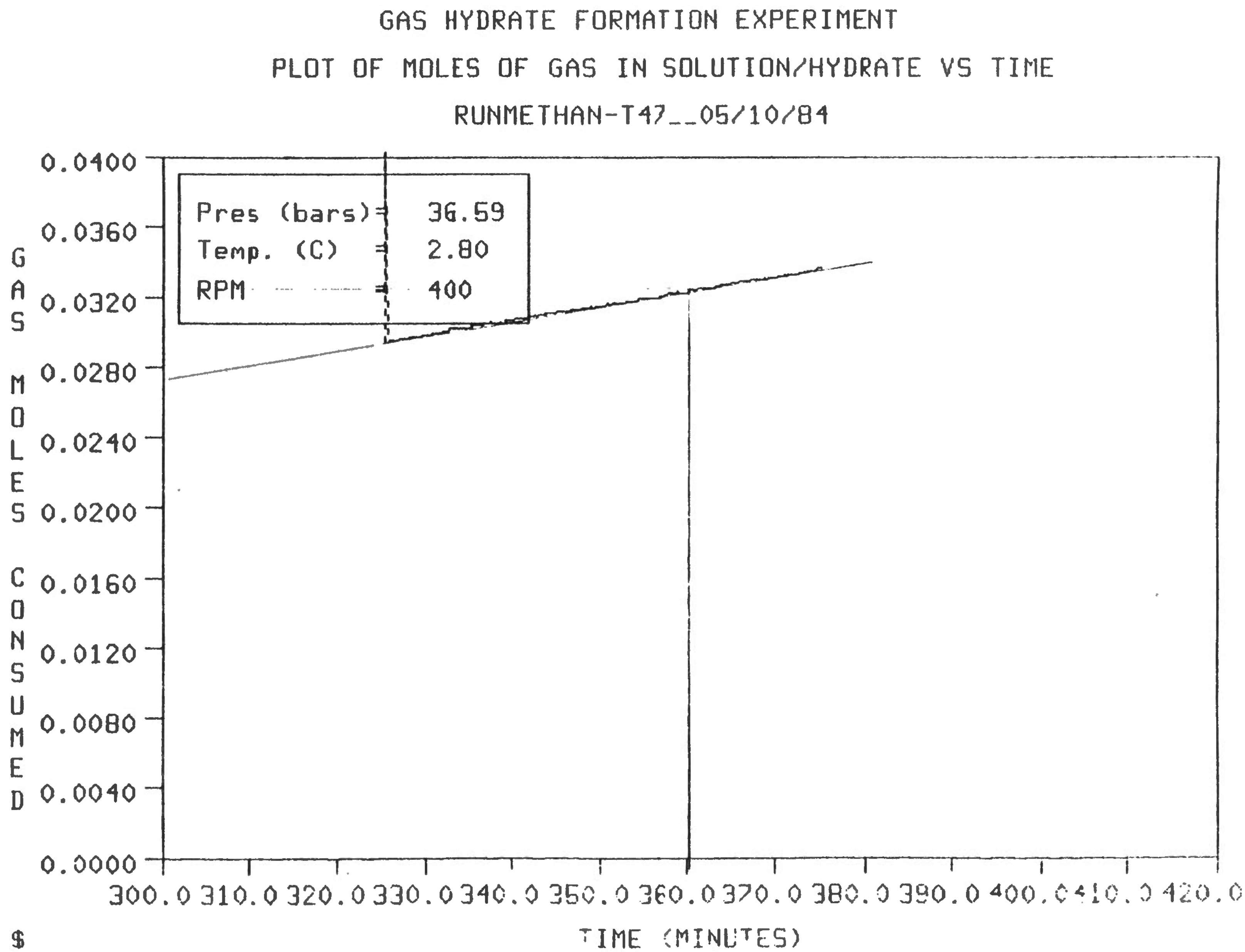
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T47__05/10/84

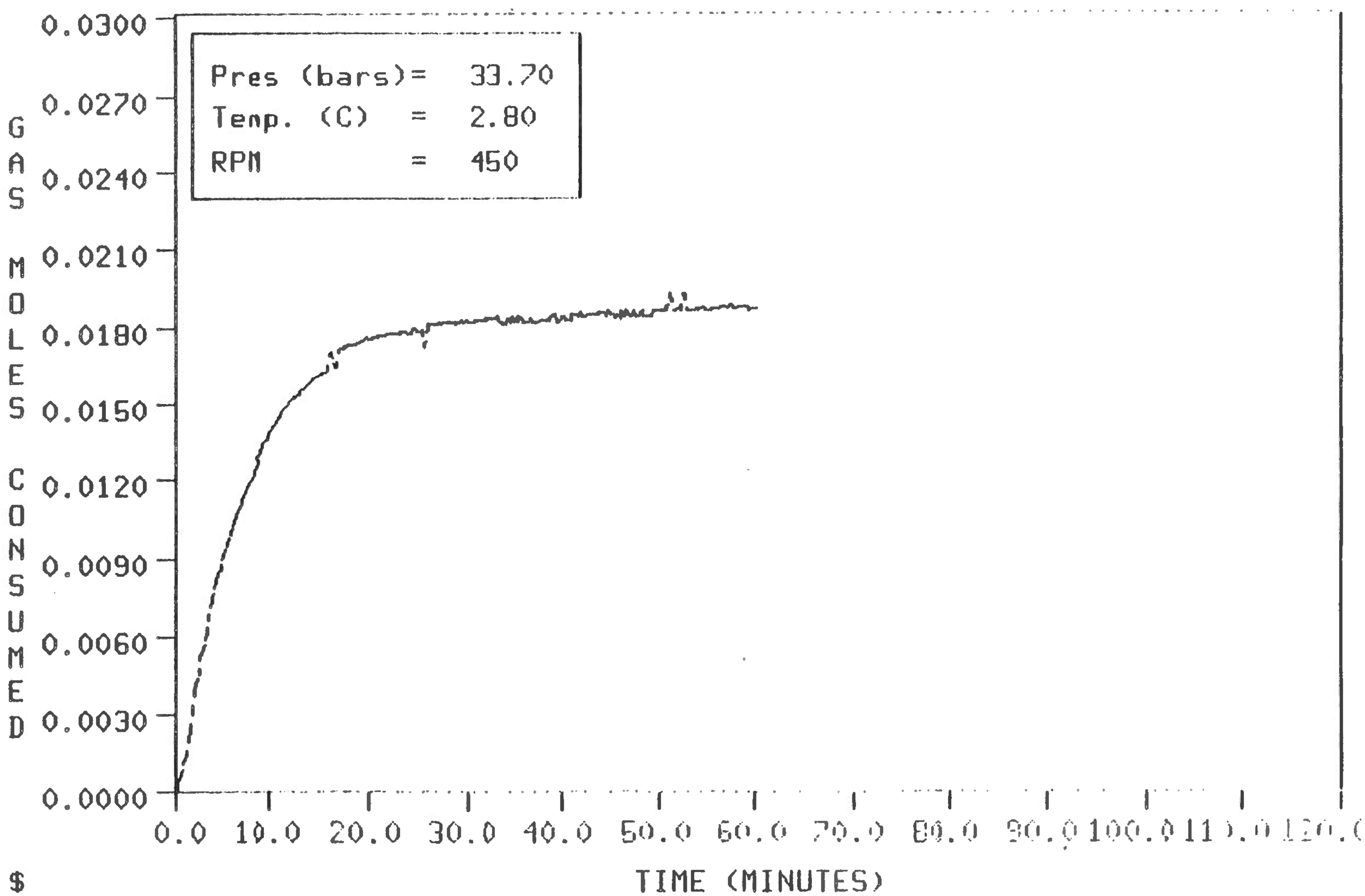



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T47__05/10/84
Pres (bars) = 36.59
Temp. (C) = 2.80
RPM = 400
GAS MOLES CONSUMED
0.0400
0.0360
0.0320
0.0280
0.0240
0.0200
0.0160
0.0120
0.0080
0.0040
0.0000
300.0 310.0 320.0 330.0 340.0 350.0 360.0 370.0 380.0 390.0 400.0 410.0 420.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

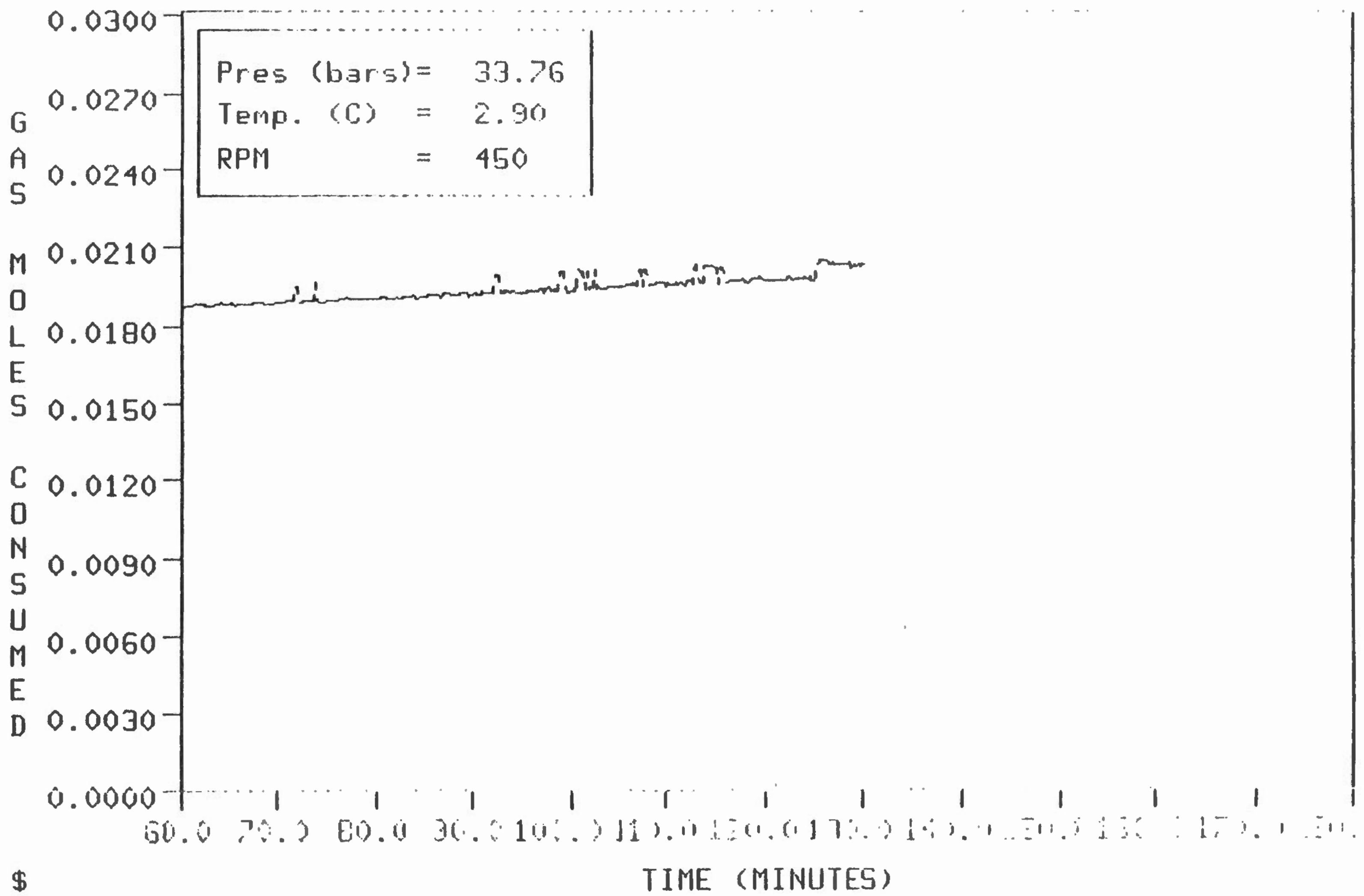
RUNMETHAN-T49__10/10/84



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T49__10/10/84



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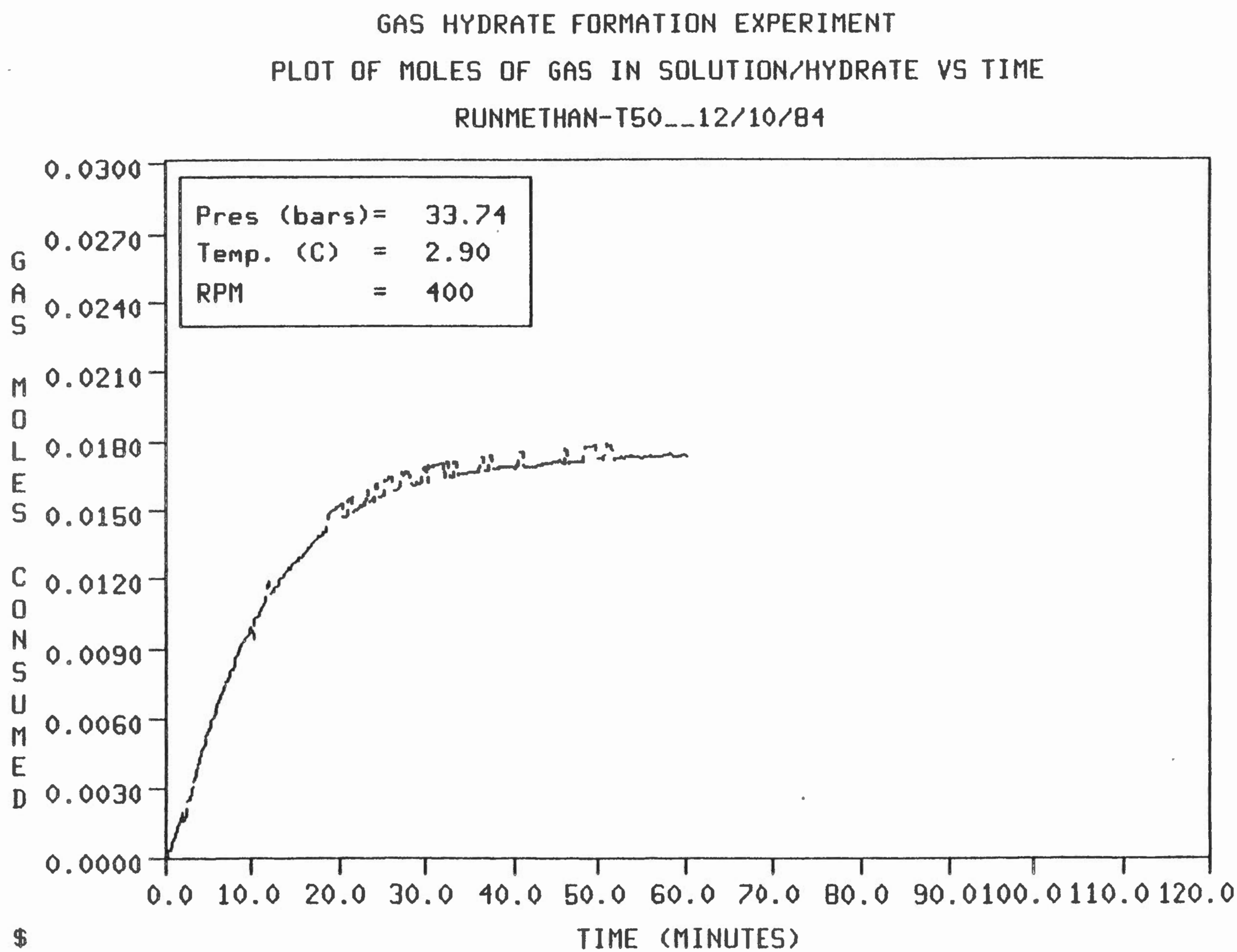
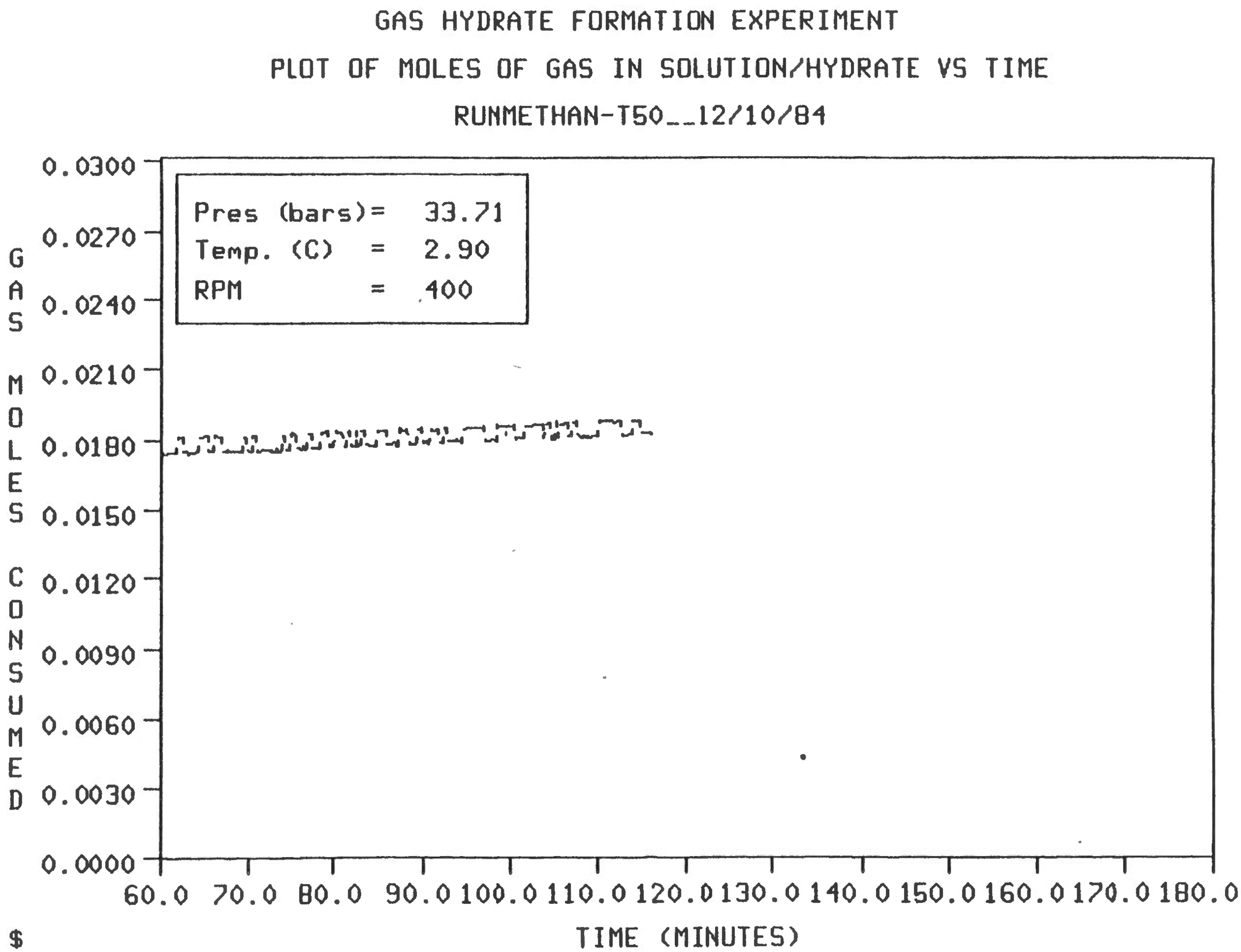
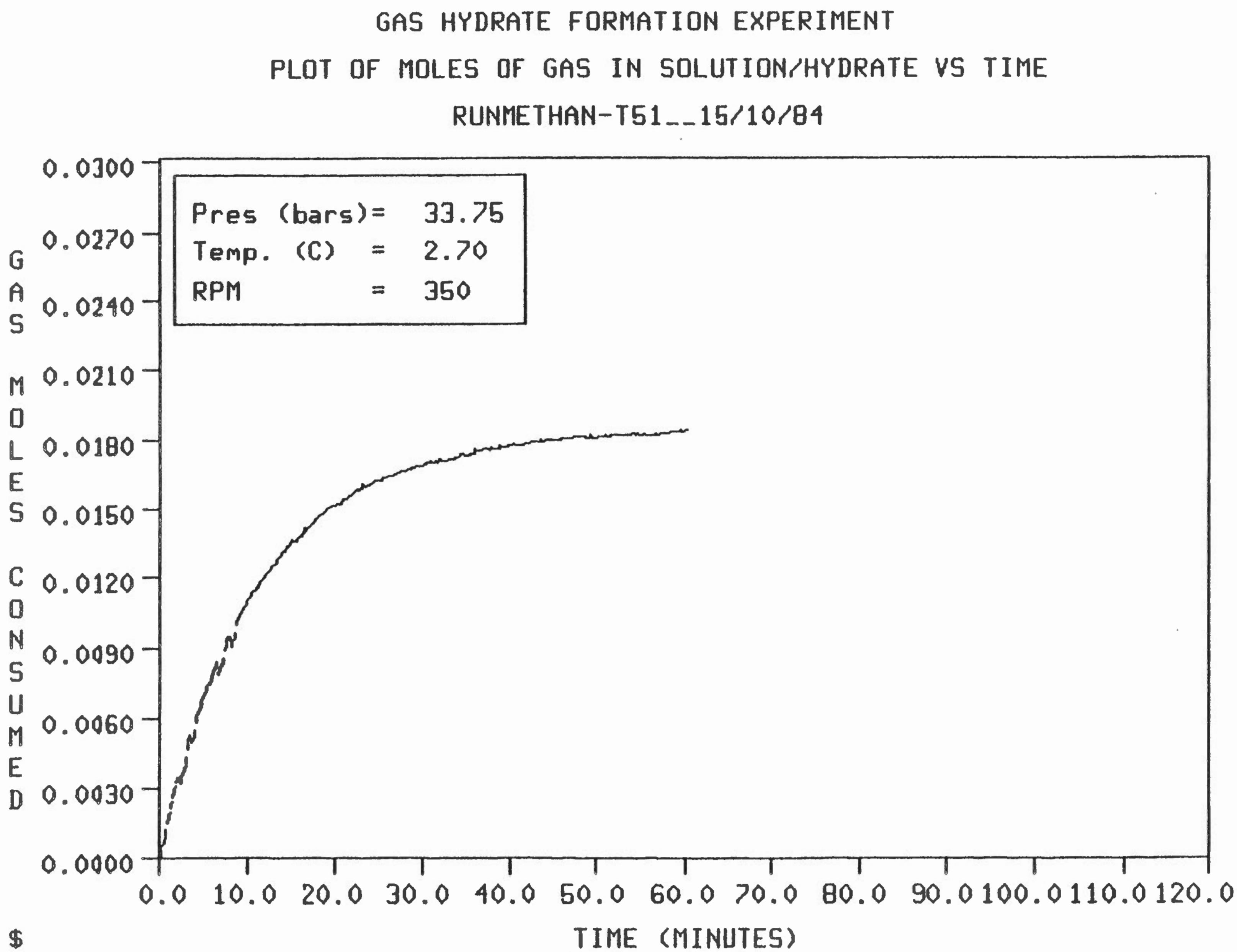

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T50__12/10/84
Pres (bars)= 33.74
Temp. (C) = 2.90
RPM = 400
GAS MOLES CONSUMED
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)
$



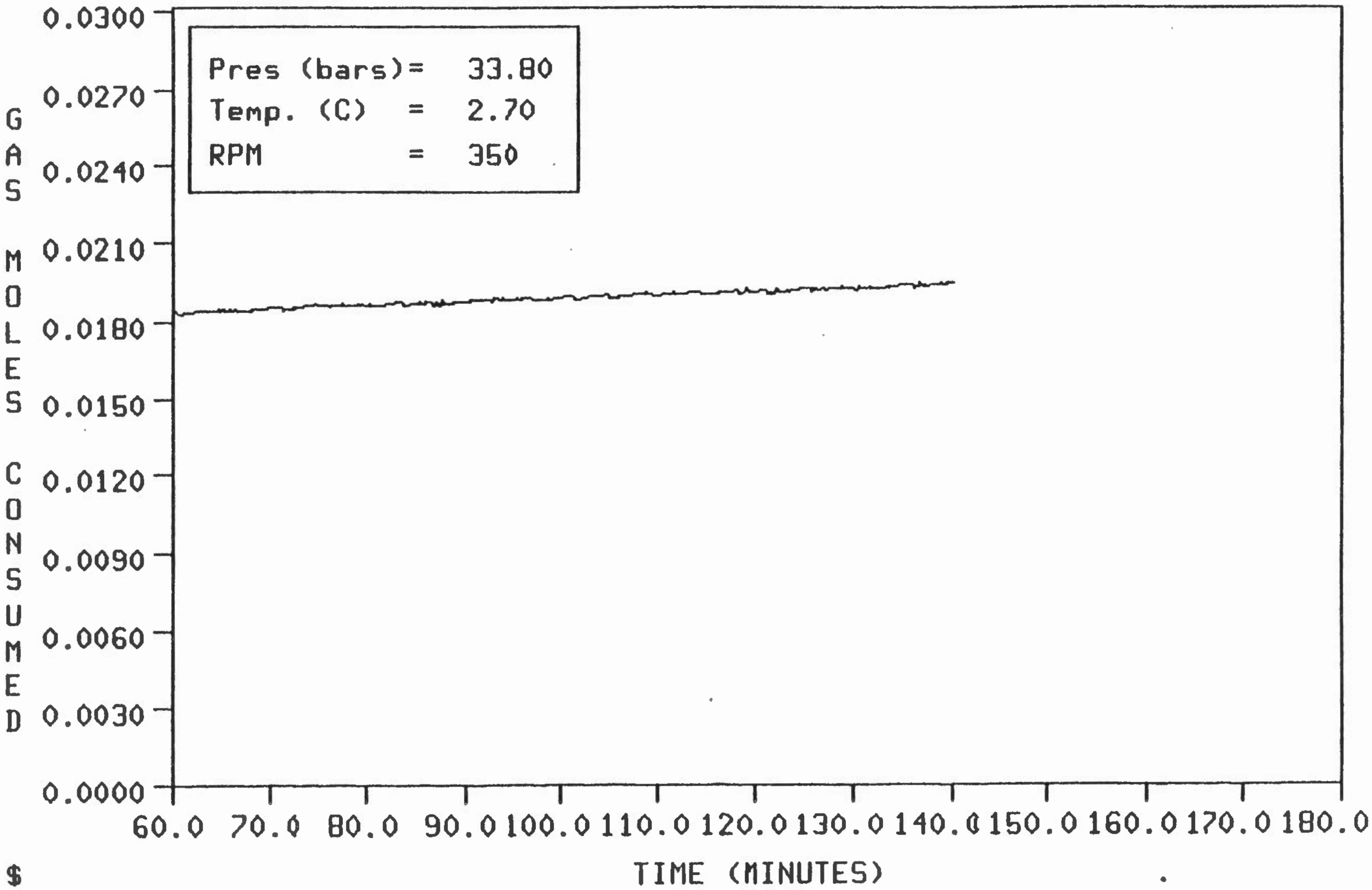
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T50__12/10/84
Pres (bars)= 33.71
Temp. (C) = 2.90
RPM = 400
GAS MOLES CONSUMED
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T51__15/10/84
Pres (bars)= 33.75
Temp. (C) = 2.70
RPM = 350
GAS MOLES CONSUMED
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T51__15/10/84



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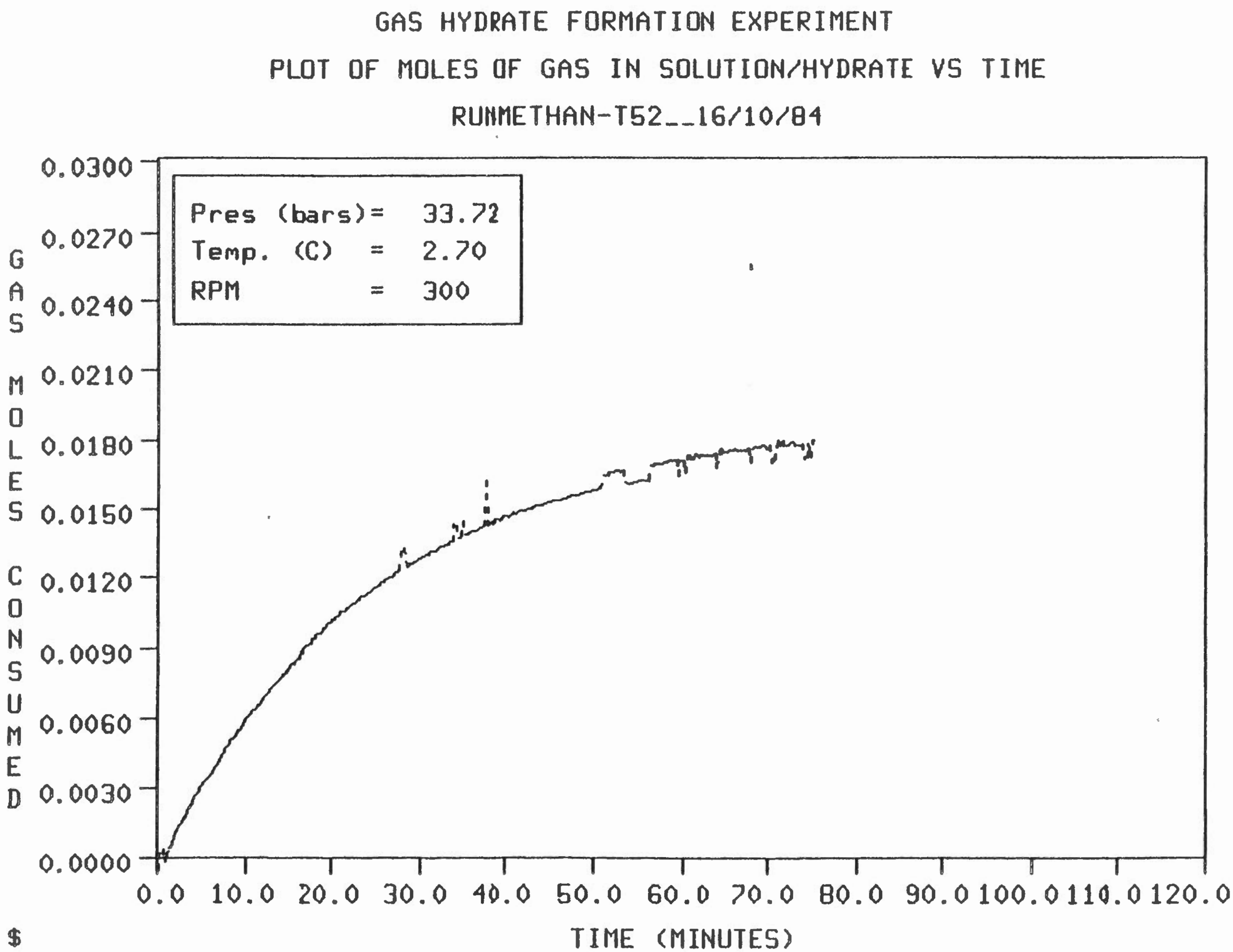
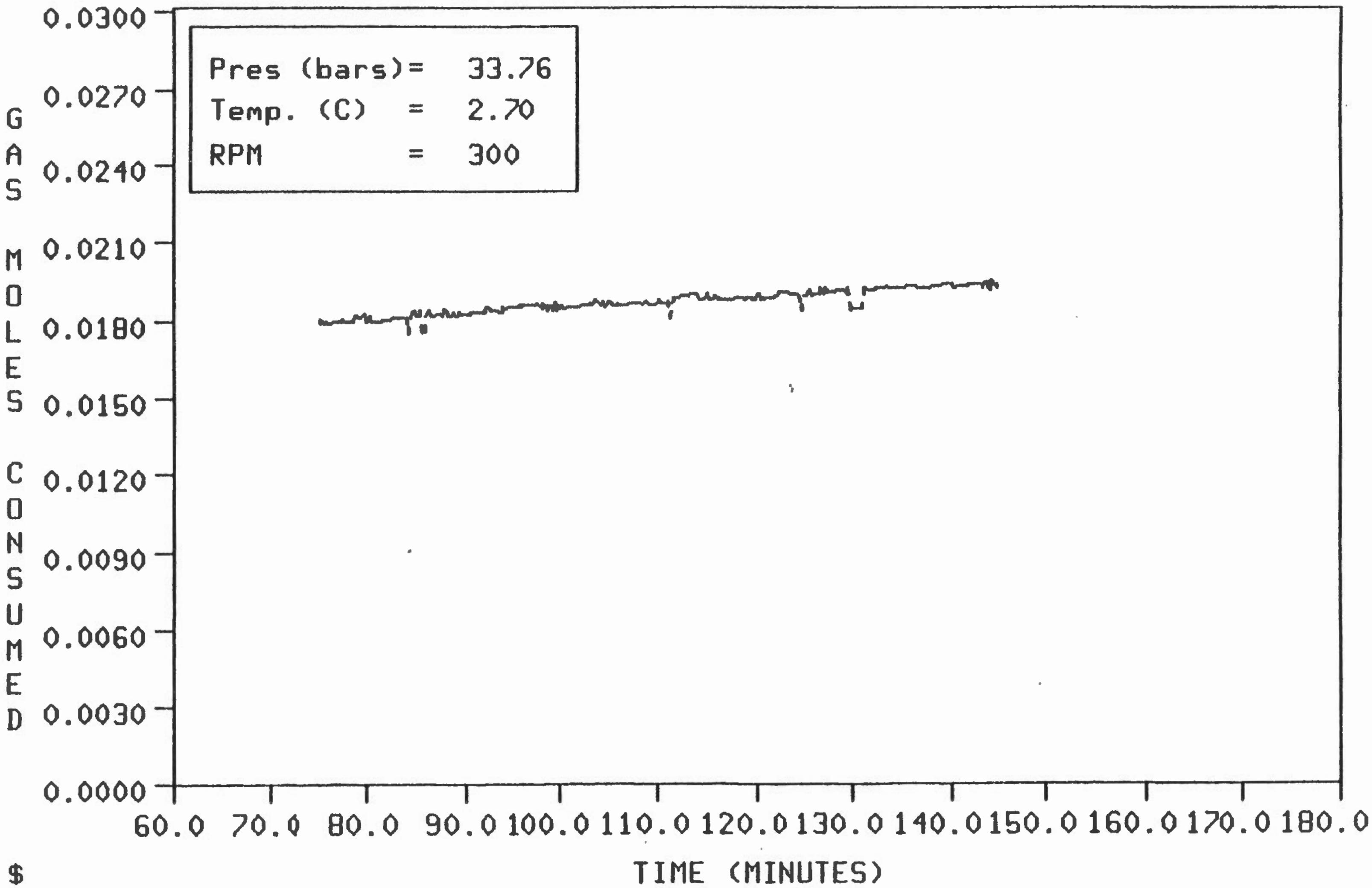

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T52__16/10/84
Pres (bars)= 33.72
Temp. (C) = 2.70
RPM = 300
GAS MOLES CONSUMED
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T52__16/10/84



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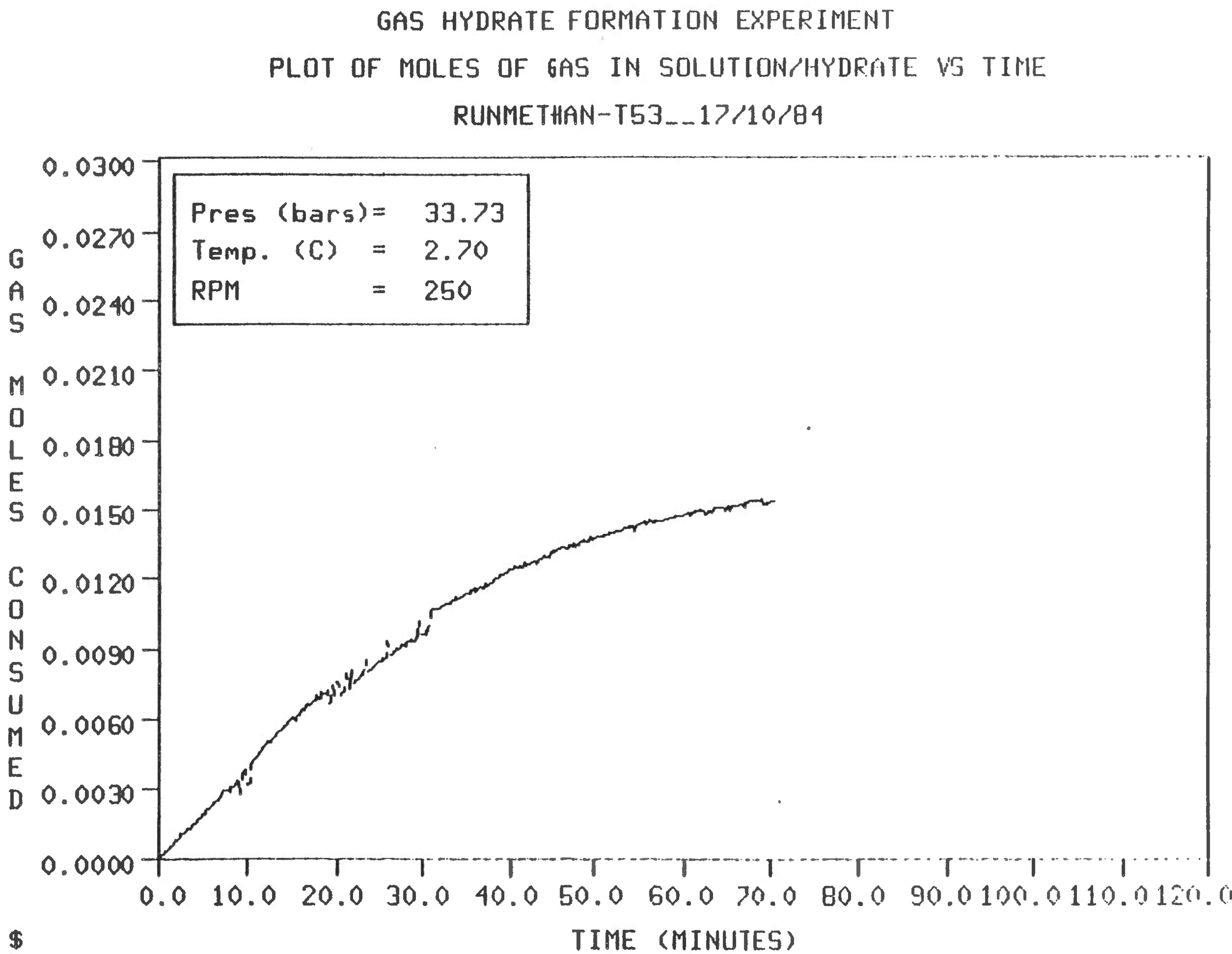
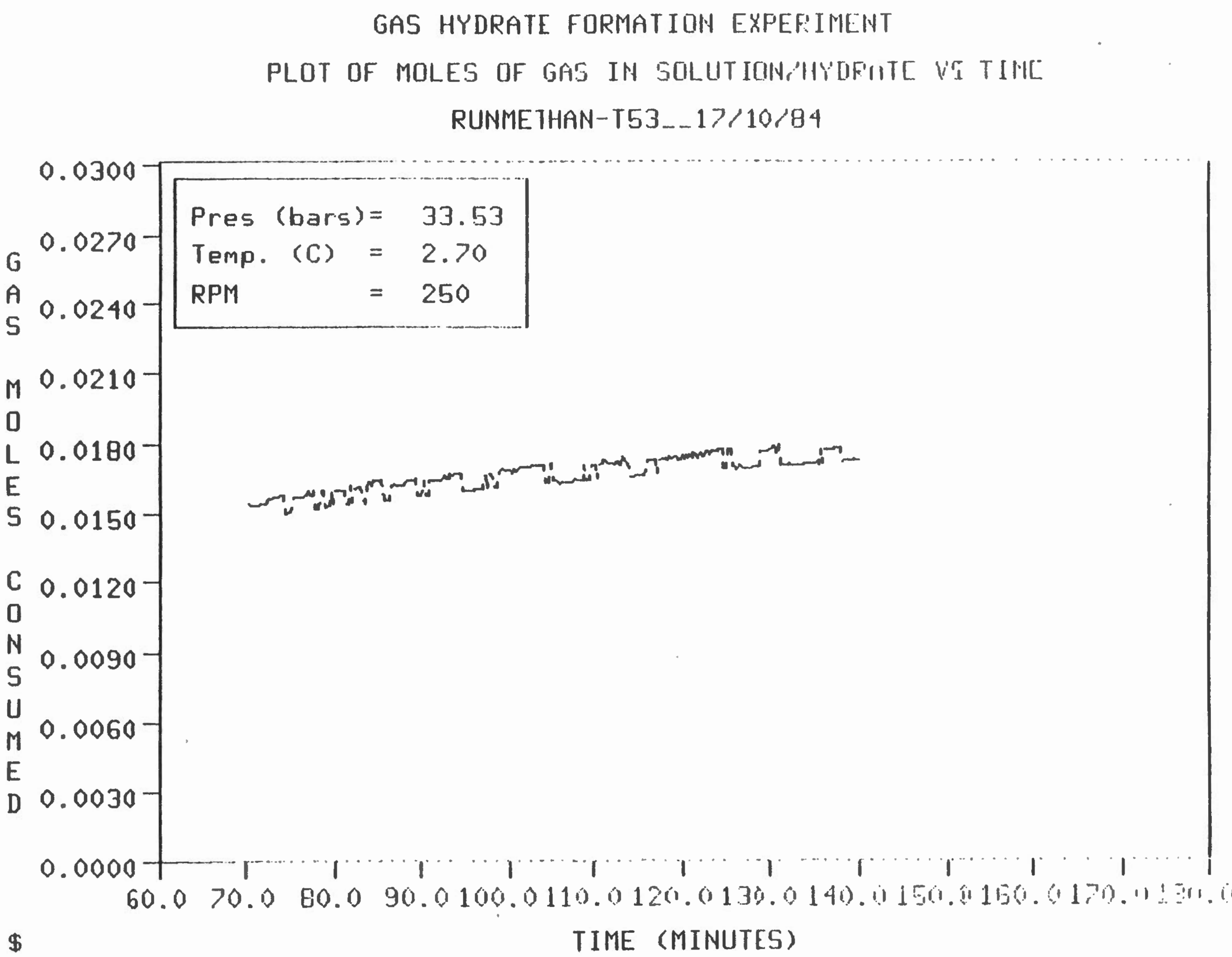
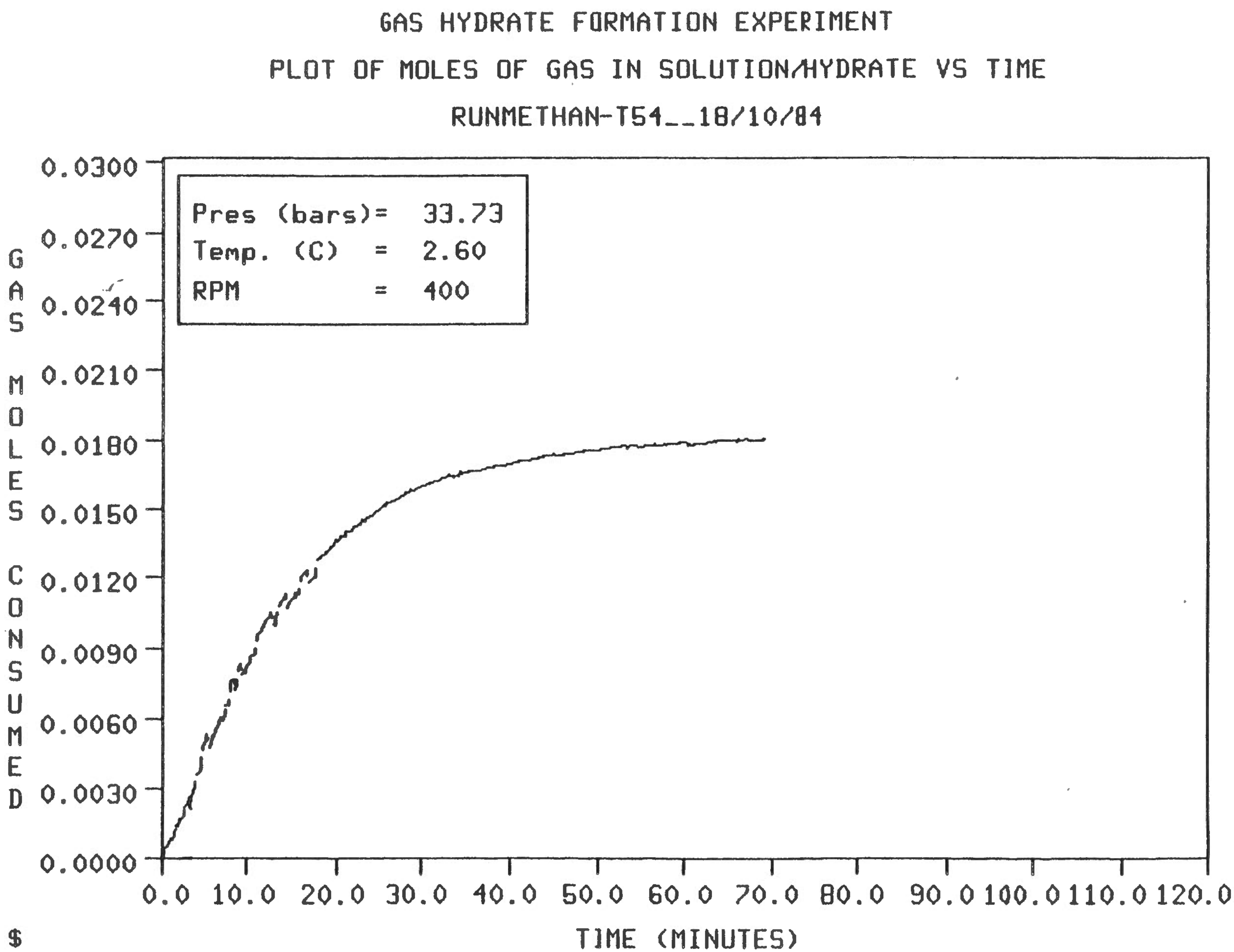


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T53__17/10/84
Pres (bars)= 33.73
Temp. (C) = 2.70
RPM = 250
GAS MOLES CONSUMED
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)
$

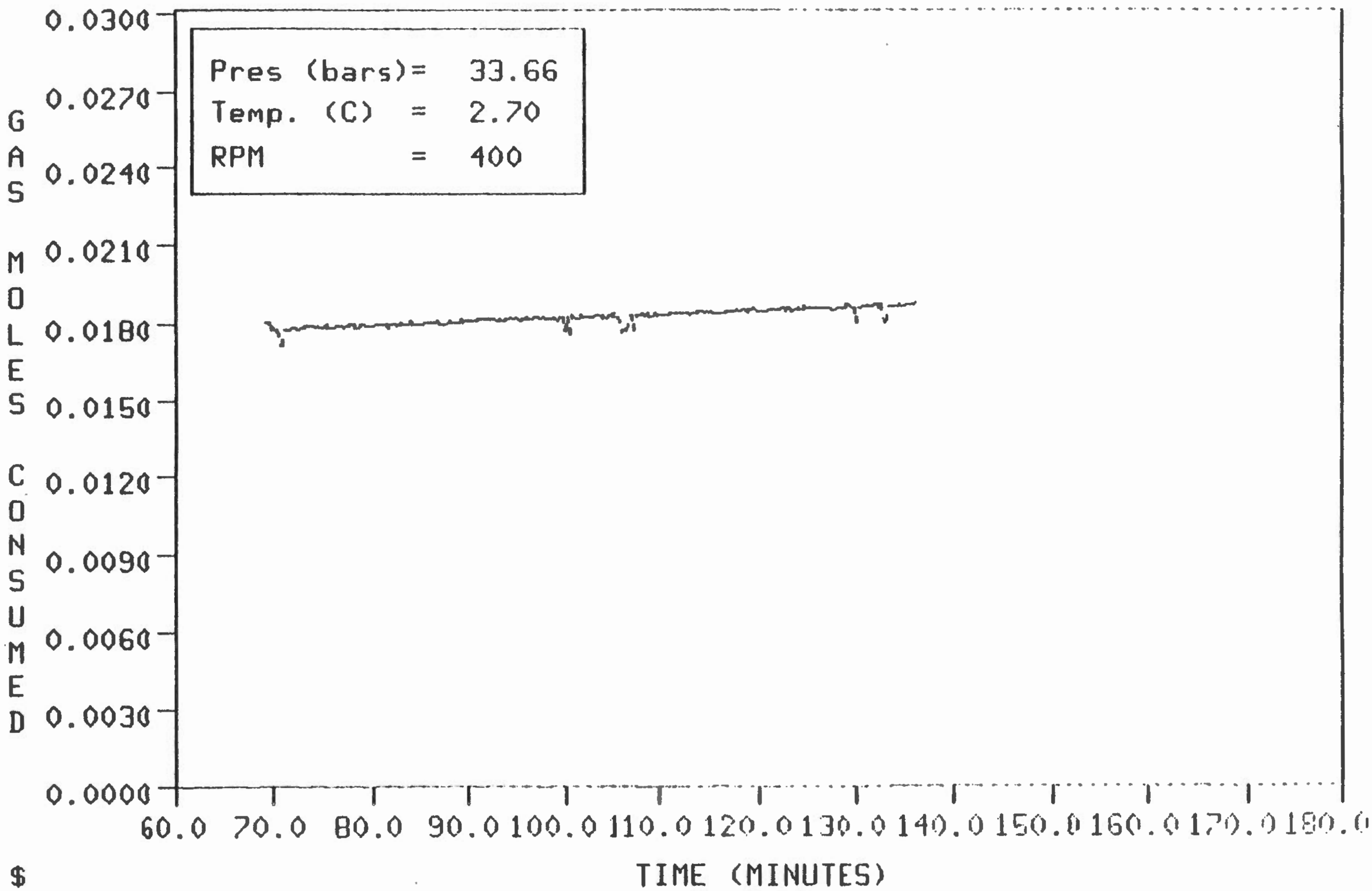

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T53__17/10/84
Pres (bars)= 33.53
Temp. (C) = 2.70
RPM = 250
GAS MOLES CONSUMED
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUNMETHAN-T54__18/10/84
Pres (bars)= 33.73
Temp. (C) = 2.60
RPM = 400
GAS MOLES CONSUMED
0.0300
0.0270
0.0240
0.0210
0.0180
0.0150
0.0120
0.0090
0.0060
0.0030
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUNMETHAN-T54__18/10/84



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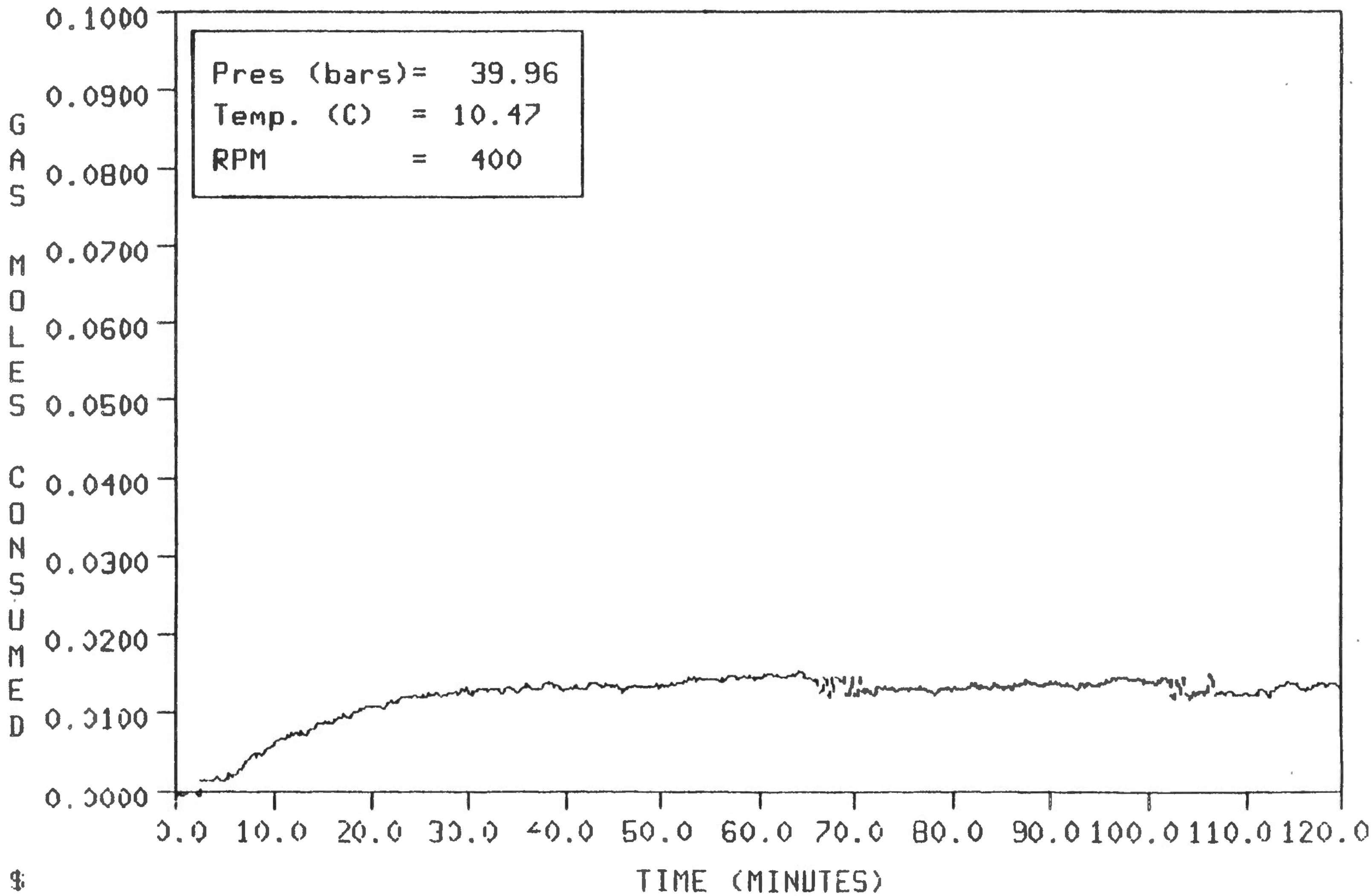
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-01__84/11/01



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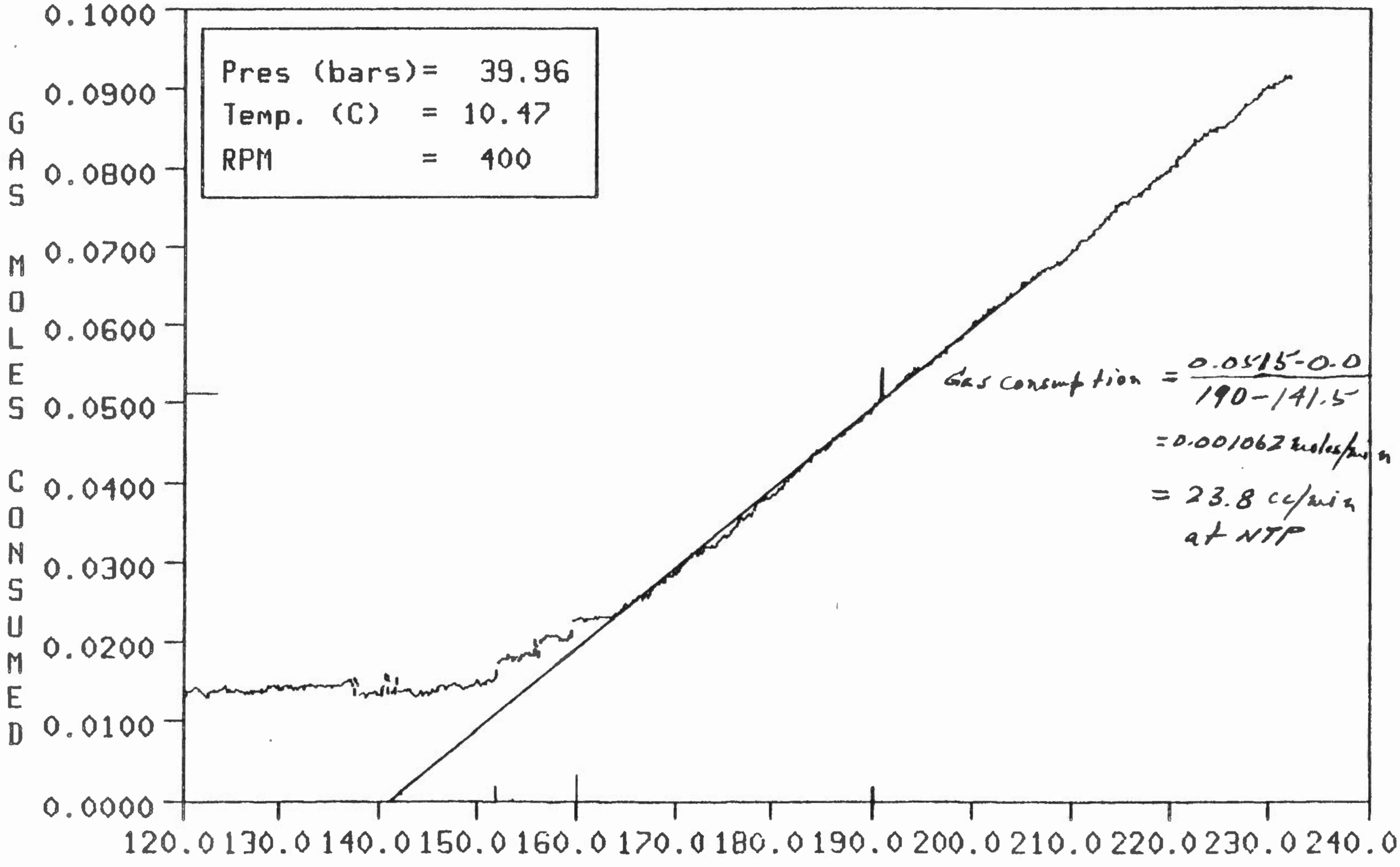
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-01__84/11/01



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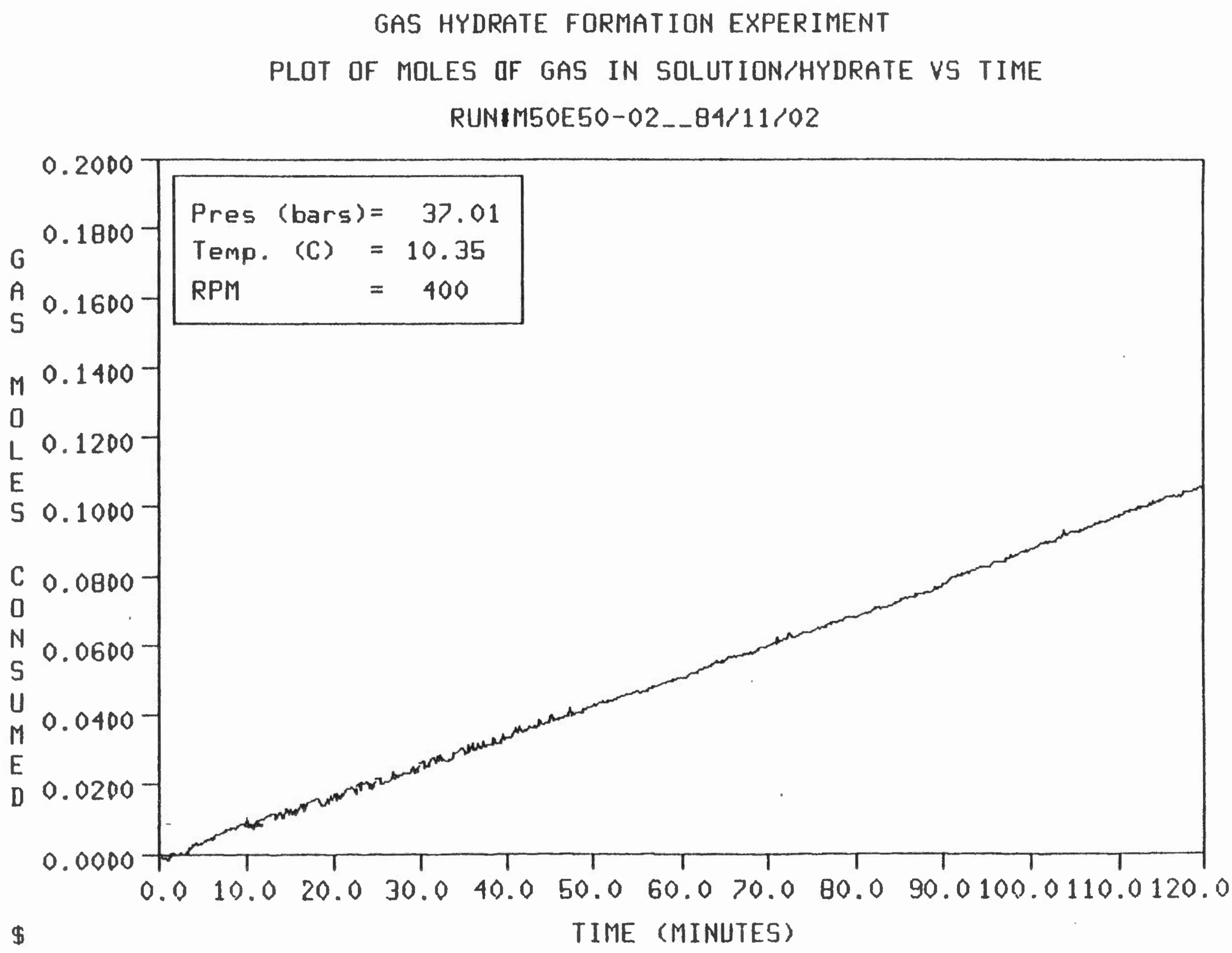
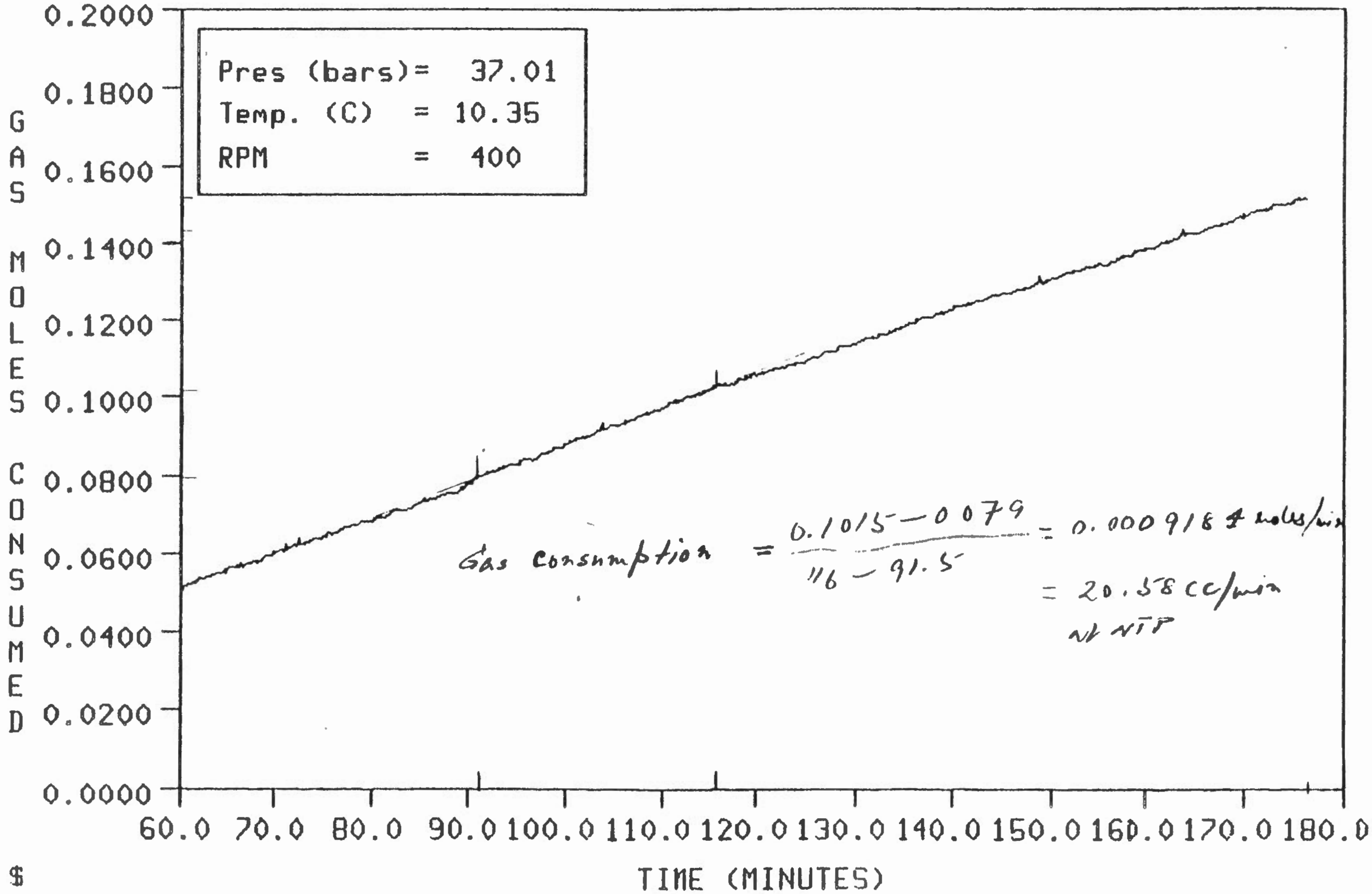

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-02__84/11/02
Pres (bars)= 37.01
Temp. (C) = 10.35
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

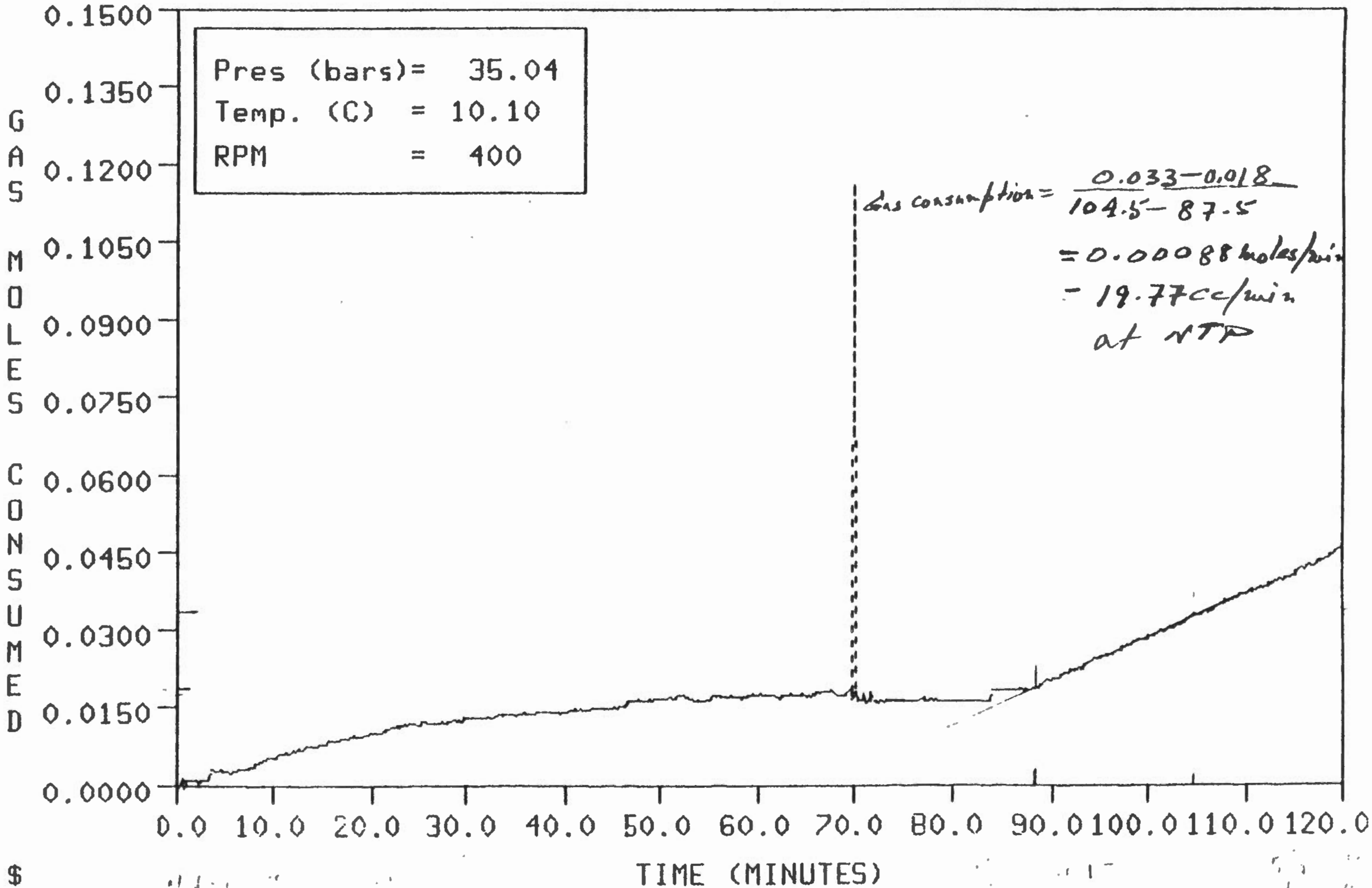
RUN#M50E50-02__84/11/02

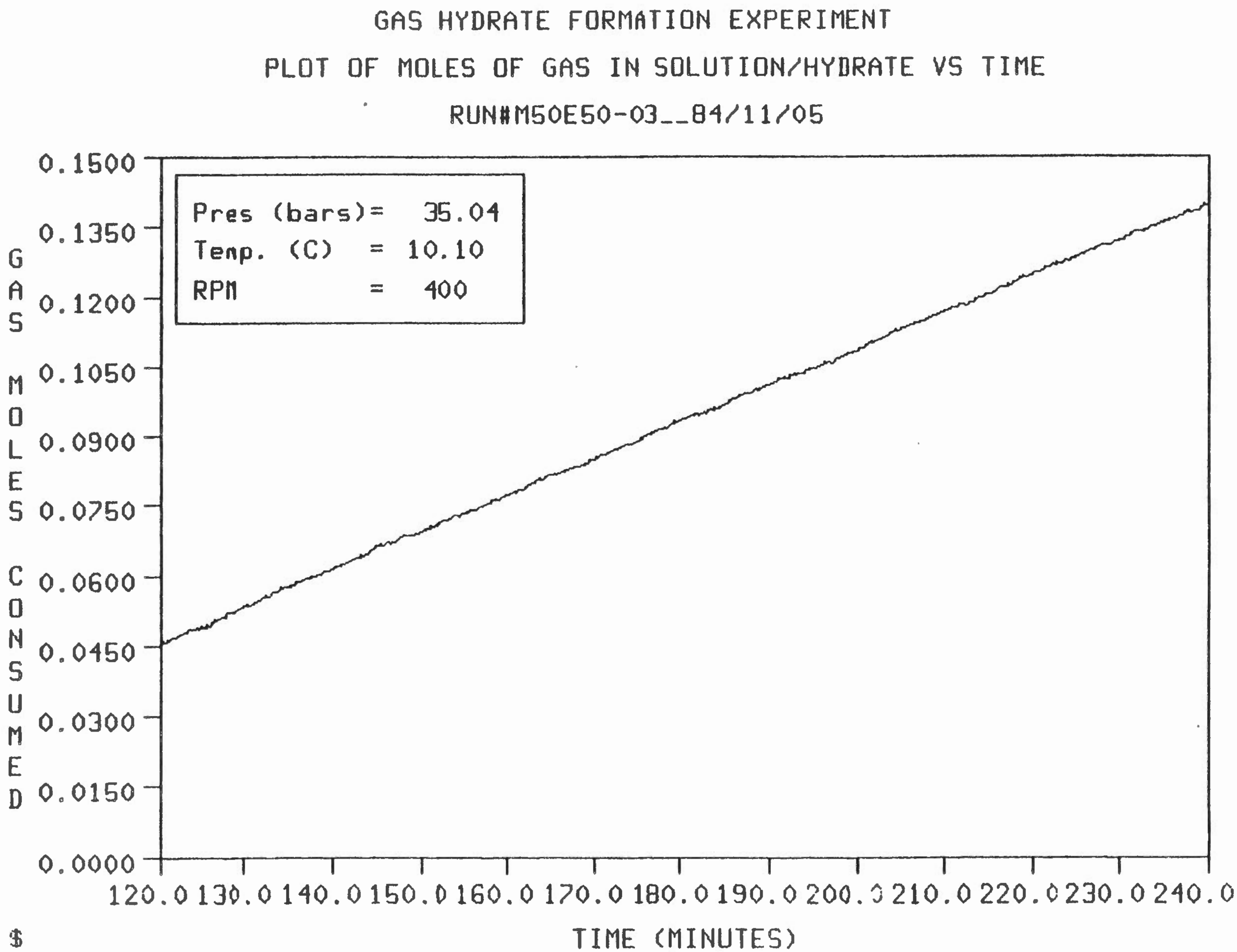


GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-03__84/11/05

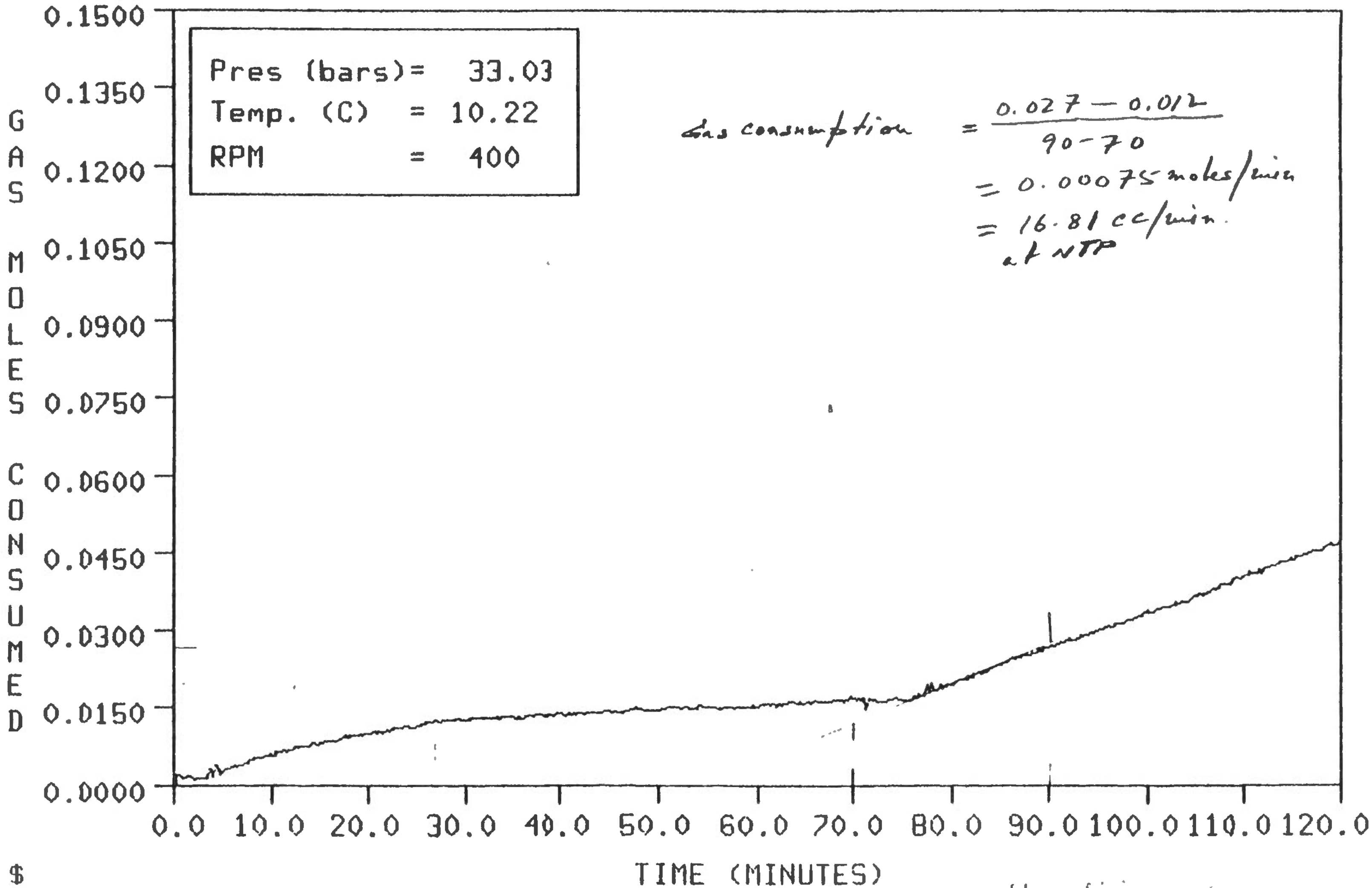



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-03__84/11/05
Pres (bars)= 35.04
Temp. (C) = 10.10
RPM = 400
GAS MOLES CONSUMED
0.1500
0.1350
0.1200
0.1050
0.0900
0.0750
0.0600
0.0450
0.0300
0.0150
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

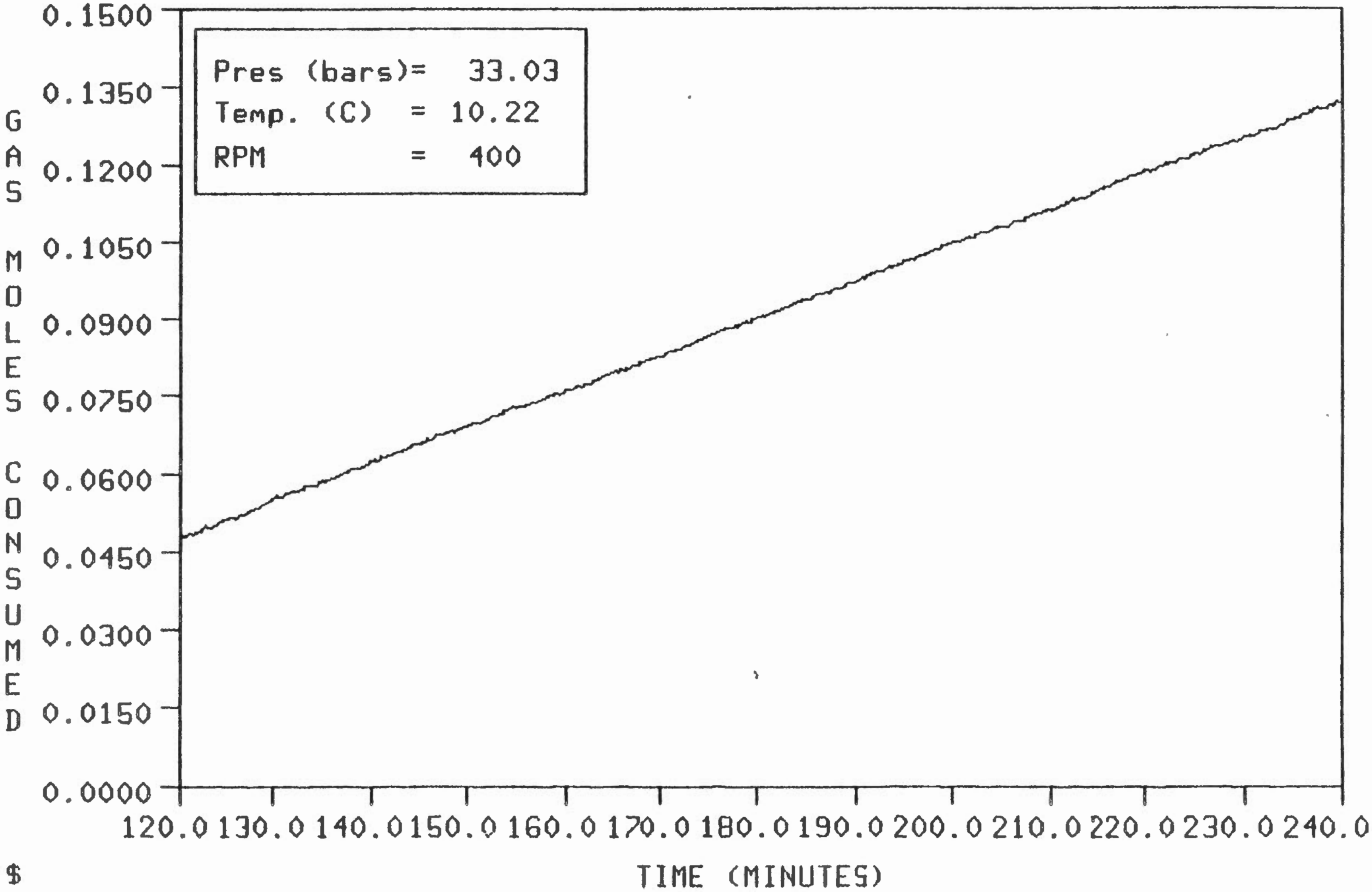
RUN#M50E50-04__84/11/06



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-04__84/11/06



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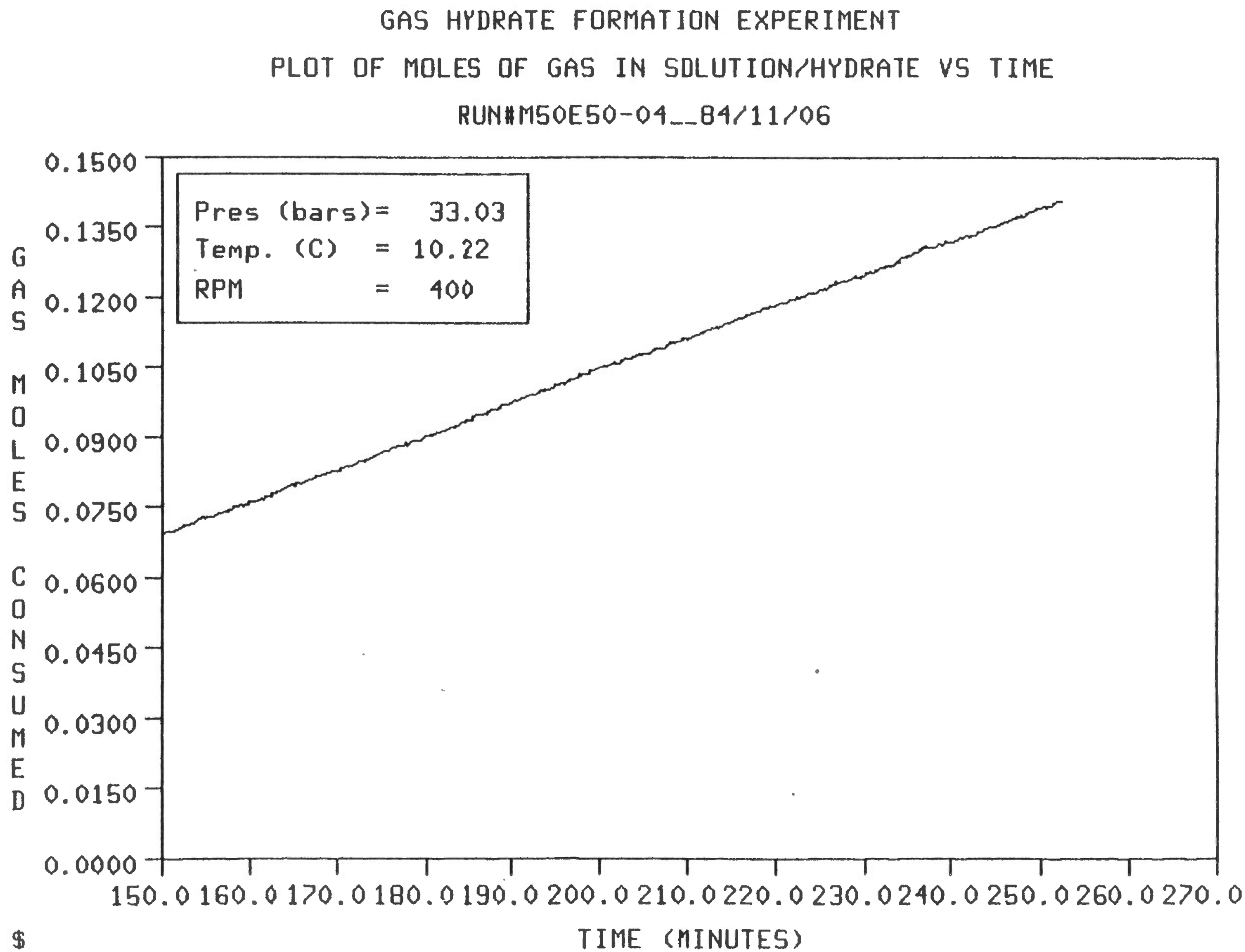
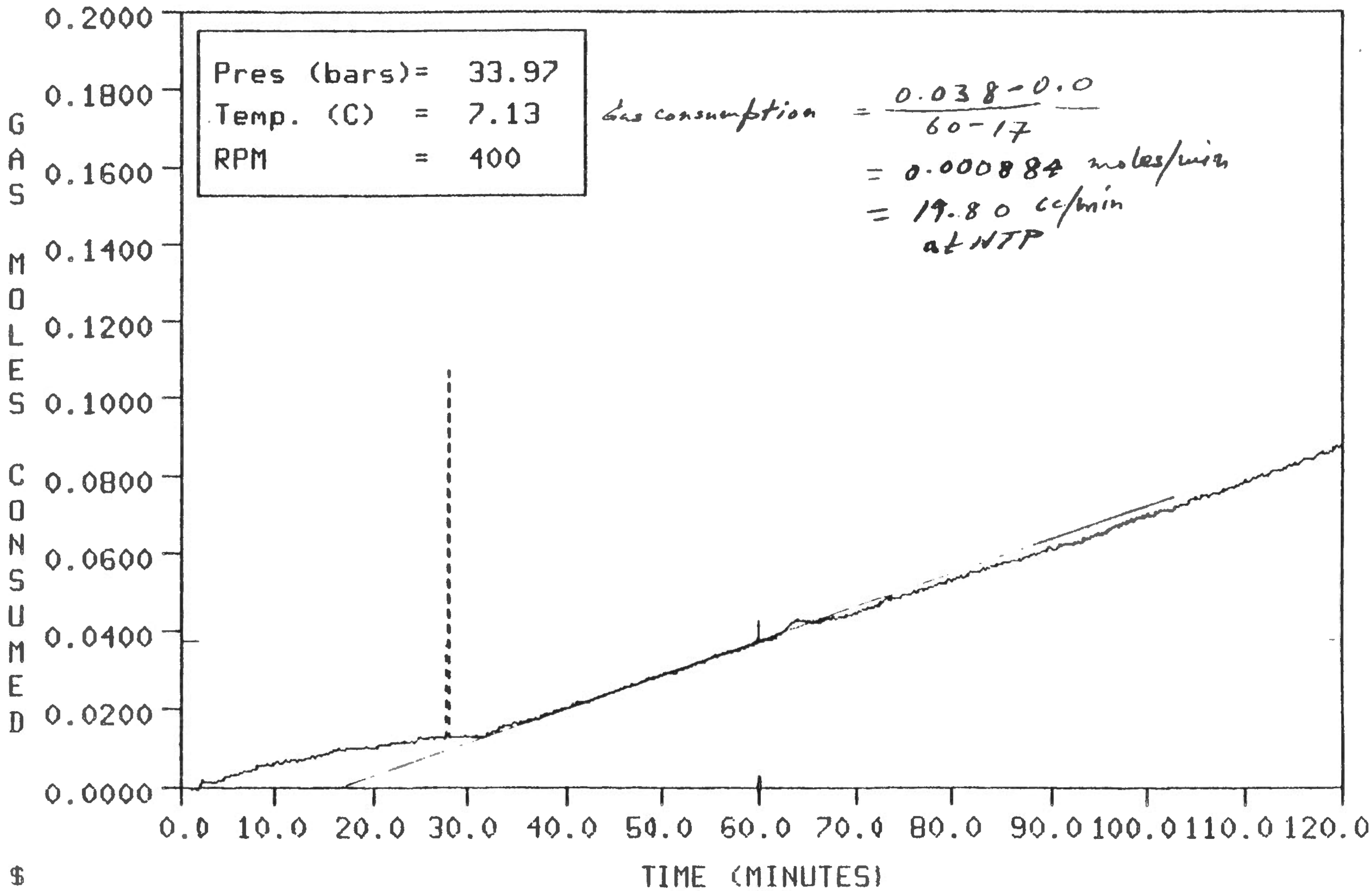
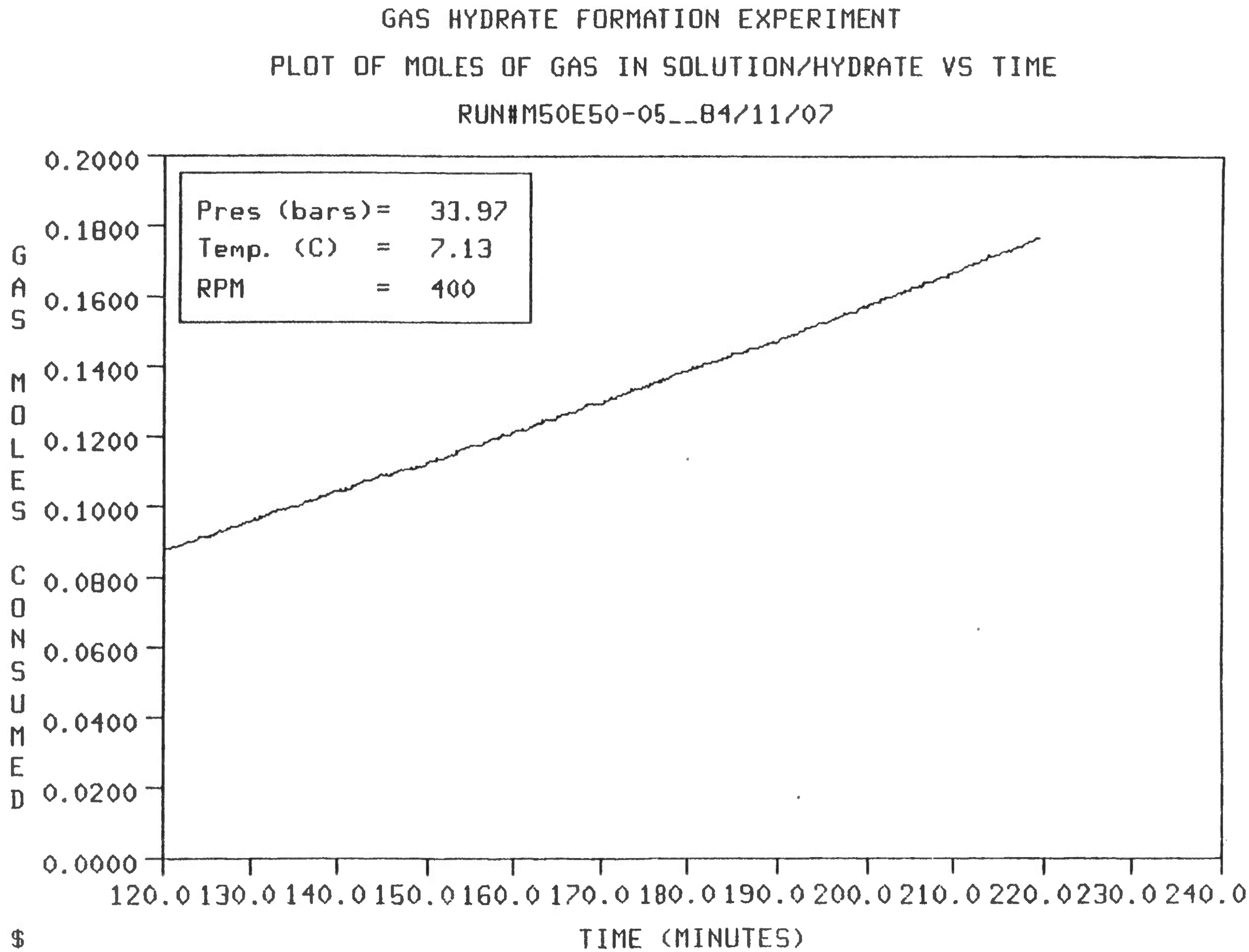

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-04__84/11/06
Pres (bars)= 33.03
Temp. (C) = 10.22
RPM = 400
GAS MOLES CONSUMED
0.1500
0.1350
0.1200
0.1050
0.0900
0.0750
0.0600
0.0450
0.0300
0.0150
0.0000
150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0 250.0 260.0 270.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-05__84/11/07

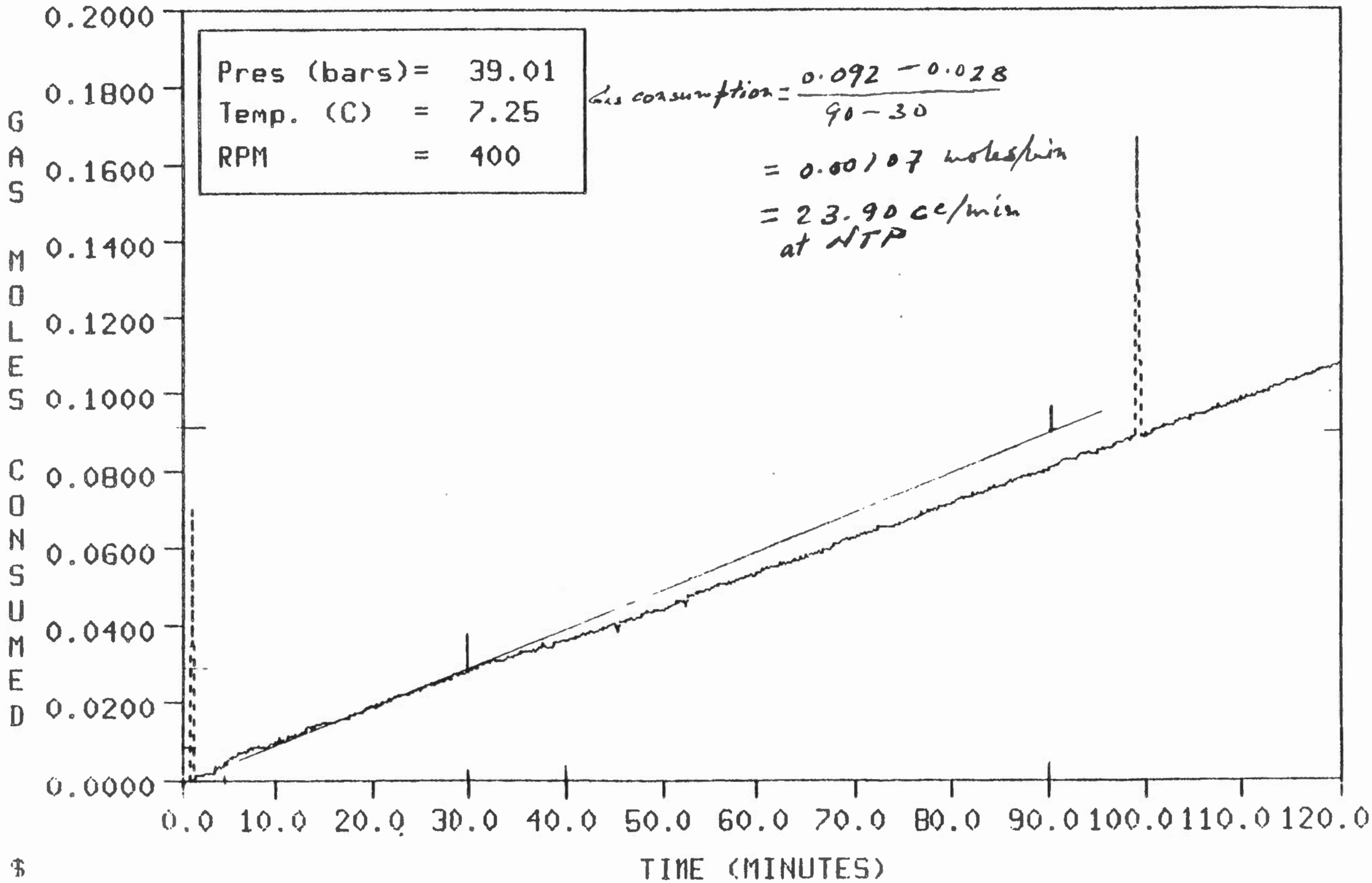



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-05__84/11/07
Pres (bars)= 33.97
Temp. (C) = 7.13
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-06__84/11/08



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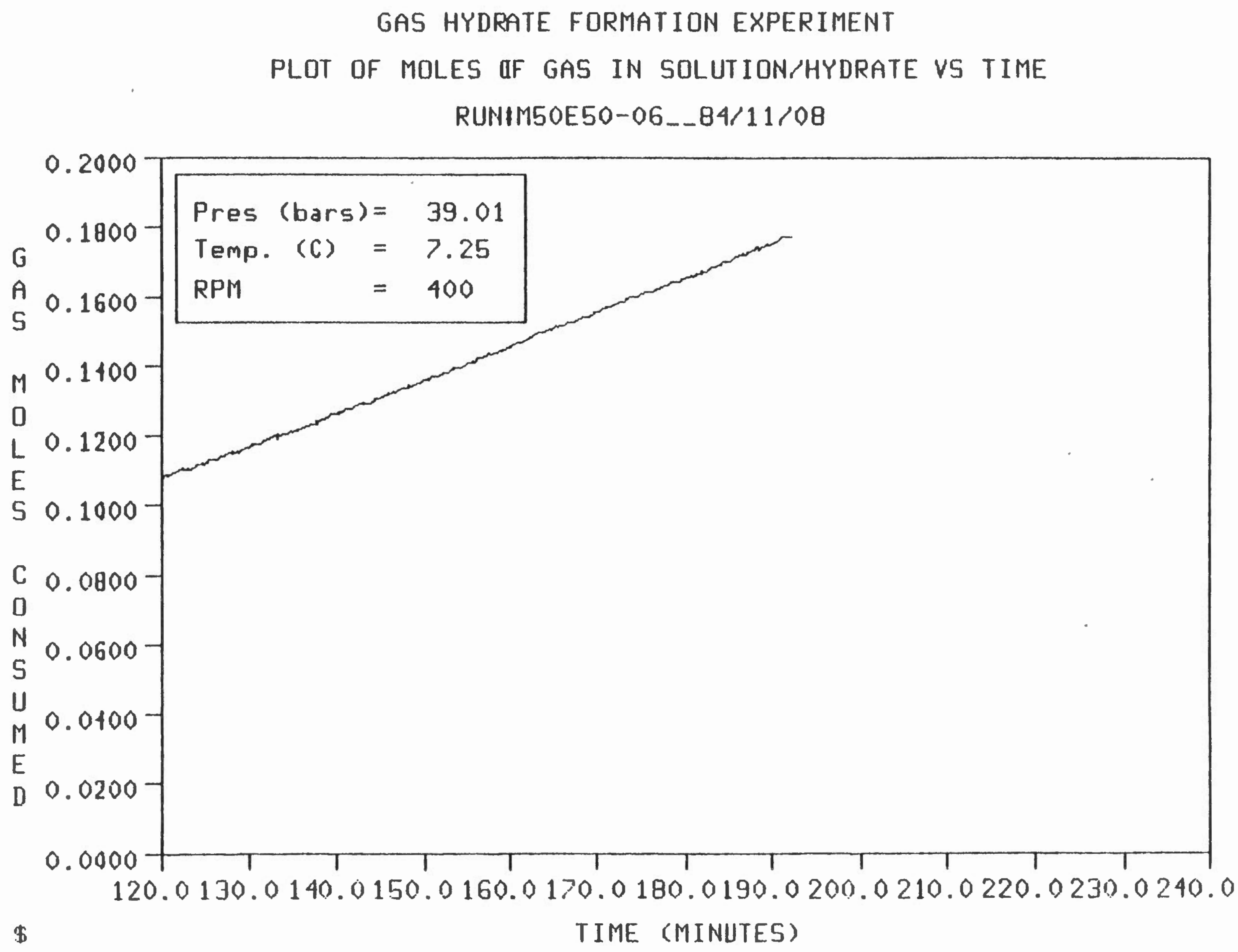
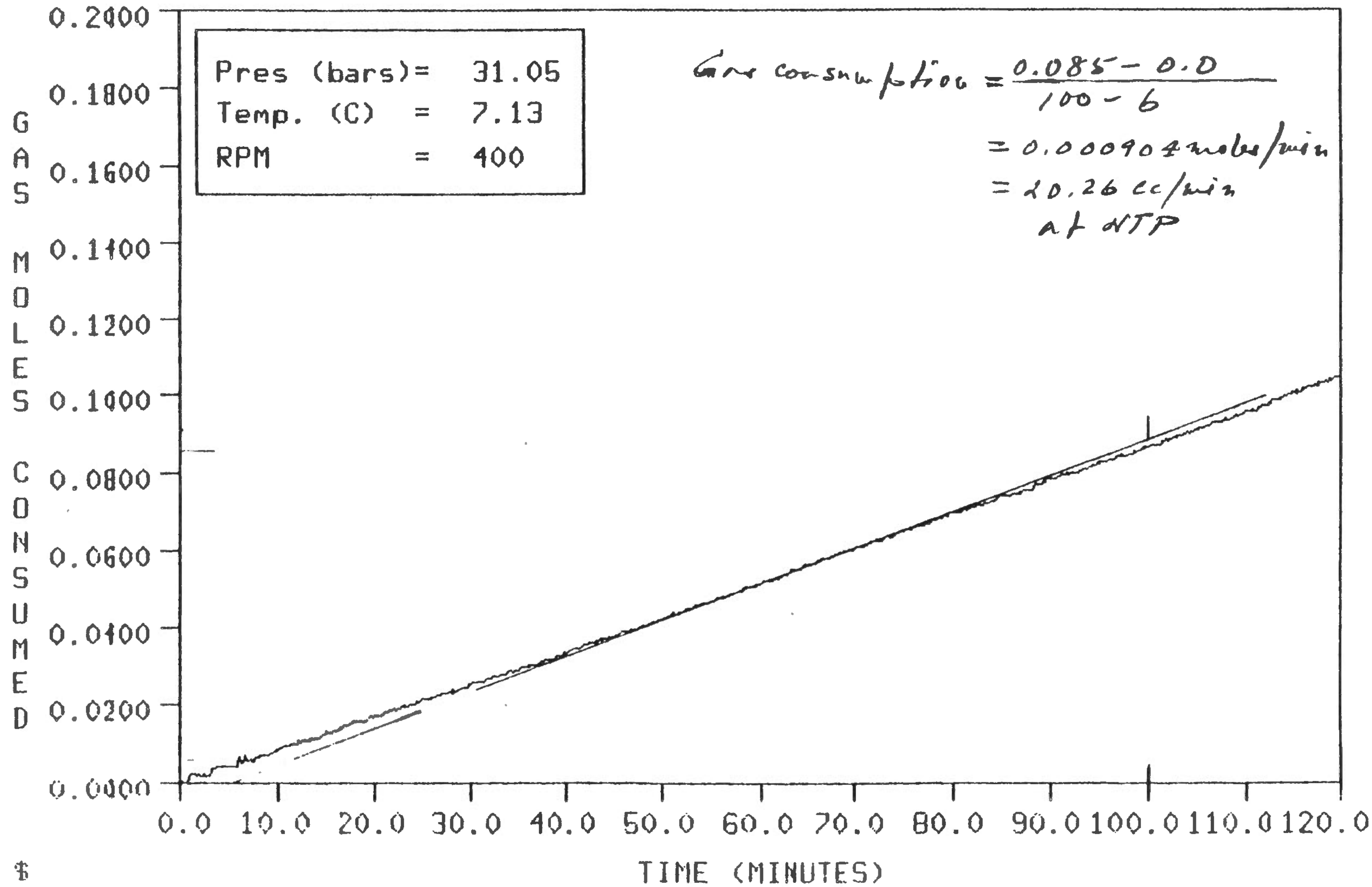

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-06__84/11/08
Pres (bars)= 39.01
Temp. (C) = 7.25
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0200
0.0400
0.0600
0.0800
0.1000
0.1200
0.1400
0.1600
0.1800
0.2000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

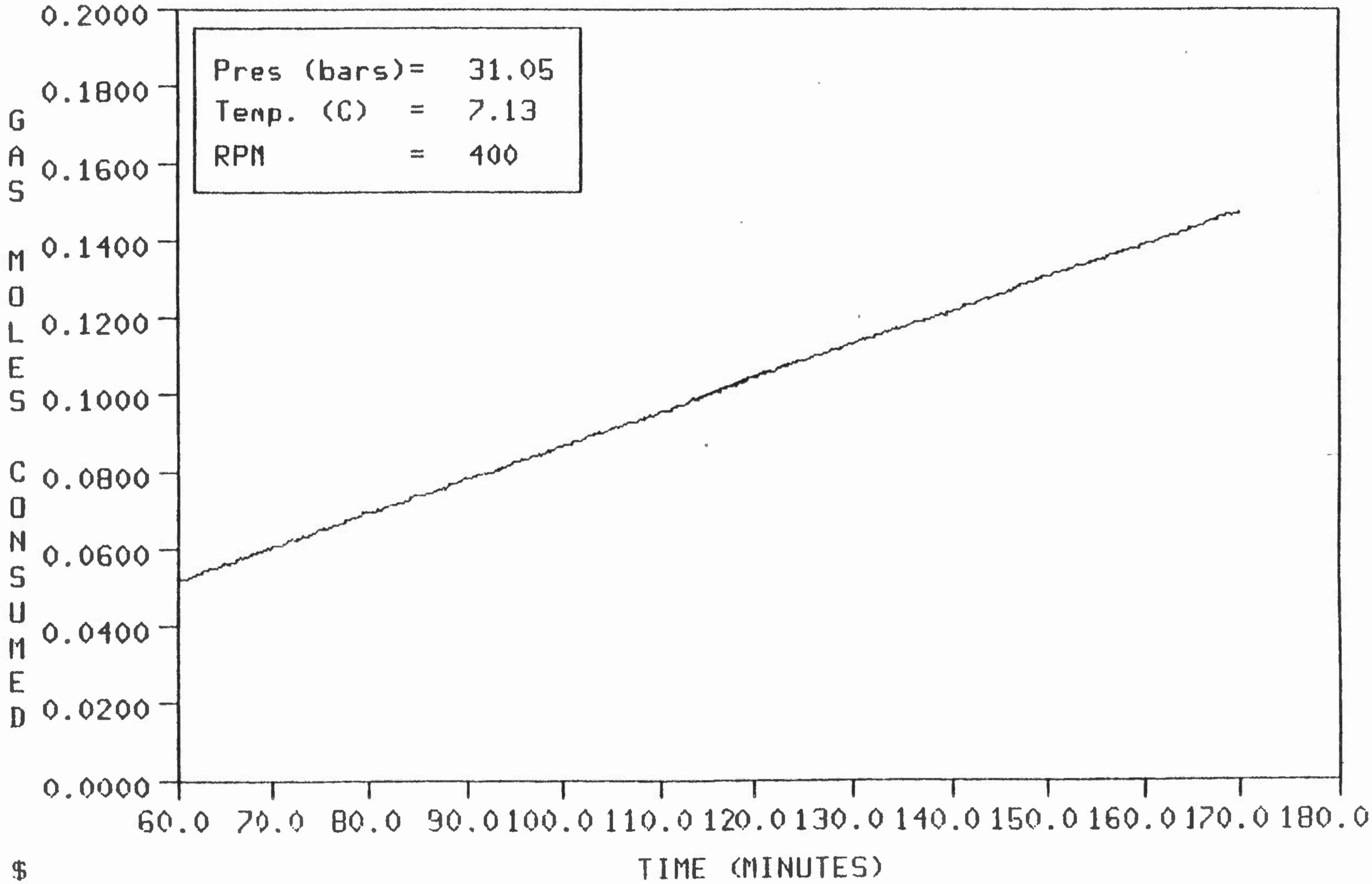
RUN#M50E50-07__84/11/08



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

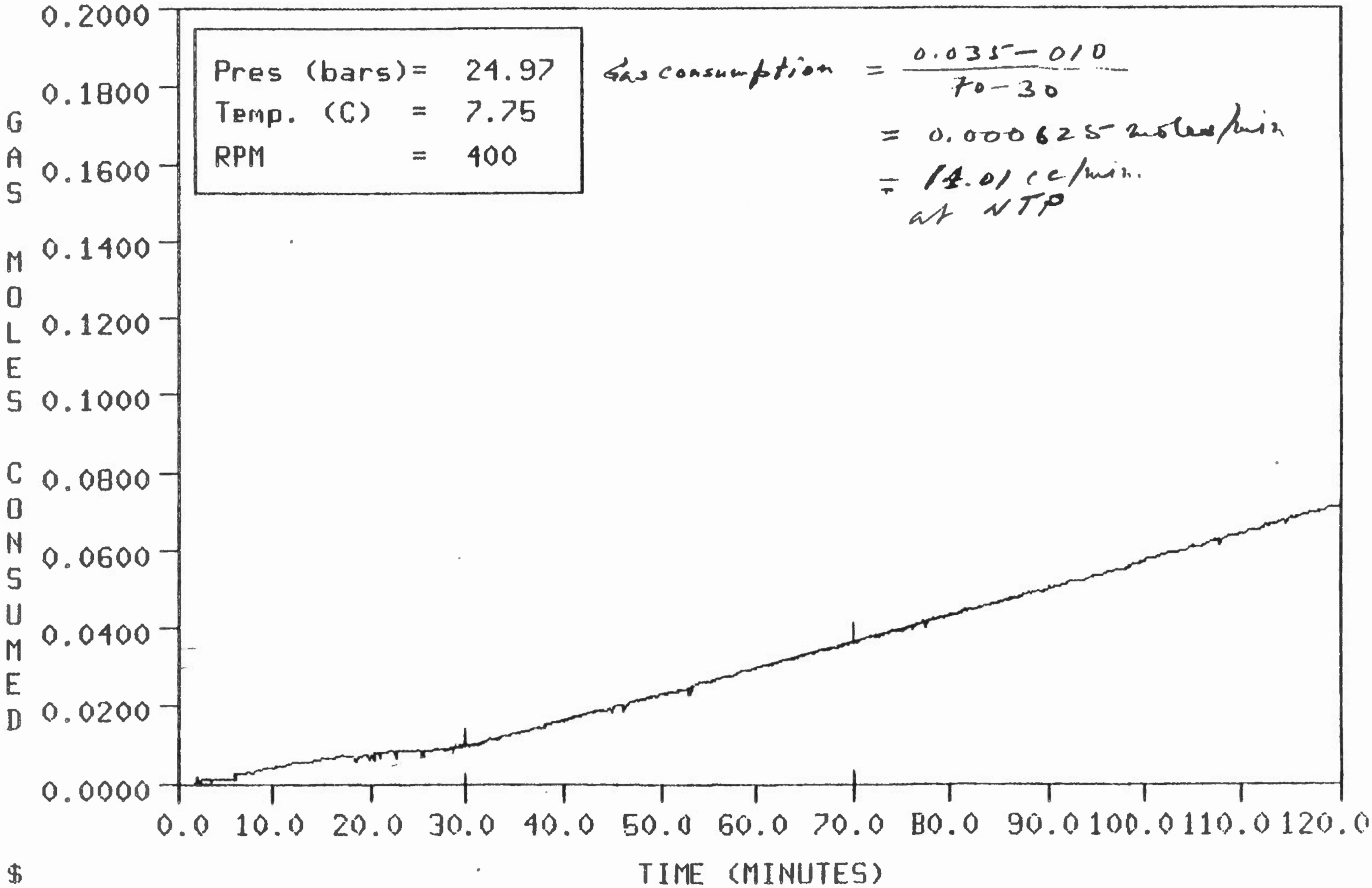
RUN#M50E50-07__84/11/08

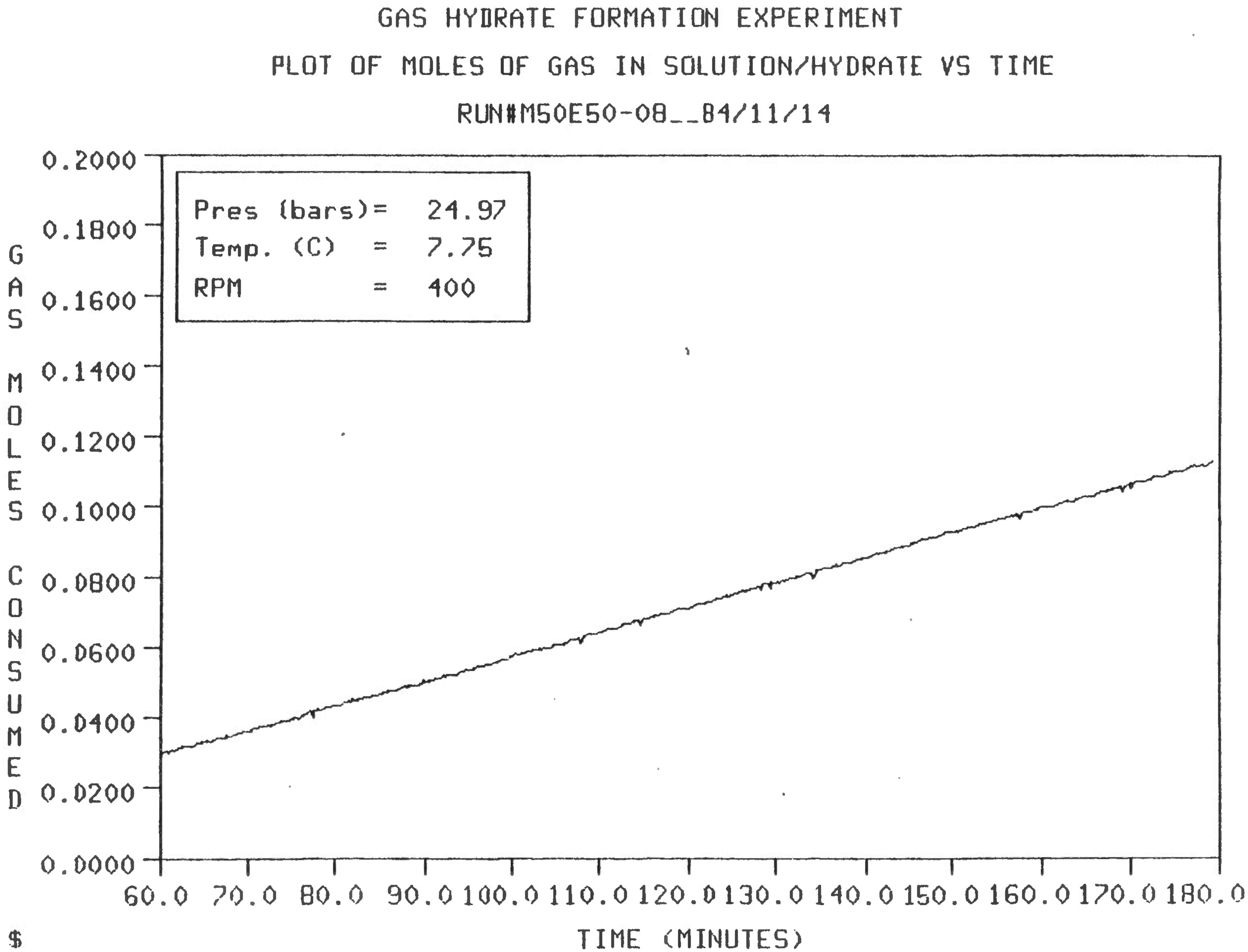


GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-08__84/11/14

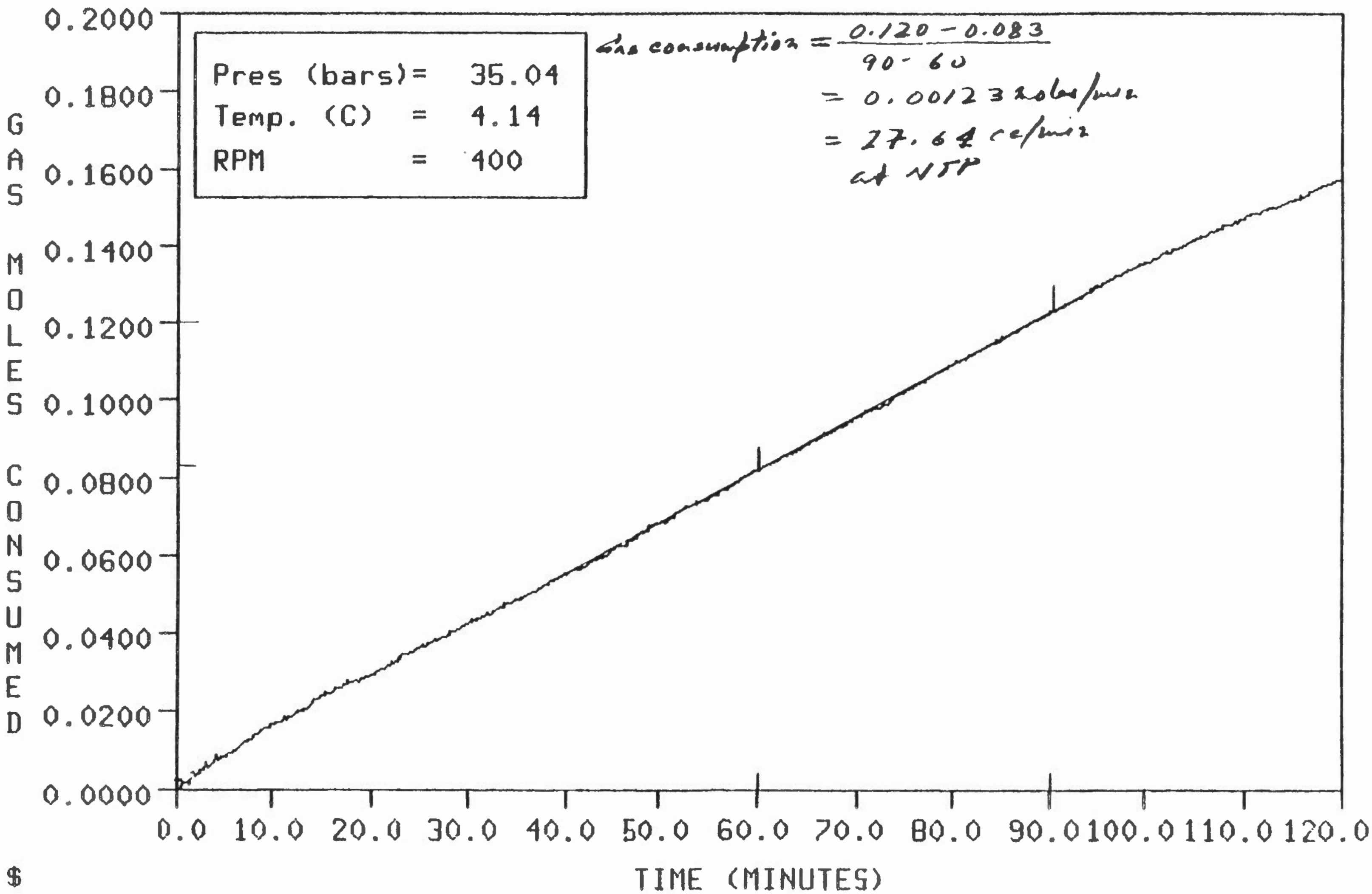



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-08__84/11/14
Pres (bars)= 24.97
Temp. (C) = 7.75
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-09__84/11/15



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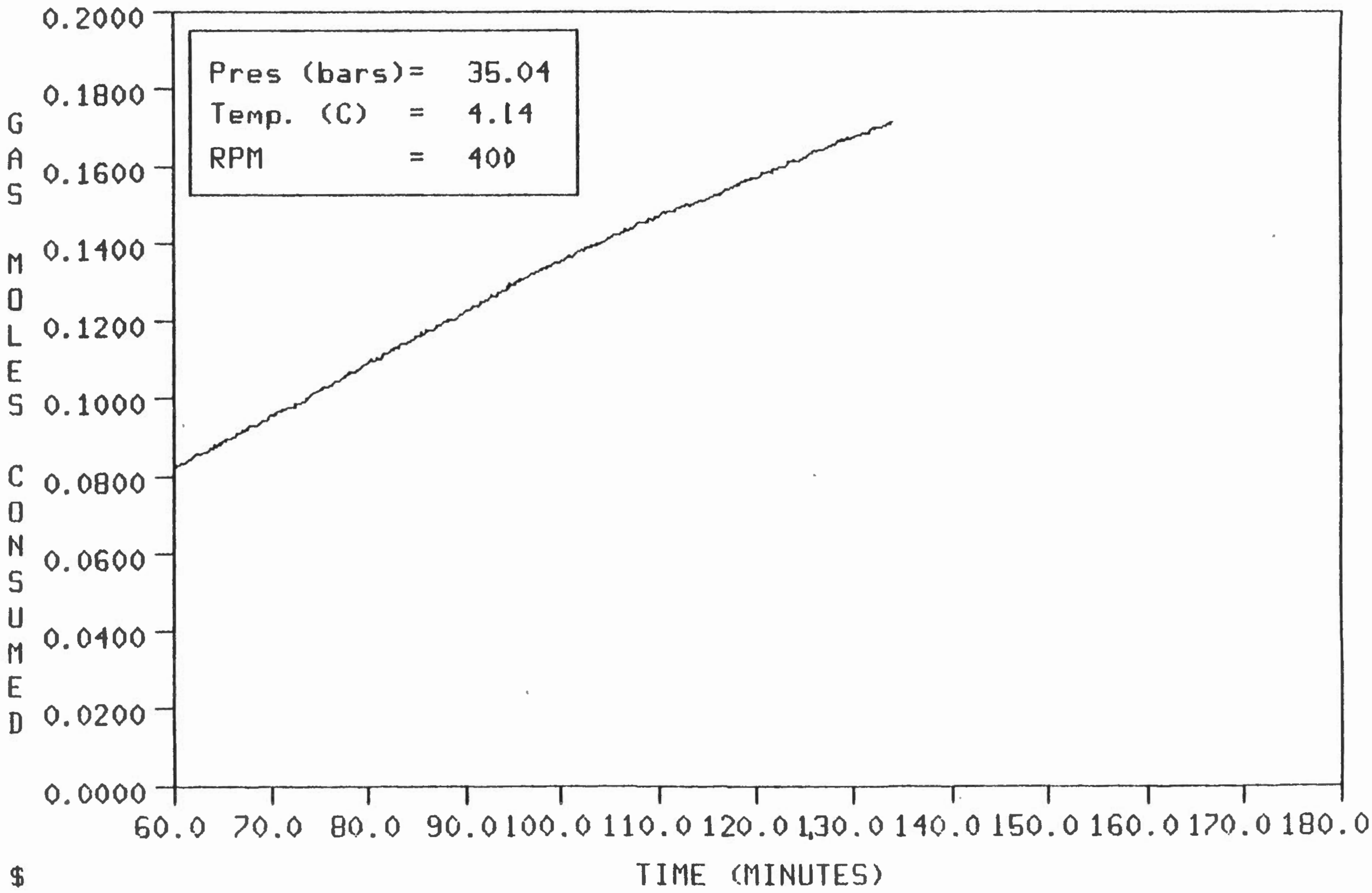
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-09__84/11/15



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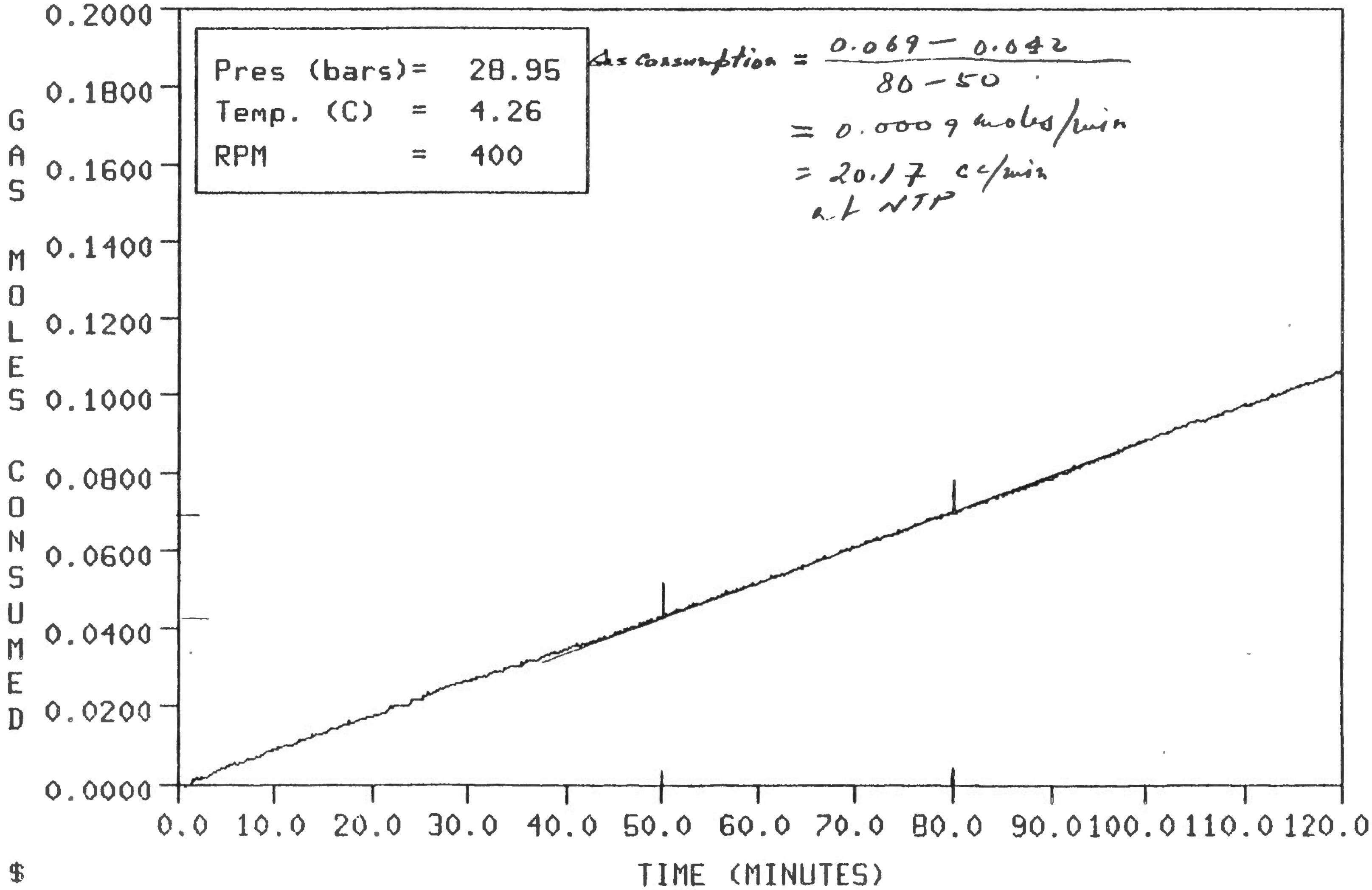
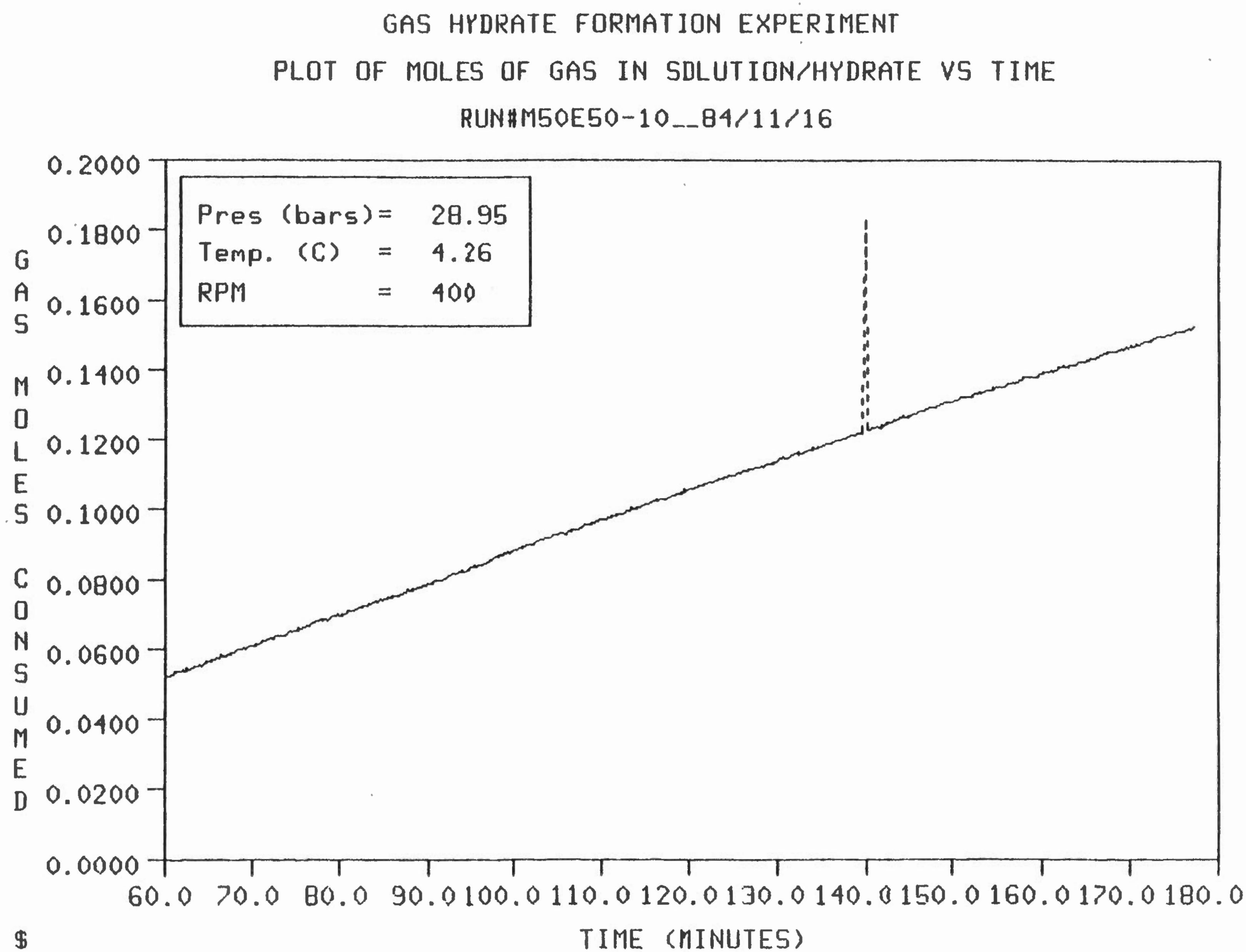
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-10__84/11/16

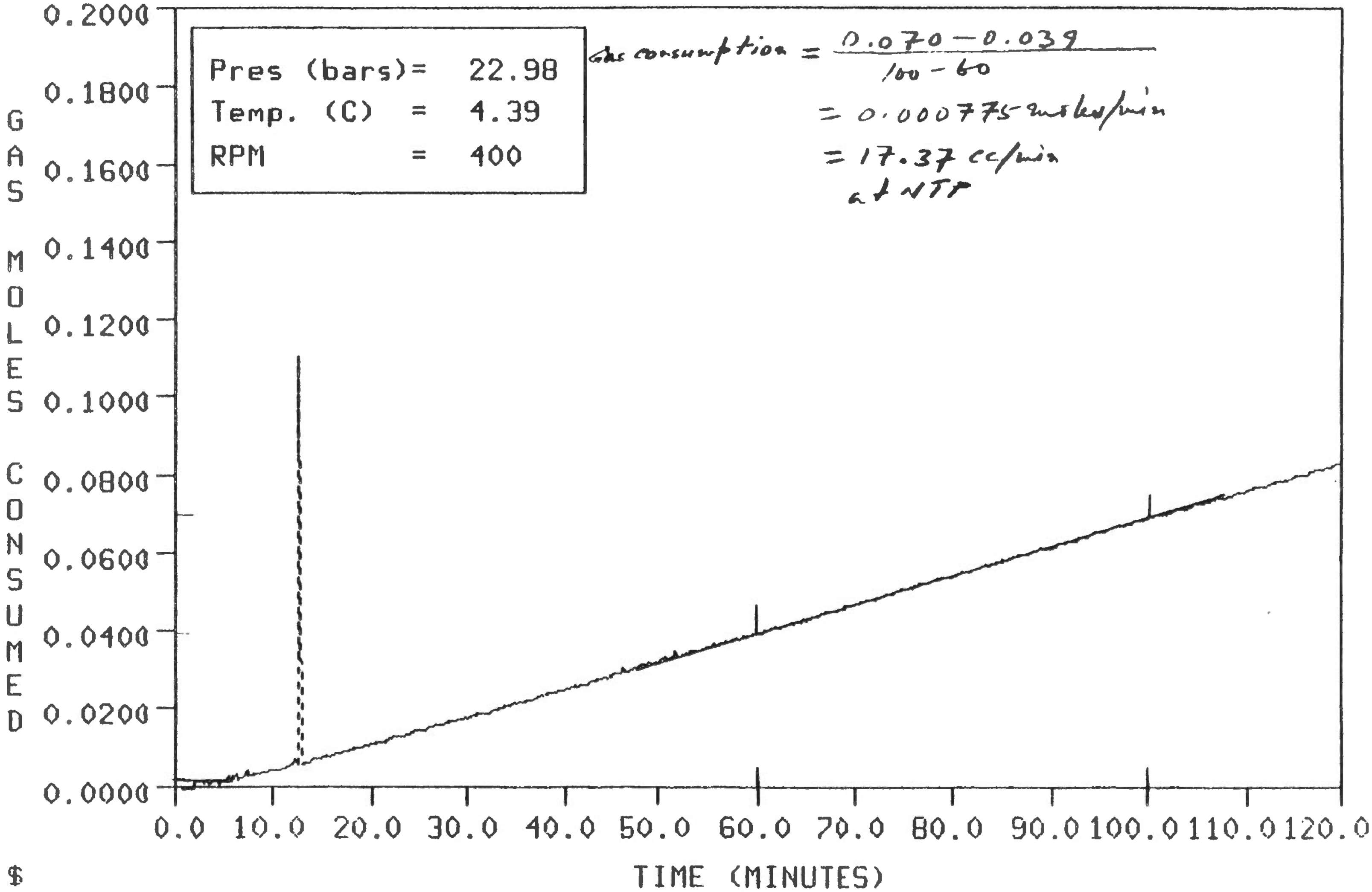



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-10__84/11/16
Pres (bars)= 28.95
Temp. (C) = 4.26
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0200
0.0400
0.0600
0.0800
0.1000
0.1200
0.1400
0.1600
0.1800
0.2000
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

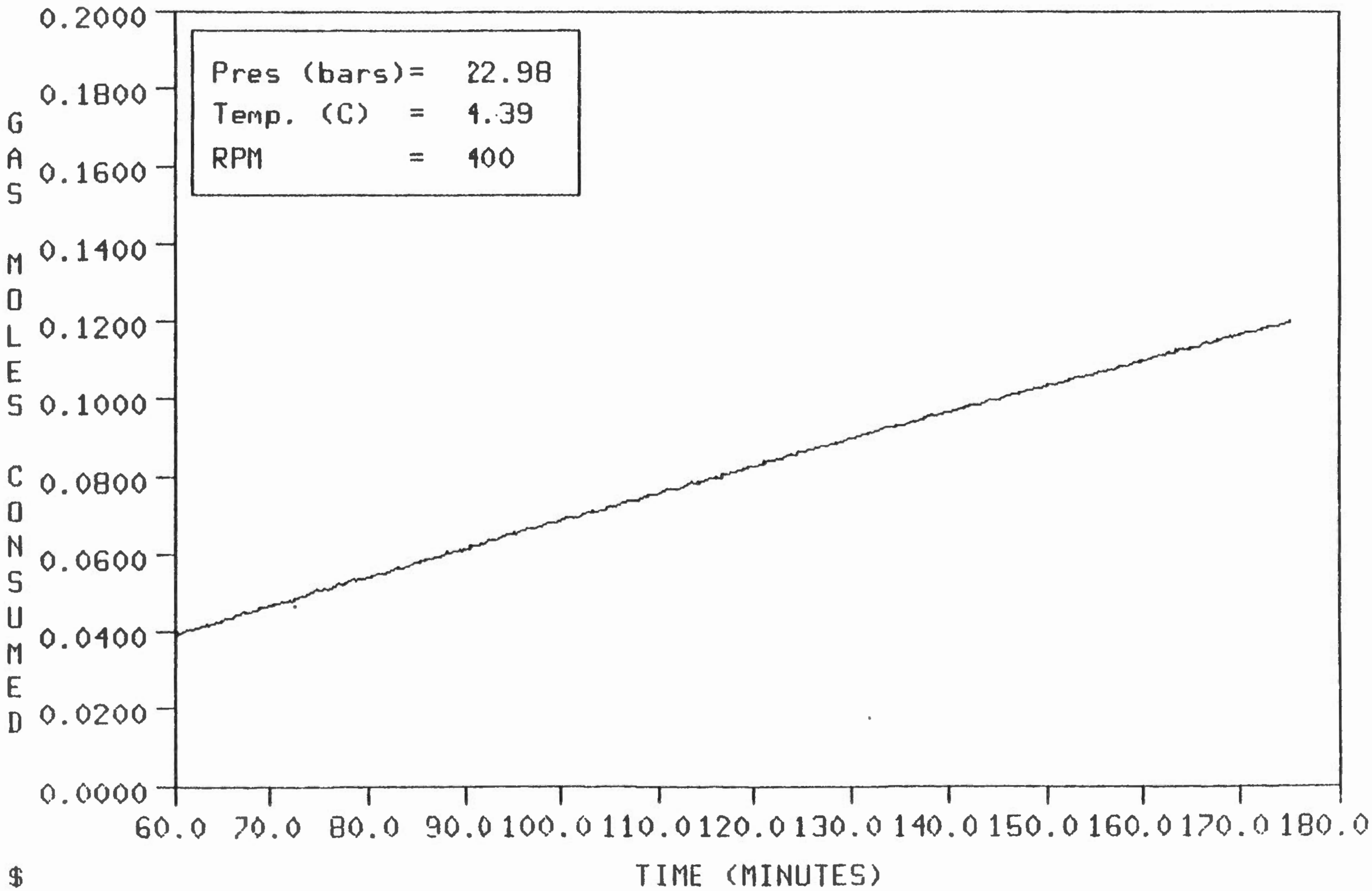
RUN#M5DE50-11__84/11/19



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-11__84/11/19



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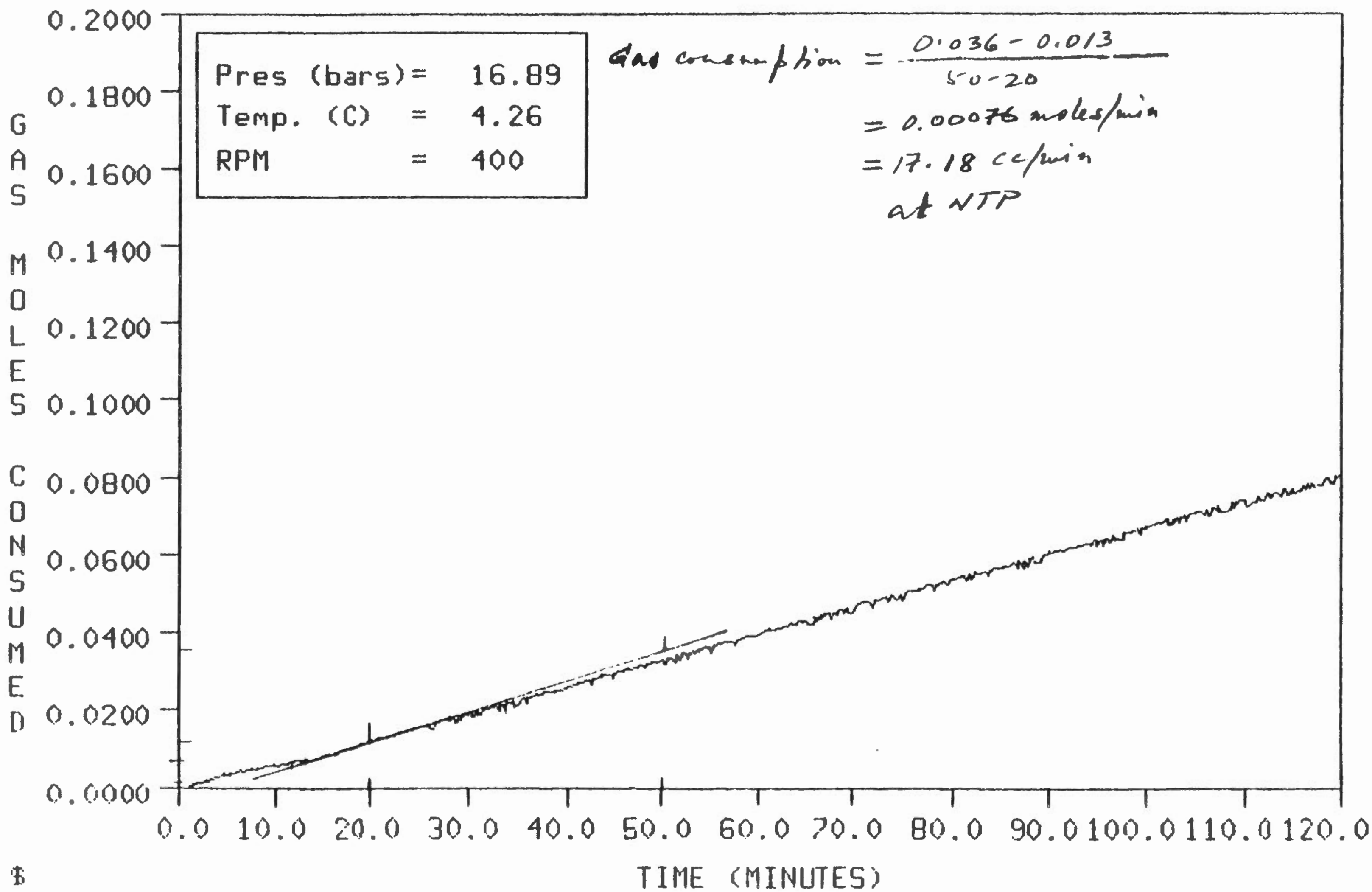
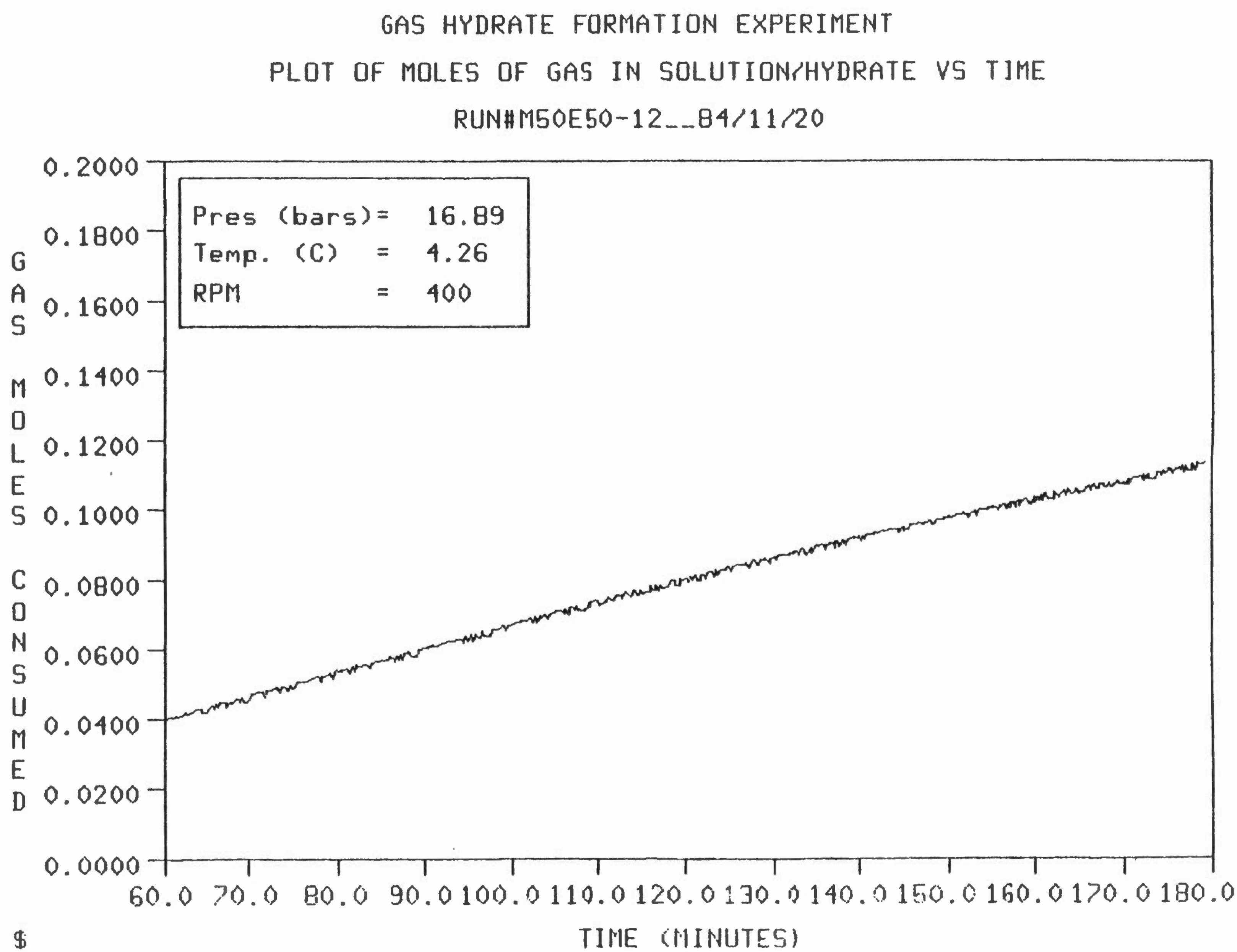
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-12__84/11/20

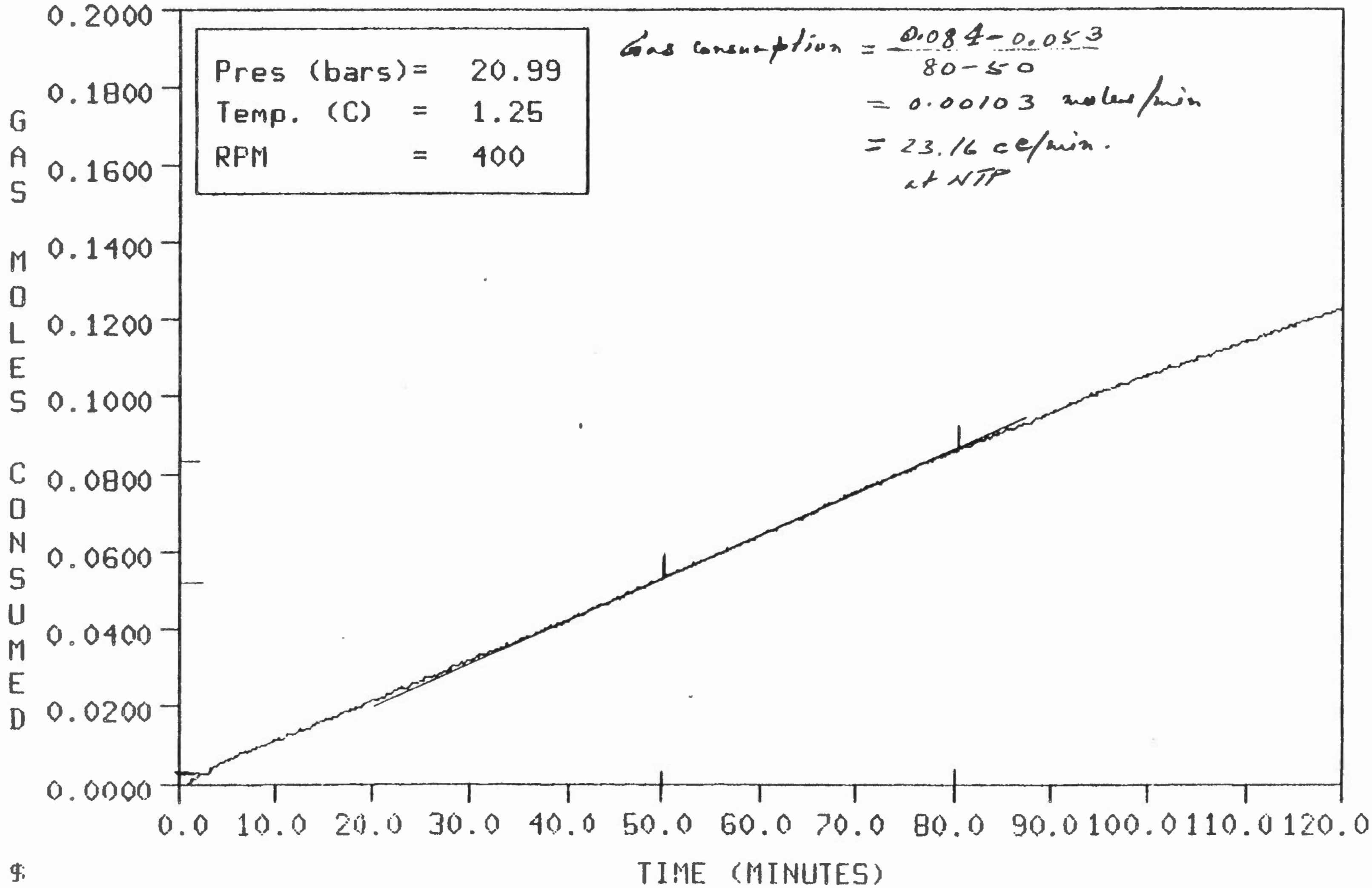



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-12__84/11/20
Pres (bars)= 16.89
Temp. (C) = 4.26
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-13__84/11/21



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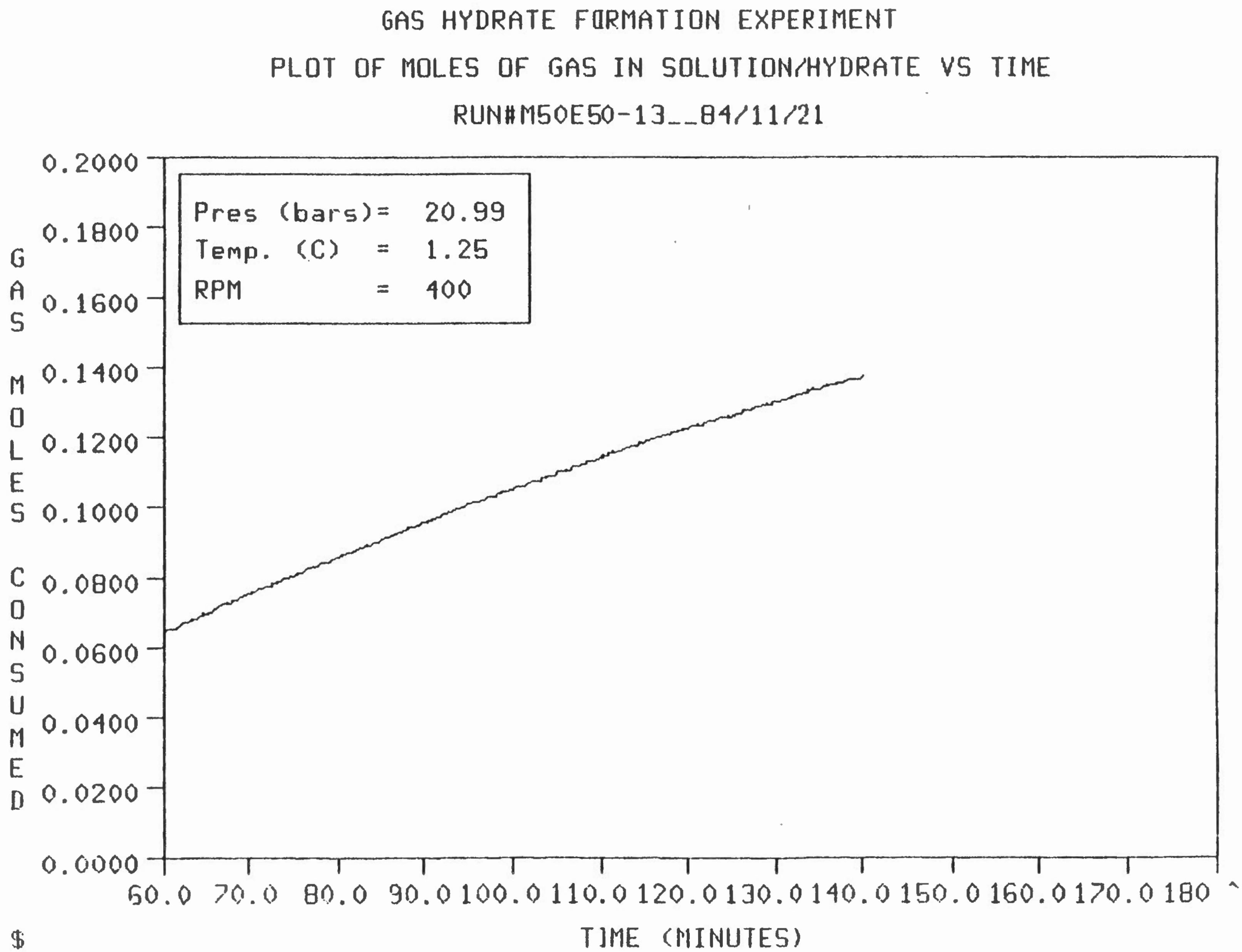
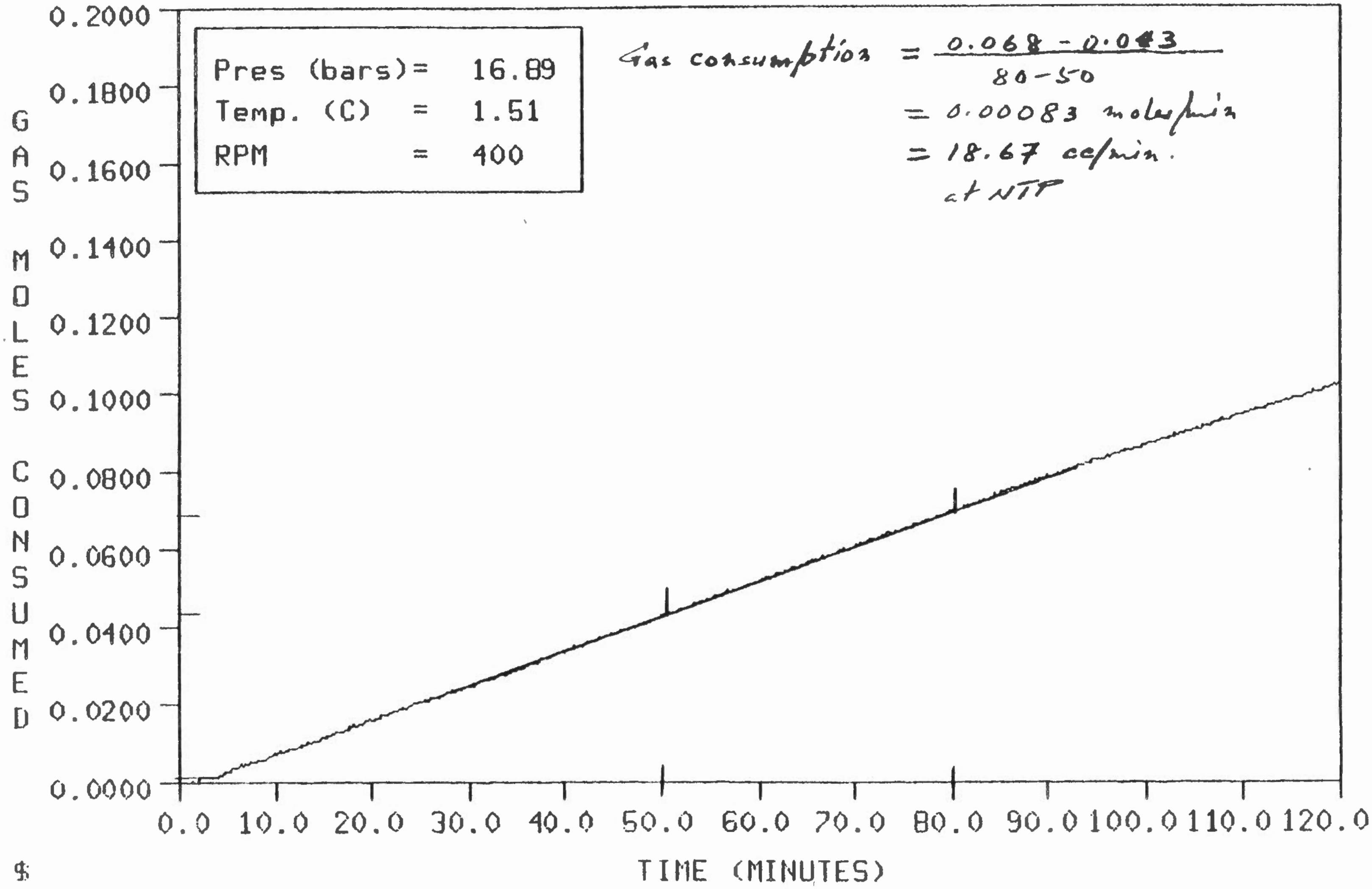
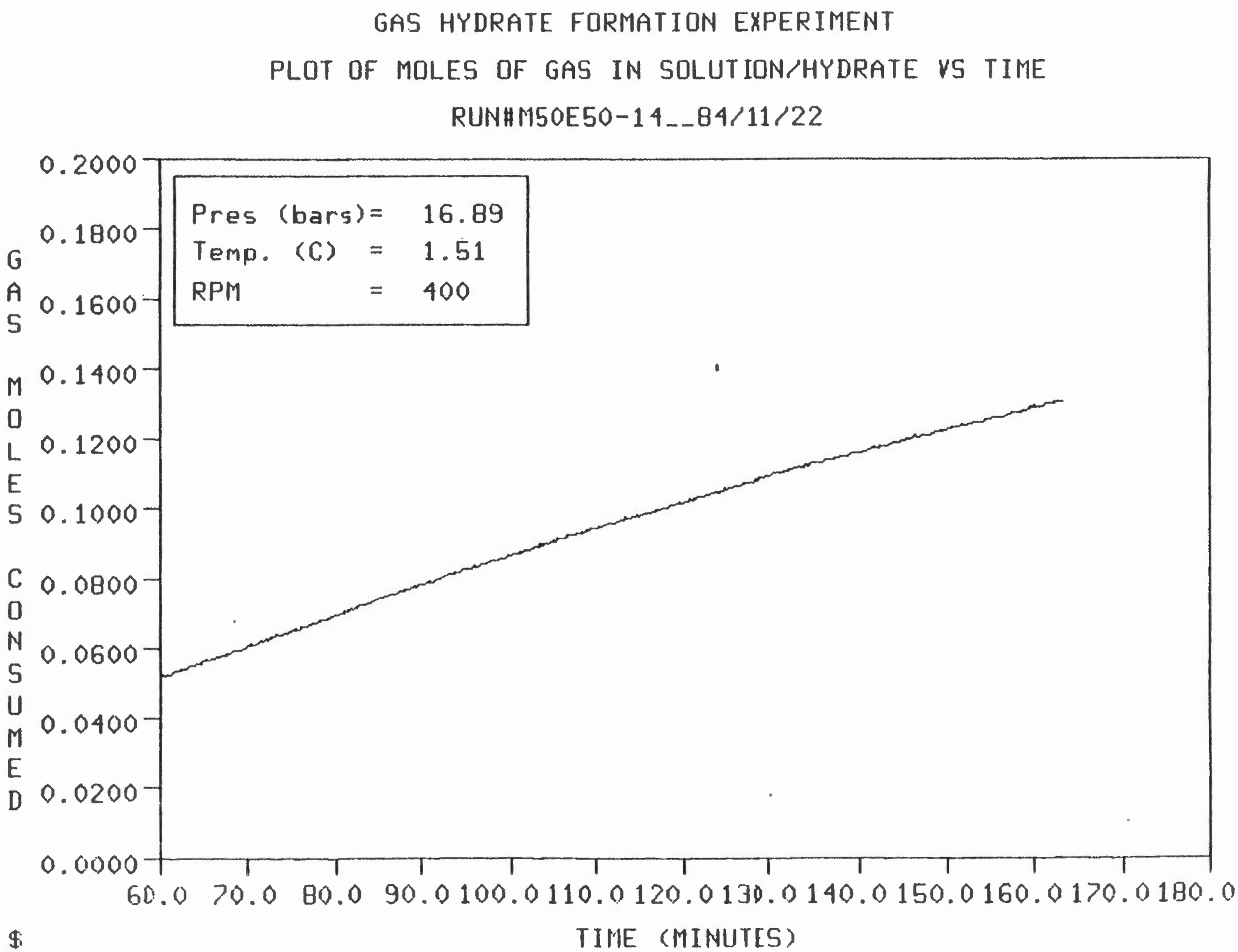

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-13__84/11/21
Pres (bars)= 20.99
Temp. (C) = 1.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-14__84/11/22



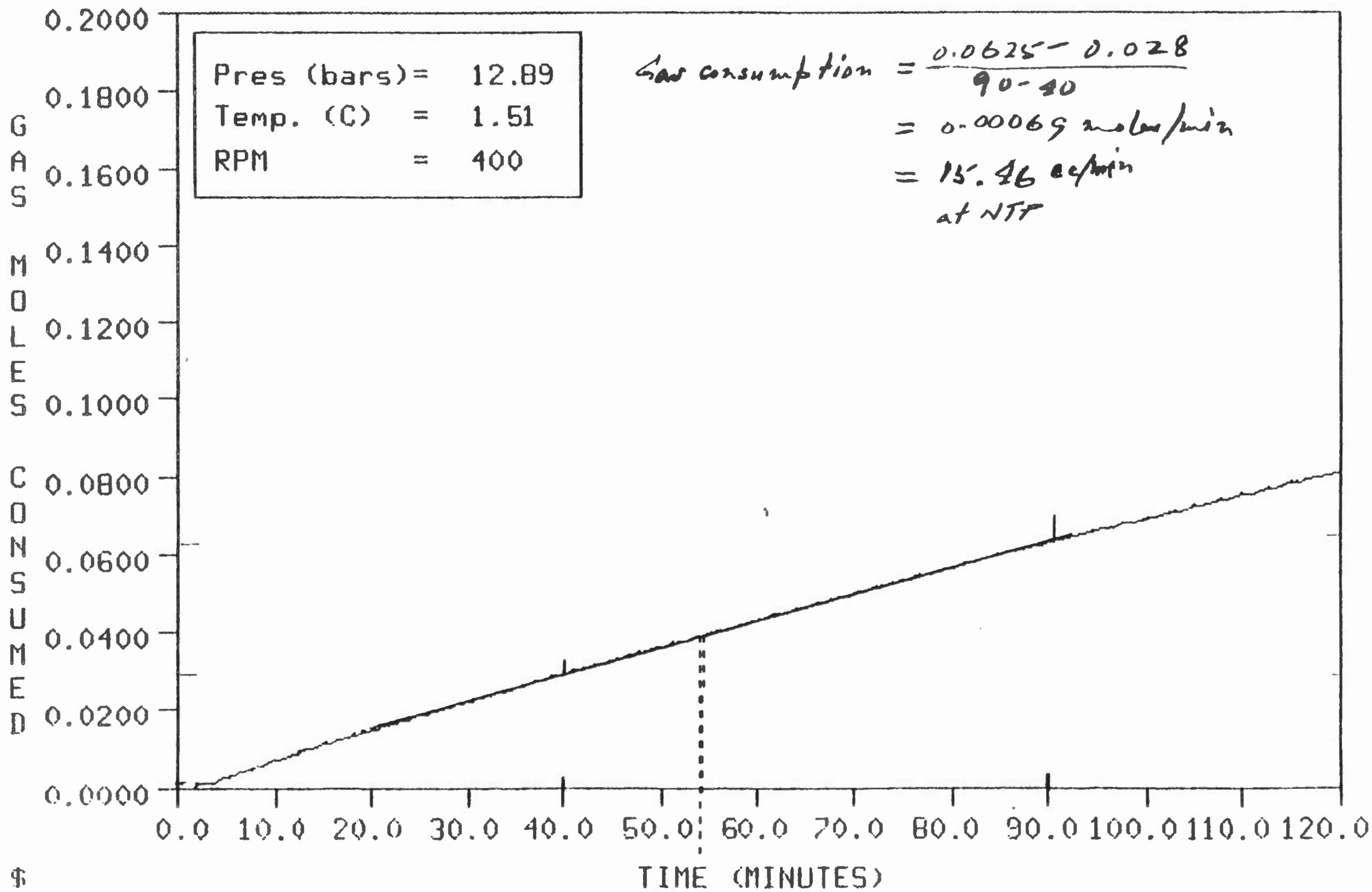

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-14__84/11/22
Pres (bars)= 16.89
Temp. (C) = 1.51
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0200
0.0400
0.0600
0.0800
0.1000
0.1200
0.1400
0.1600
0.1800
0.2000
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
TIME (MINUTES)

$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

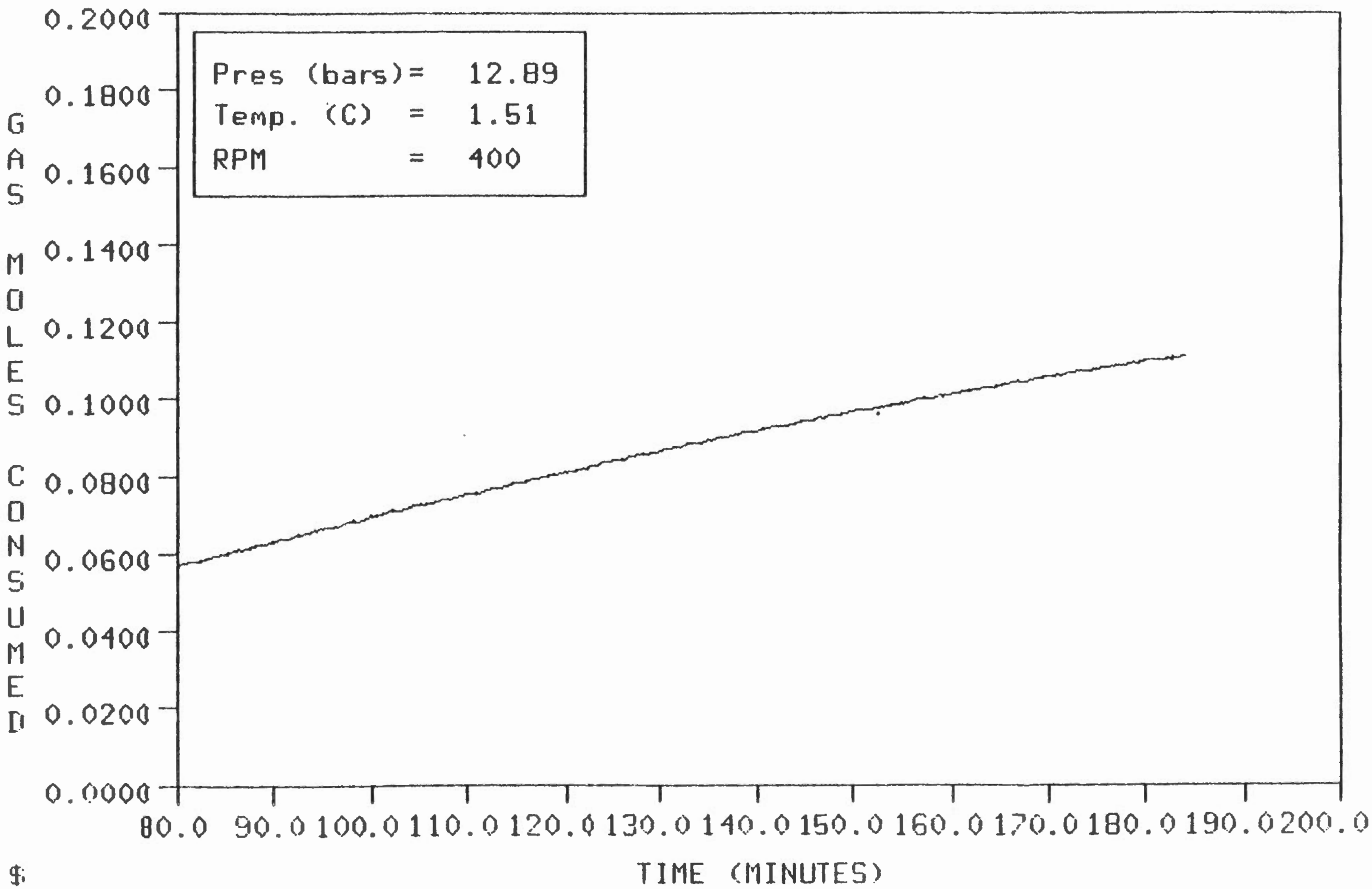
RUN#M50E50-15__84/11/23



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

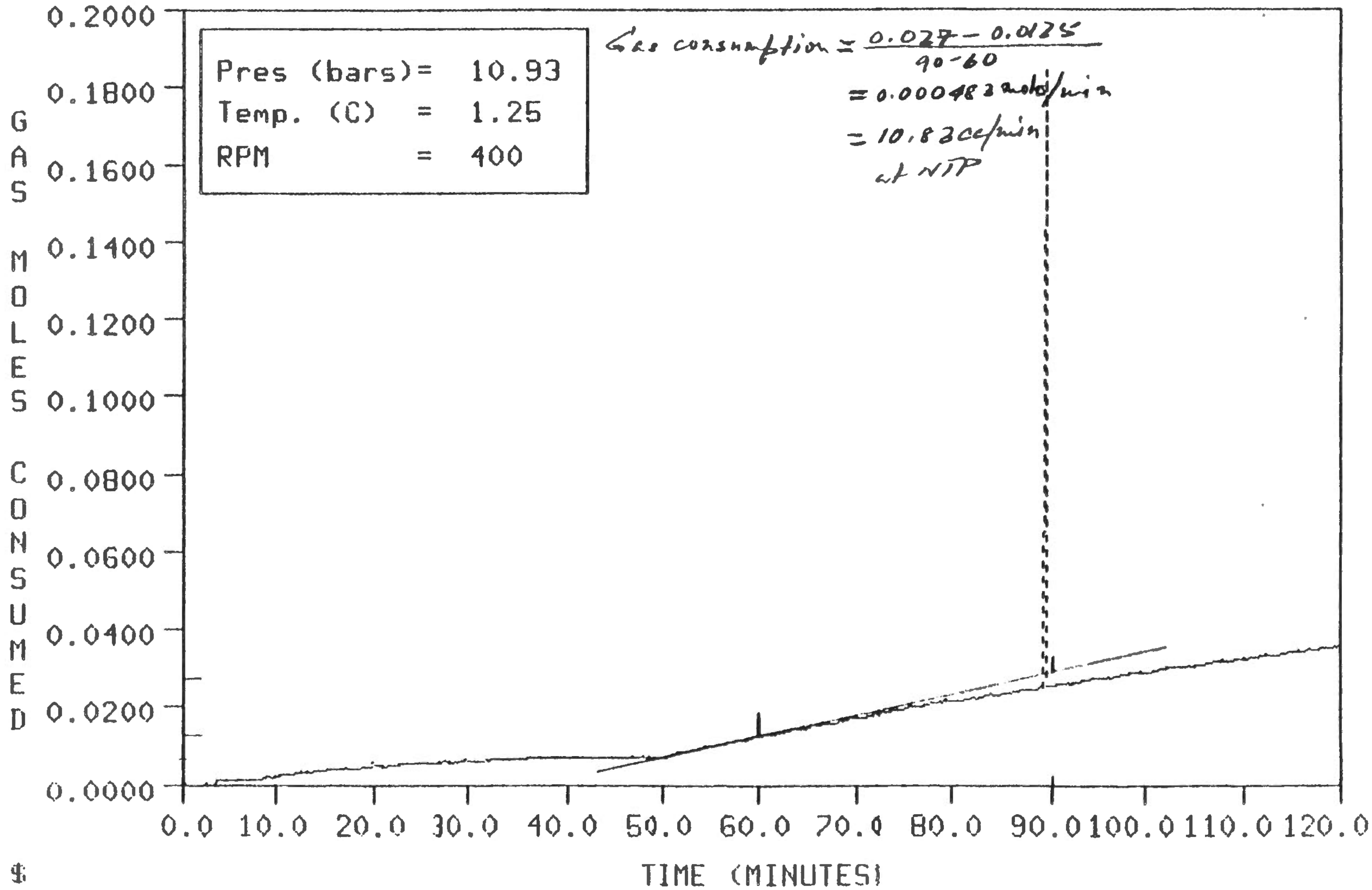
RUN#M50E50-15__84/11/23

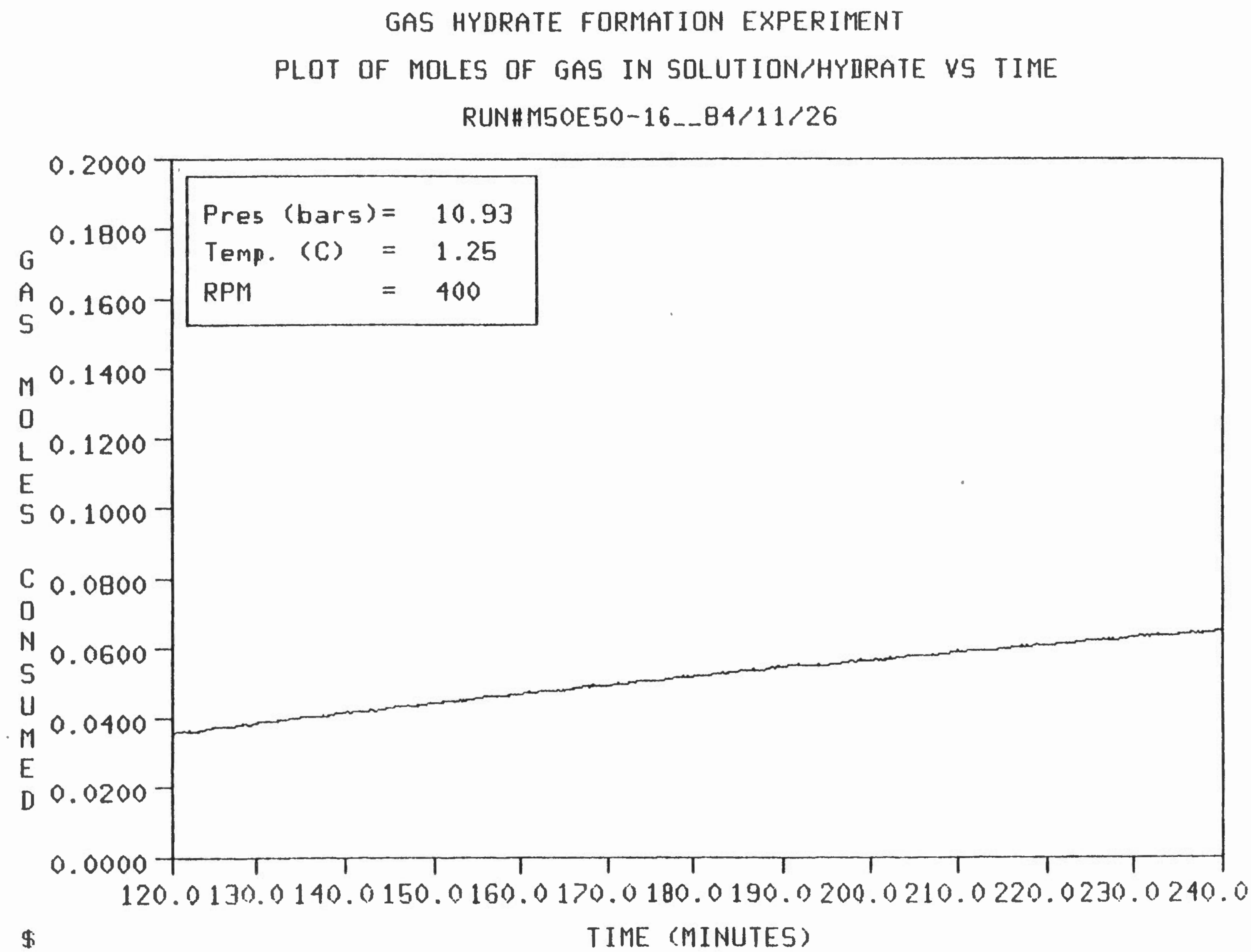


GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-16__84/11/26

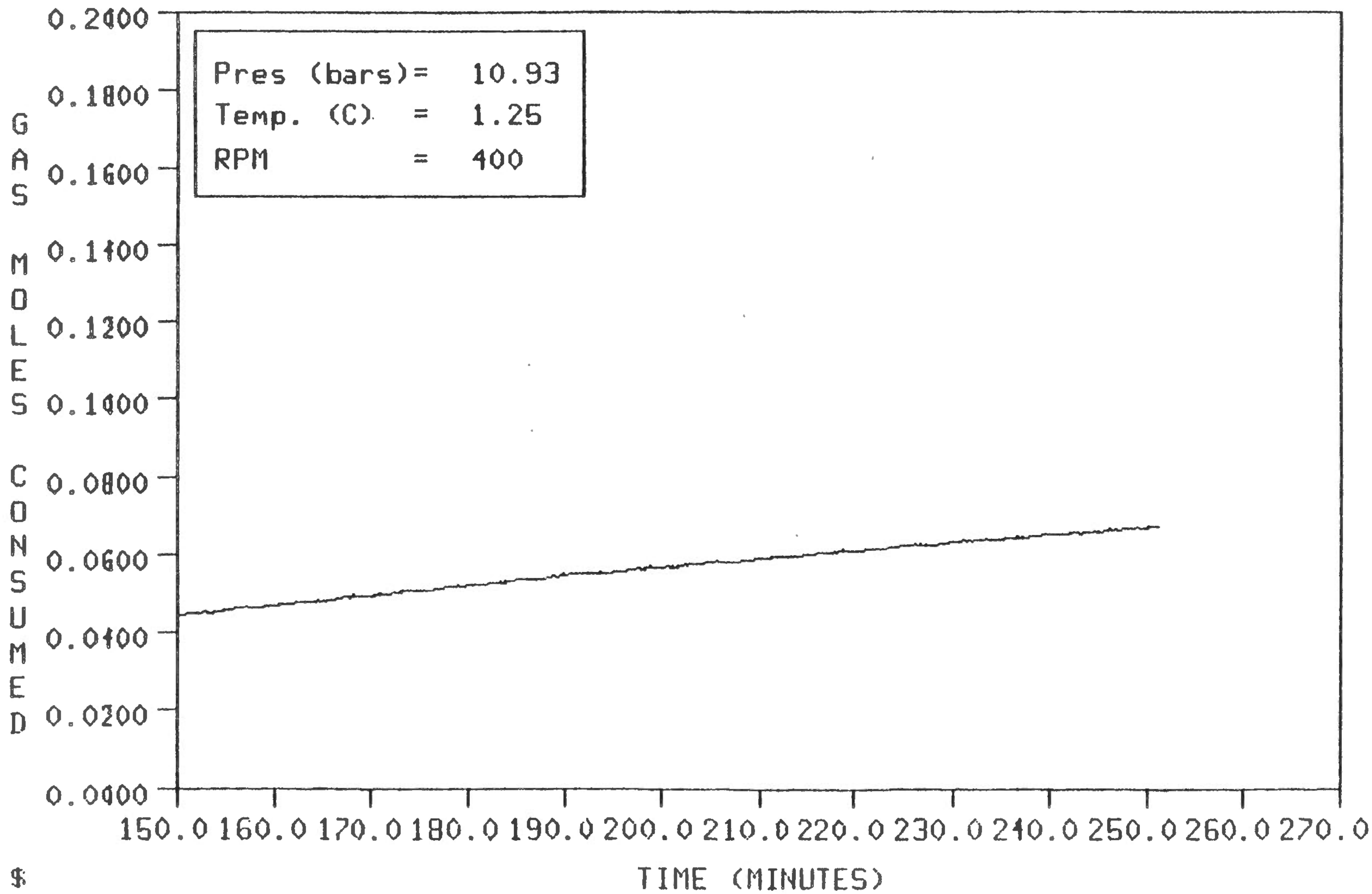



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-16__84/11/26
Pres (bars)= 10.93
Temp. (C) = 1.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

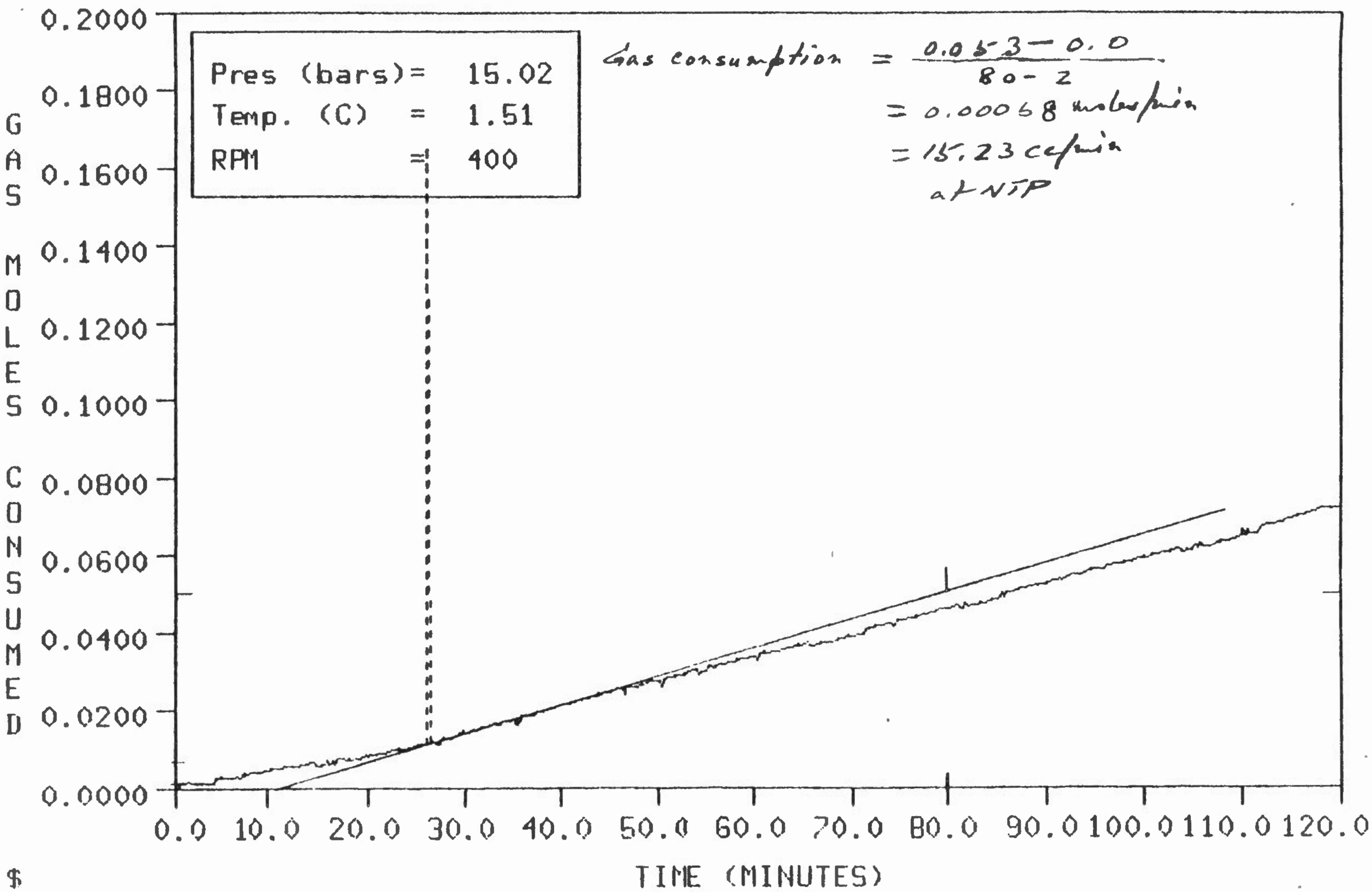
RUN#M50E50-16__84/11/26



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

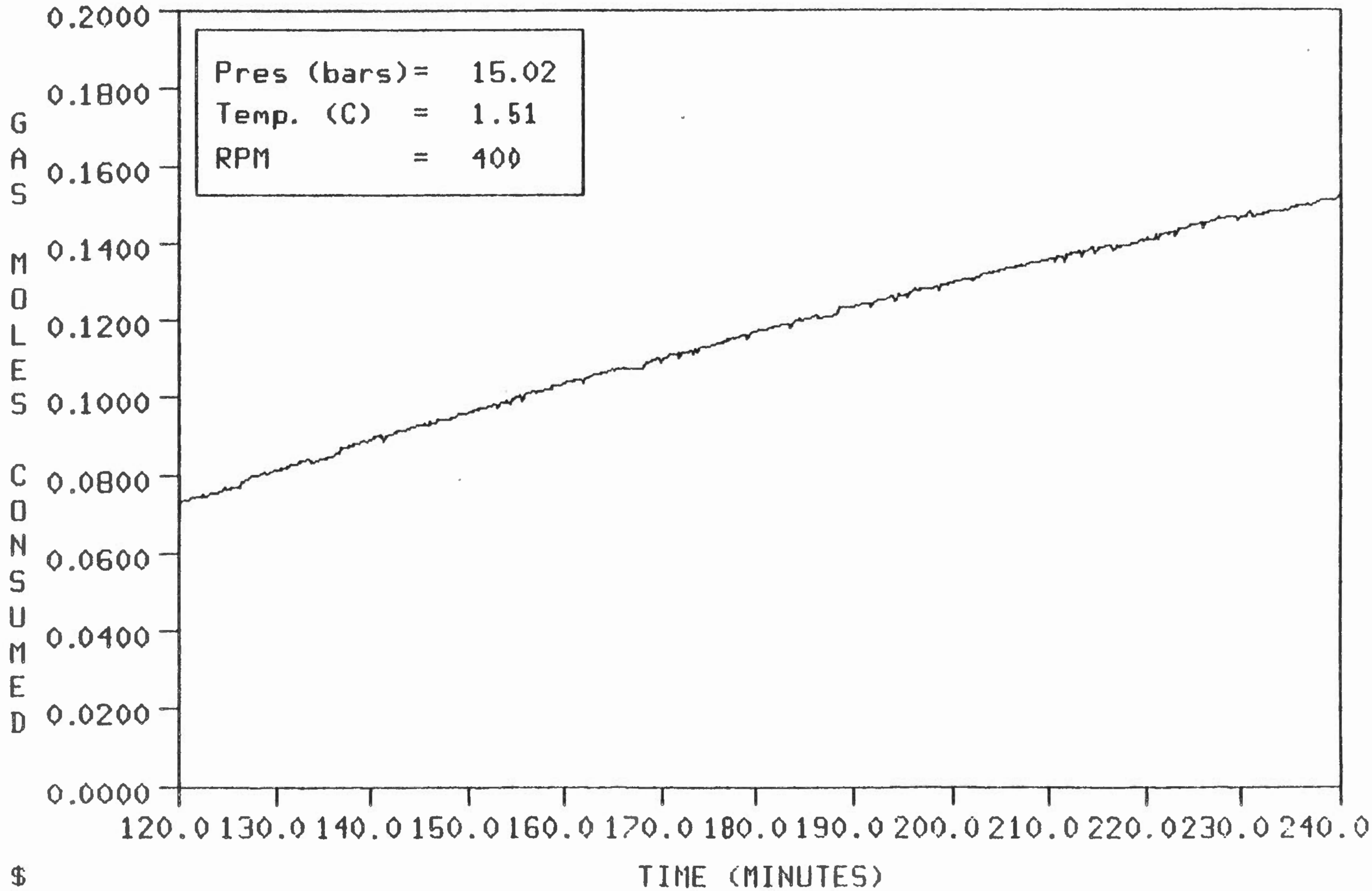
RUN#M50E50-17__84/11/27



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-17__84/11/27

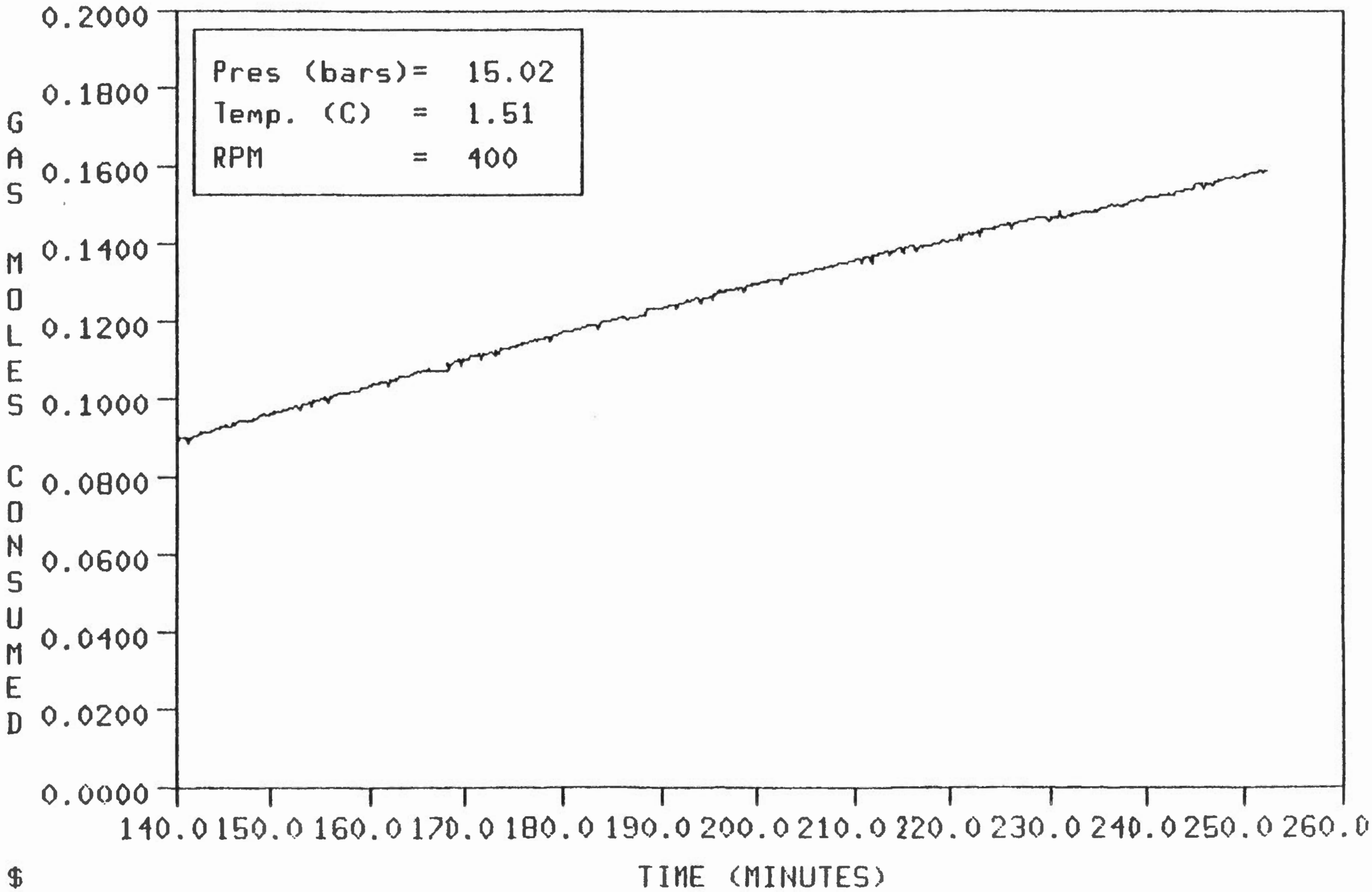


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

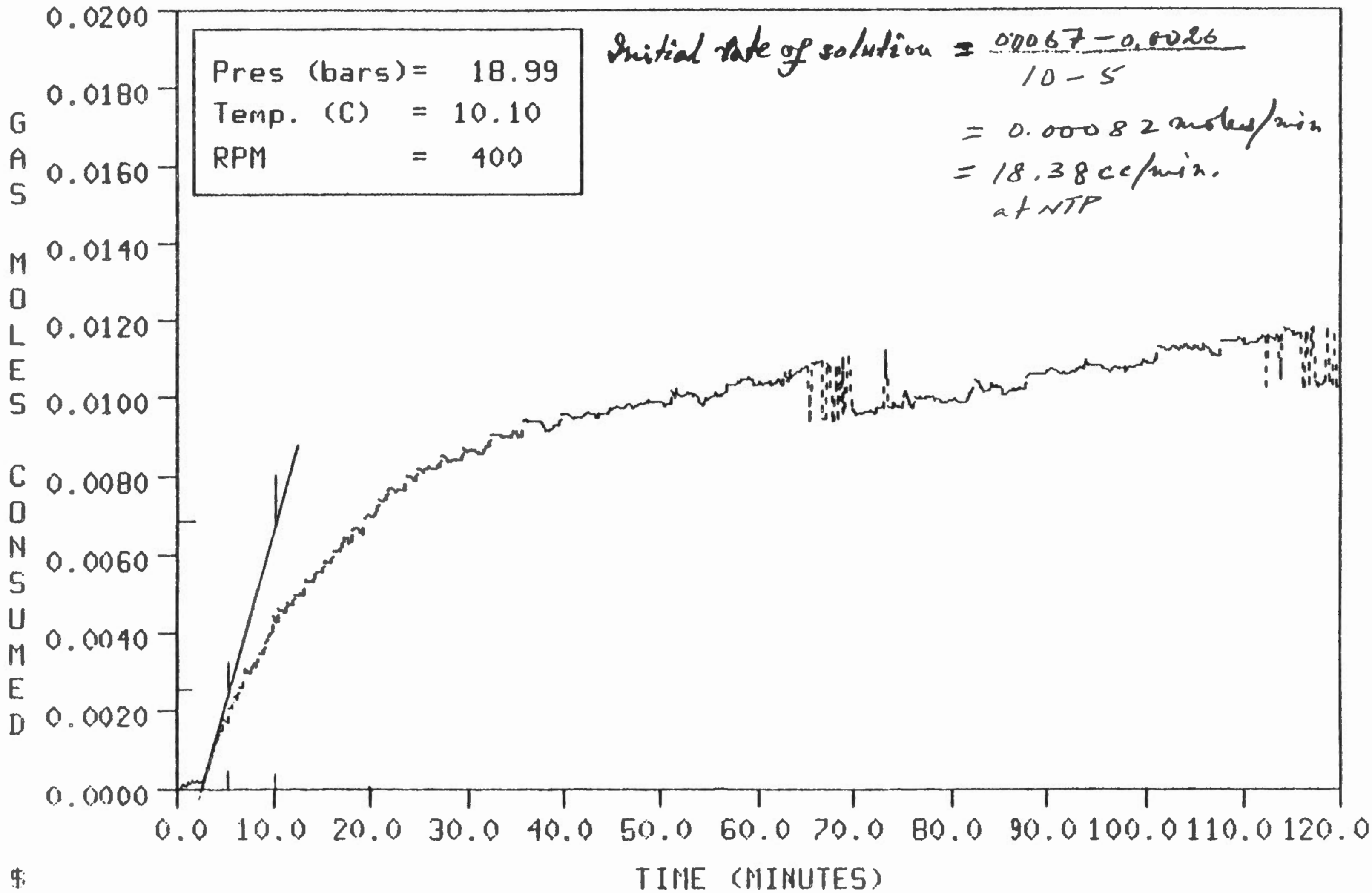
RUN#M50E50-17__84/11/27



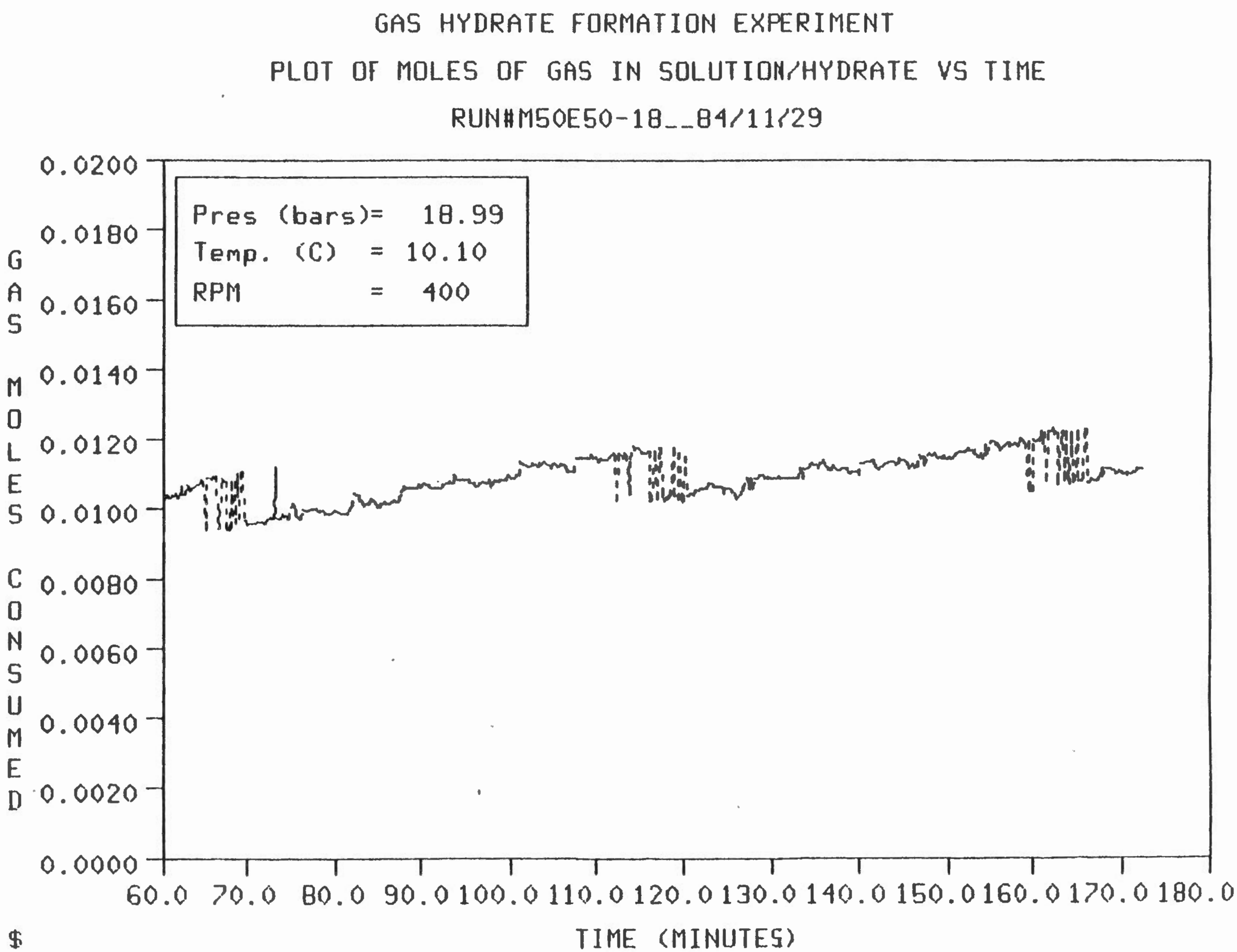
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-18__84/11/29



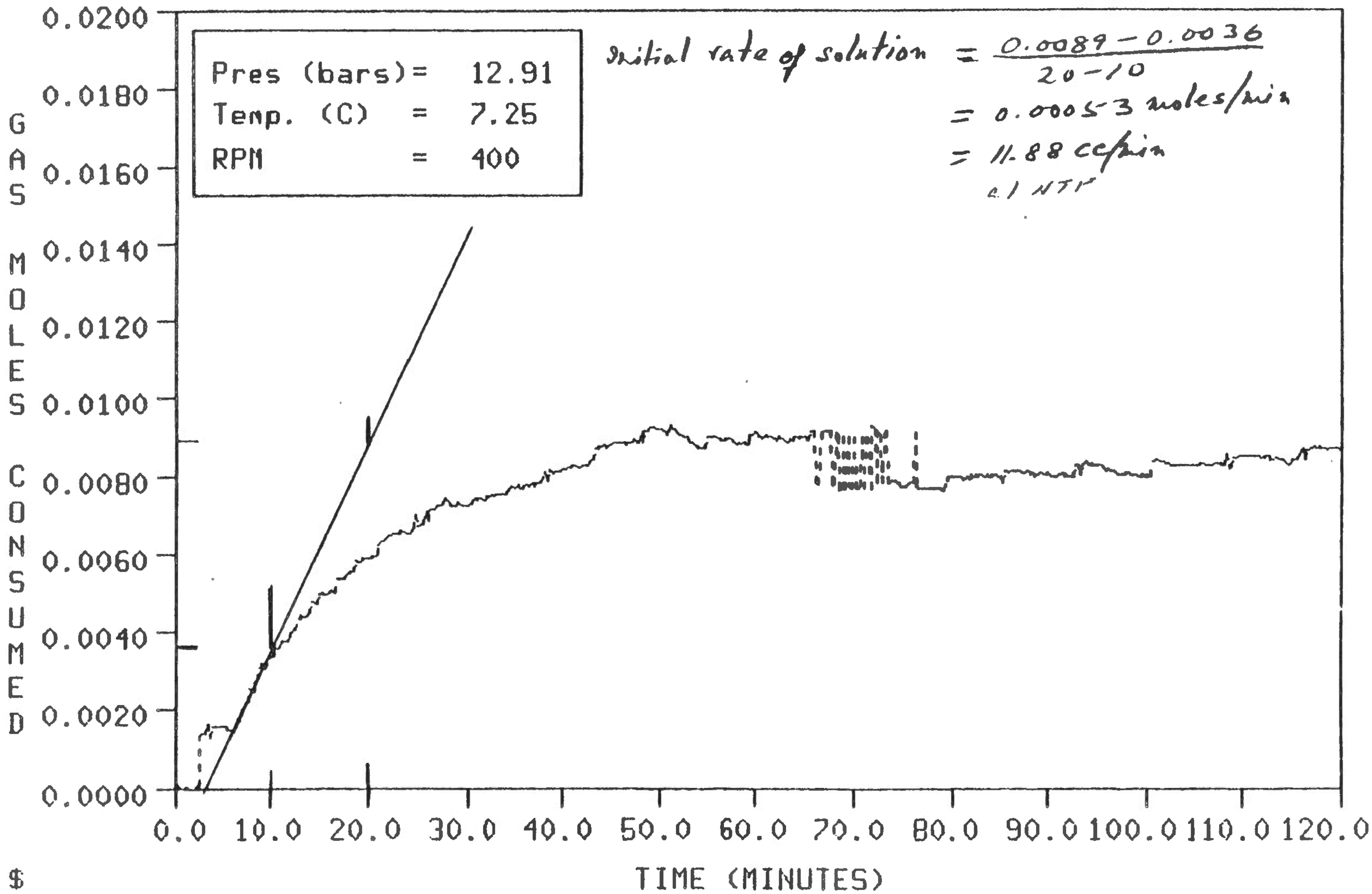
$

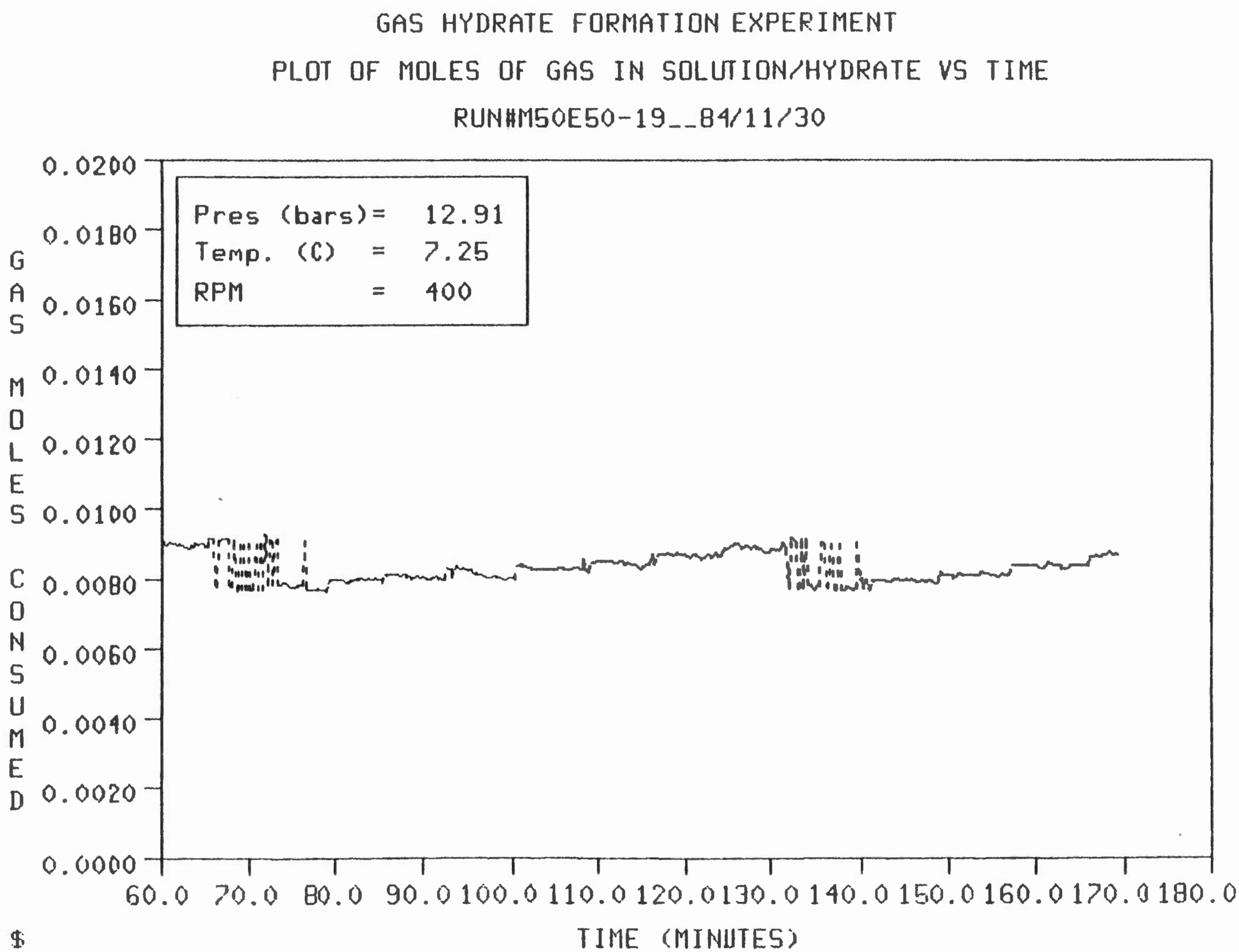

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-18__84/11/29
Pres (bars)= 18.99
Temp. (C) = 10.10
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-19__84/11/30

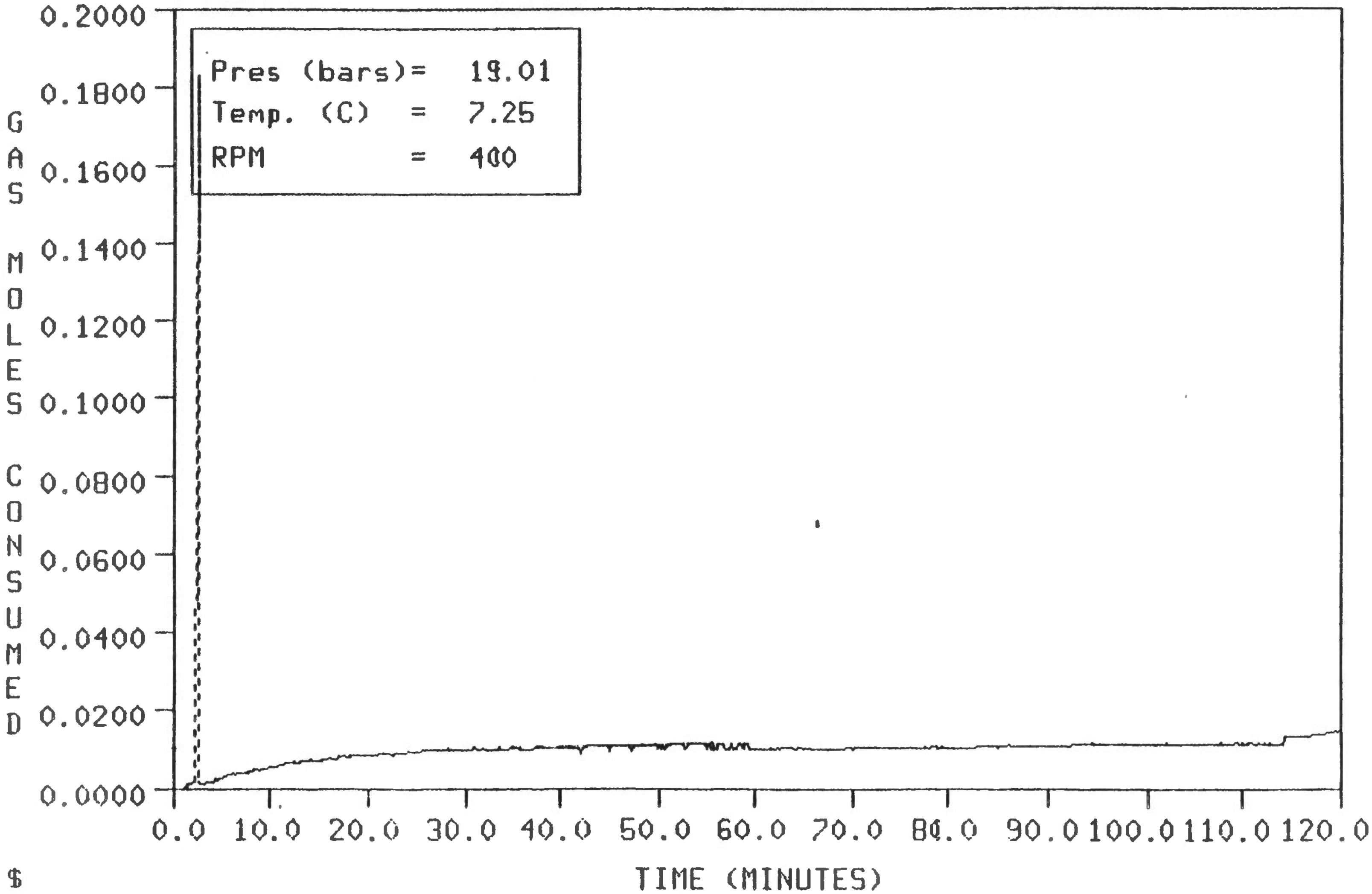



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-19__84/11/30
Pres (bars)= 12.91
Temp. (C) = 7.25
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-20__84/12/03

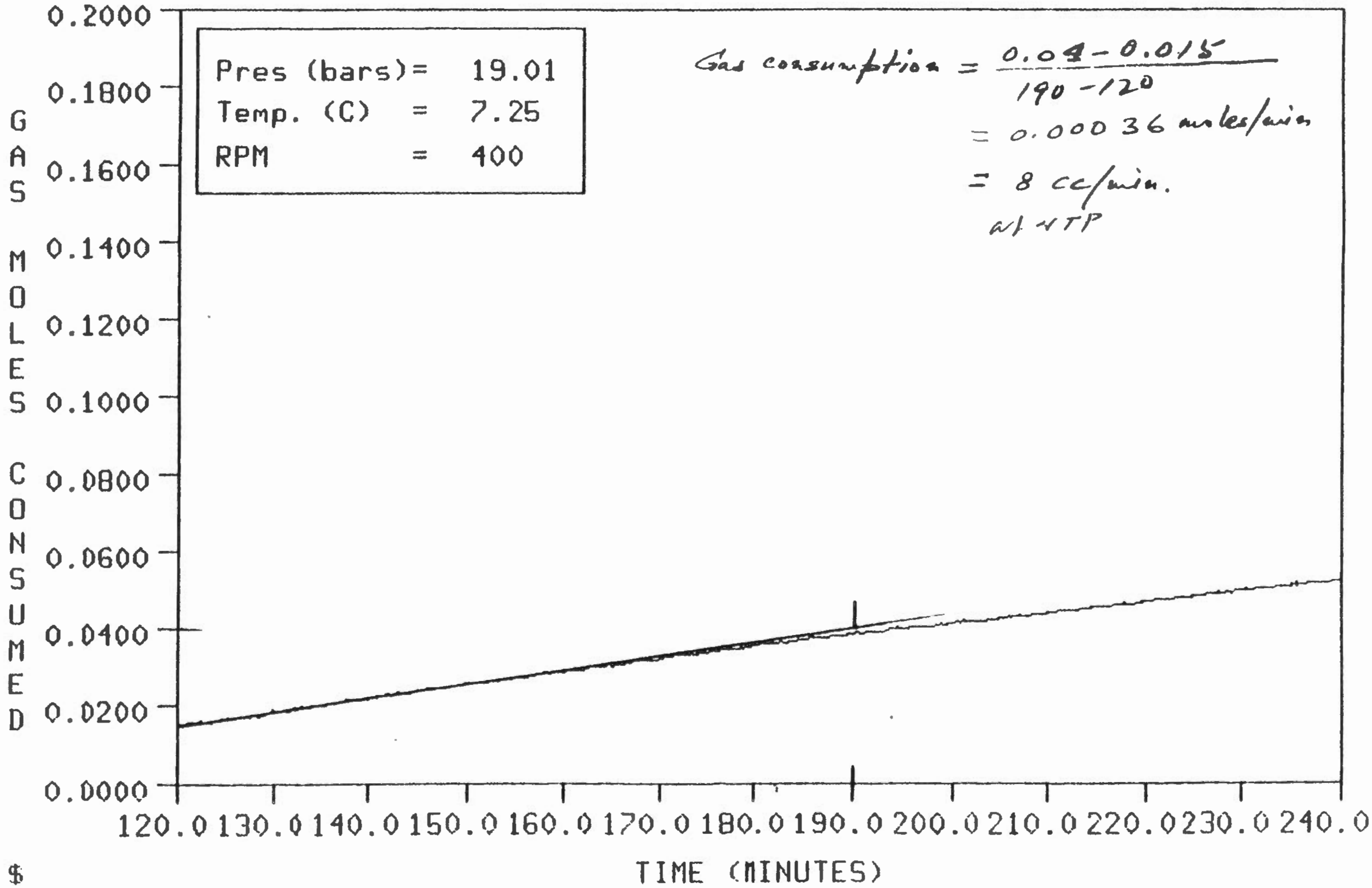


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-20_84/12/03

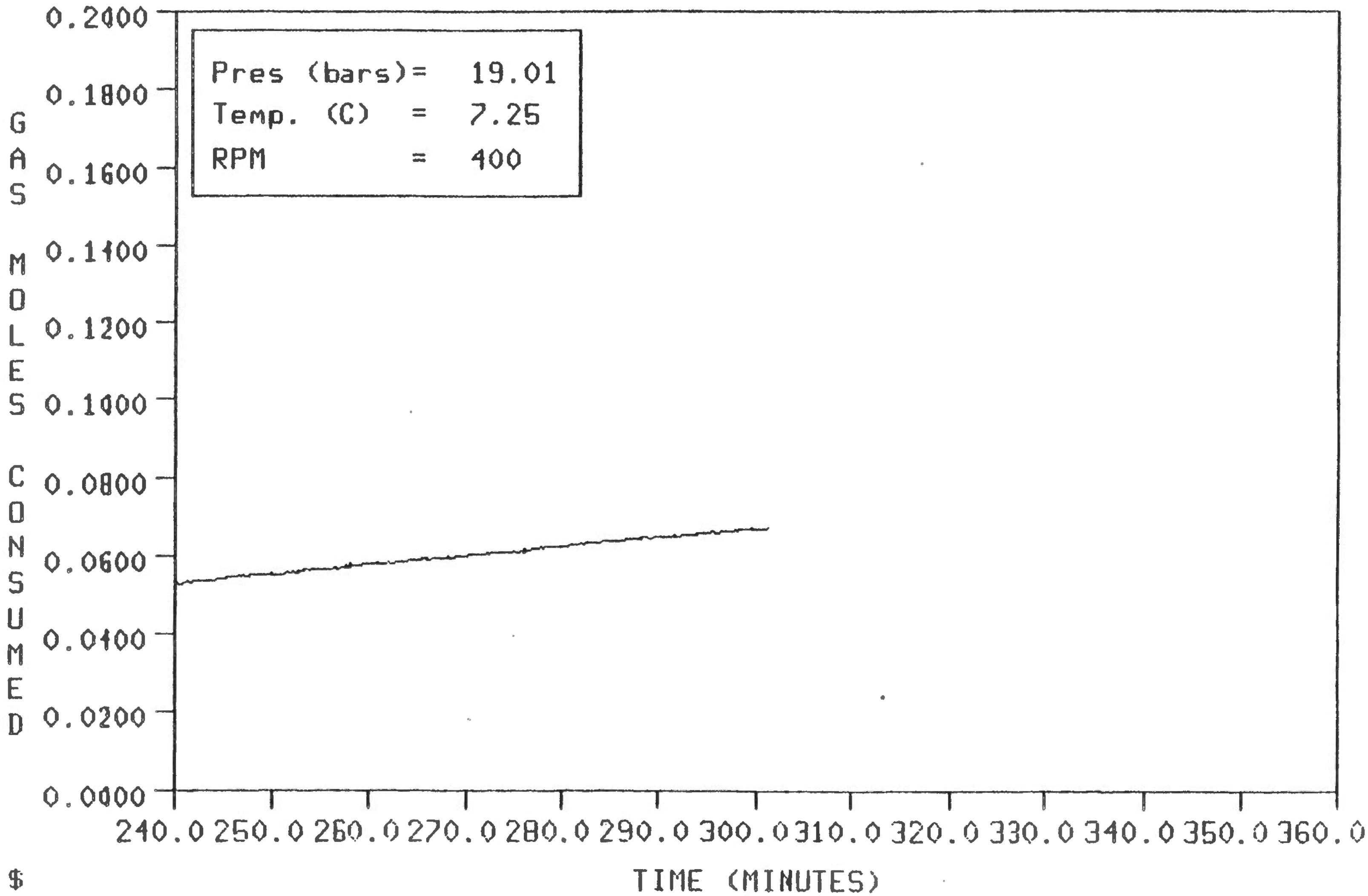


[redacted] [redacted]

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

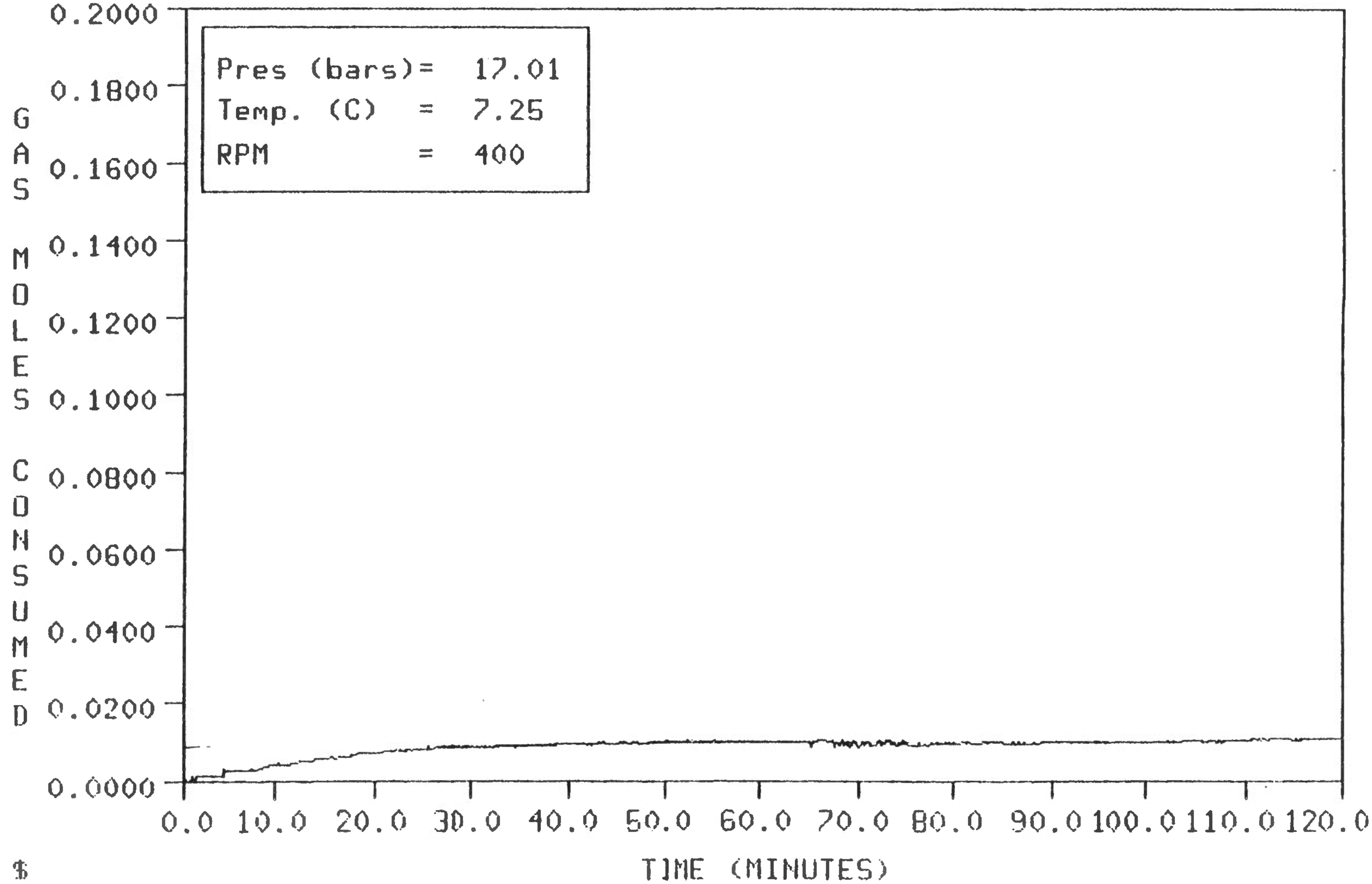
RUN#M50E50-20__84/12/03



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

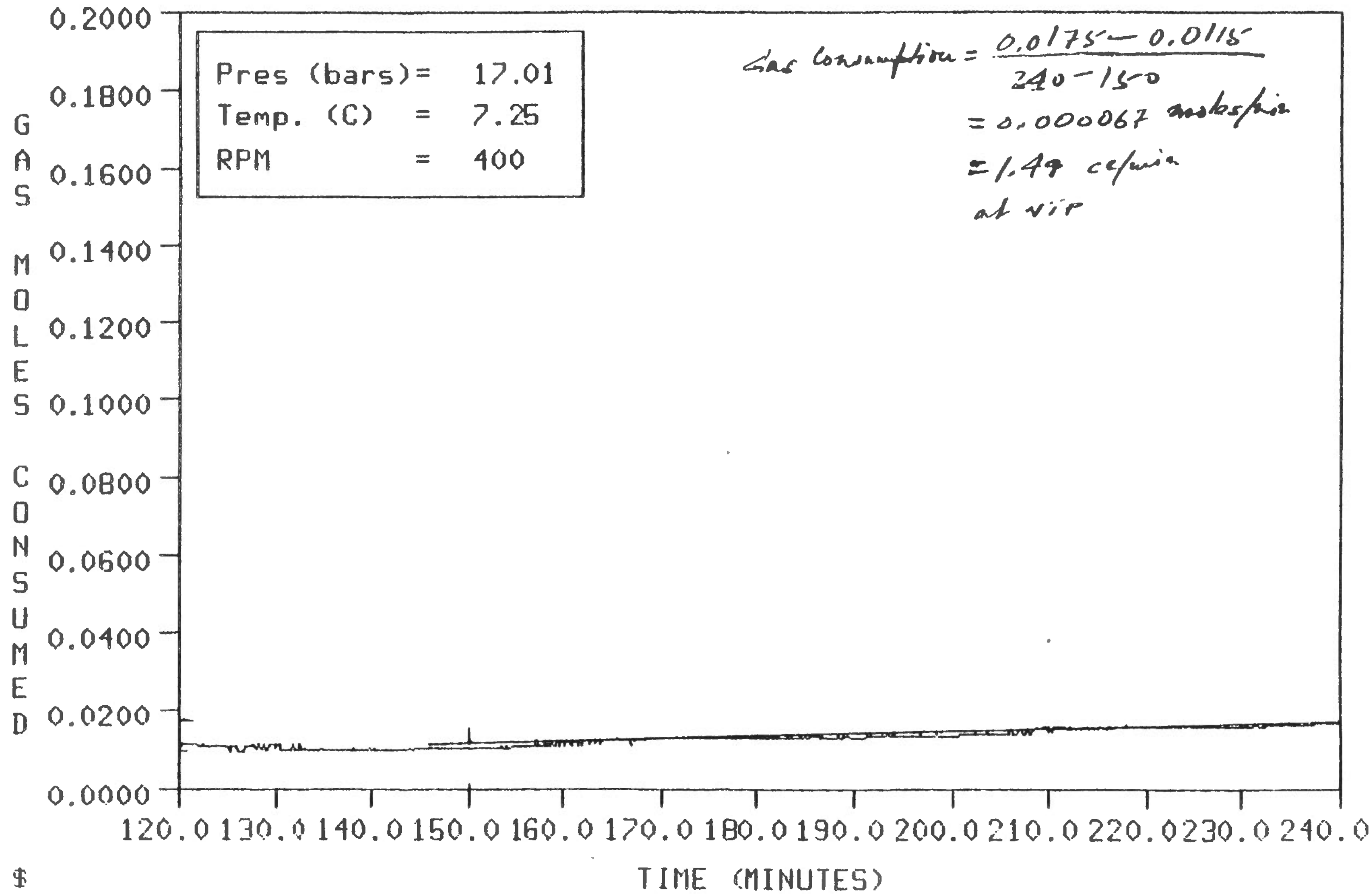
RUN#M50E50-21__84/12/04



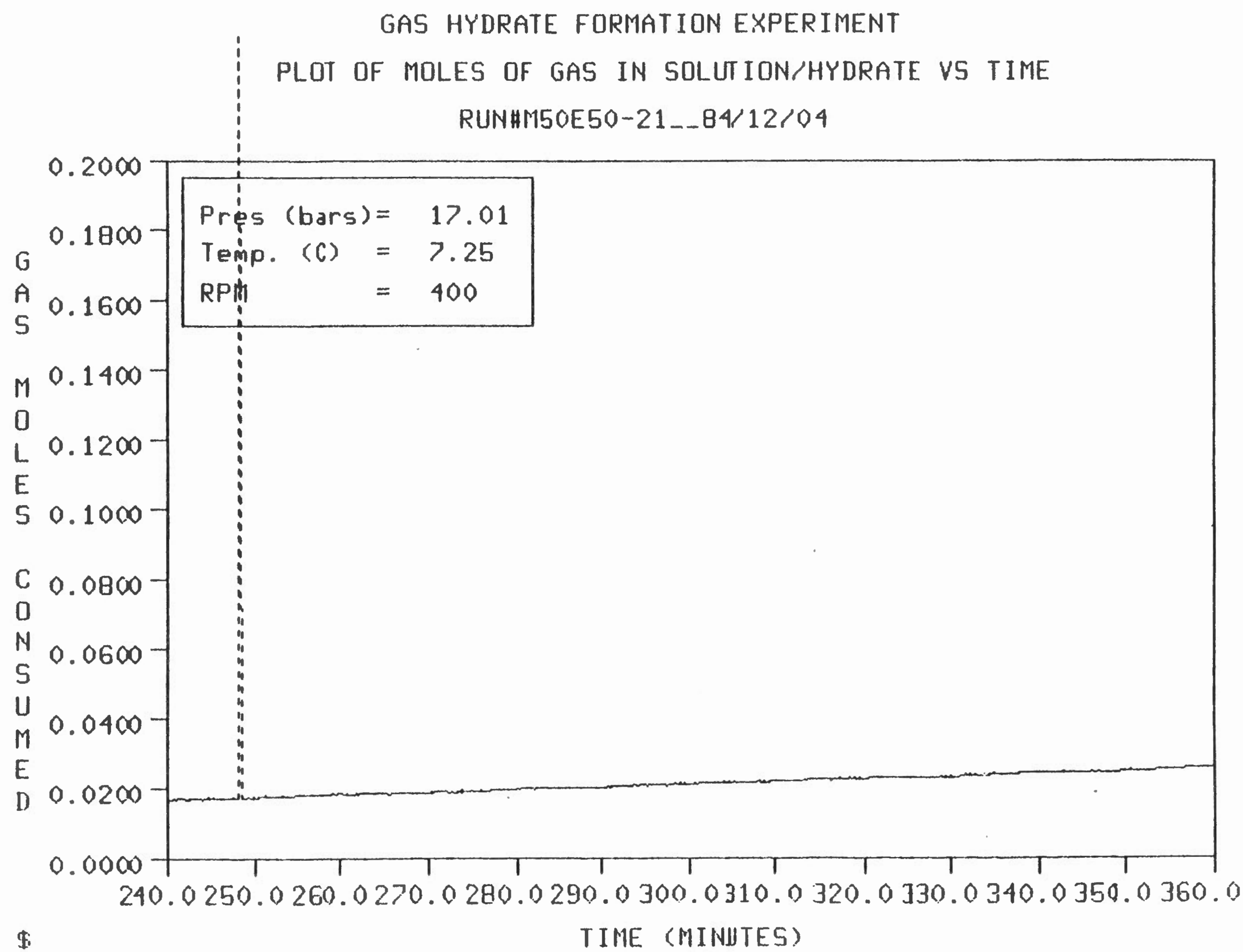
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-21__84/12/04



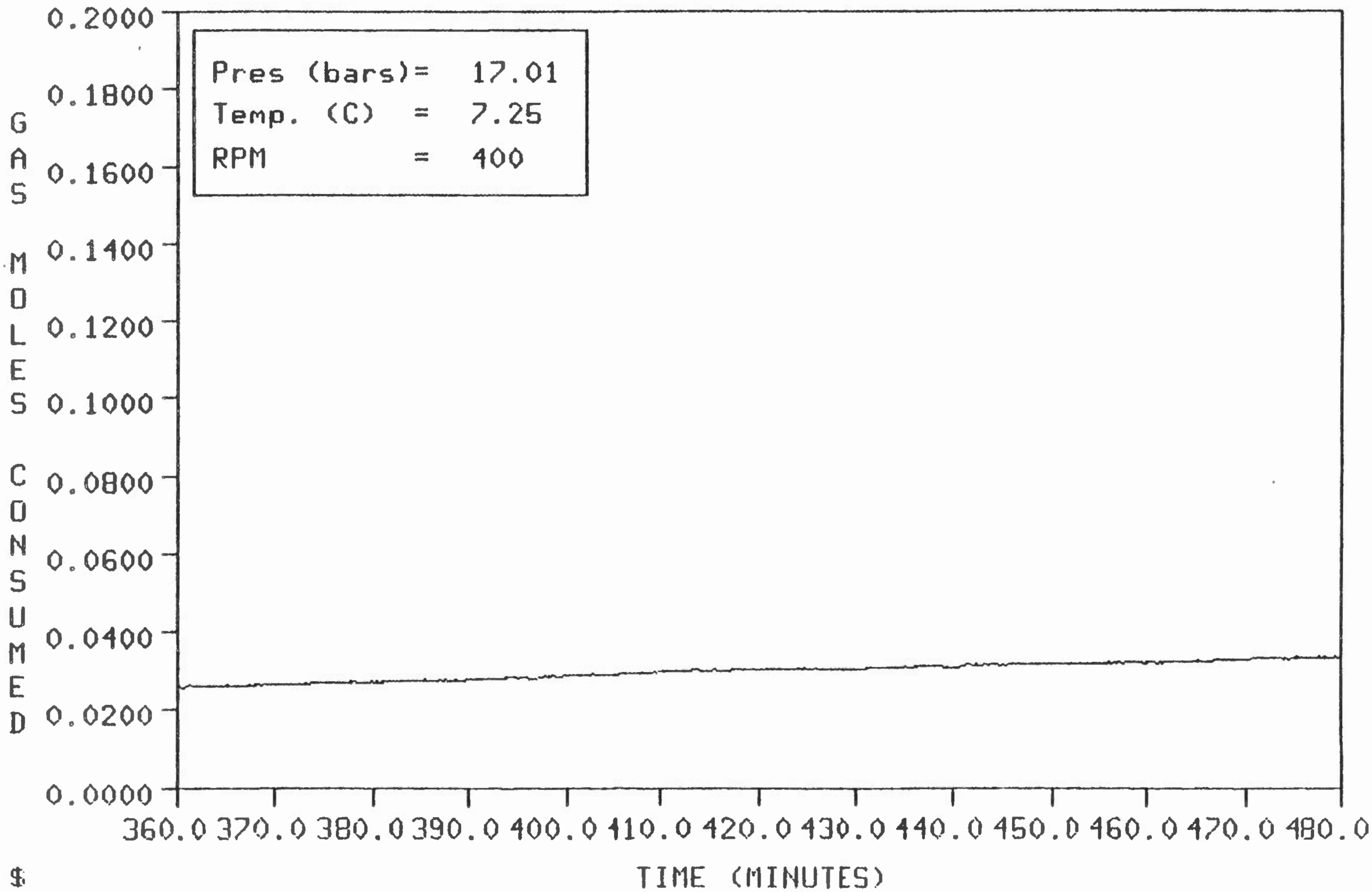
$

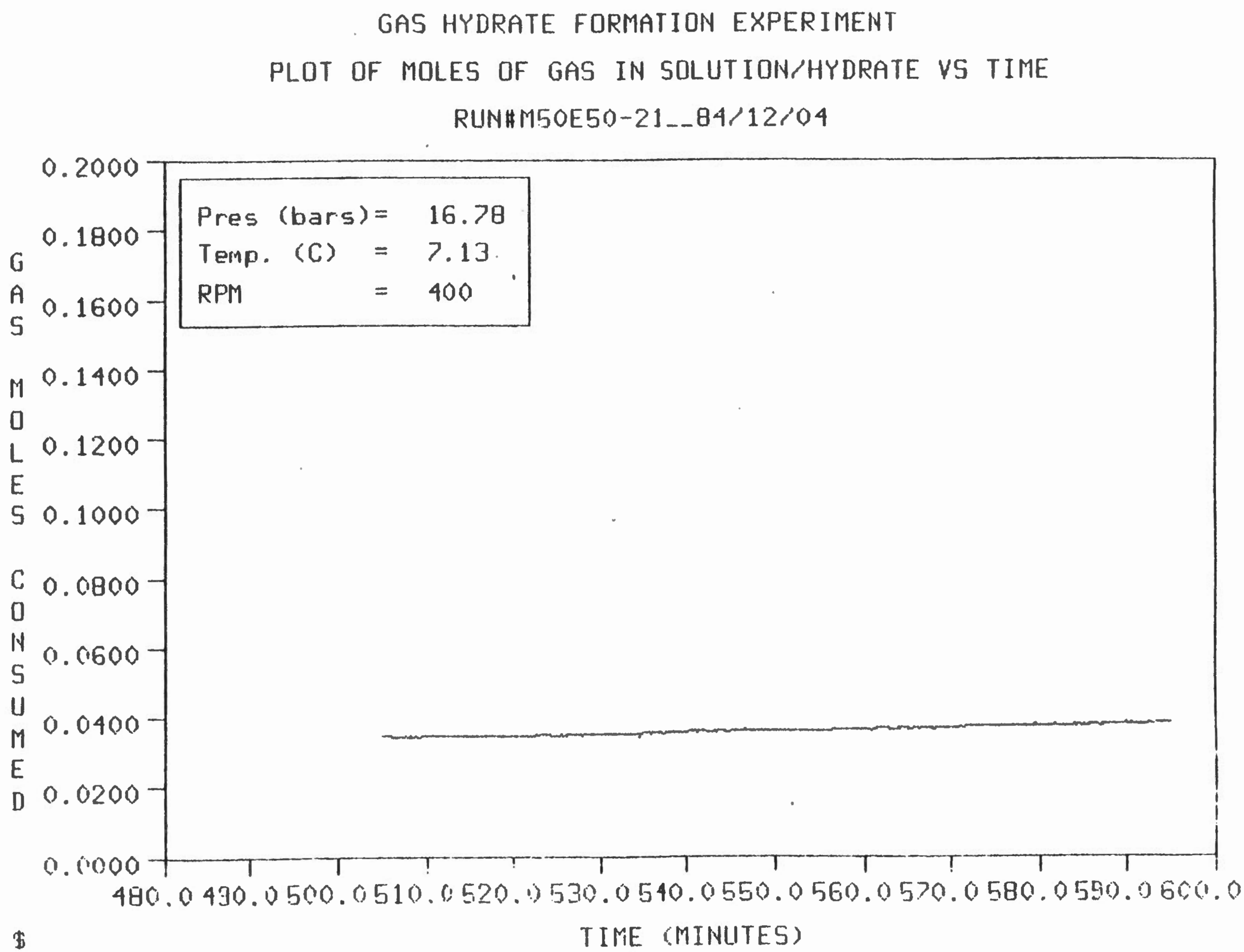

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-21__84/12/04
Pres (bars)= 17.01
Temp. (C) = 7.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-21__84/12/04

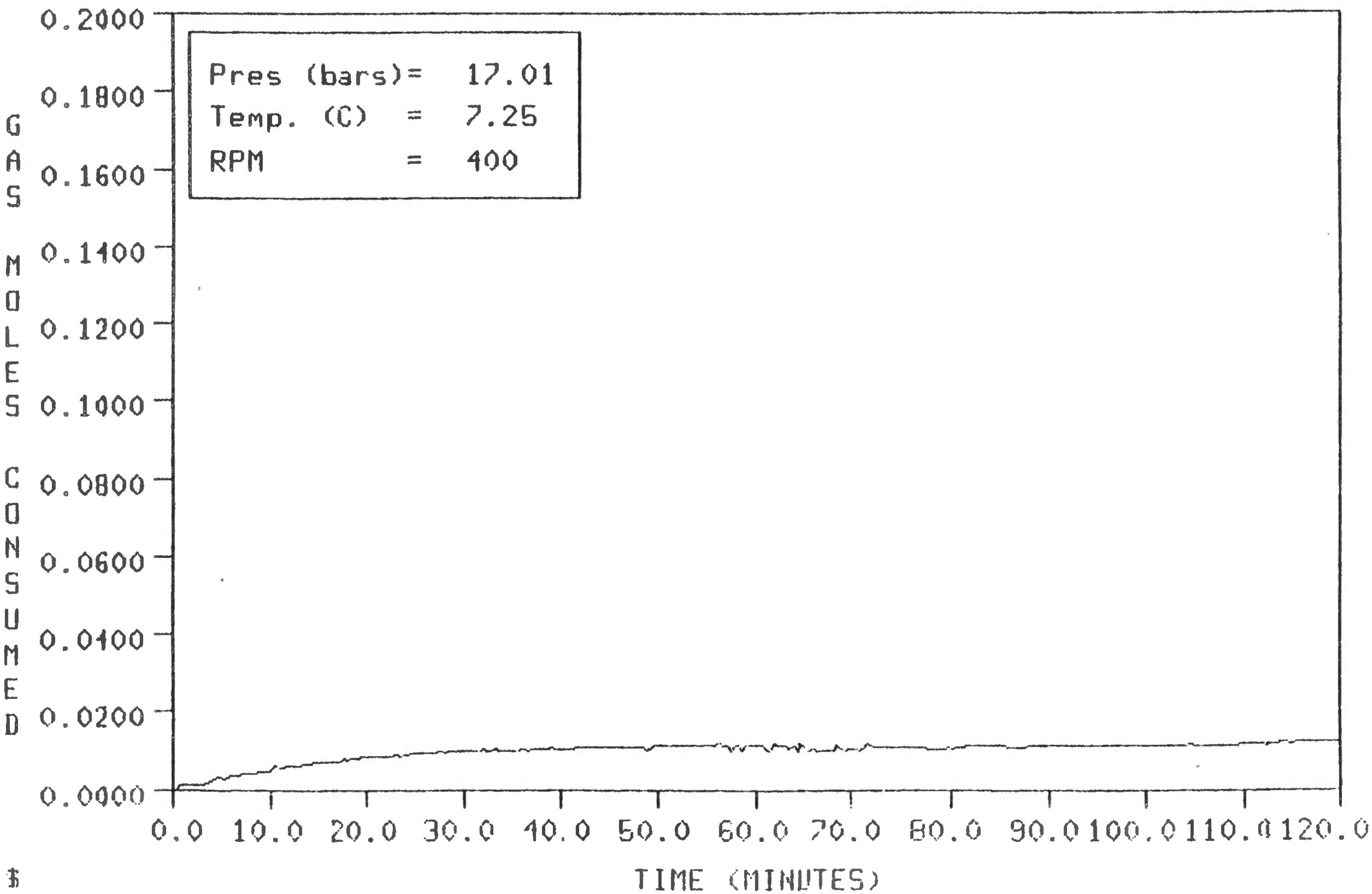



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-21__84/12/04
Pres (bars)= 16.78
Temp. (C) = 7.13
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
480.0 490.0 500.0 510.0 520.0 530.0 540.0 550.0 560.0 570.0 580.0 590.0 600.0
TIME (MINUTES)
$

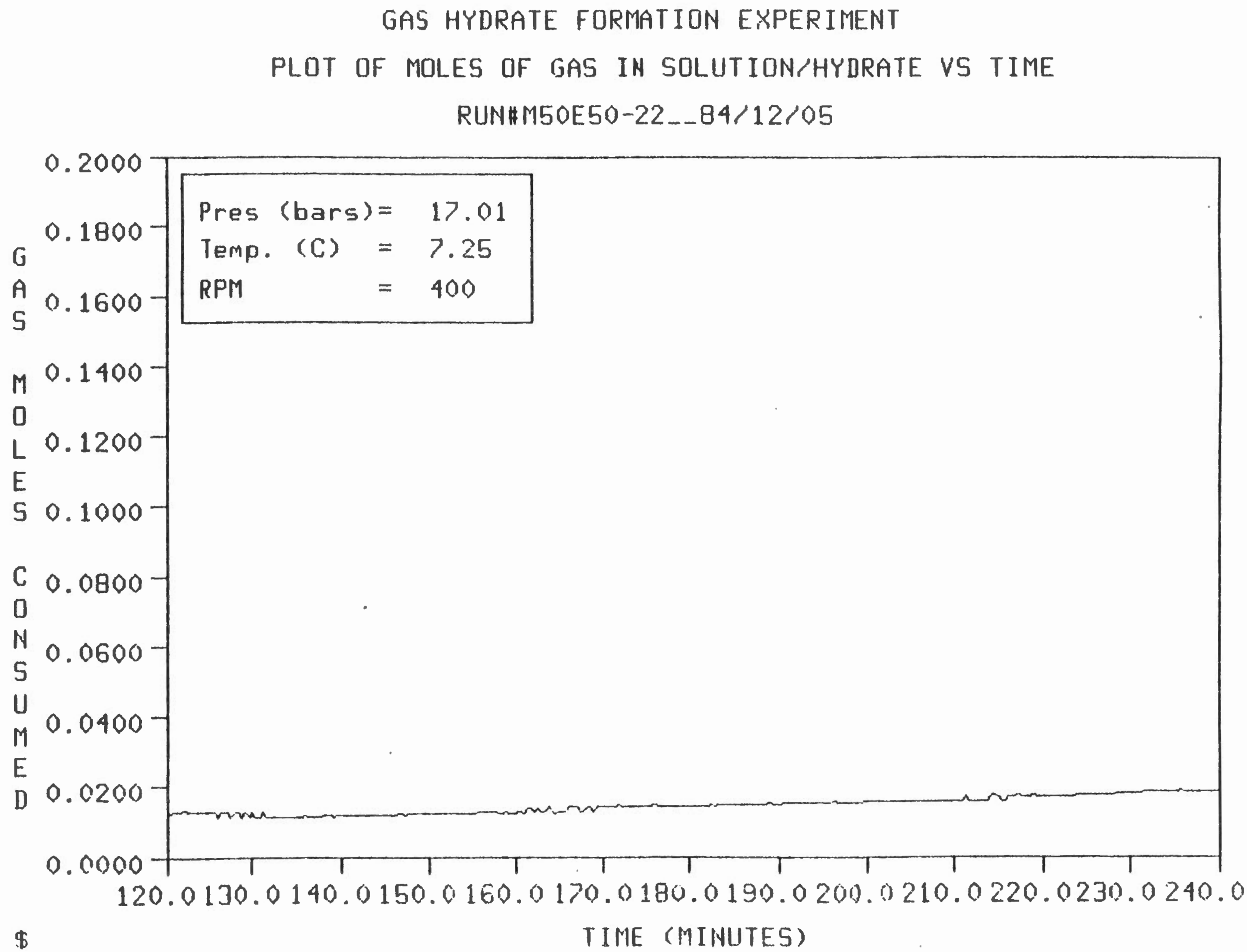
GAS HYDRATE FORMATION EXPERIMENT

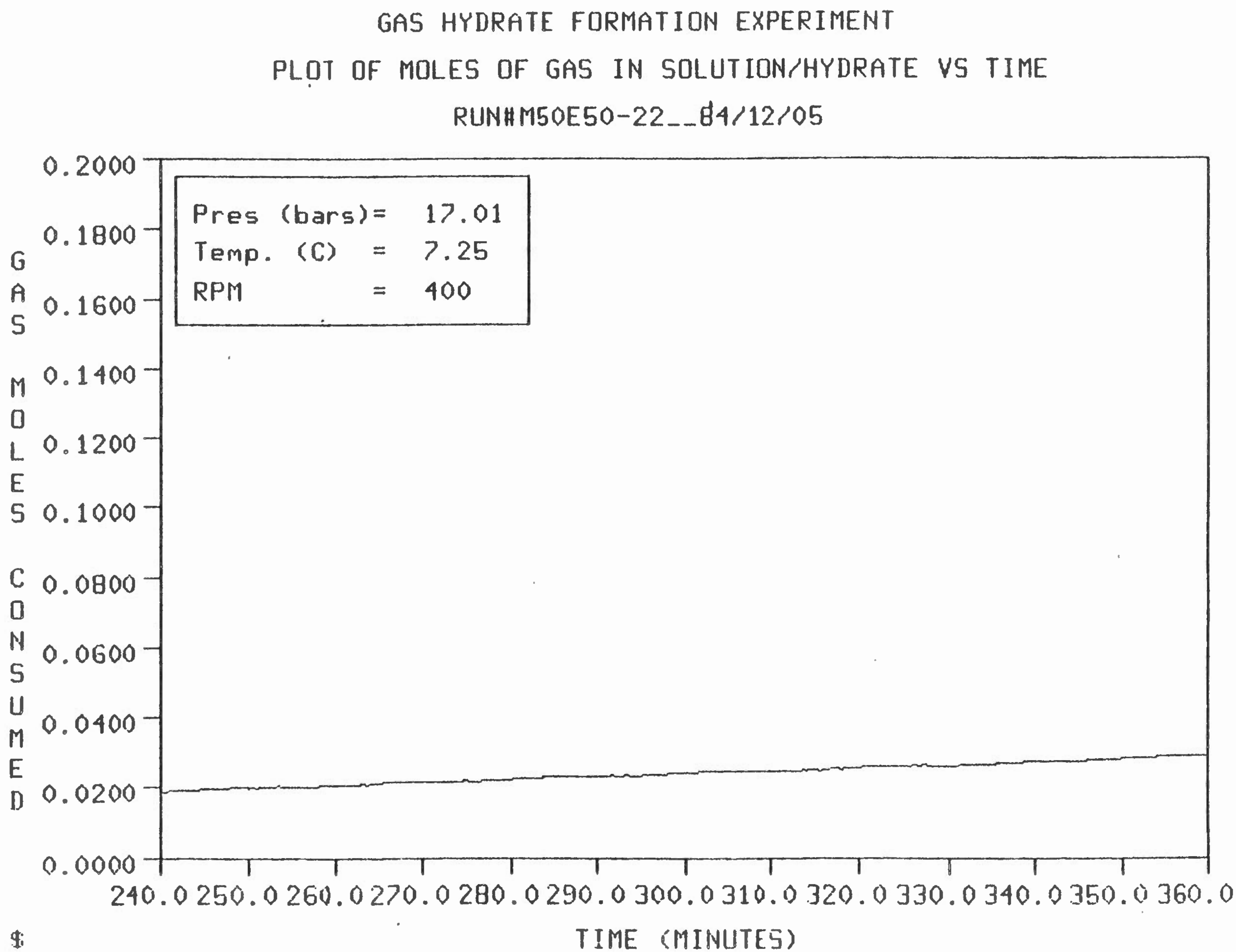
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-22__84/12/05



$

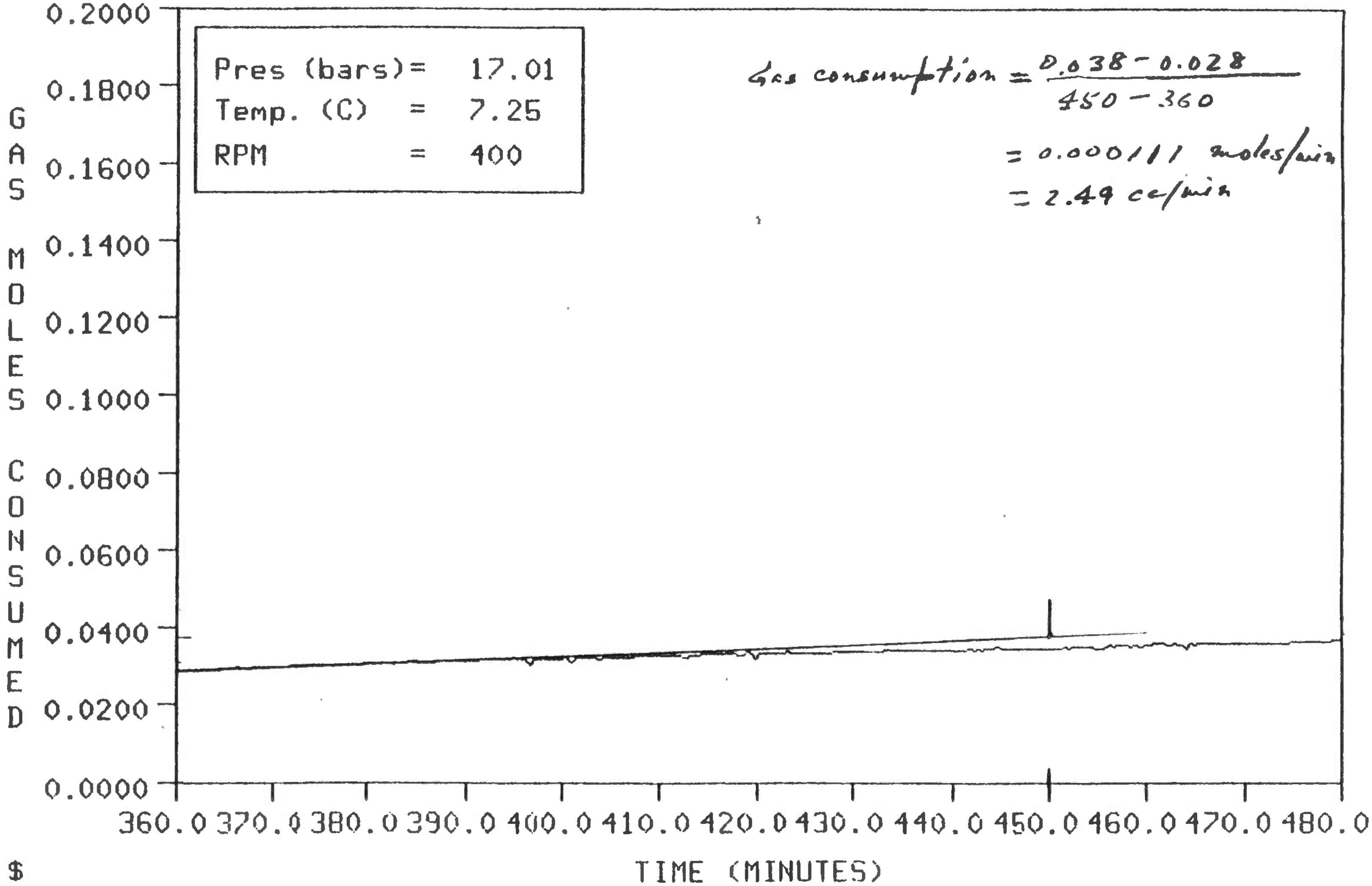

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-22__84/12/05
Pres (bars)= 17.01
Temp. (C) = 7.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-22__04/12/05
Pres (bars)= 17.01
Temp. (C) = 7.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-22__84/12/05

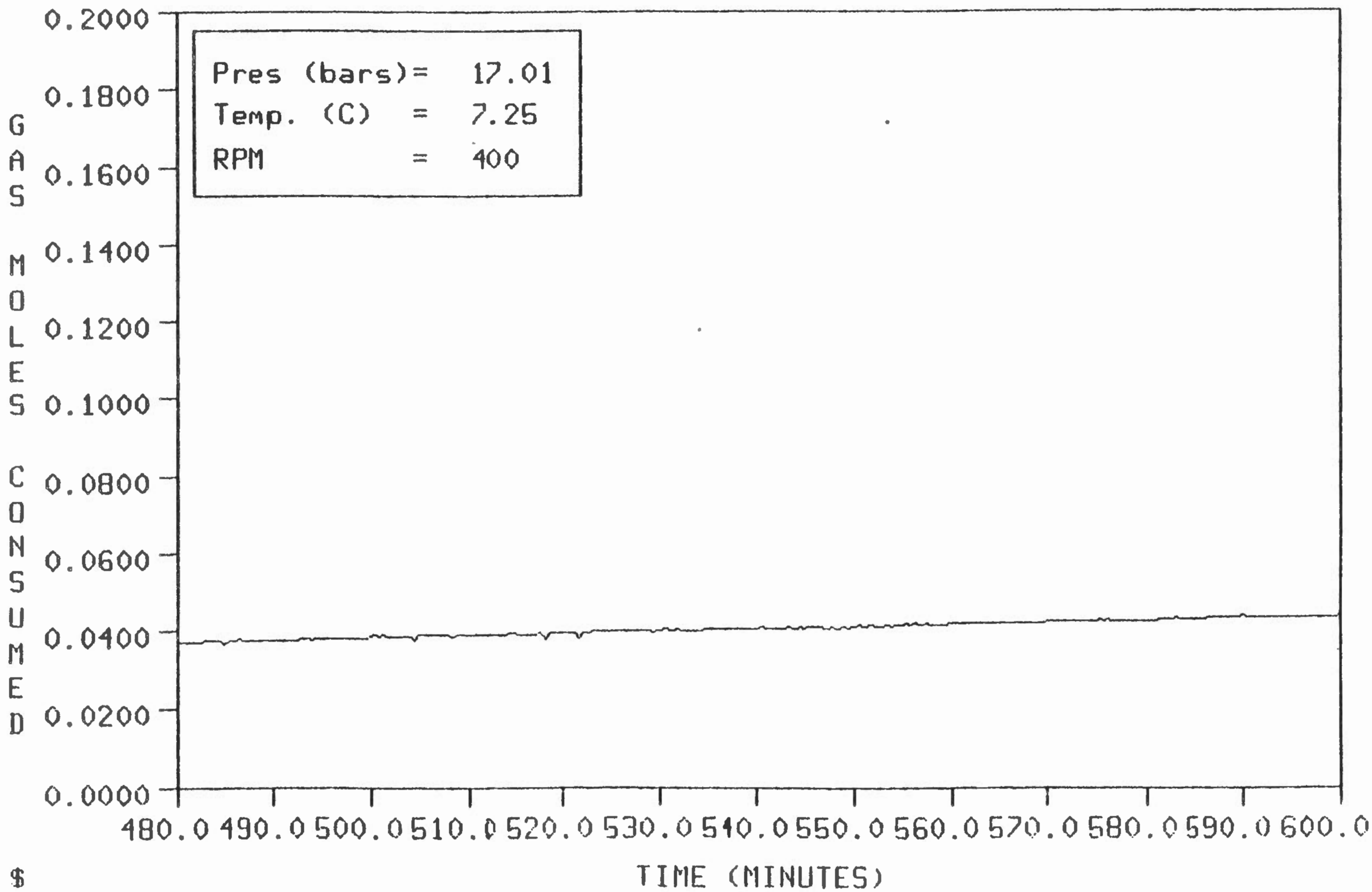


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-22__84/12/05



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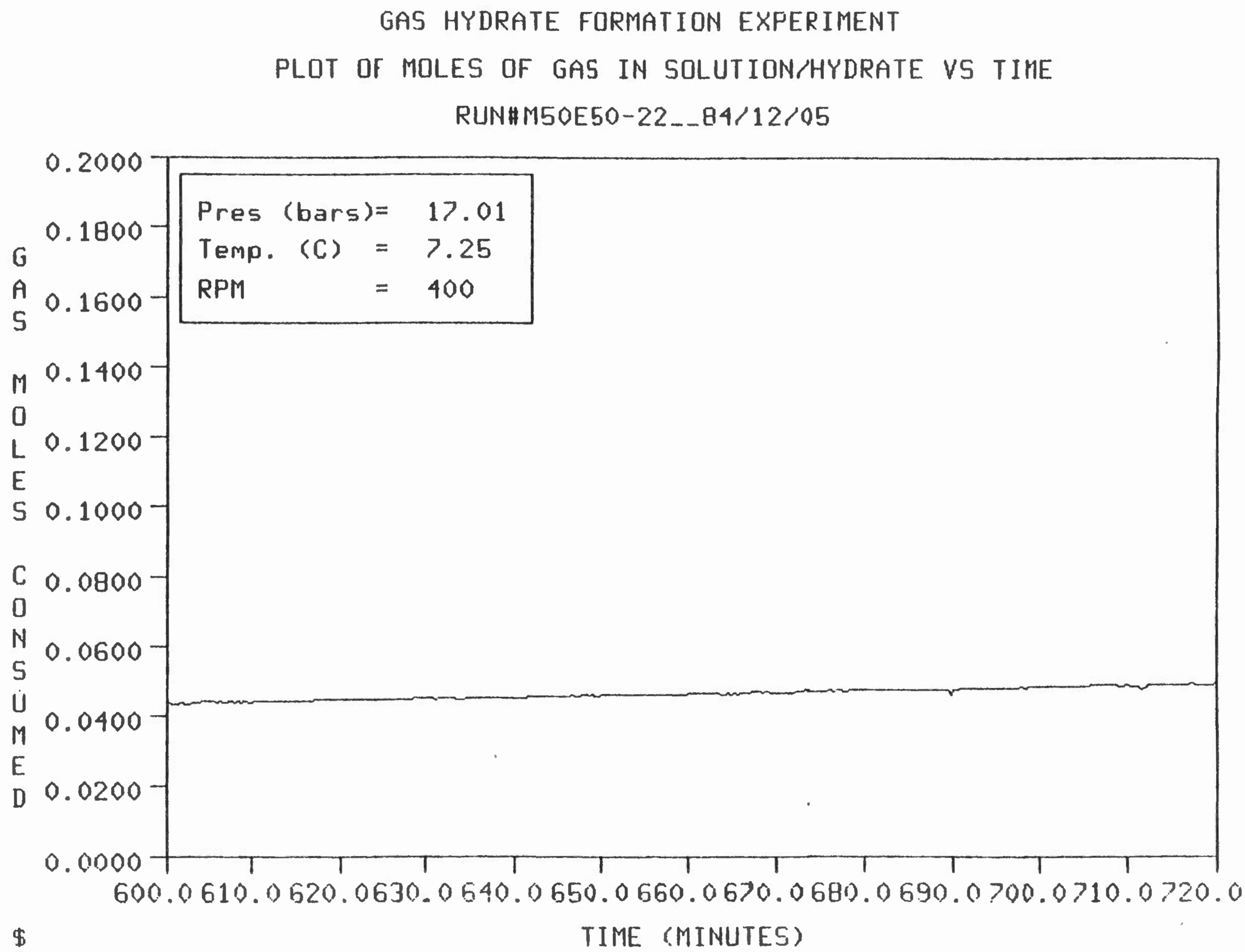
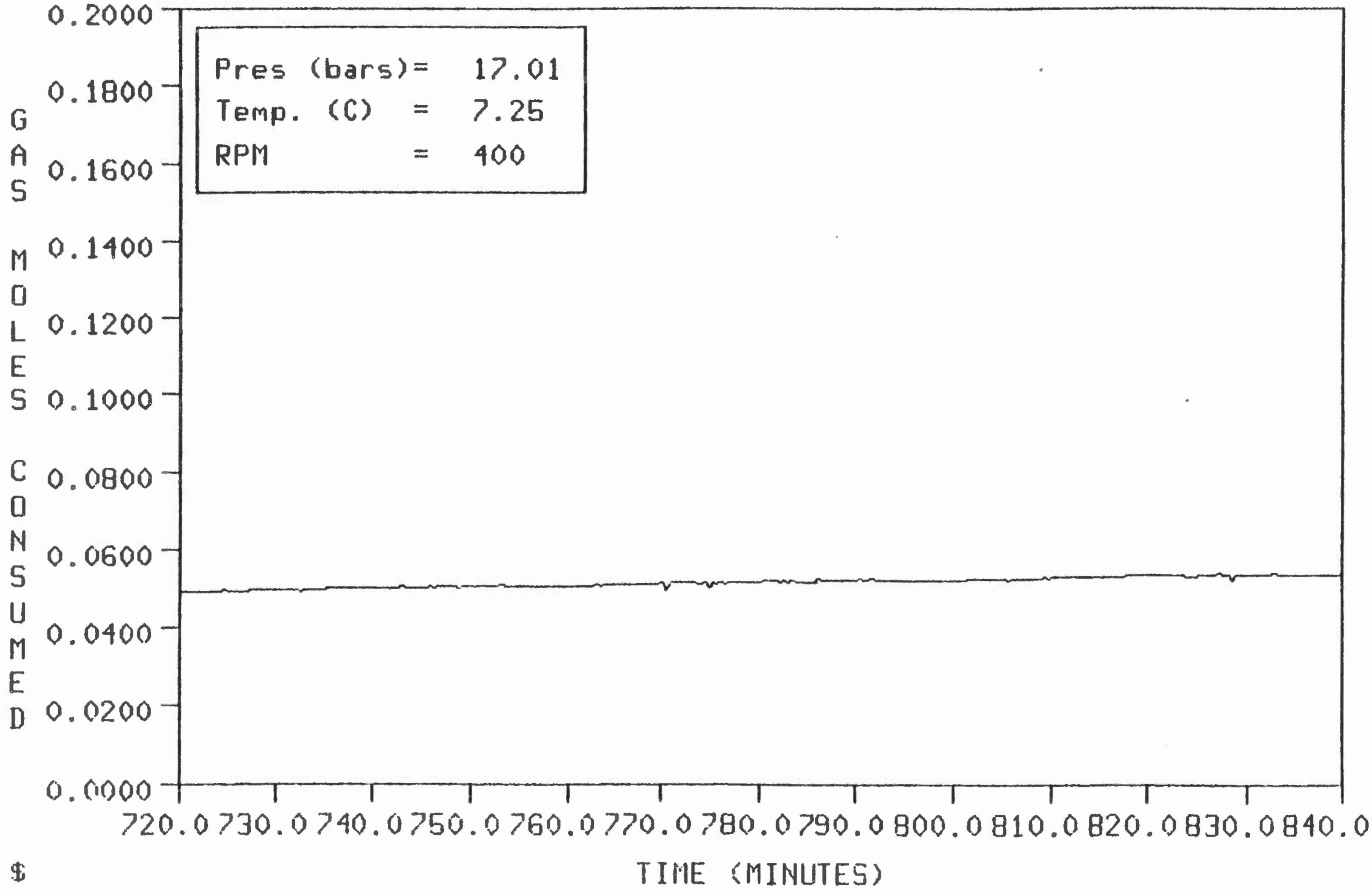

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-22__84/12/05
Pres (bars)= 17.01
Temp. (C) = 7.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
600.0 610.0 620.0 630.0 640.0 650.0 660.0 670.0 680.0 690.0 700.0 710.0 720.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-22__84/12/05

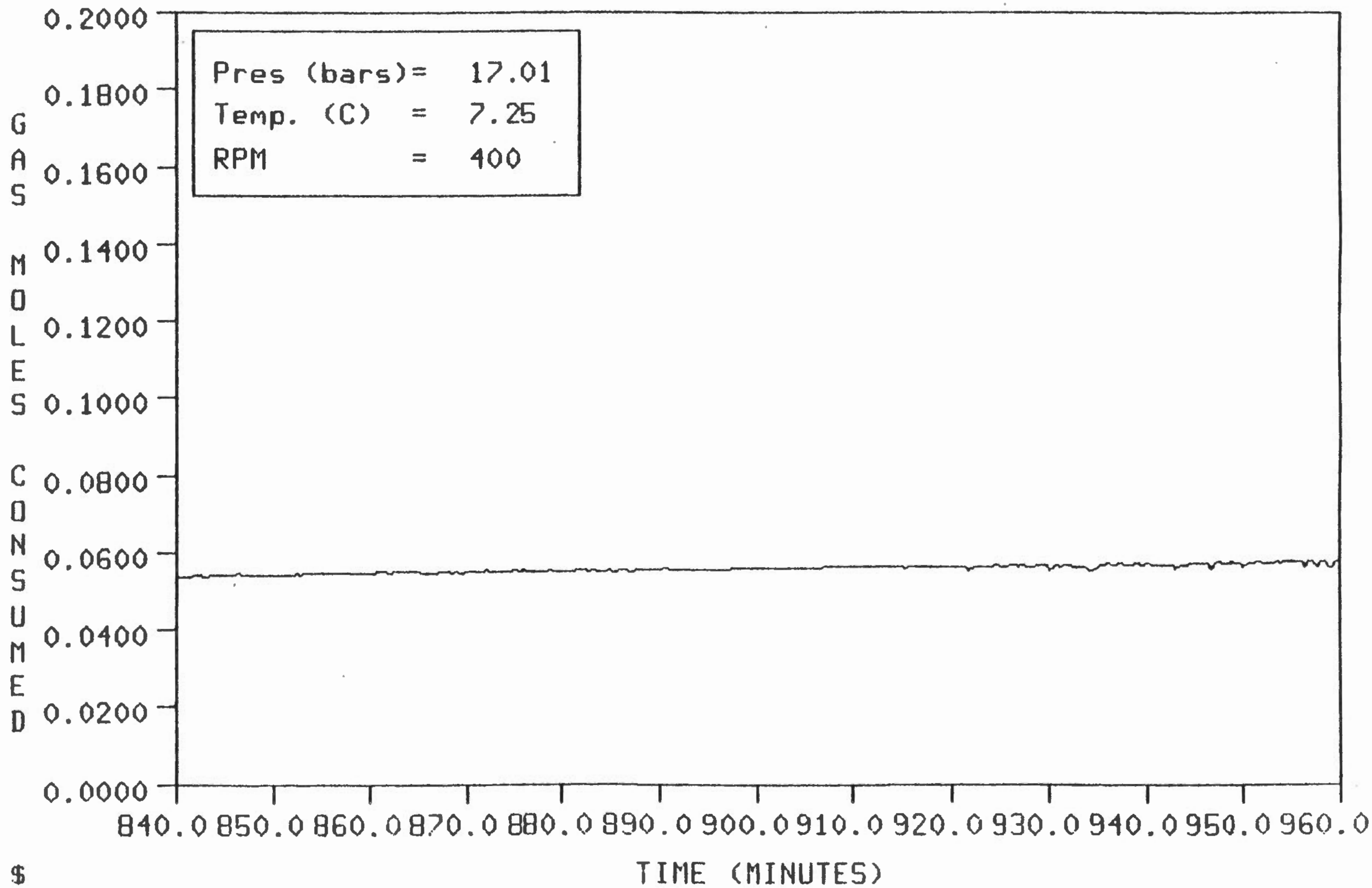


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

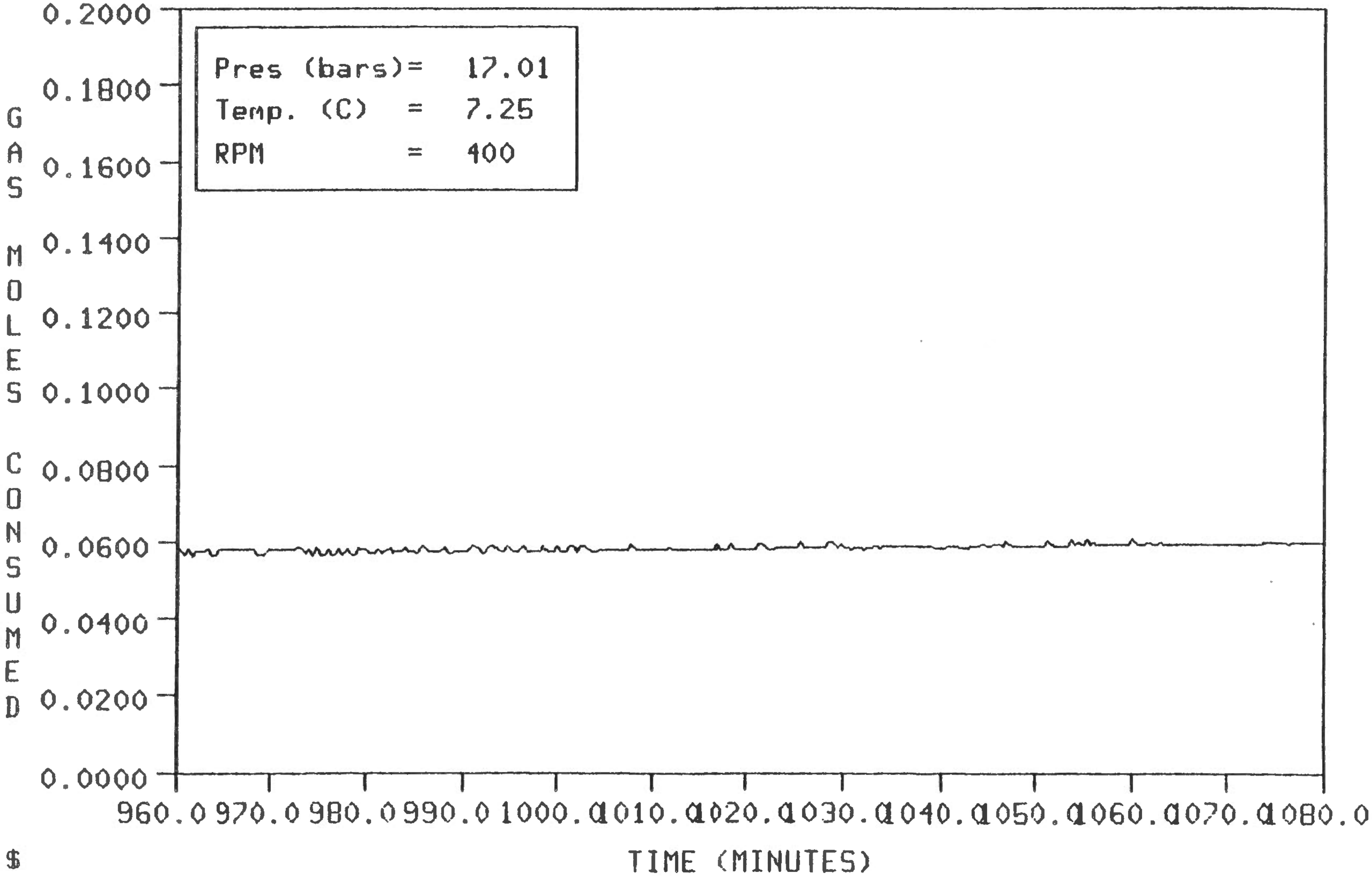
RUN#M50E50-22__84/12/05



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-22__84/12/05

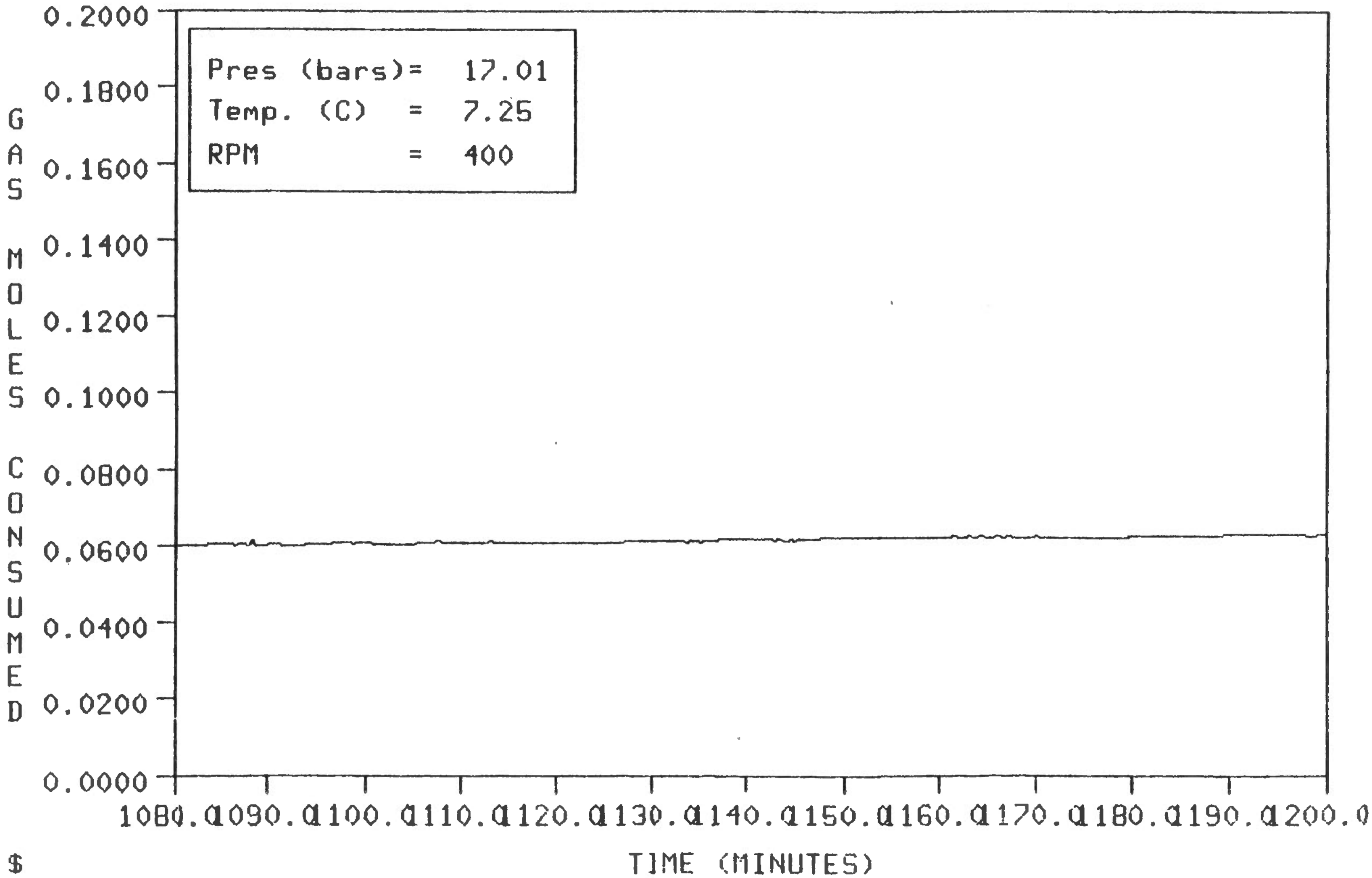


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-22__84/12/05



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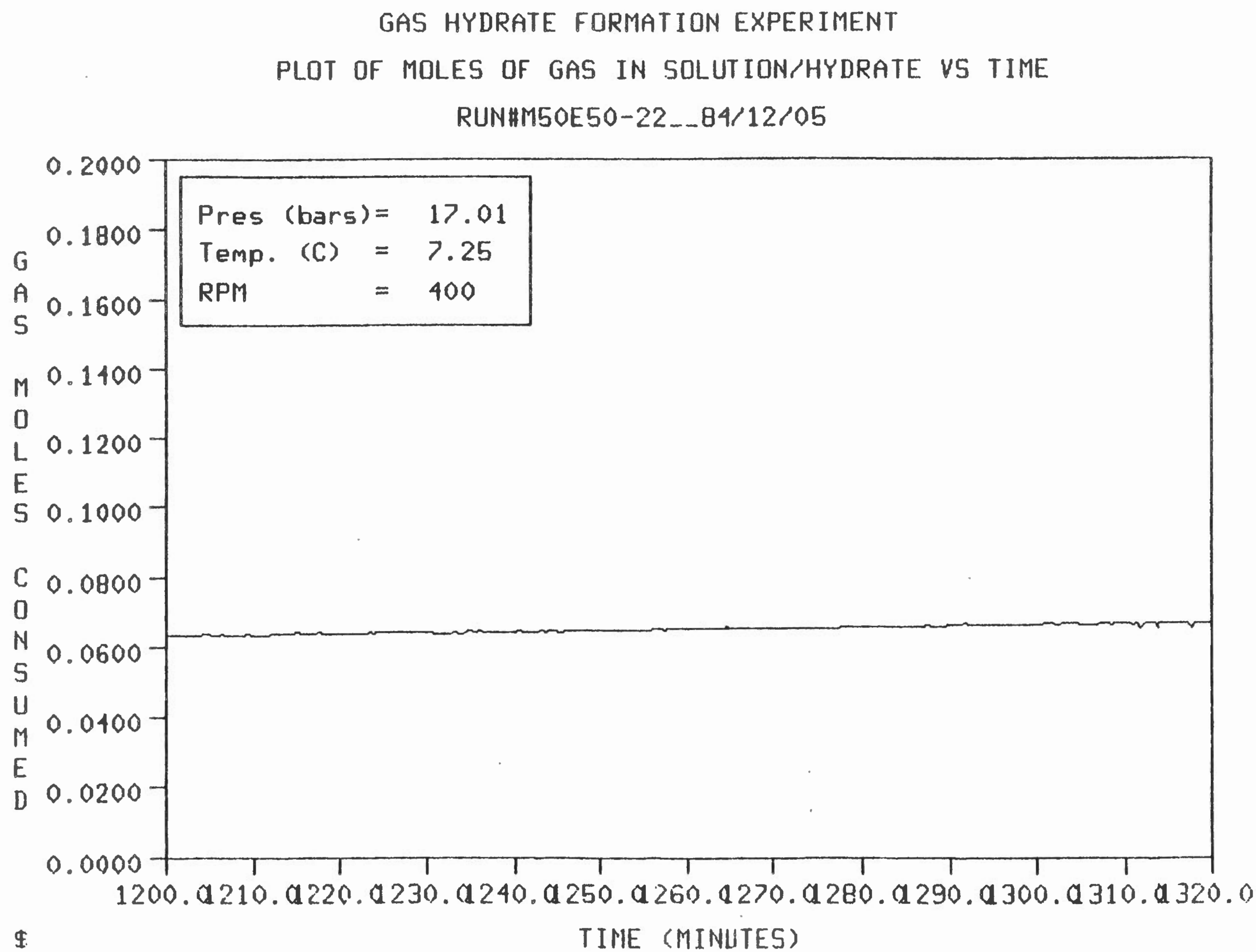
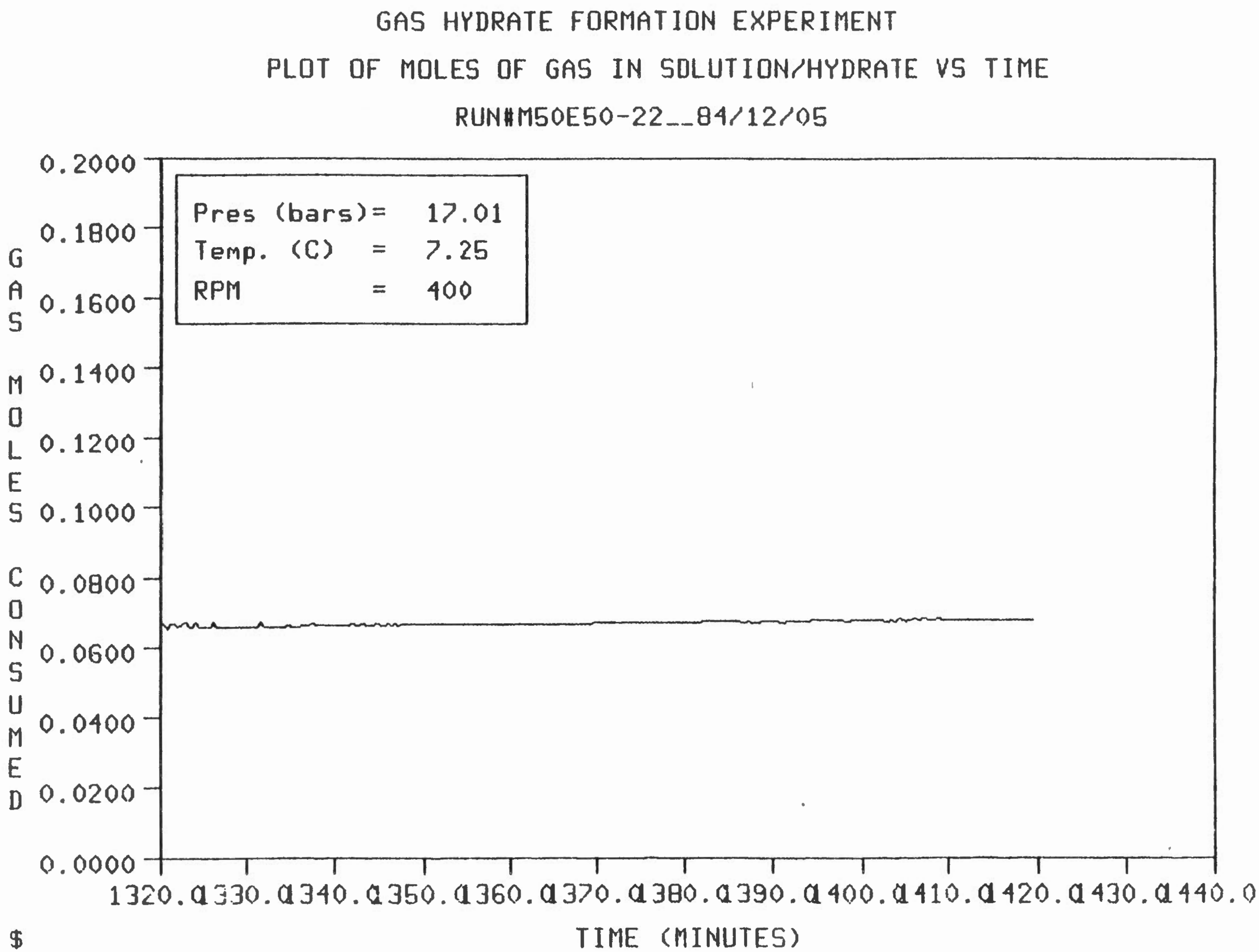
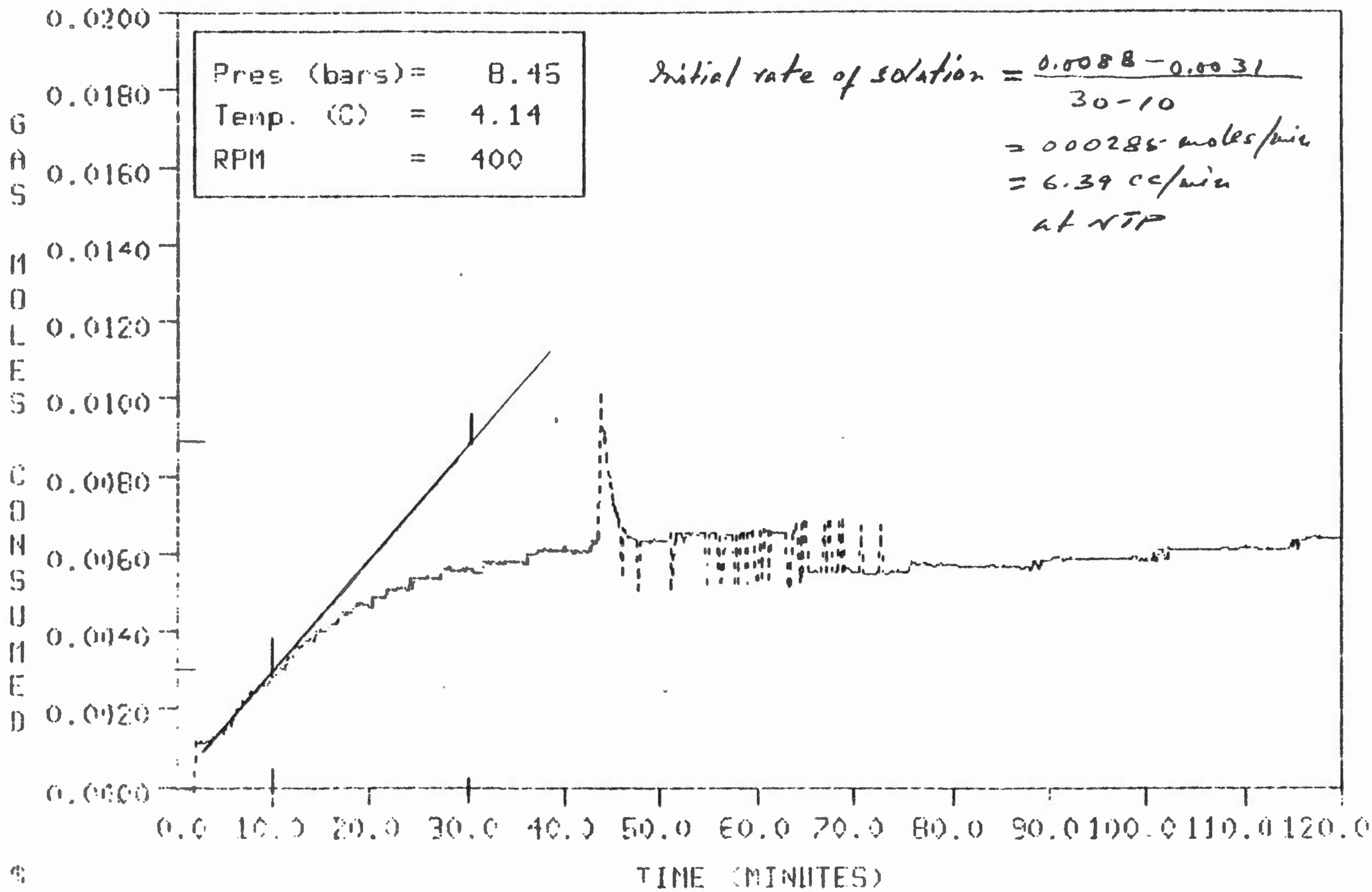

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-22__84/12/05
Pres (bars)= 17.01
Temp. (C) = 7.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
1200.0 1210.0 1220.0 1230.0 1240.0 1250.0 1260.0 1270.0 1280.0 1290.0 1300.0 1310.0 1320.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-22__84/12/05
Pres (bars)= 17.01
Temp. (C) = 7.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
1320.0
1330.0
1340.0
1350.0
1360.0
1370.0
1380.0
1390.0
1400.0
1410.0
1420.0
1430.0
1440.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

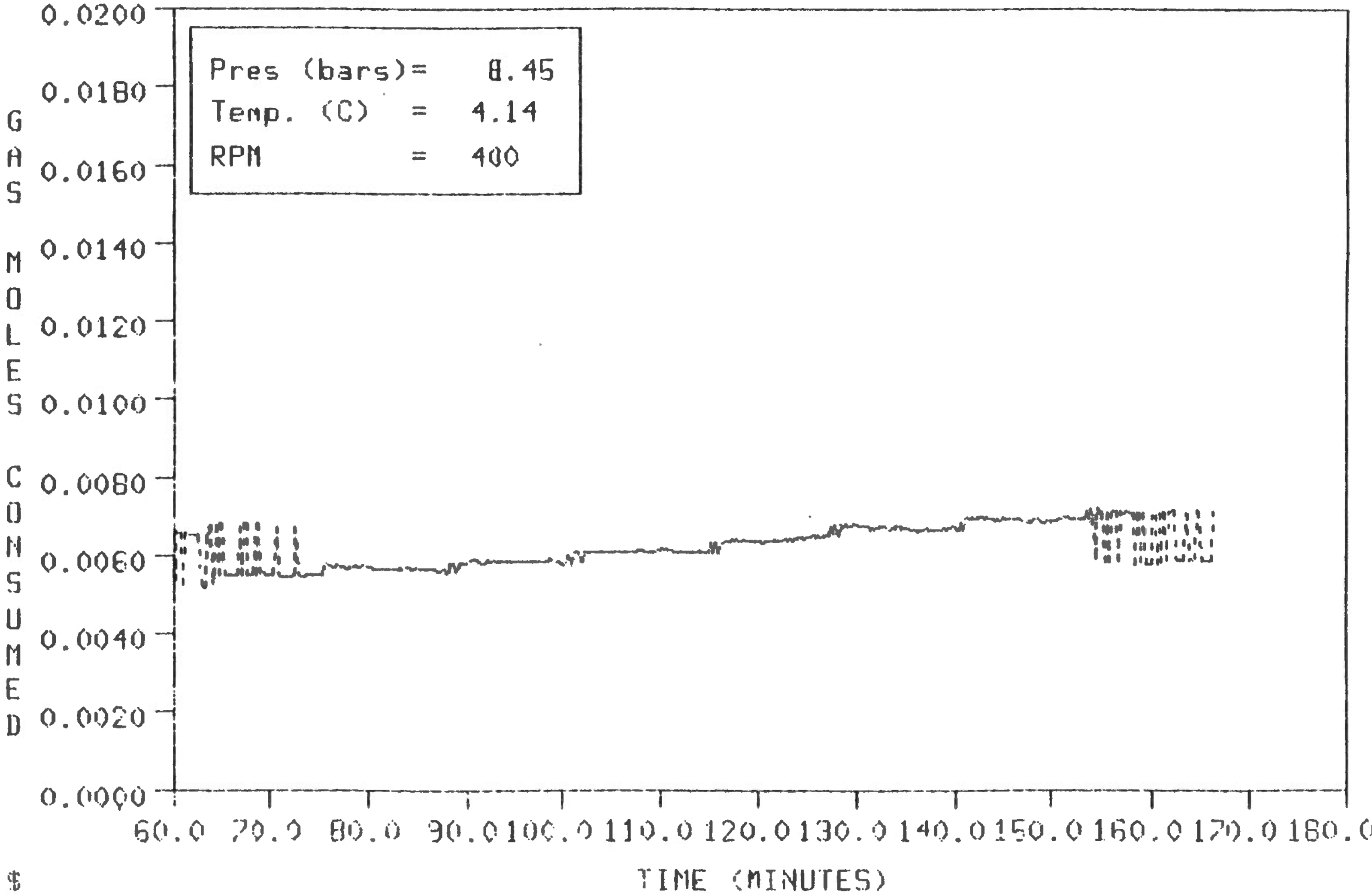
RUN#M50E50-23__84/12/11



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-23__84/12/11

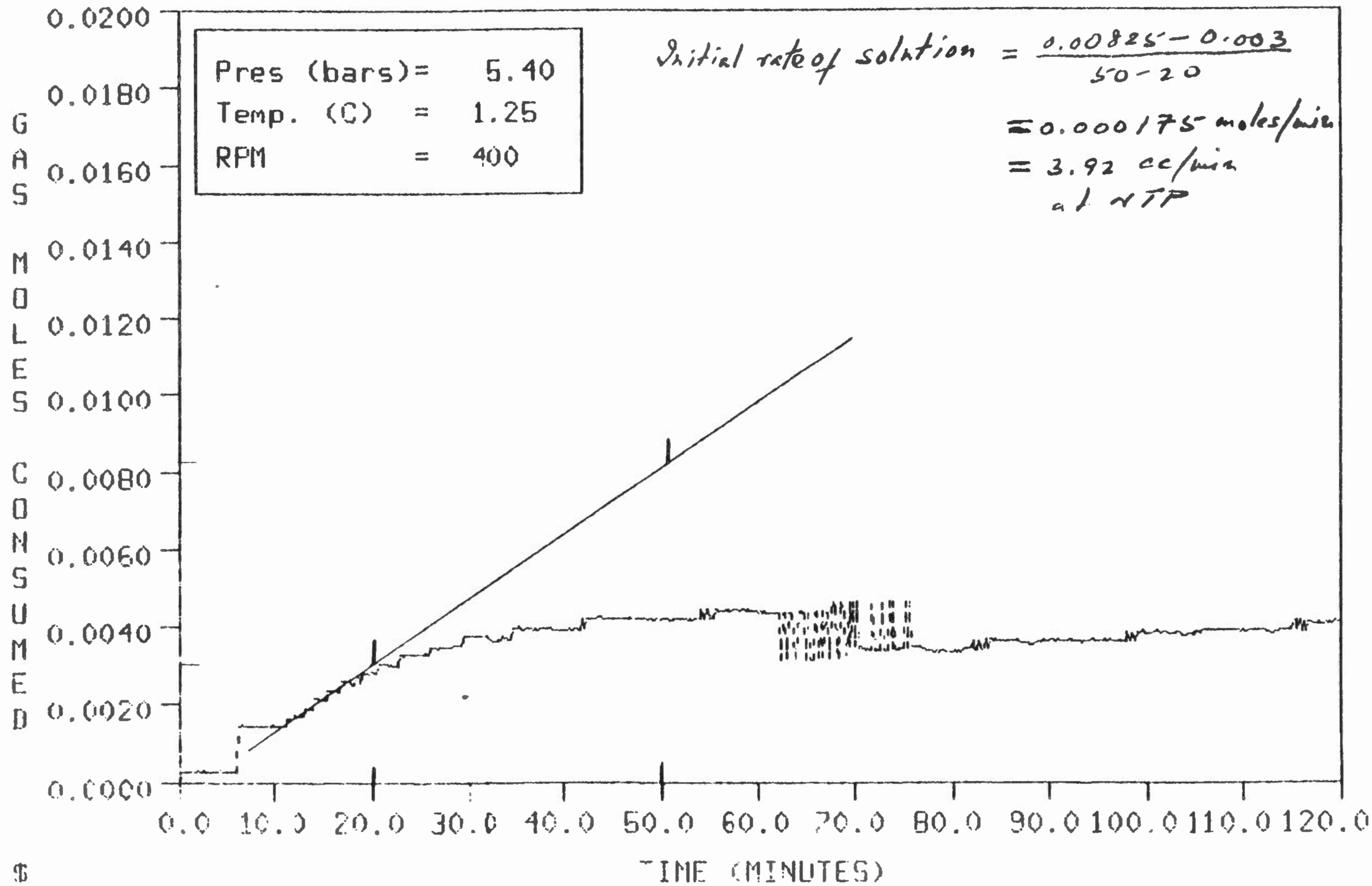


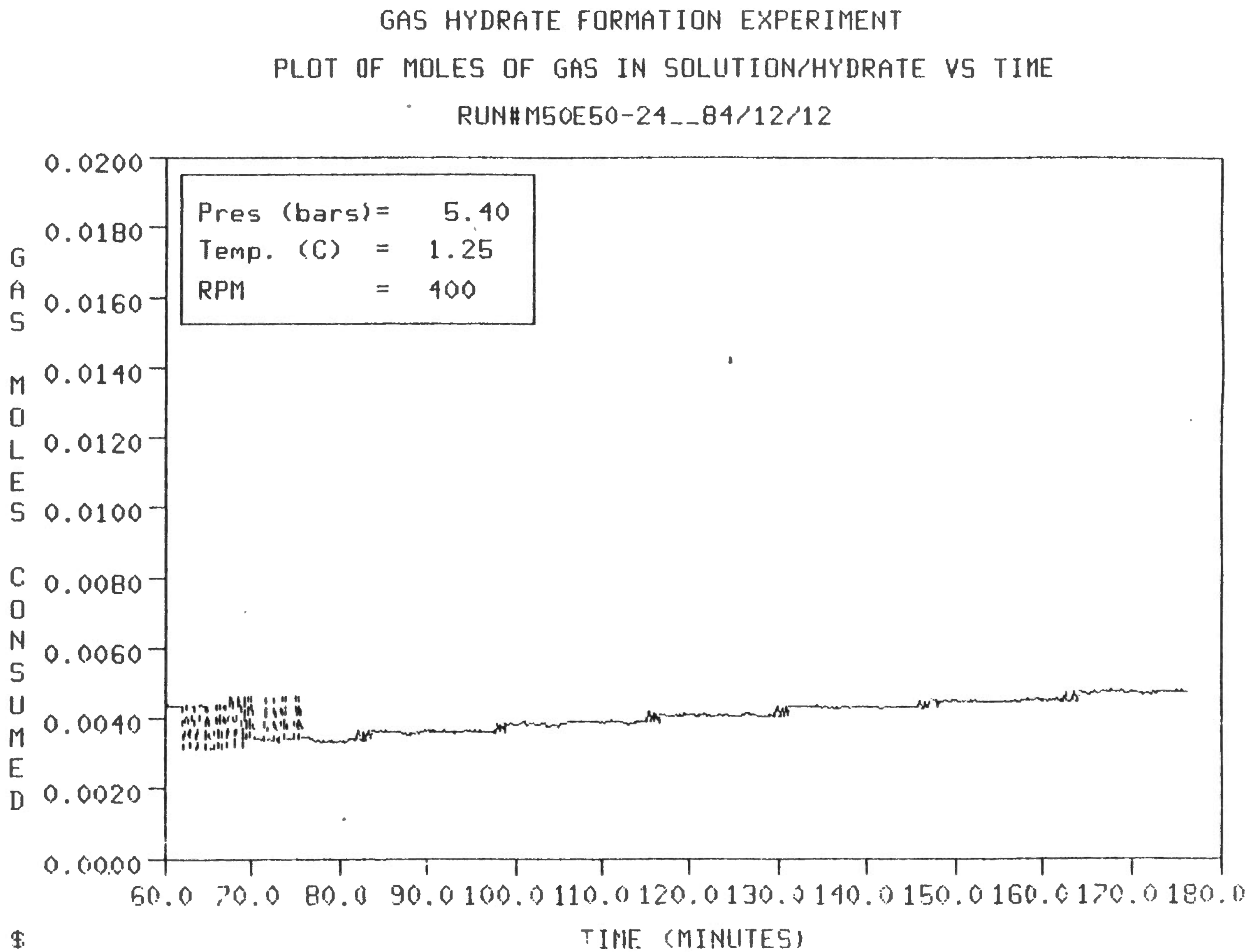
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-24__84/12/12

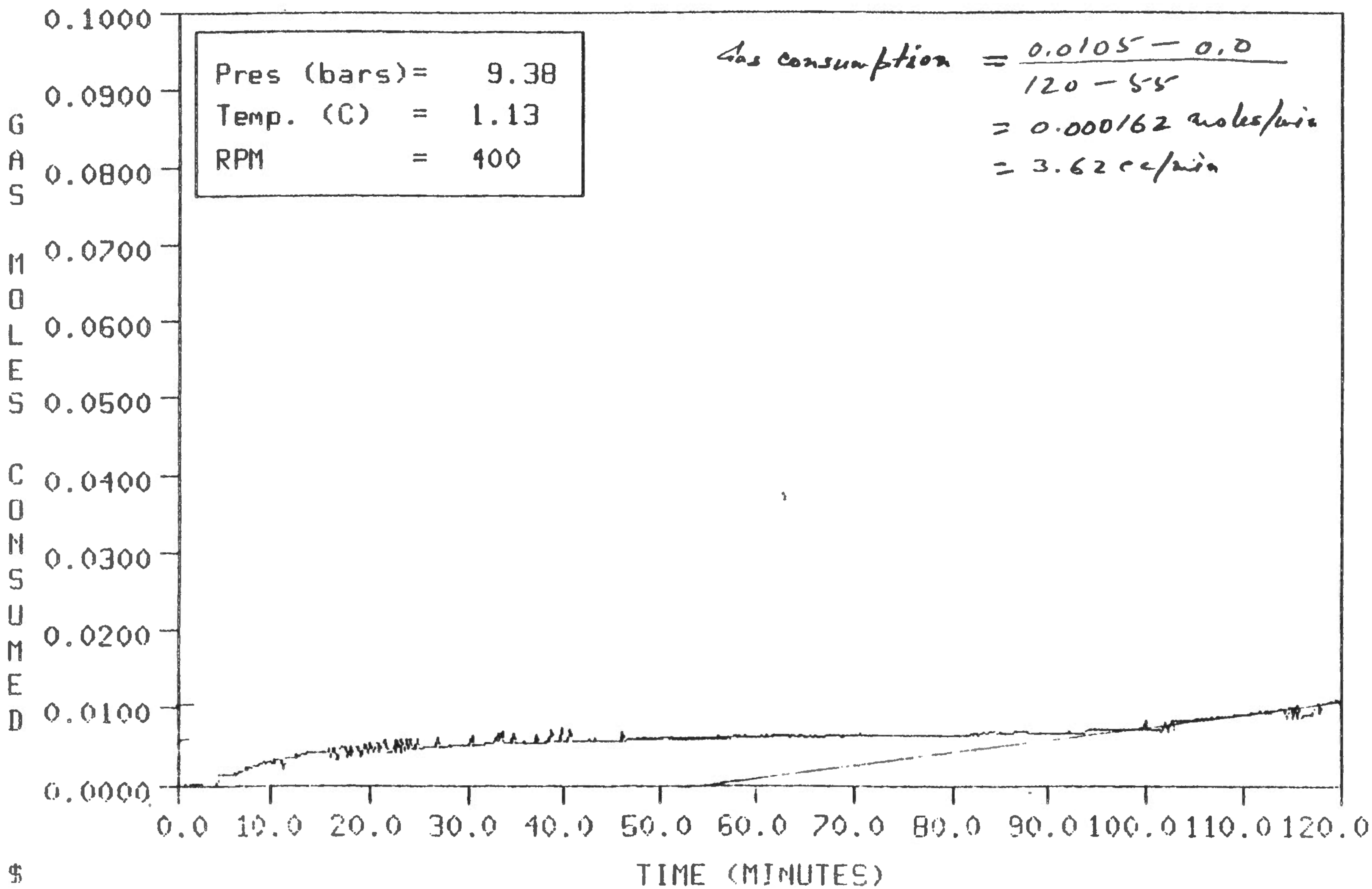


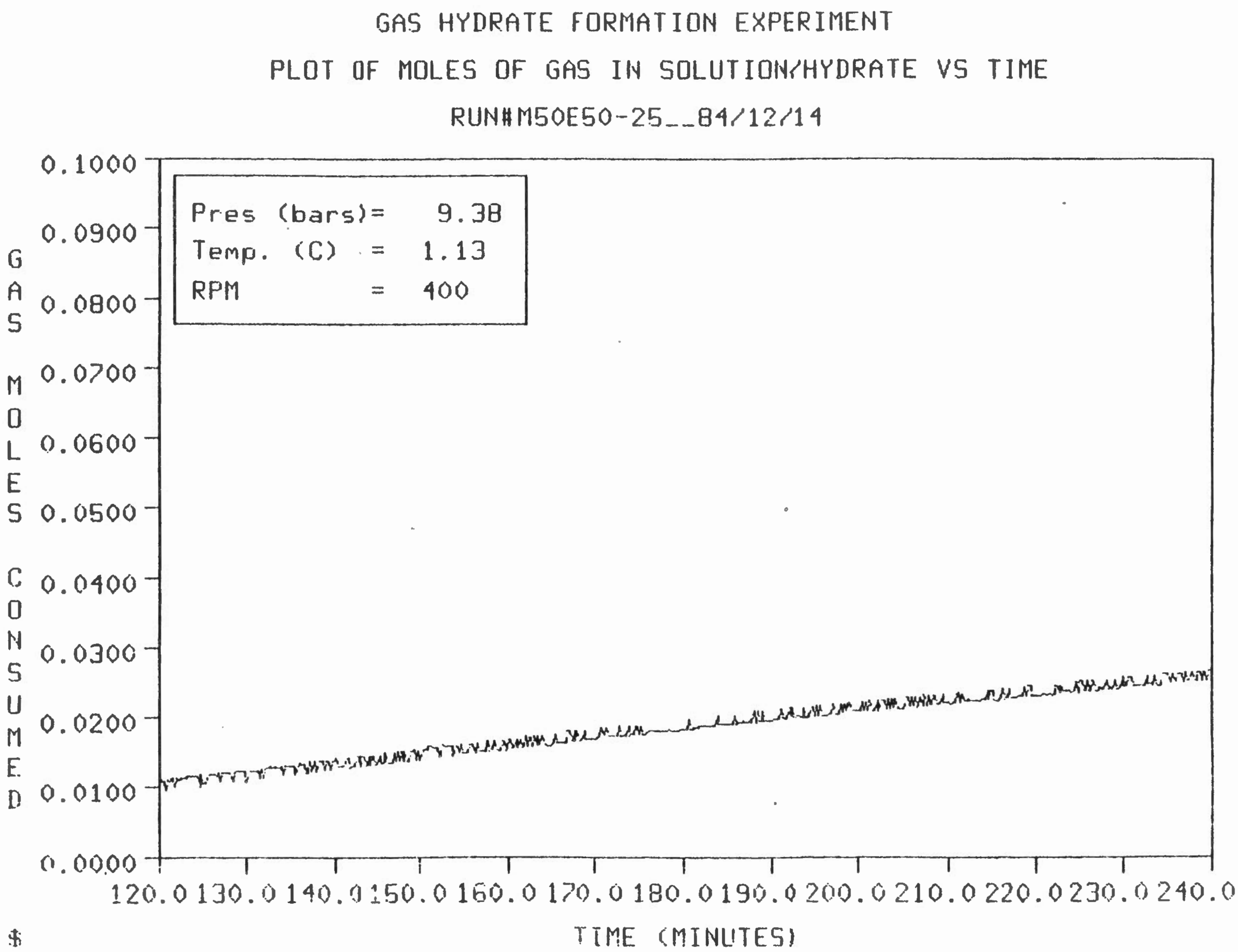

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-24__84/12/12
Pres (bars)= 5.40
Temp. (C) = 1.25
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-25__84/12/14



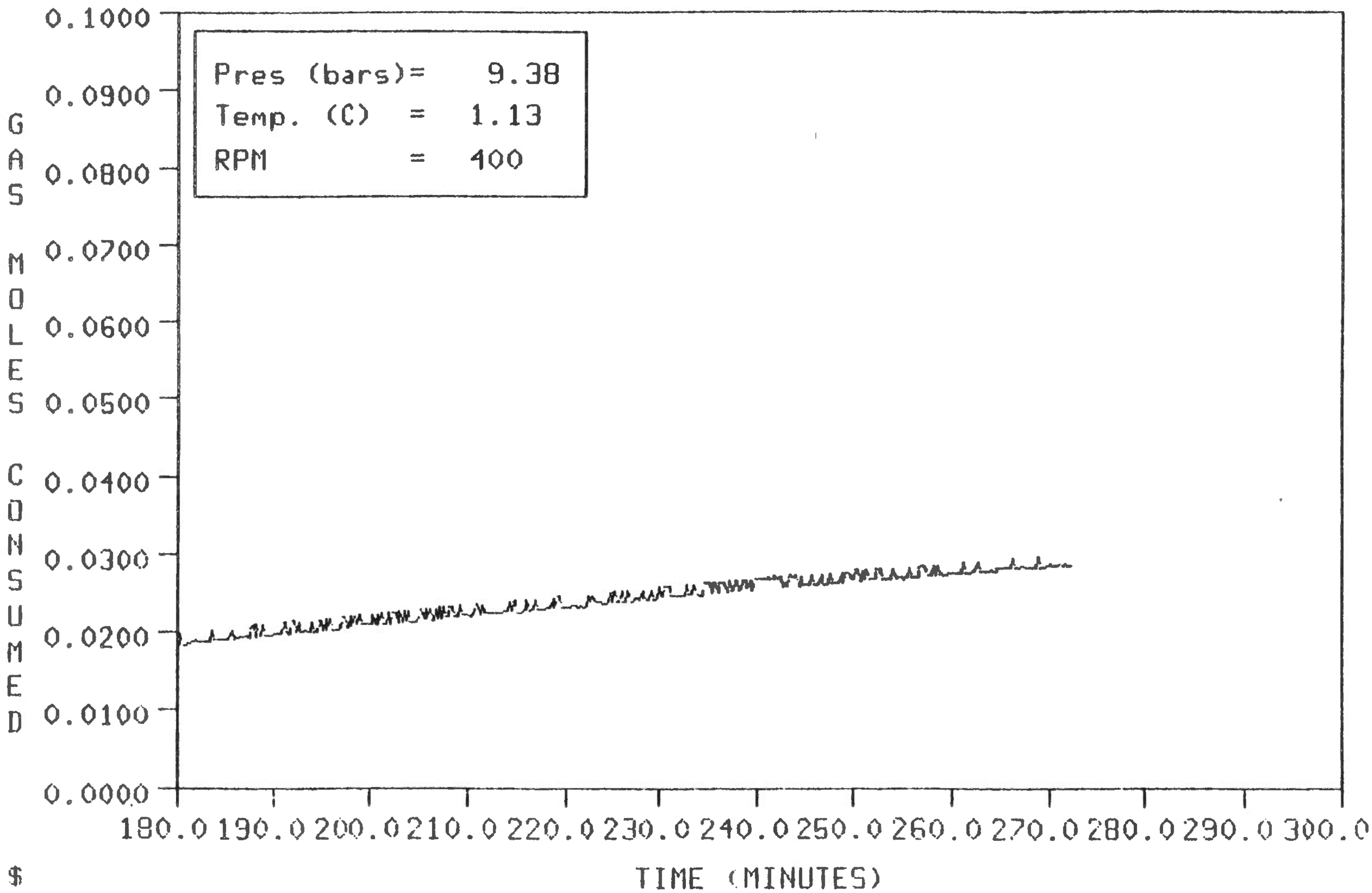

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-25__84/12/14
Pres (bars)= 9.38
Temp. (C) = 1.13
RPM = 400
GAS MOLES CONSUMED
0.1000
0.0900
0.0800
0.0700
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)

$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-25__84/12/14



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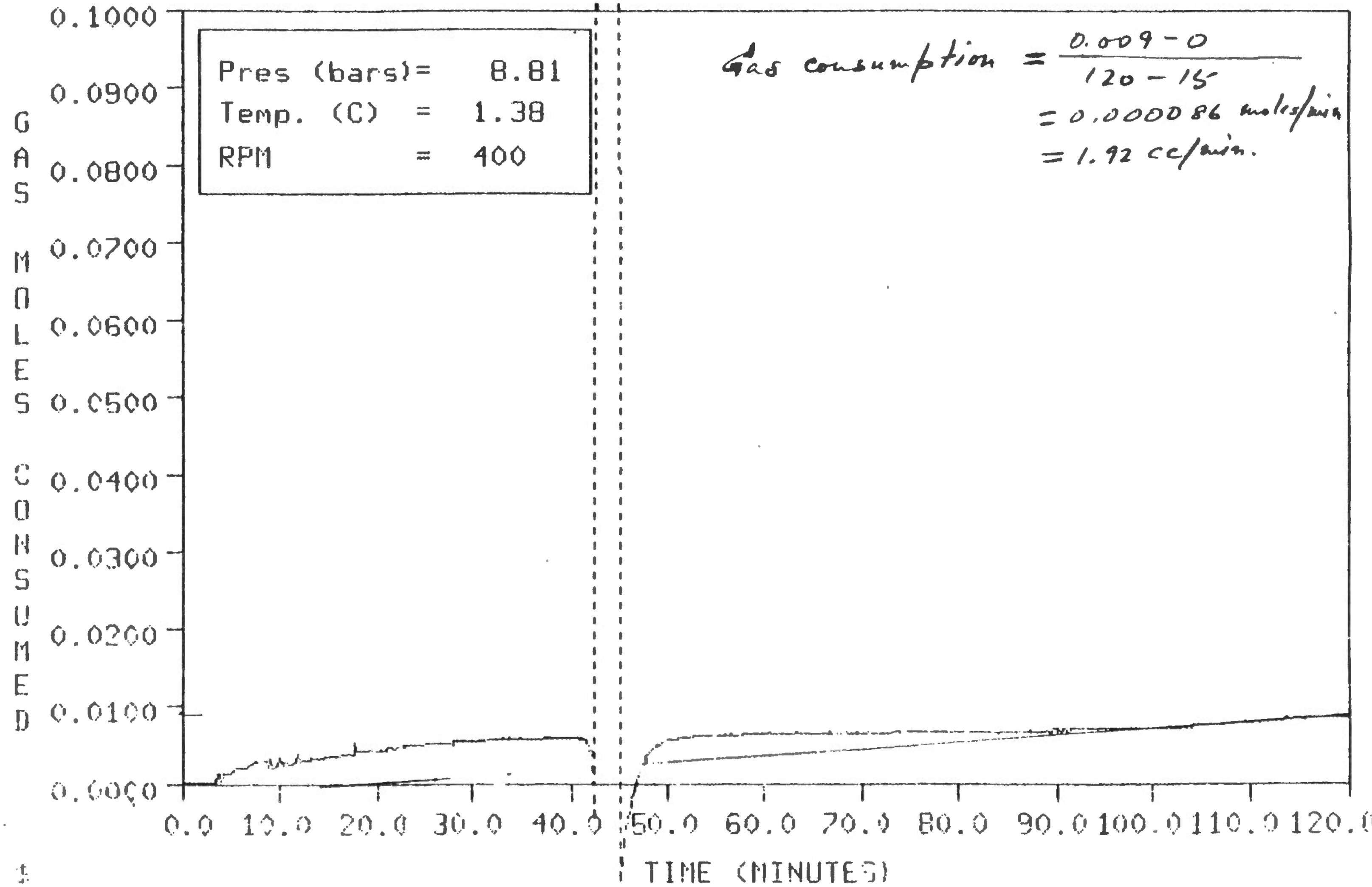
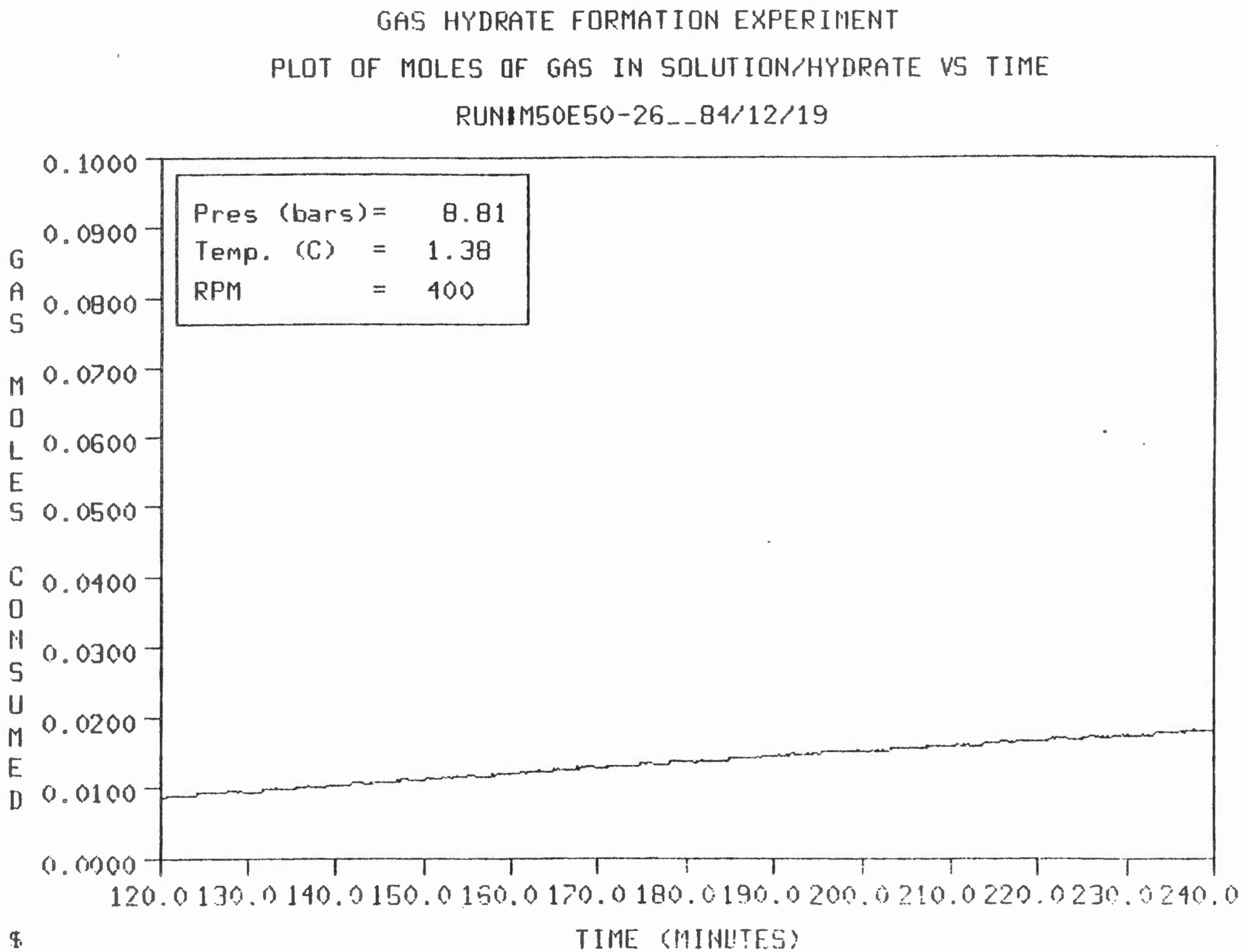
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-26__84/12/19



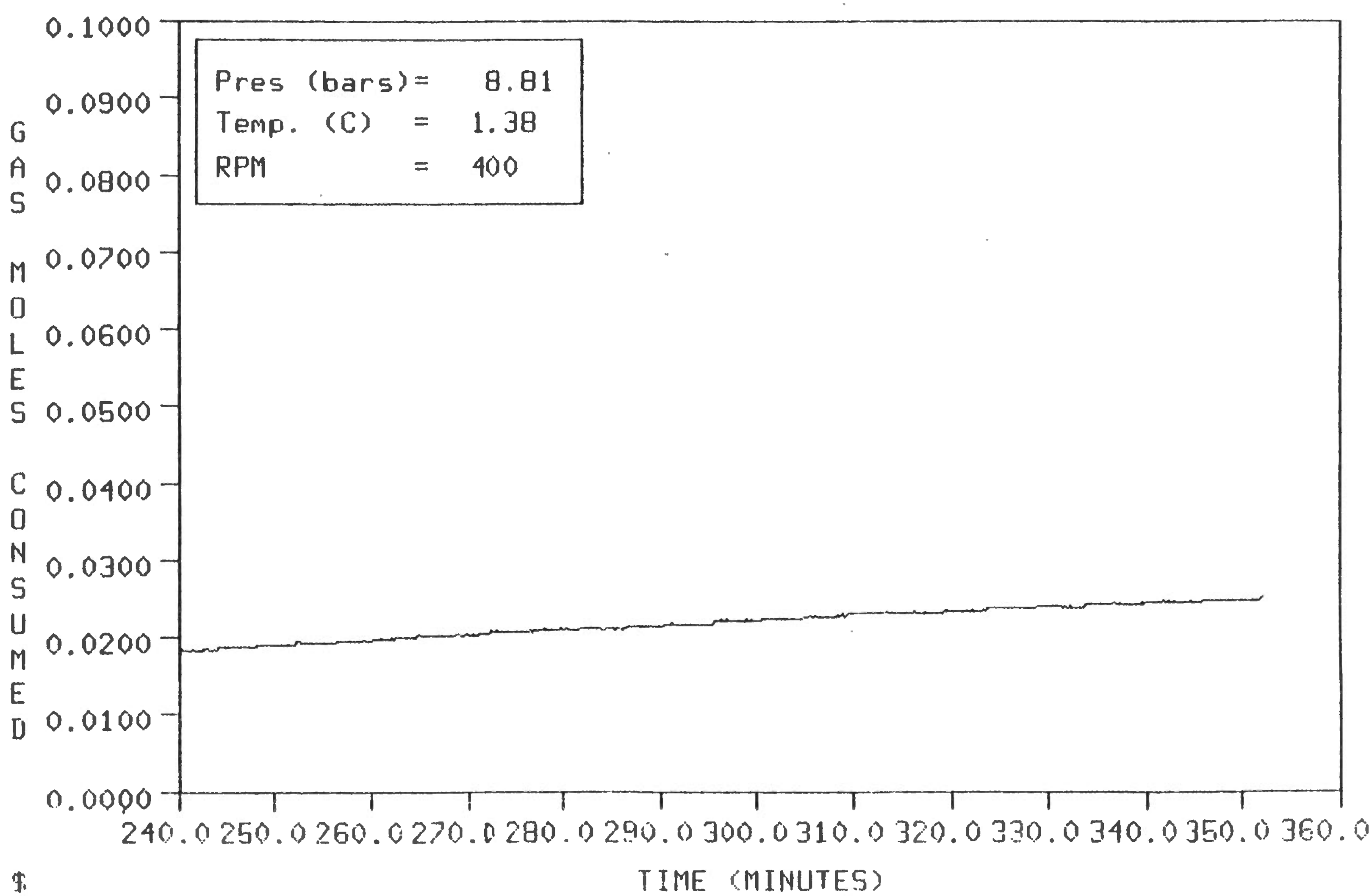
[redacted]


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-26__84/12/19
Pres (bars)= 8.81
Temp. (C) = 1.38
RPM = 400
GAS MOLES CONSUMED
0.1000
0.0900
0.0800
0.0700
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-26__84/12/19



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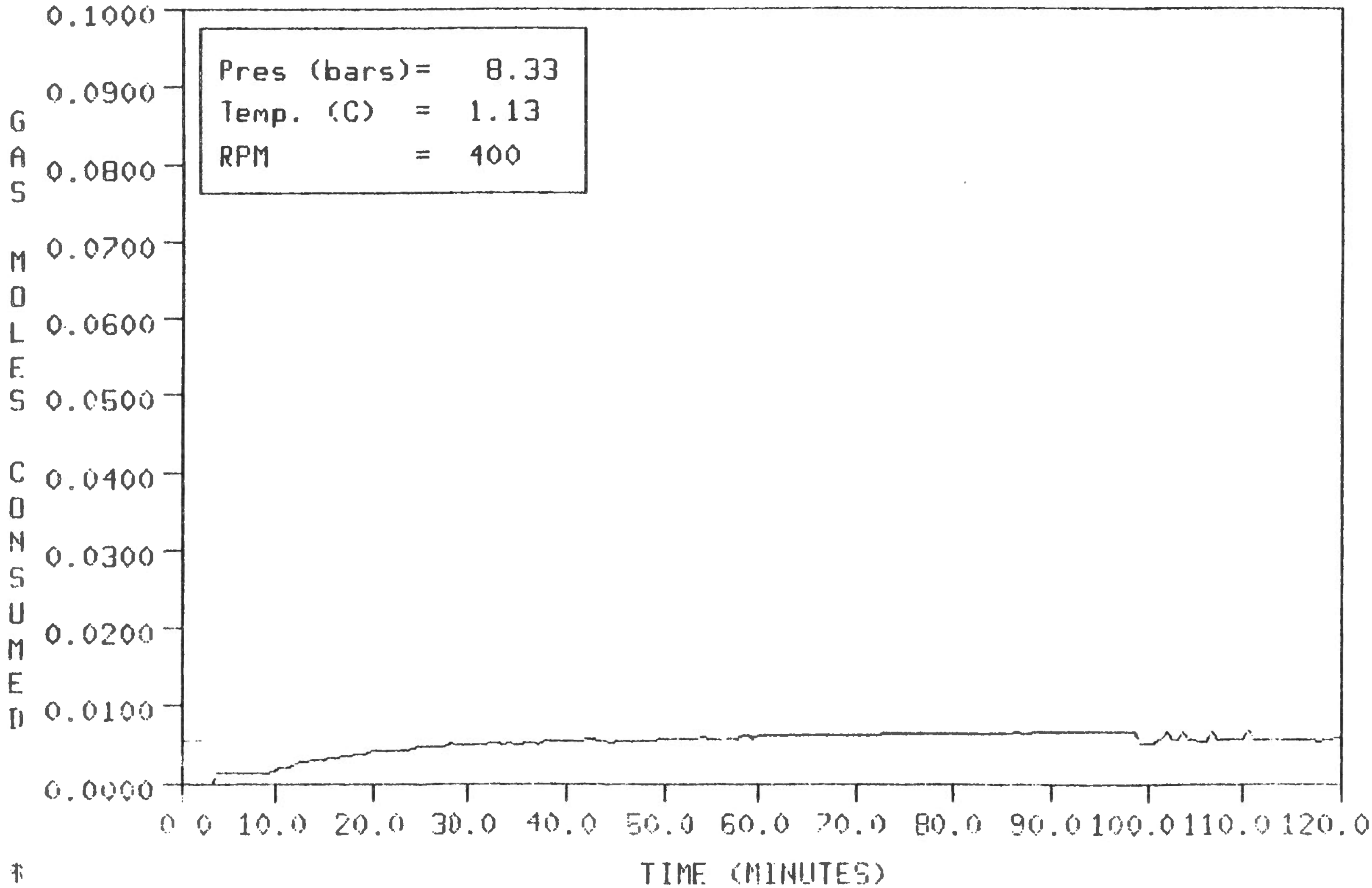
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

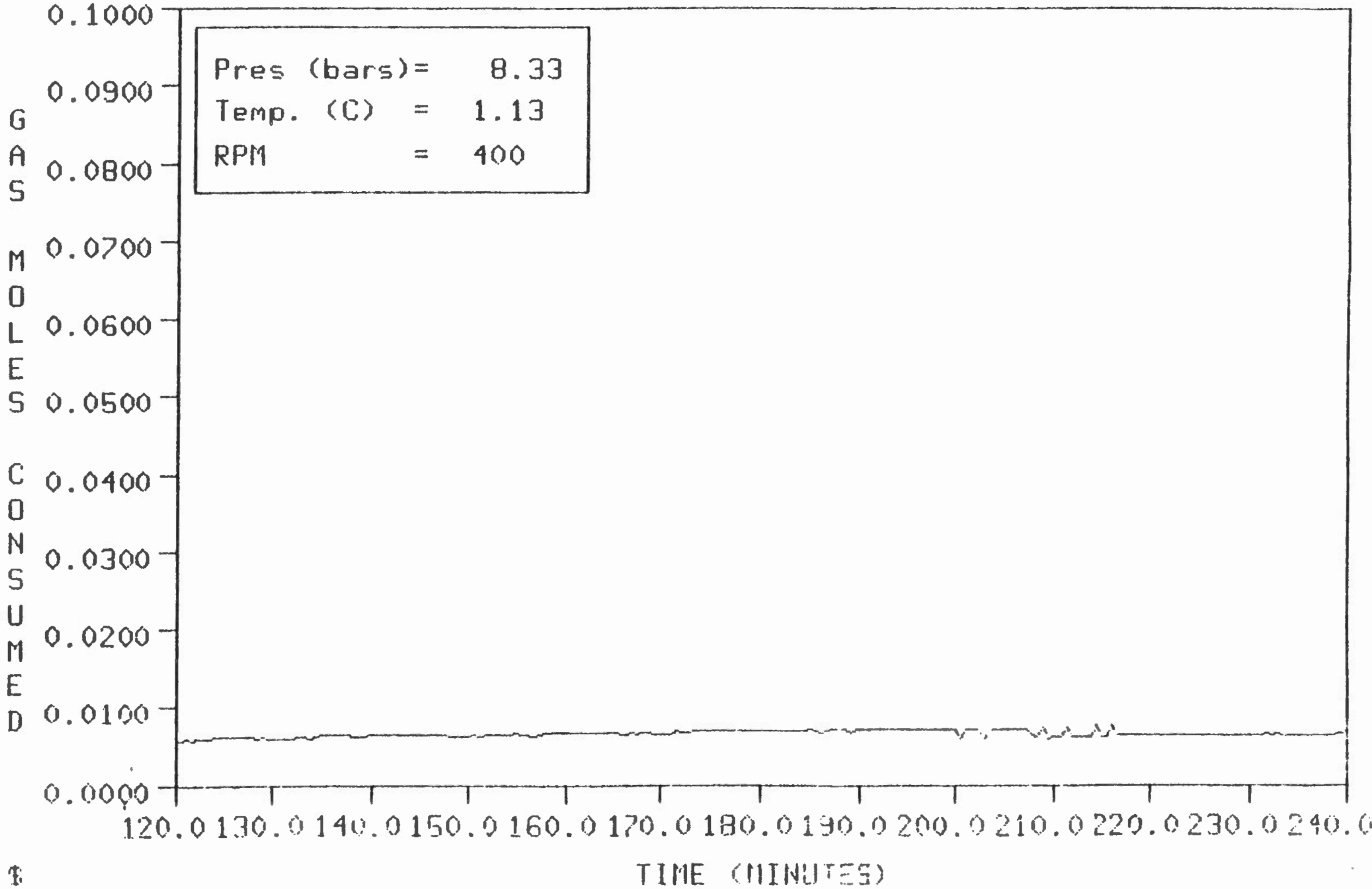
RUN#M50E50-27__84/12/20



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-27__84/12/20



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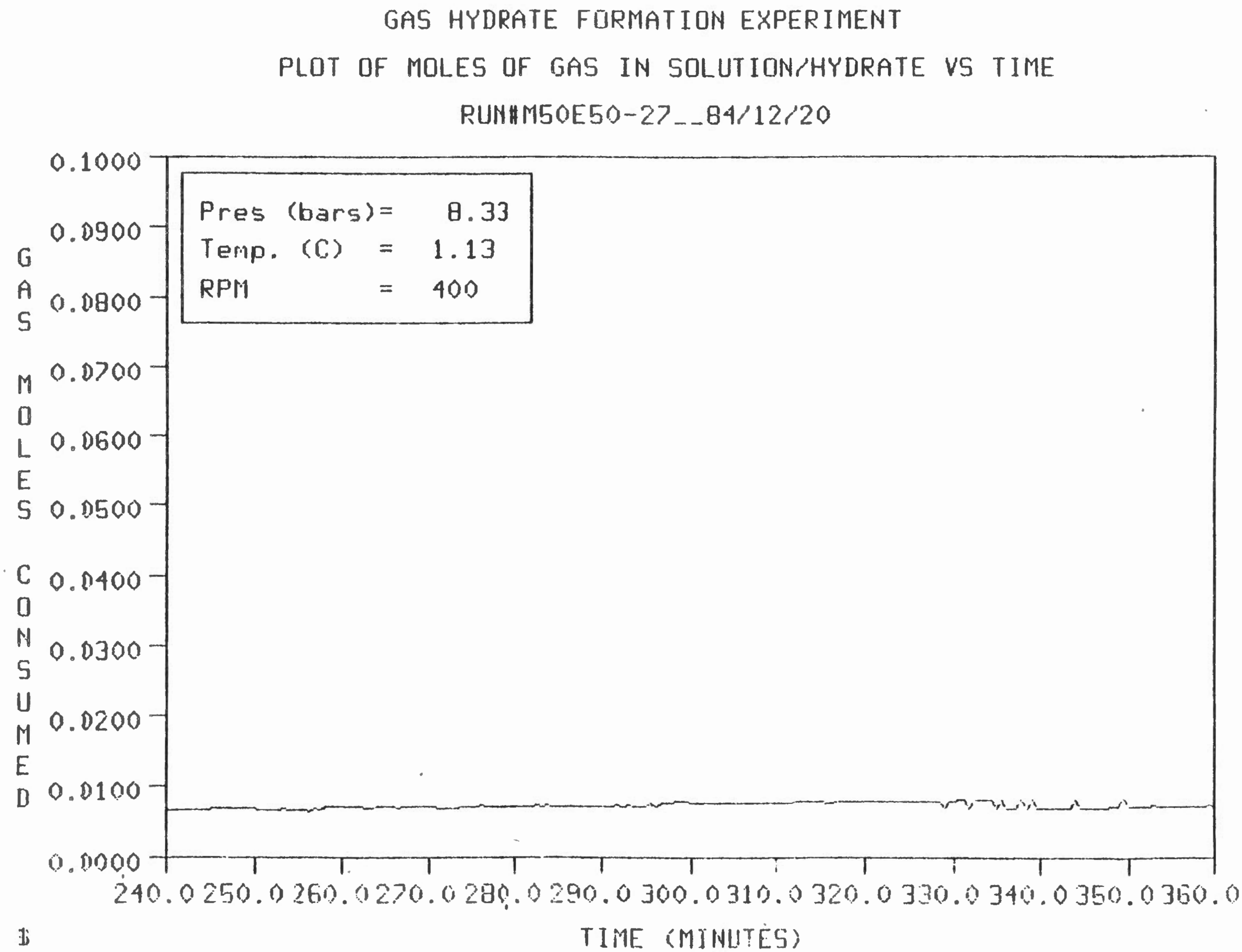
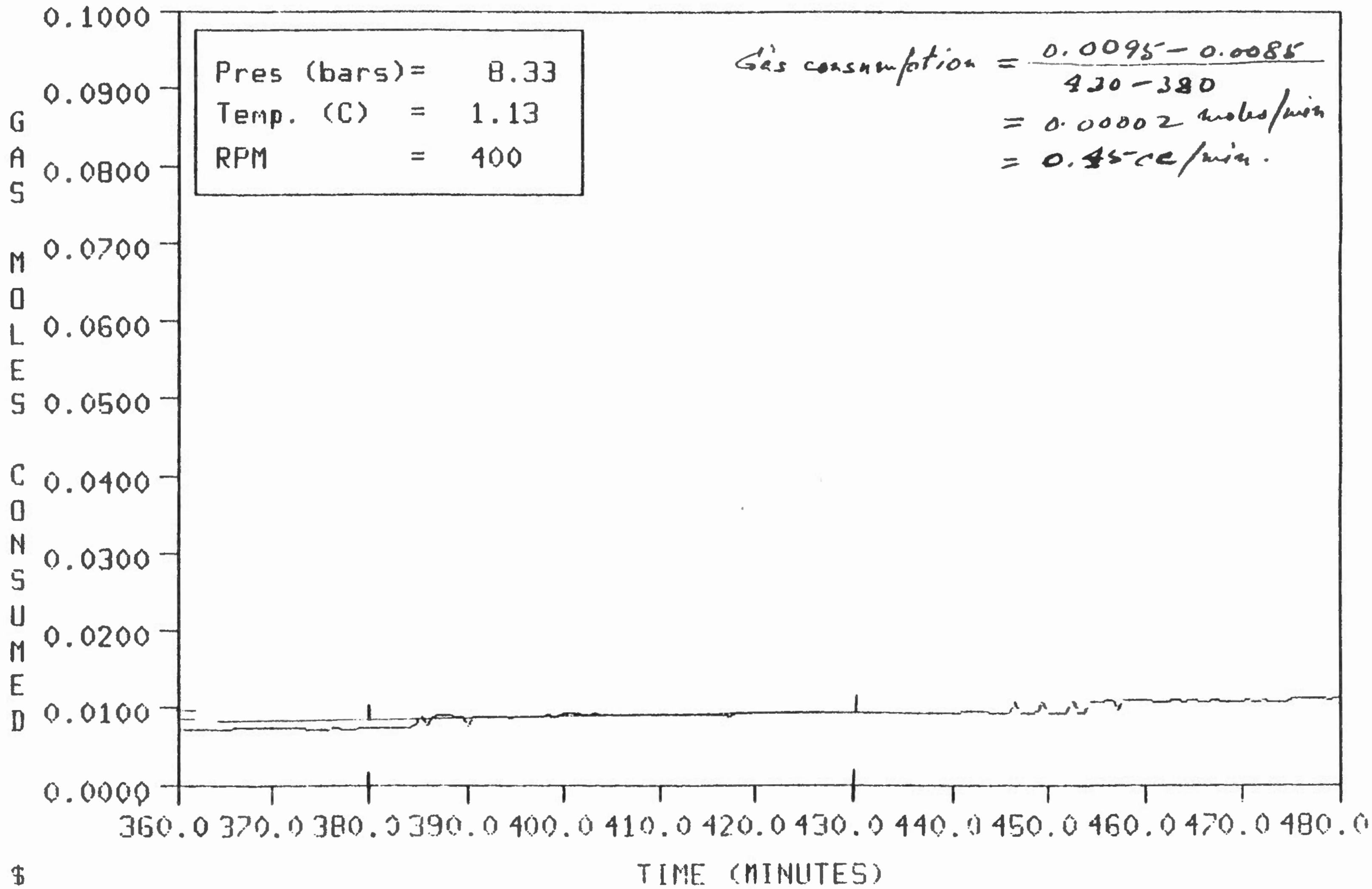

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-27__84/12/20
Pres (bars)= 8.33
Temp. (C) = 1.13
RPM = 400
GAS MOLES CONSUMED
0.1000
0.0900
0.0800
0.0700
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

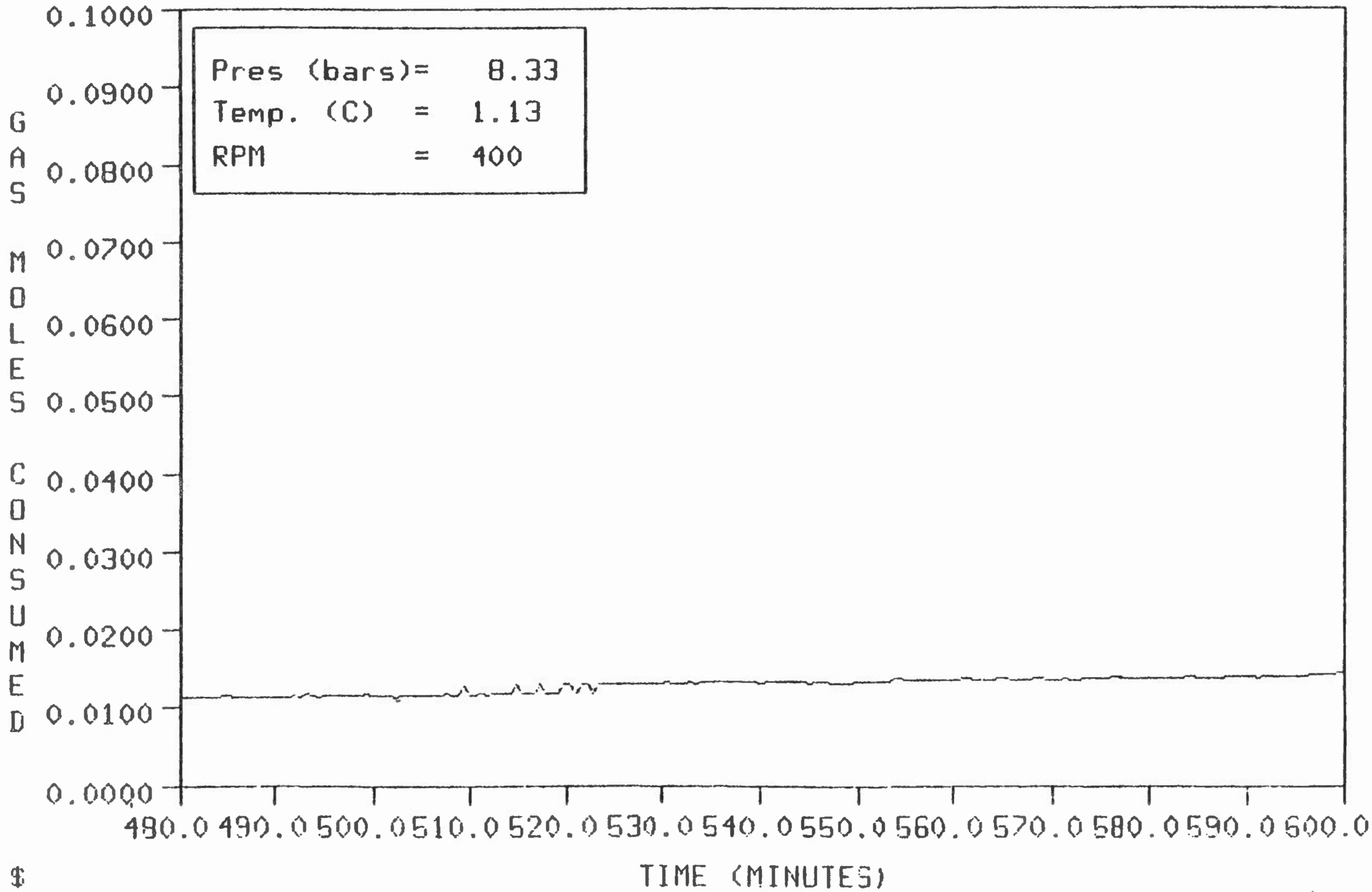
RUN#M50E50-27__84/12/20



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-27__84/12/20



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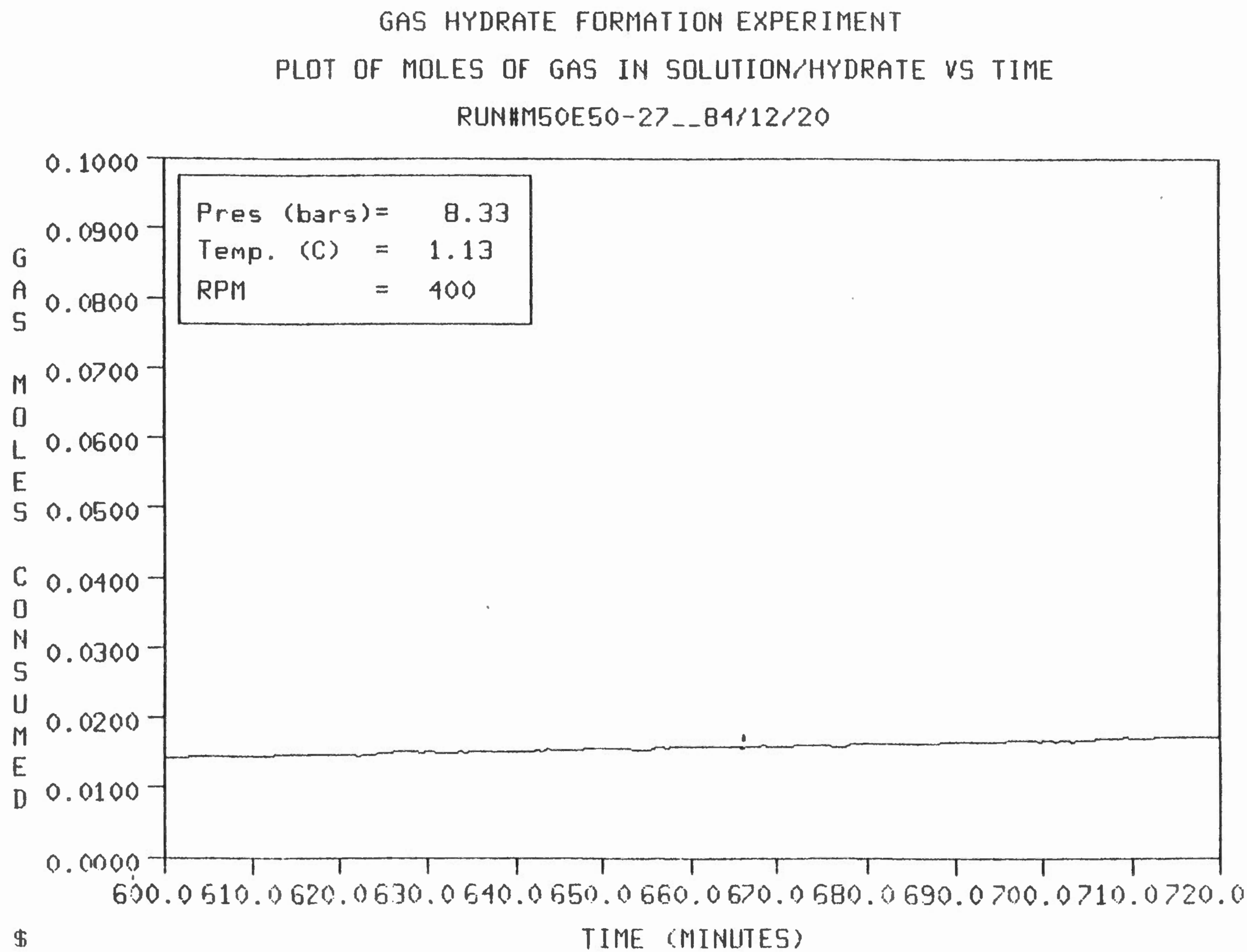
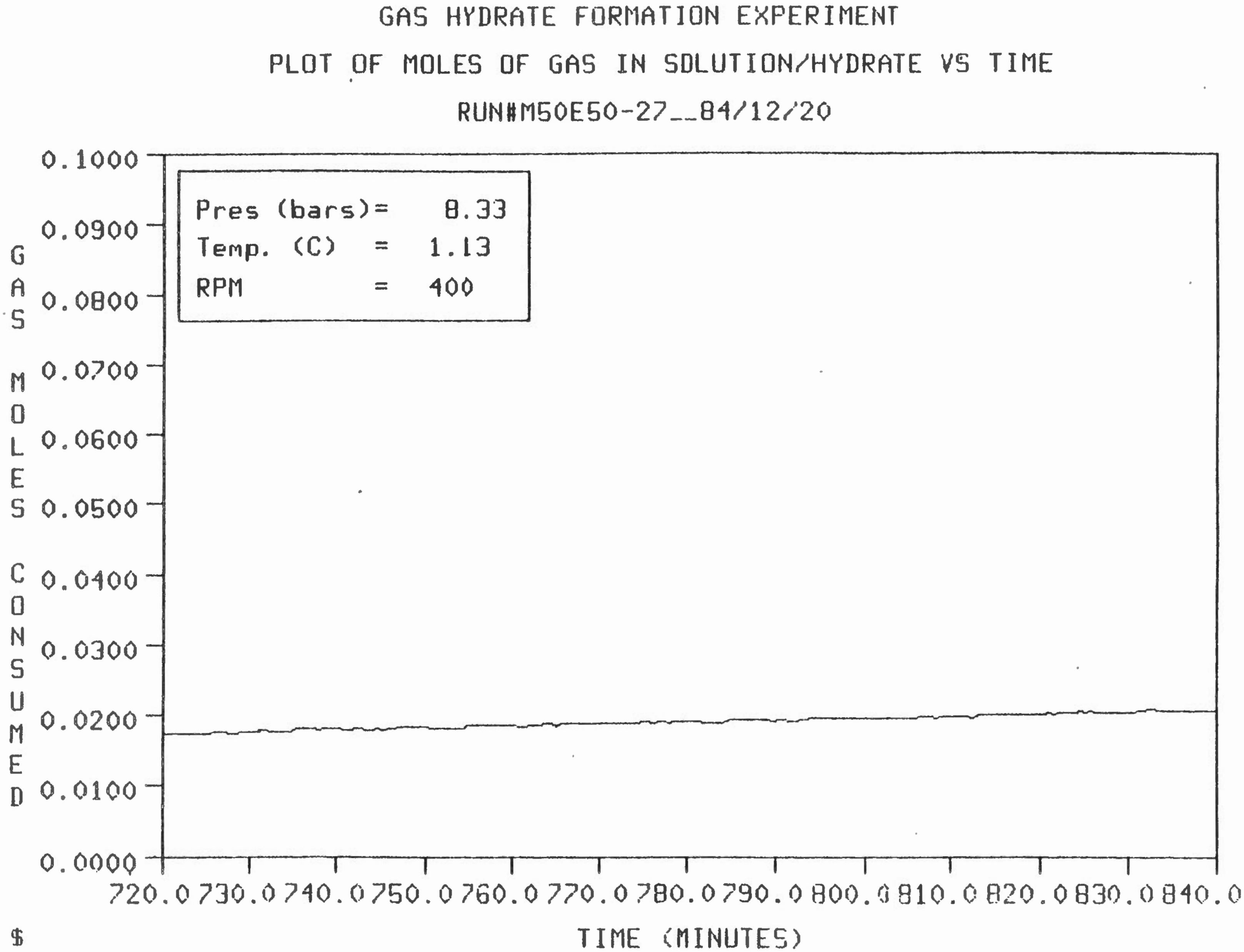
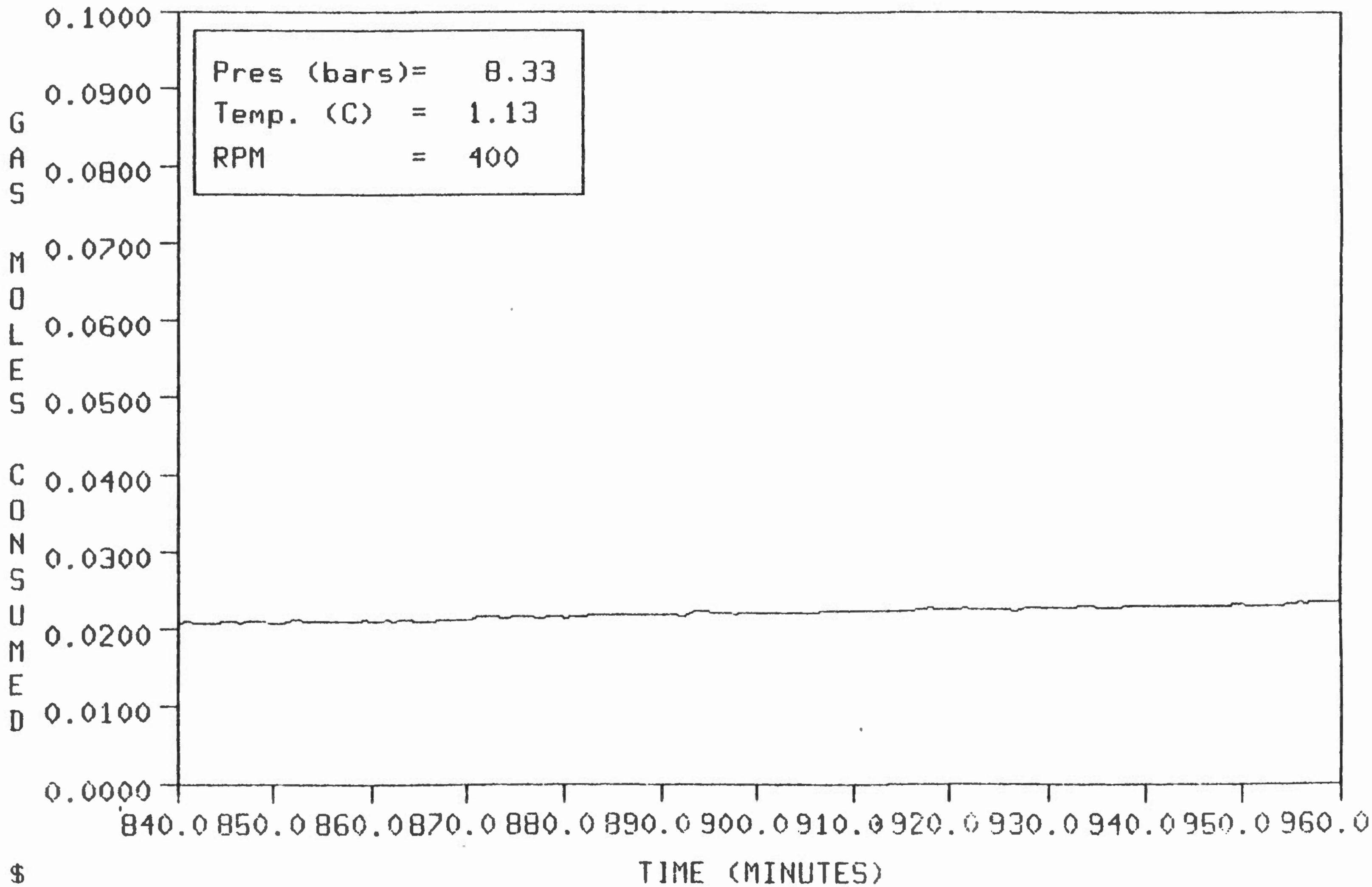

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-27__84/12/20
Pres (bars)= 8.33
Temp. (C) = 1.13
RPM = 400
GAS MOLES CONSUMED
0.1000
0.0900
0.0800
0.0700
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
600.0 610.0 620.0 630.0 640.0 650.0 660.0 670.0 680.0 690.0 700.0 710.0 720.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-27__84/12/20
Pres (bars)= 8.33
Temp. (C) = 1.13
RPM = 400
GAS MOLES CONSUMED
0.1000
0.0900
0.0800
0.0700
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
720.0 730.0 740.0 750.0 760.0 770.0 780.0 790.0 800.0 810.0 820.0 830.0 840.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-27__84/12/20



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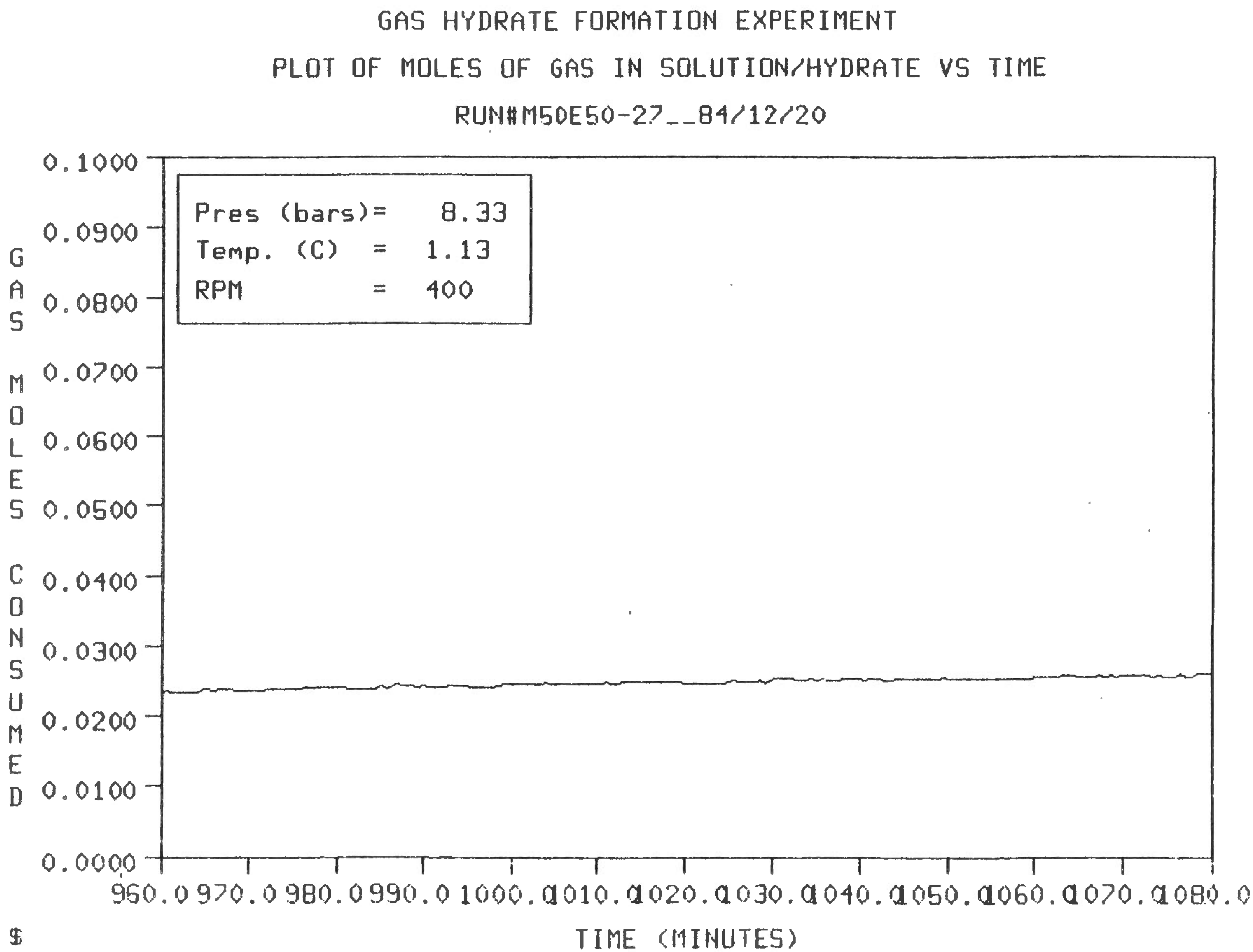
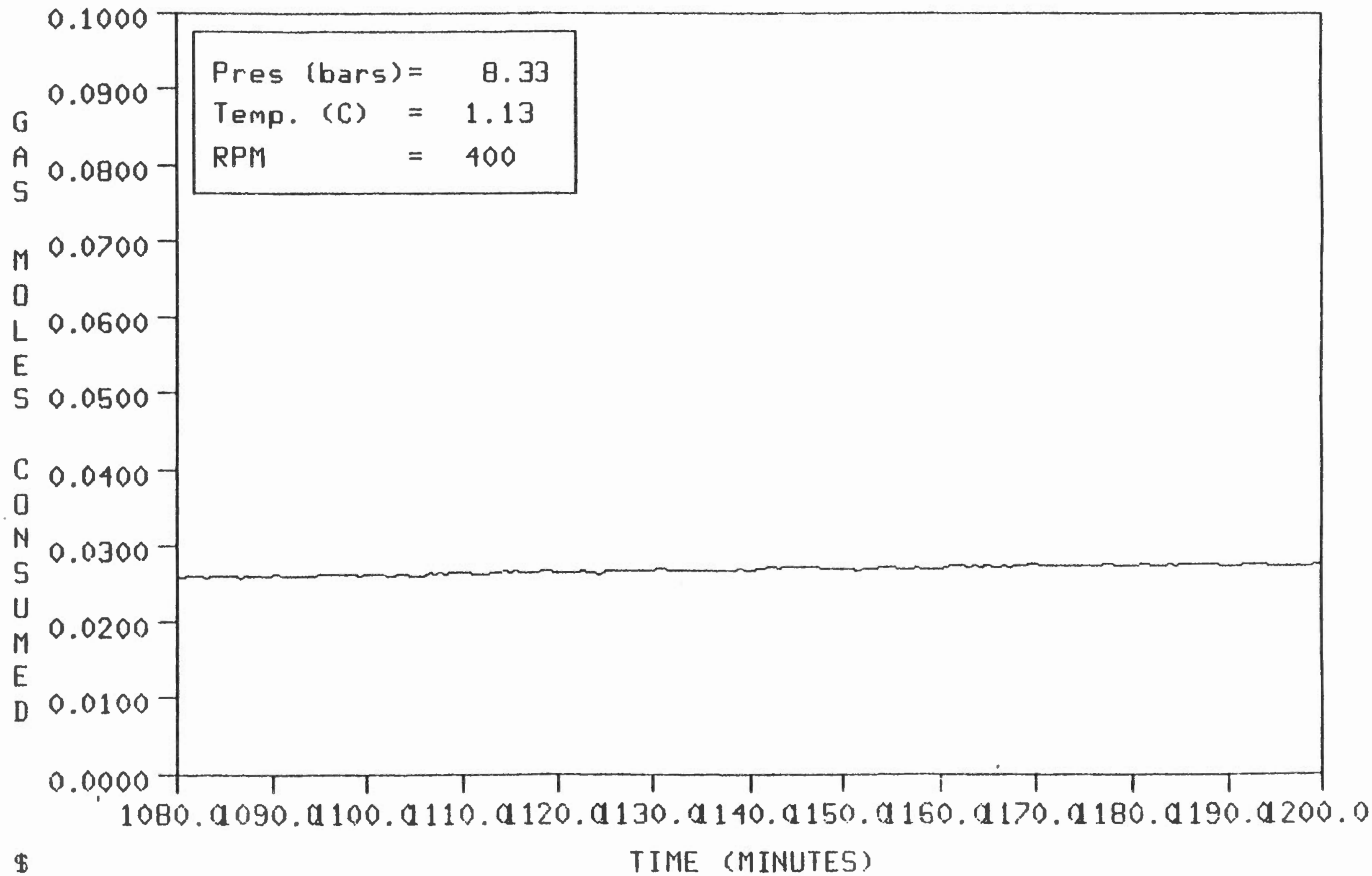

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-27__84/12/20
Pres (bars)= 8.33
Temp. (C) = 1.13
RPM = 400
GAS MOLES CONSUMED
0.1000
0.0900
0.0800
0.0700
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
960.0
970.0
980.0
990.0
1000.0
1010.0
1020.0
1030.0
1040.0
1050.0
1060.0
1070.0
1080.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-27__84/12/20

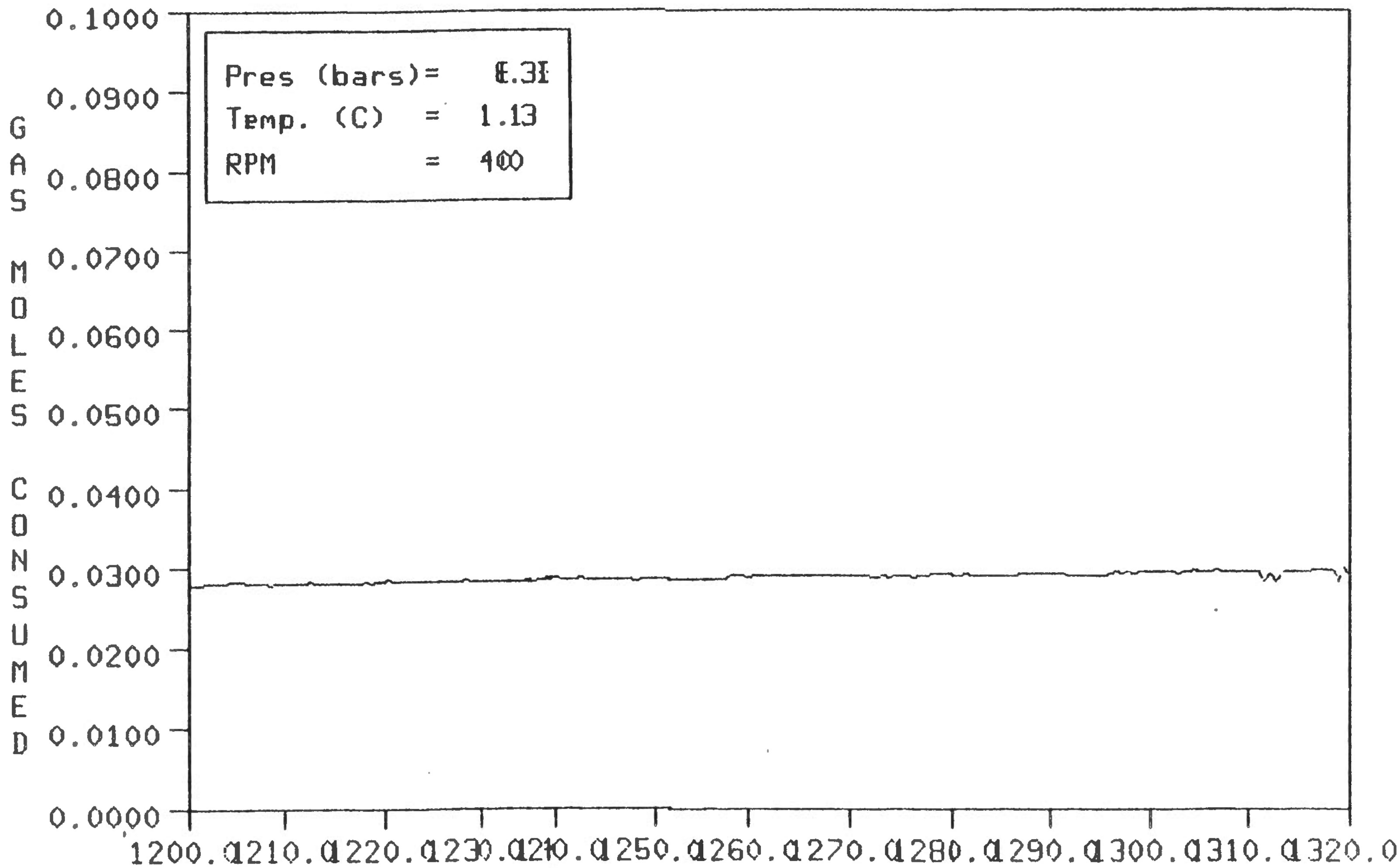


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN M50E50-27__84/12/20



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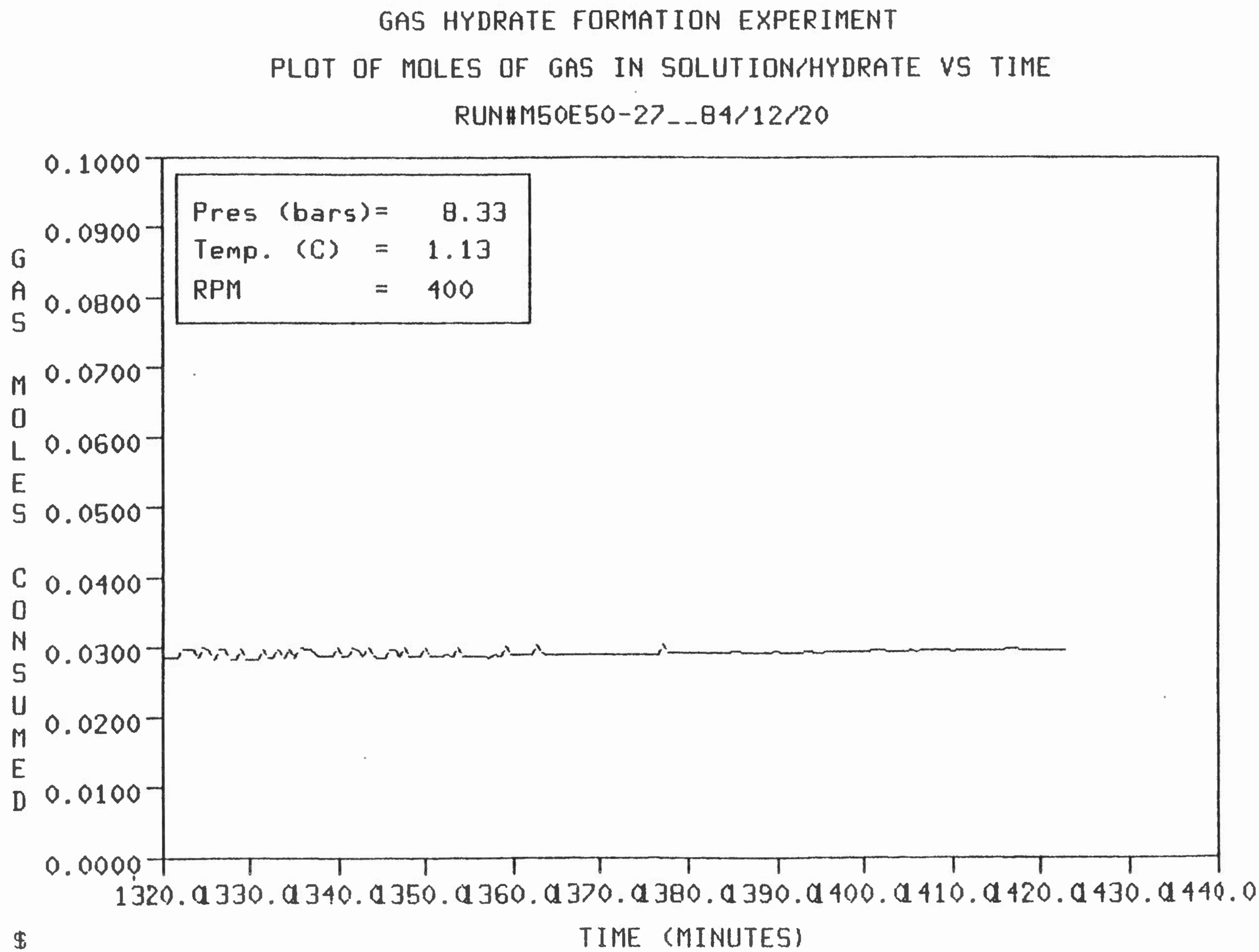
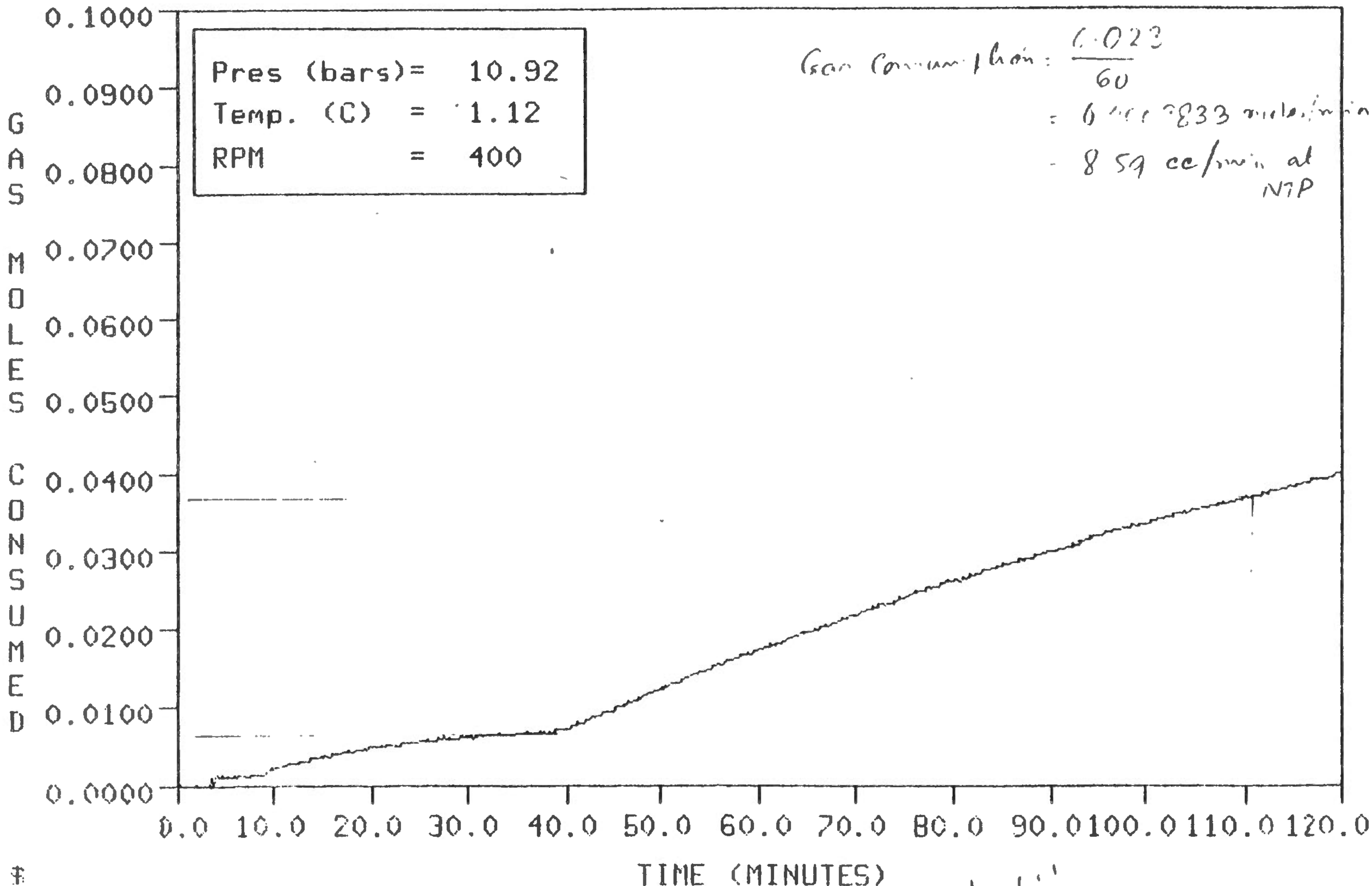

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M50E50-27__84/12/20
Pres (bars)= 8.33
Temp. (C) = 1.13
RPM = 400
GAS MOLES CONSUMED
0.1000
0.0900
0.0800
0.0700
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
1320.0
1330.0
1340.0
1350.0
1360.0
1370.0
1380.0
1390.0
1400.0
1410.0
1420.0
1430.0
1440.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

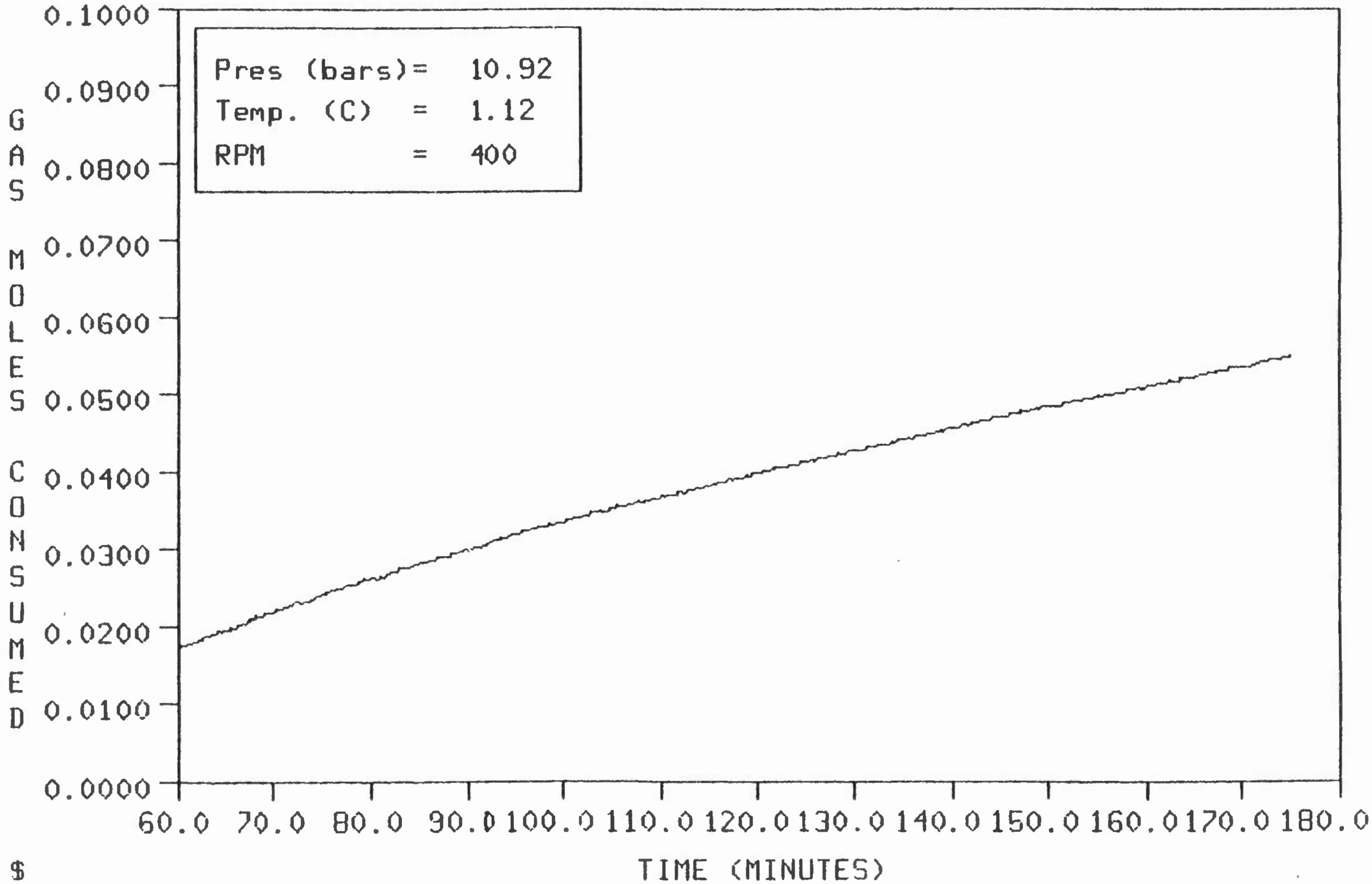
RUN#M50E50-28__85/01/14



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M50E50-28__85/01/14



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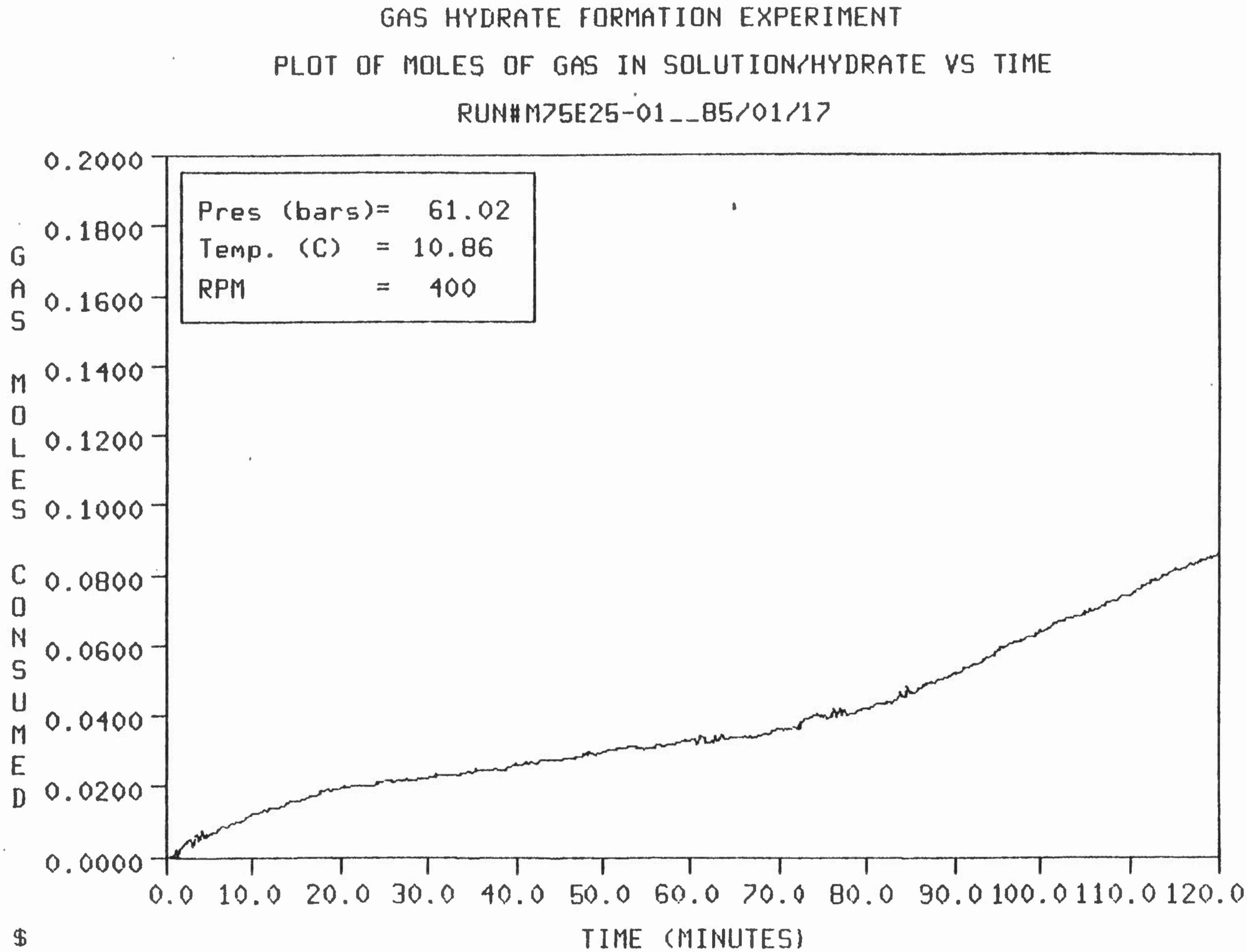
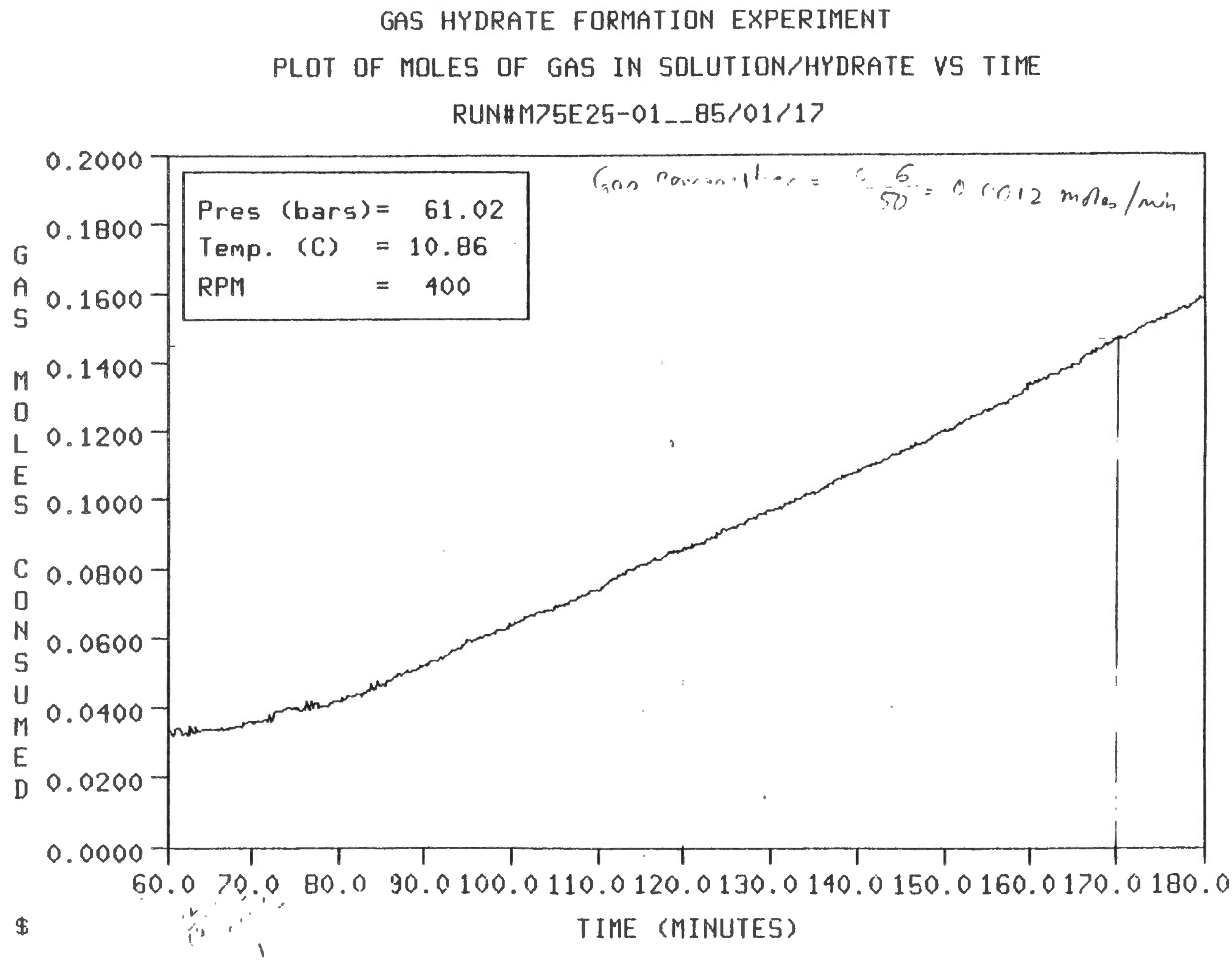
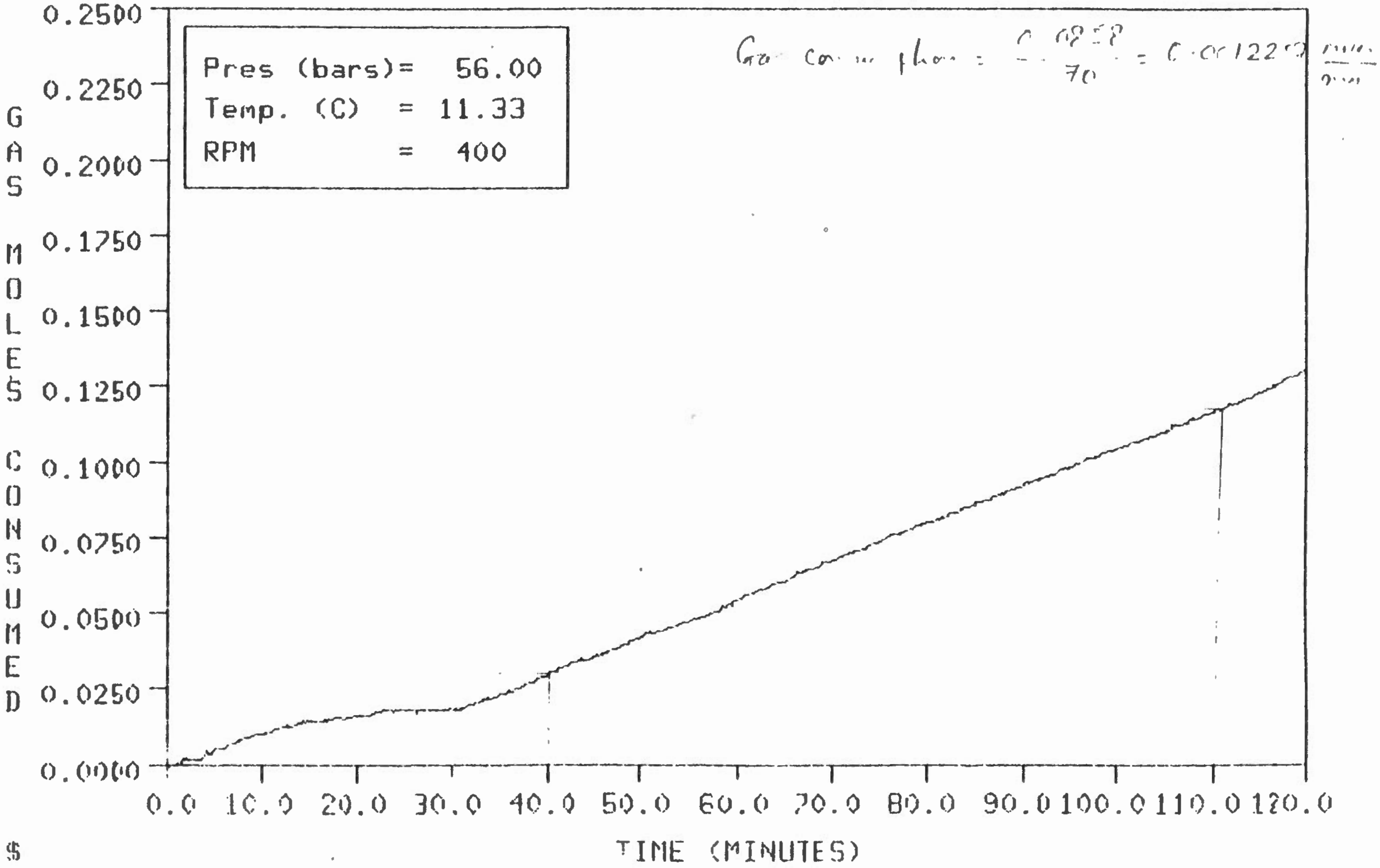

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-01__85/01/17
Pres (bars)= 61.02
Temp. (C) = 10.86
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-01__85/01/17
Pres (bars)= 61.02
Temp. (C) = 10.86
RPM = 400
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
GAS MOLES CONSUMED
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-02__85/01/22



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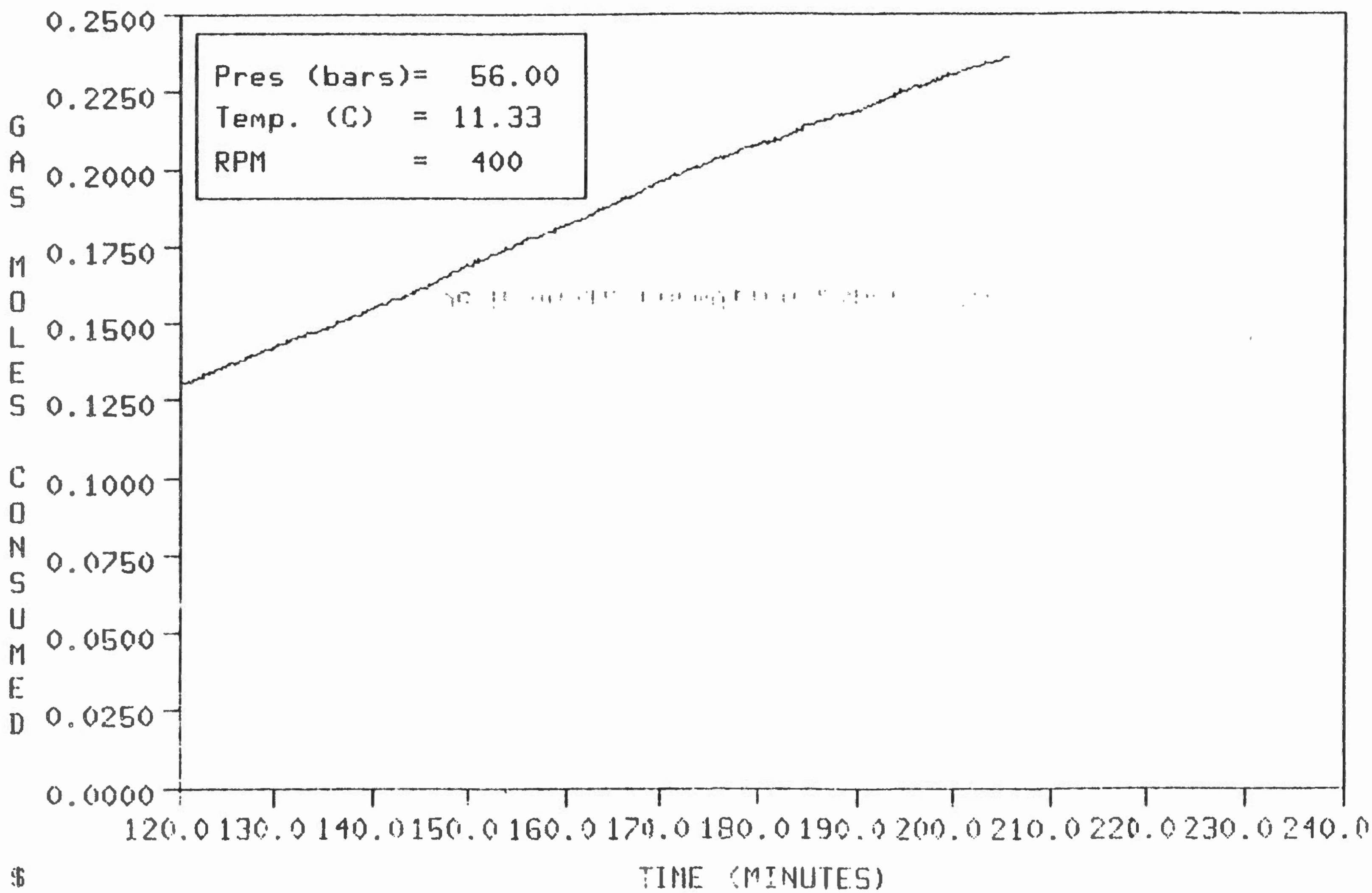
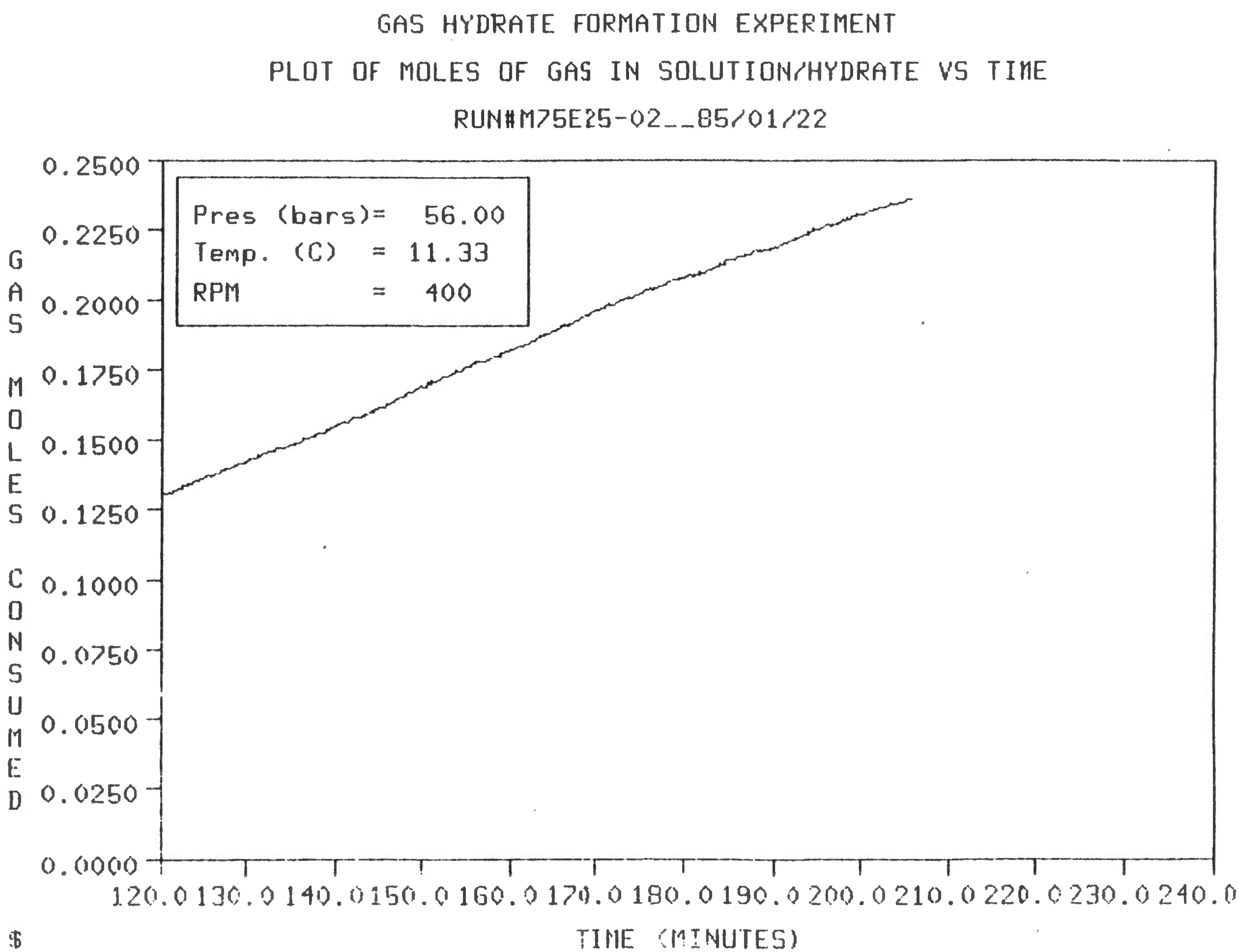
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-02__85/01/22

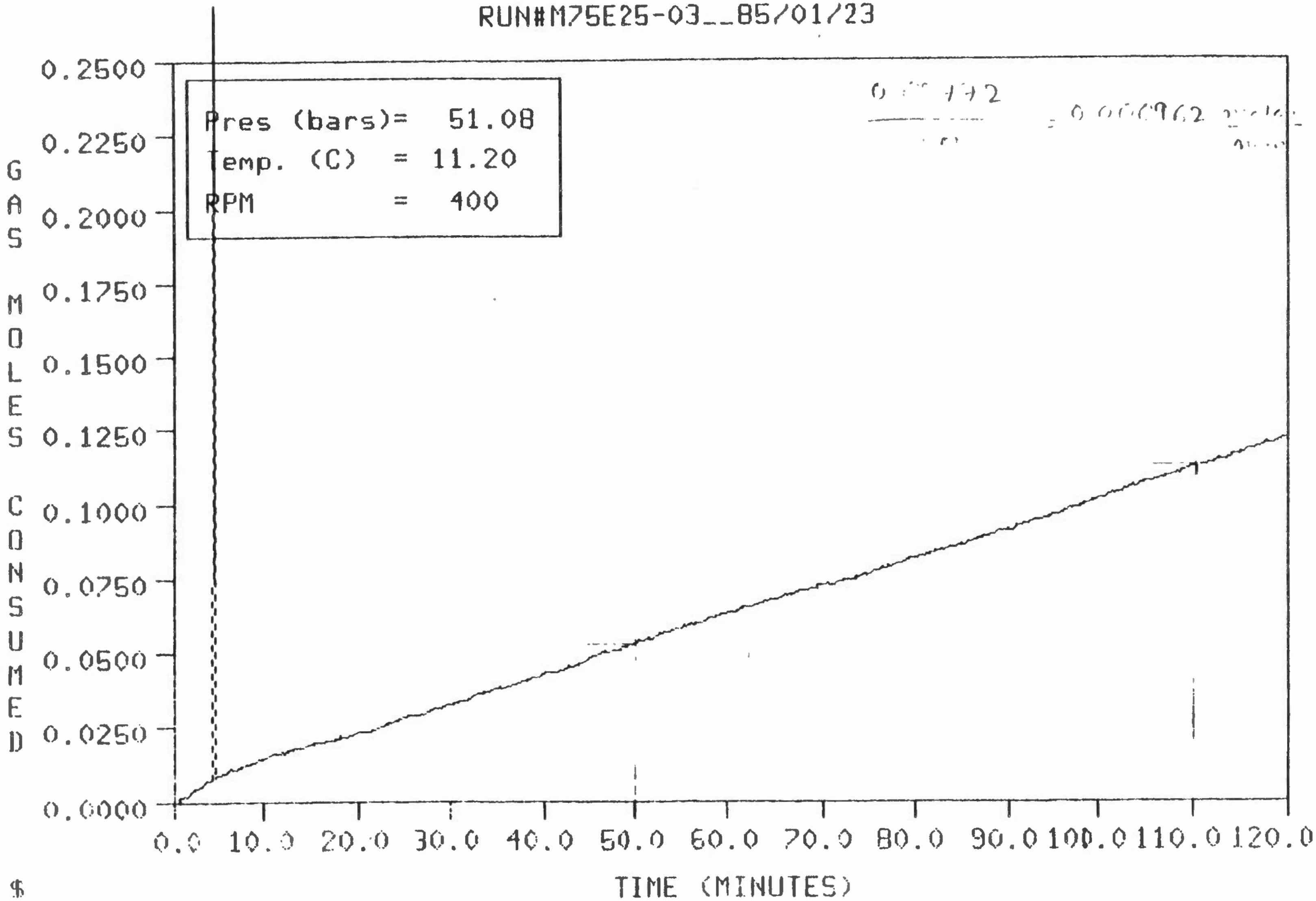


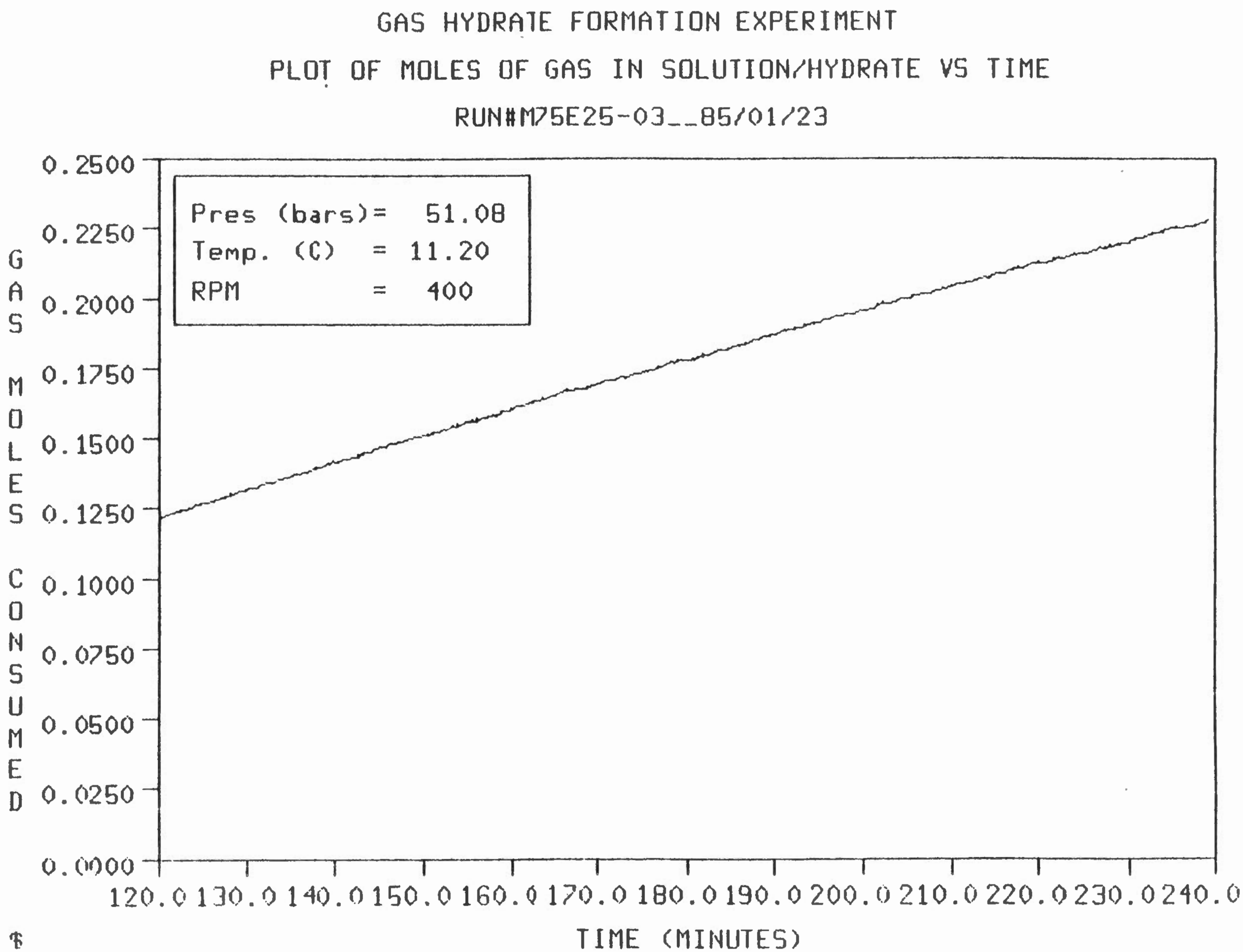

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-02__85/01/22
Pres (bars)= 56.00
Temp. (C) = 11.33
RPM = 400
GAS MOLES CONSUMED
0.2500
0.2250
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-03__85/01/23



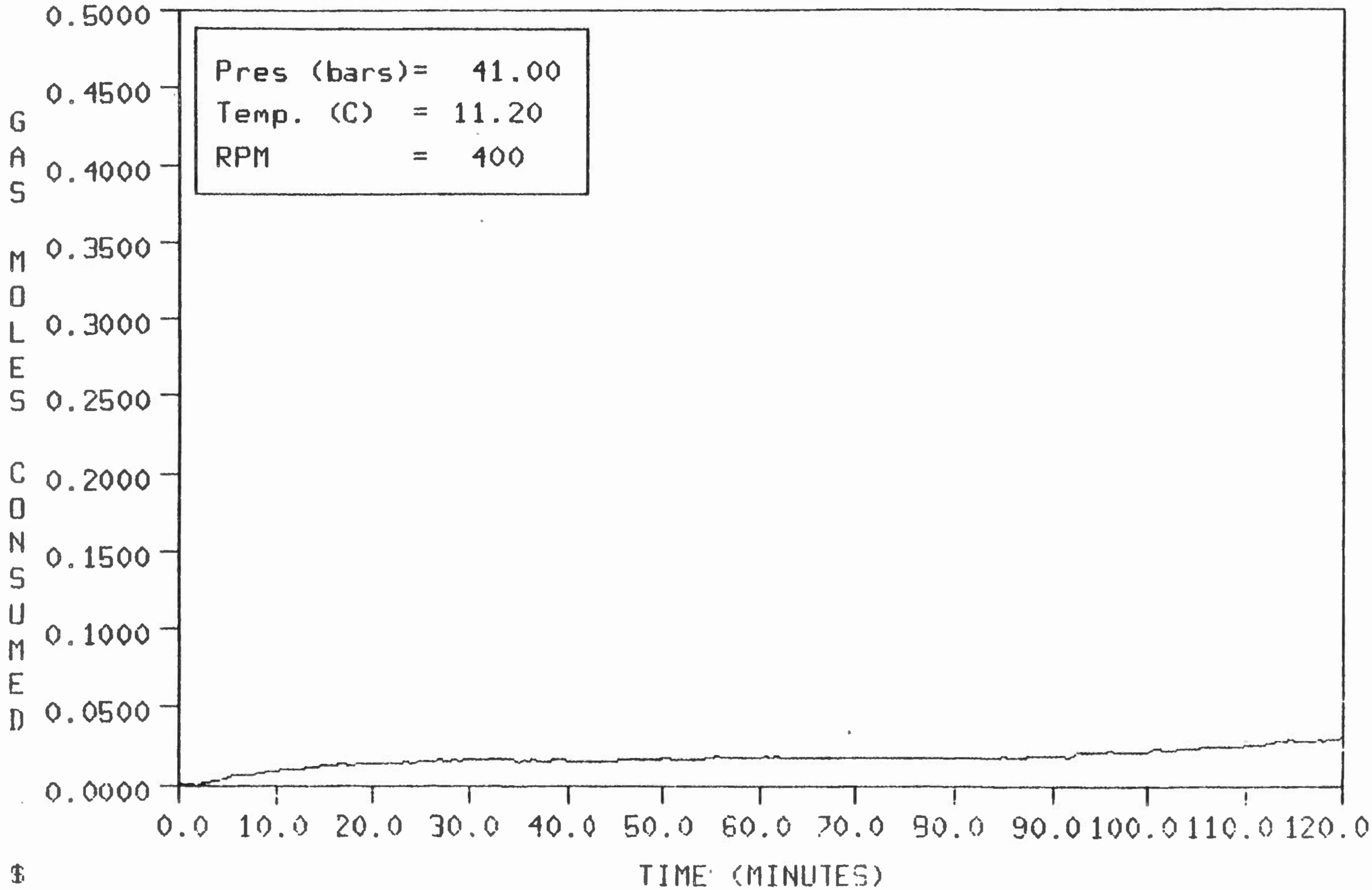


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-03__85/01/23
Pres (bars)= 51.08
Temp. (C) = 11.20
RPM = 400
GAS MOLES CONSUMED
0.2500
0.2250
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-05__85/01/28



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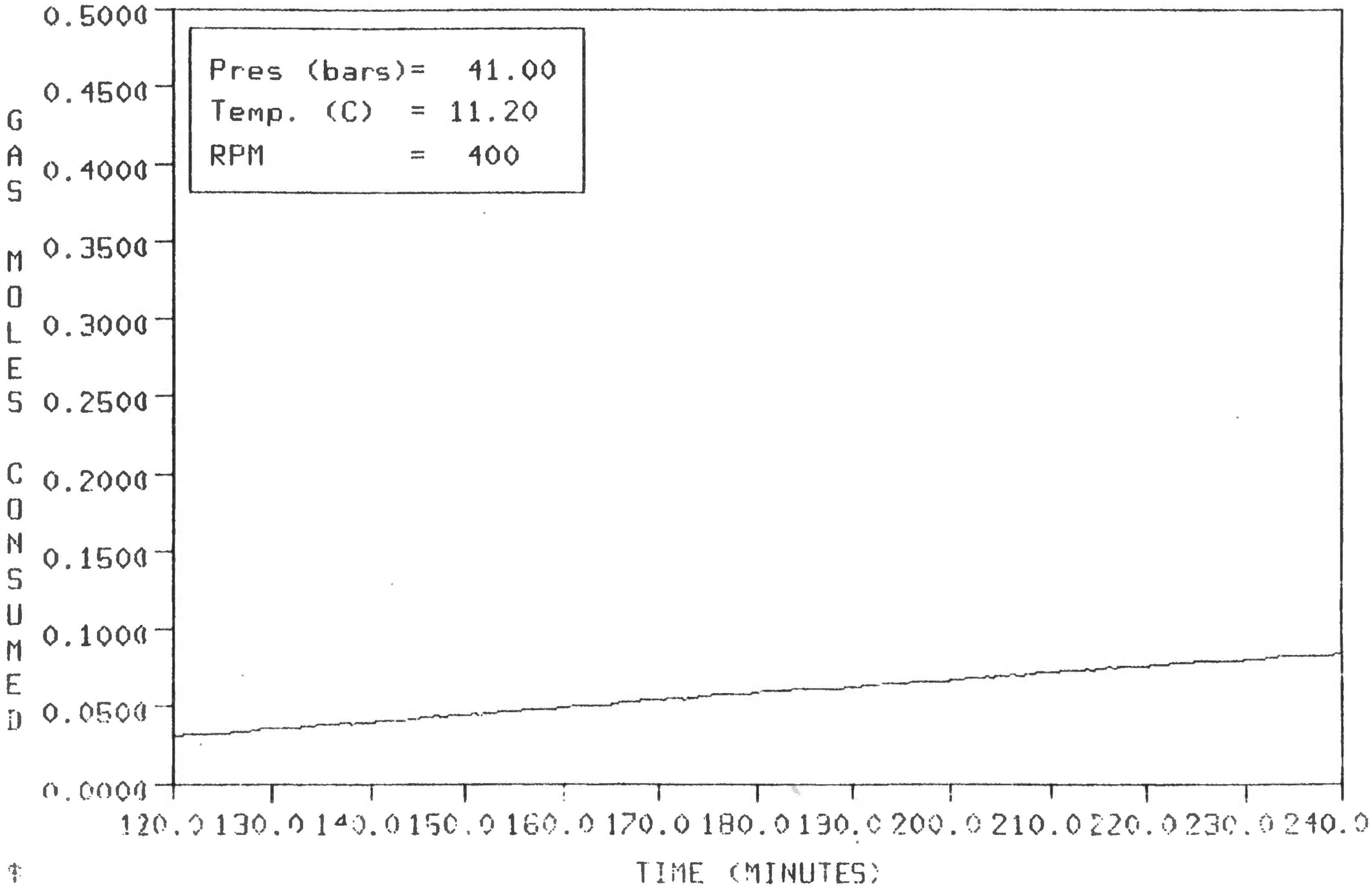
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

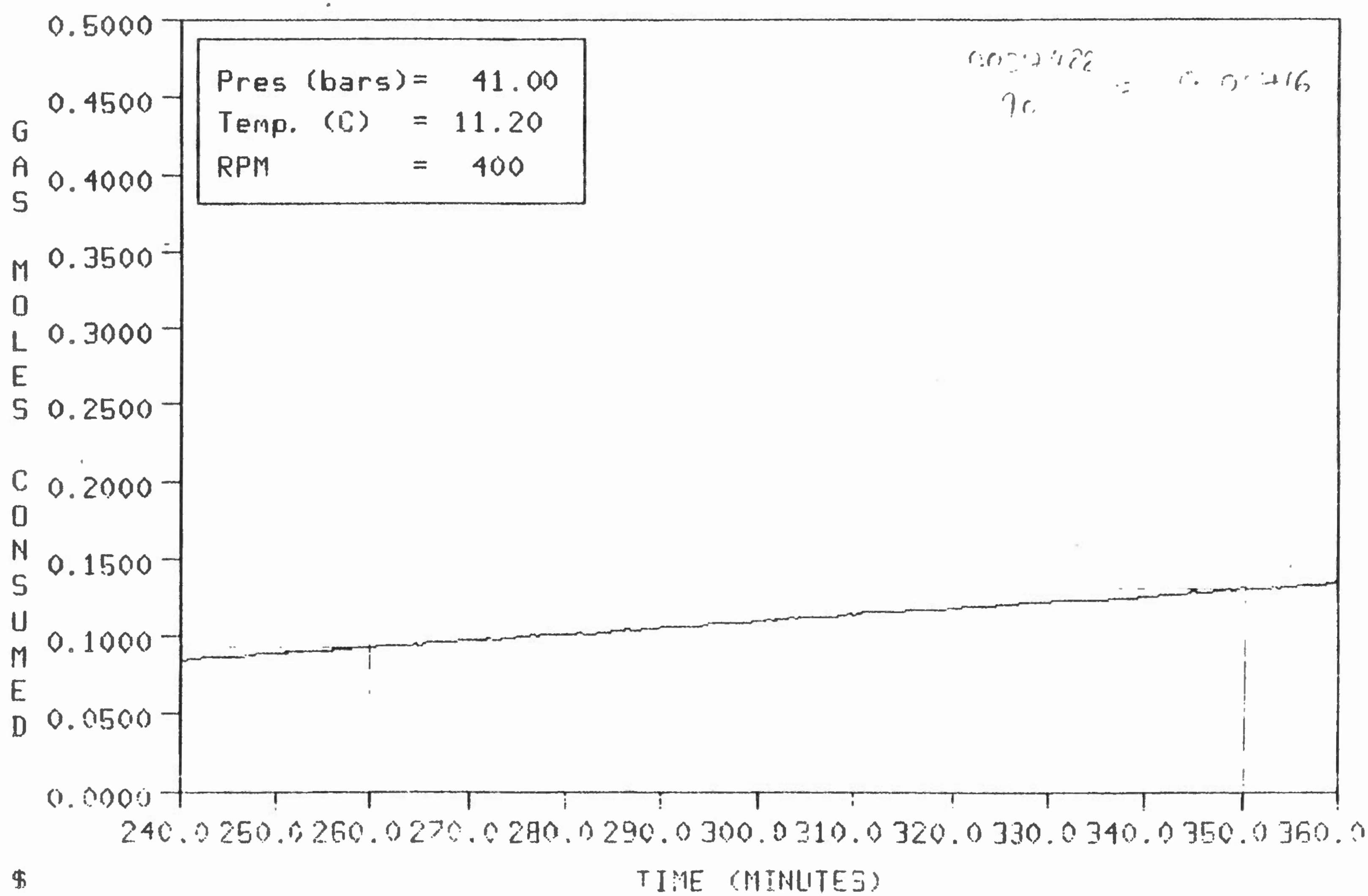
RUN#M75E25-05__85/01/28



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

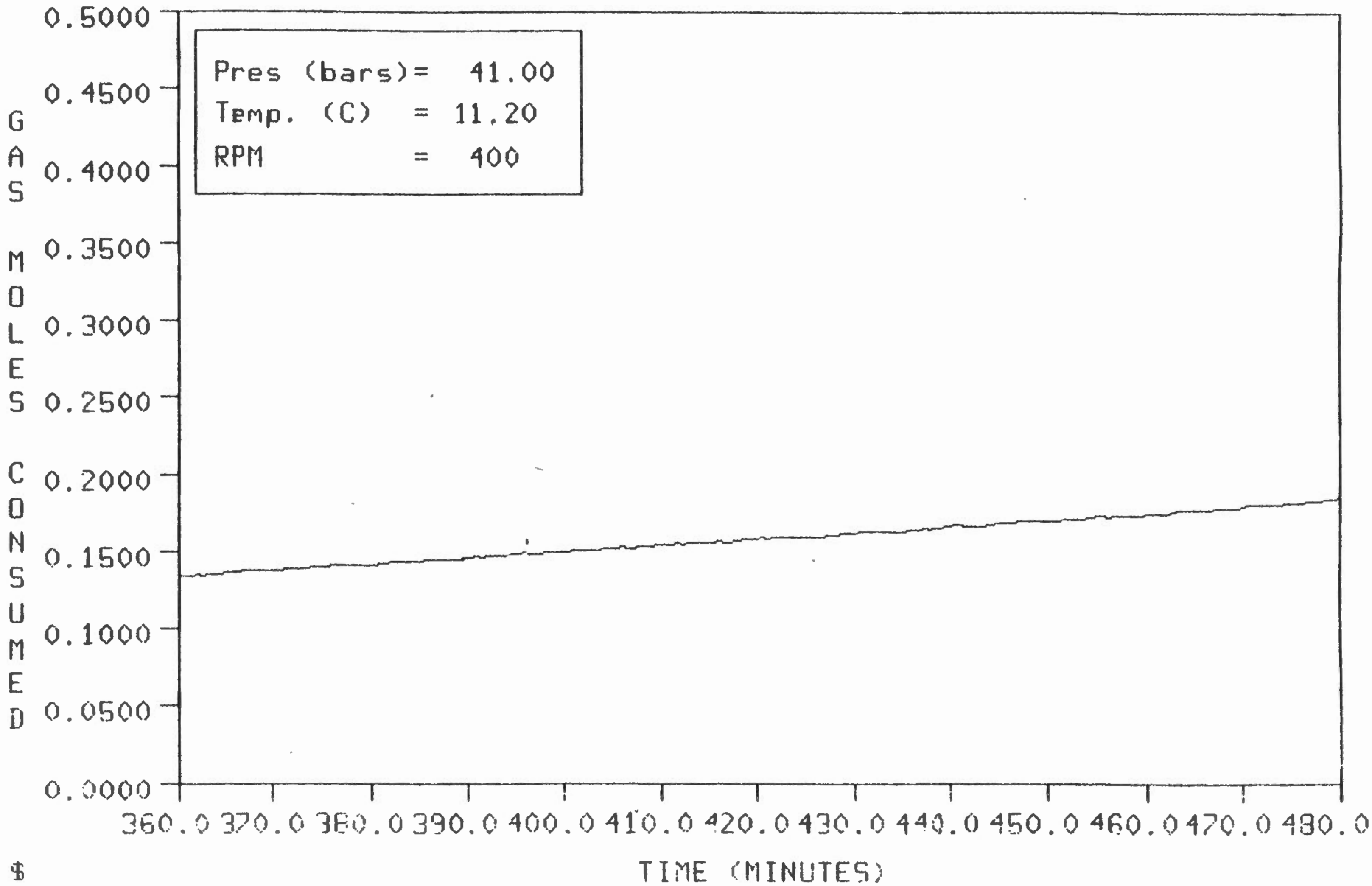
RUN#M75E25-05__85/01/28



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-05__85/01/28



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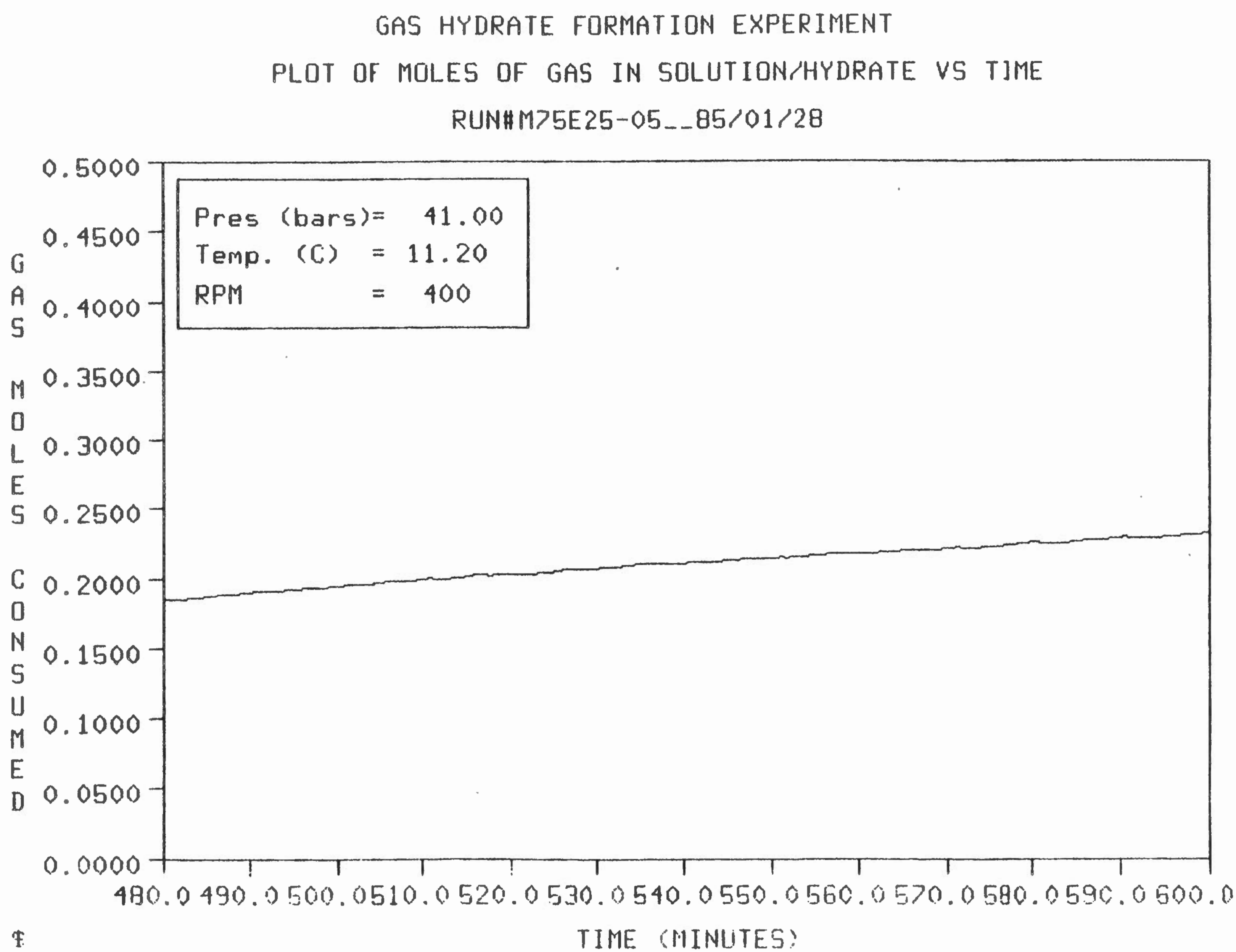
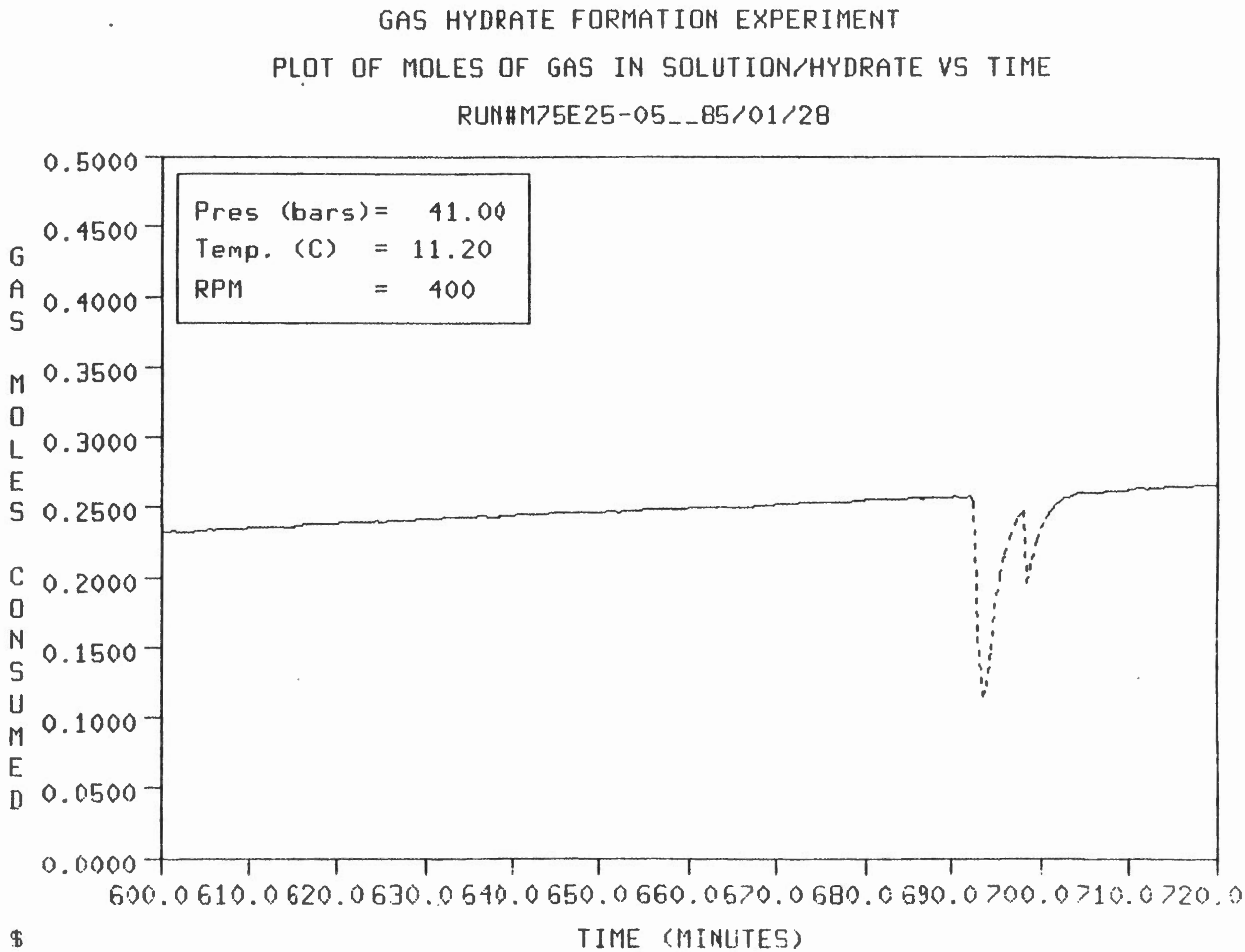
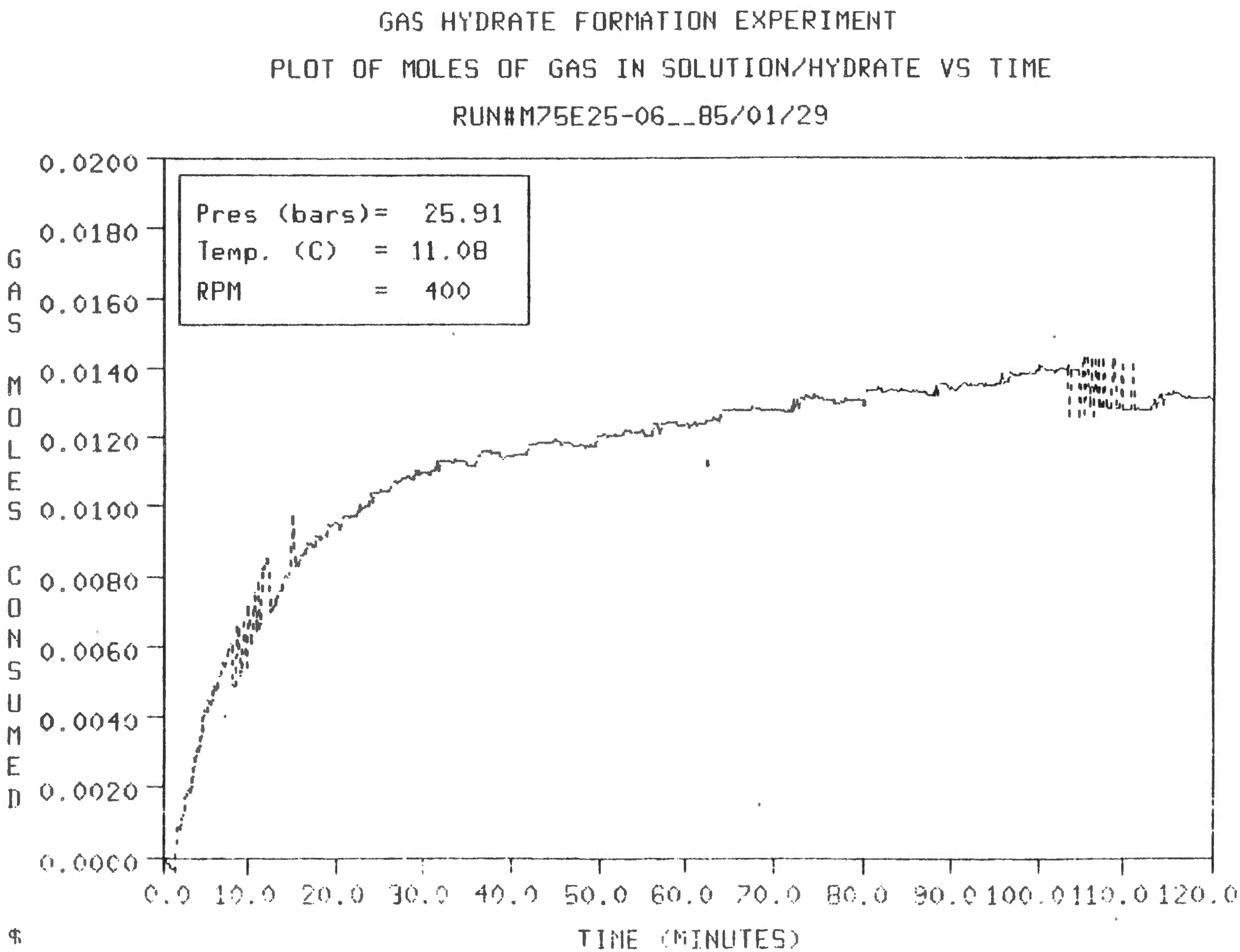
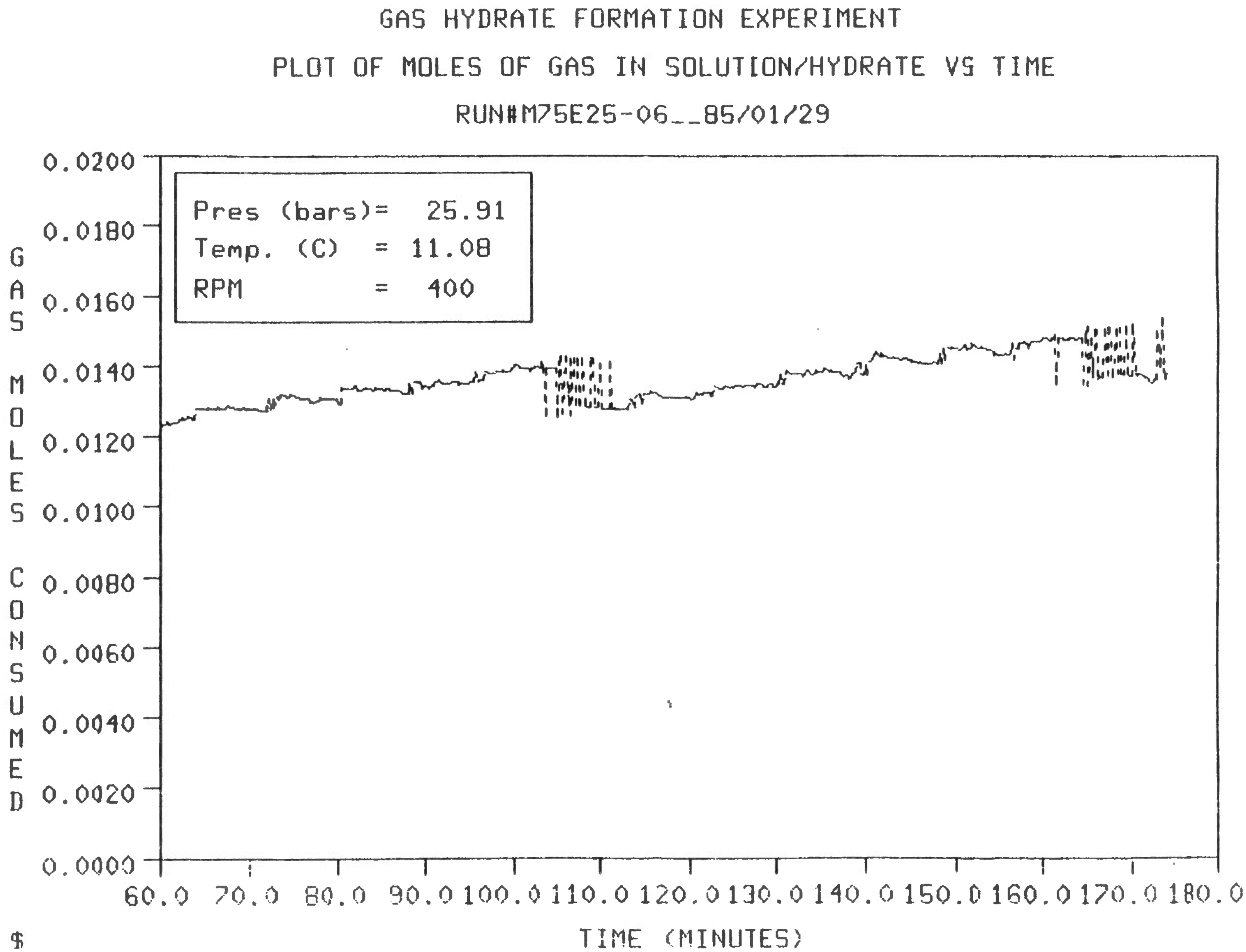

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-05__85/01/28
Pres (bars)= 41.00
Temp. (C) = 11.20
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
480.0 490.0 500.0 510.0 520.0 530.0 540.0 550.0 560.0 570.0 580.0 590.0 600.0
TIME (MINUTES)


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-05__85/01/28
Pres (bars)= 41.00
Temp. (C) = 11.20
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
600.0 610.0 620.0 630.0 640.0 650.0 660.0 670.0 680.0 690.0 700.0 710.0 720.0
TIME (MINUTES)
$

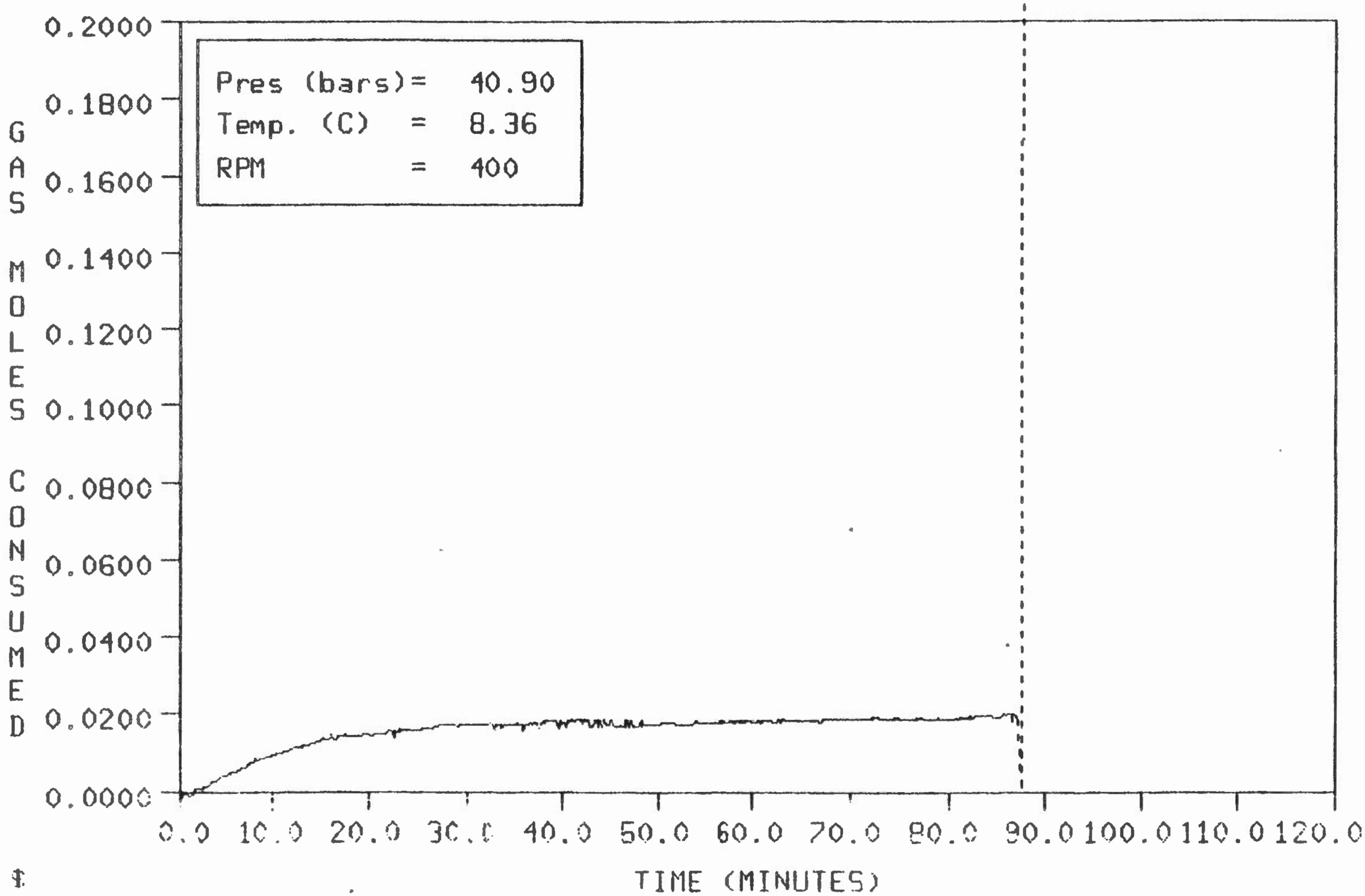

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-06__85/01/29
Pres (bars)= 25.91
Temp. (C) = 11.08
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)

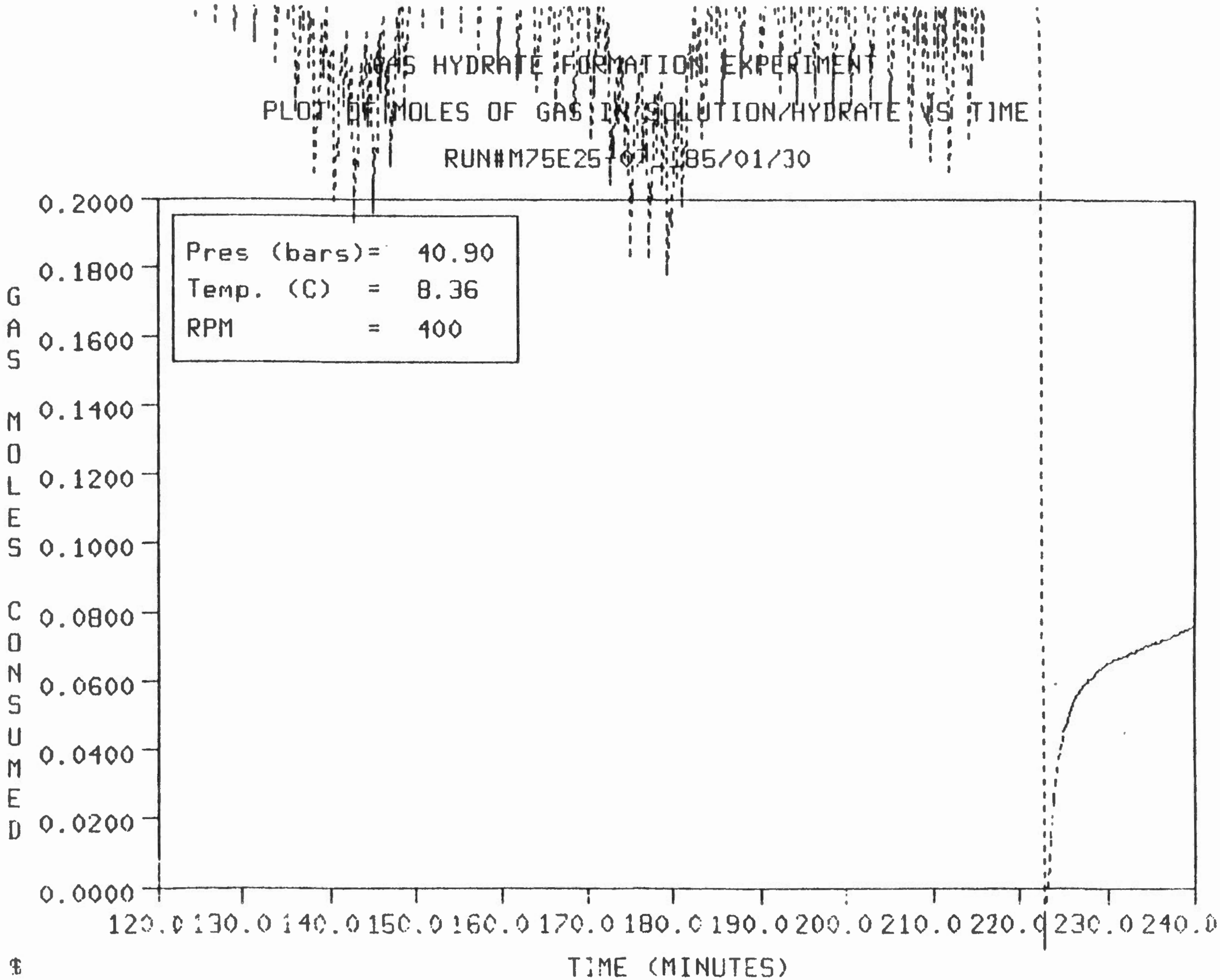

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-06__85/01/29
Pres (bars)= 25.91
Temp. (C) = 11.08
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

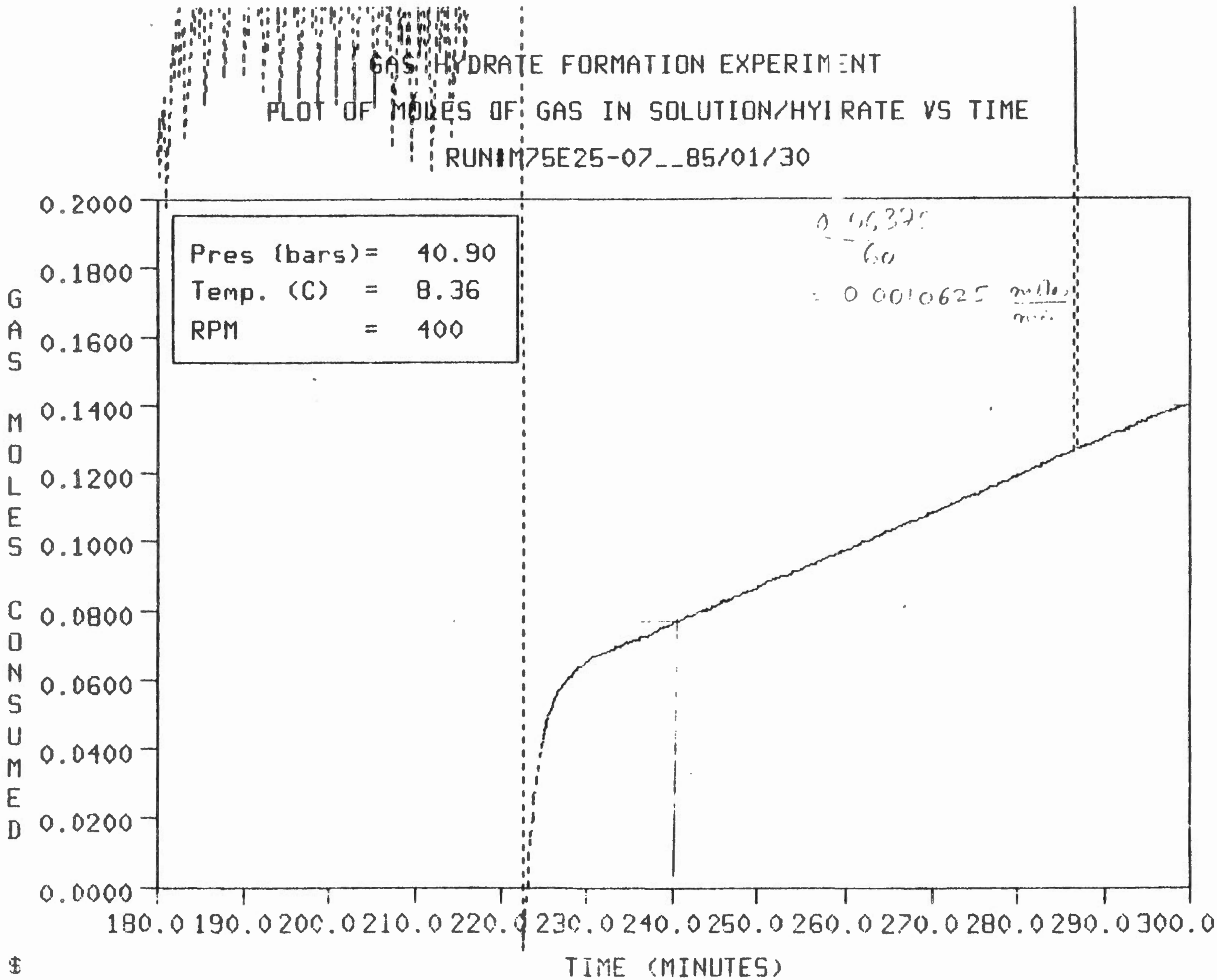
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-07__85/01/30





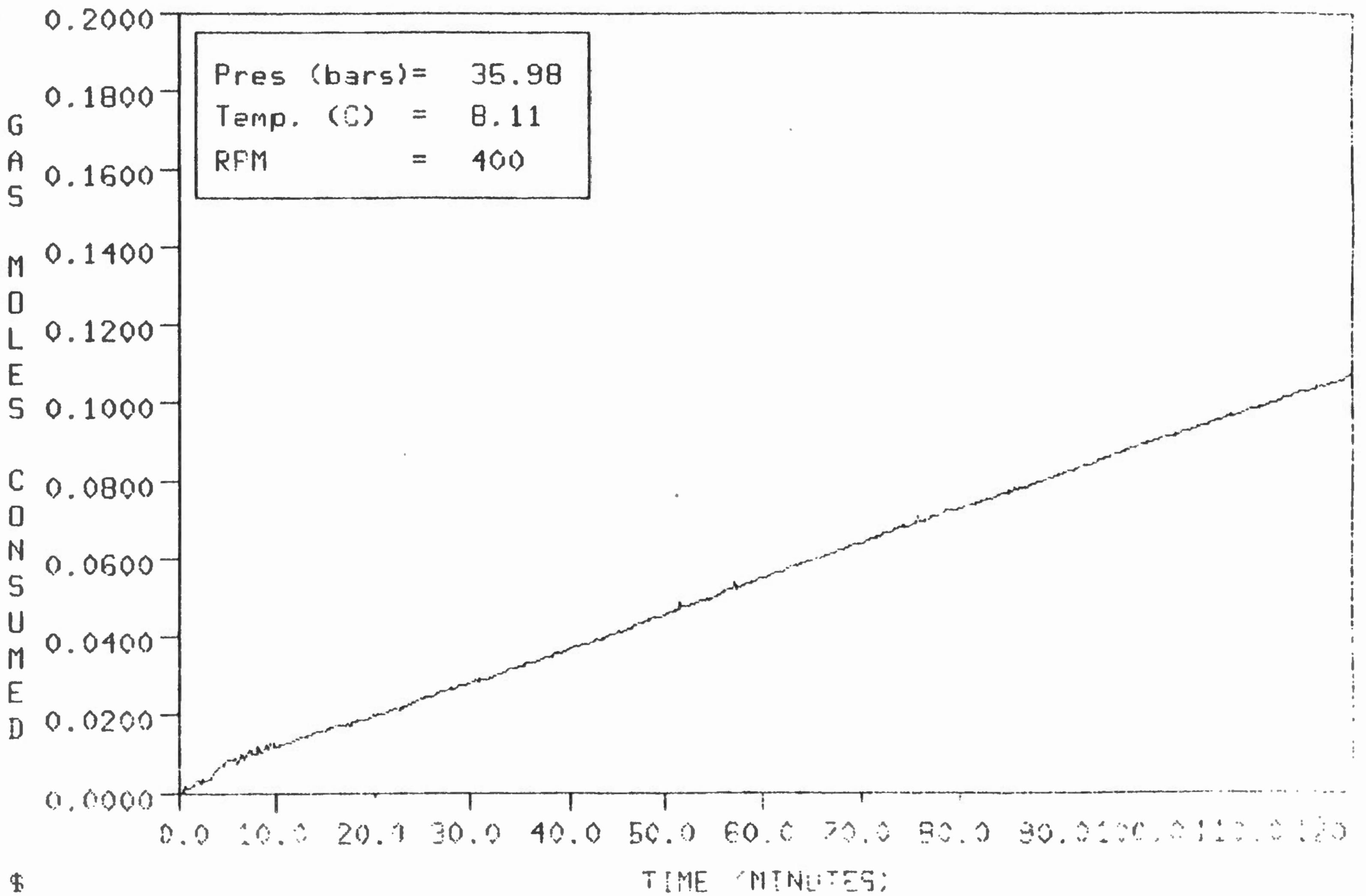
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-07 85/01/30
Pres (bars)= 40.90
Temp. (C) = 8.36
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0
130.0
140.0
150.0
160.0
170.0
180.0
190.0
200.0
210.0
220.0
230.0
240.0
TIME (MINUTES)


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-07__85/01/30
Pres (bars)= 40.90
Temp. (C) = 8.36
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0200
0.0400
0.0600
0.0800
0.1000
0.1200
0.1400
0.1600
0.1800
0.2000
180.0 190.0 200.0 210.0 220.0 230.0 240.0 250.0 260.0 270.0 280.0 290.0 300.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-08__85/01/31



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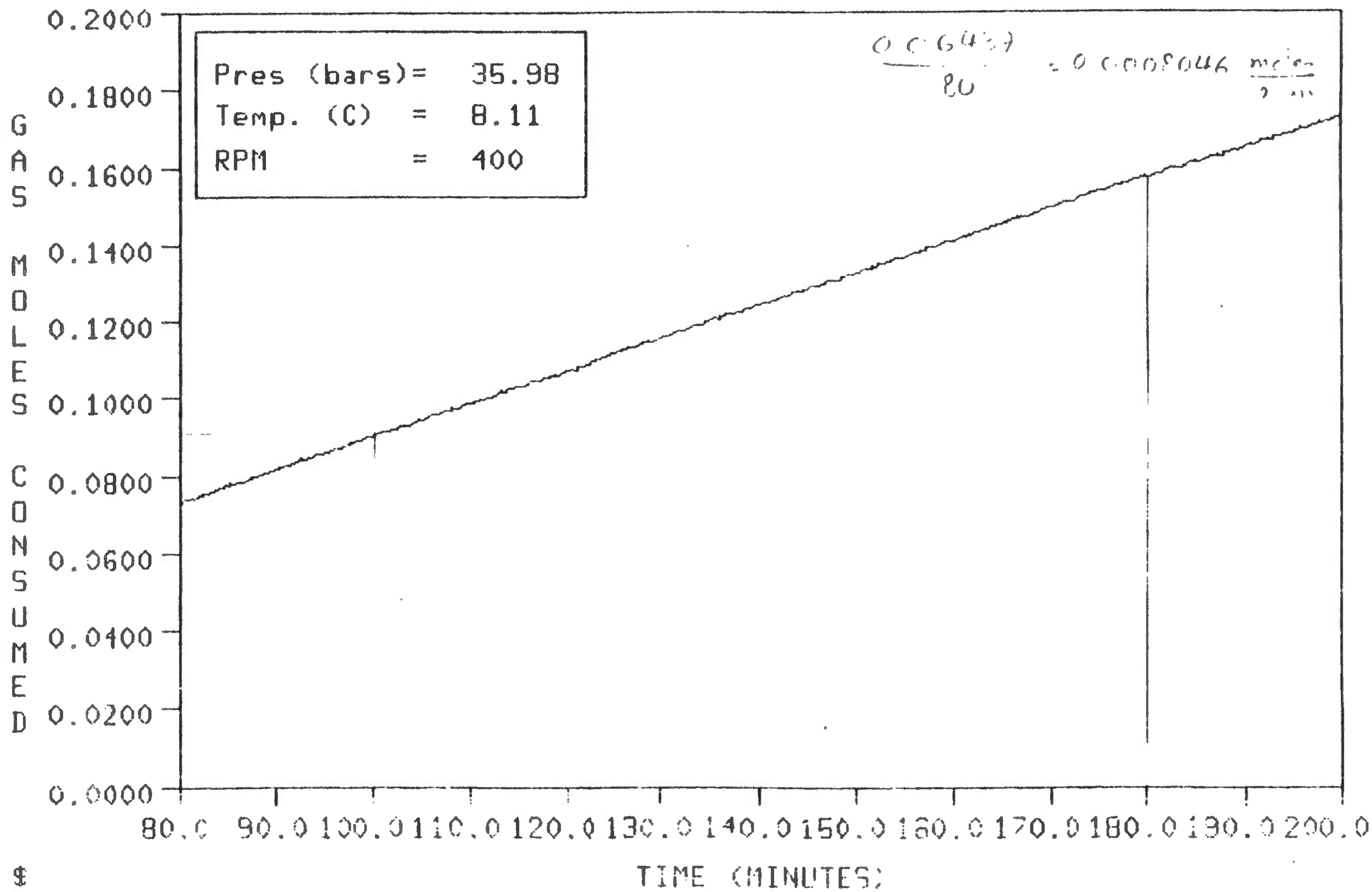
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

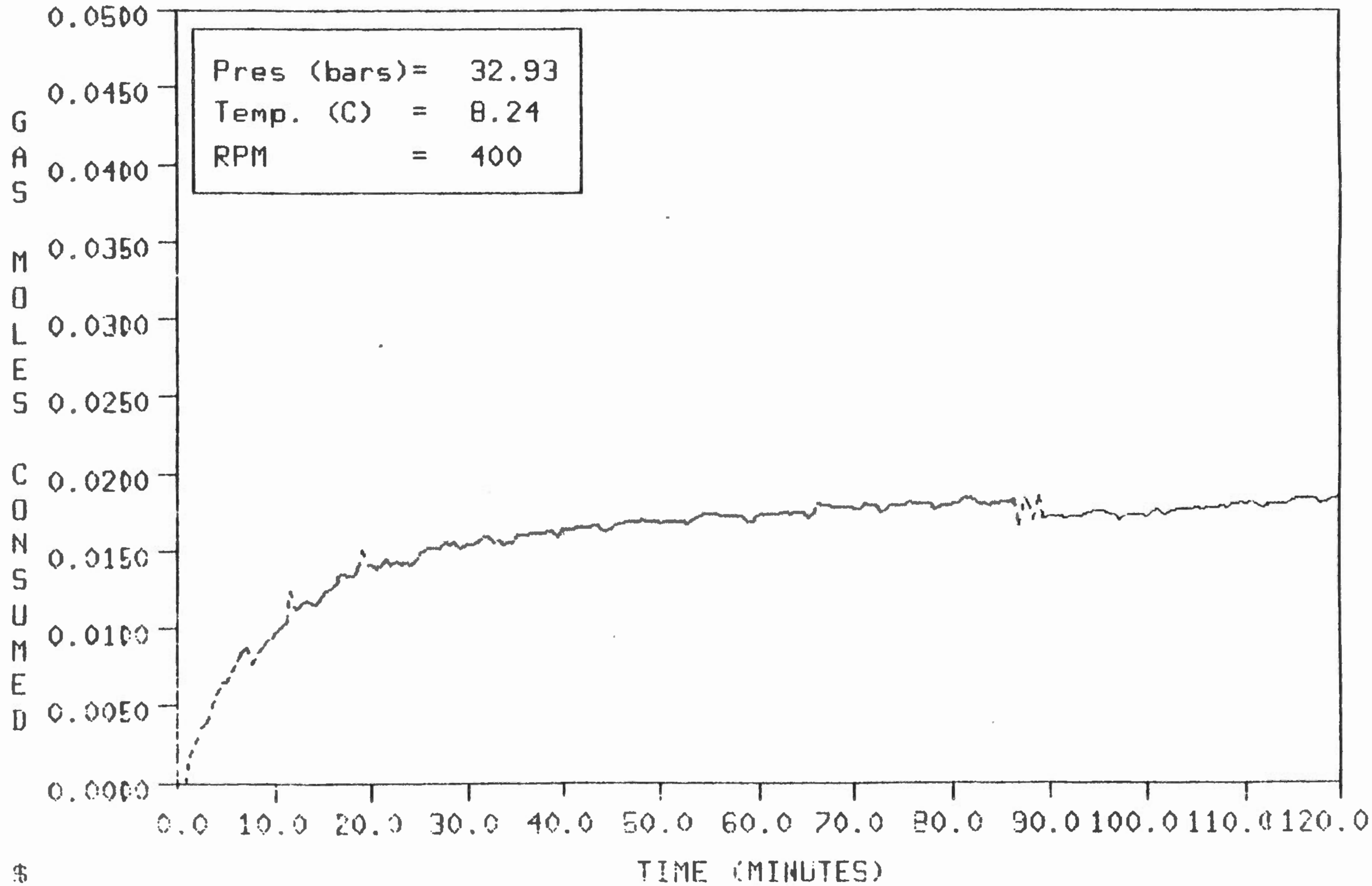
RUN#M75E25-08__85/01/31

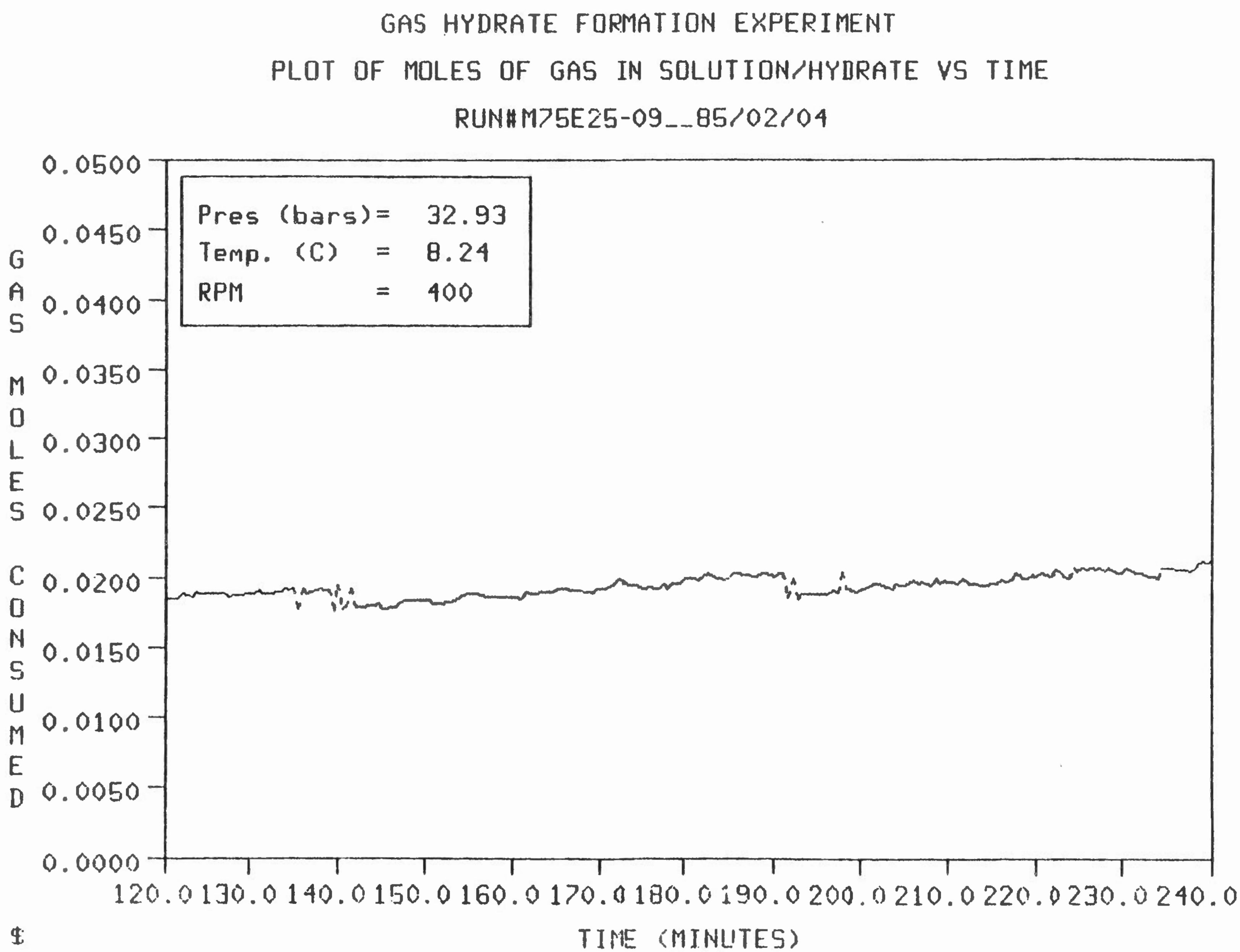


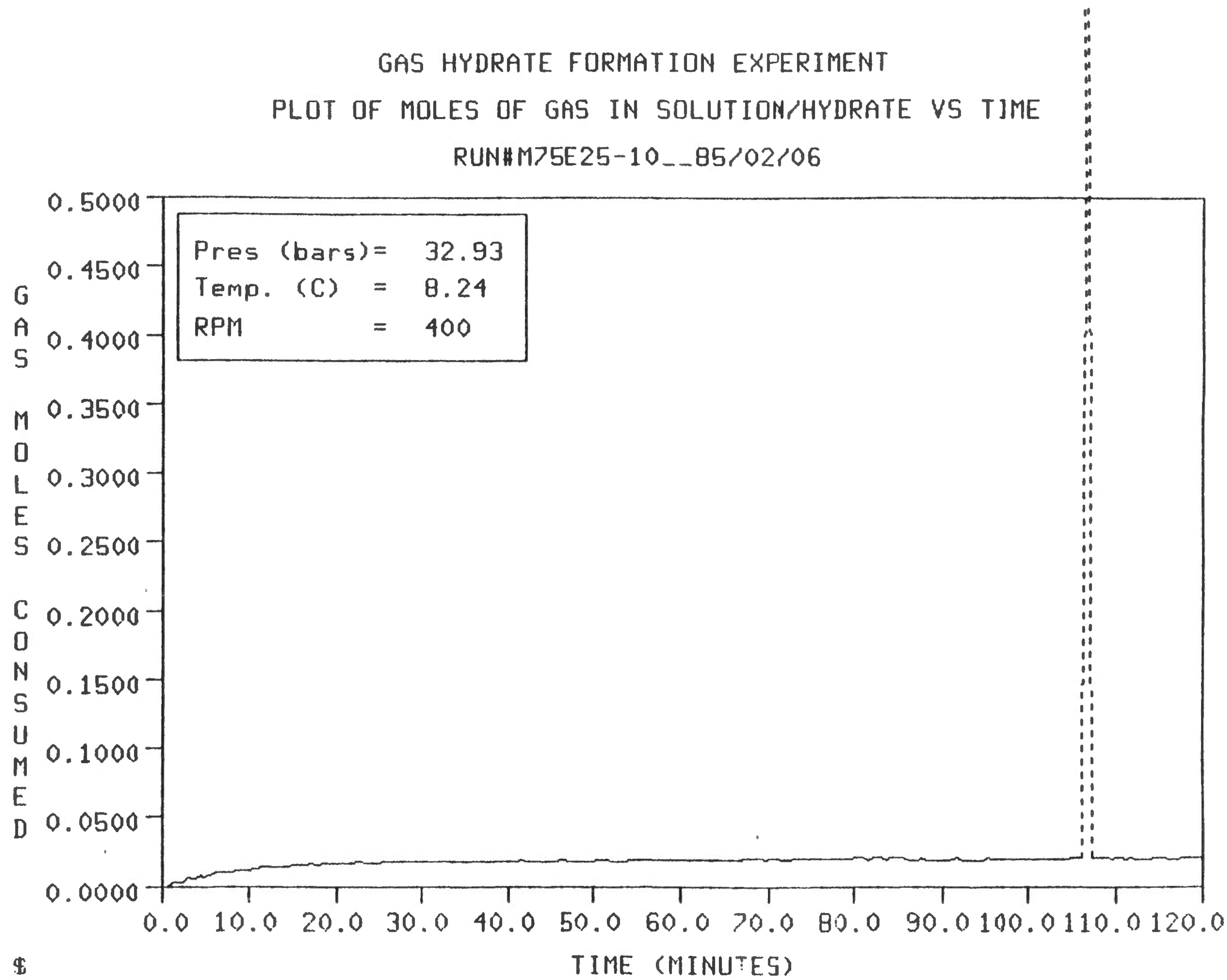
GAS HYDRATE FORMATION EXPERIMENT

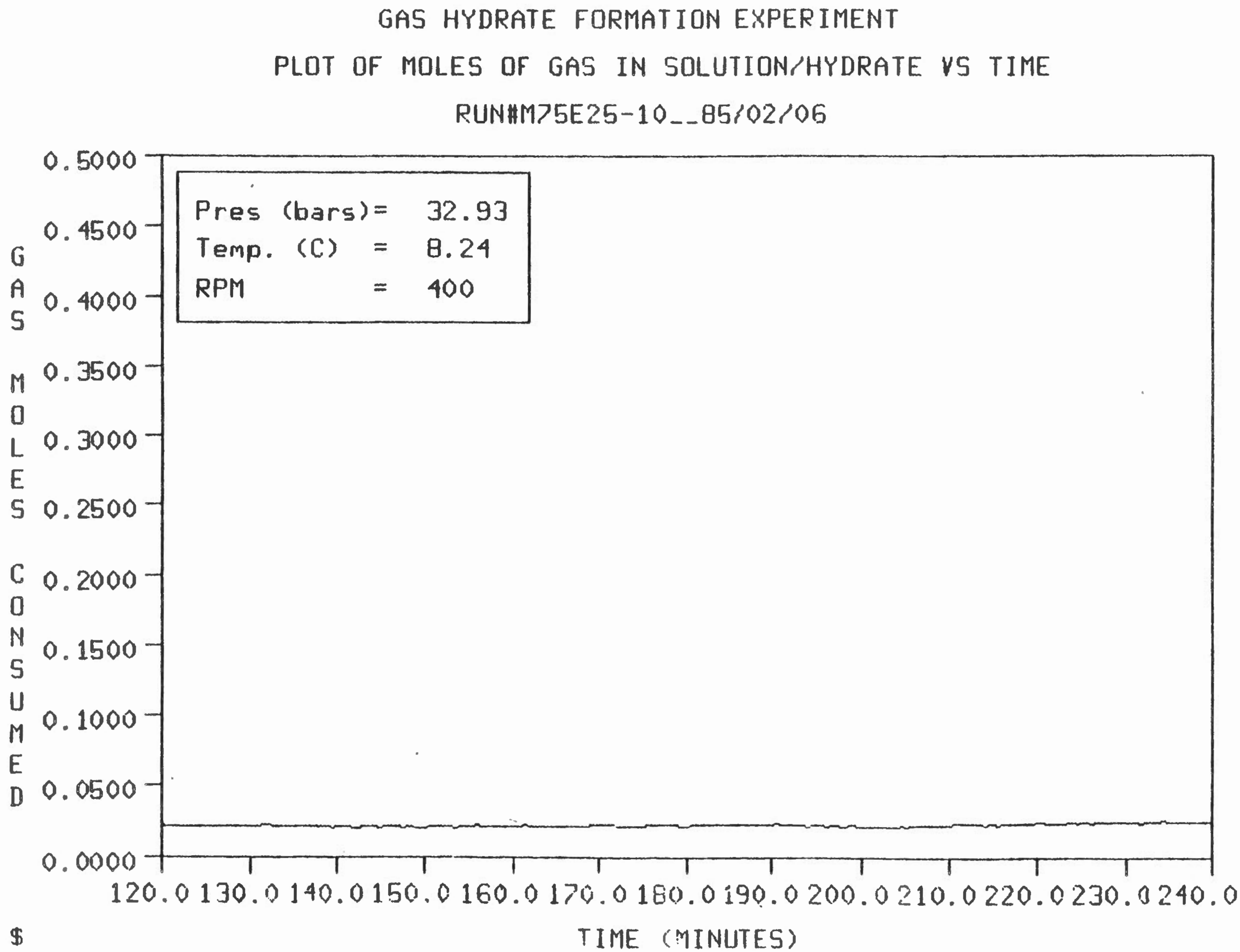
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-09__85/02/04




GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-09__85/02/04
Pres (bars)= 32.93
Temp. (C) = 8.24
RPM = 400
GAS MOLES CONSUMED
0.0500
0.0450
0.0400
0.0350
0.0300
0.0250
0.0200
0.0150
0.0100
0.0050
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-10__85/02/06
Pres (bars)= 32.93
Temp. (C) = 8.24
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)
$

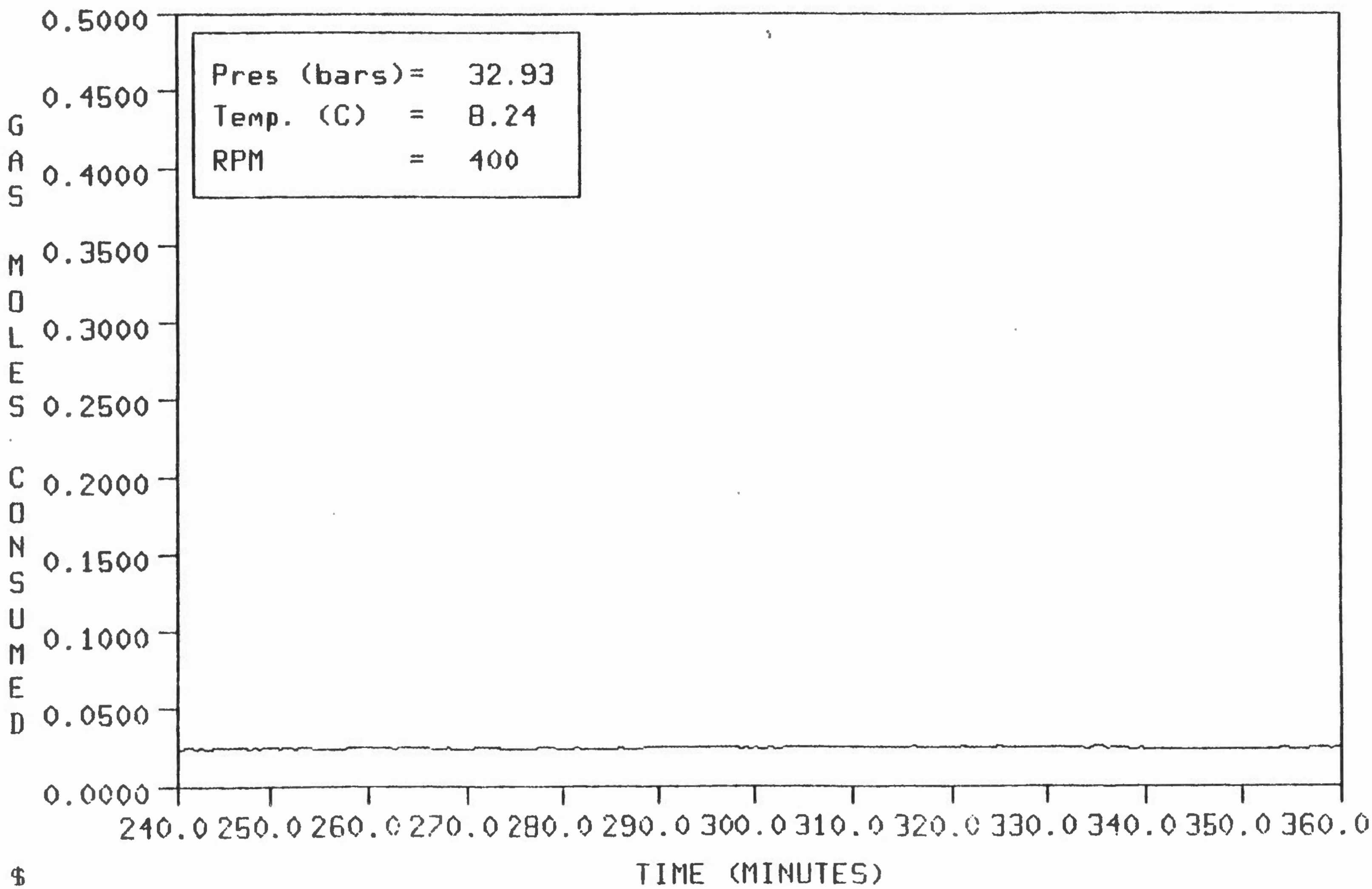


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-10__85/02/06
Pres (bars)= 32.93
Temp. (C) = 8.24
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-10__85/02/06



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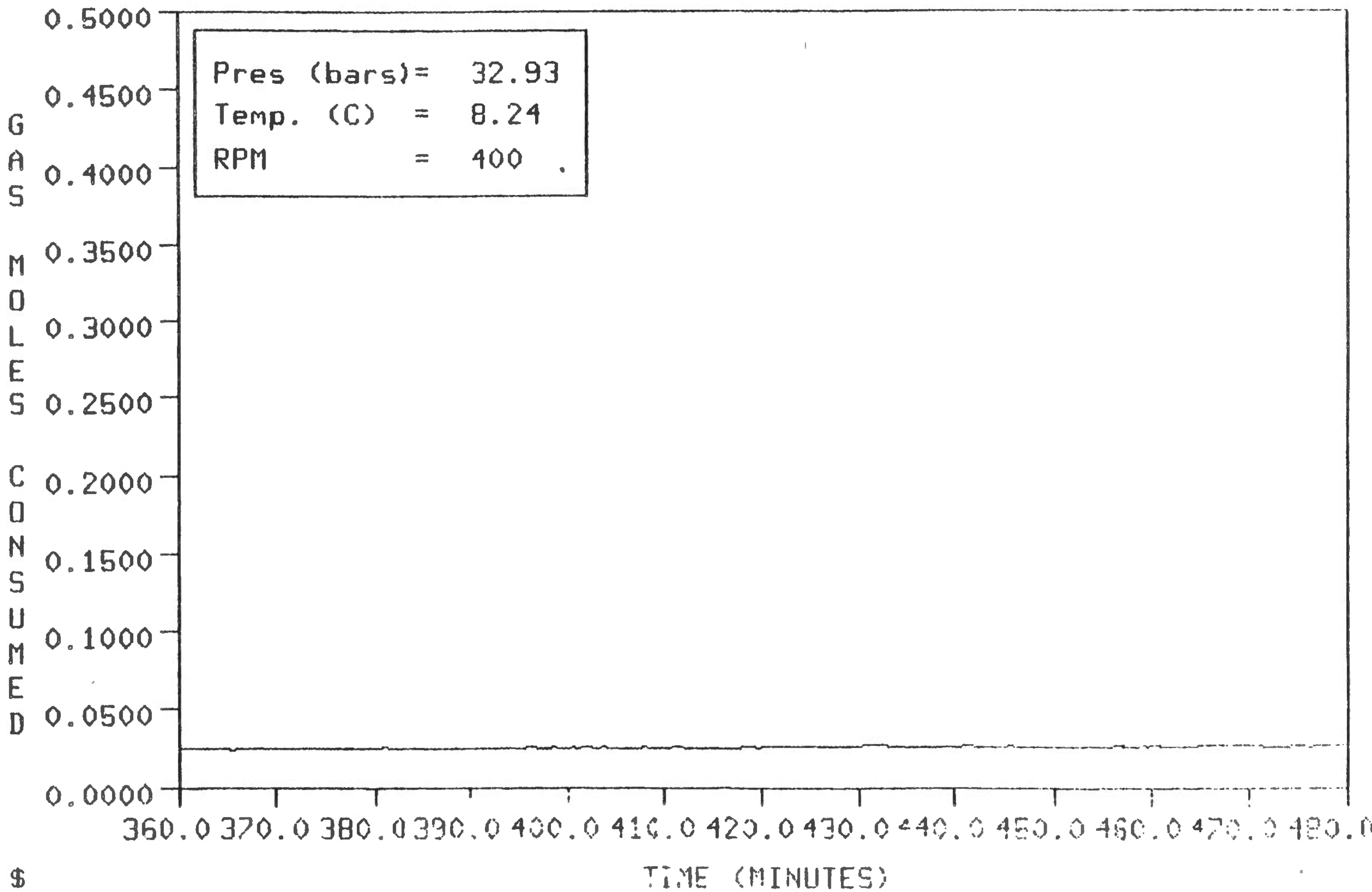
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-10__85/02/06



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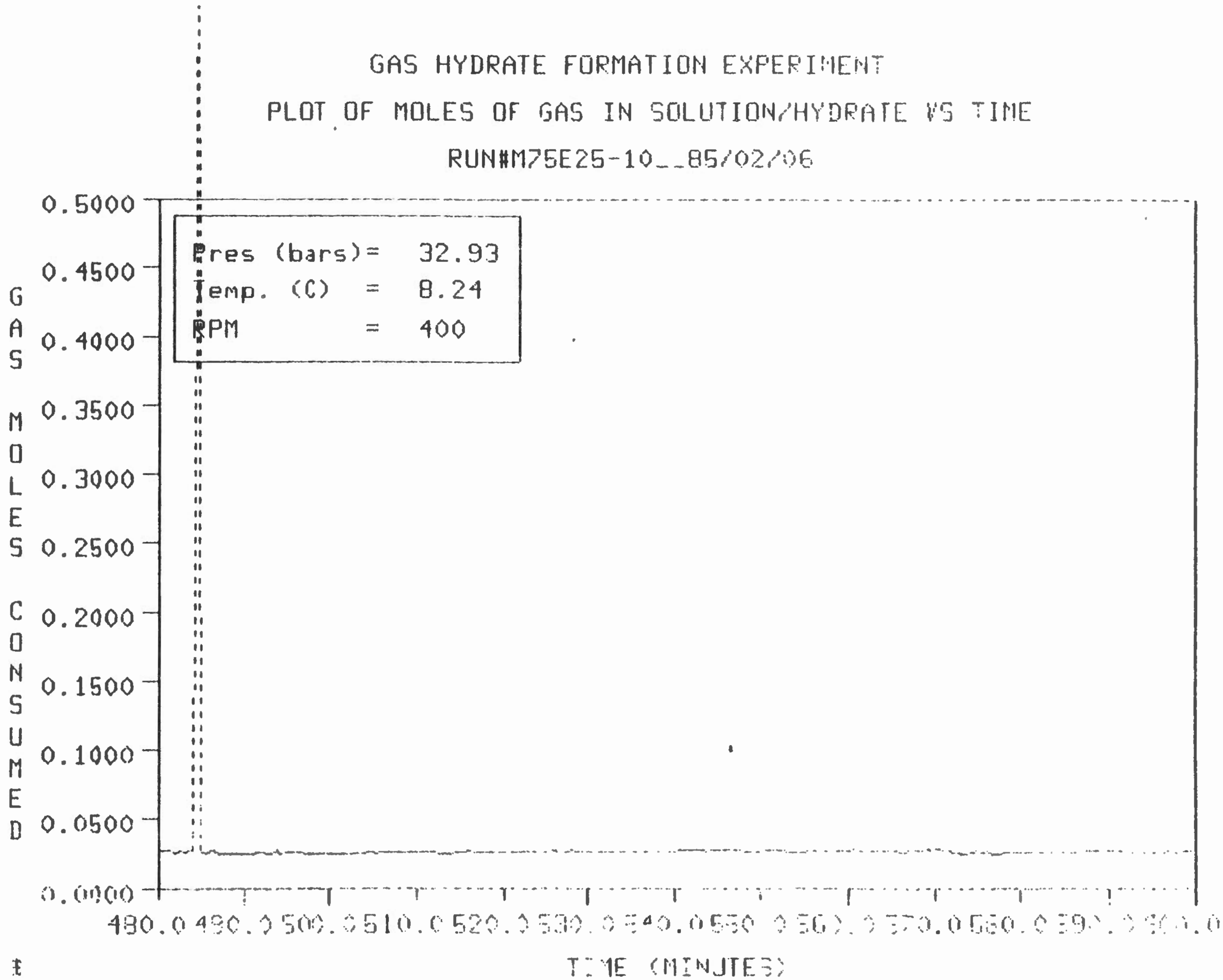
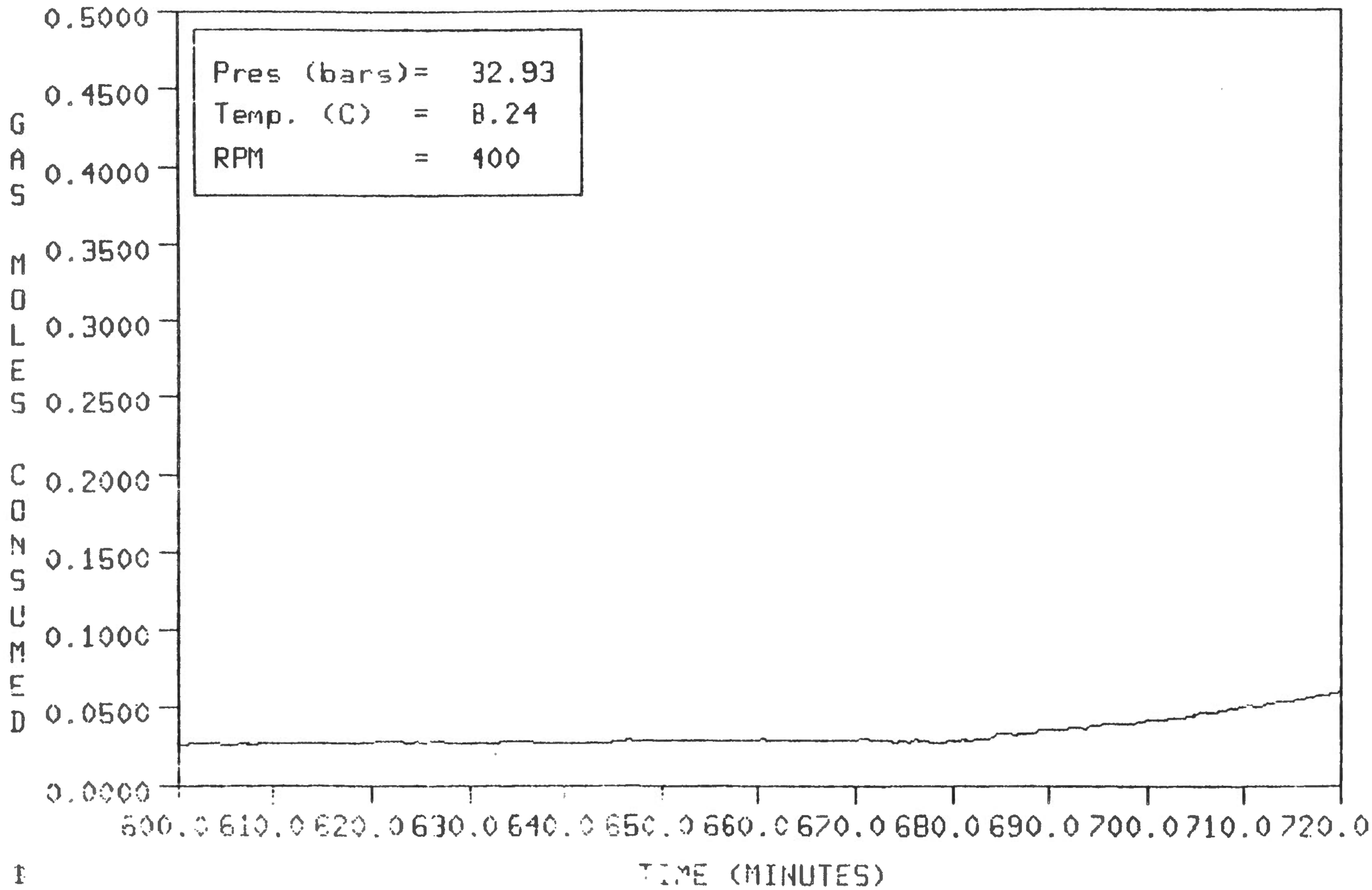


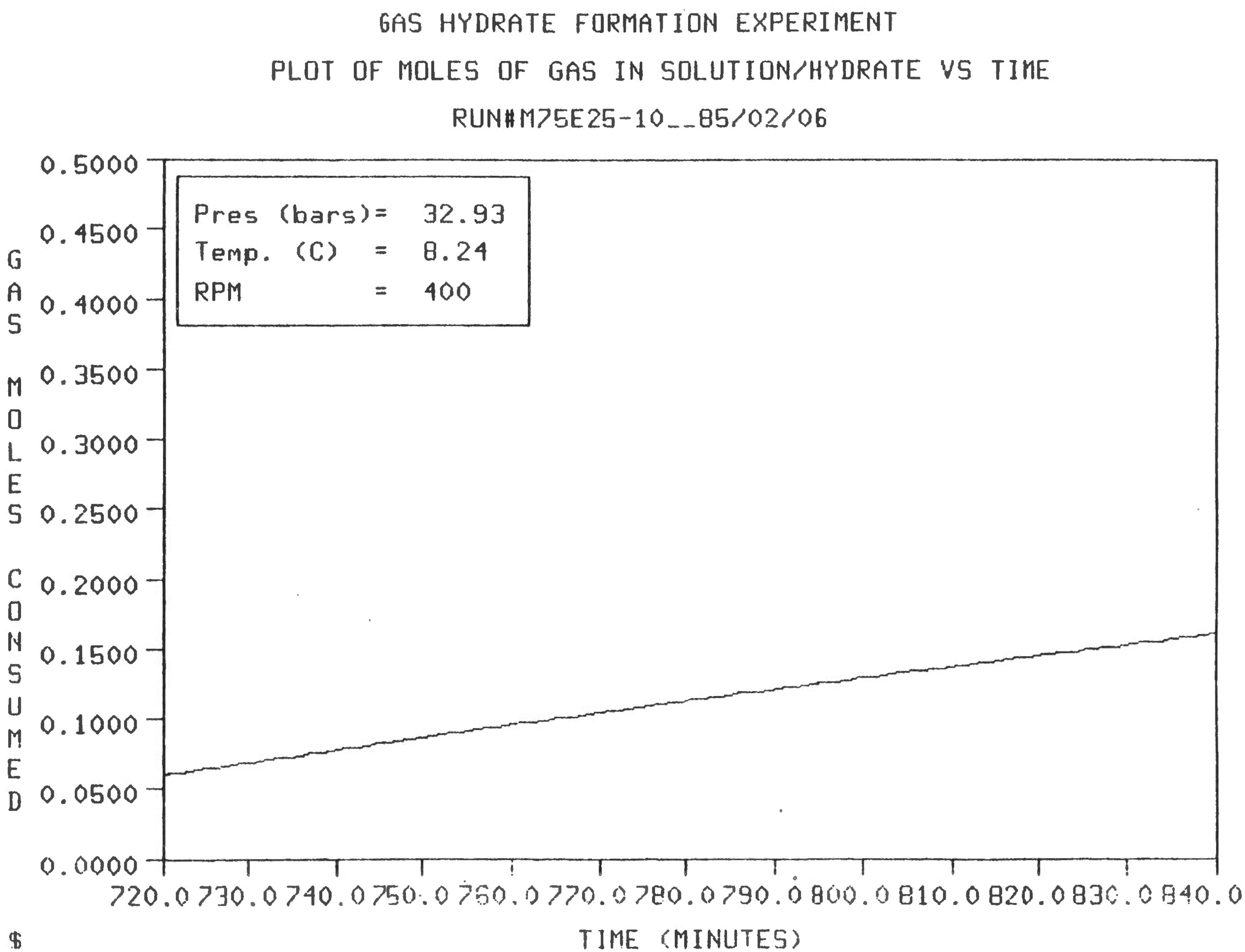
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-10__85/02/06
Pres (bars) = 32.93
Temp. (C) = 8.24
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
480.0
490.0
500.0
510.0
520.0
530.0
540.0
550.0
560.0
570.0
580.0
590.0
600.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-10__85/02/06



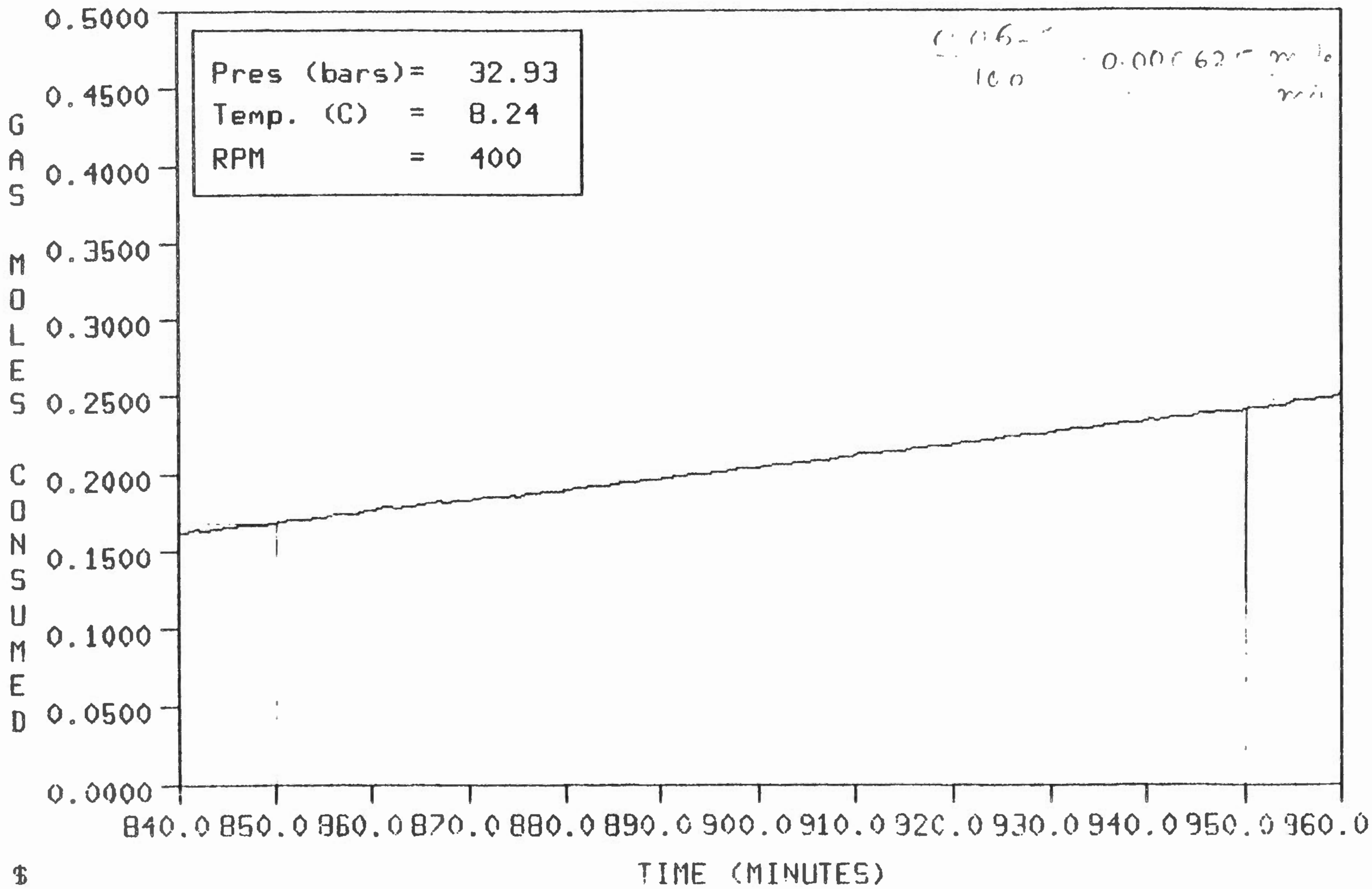


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-10__85/02/06
Pres (bars)= 32.93
Temp. (C) = 8.24
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
720.0 730.0 740.0 750.0 760.0 770.0 780.0 790.0 800.0 810.0 820.0 830.0 840.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-10__85/02/06



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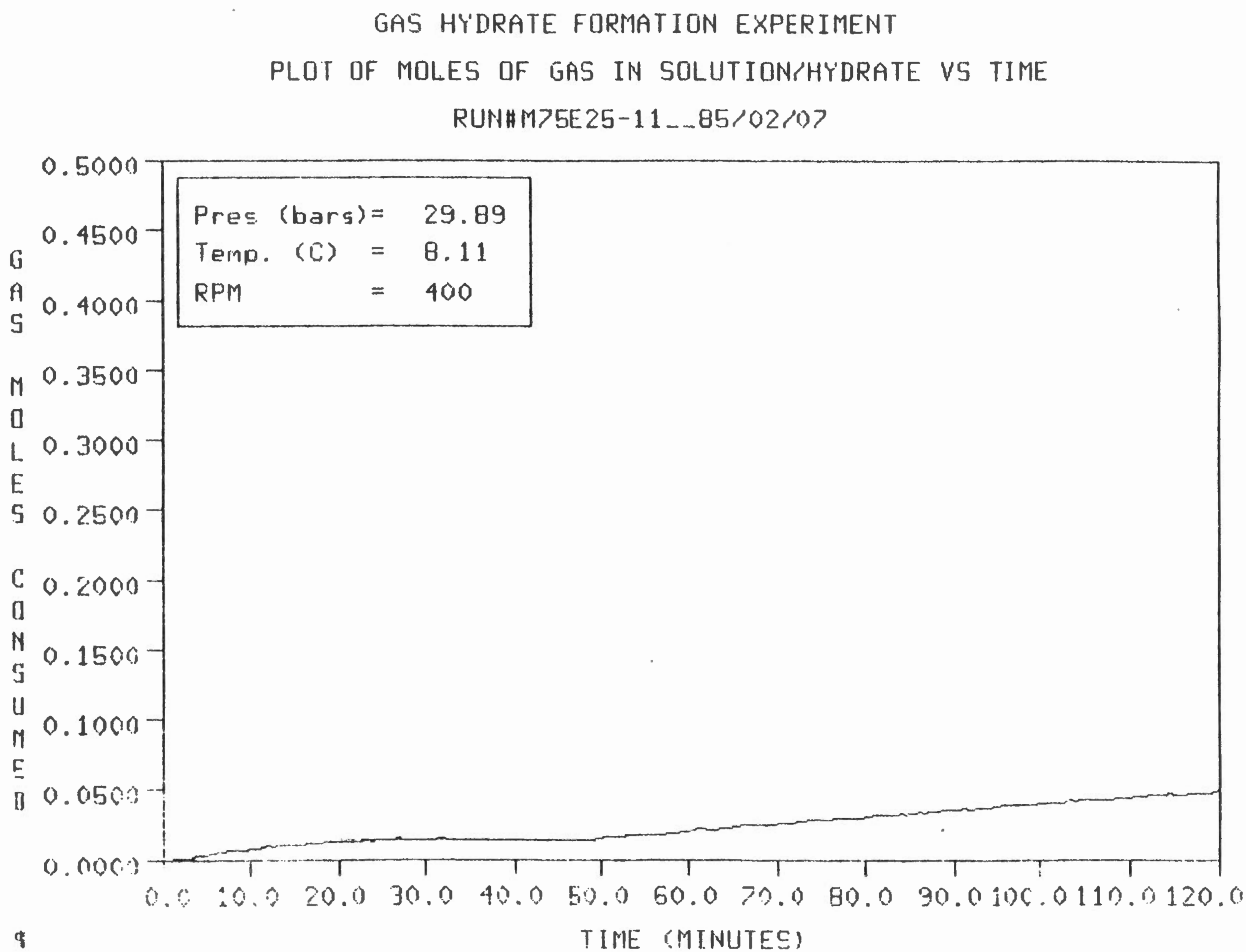
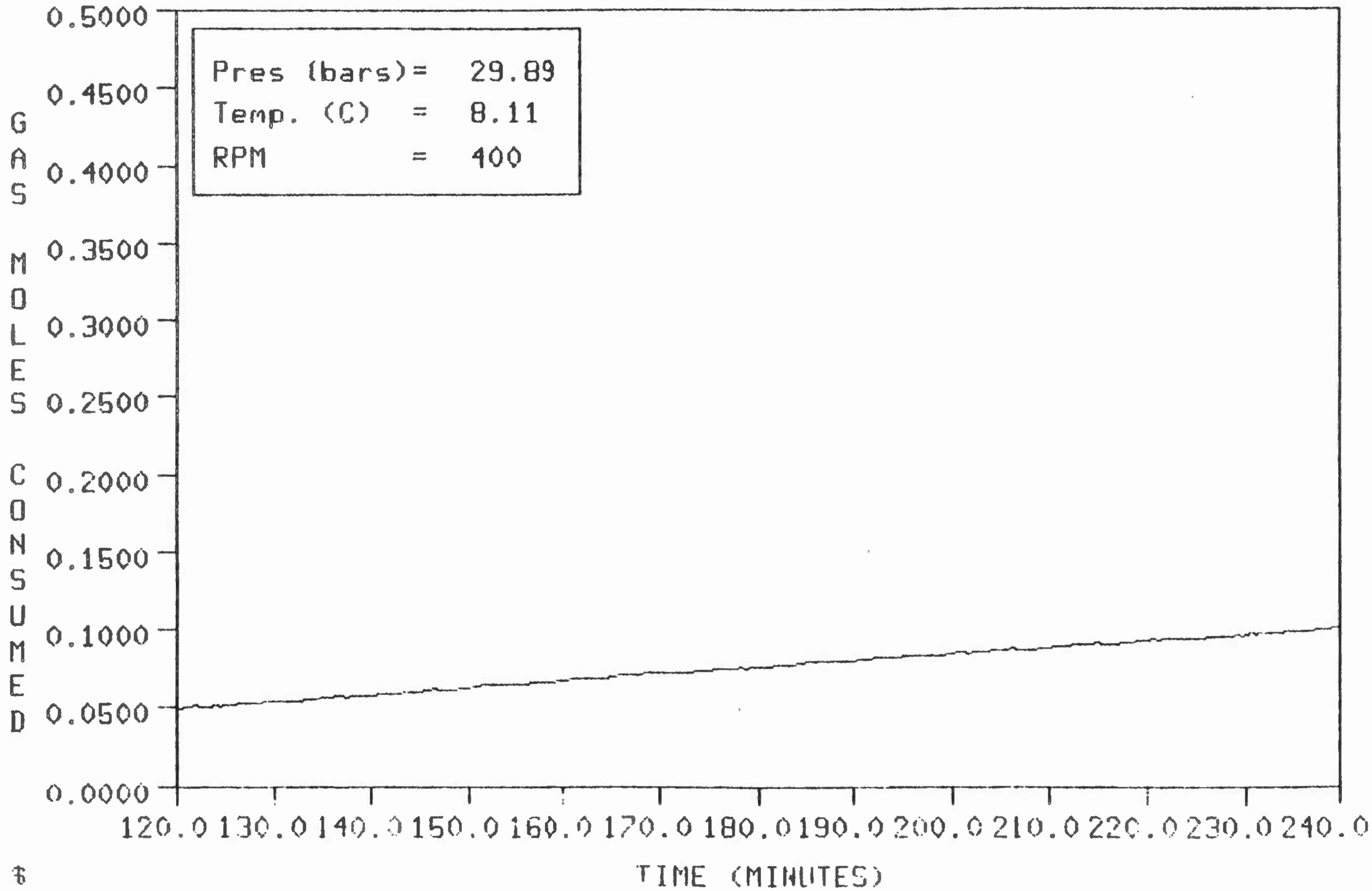
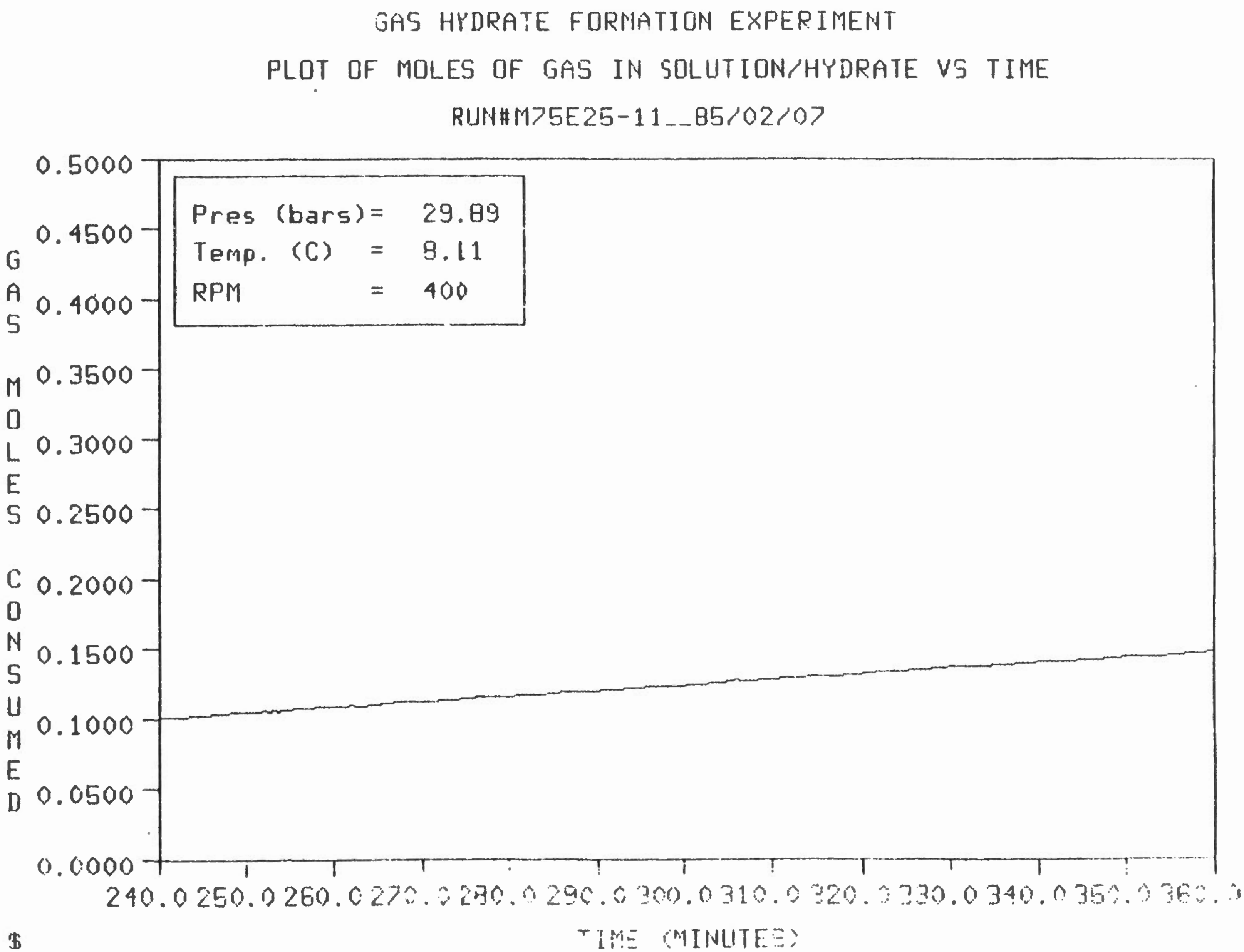

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-11__85/02/07
Pres (bars)= 29.89
Temp. (C) = 8.11
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

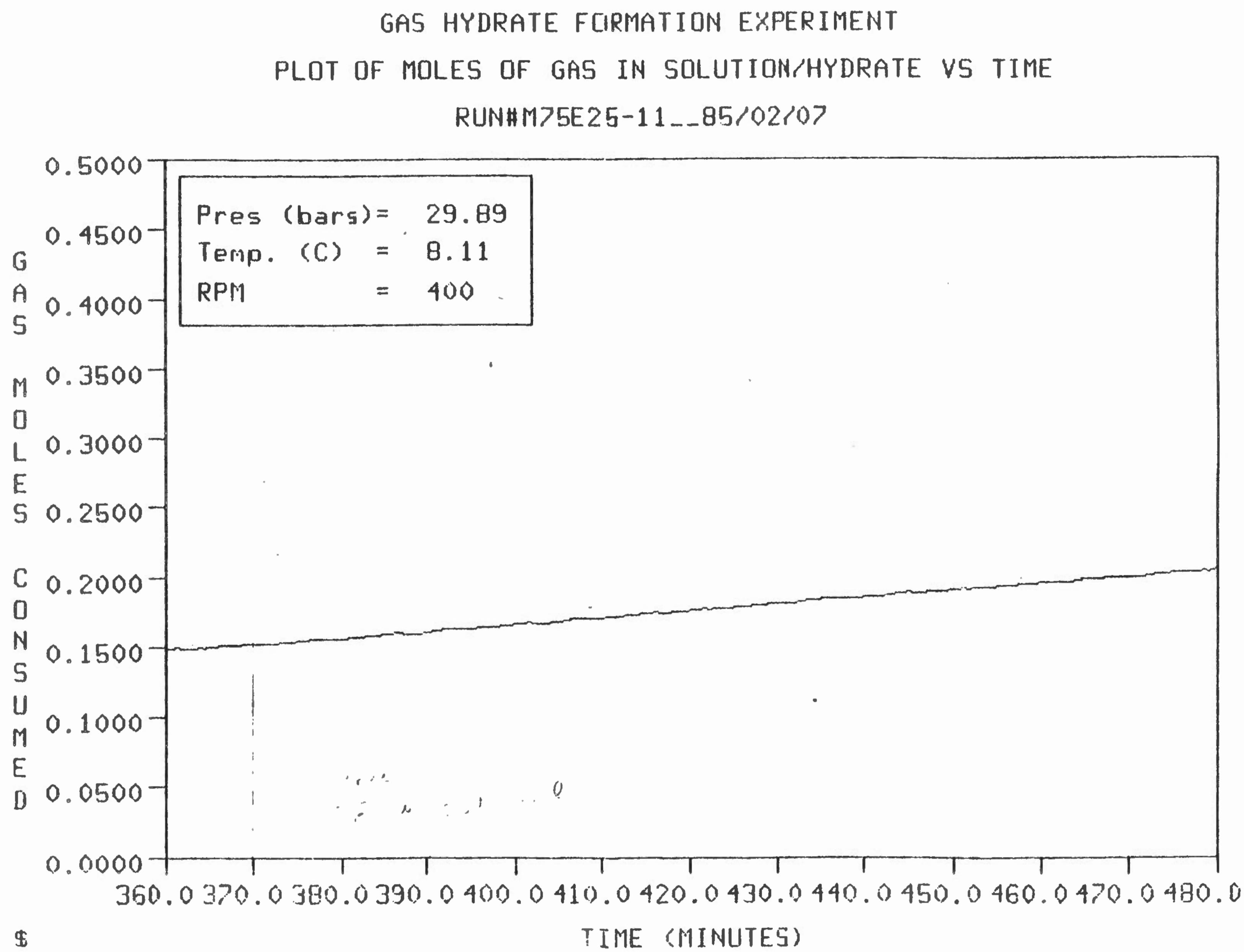
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

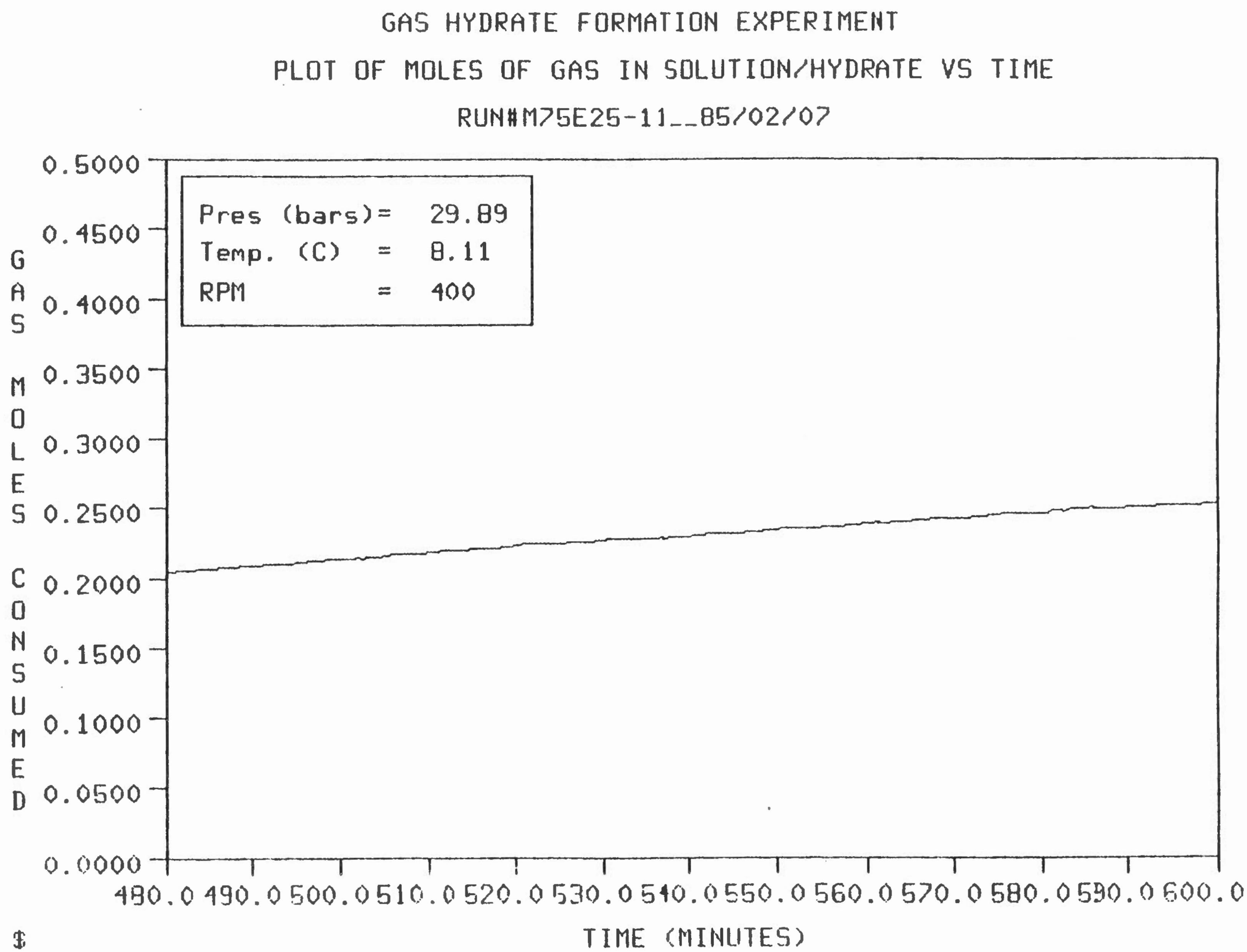
RUN#M75E25-11__85/02/07





GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-11__85/02/07
Pres (bars)= 29.89
Temp. (C) = 8.11
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$

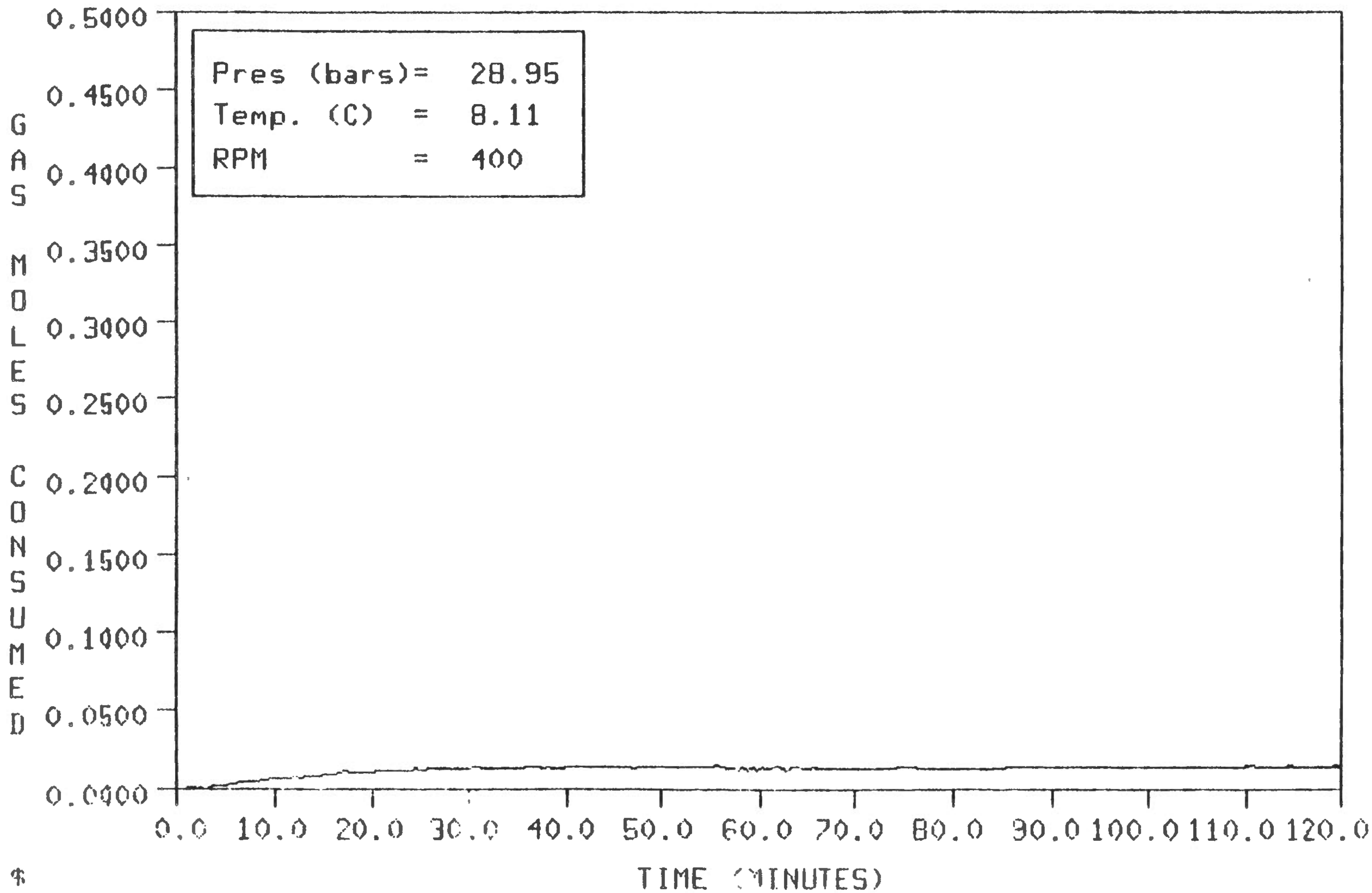

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-11__85/02/07
Pres (bars)= 29.89
Temp. (C) = 8.11
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)
$

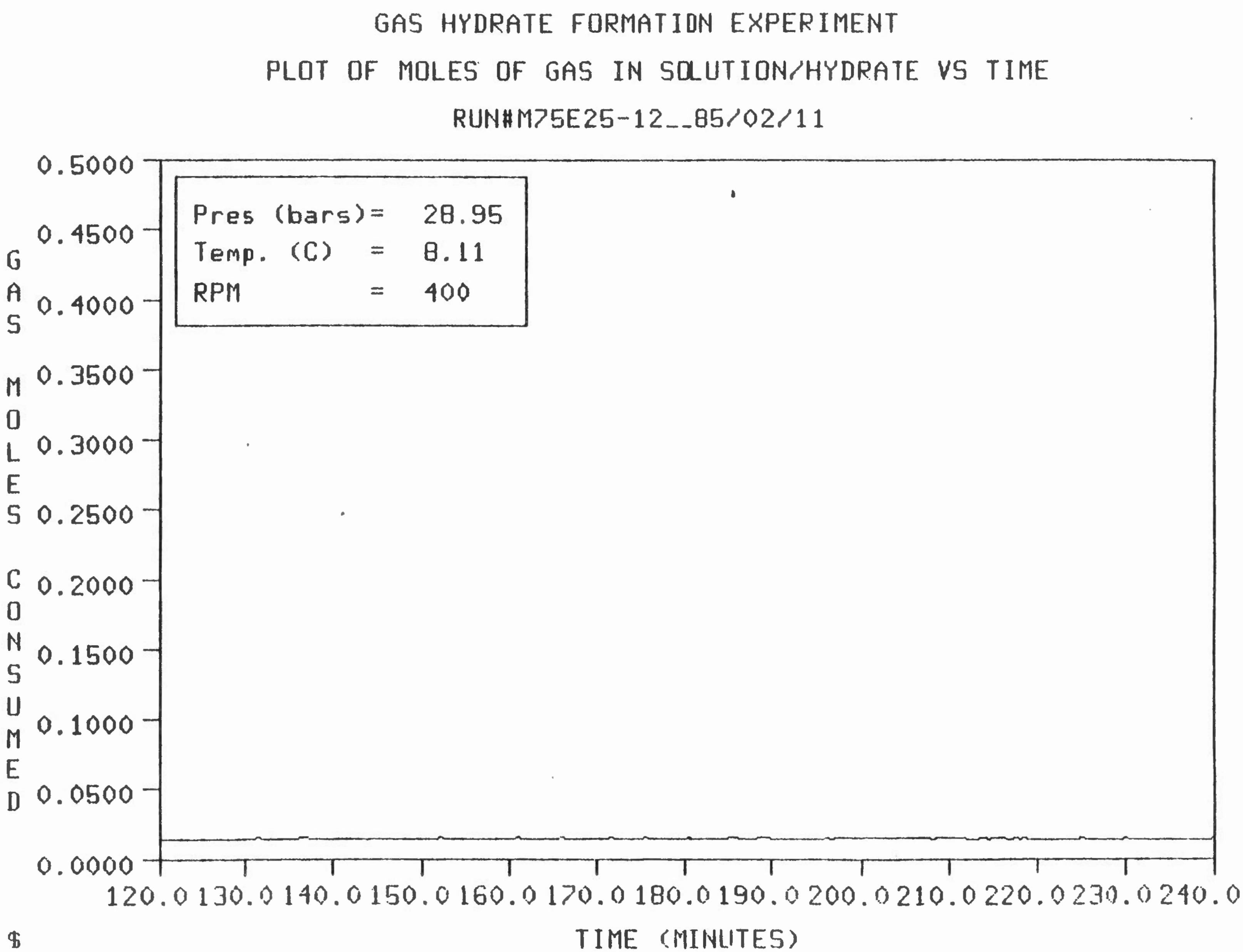

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-11__85/02/07
Pres (bars)= 29.89
Temp. (C) = 8.11
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
480.0 490.0 500.0 510.0 520.0 530.0 540.0 550.0 560.0 570.0 580.0 590.0 600.0
TIME (MINUTES)
$

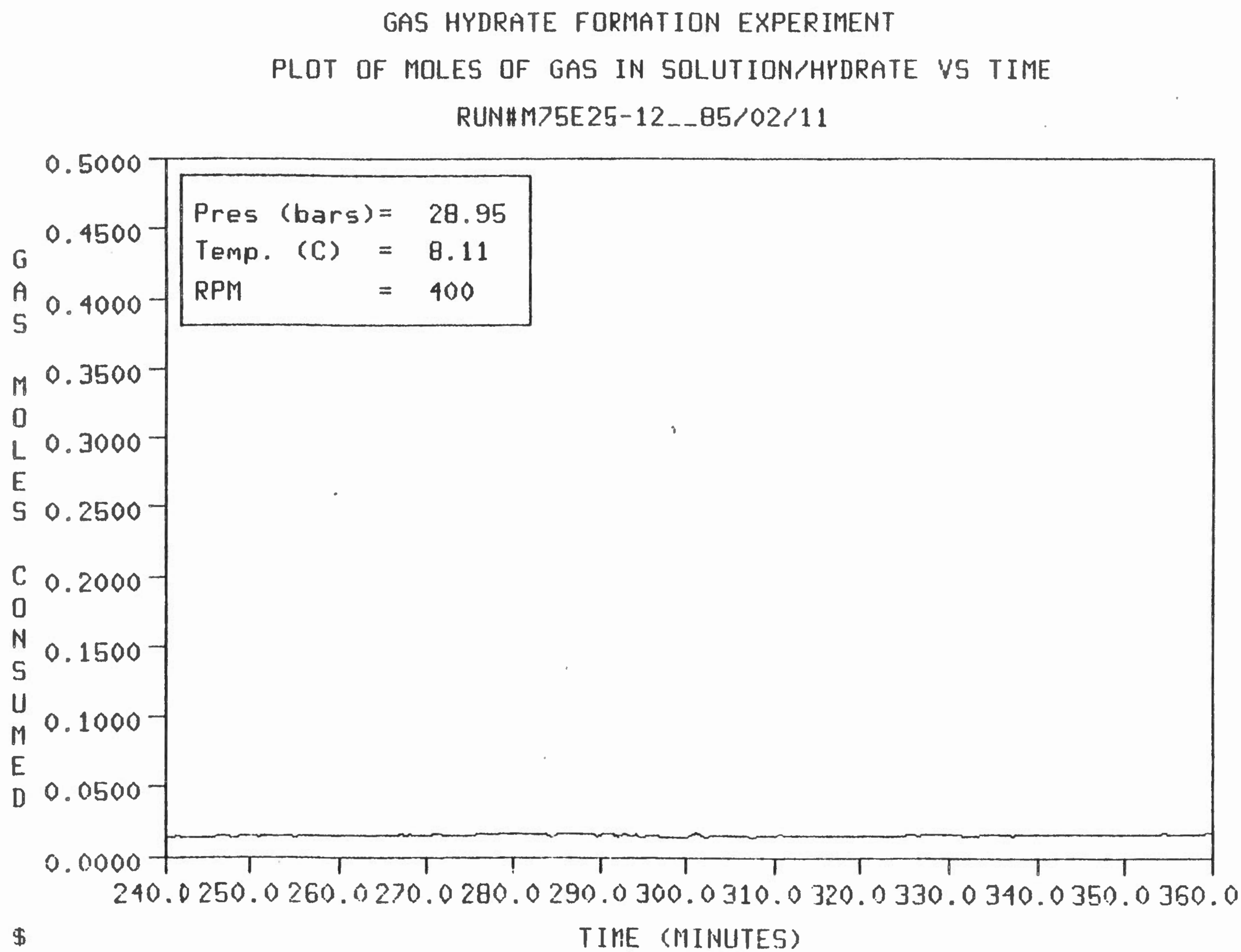
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-12__85/02/11




GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-12__85/02/11
Pres (bars)= 28.95
Temp. (C) = 8.11
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

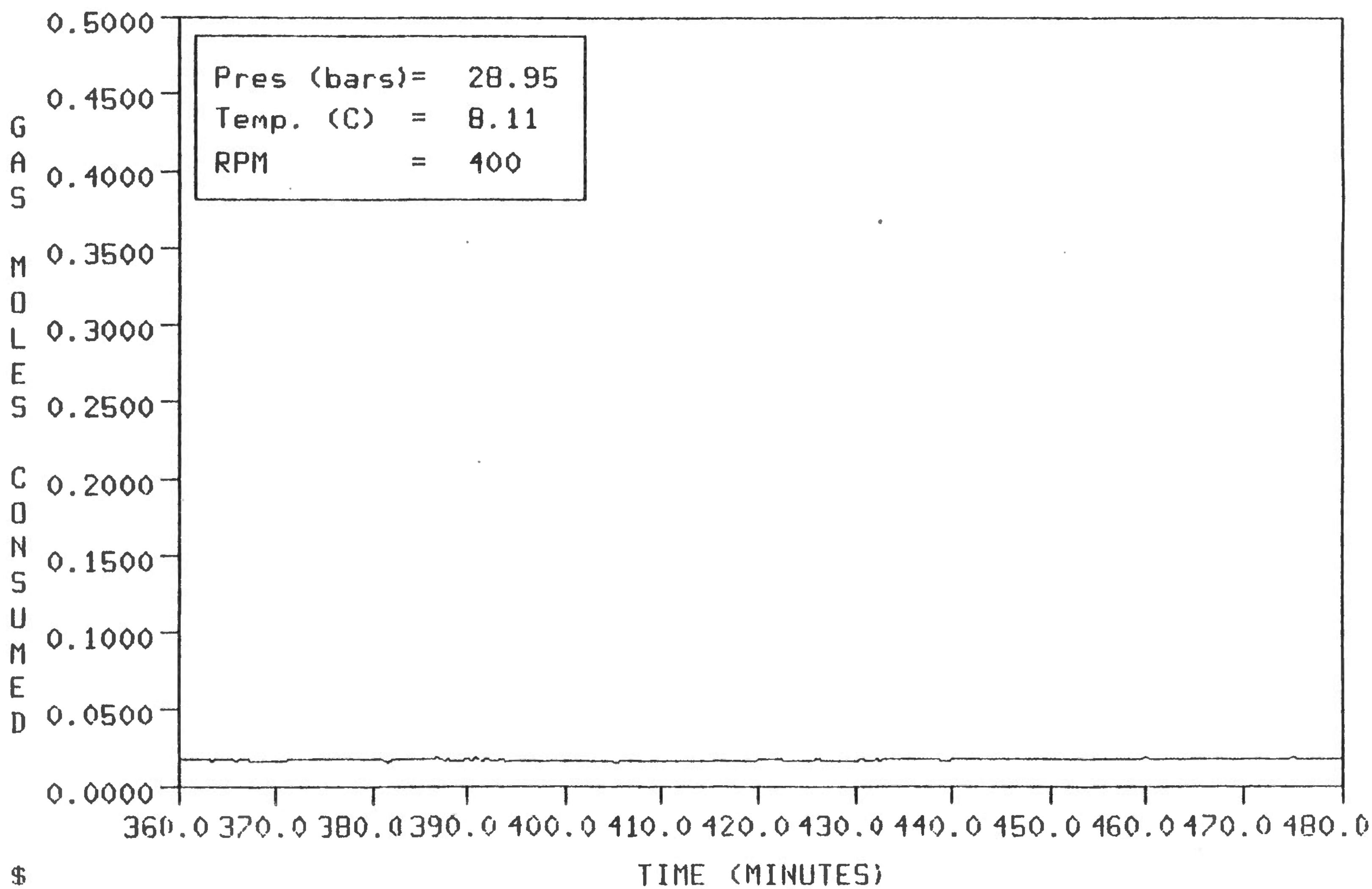


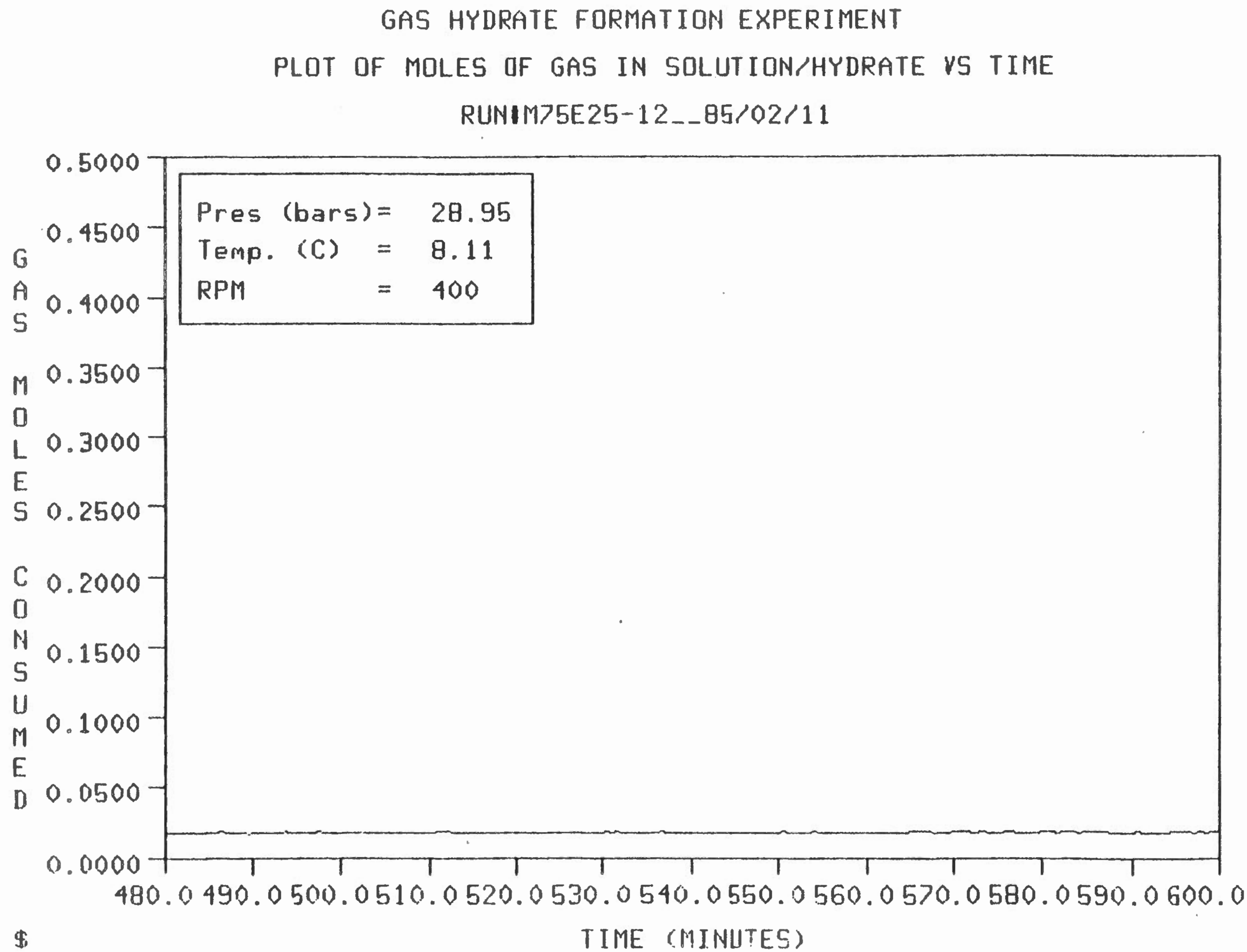
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-12__85/02/11
Pres (bars)= 28.95
Temp. (C) = 8.11
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-12__85/02/11

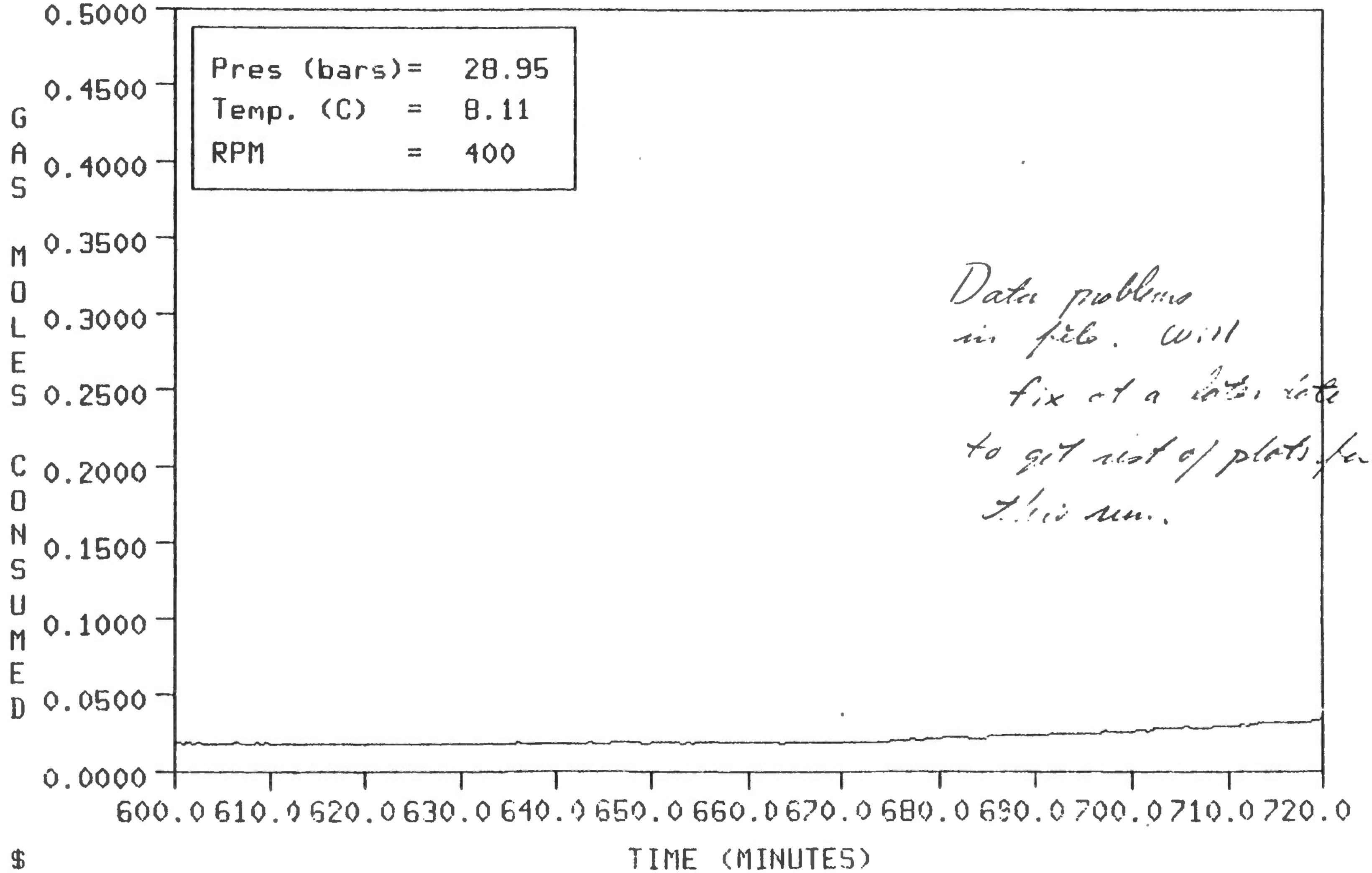


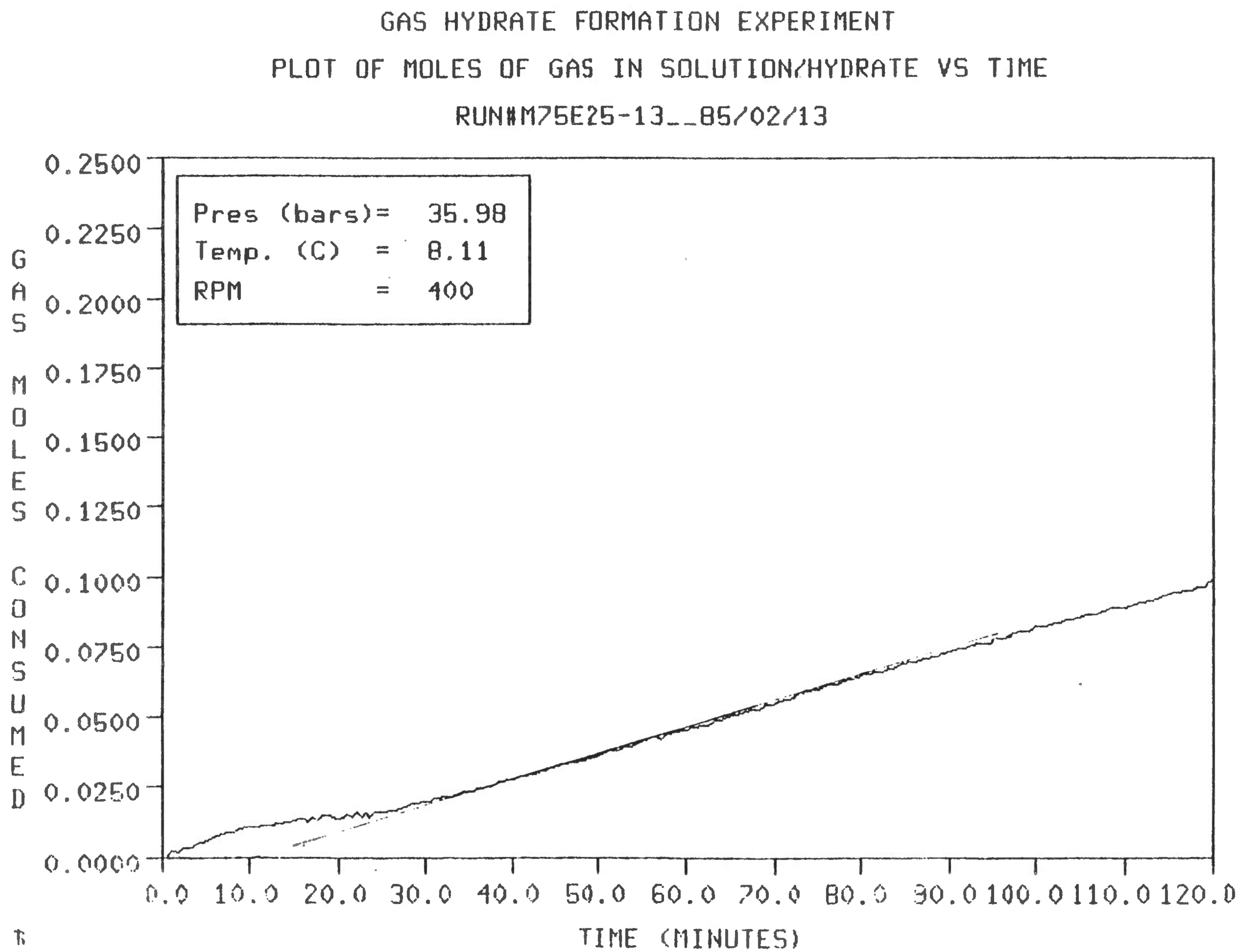

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-12__85/02/11
Pres (bars)= 28.95
Temp. (C) = 8.11
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
480.0 490.0 500.0 510.0 520.0 530.0 540.0 550.0 560.0 570.0 580.0 590.0 600.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-12__85/02/11

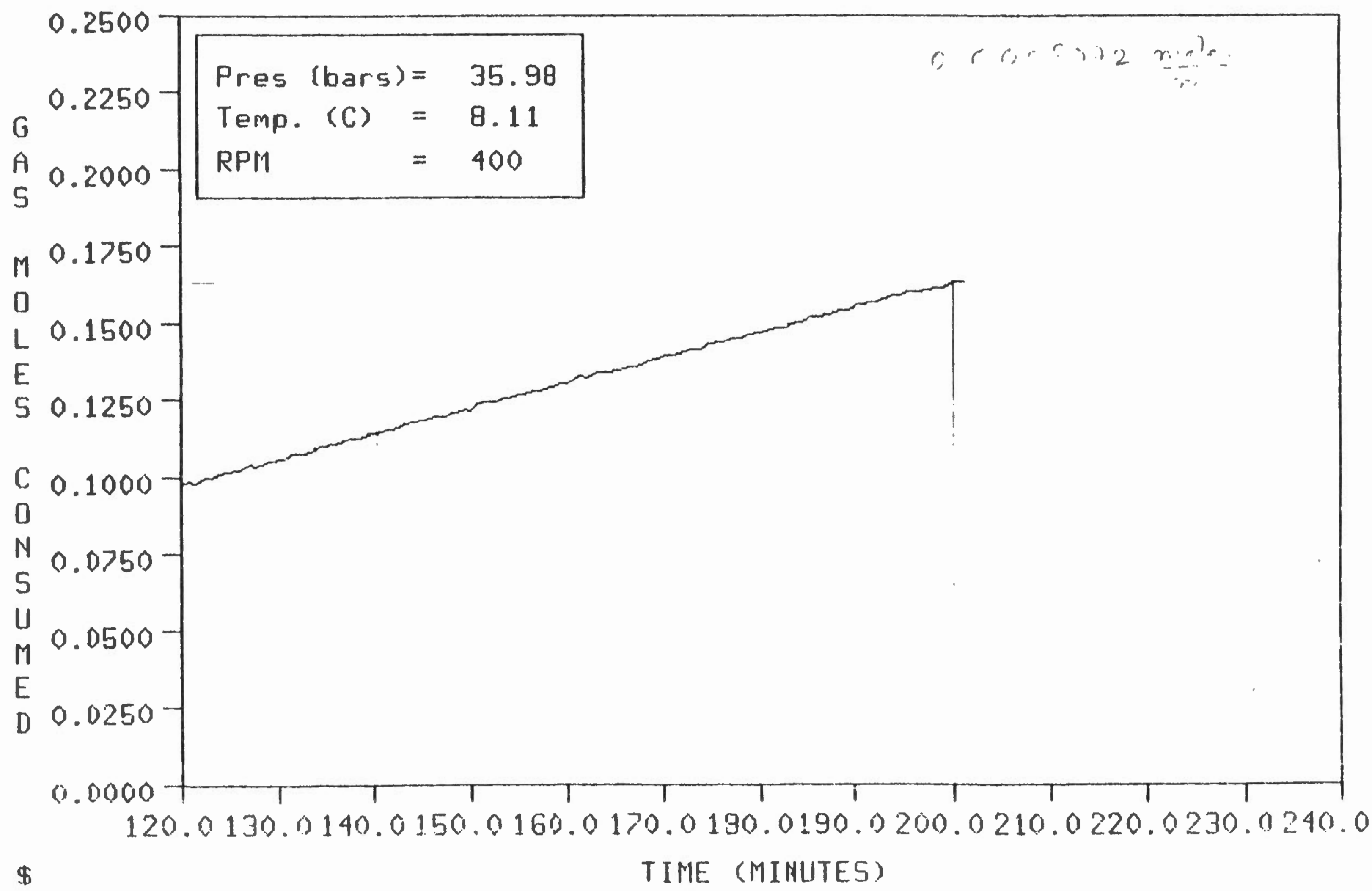



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-13__85/02/13
Pres (bars)= 35.98
Temp. (C) = 8.11
RPM = 400
GAS MOLES CONSUMED
0.2500
0.2250
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-13__85/02/13



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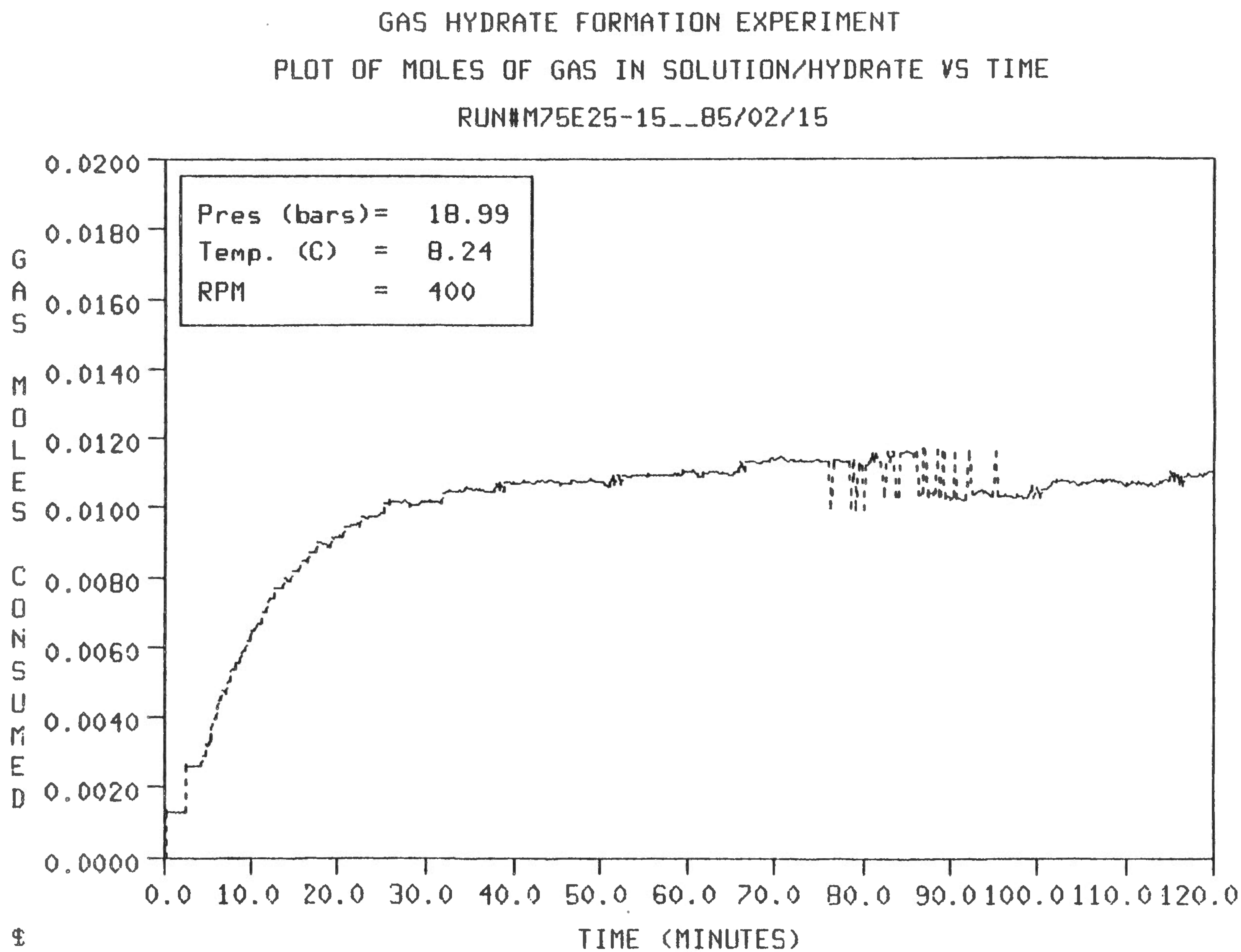
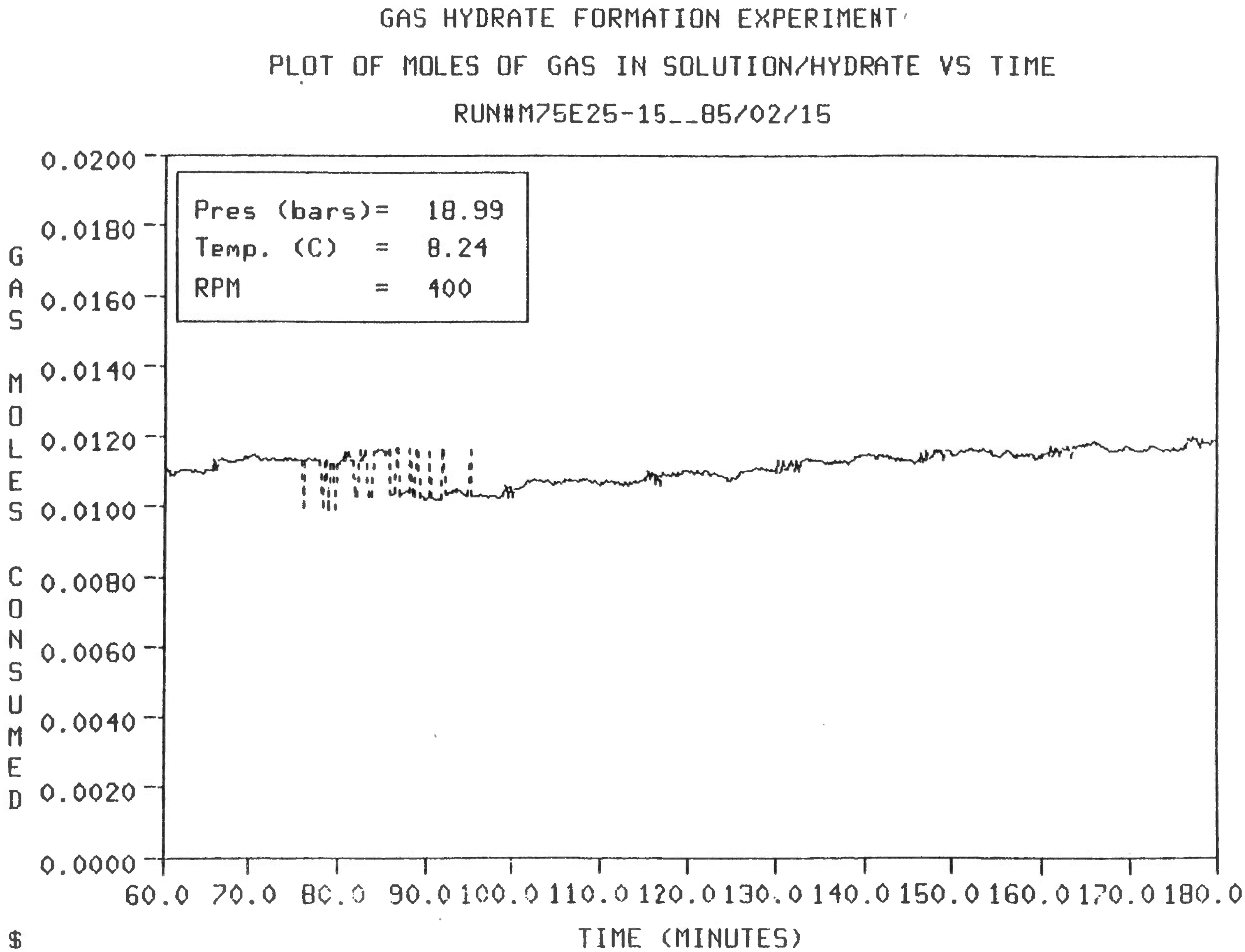
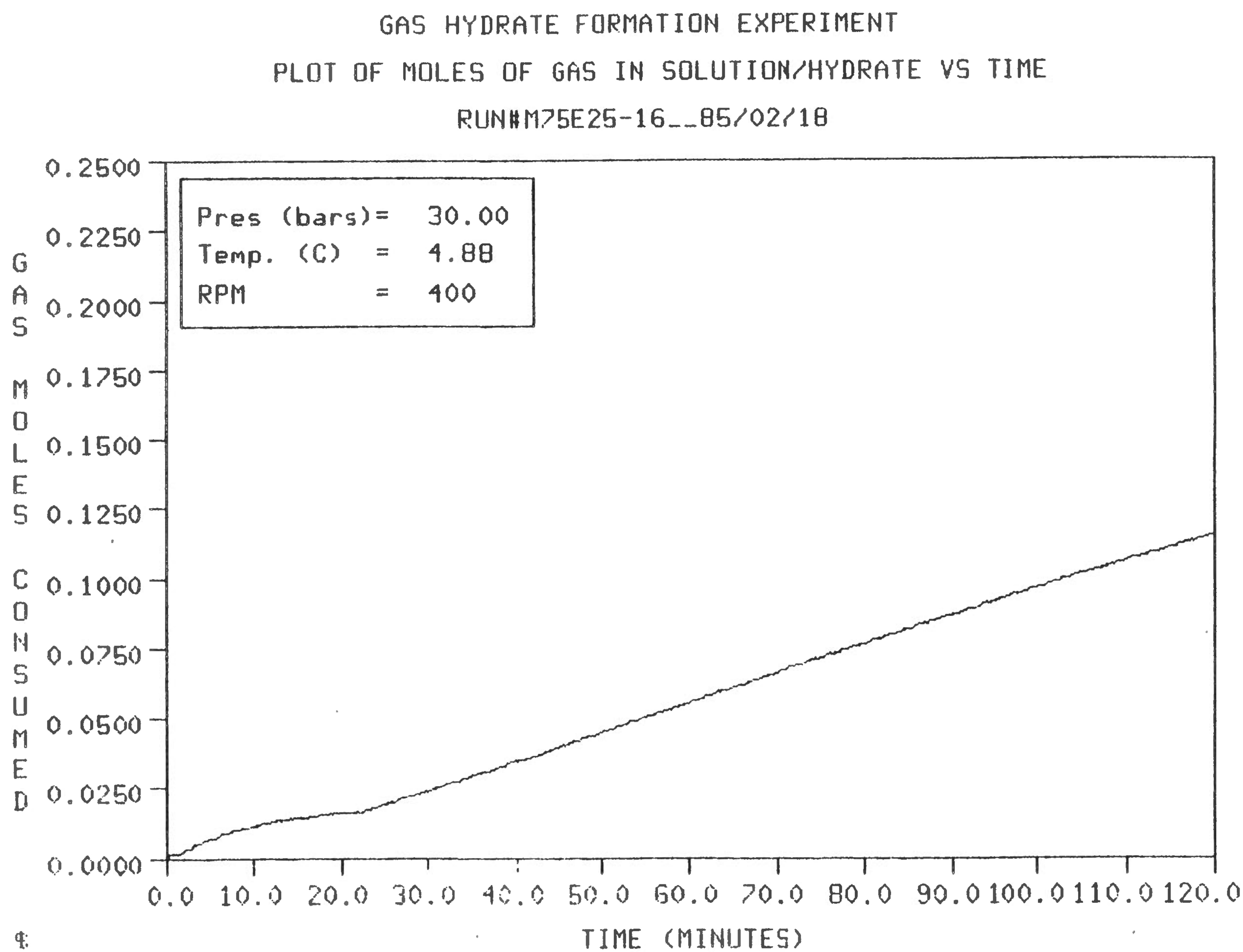

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-15__85/02/15
Pres (bars)= 18.99
Temp. (C) = 8.24
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0020
0.0040
0.0060
0.0080
0.0100
0.0120
0.0140
0.0160
0.0180
0.0200
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-15__85/02/15
Pres (bars)= 18.99
Temp. (C) = 8.24
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
60.0 70.0 80.0 90.0 100.0 110.0 120.0 130.0 140.0 150.0 160.0 170.0 180.0
TIME (MINUTES)

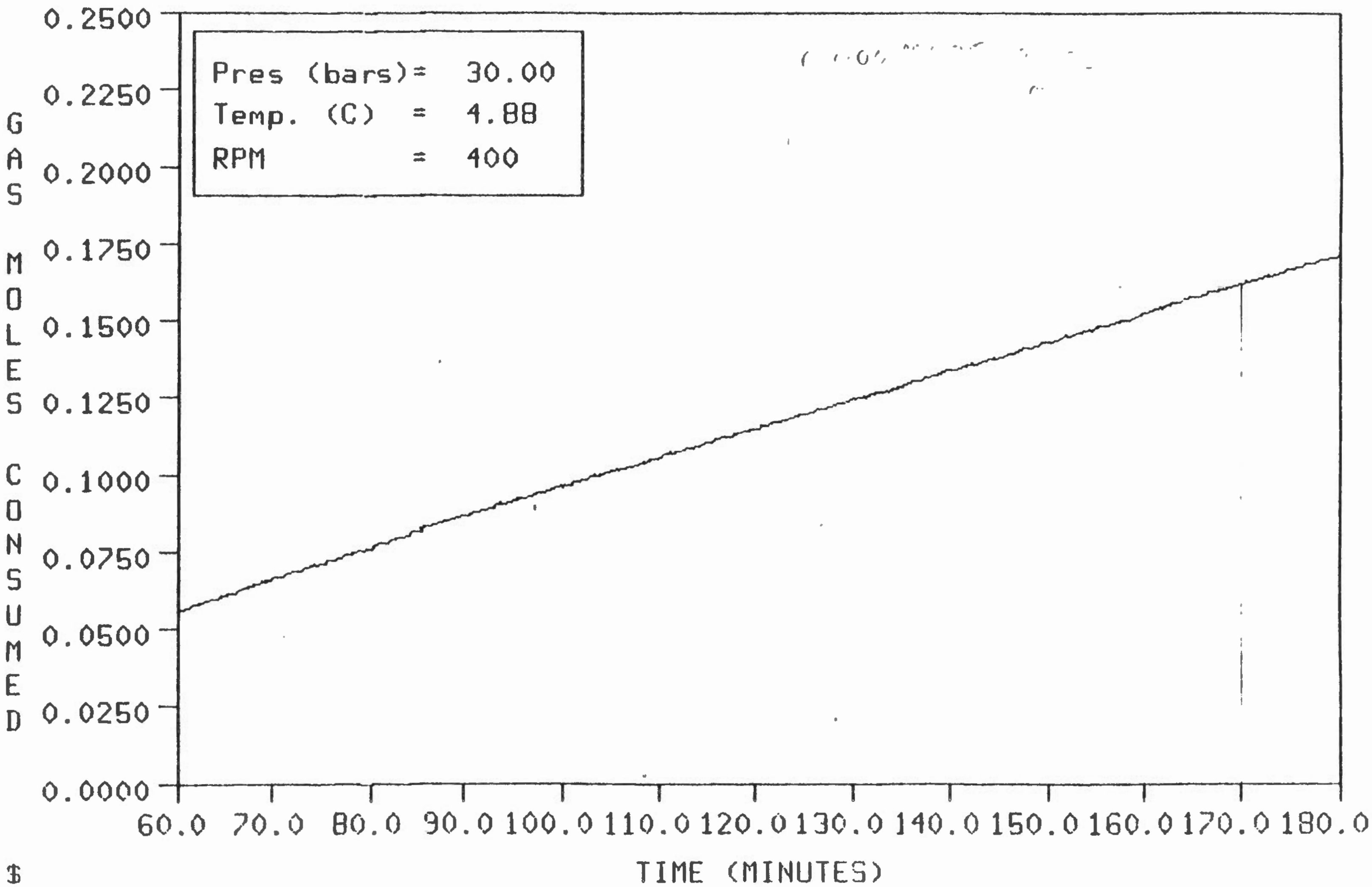
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-16__85/02/18
Pres (bars)= 30.00
Temp. (C) = 4.88
RPM = 400
GAS MOLES CONSUMED
0.2500
0.2250
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

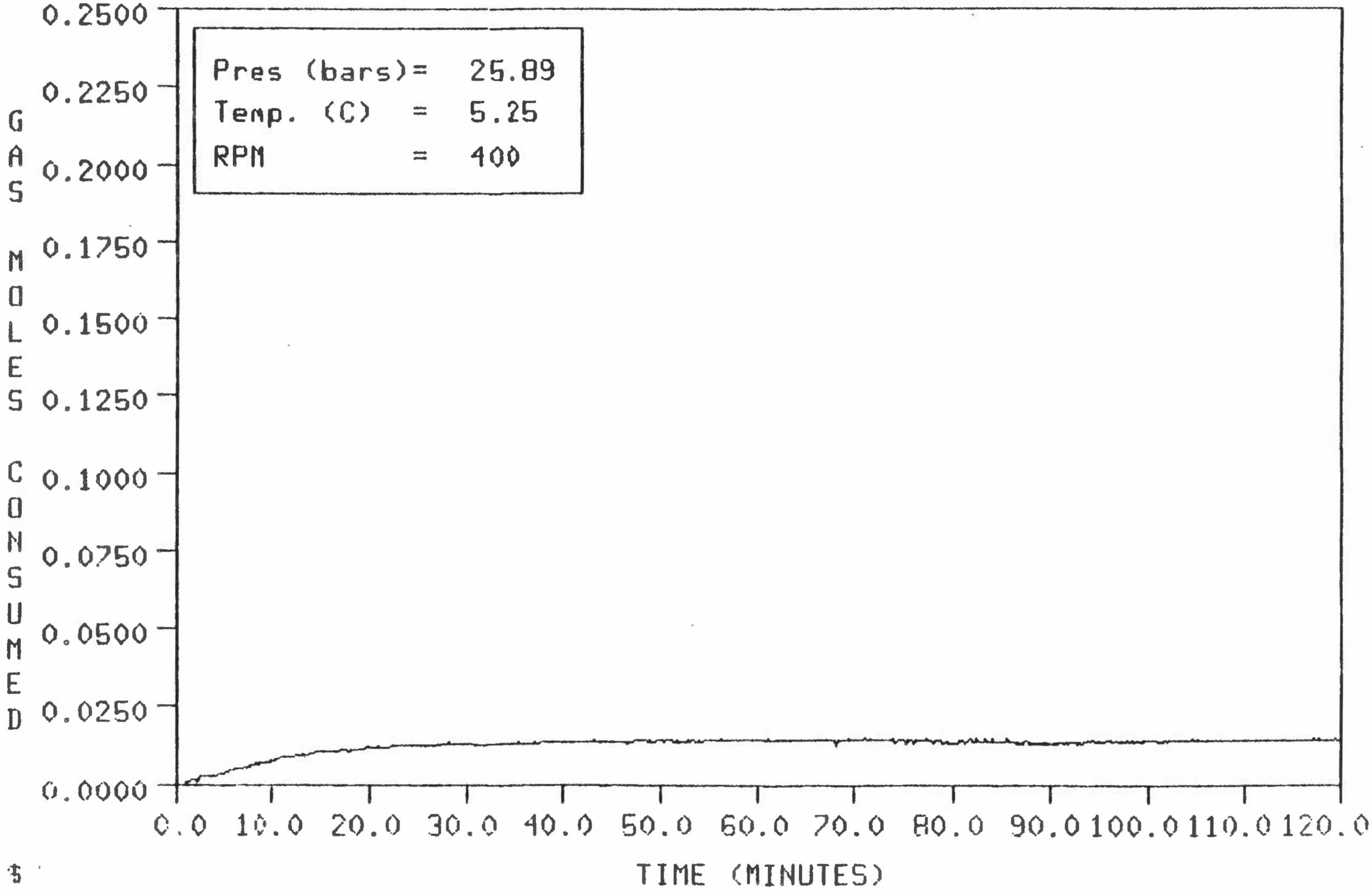
RUN#M75E25-16__85/02/18



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-17__85/02/19



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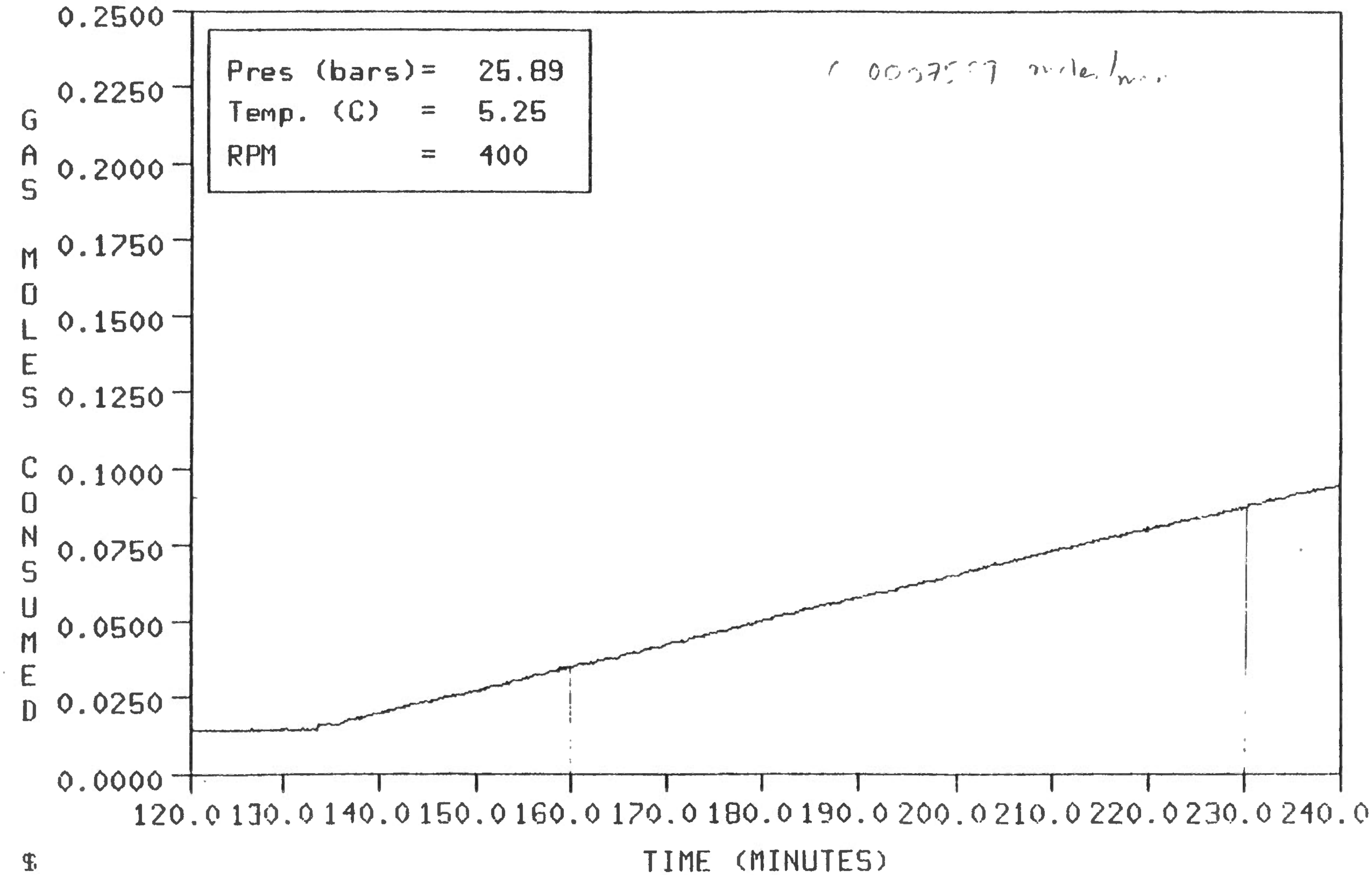
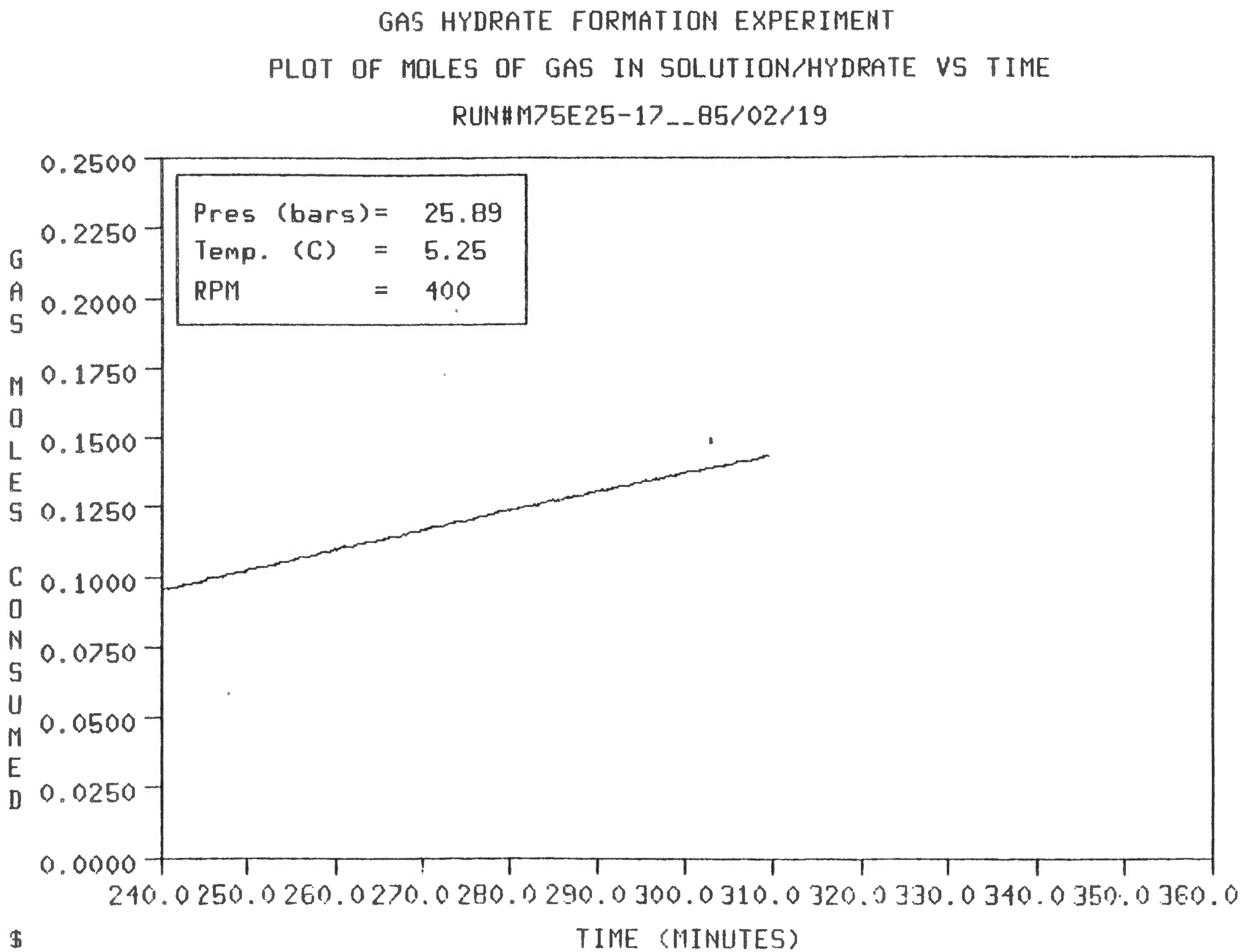
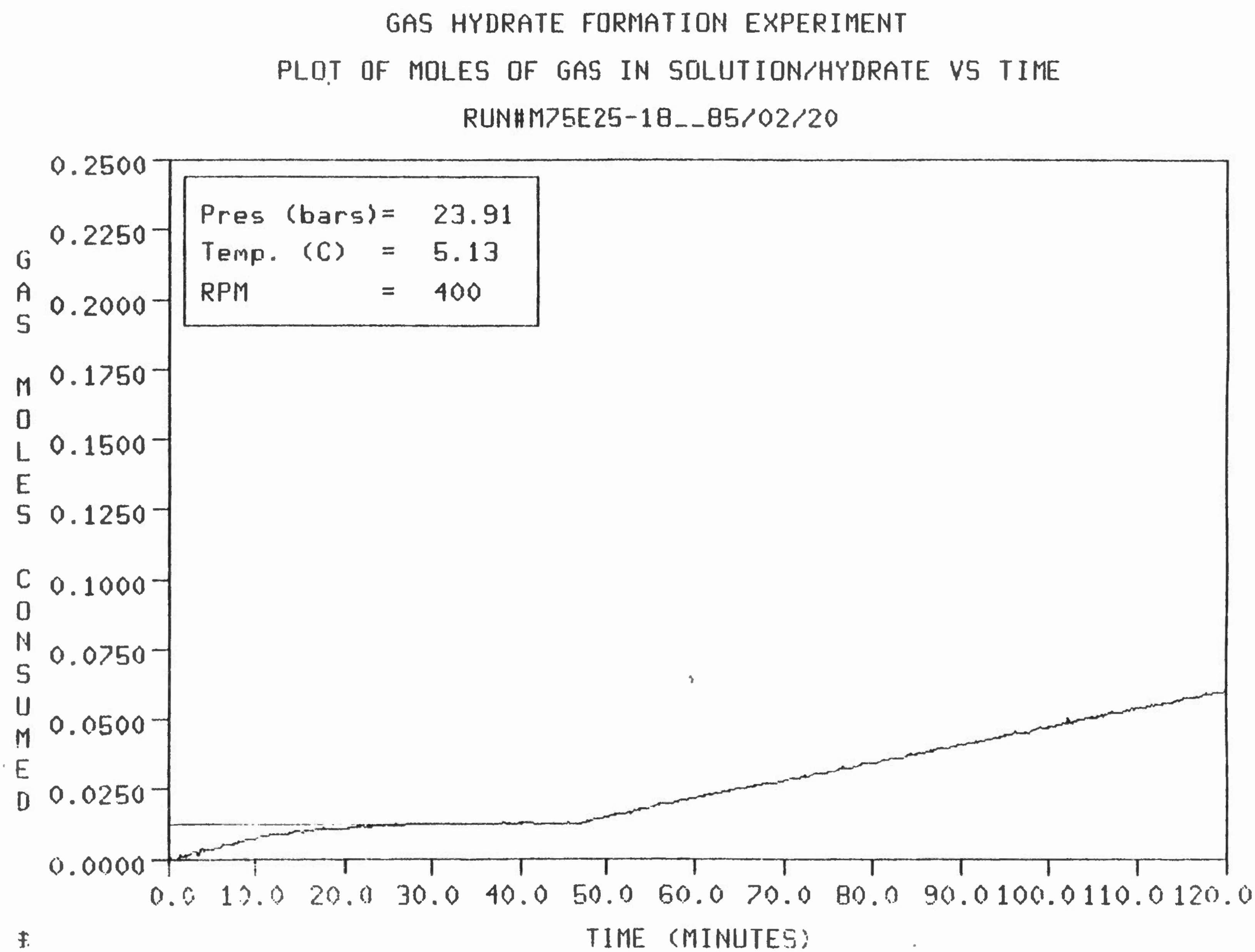
GAS HYDRATE FORMATION EXPERIMENT

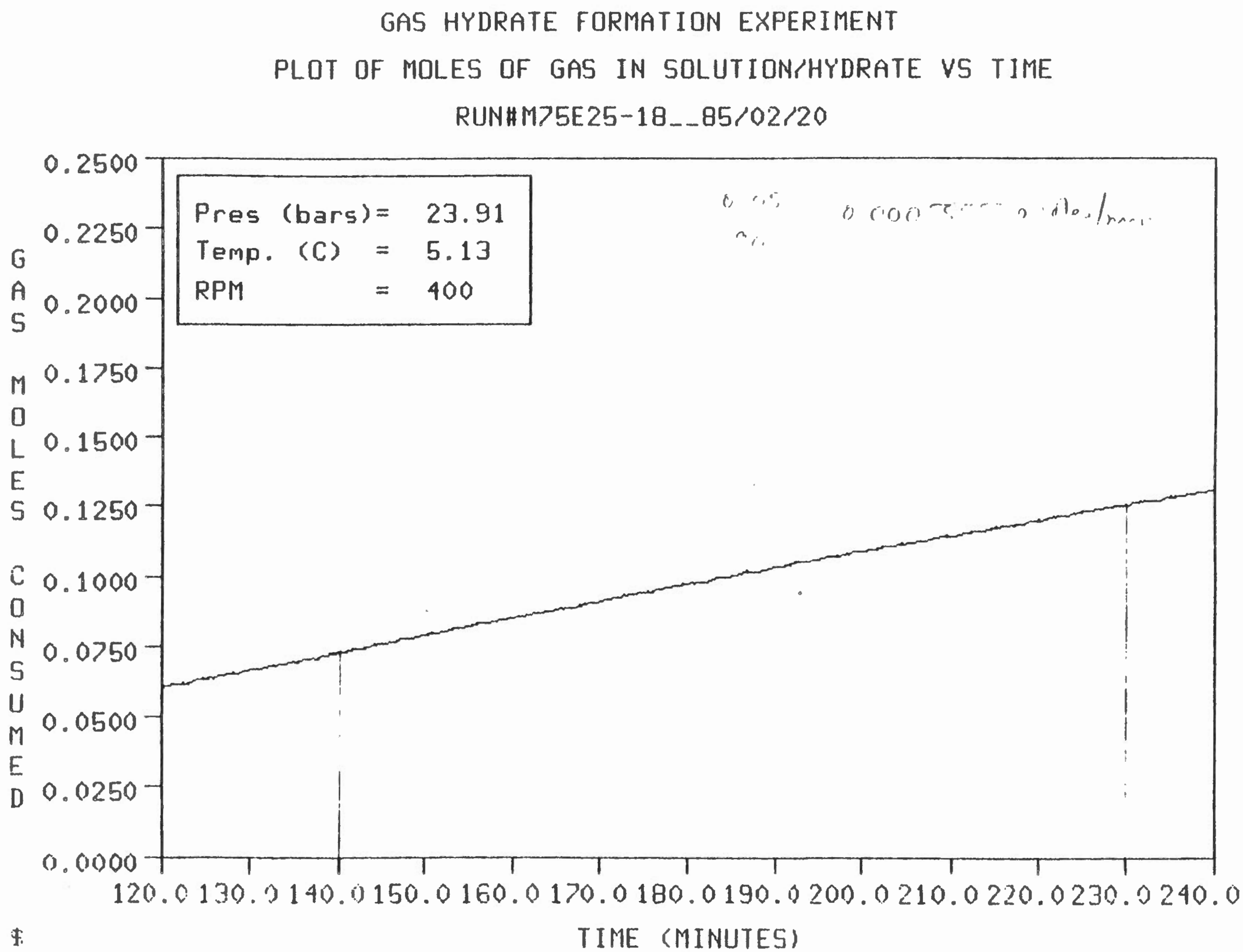
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

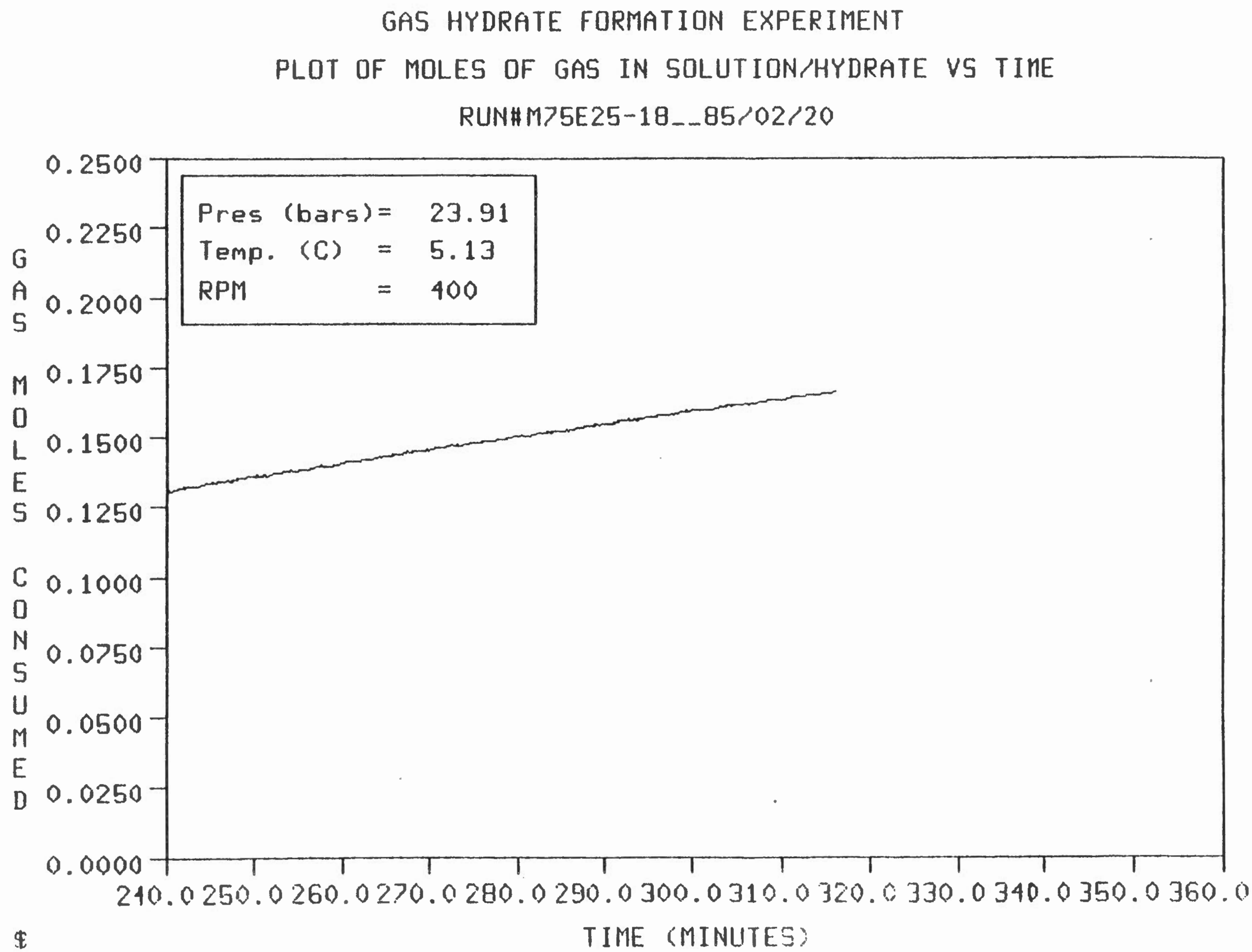
RUN#M75E25-17__85/02/19



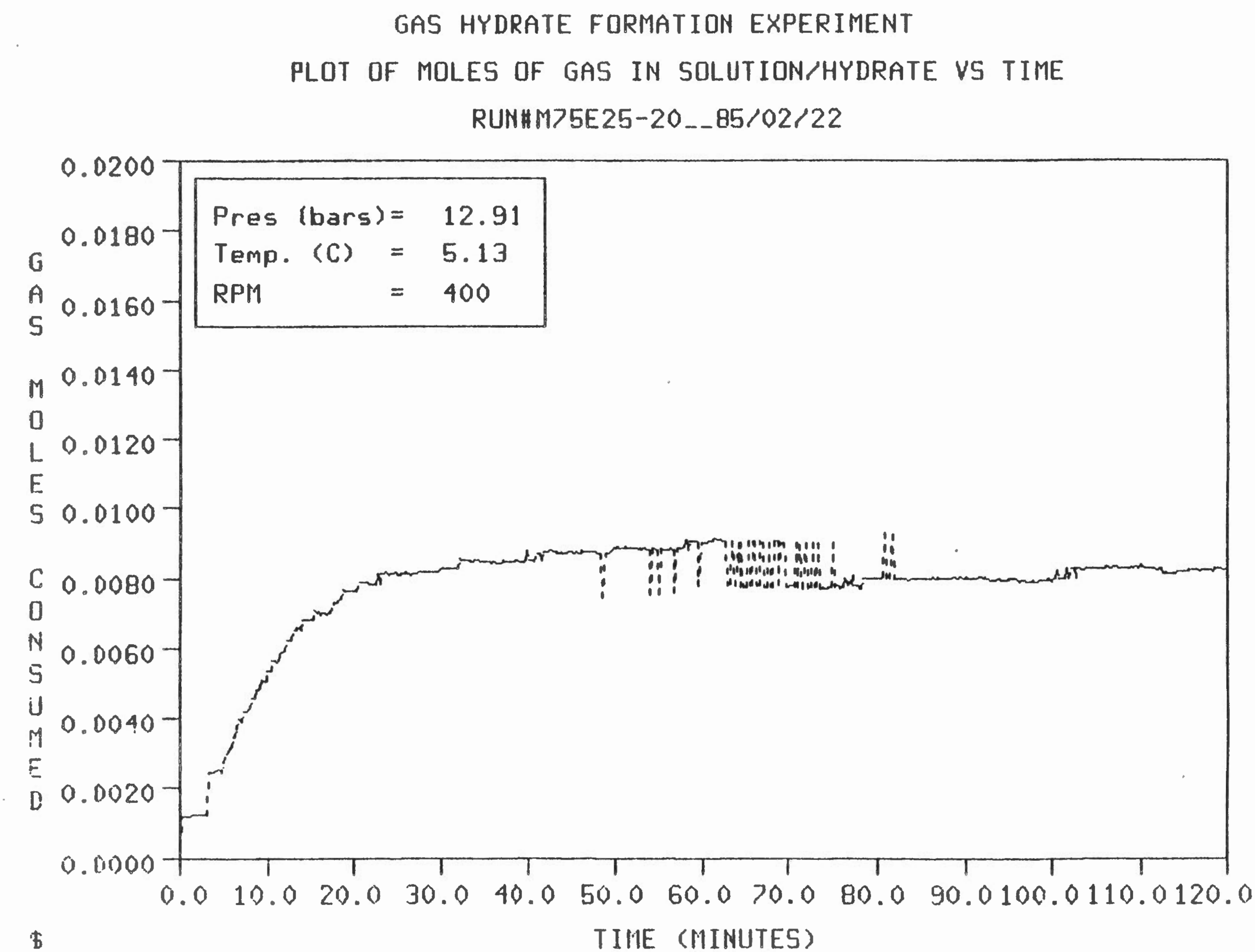

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-17__85/02/19
Pres (bars)= 25.89
Temp. (C) = 5.25
RPM = 400
GAS MOLES CONSUMED
0.2500
0.2250
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-18__85/02/20
Pres (bars)= 23.91
Temp. (C) = 5.13
RPM = 400
GAS MOLES CONSUMED
0.2500
0.2250
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-18__85/02/20
Pres (bars)= 23.91
Temp. (C) = 5.13
RPM = 400
GAS MOLES CONSUMED
0.2500
0.2250
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-18__85/02/20
Pres (bars)= 23.91
Temp. (C) = 5.13
RPM = 400
GAS MOLES CONSUMED
0.2500
0.2250
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)

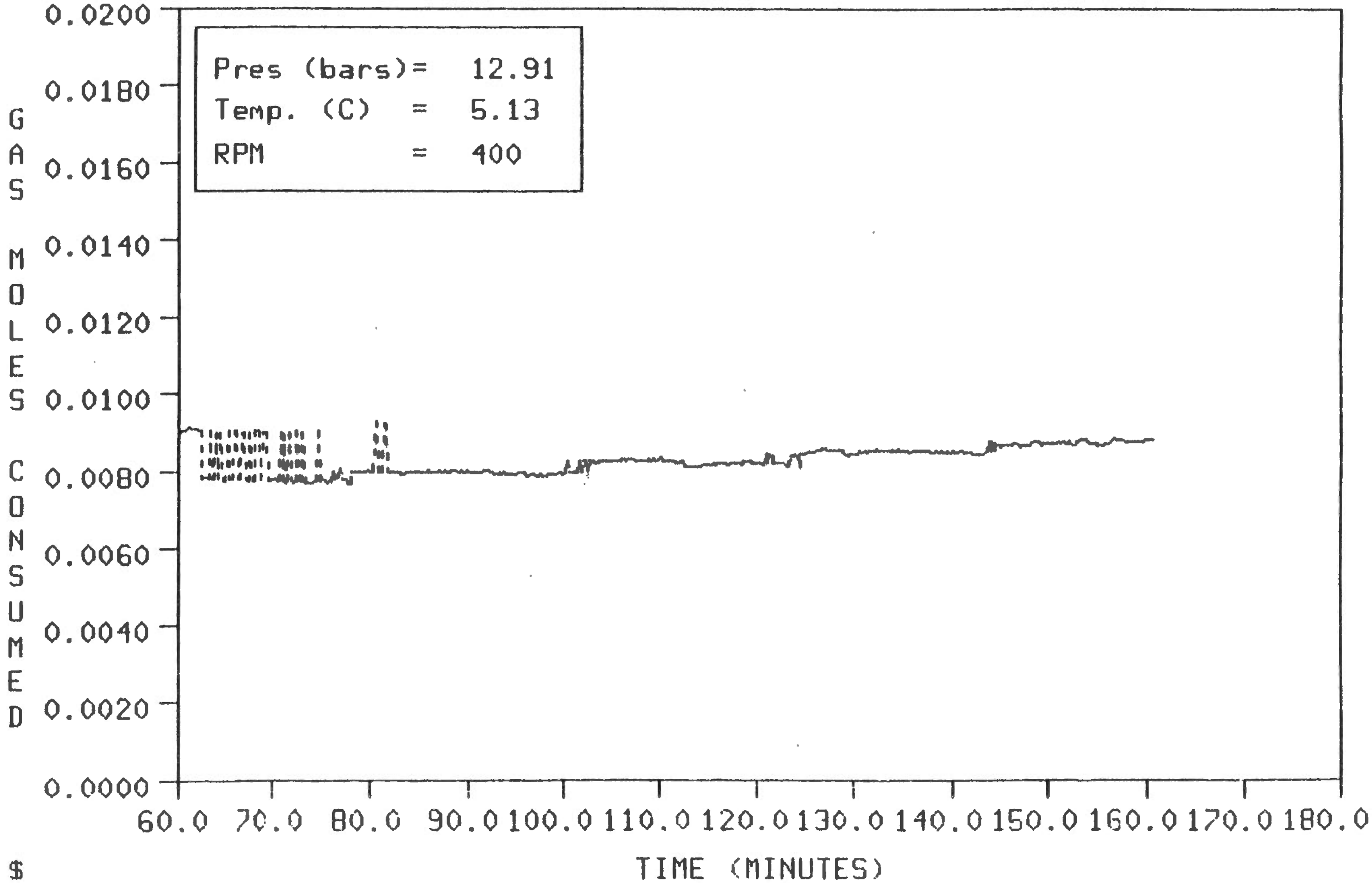
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-20__85/02/22
Pres (bars)= 12.91
Temp. (C) = 5.13
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-20__85/02/22



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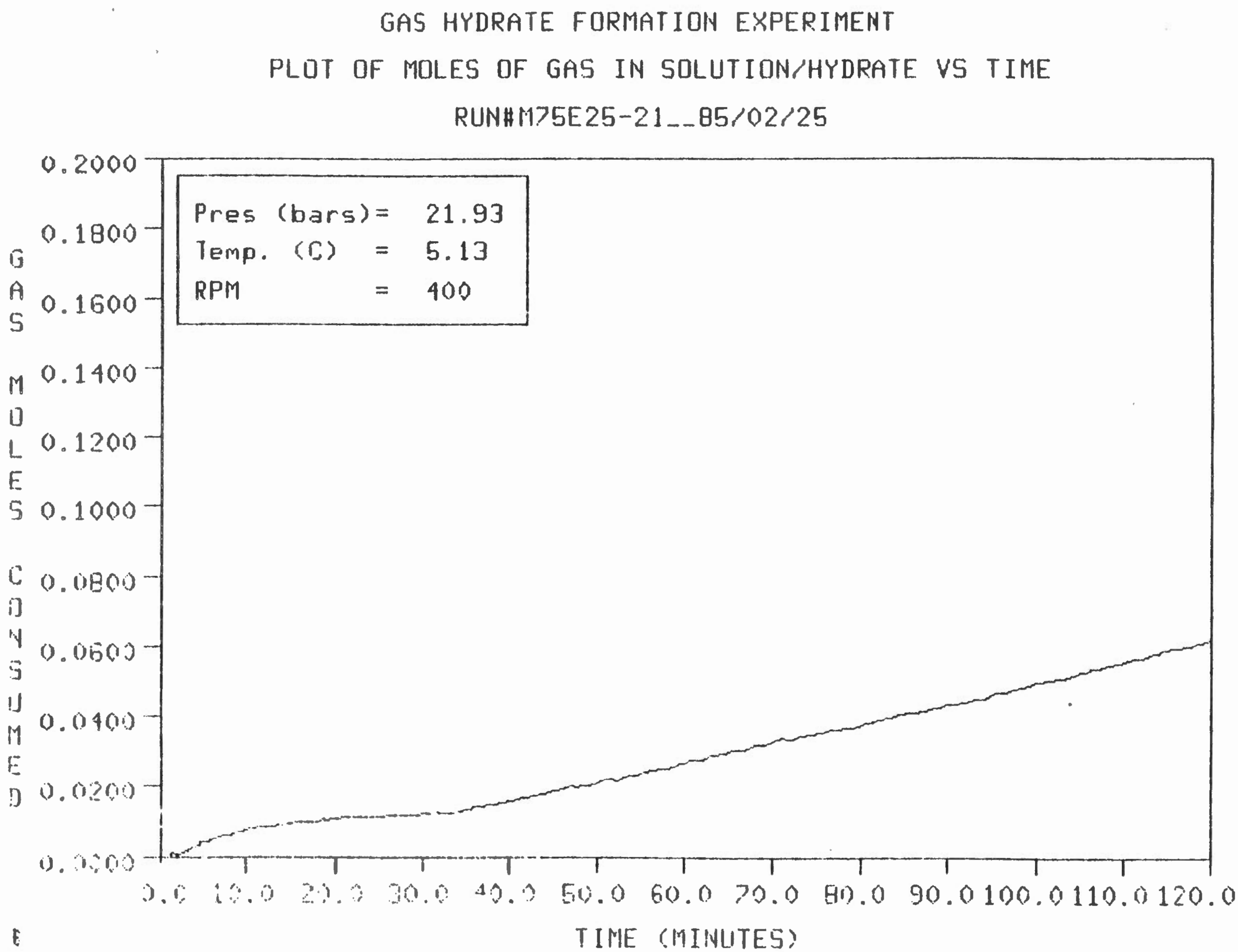
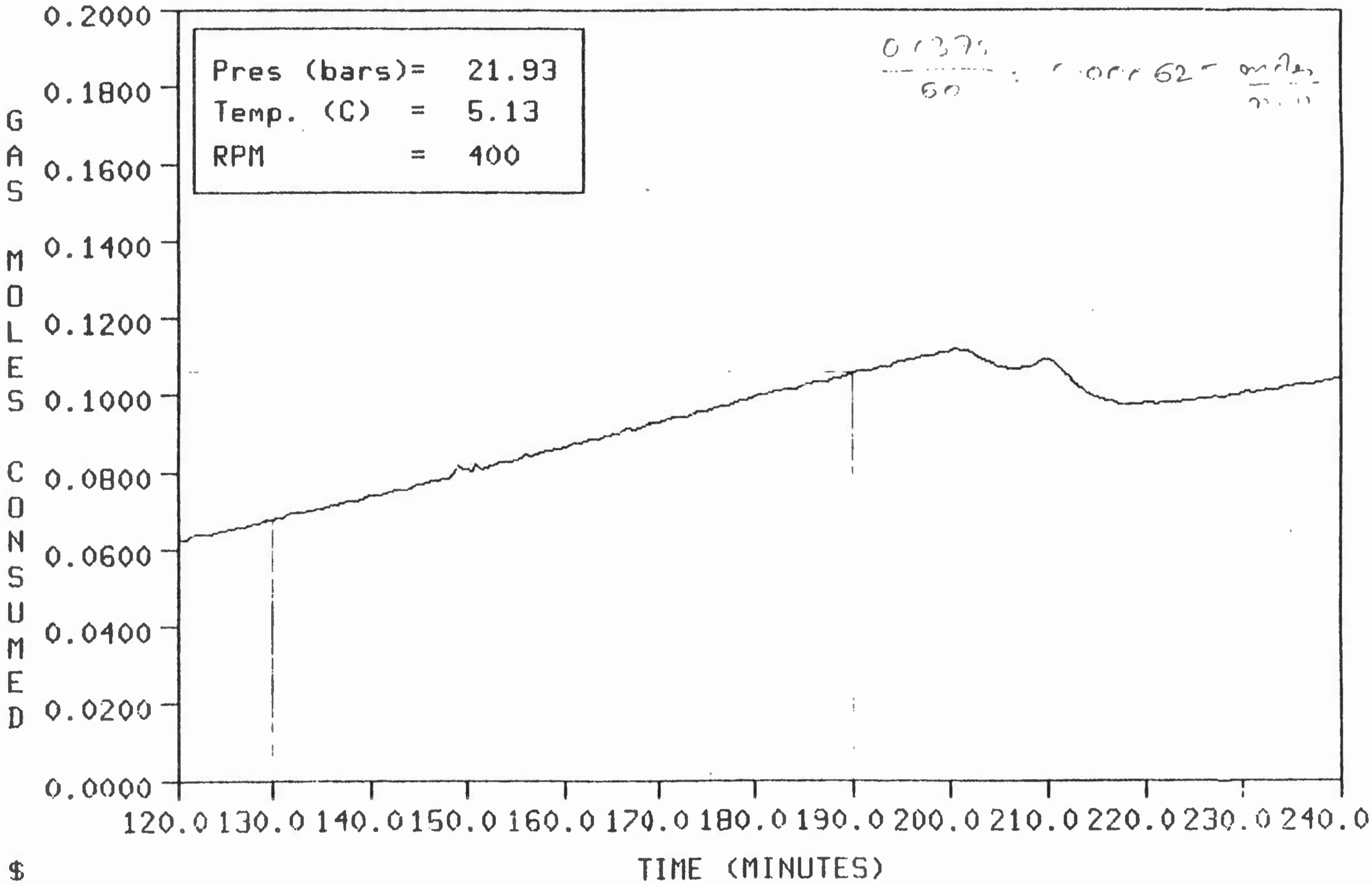

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-21__85/02/25
Pres (bars)= 21.93
Temp. (C) = 5.13
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-21__85/02/25



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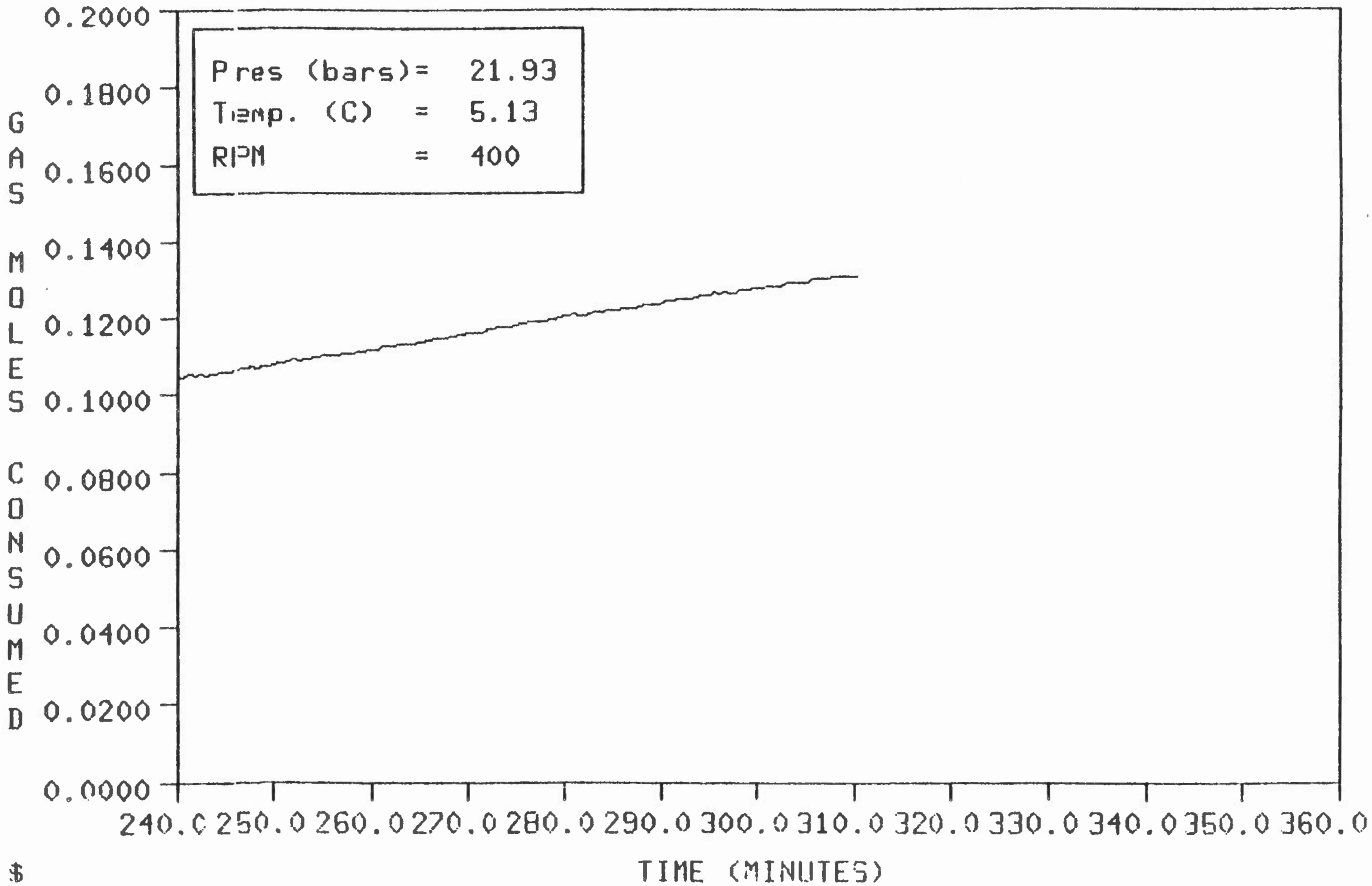
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-21__85/02/25



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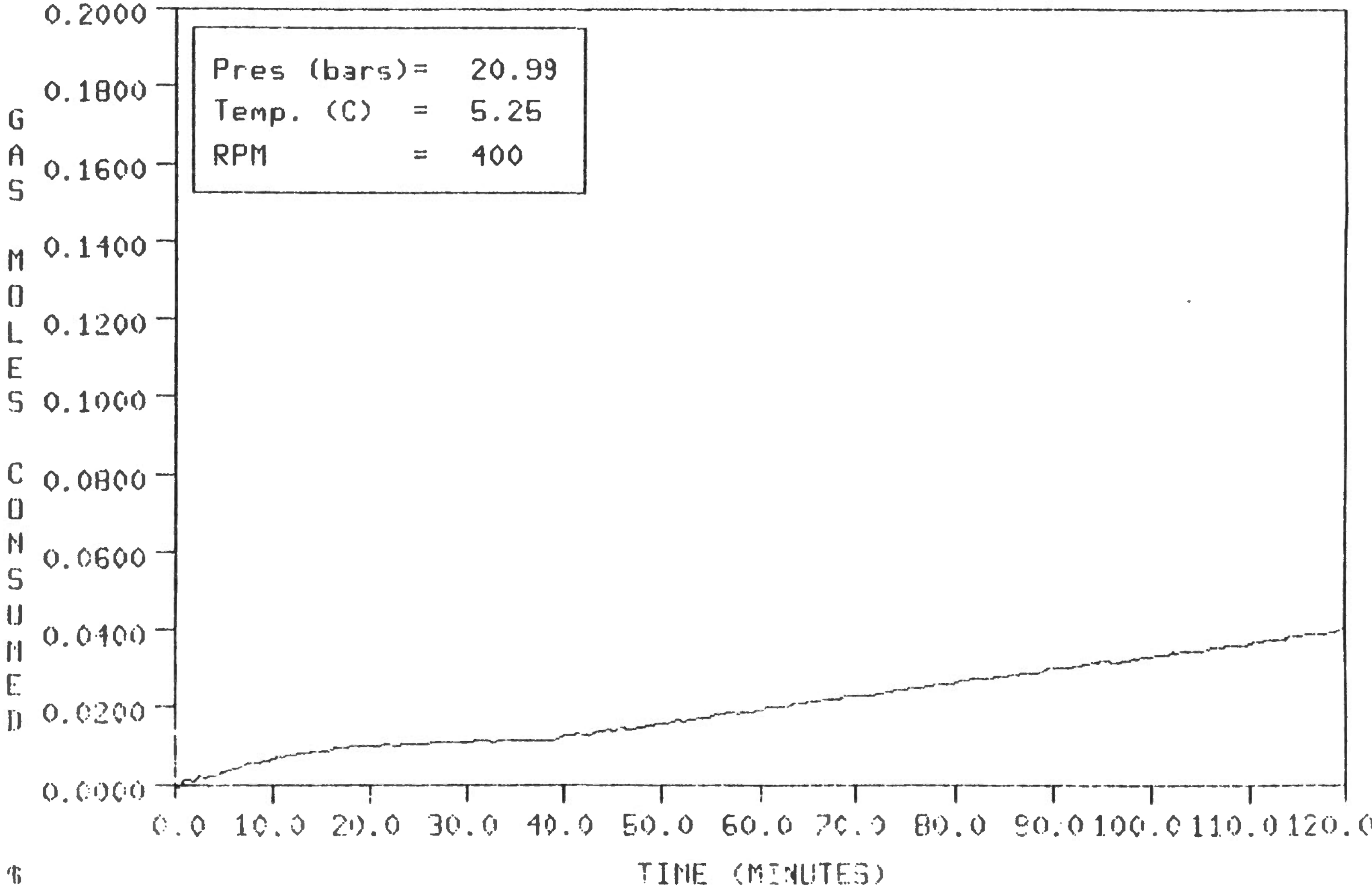
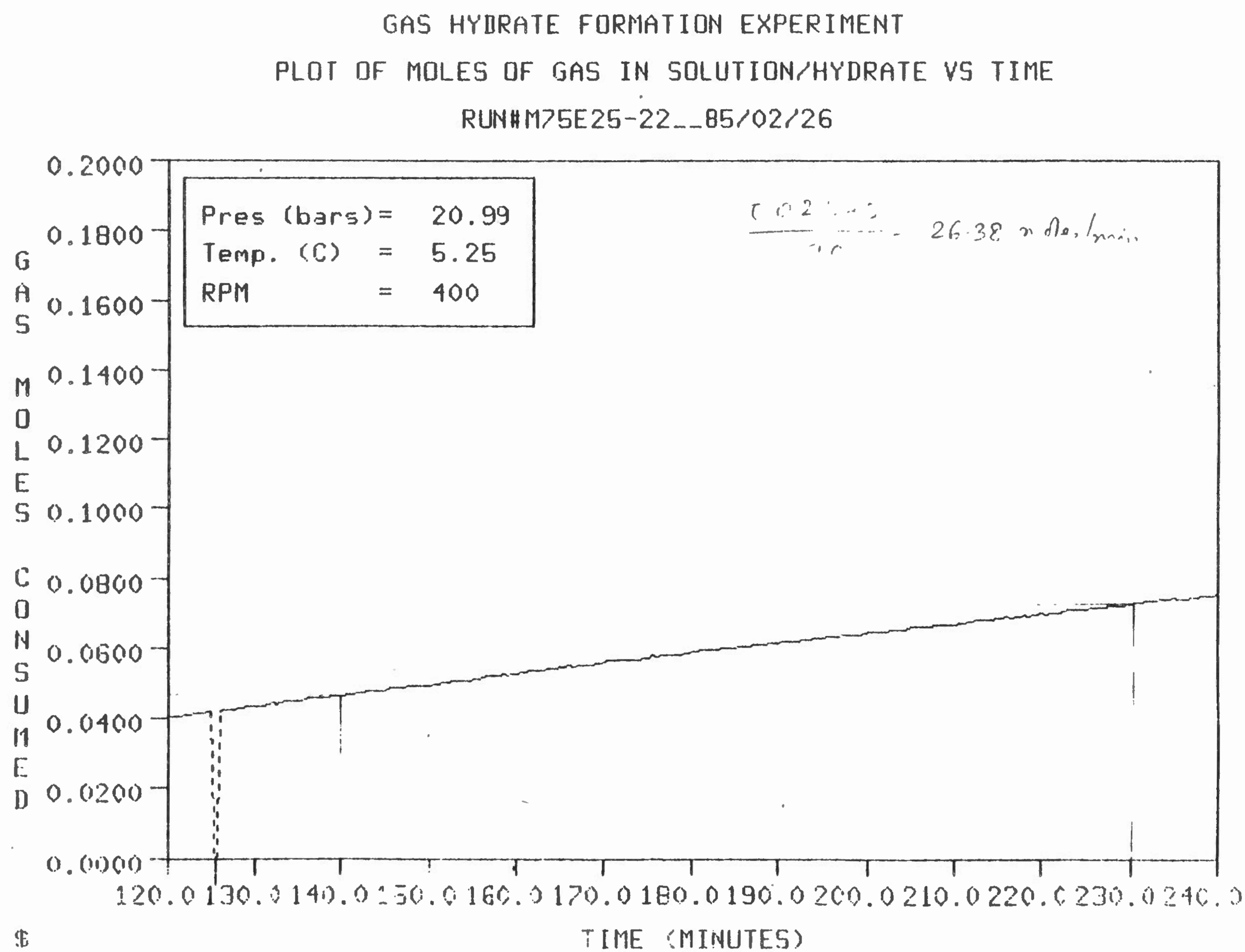
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-22__85/02/26

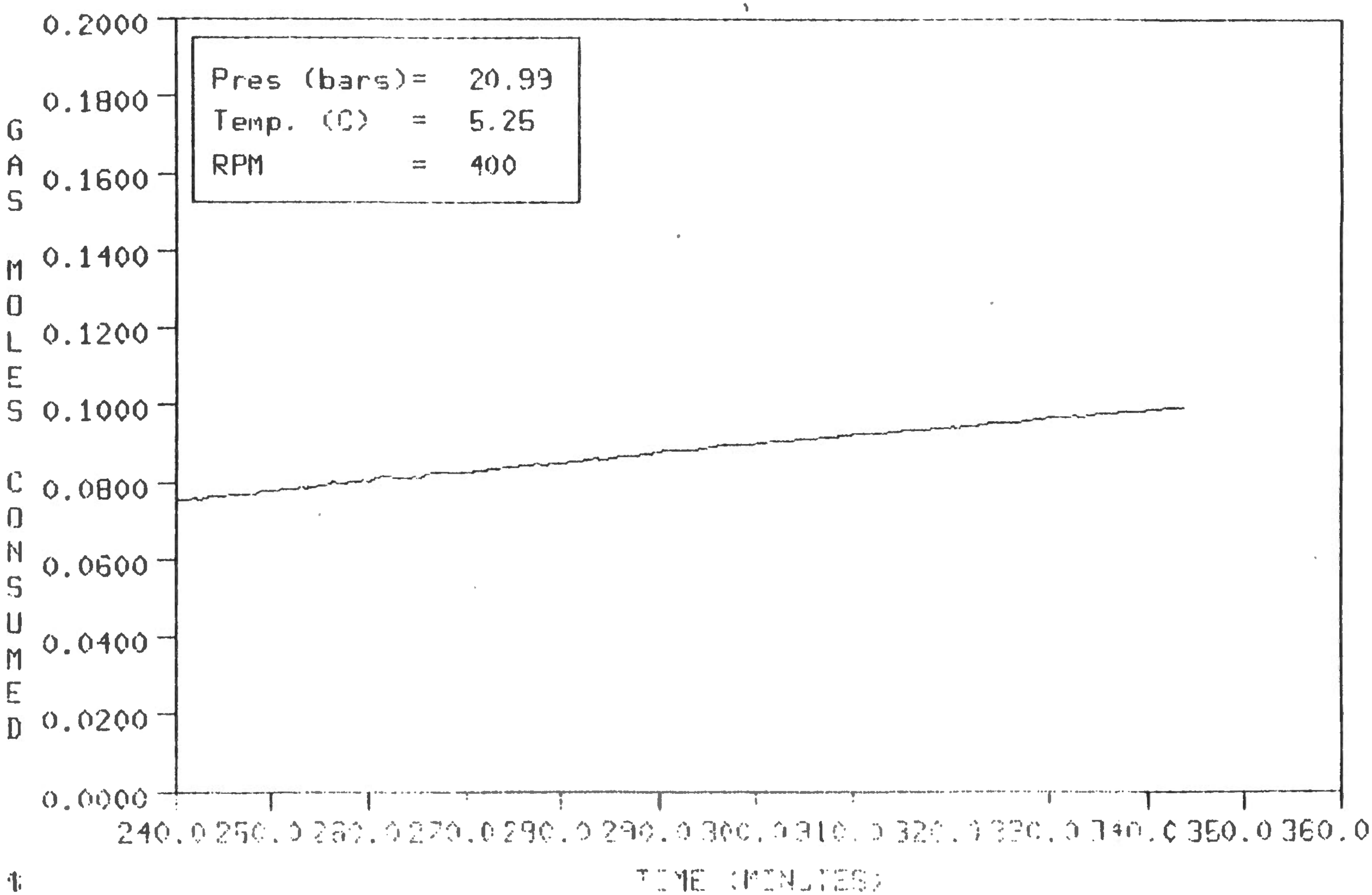


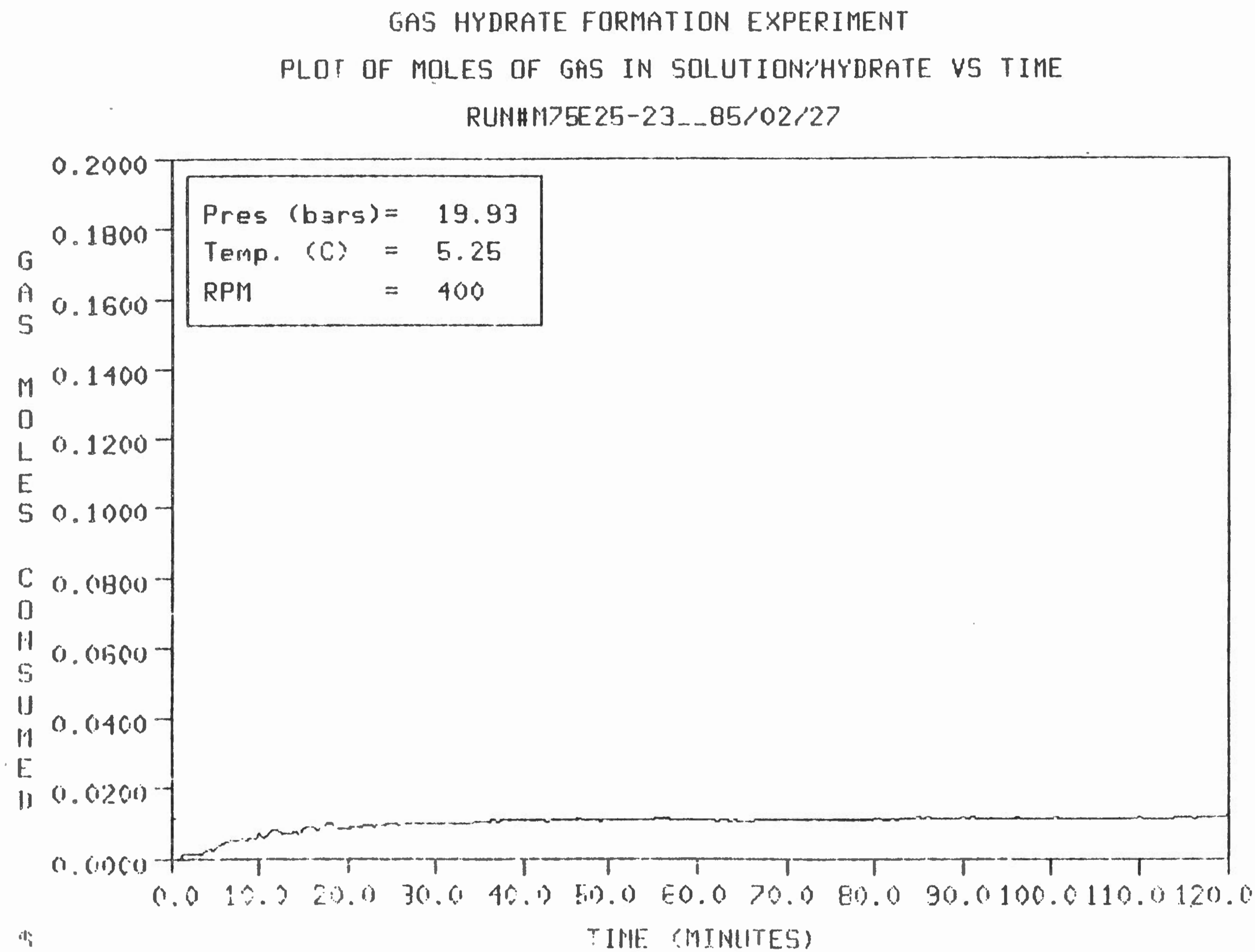

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-22__85/02/26
Pres (bars)= 20.99
Temp. (C) = 5.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0
130.0
140.0
150.0
160.0
170.0
180.0
190.0
200.0
210.0
220.0
230.0
240.0
TIME (MINUTES)
$

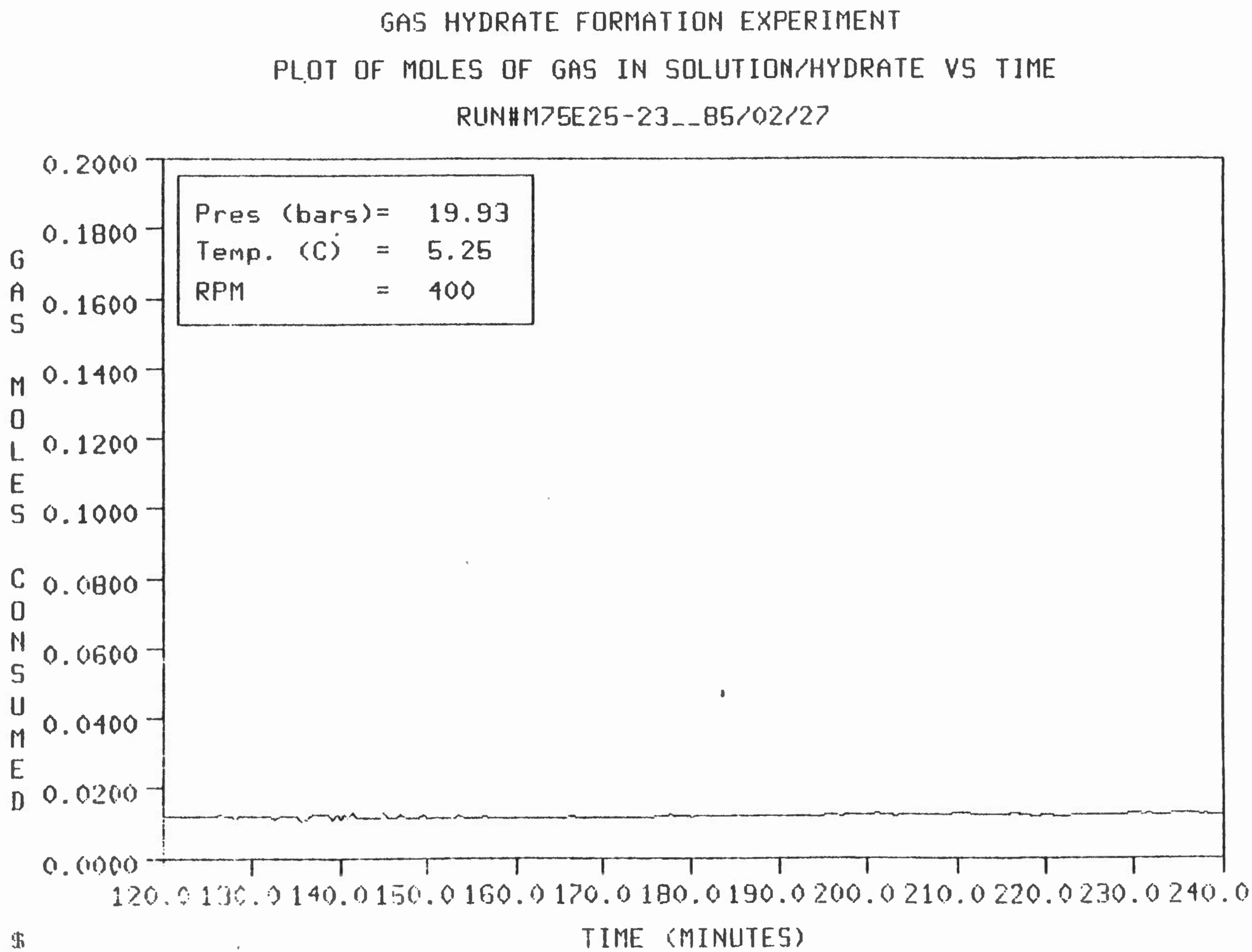
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-22__85/02/26




GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-23__85/02/27
Pres (bars)= 19.93
Temp. (C) = 5.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)

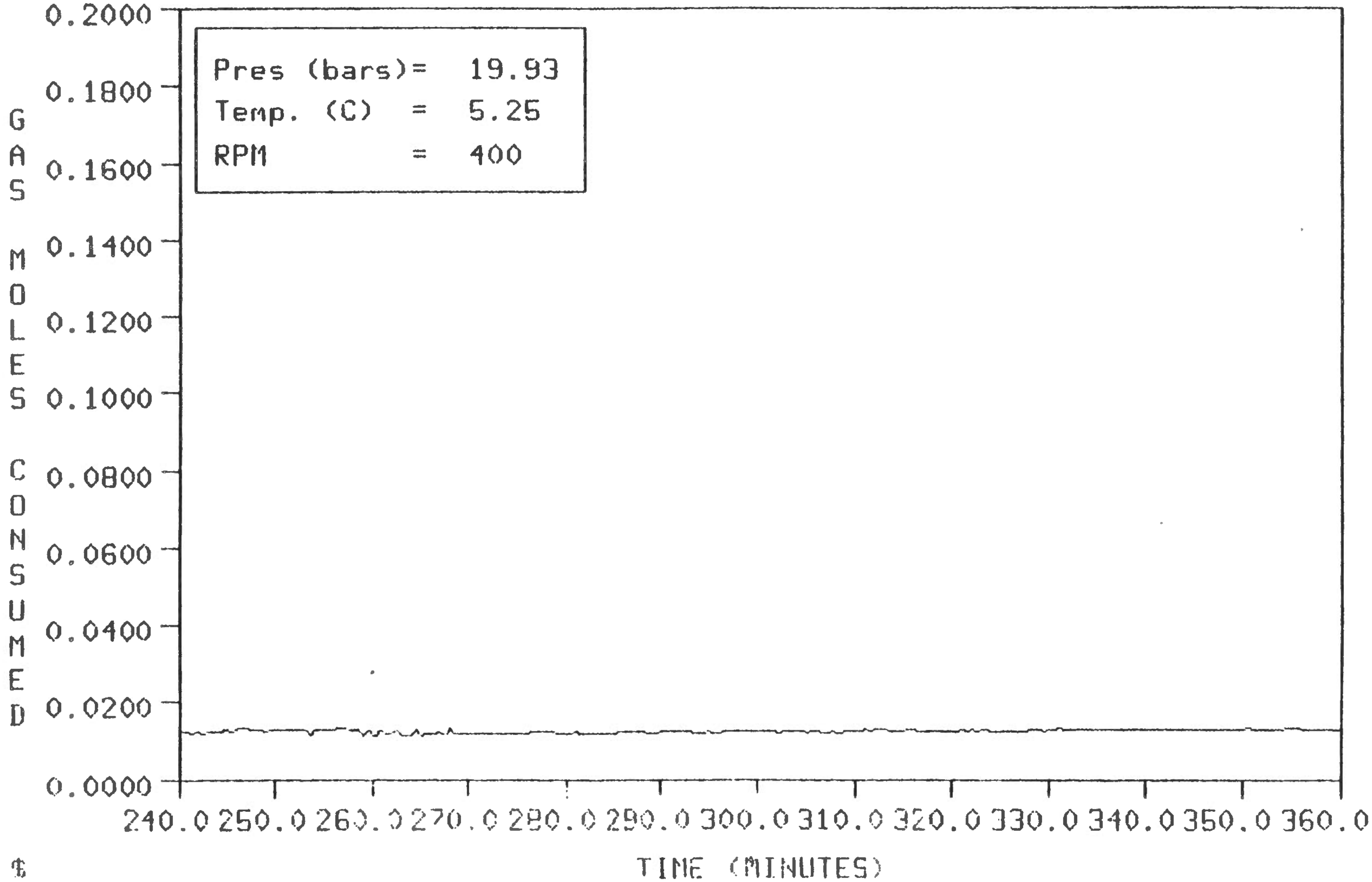


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-23__85/02/27
Pres (bars)= 19.93
Temp. (C) = 5.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-23__85/02/27



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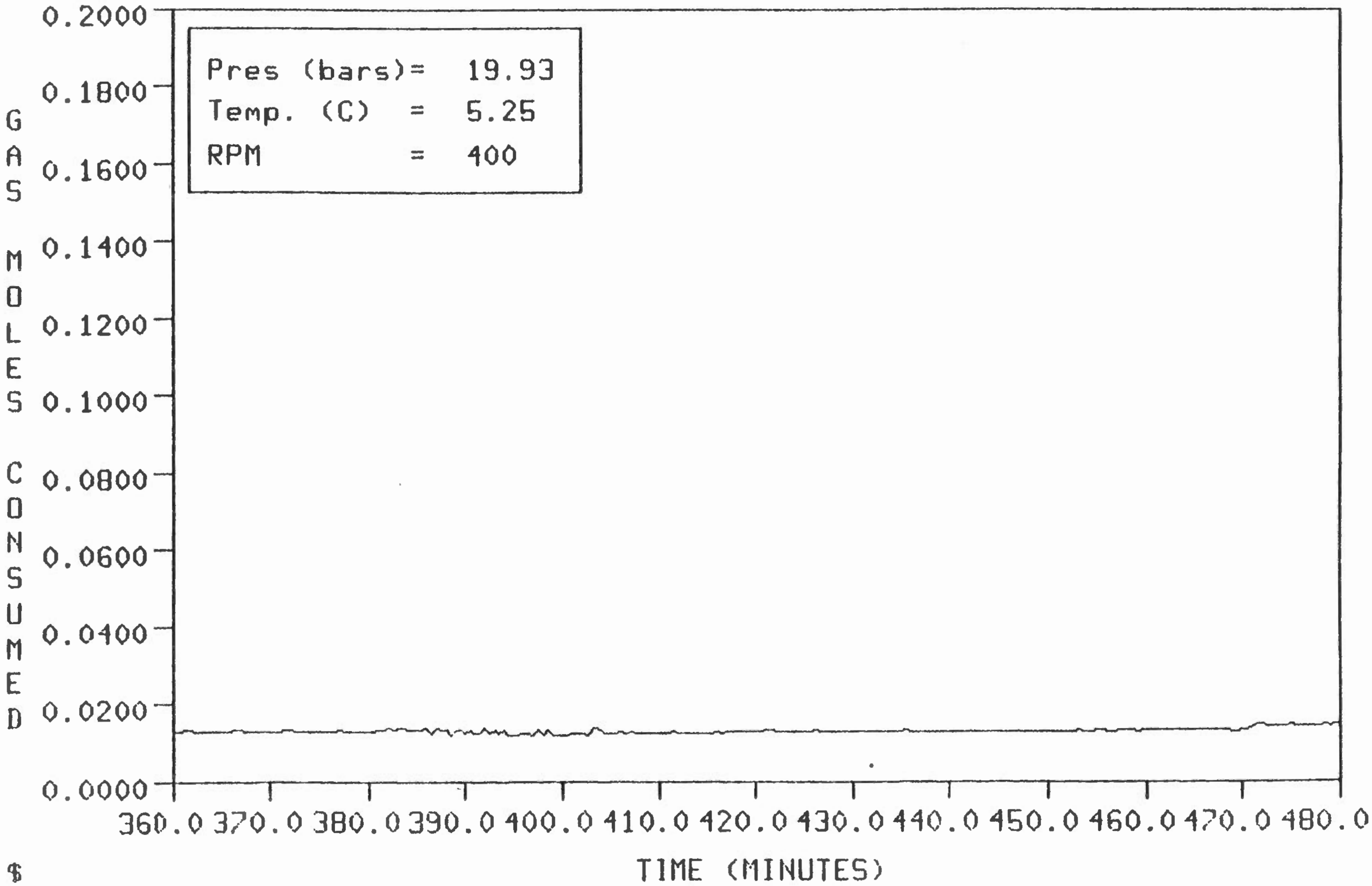
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-23__85/02/27



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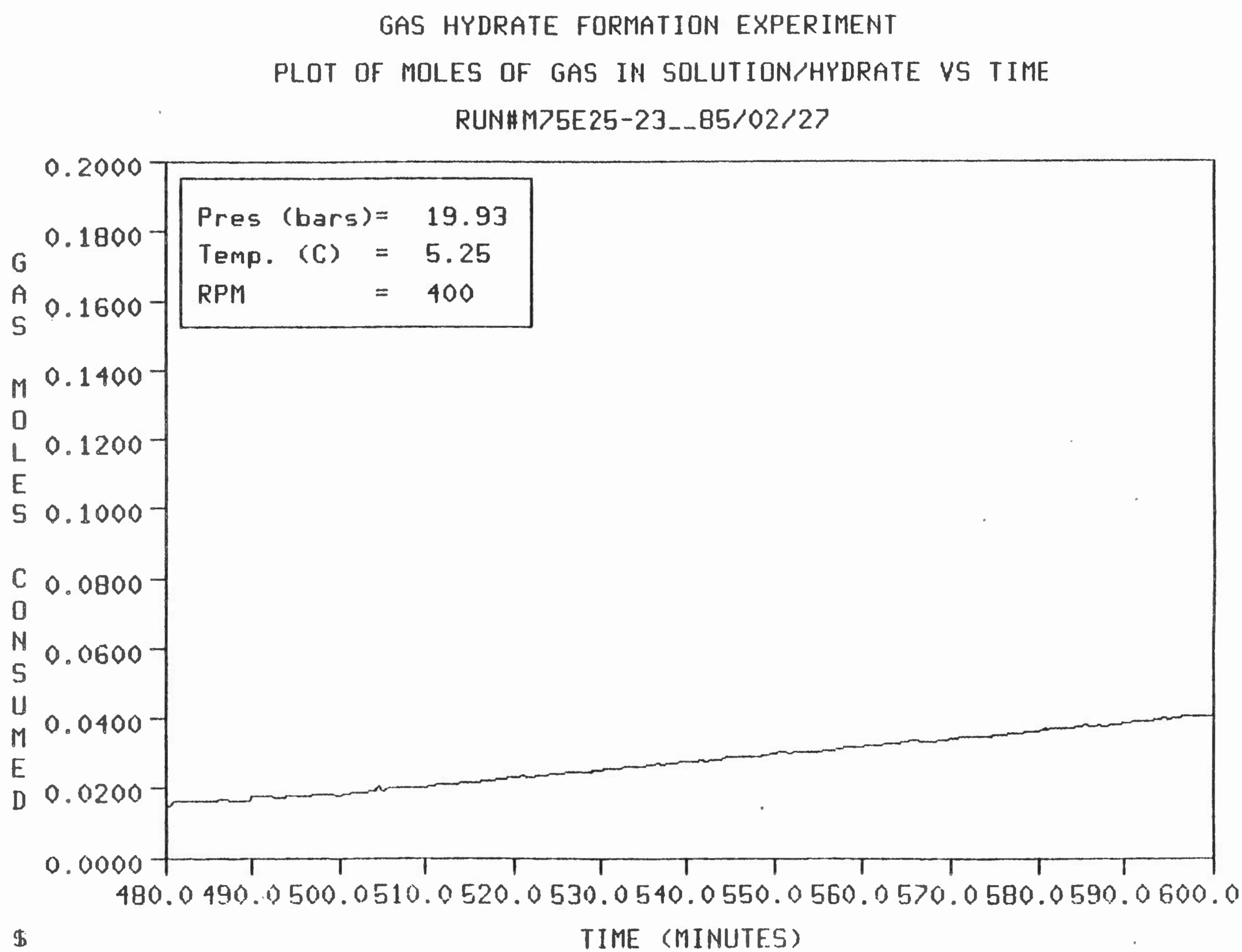
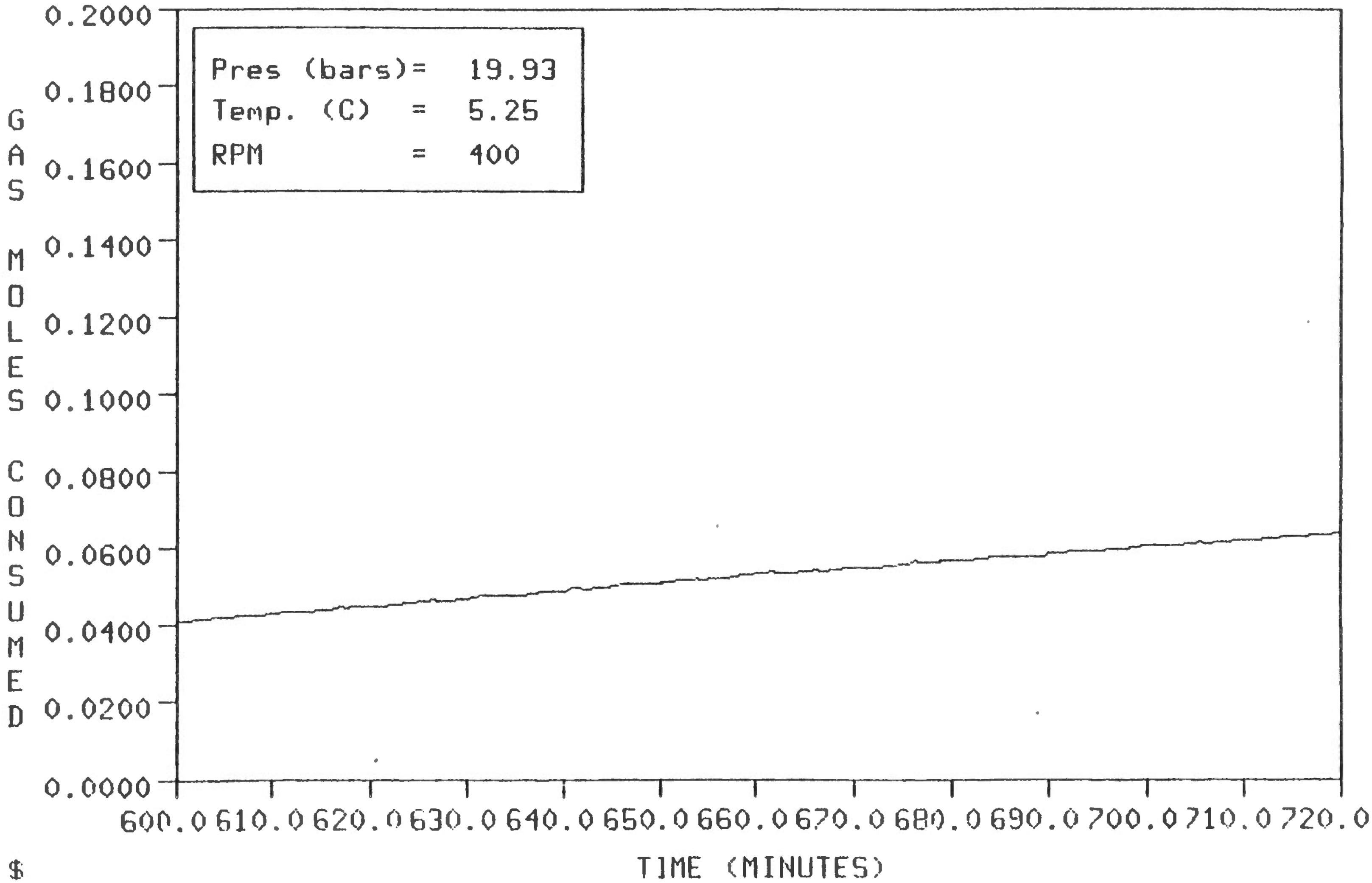

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-23__85/02/27
Pres (bars)= 19.93
Temp. (C) = 5.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
480.0 490.0 500.0 510.0 520.0 530.0 540.0 550.0 560.0 570.0 580.0 590.0 600.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-23__85/02/27



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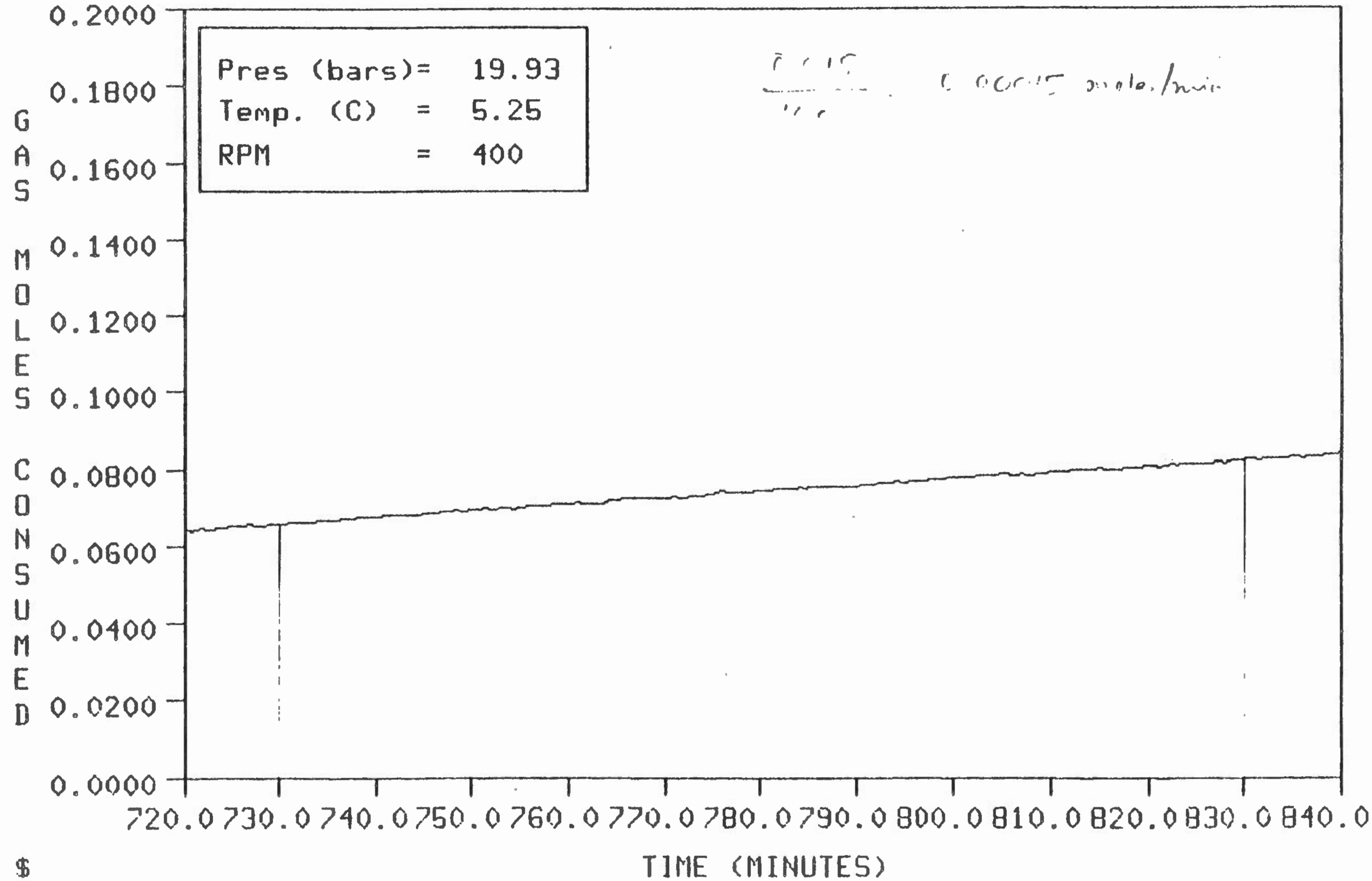
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-23__85/02/27



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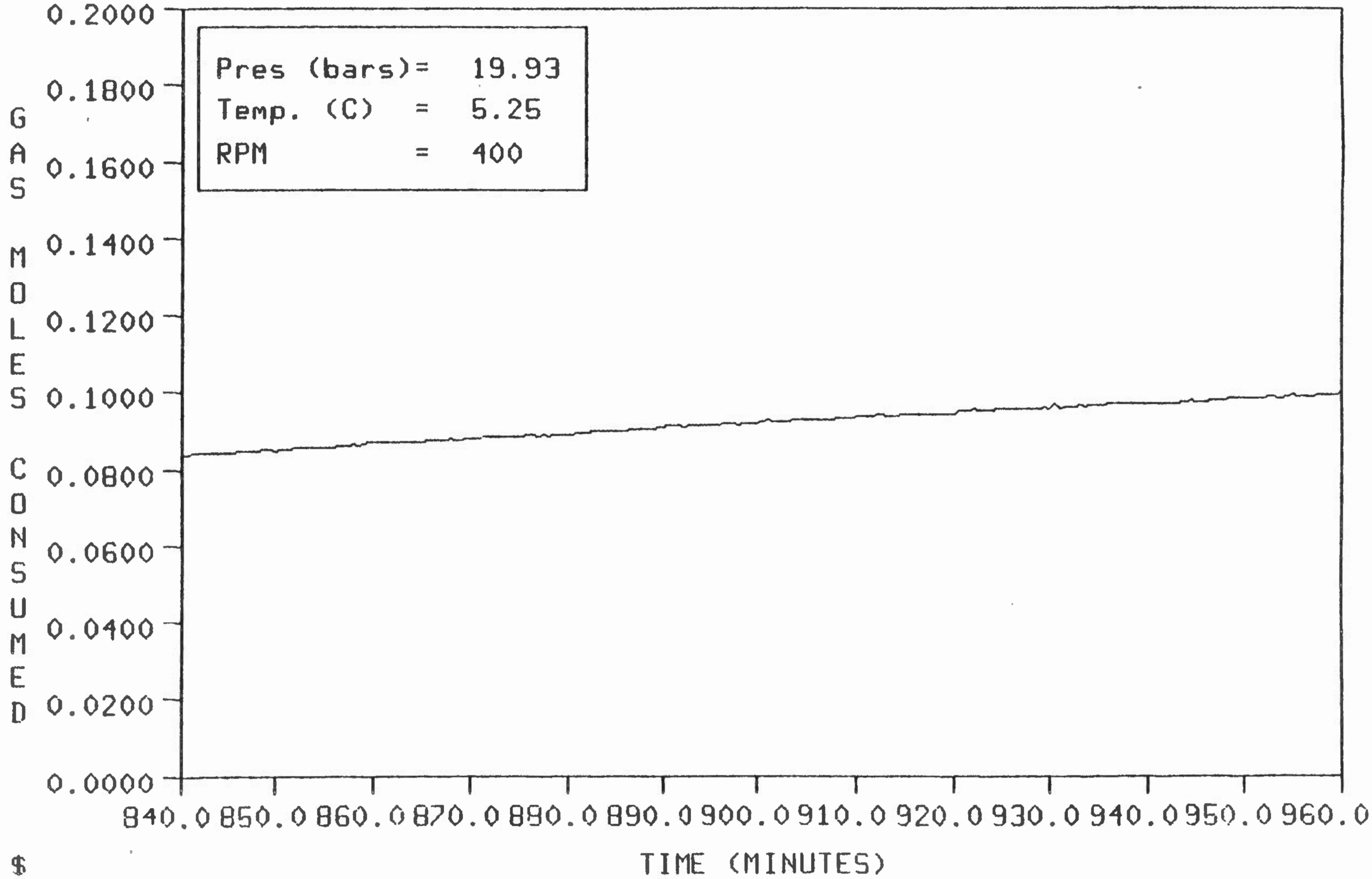
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-23__85/02/27



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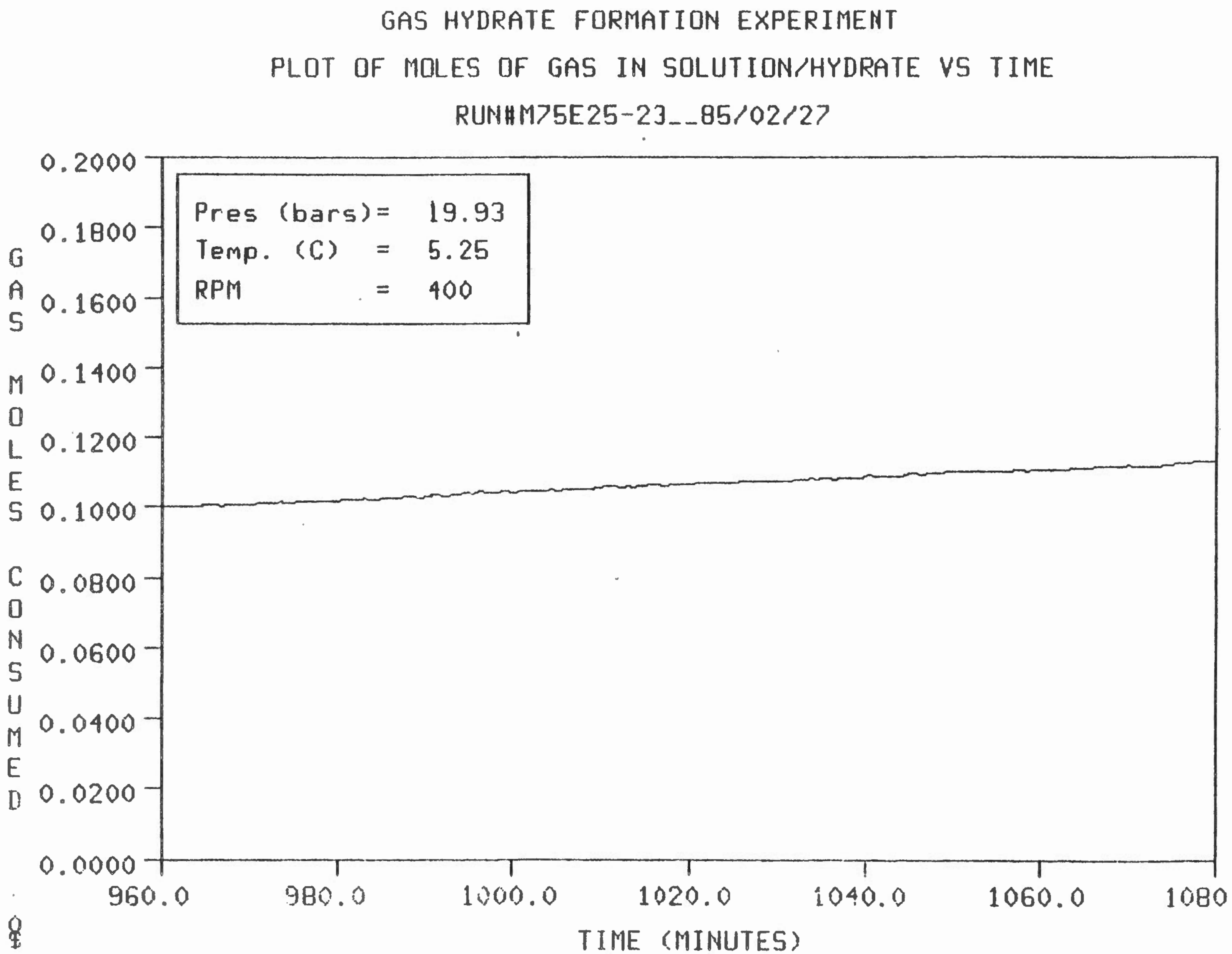
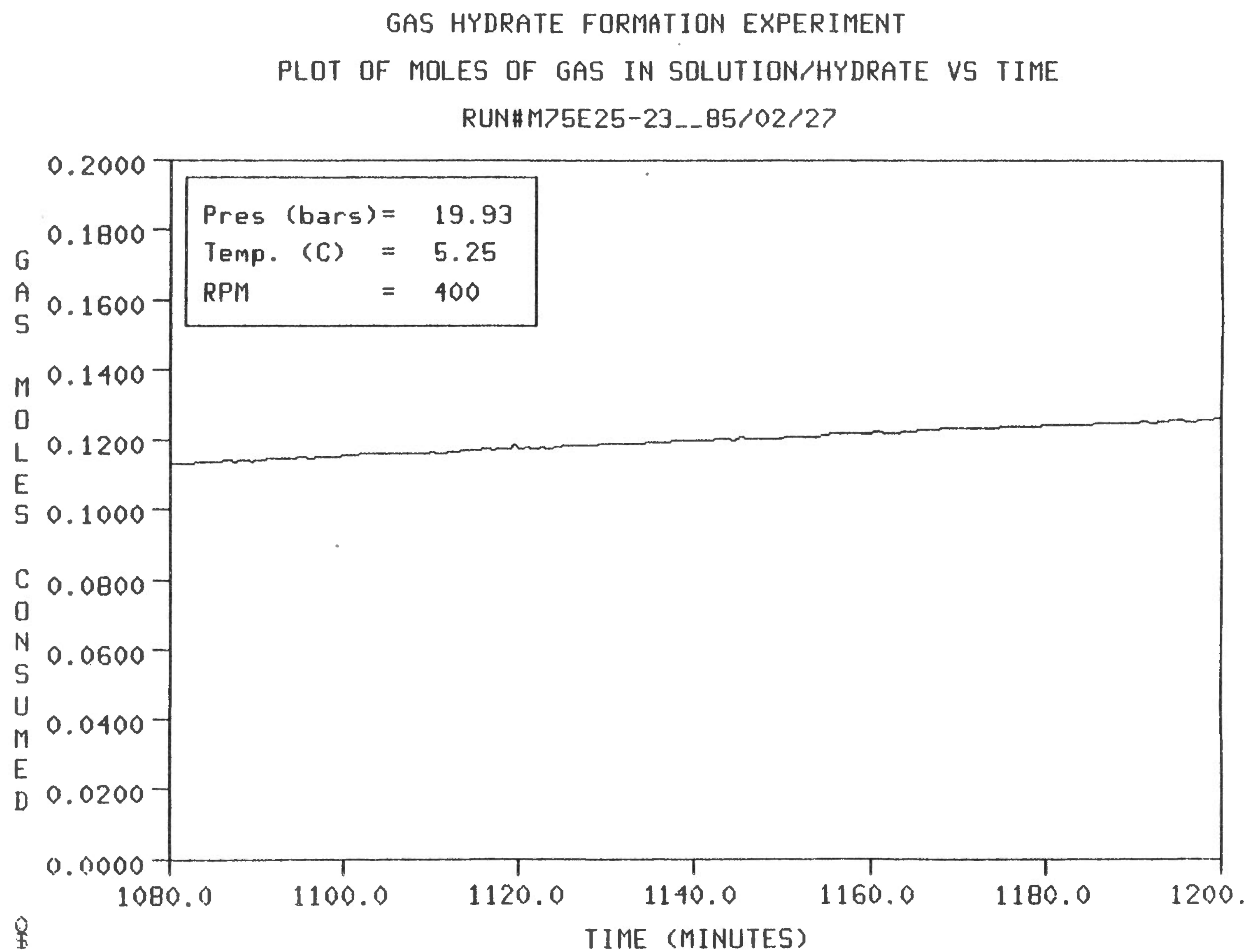
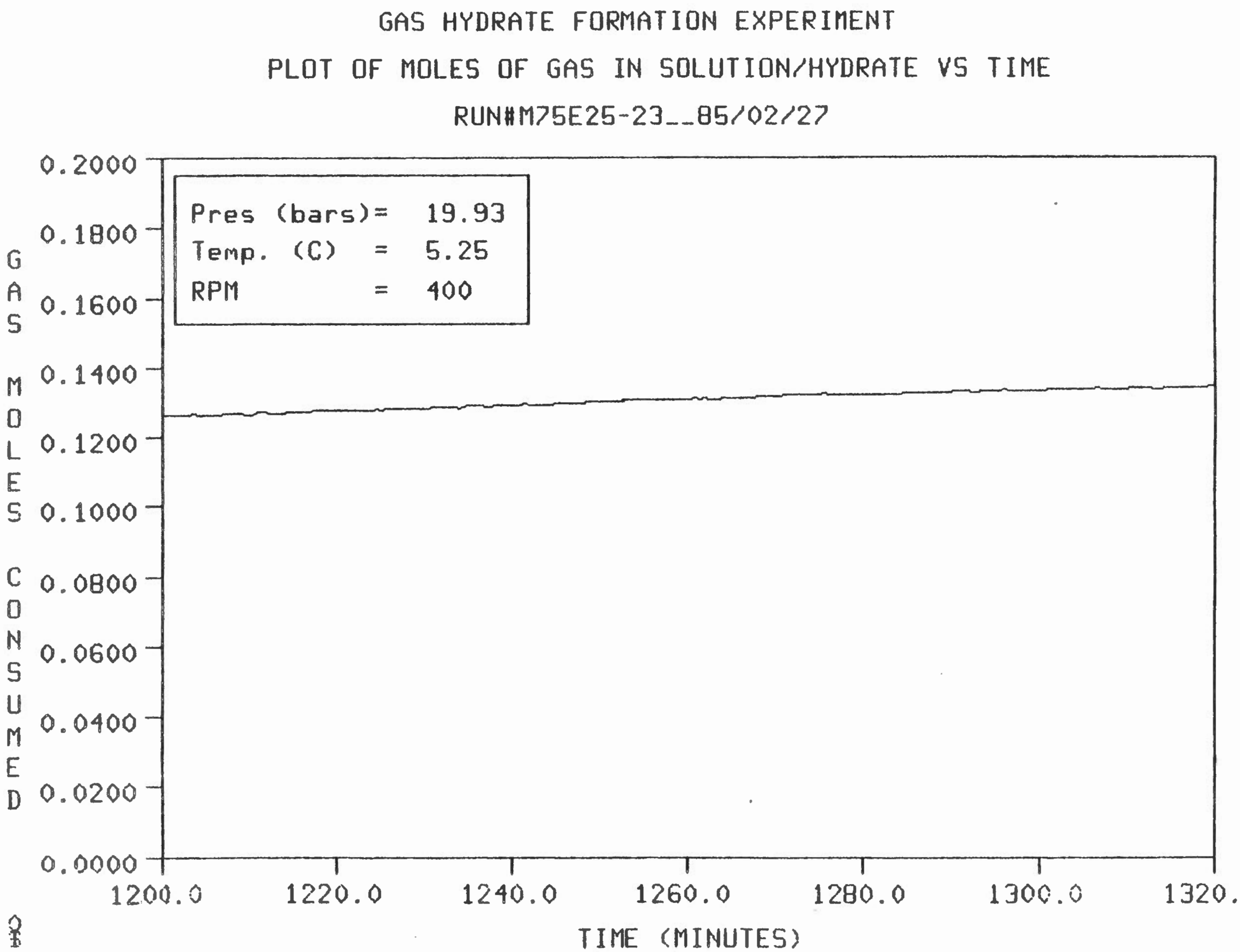
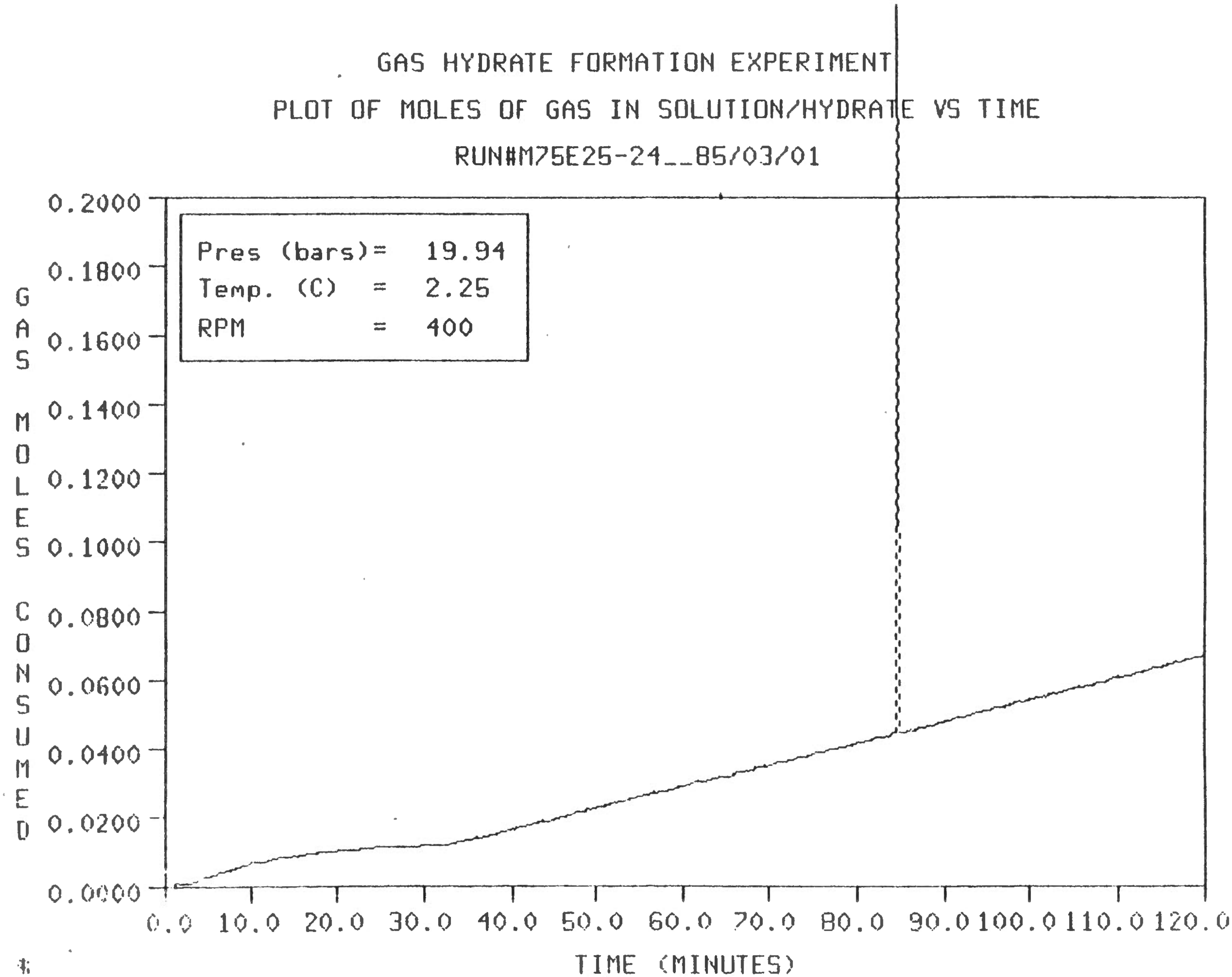
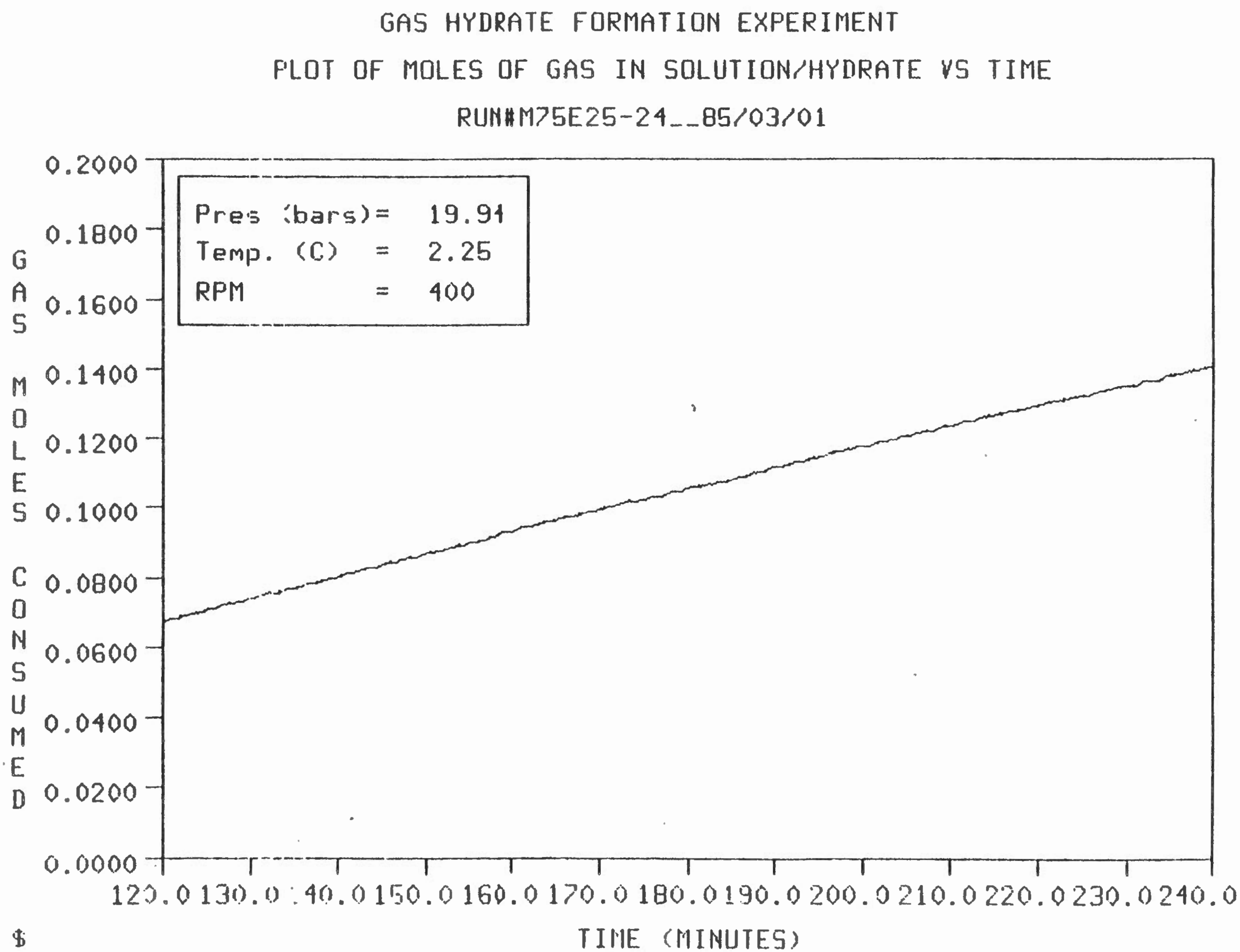

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-23__85/02/27
Pres (bars)= 19.93
Temp. (C) = 5.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
960.0
980.0
1000.0
1020.0
1040.0
1060.0
1080.
TIME (MINUTES)


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-23__85/02/27
Pres (bars)= 19.93
Temp. (C) = 5.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
1080.0
1100.0
1120.0
1140.0
1160.0
1180.0
1200.
TIME (MINUTES)



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-23__85/02/27
Pres (bars)= 19.93
Temp. (C) = 5.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
1200.0
1220.0
1240.0
1260.0
1280.0
1300.0
1320.
TIME (MINUTES)

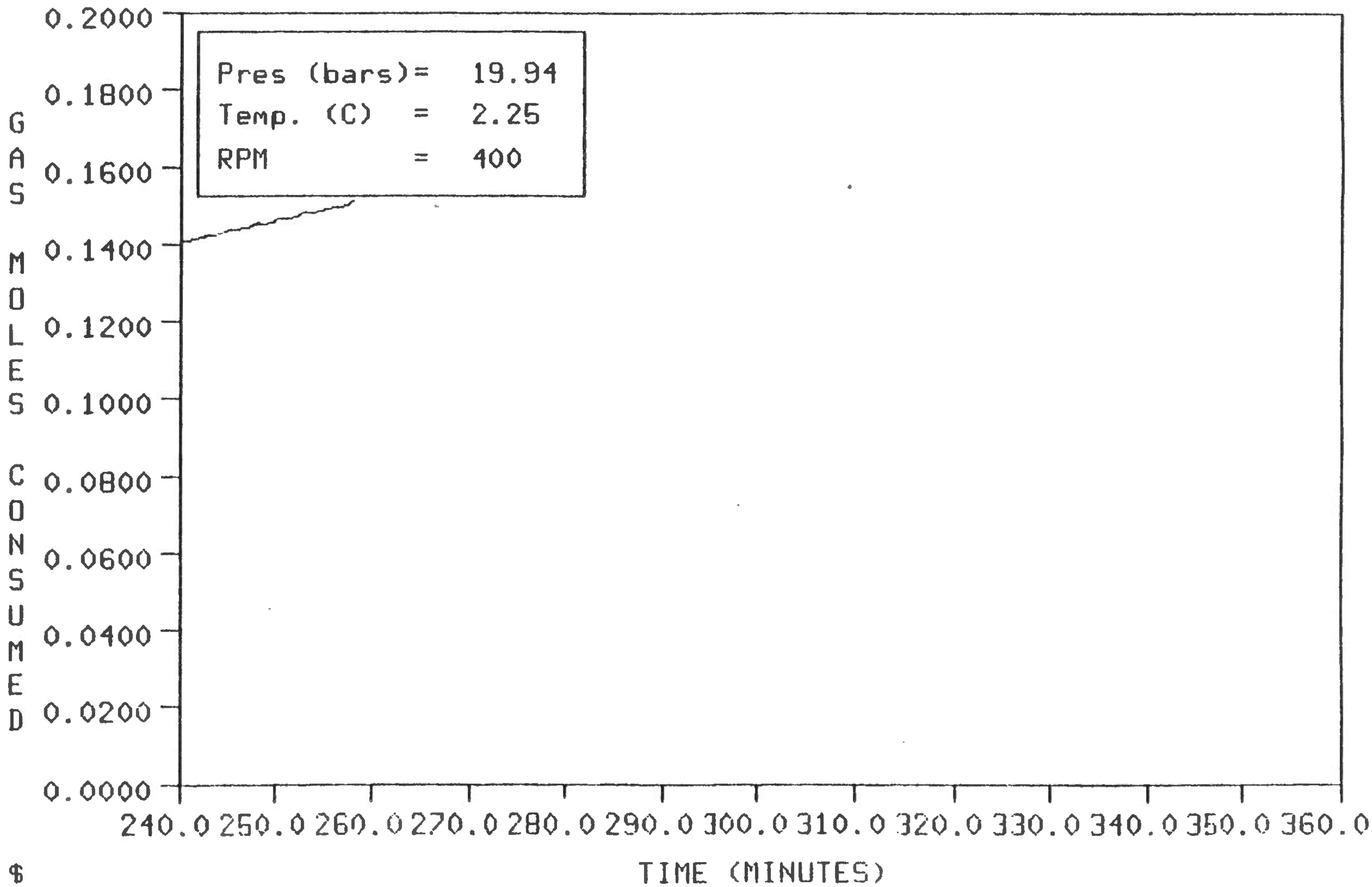

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-24__85/03/01
Pres (bars)= 19.94
Temp. (C) = 2.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)

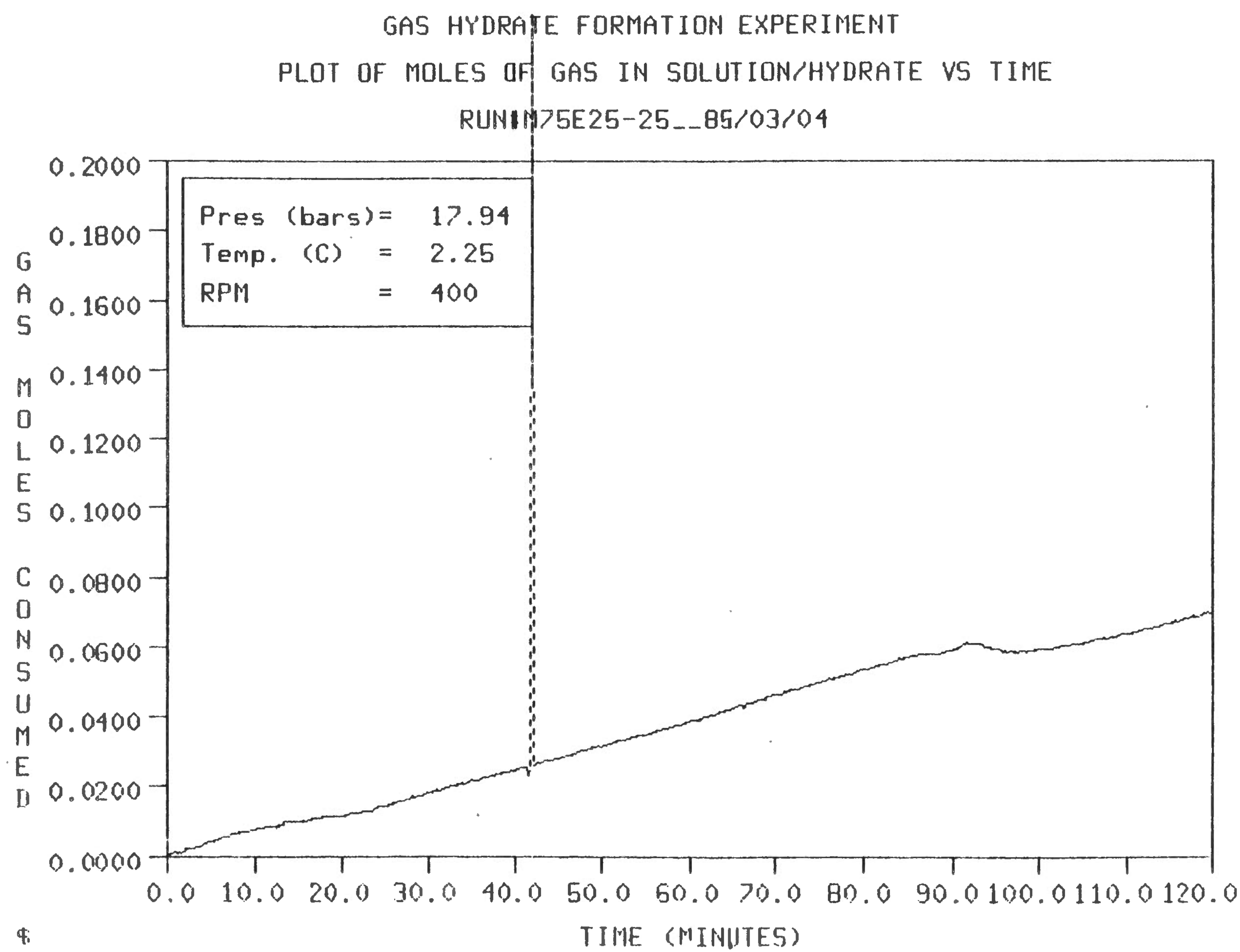

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-24__85/03/01
Pres (bars)= 19.94
Temp. (C) = 2.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
130.0
150.0
160.0
170.0
180.0
190.0
200.0
210.0
220.0
230.0
240.0
TIME (MINUTES)
$

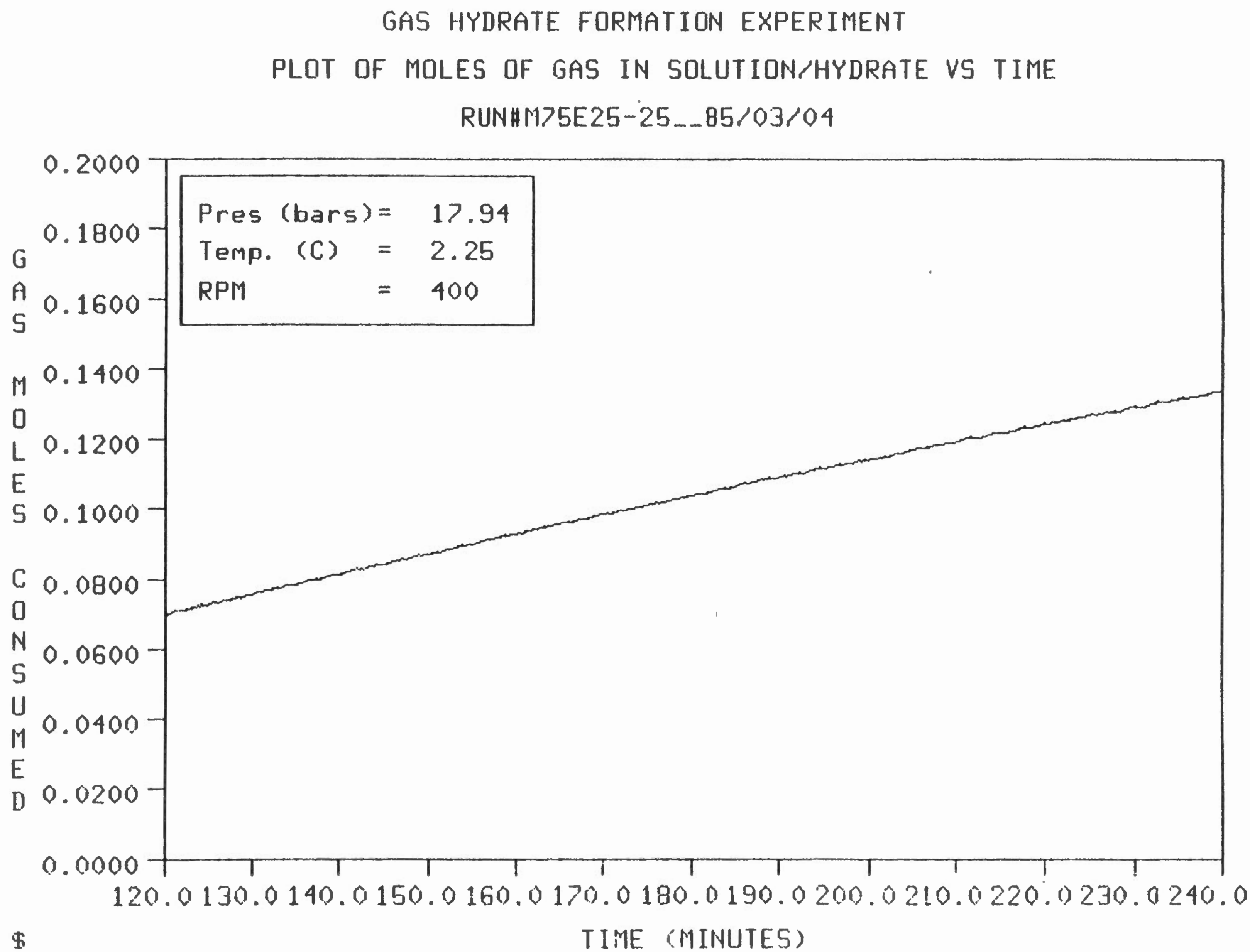
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-24__85/03/01



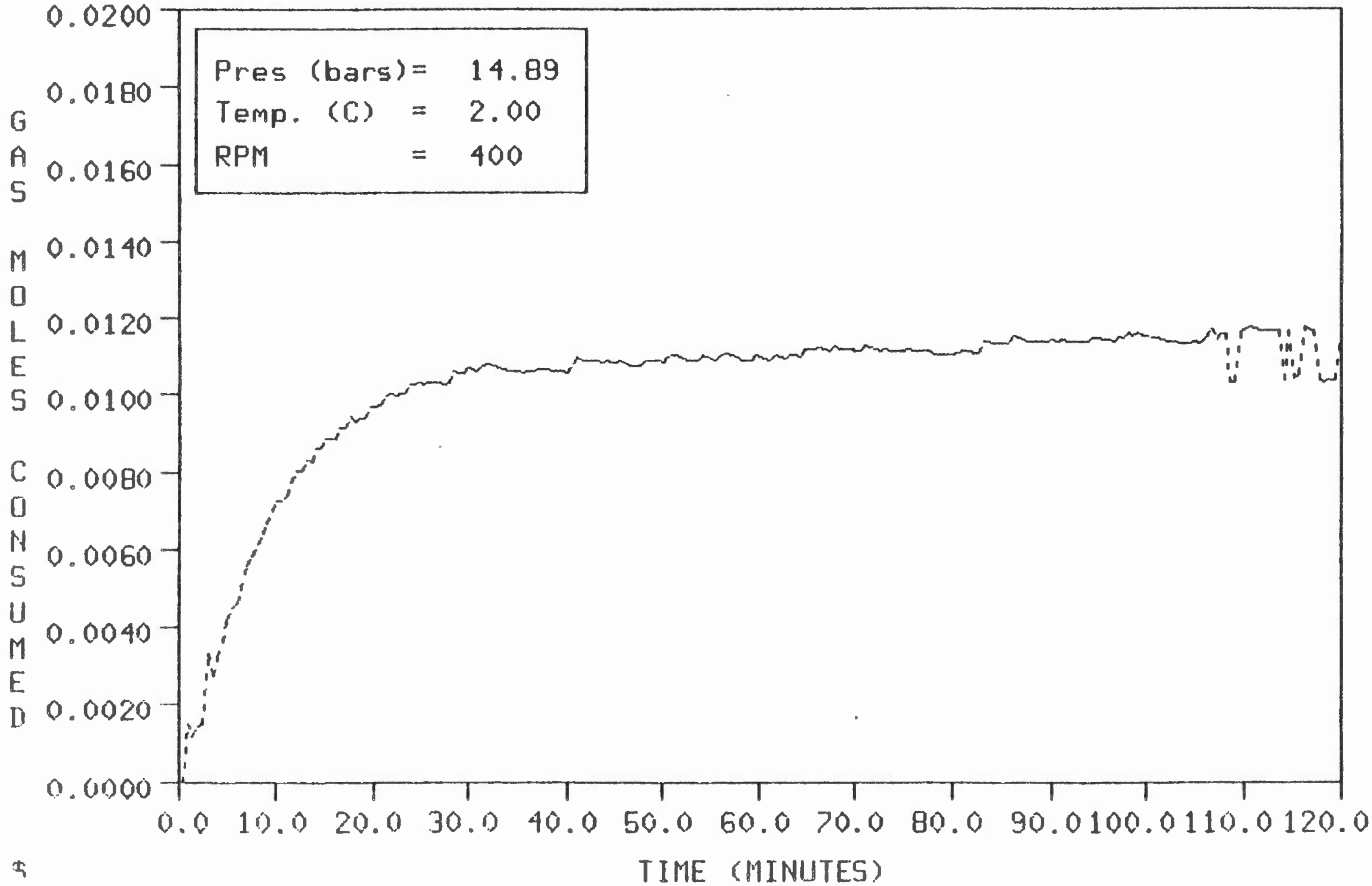

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-25__85/03/04
Pres (bars)= 17.94
Temp. (C) = 2.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

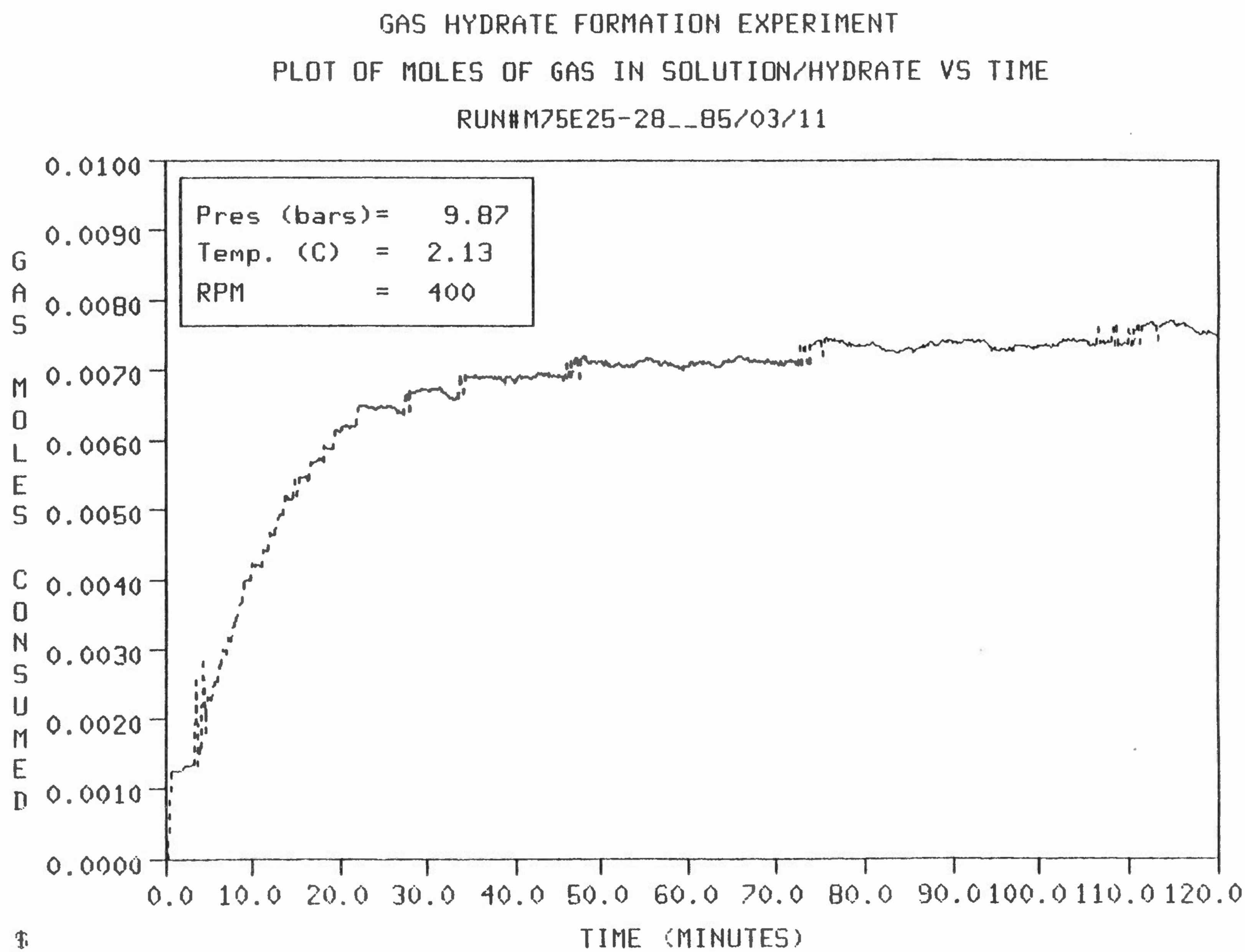

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-25__85/03/04
Pres (bars)= 17.94
Temp. (C) = 2.25
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

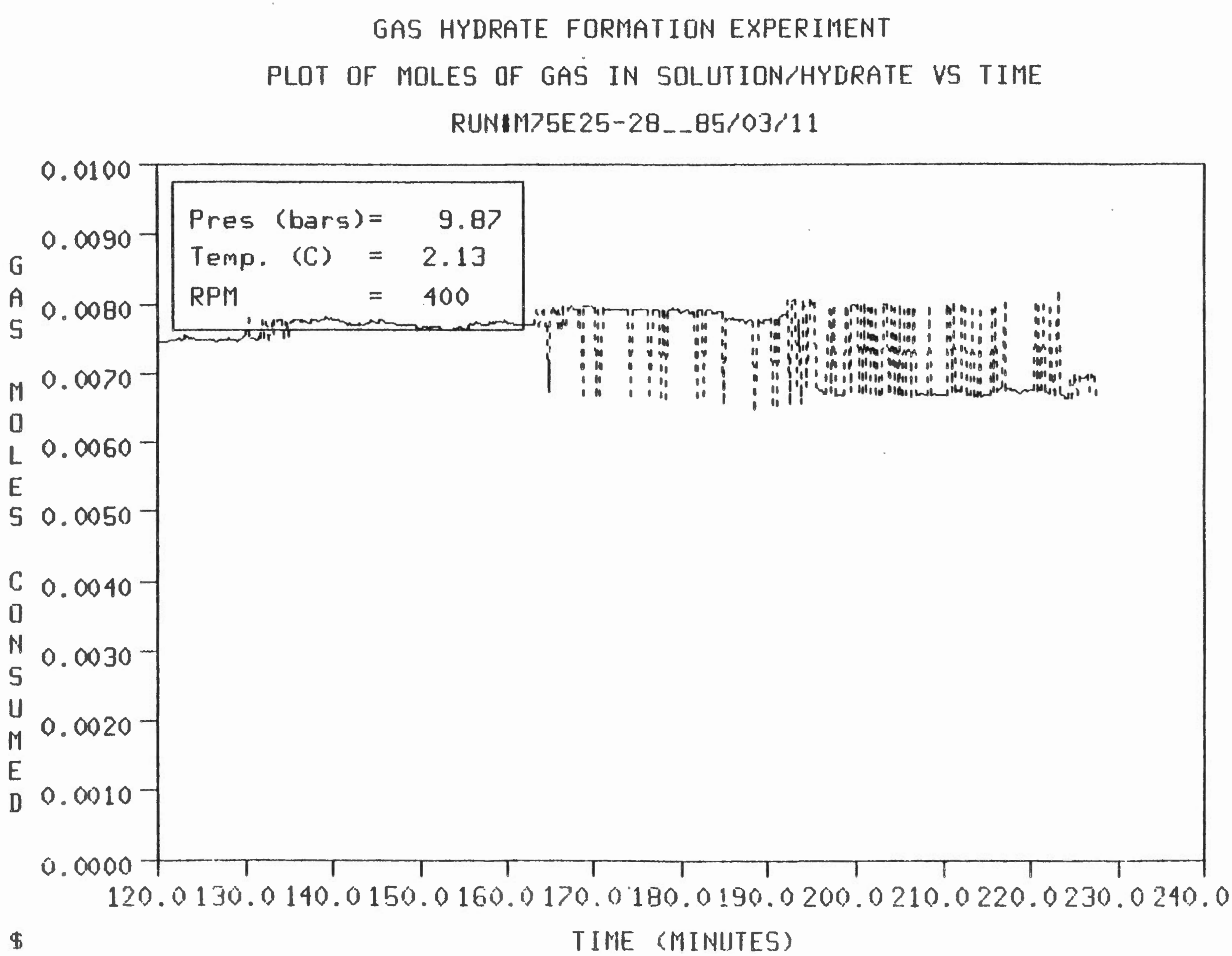
GAS HYDRATE FORMATION EXPERIMENT

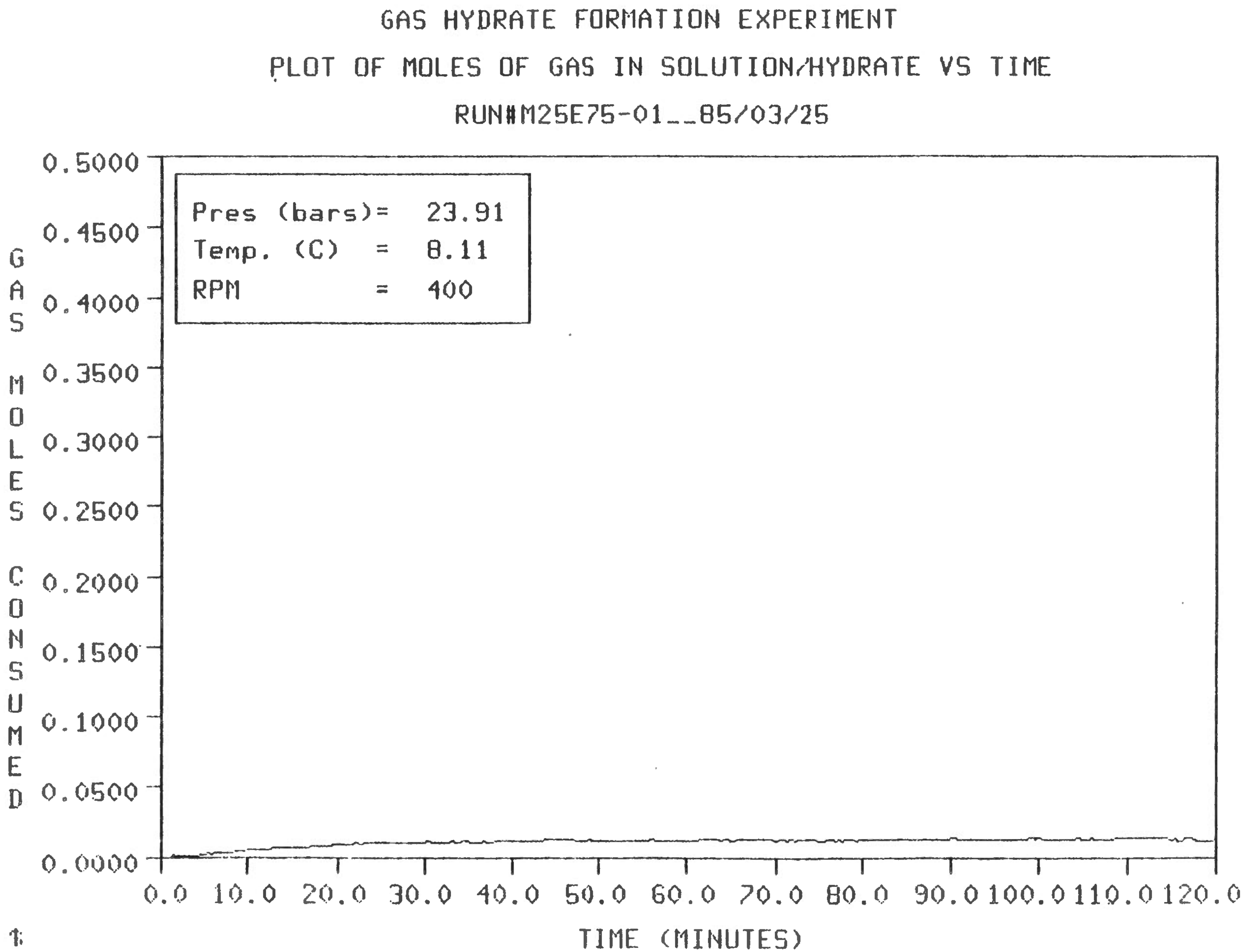
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M75E25-27__85/03/07




GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-28__85/03/11
Pres (bars)= 9.87
Temp. (C) = 2.13
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0010
0.0020
0.0030
0.0040
0.0050
0.0060
0.0070
0.0080
0.0090
0.0100
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M75E25-28__85/03/11
Pres (bars)= 9.87
Temp. (C) = 2.13
RPM = 400
GAS MOLES CONSUMED
0.0100
0.0090
0.0080
0.0070
0.0060
0.0050
0.0040
0.0030
0.0020
0.0010
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

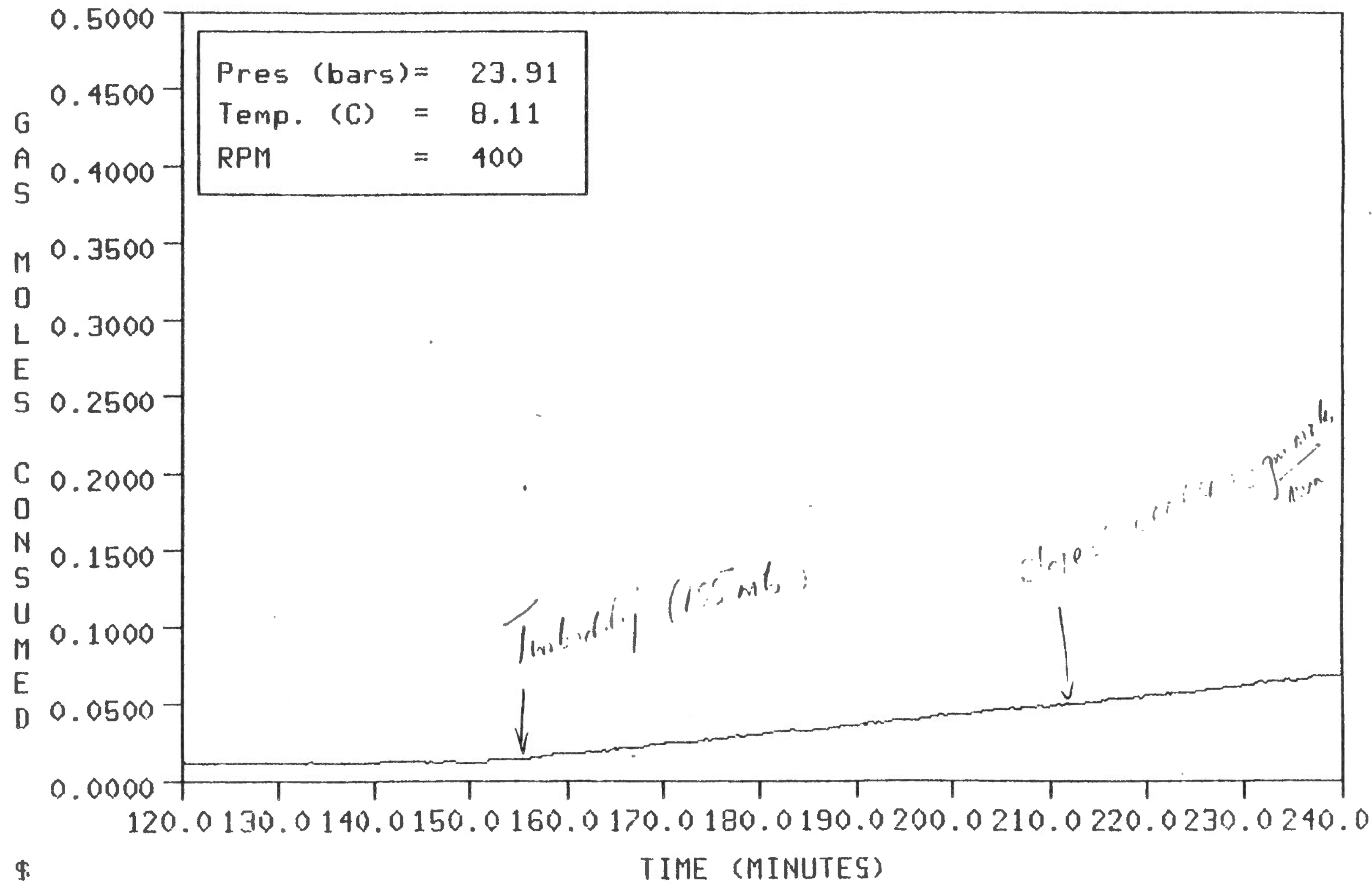


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-01__85/03/25
Pres (bars)= 23.91
Temp. (C) = 8.11
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

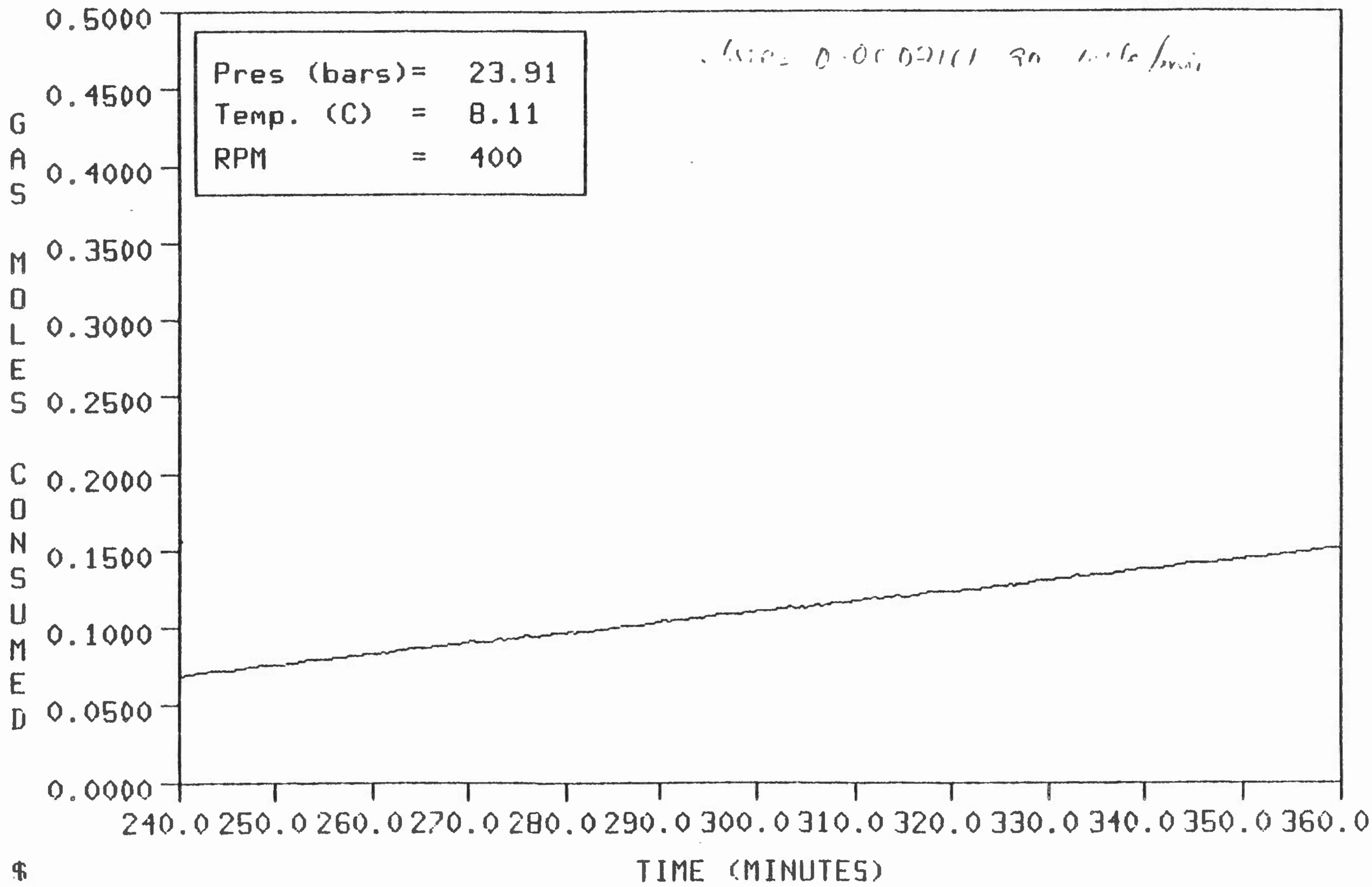
RUN#M25E75-01__85/03/25



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

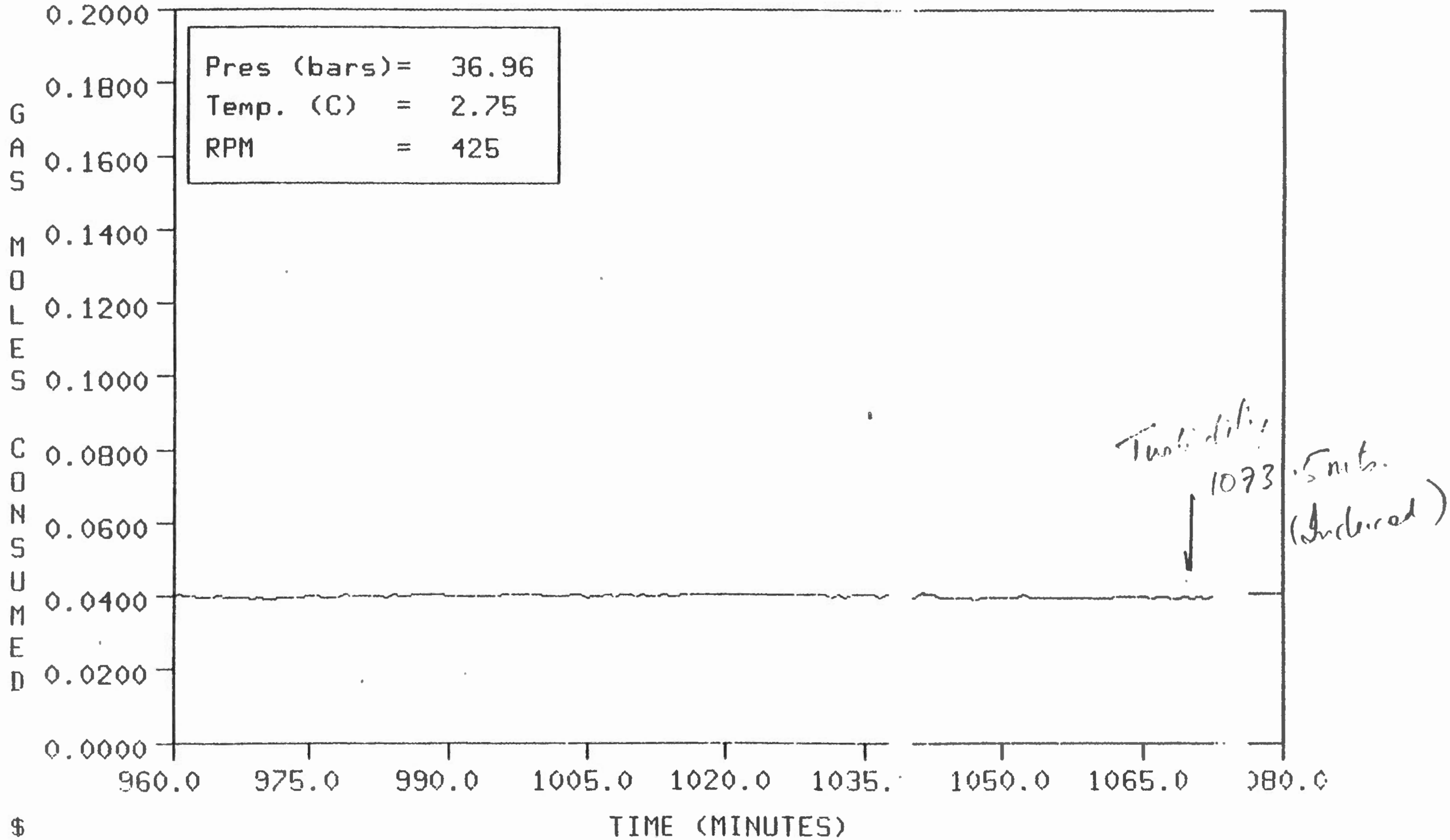
RUN#M25E75-01__85/03/25



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

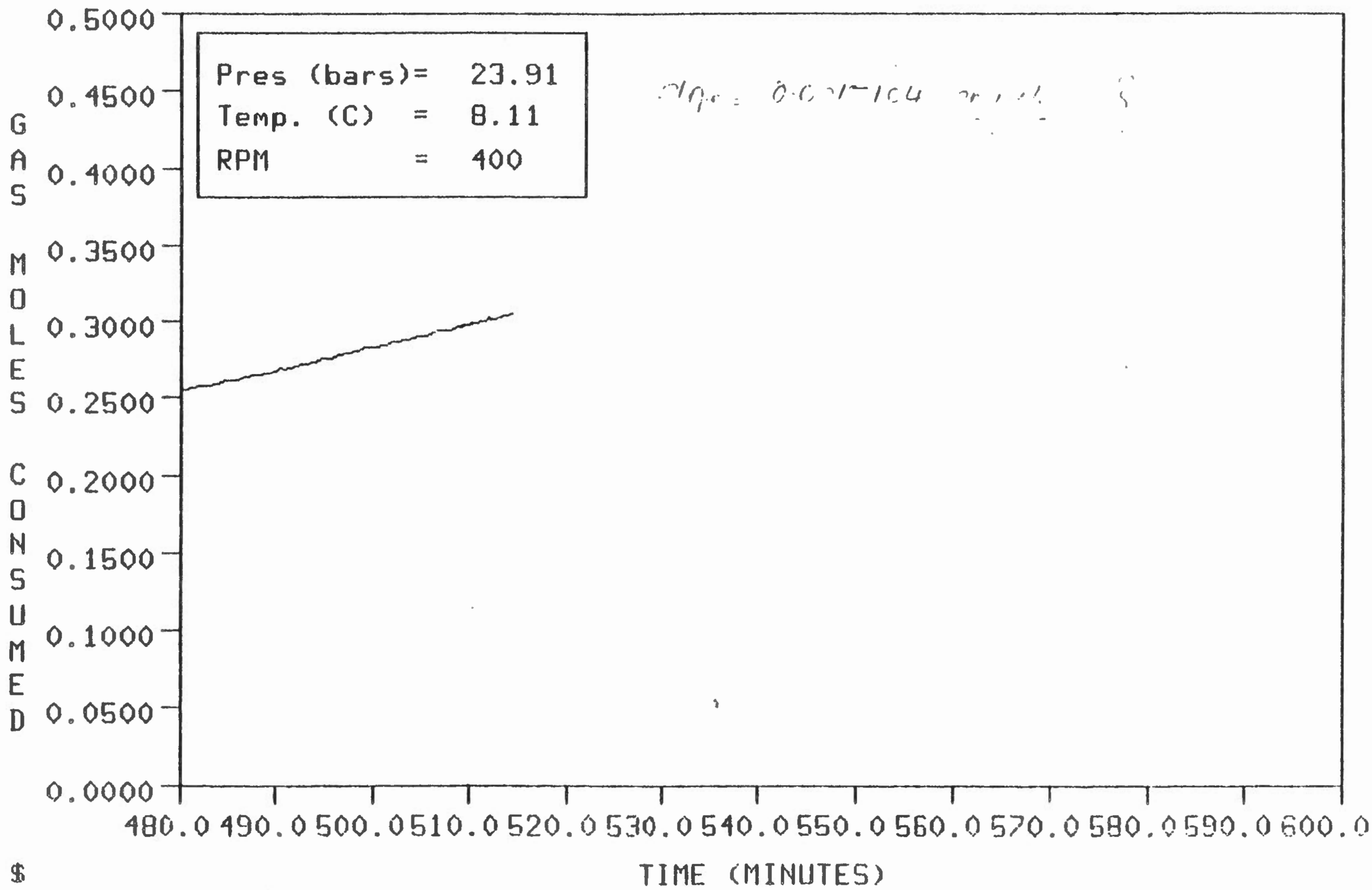
RUN#MTH100-42__85/08/27



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

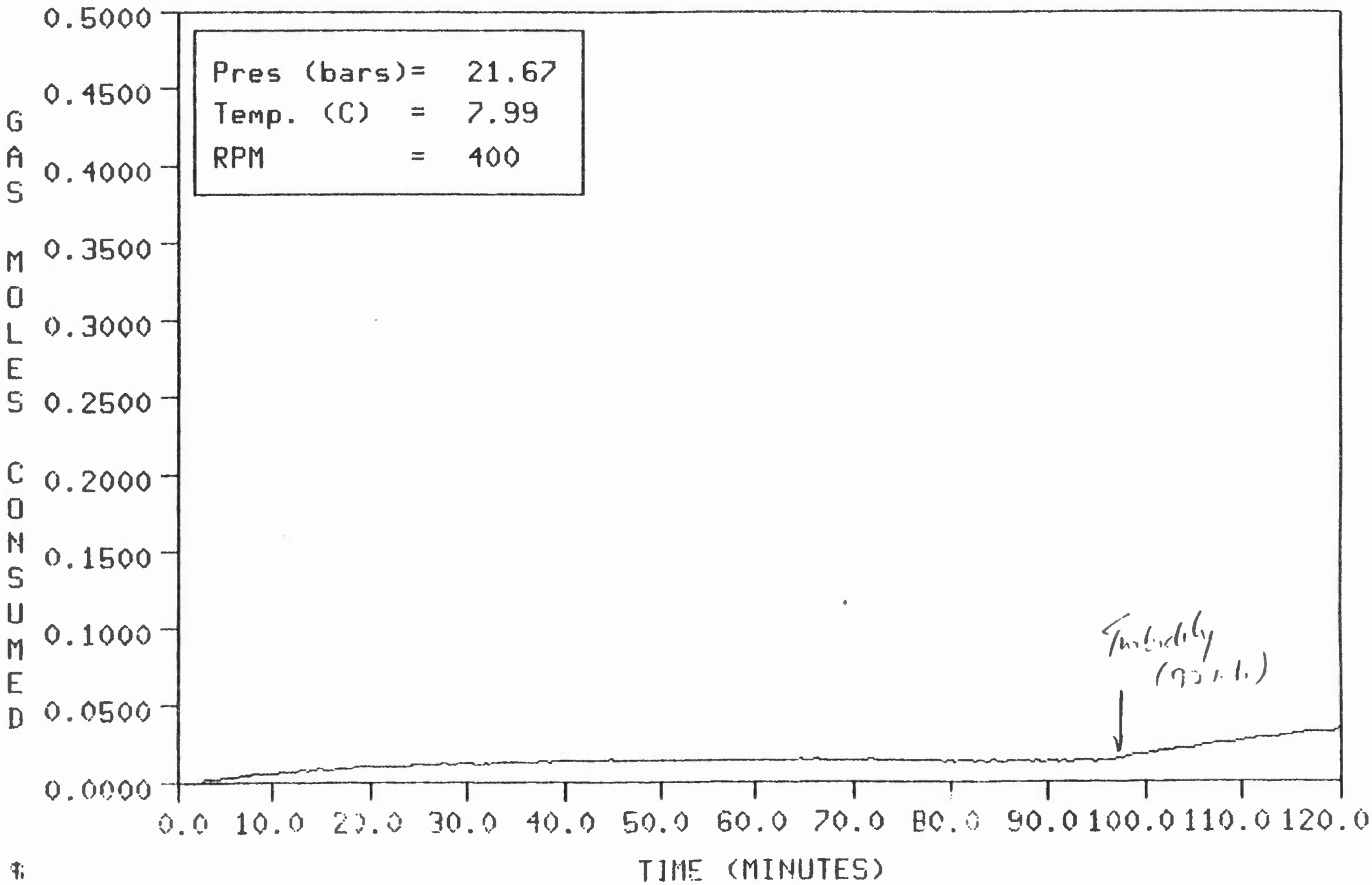
RUN#M25E75-01__85/03/25



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

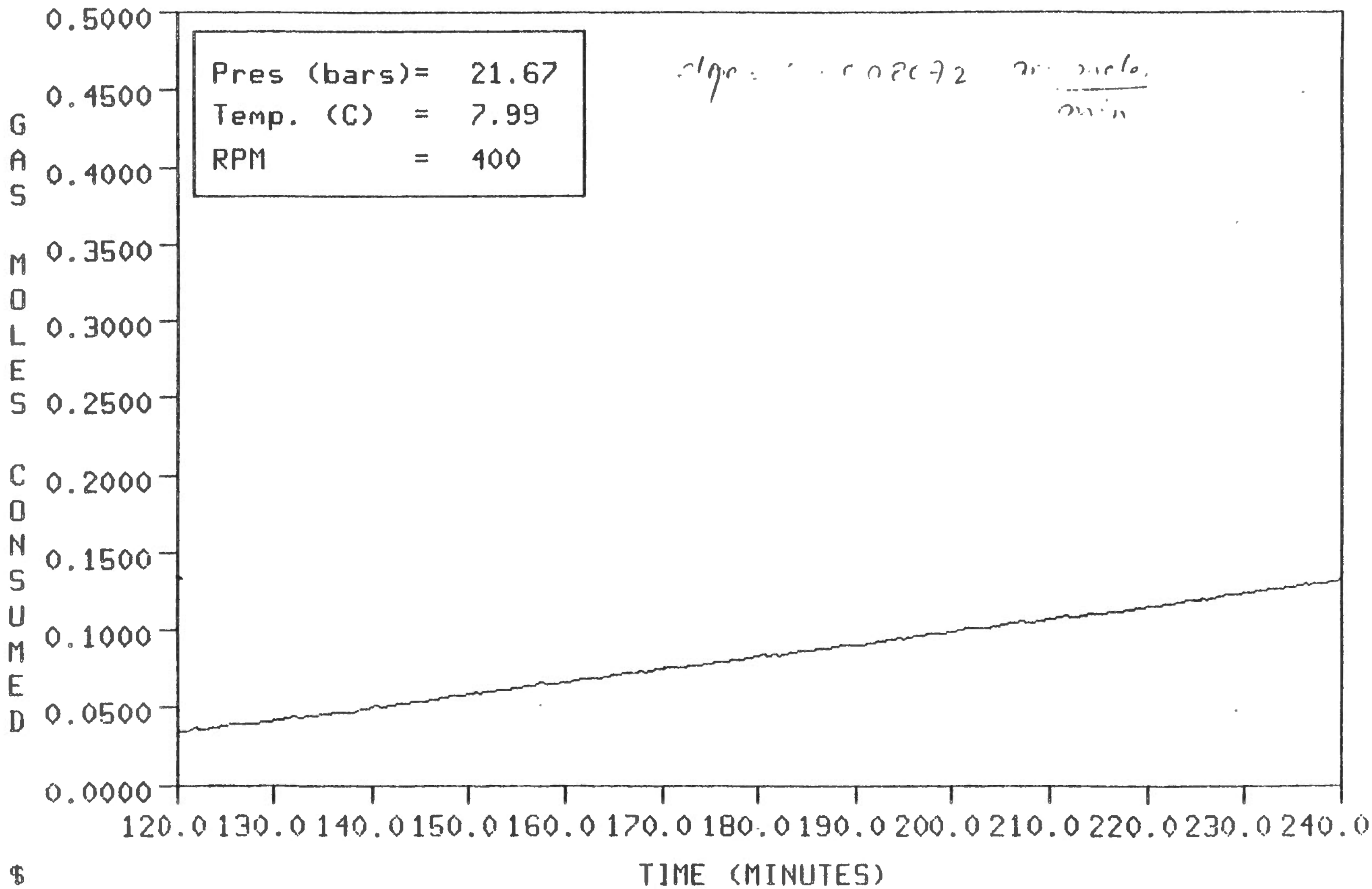
RUN#M25E75-02__85/03/26



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-02__85/03/26



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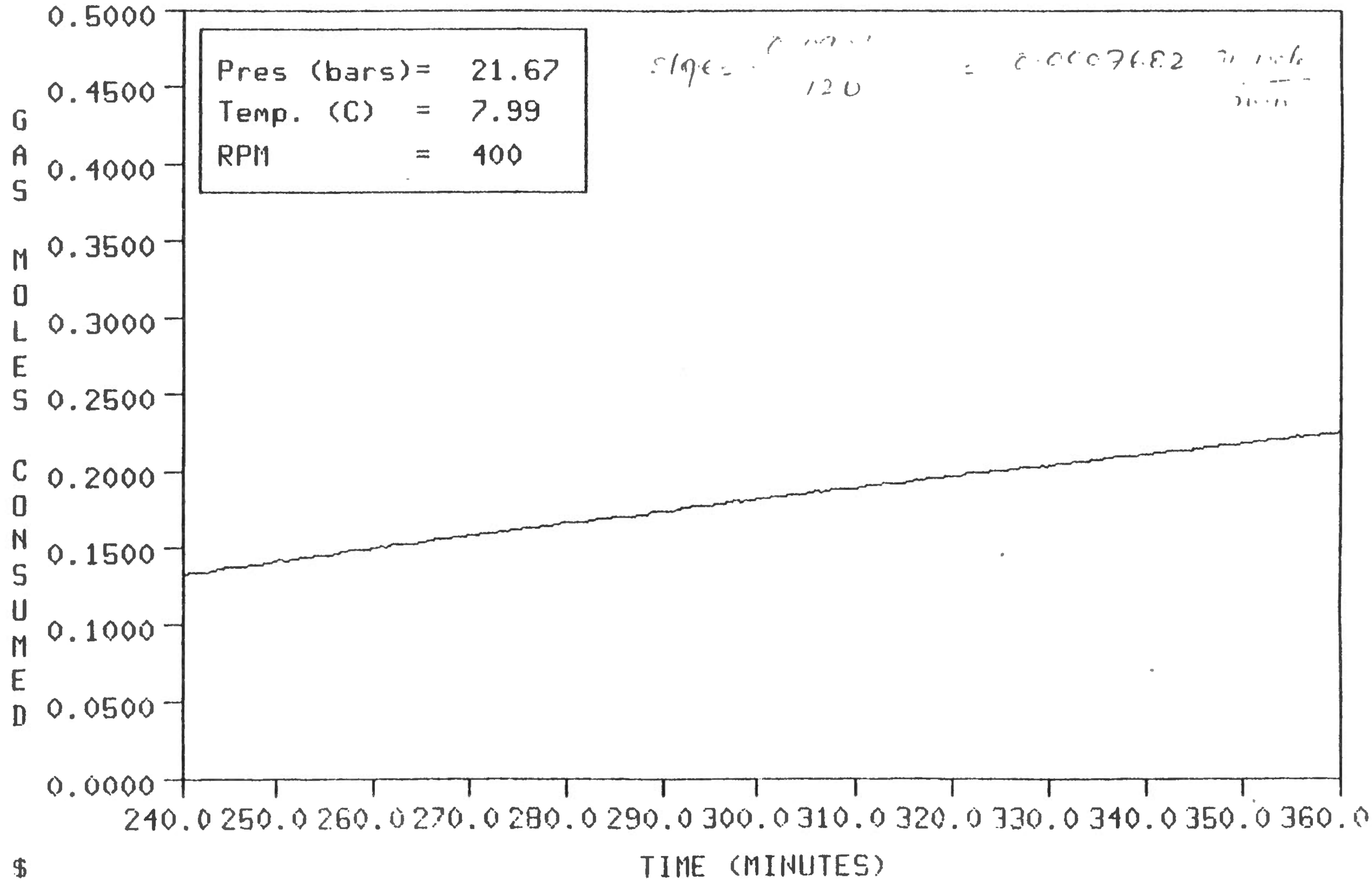
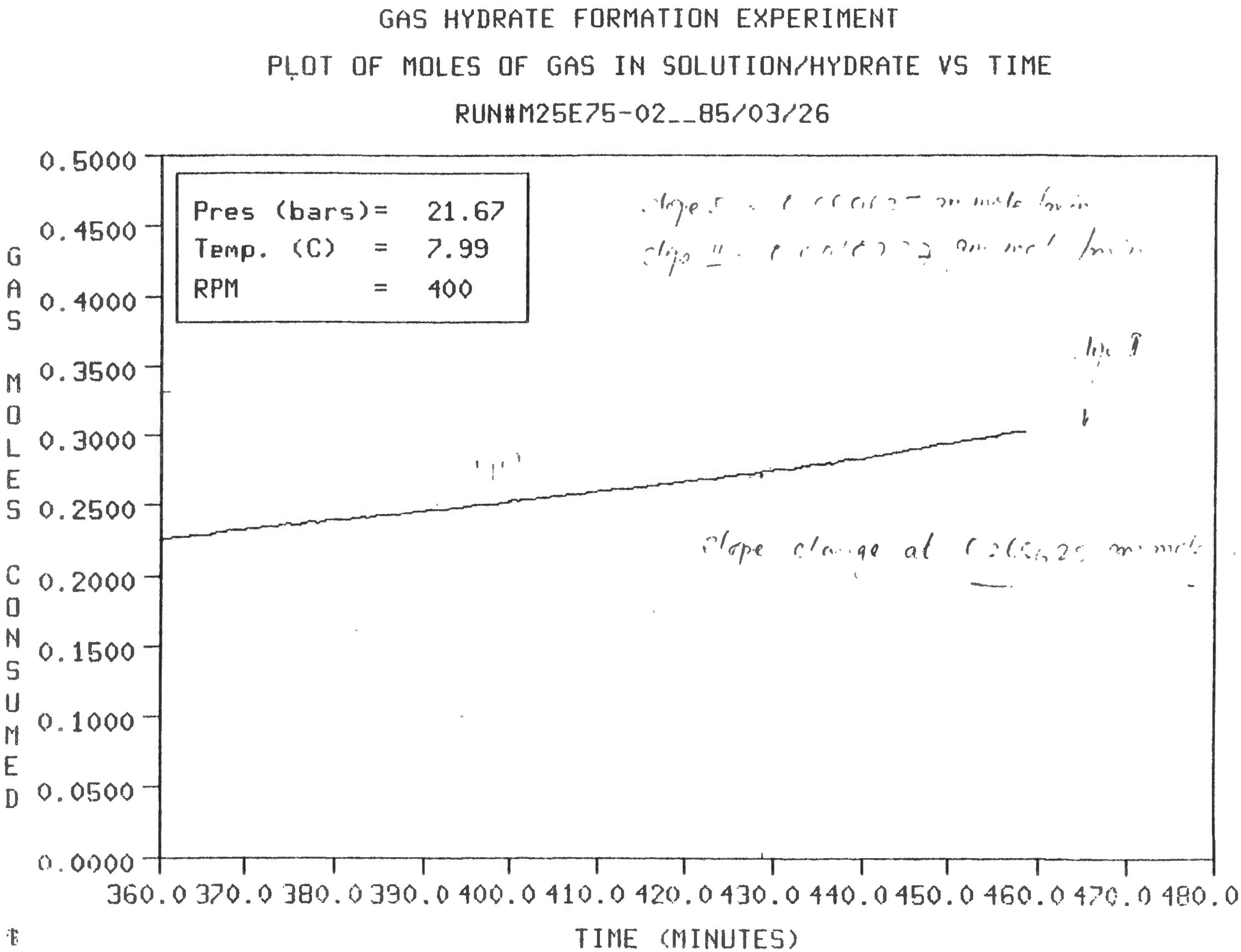
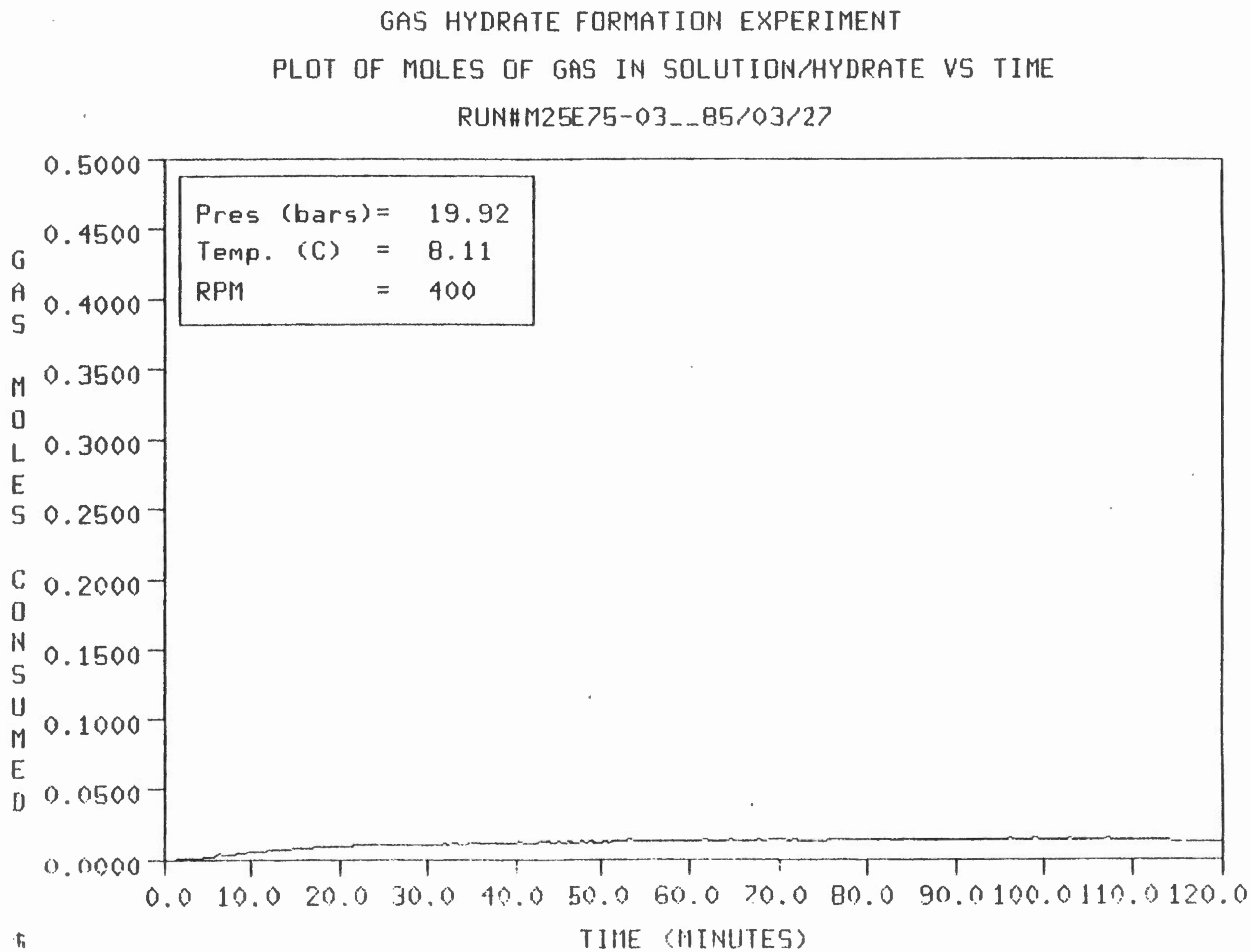
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

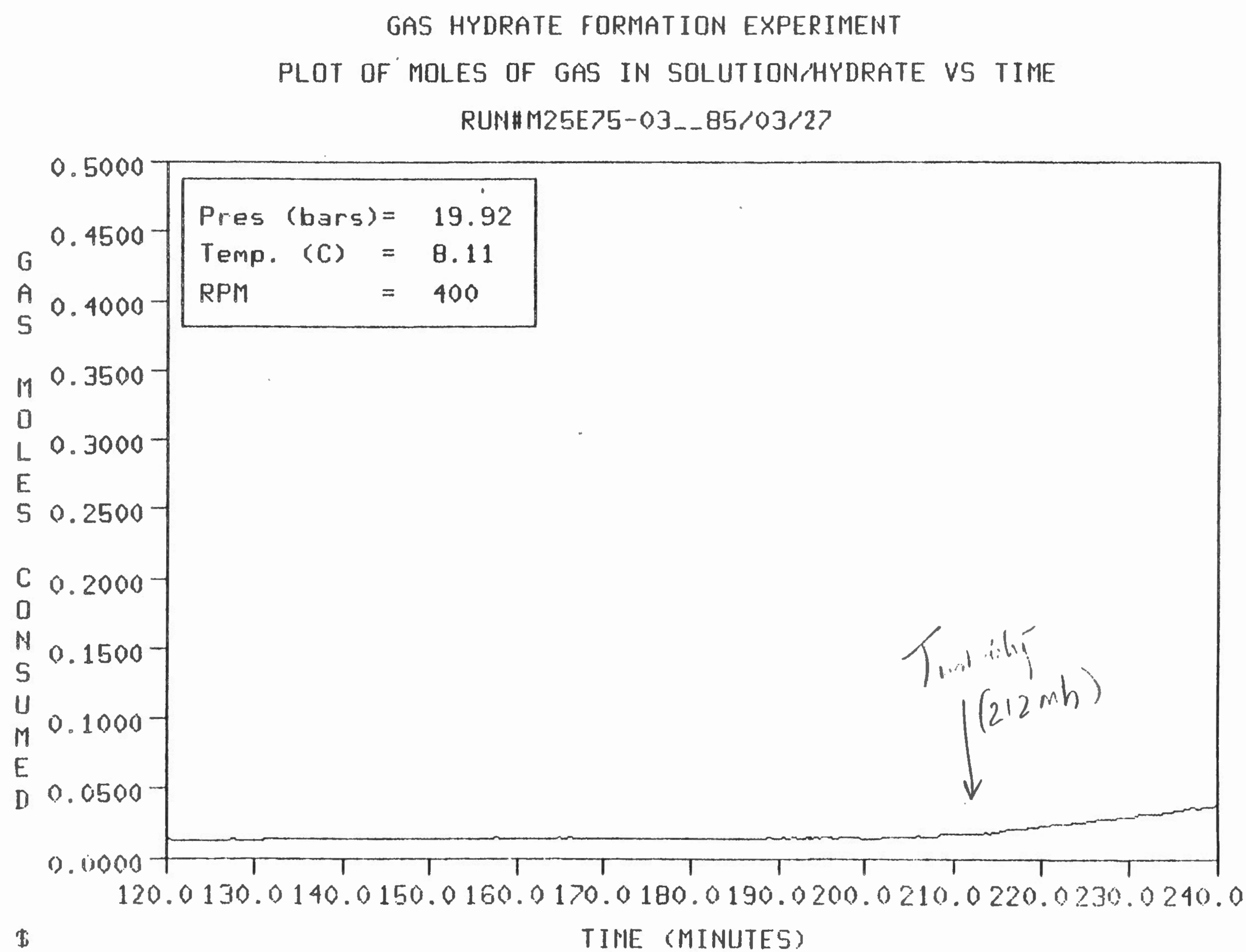
RUN#M25E75-02__85/03/26




GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-02__85/03/26
Pres (bars)= 21.67
Temp. (C) = 7.99
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)



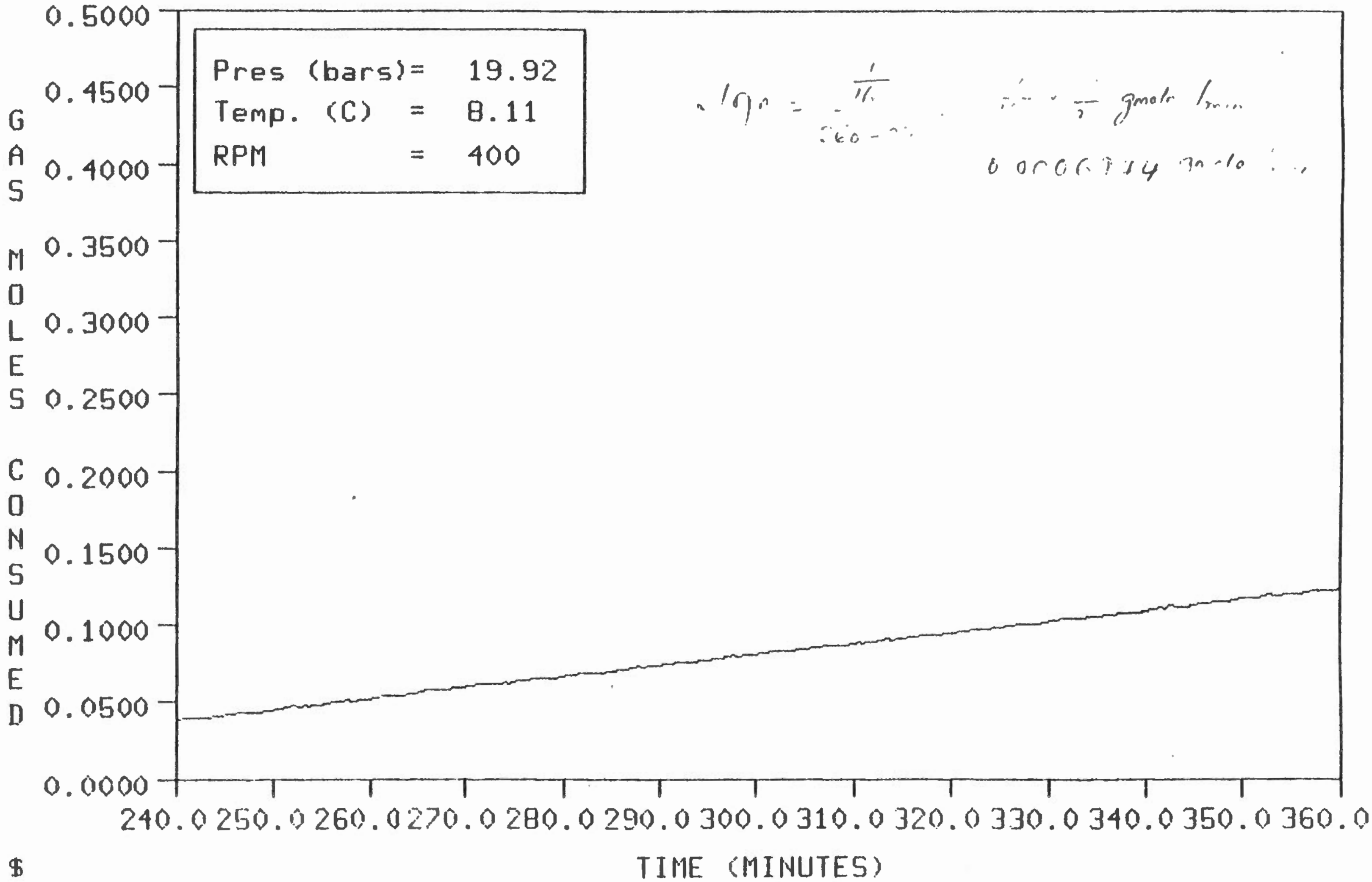
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-03__85/03/27
Pres (bars)= 19.92
Temp. (C) = 8.11
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-03__85/03/27
Pres (bars)= 19.92
Temp. (C) = 8.11
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
(212 min)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-03__85/03/27

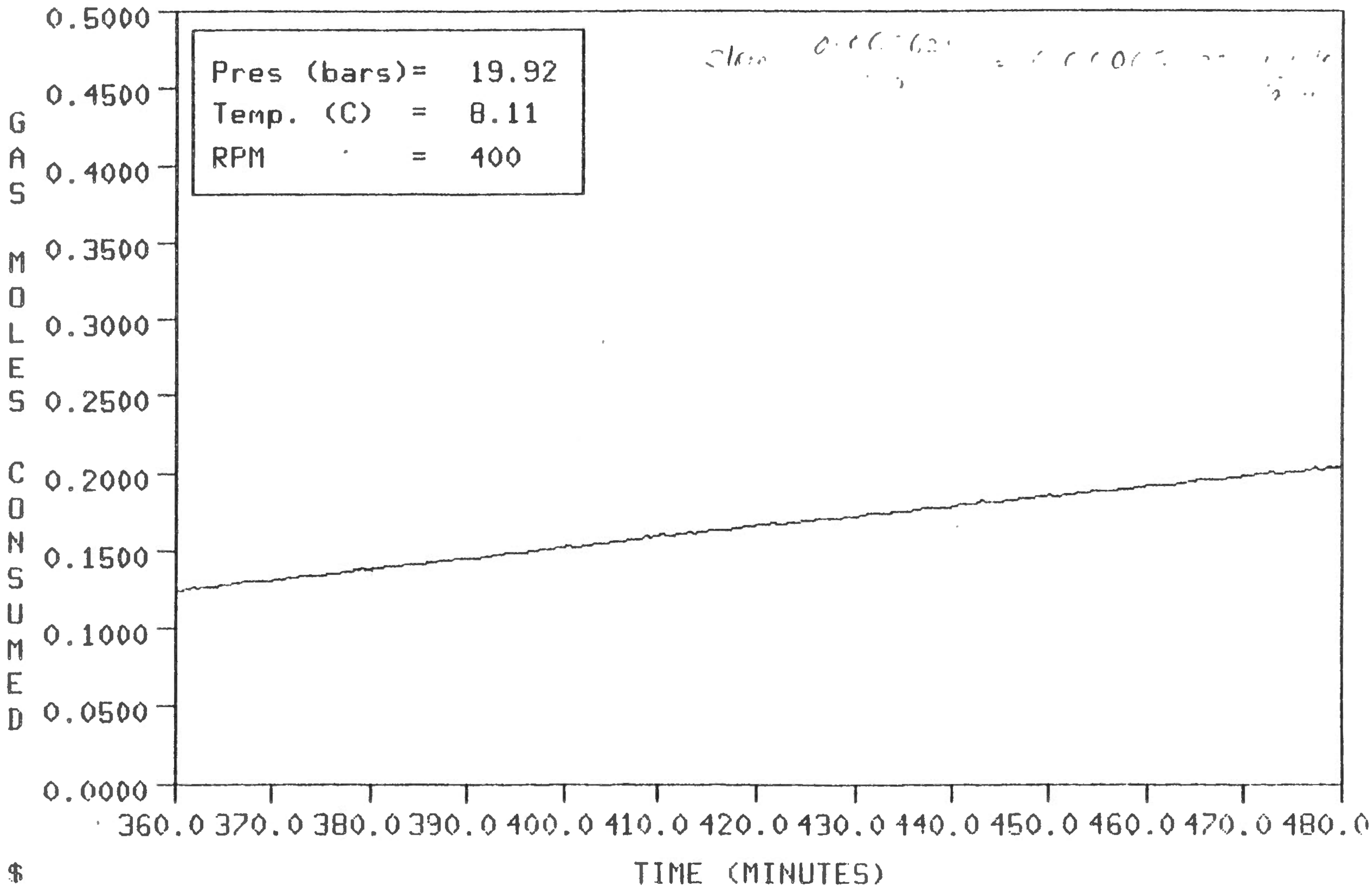


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

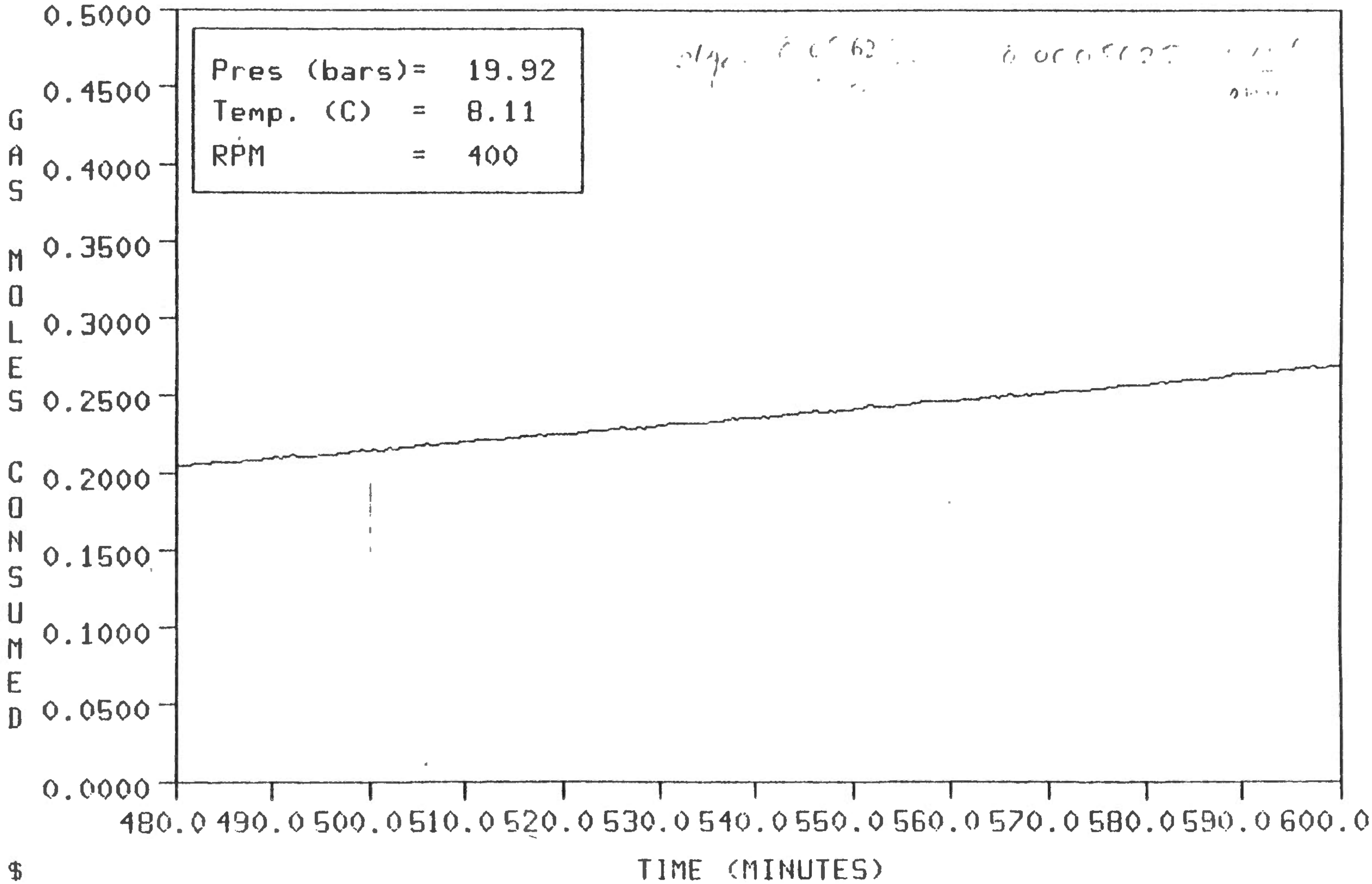
RUN#M25E75-03__85/03/27



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-03__85/03/27

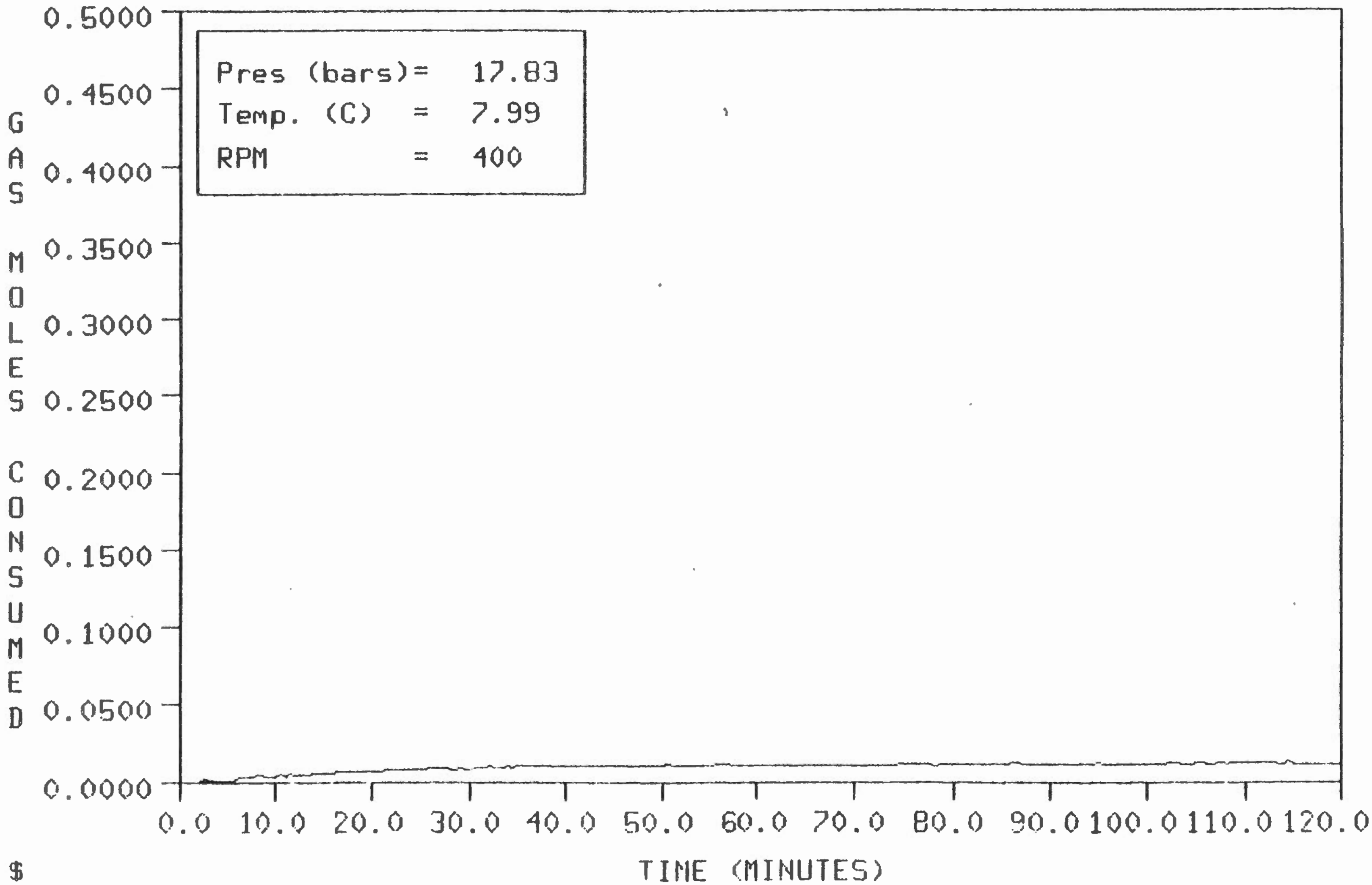


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

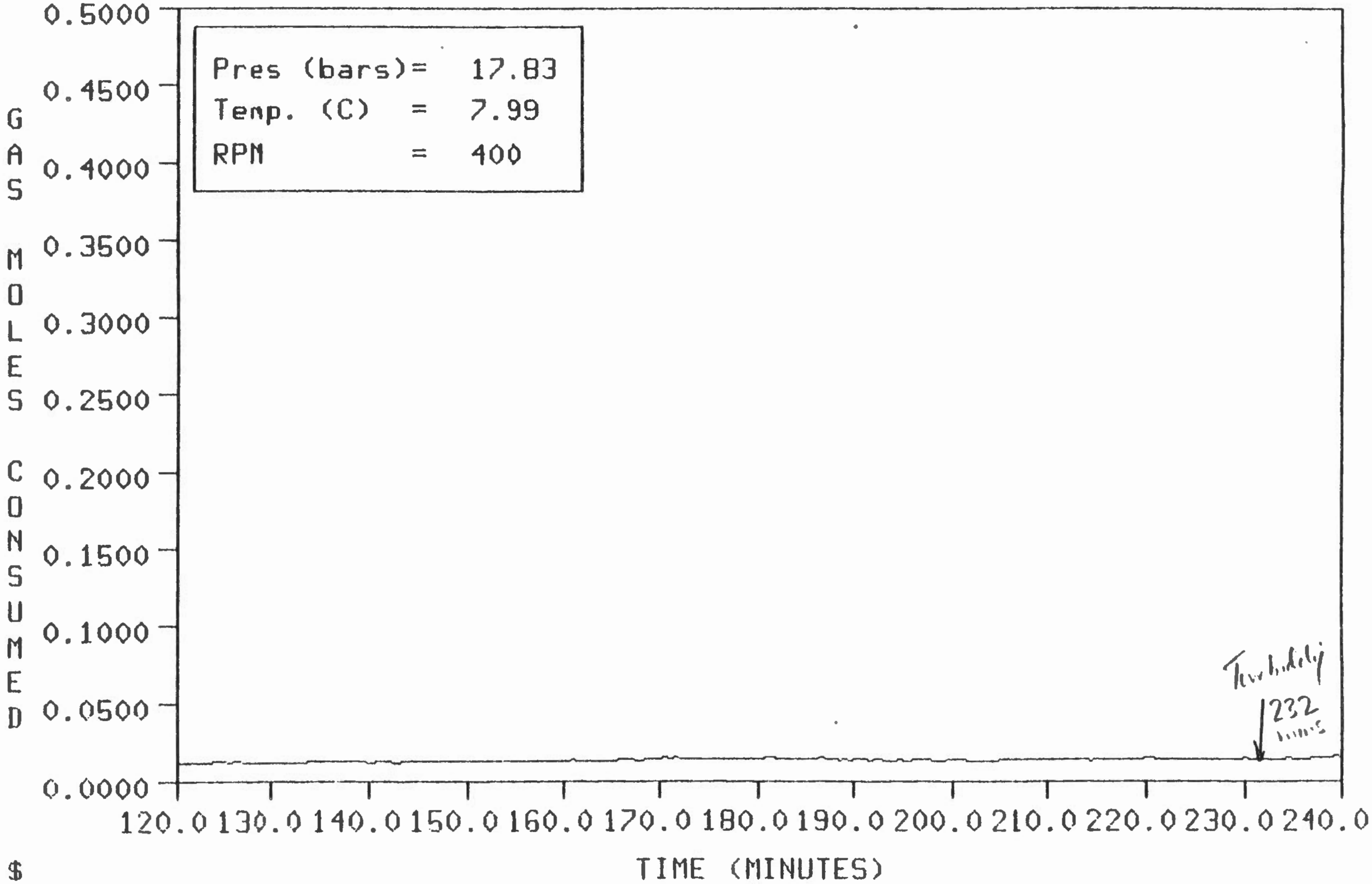
RUN#M25E75-04__85/03/28

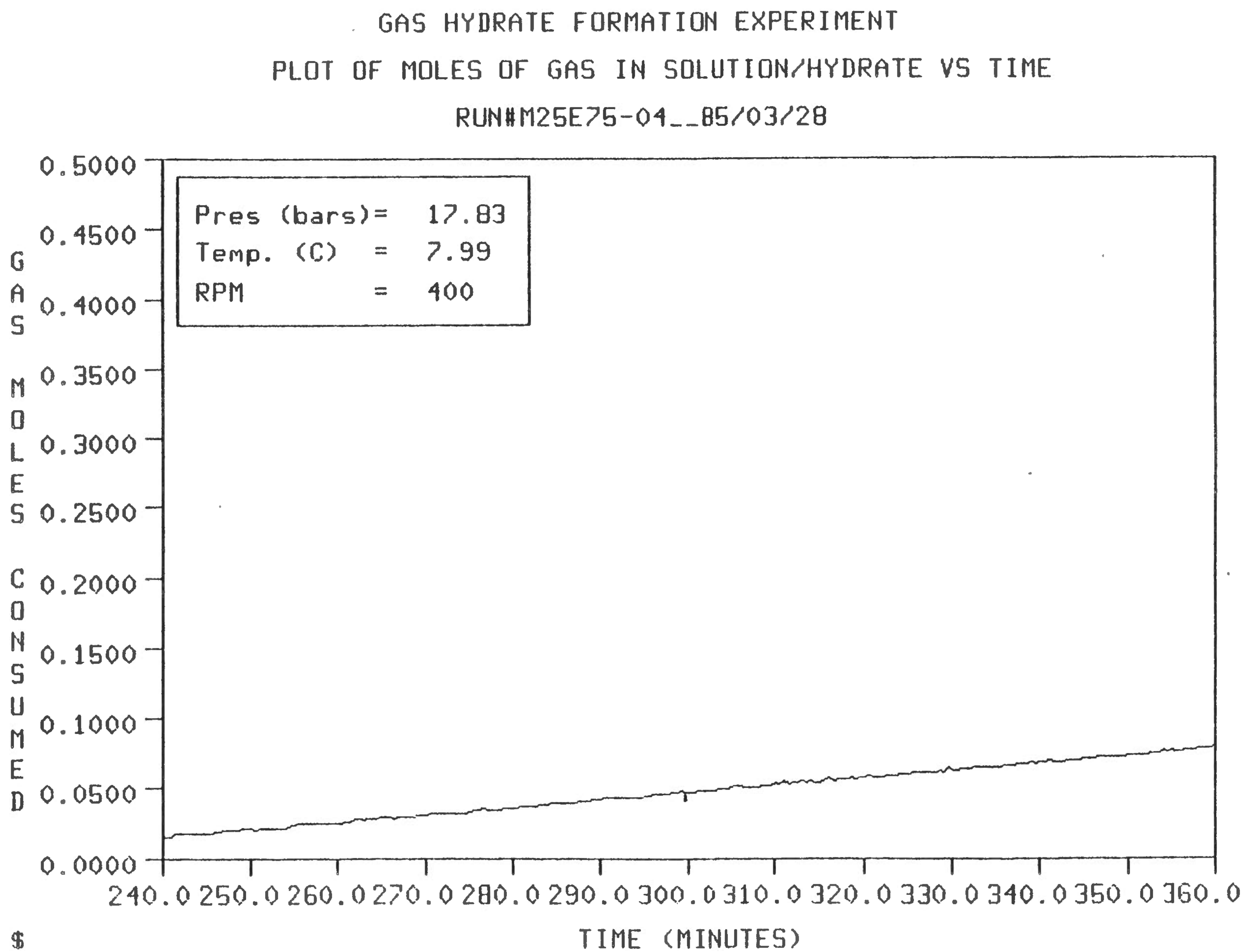


GAS HYDRATE FORMATION EXPERIMENT

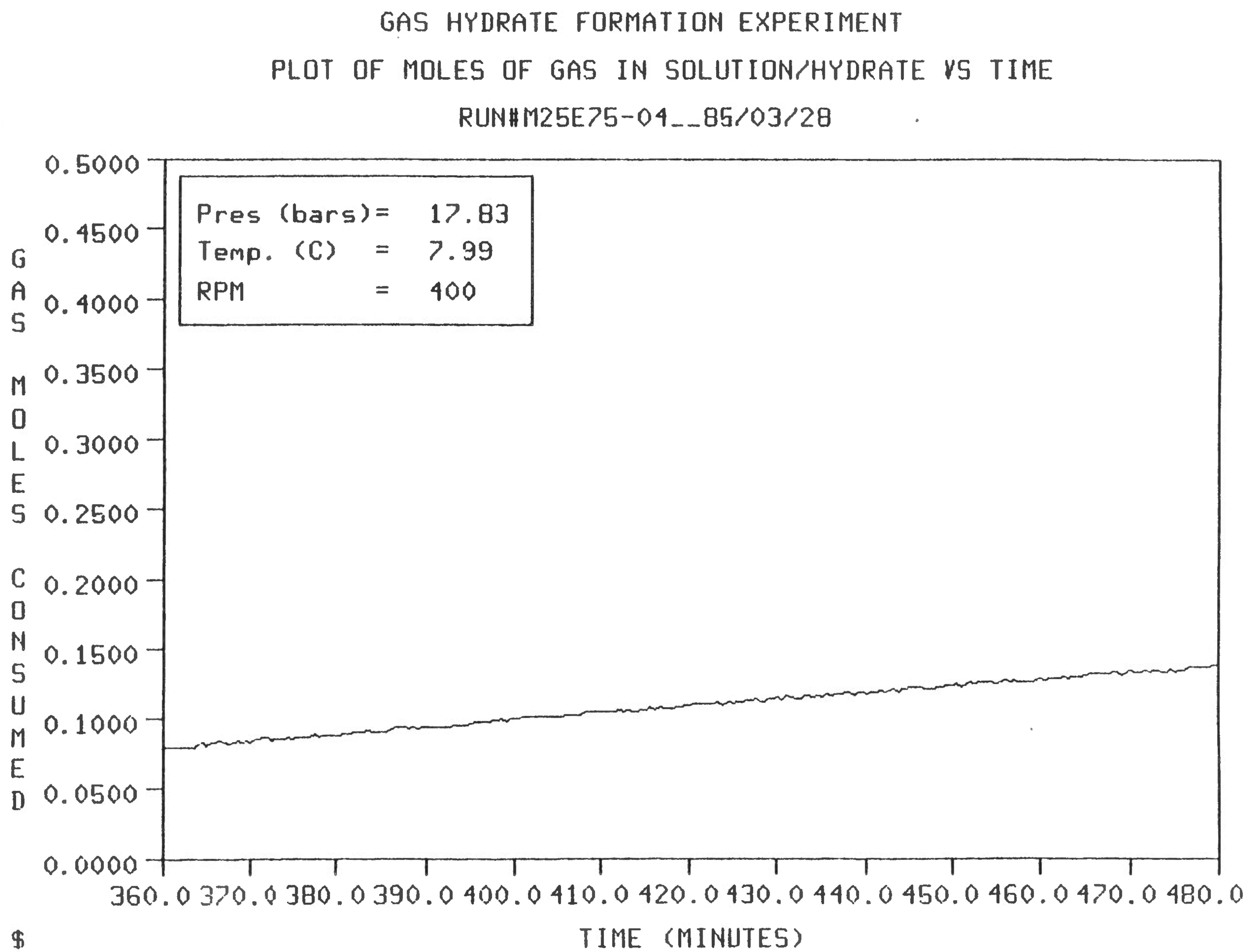
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-04__85/03/28

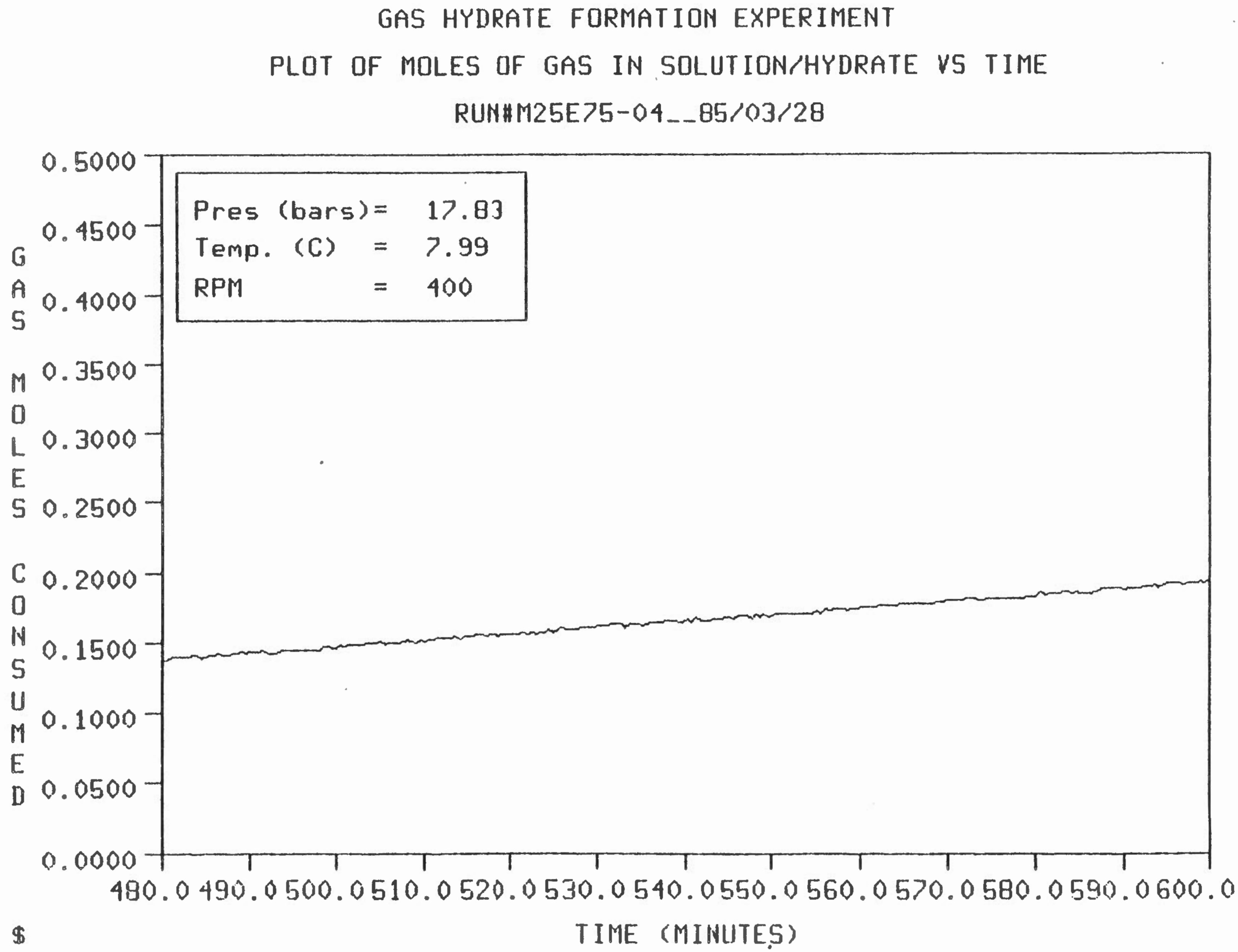




GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-04__85/03/28
Pres (bars)= 17.83
Temp. (C) = 7.99
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$



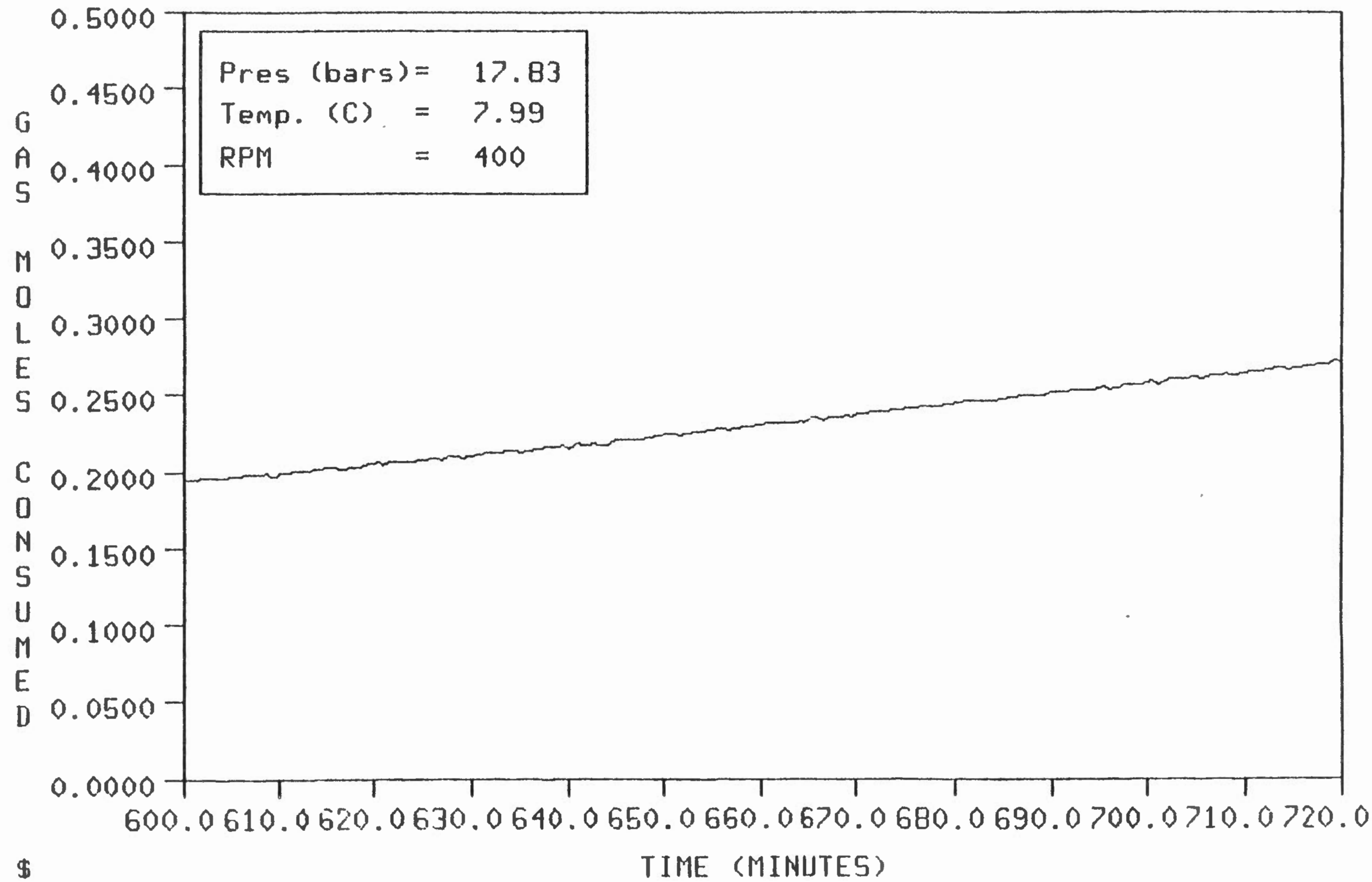
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-04__85/03/28
Pres (bars)= 17.83
Temp. (C) = 7.99
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-04__85/03/28
Pres (bars)= 17.83
Temp. (C) = 7.99
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
480.0 490.0 500.0 510.0 520.0 530.0 540.0 550.0 560.0 570.0 580.0 590.0 600.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

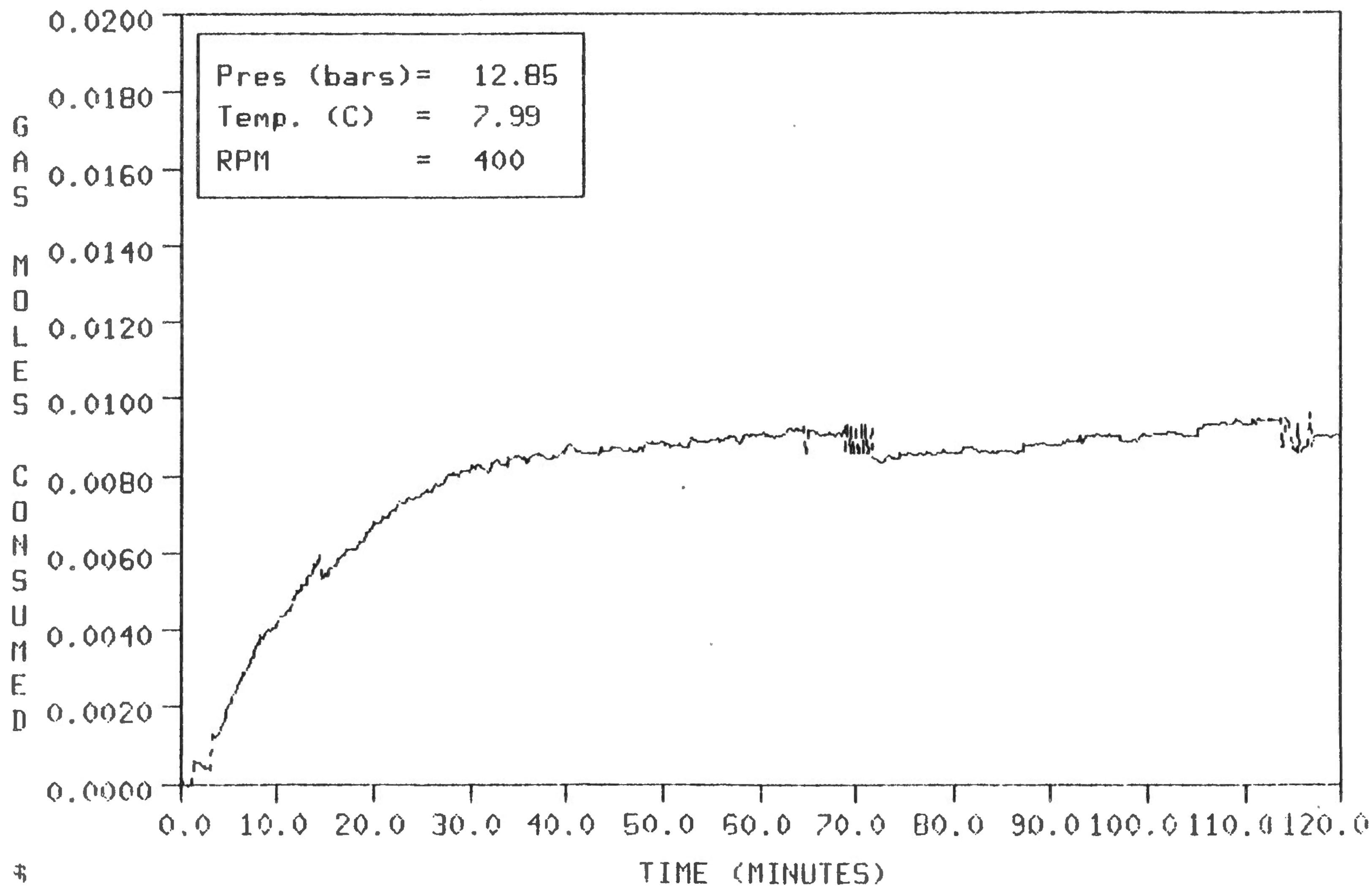
RUN#M25E75-04__85/03/28



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-05__85/03/29



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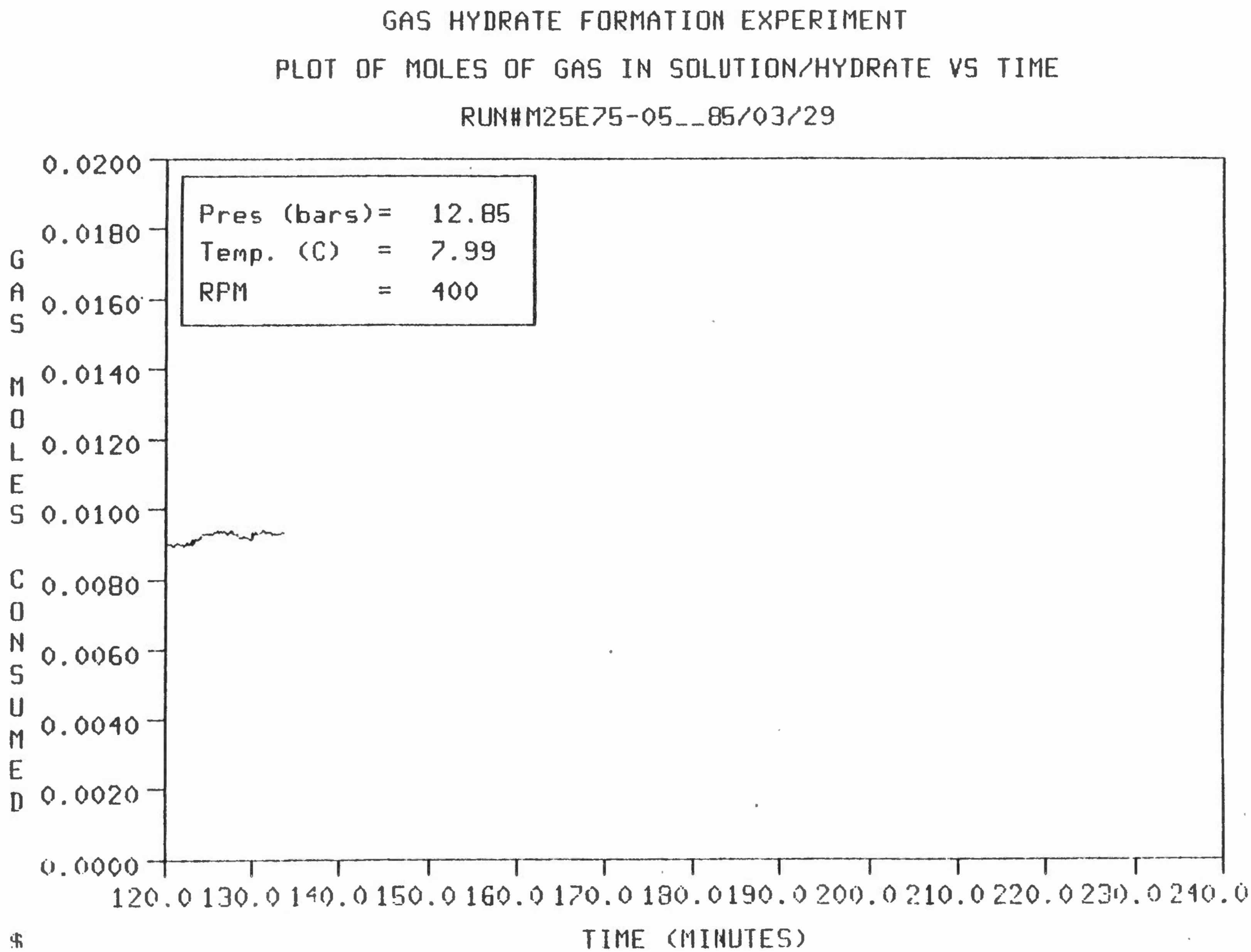
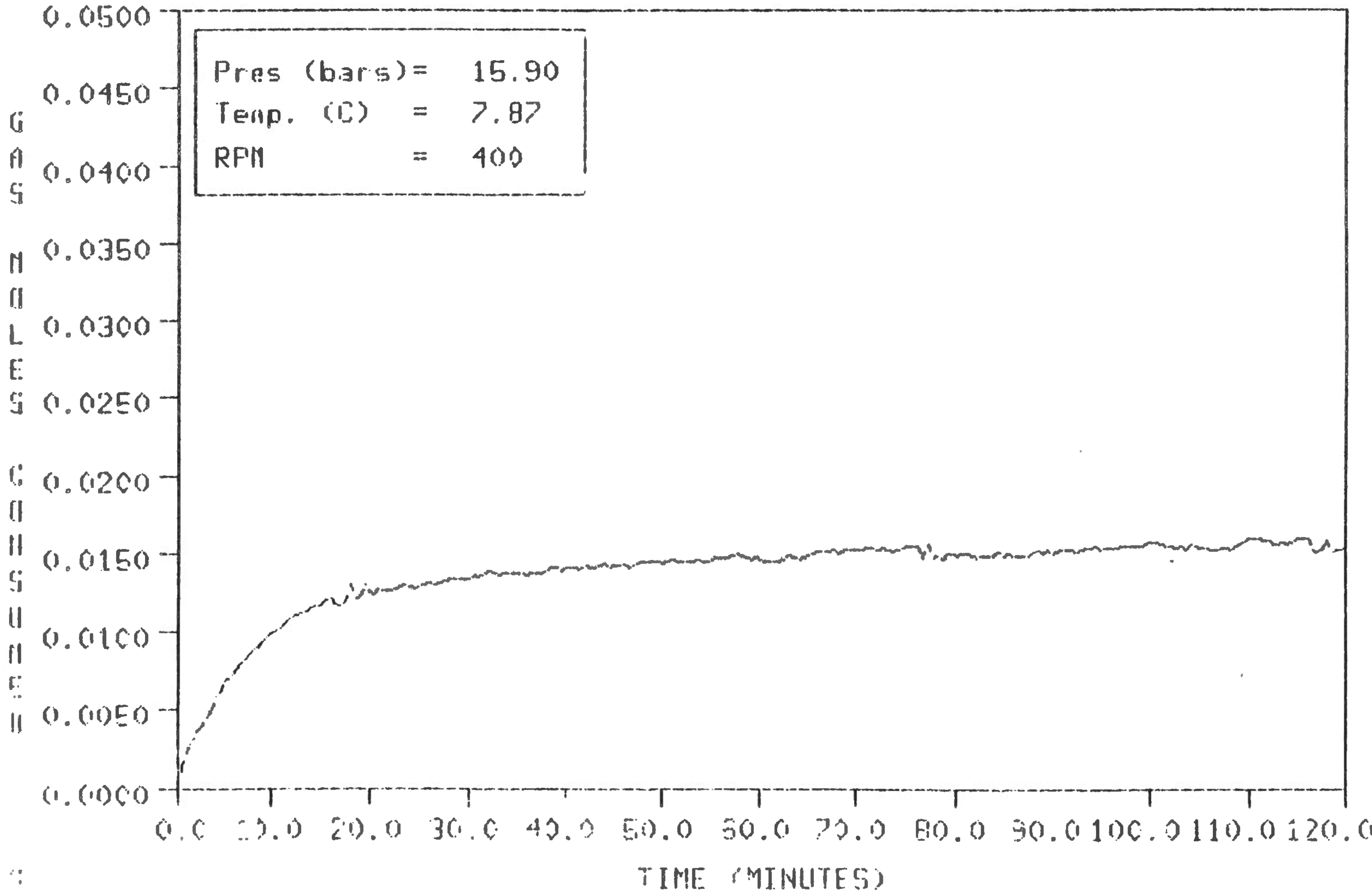

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-05__85/03/29
Pres (bars)= 12.85
Temp. (C) = 7.99
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)

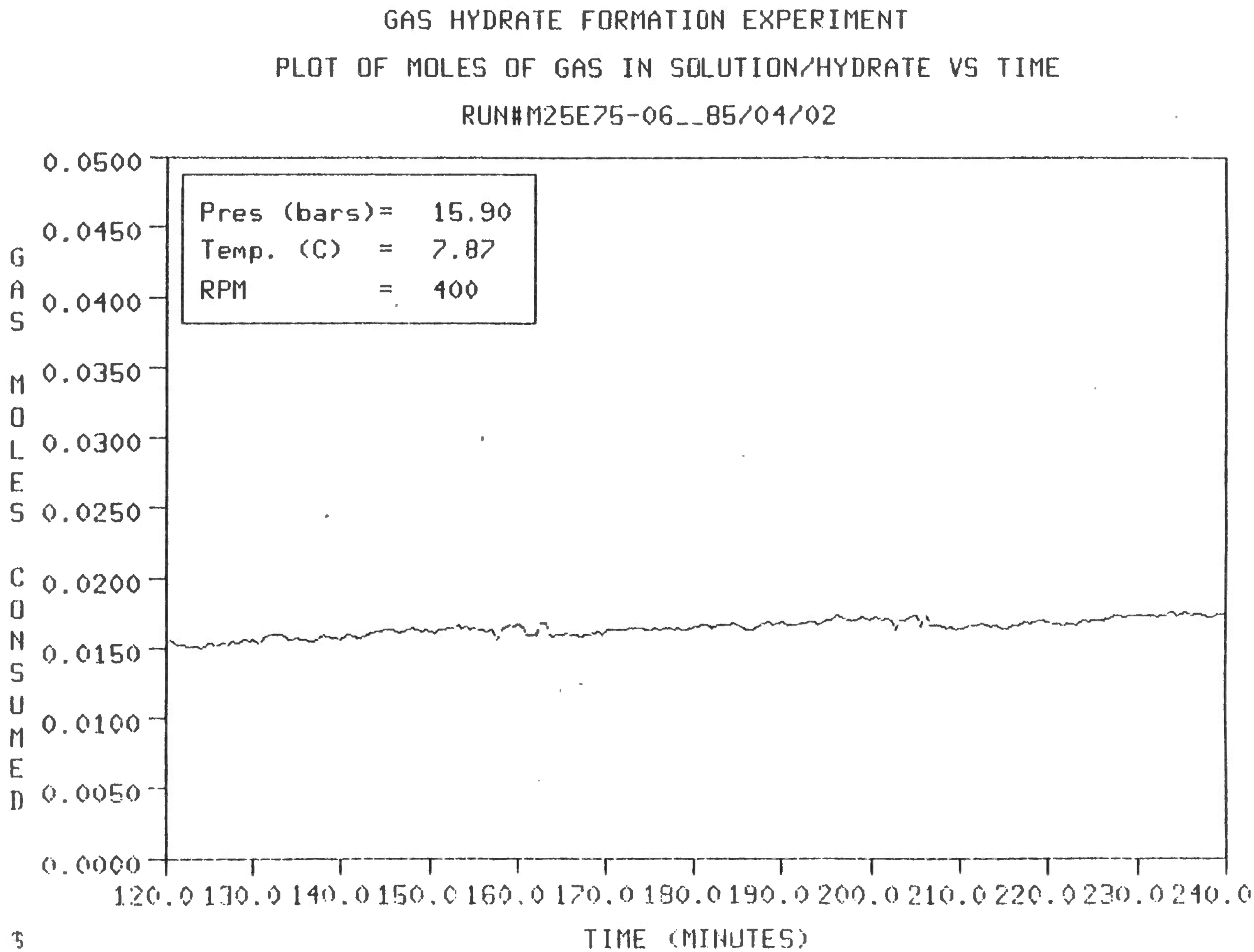
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-06__85/04/02

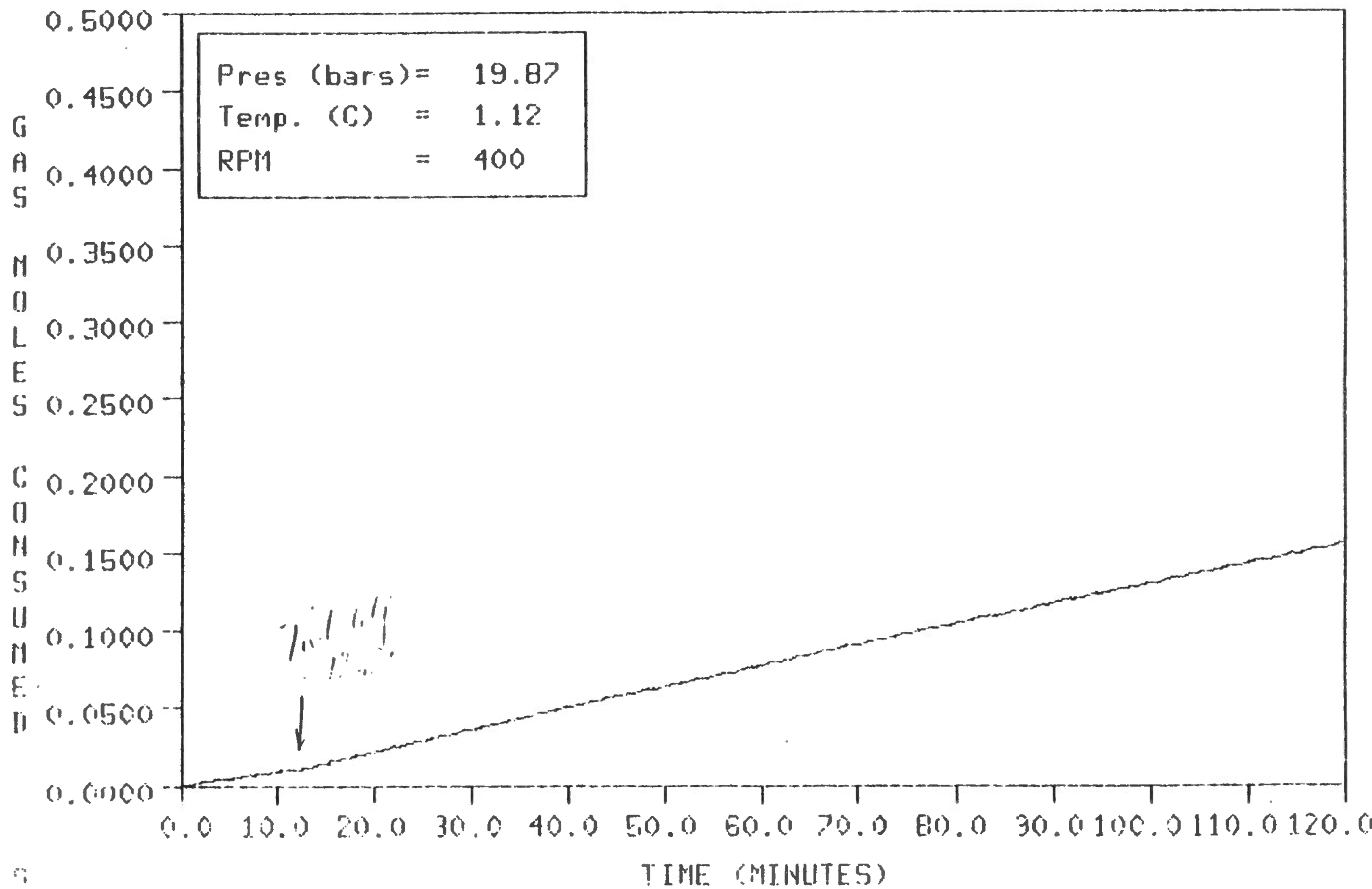



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-06__85/04/02
Pres (bars)= 15.90
Temp. (C) = 7.87
RPM = 400
GAS MOLES CONSUMED
0.0500
0.0450
0.0400
0.0350
0.0300
0.0250
0.0200
0.0150
0.0100
0.0050
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

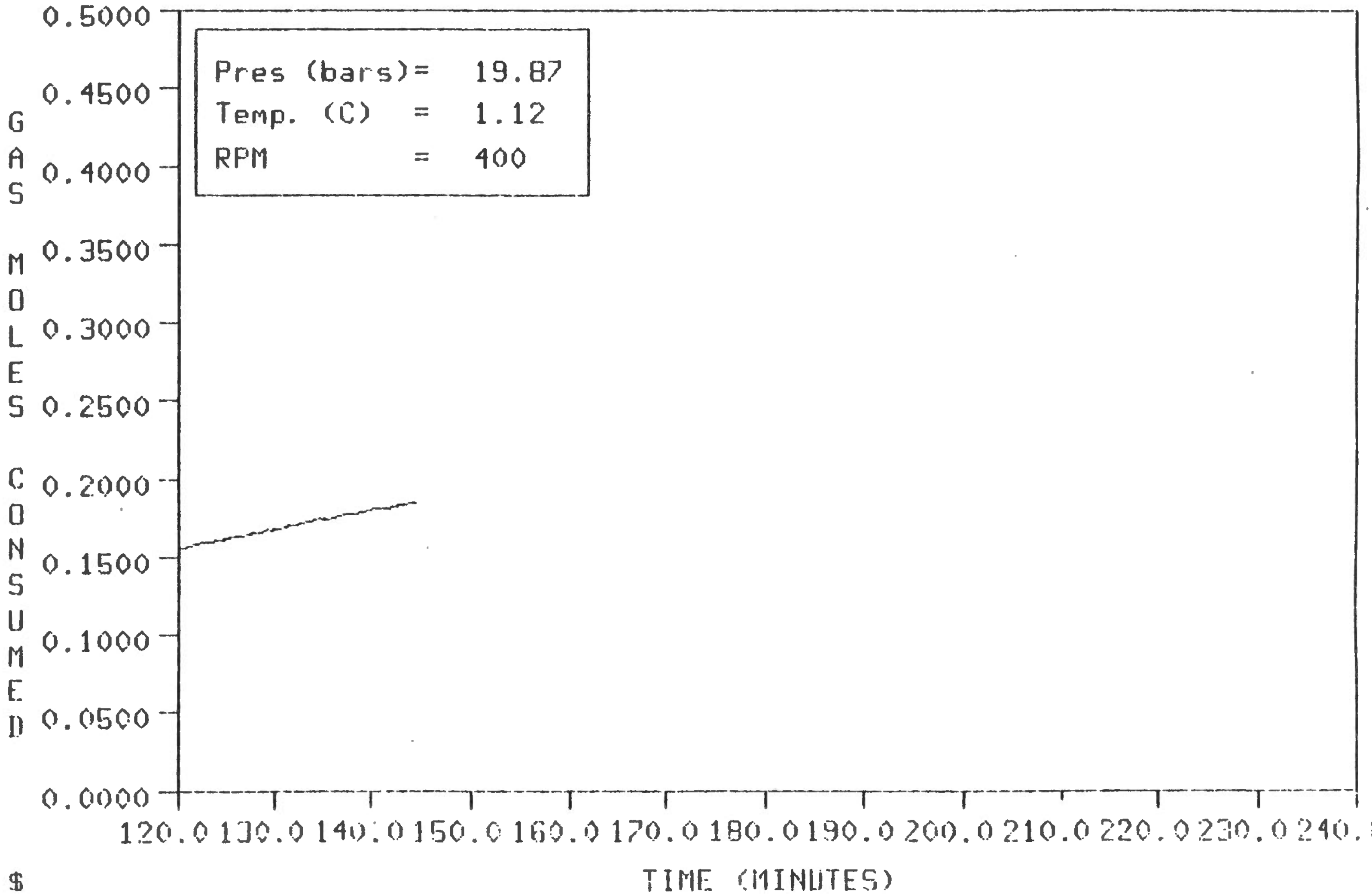
RUN#M25E75-07__85/04/04



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-07__85/04/04



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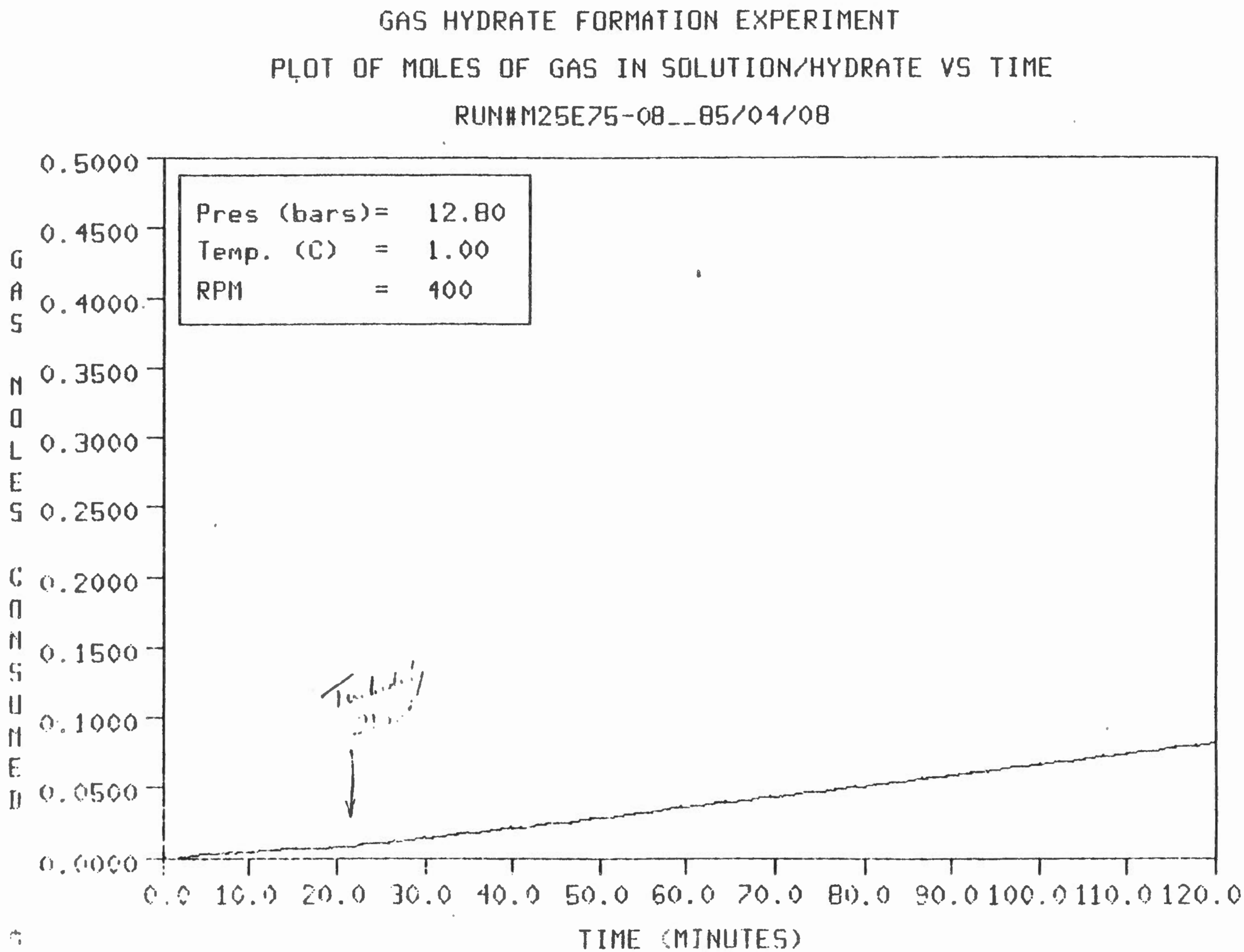
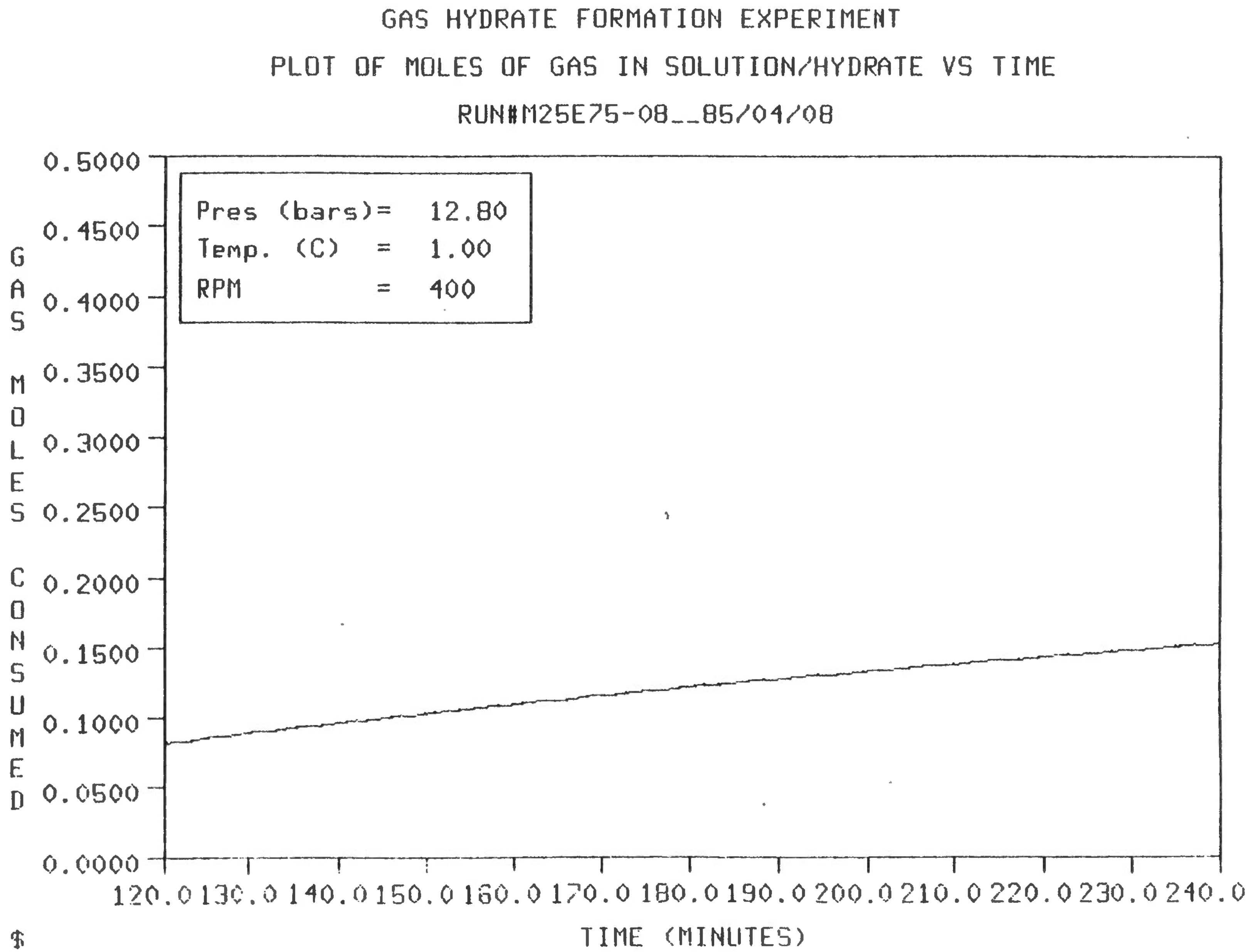
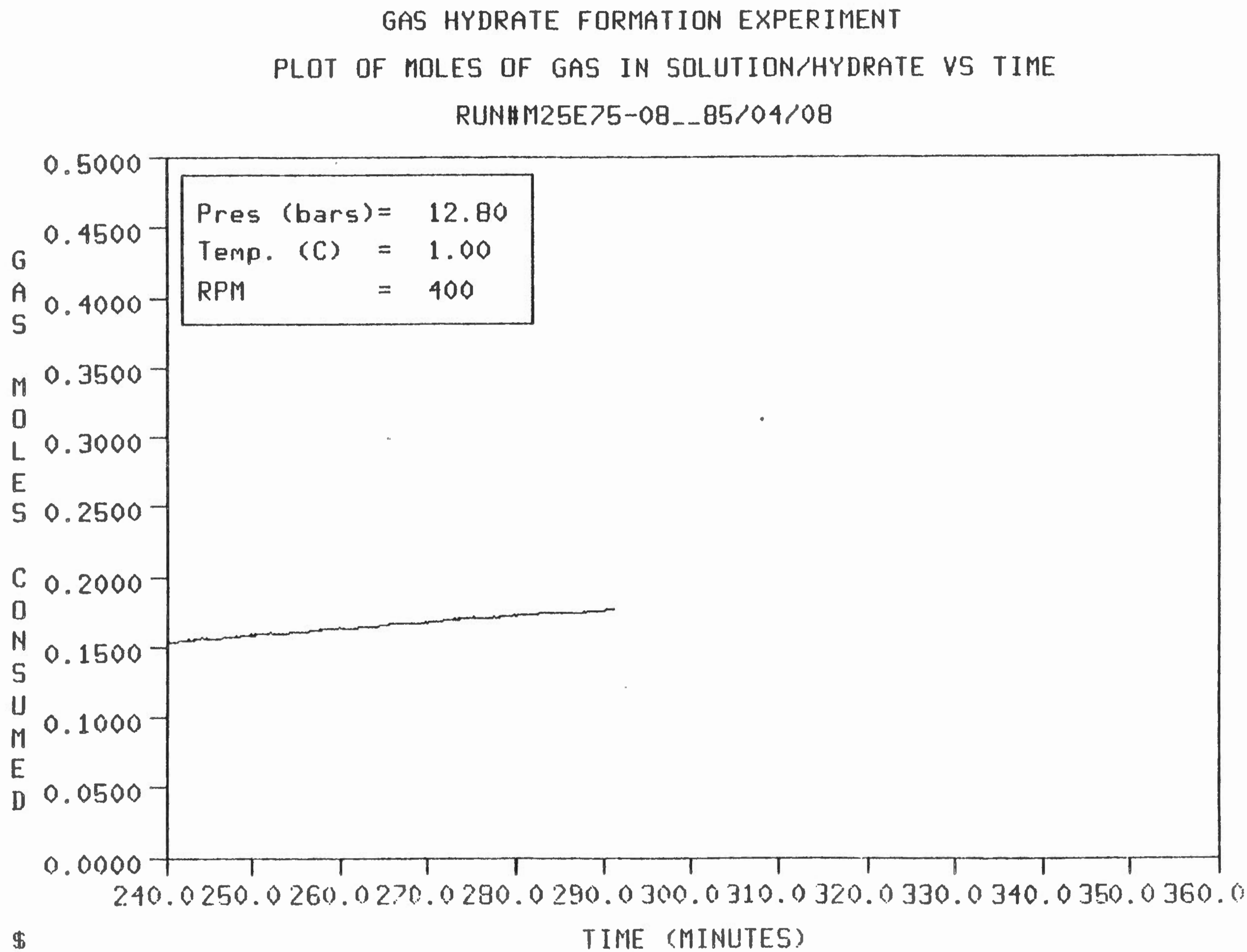

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-08__85/04/08
Pres (bars)= 12.80
Temp. (C) = 1.00
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)

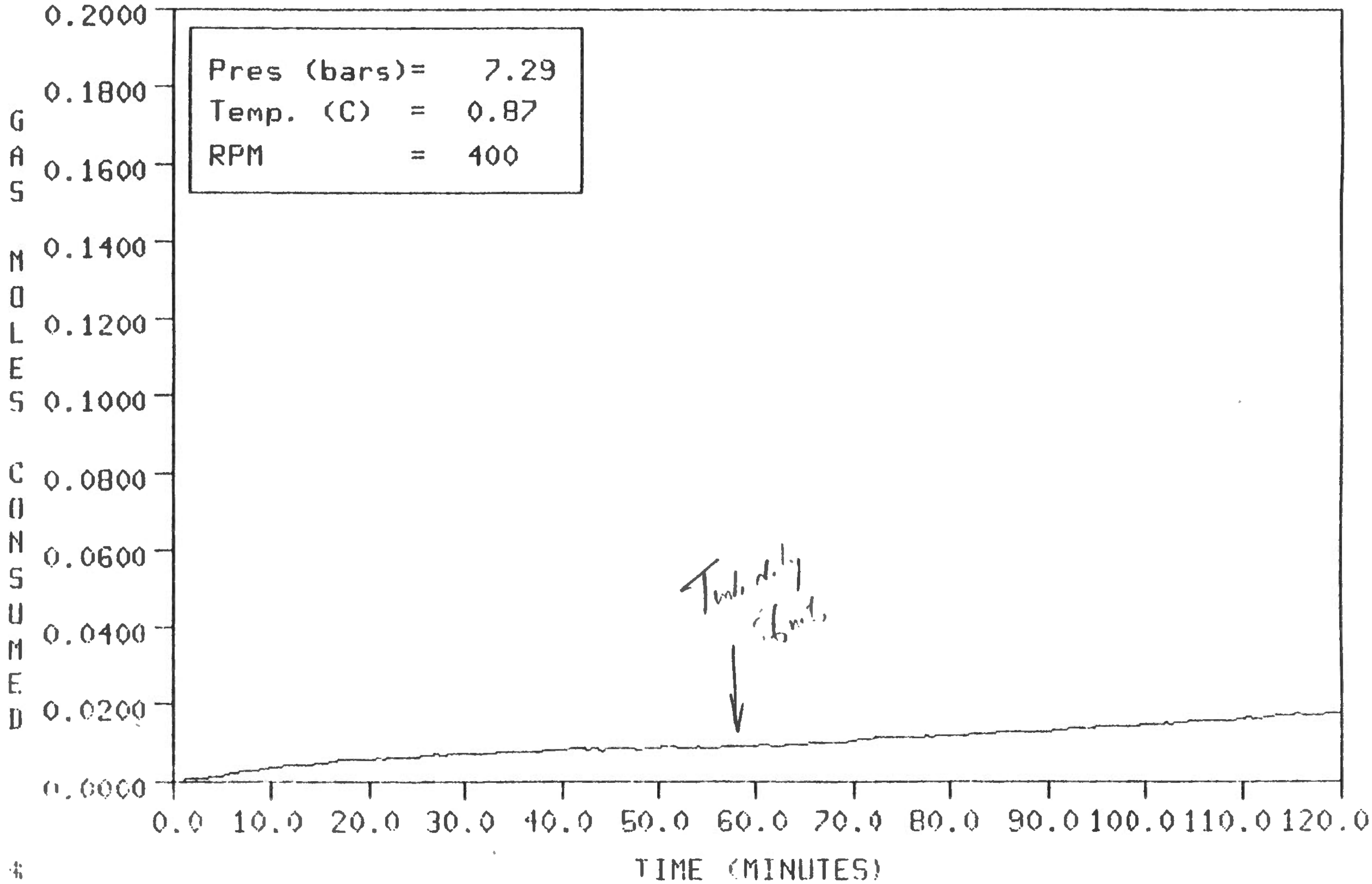

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-08__85/04/08
Pres (bars)= 12.80
Temp. (C) = 1.00
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0500
0.1000
0.1500
0.2000
0.2500
0.3000
0.3500
0.4000
0.4500
0.5000
120.0
130.0
140.0
150.0
160.0
170.0
180.0
190.0
200.0
210.0
220.0
230.0
240.0
TIME (MINUTES)
$

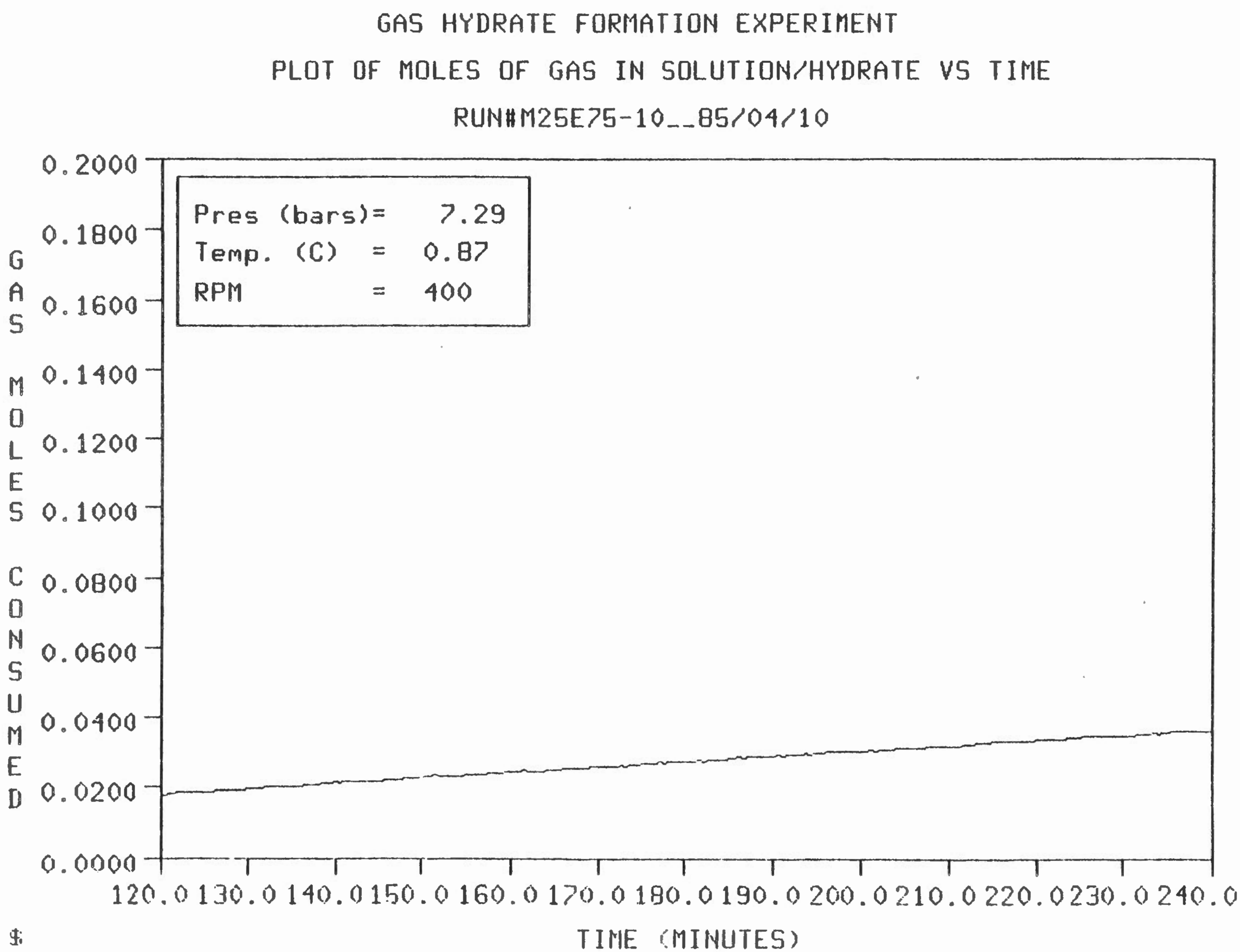

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-08__85/04/08
Pres (bars)= 12.80
Temp. (C) = 1.00
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$

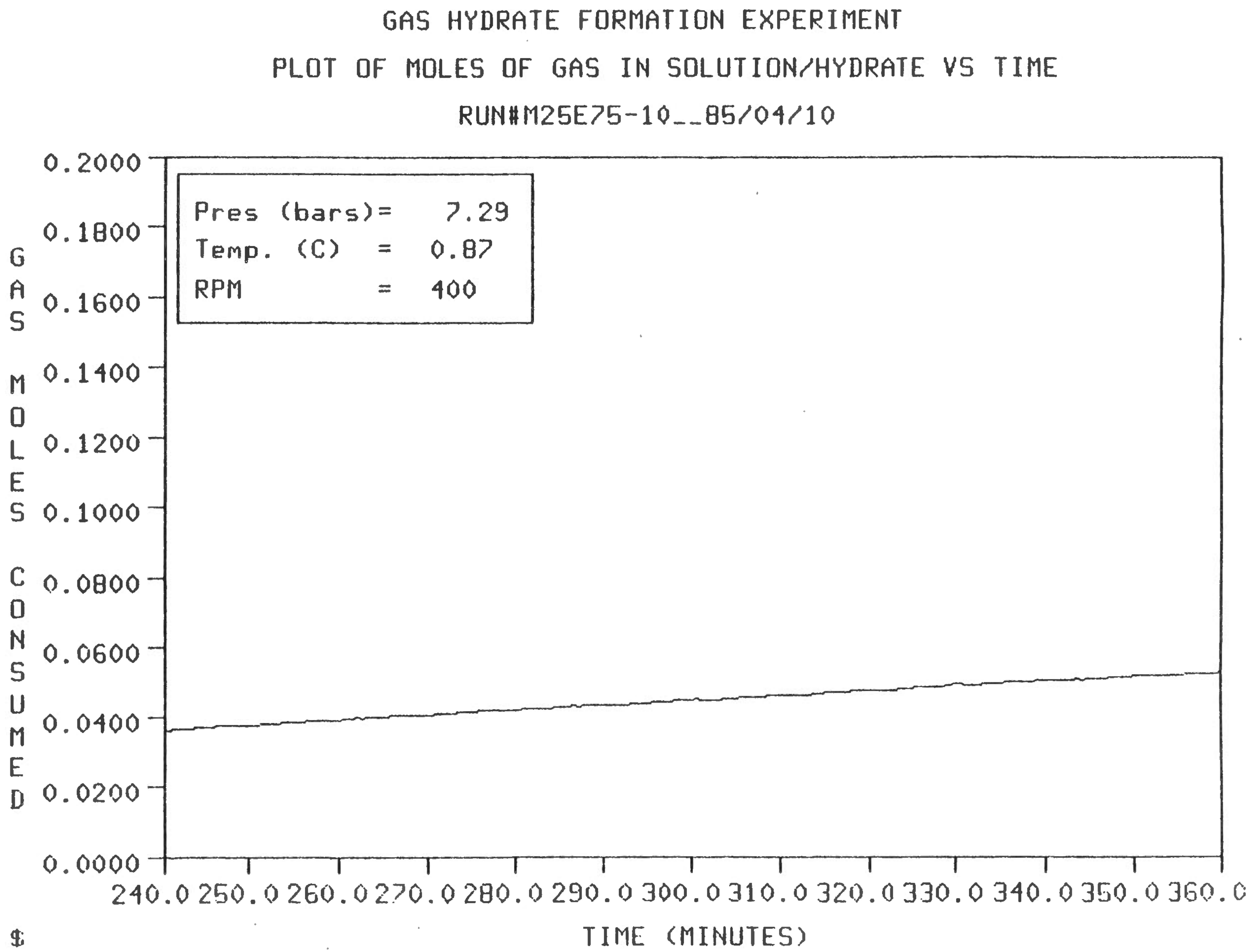
GAS HYDRATE FORMATION EXPERIMENT

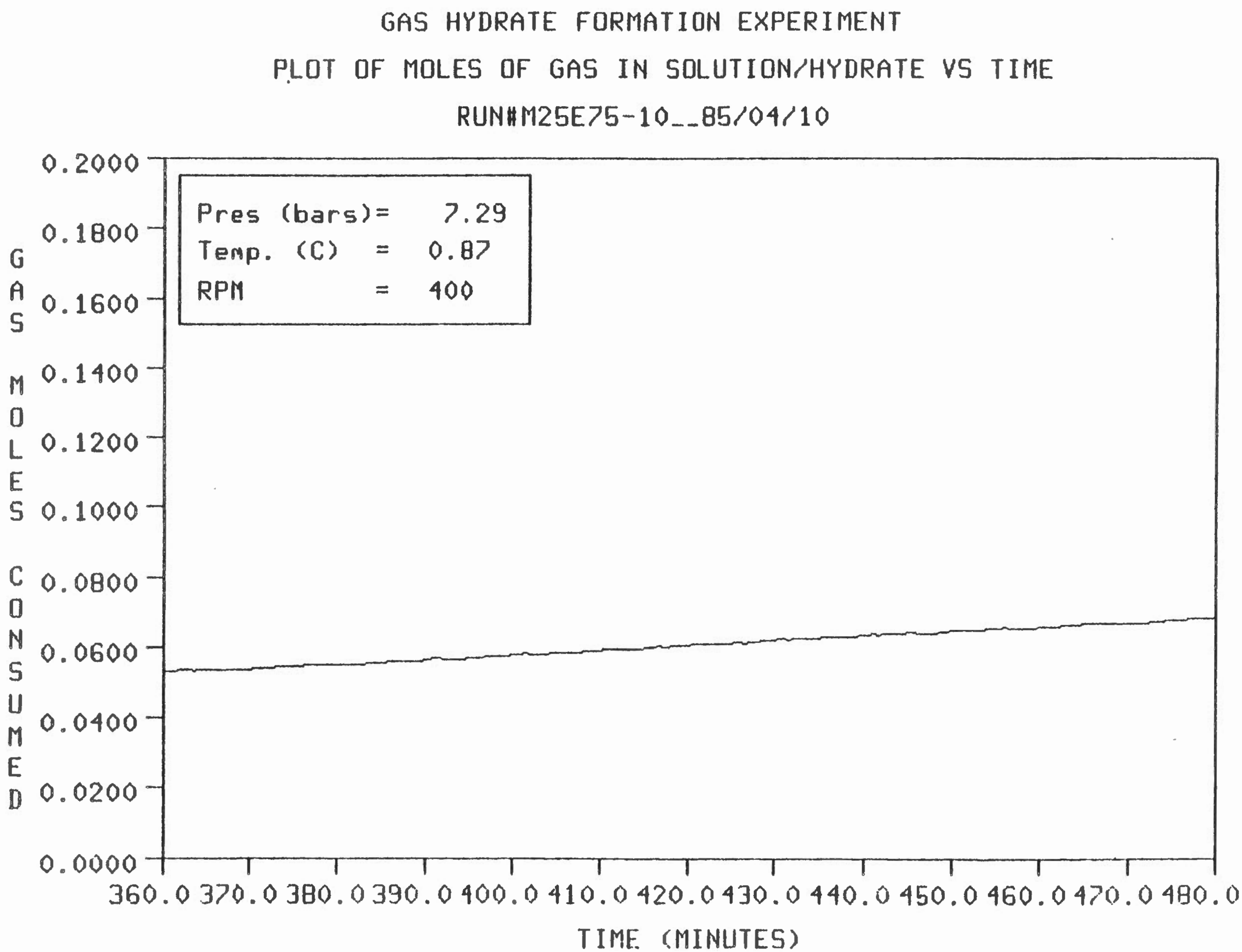
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-10__85/04/10




GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$

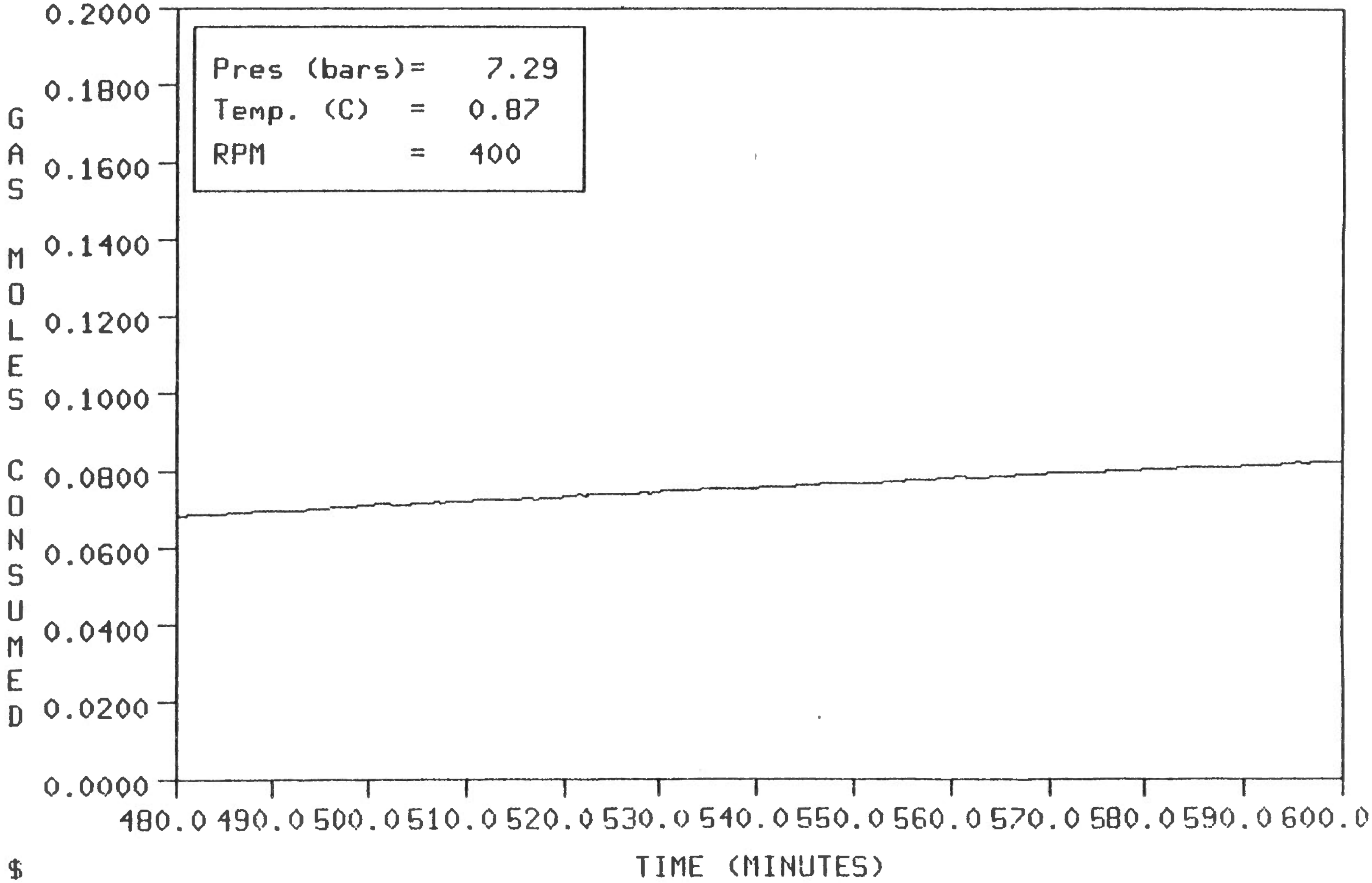


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-10__85/04/10



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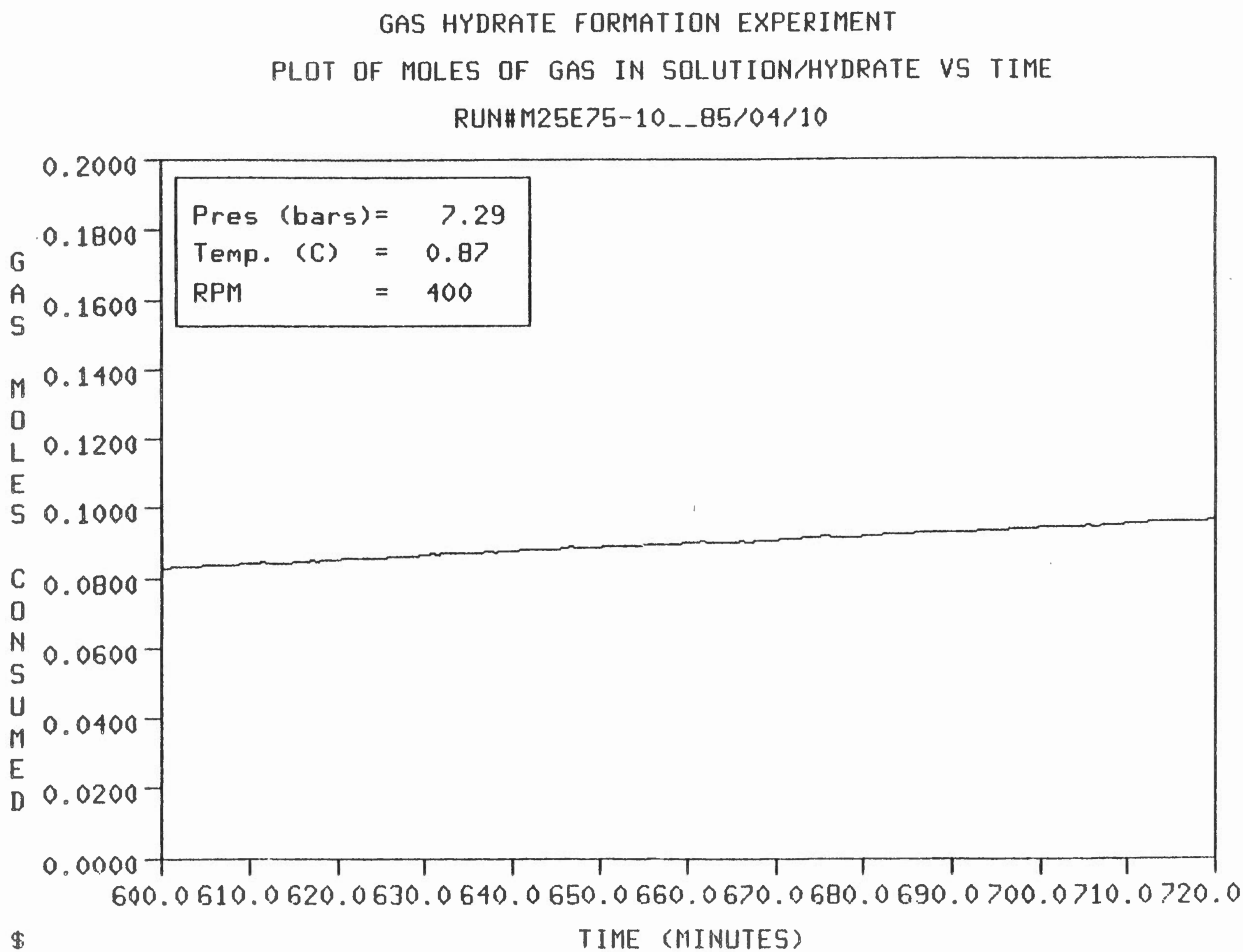
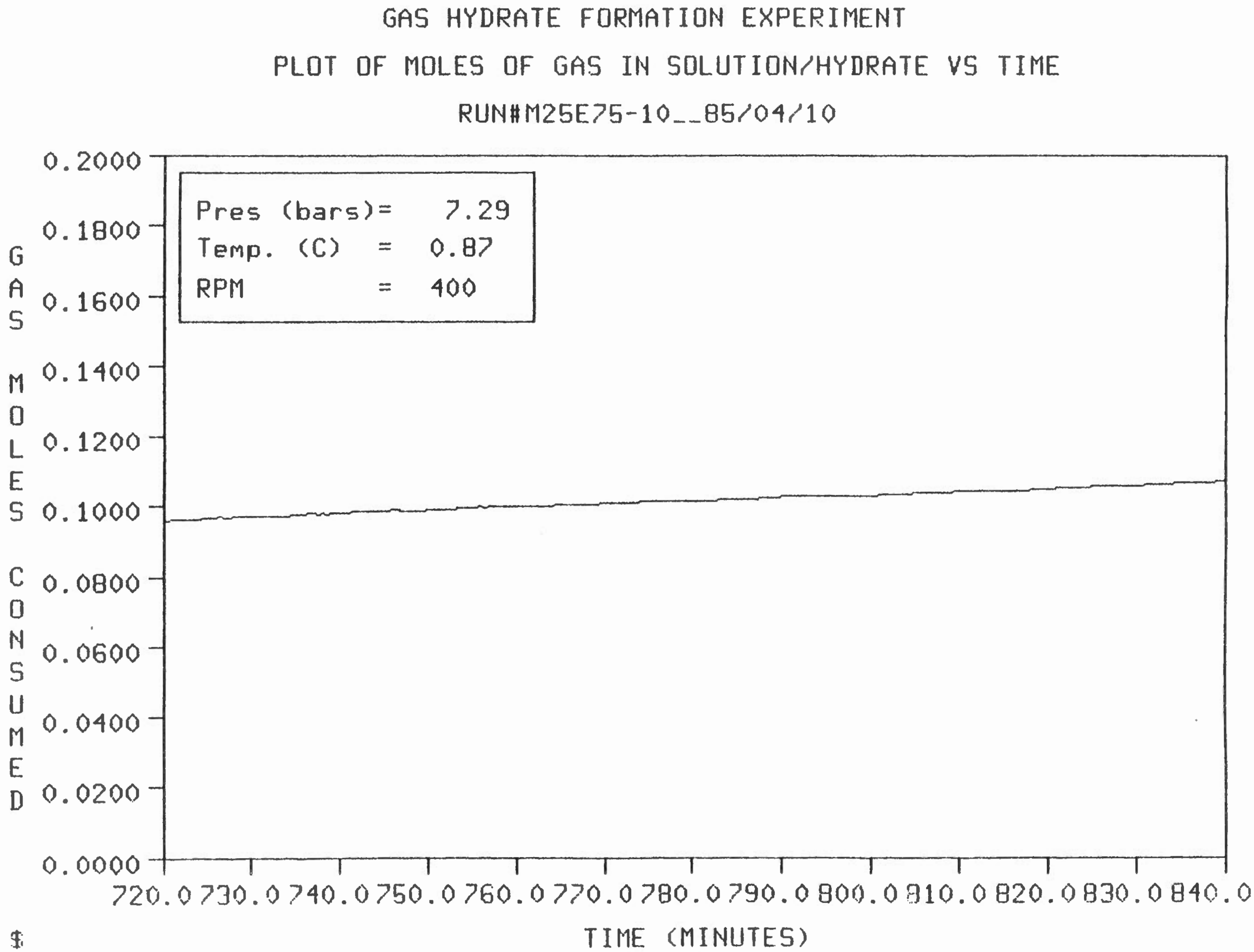
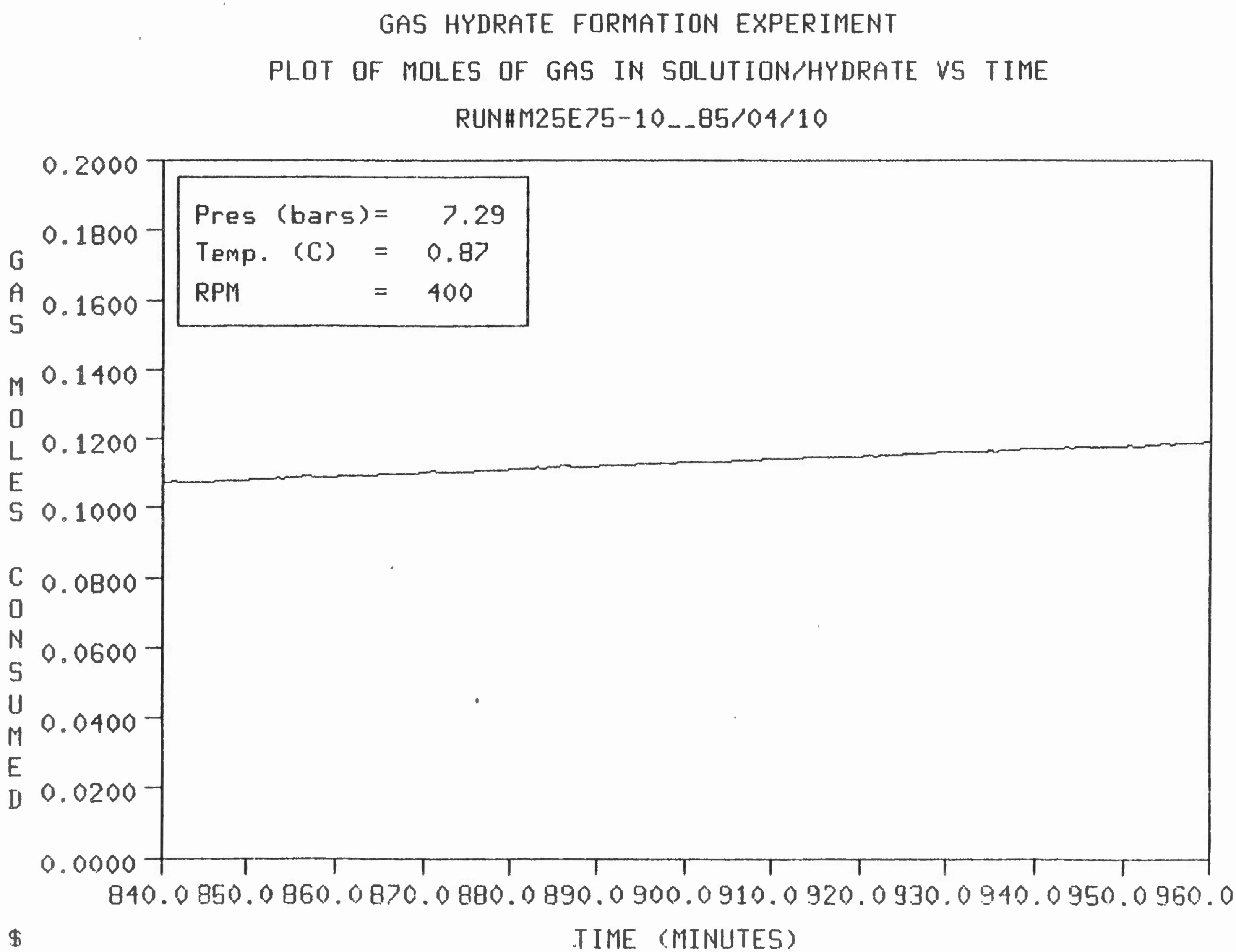
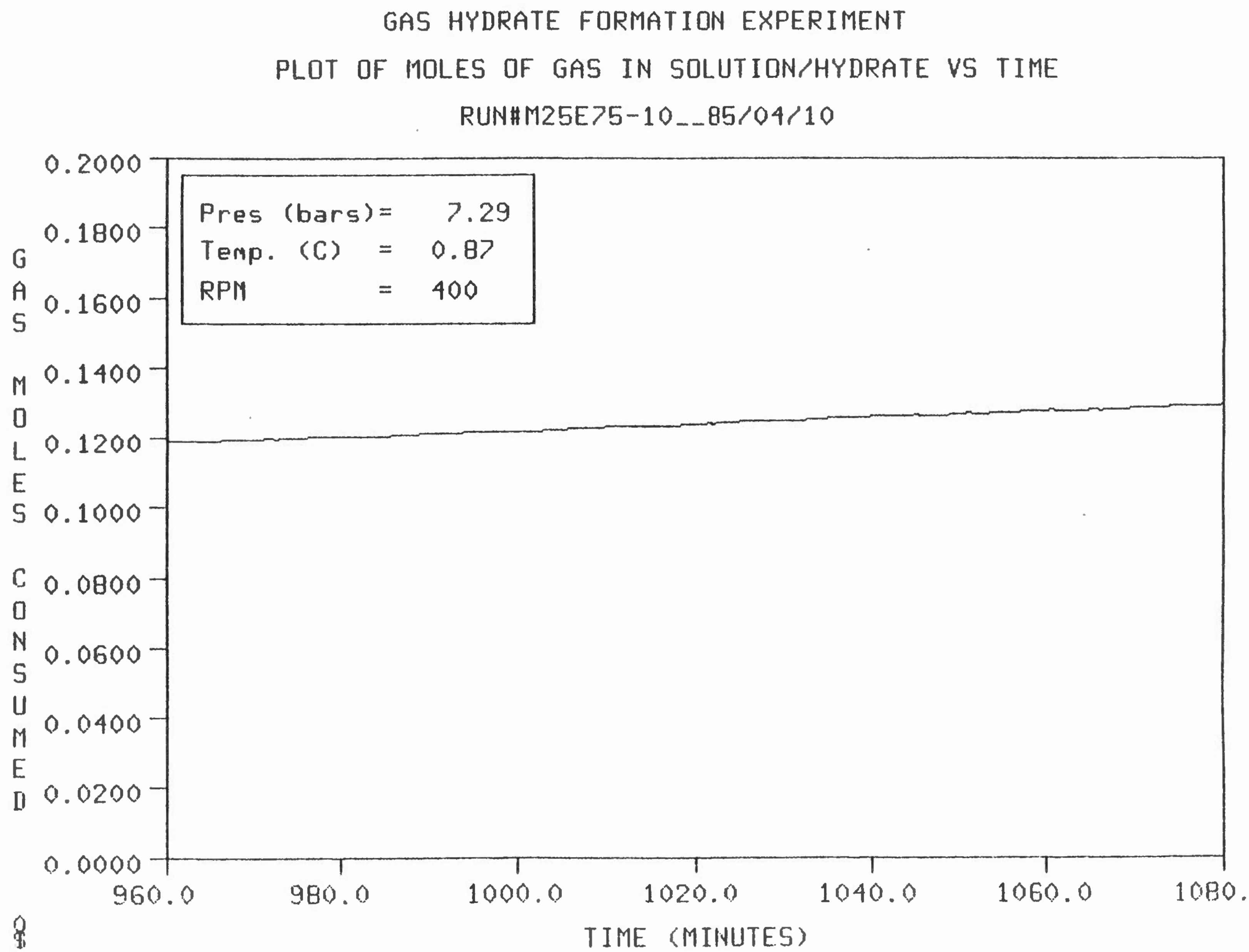
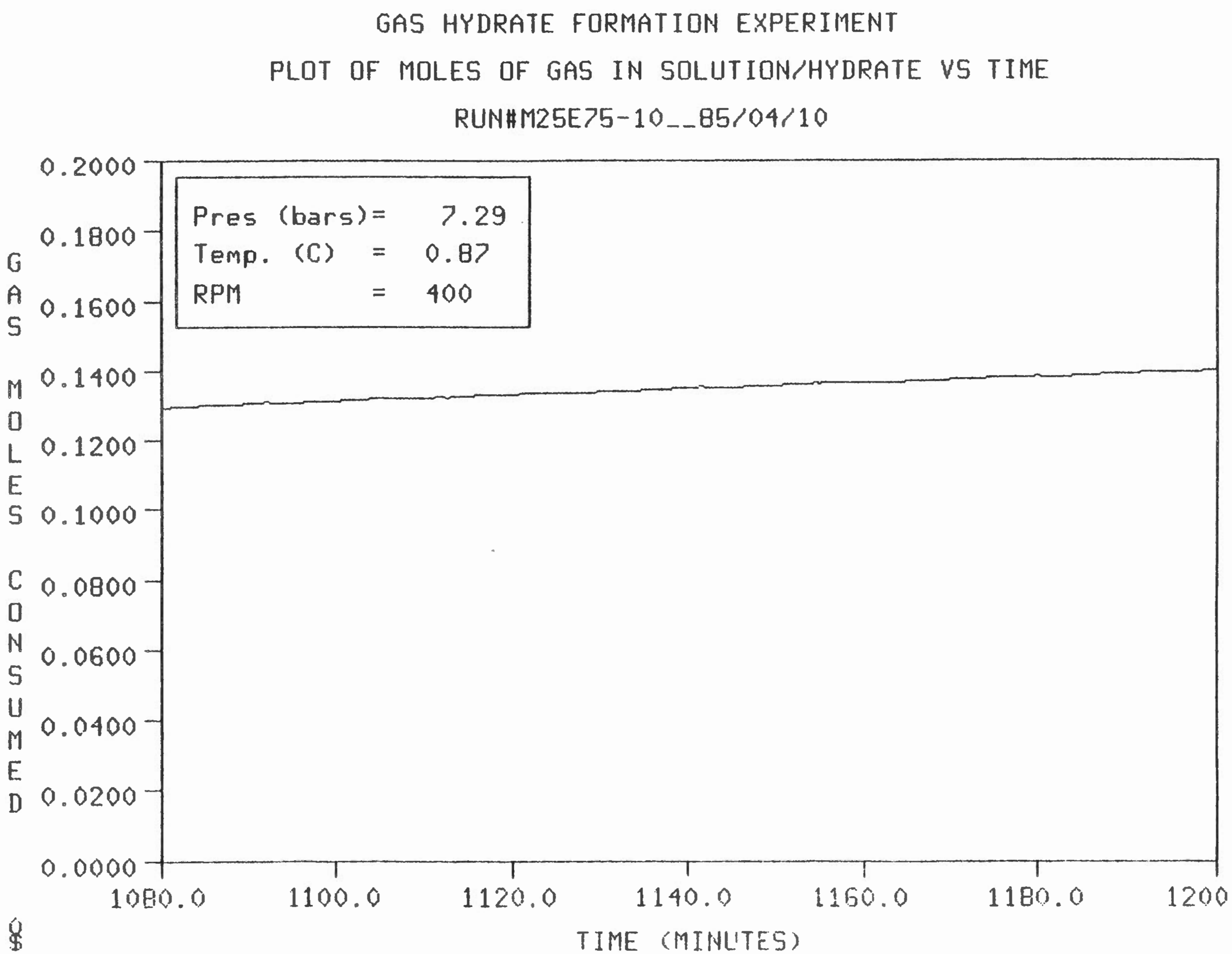

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
600.0 610.0 620.0 630.0 640.0 650.0 660.0 670.0 680.0 690.0 700.0 710.0 720.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
720.0 730.0 740.0 750.0 760.0 770.0 780.0 790.0 800.0 810.0 820.0 830.0 840.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
840.0 850.0 860.0 870.0 880.0 890.0 900.0 910.0 920.0 930.0 940.0 950.0 960.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
960.0
980.0
1000.0
1020.0
1040.0
1060.0
1080.
TIME (MINUTES)

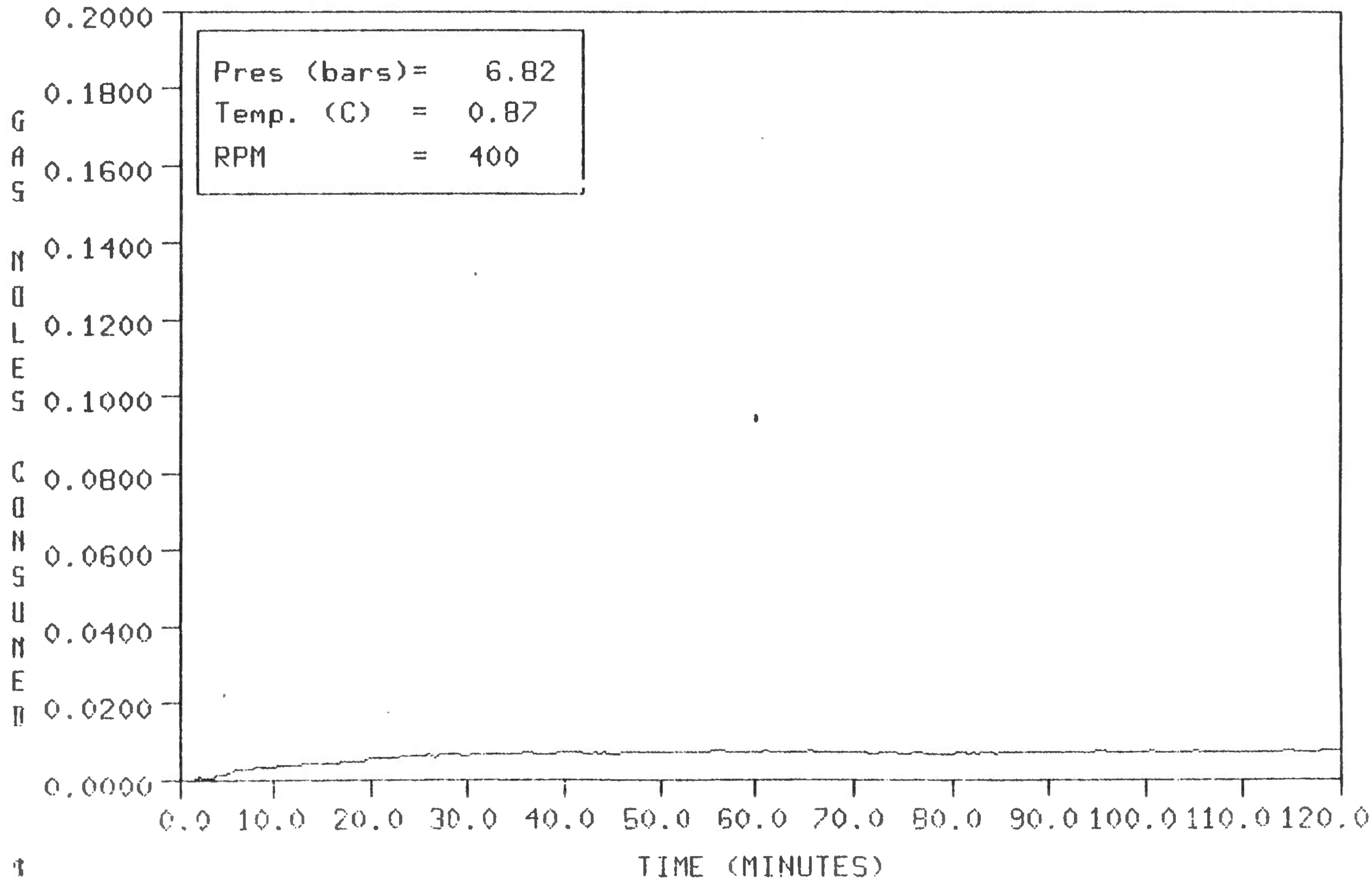


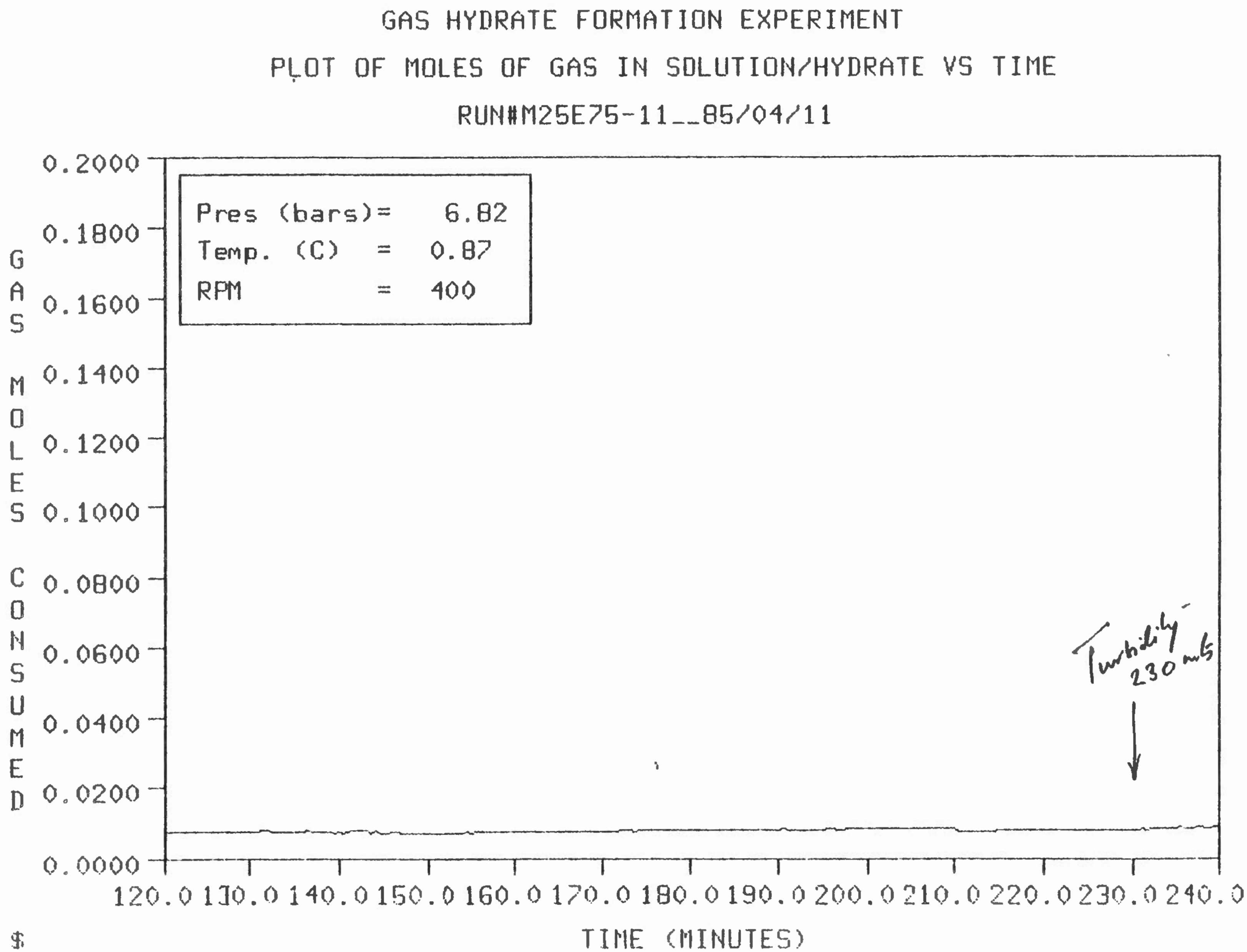
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
1080.0
1100.0
1120.0
1140.0
1160.0
1180.0
1200.
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-11__85/04/11

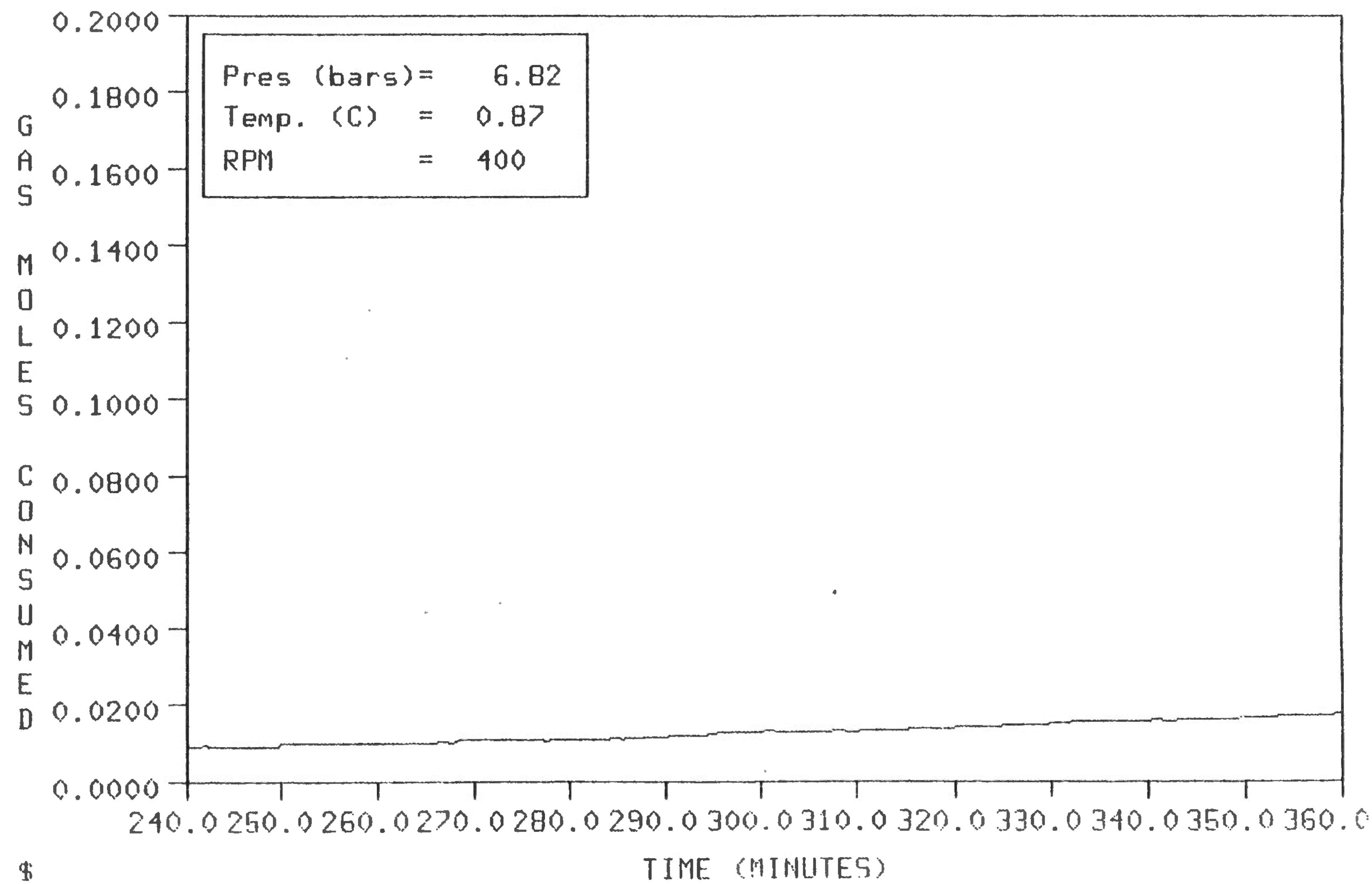



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-11__85/04/11
Pres (bars)= 6.82
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
Turbidity 230 mts
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-11__85/04/11



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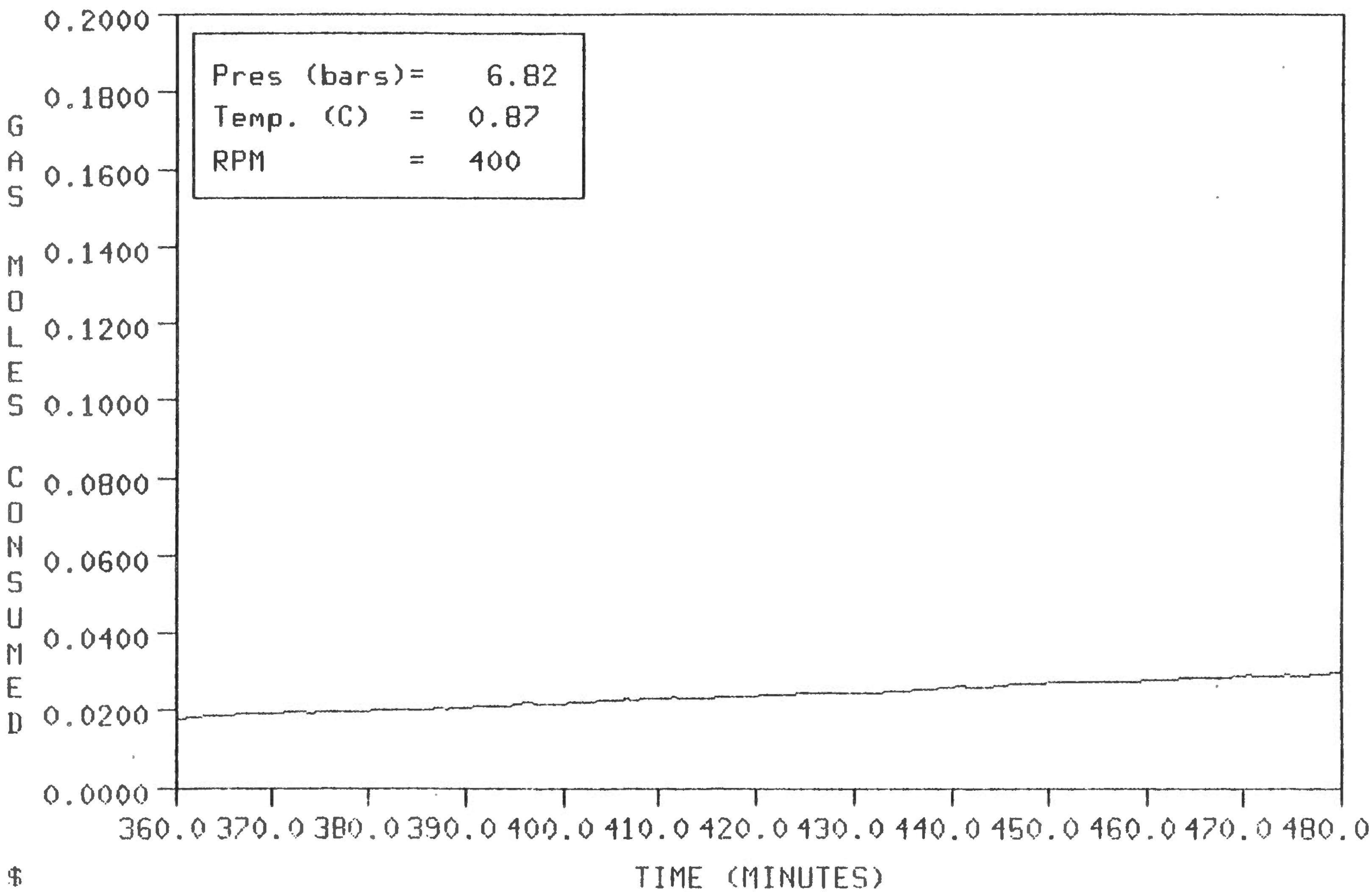
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-11__85/04/11



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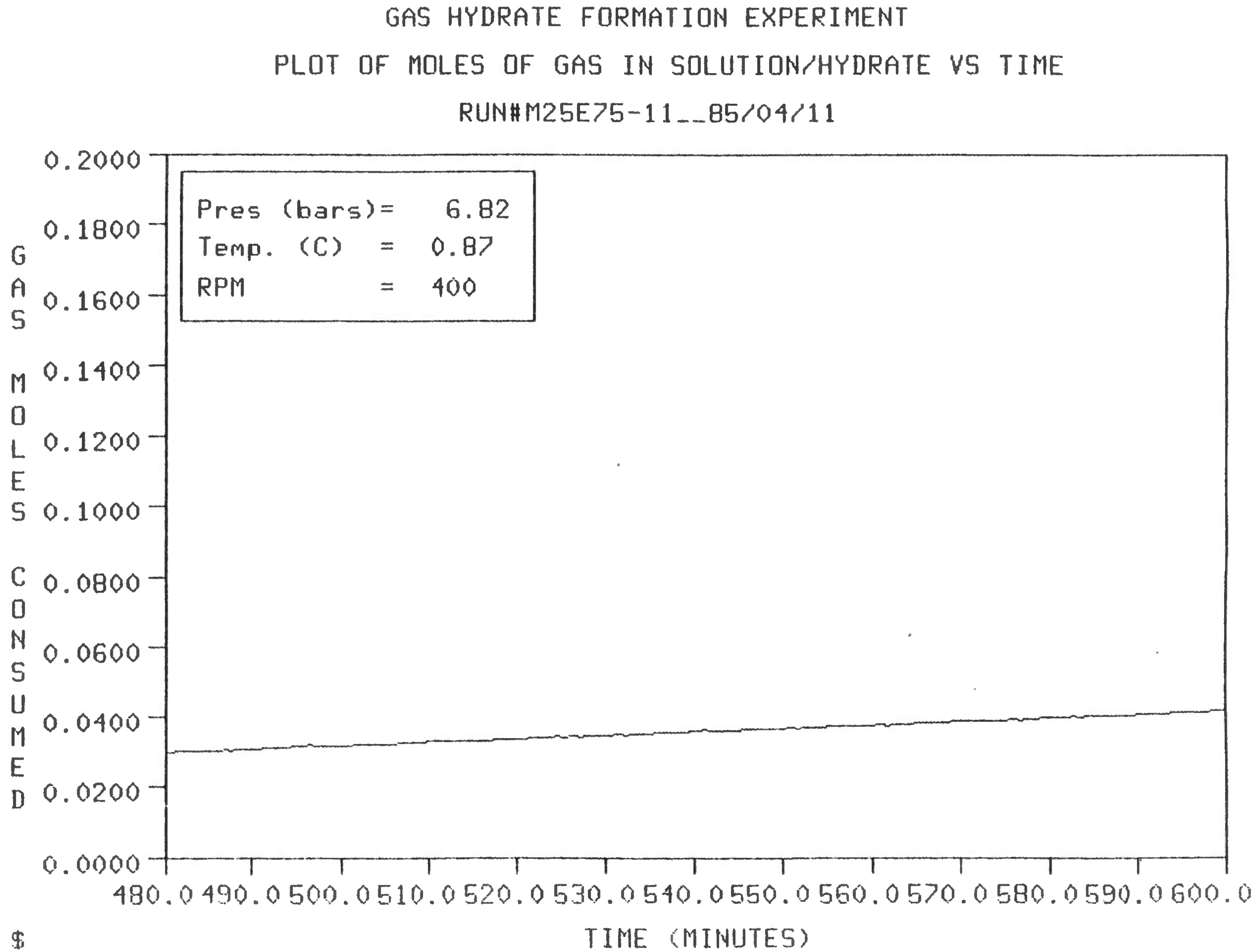
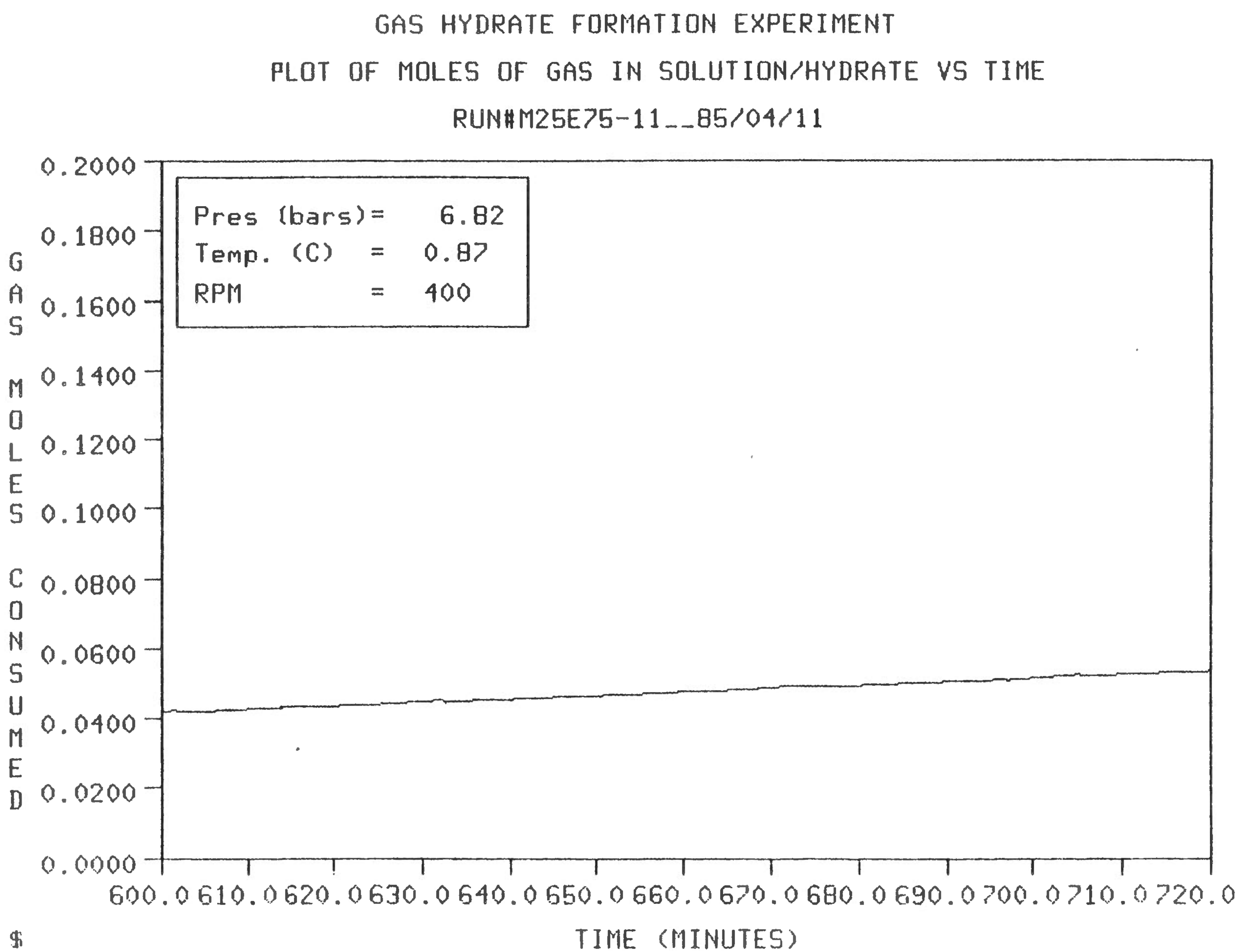
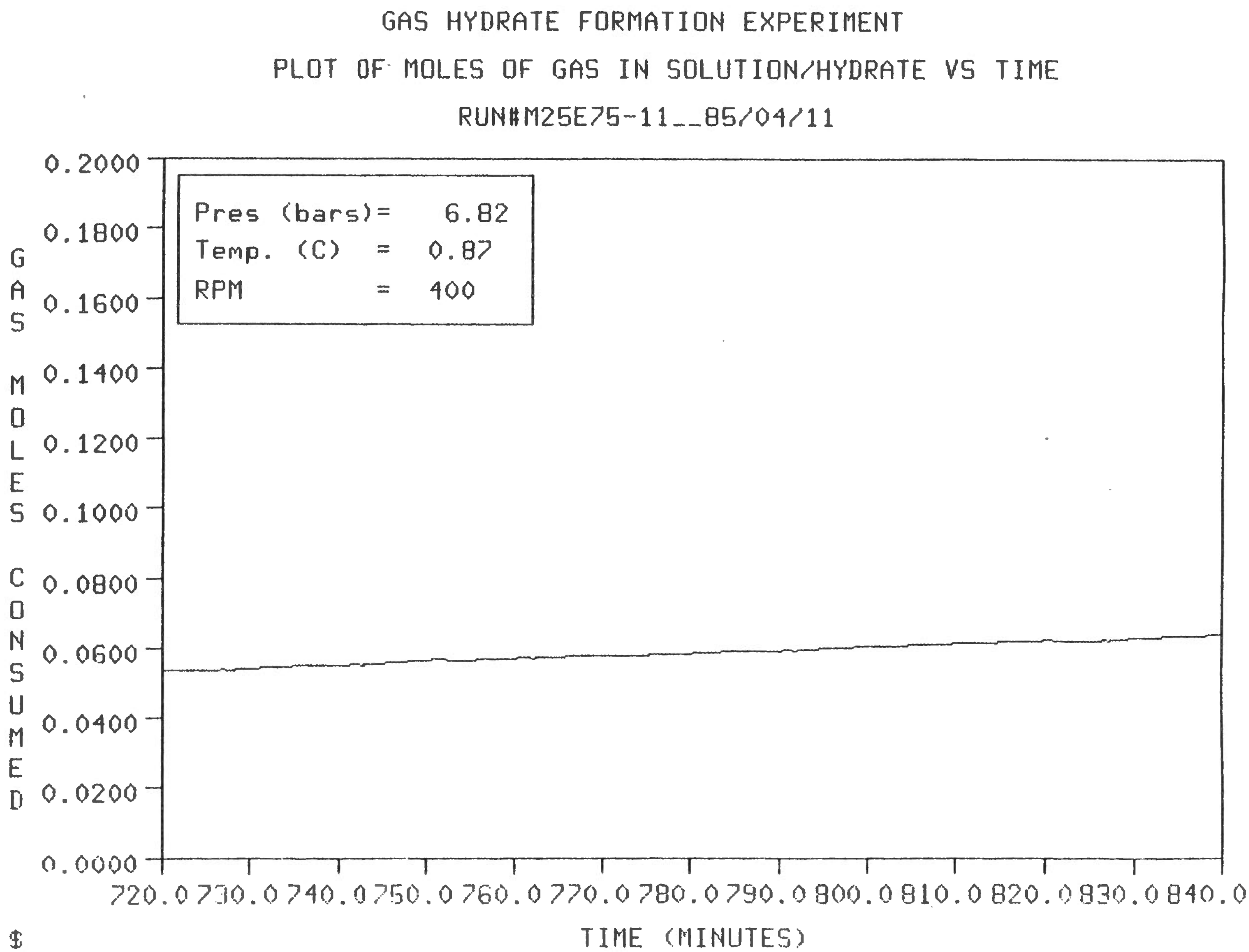

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-11__85/04/11
Pres (bars)= 6.82
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
480.0 490.0 500.0 510.0 520.0 530.0 540.0 550.0 560.0 570.0 580.0 590.0 600.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-11__85/04/11
Pres (bars)= 6.82
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
600.0 610.0 620.0 630.0 640.0 650.0 660.0 670.0 680.0 690.0 700.0 710.0 720.0
TIME (MINUTES)
$



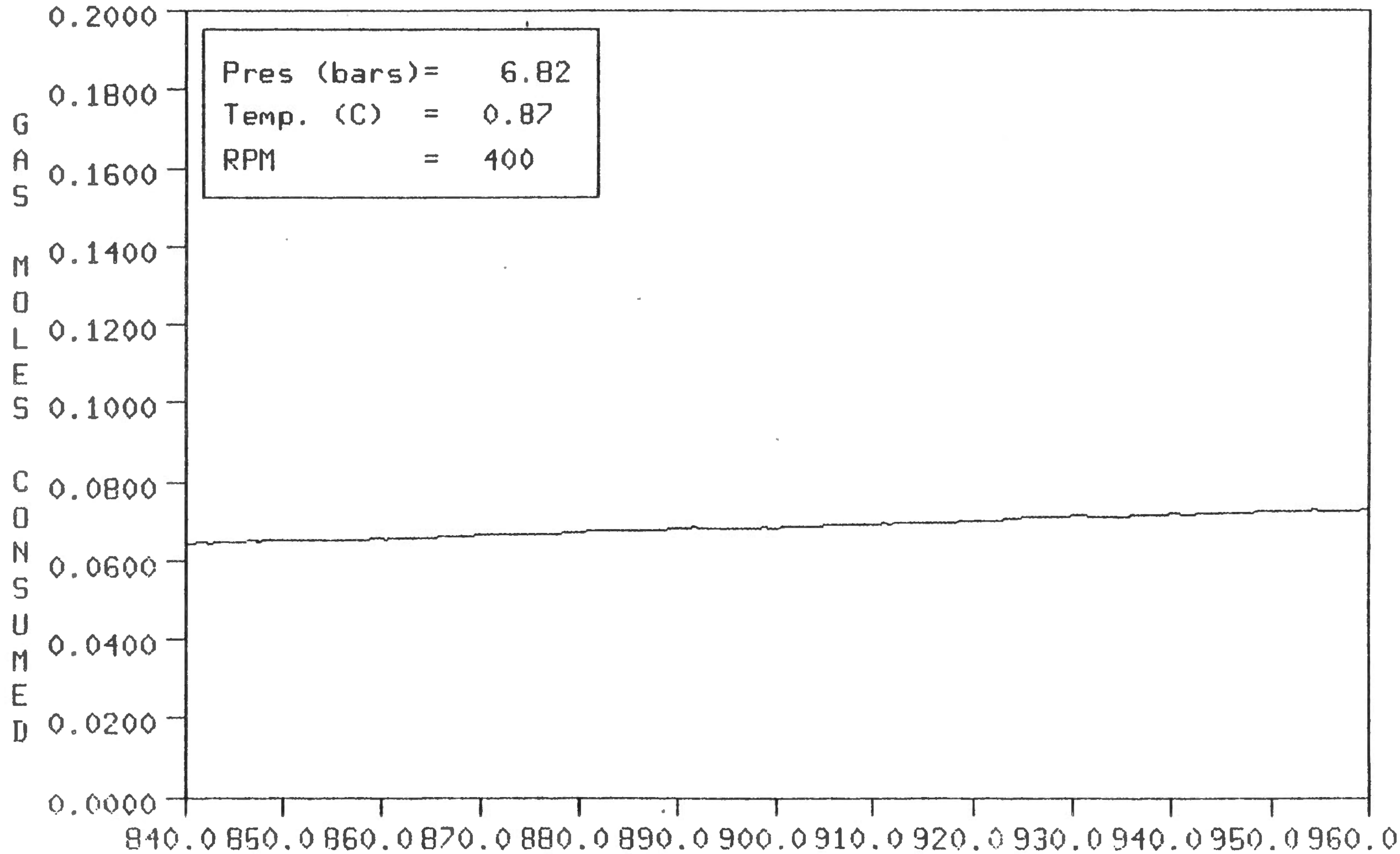
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-11__85/04/11
Pres (bars)= 6.82
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
720.0 730.0 740.0 750.0 760.0 770.0 780.0 790.0 800.0 810.0 820.0 830.0 840.0
TIME (MINUTES)

$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-11__85/04/11



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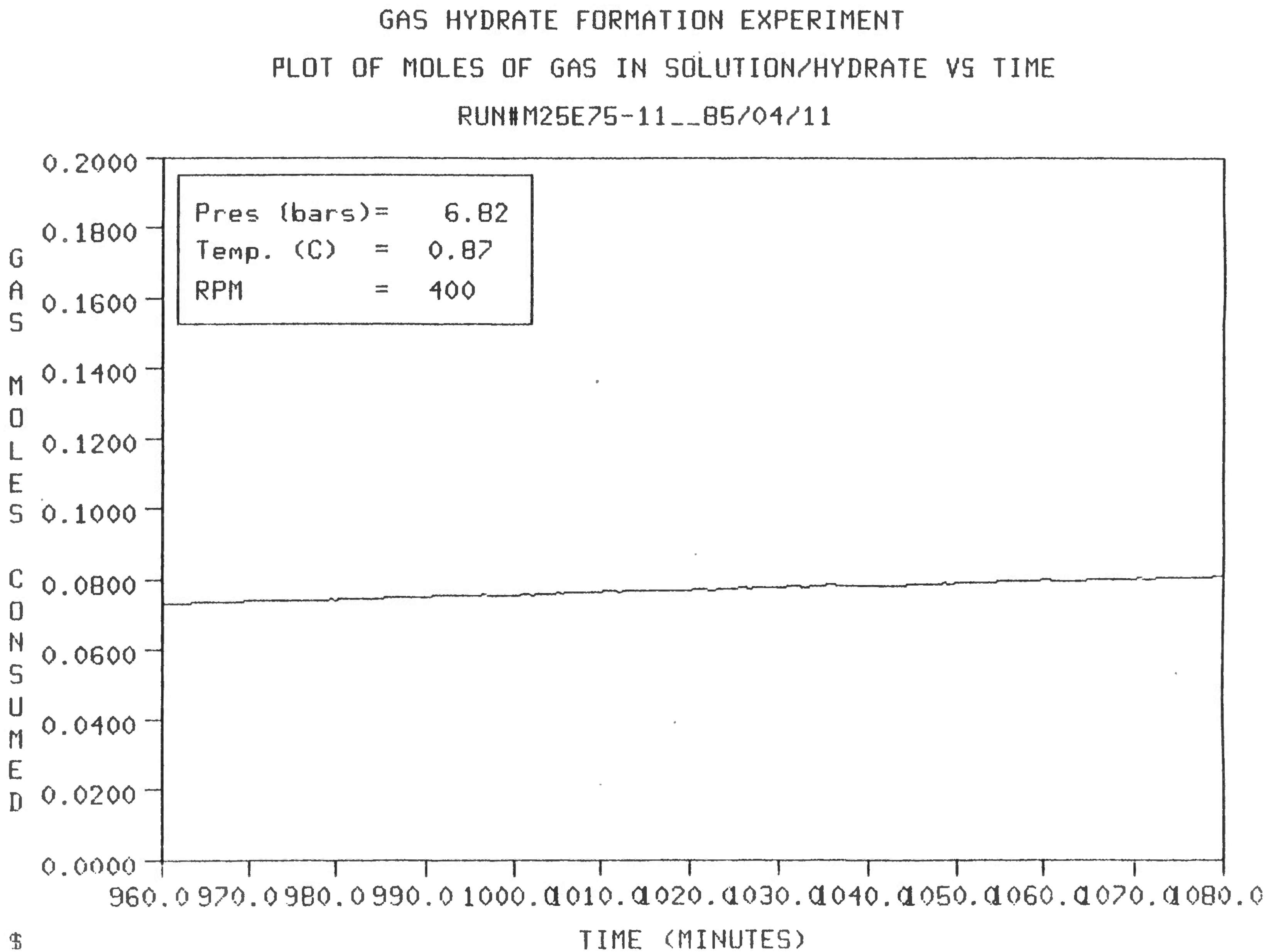
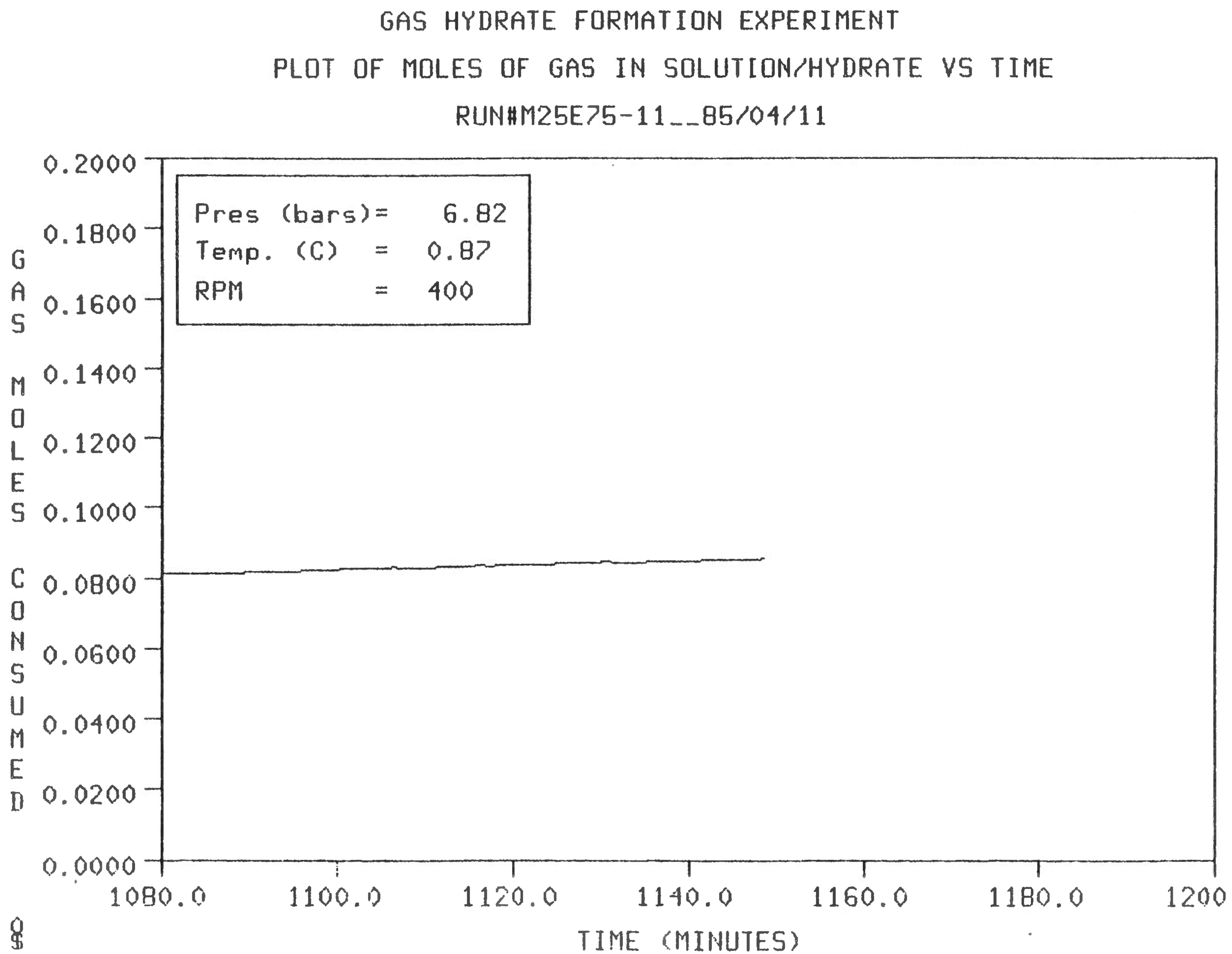
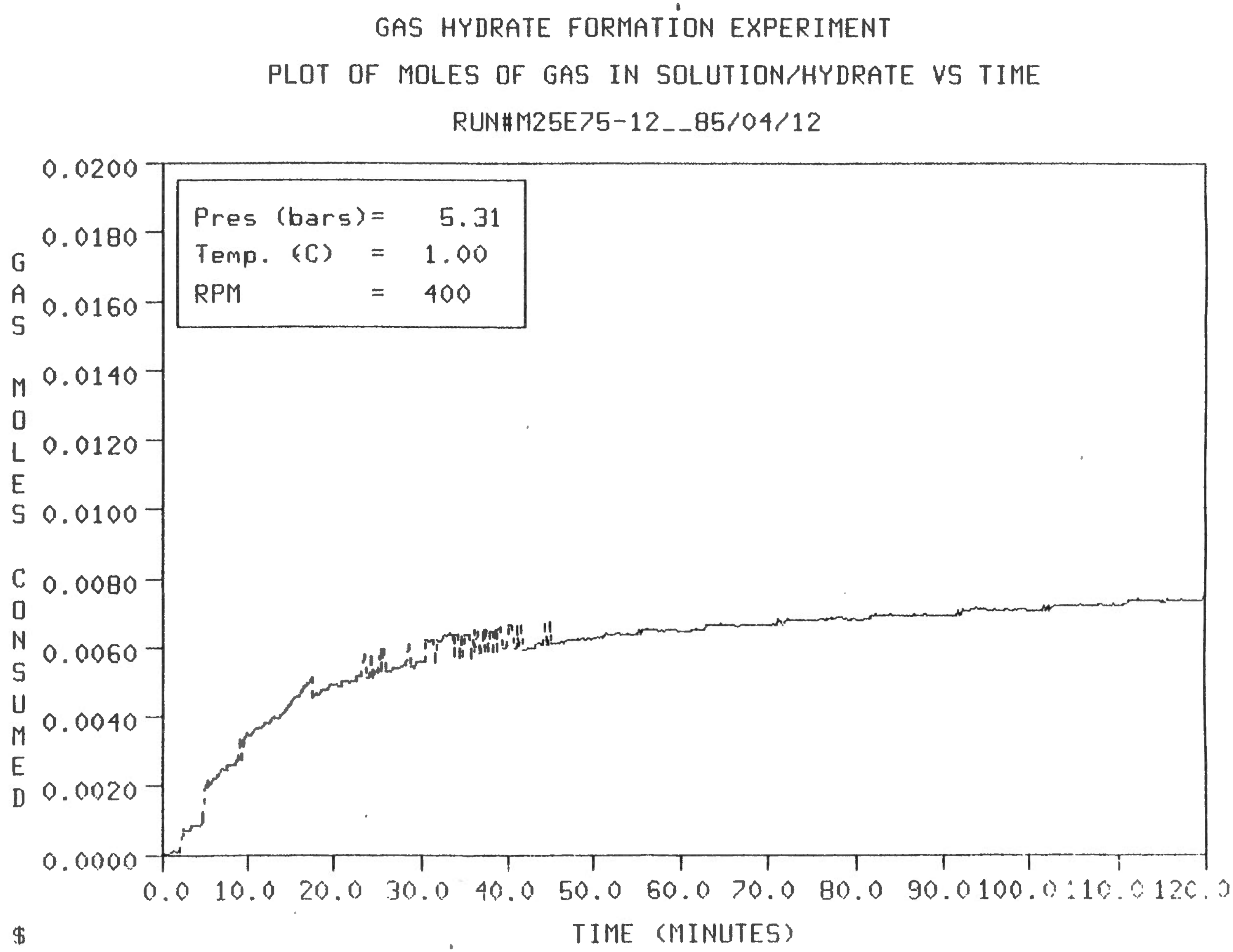
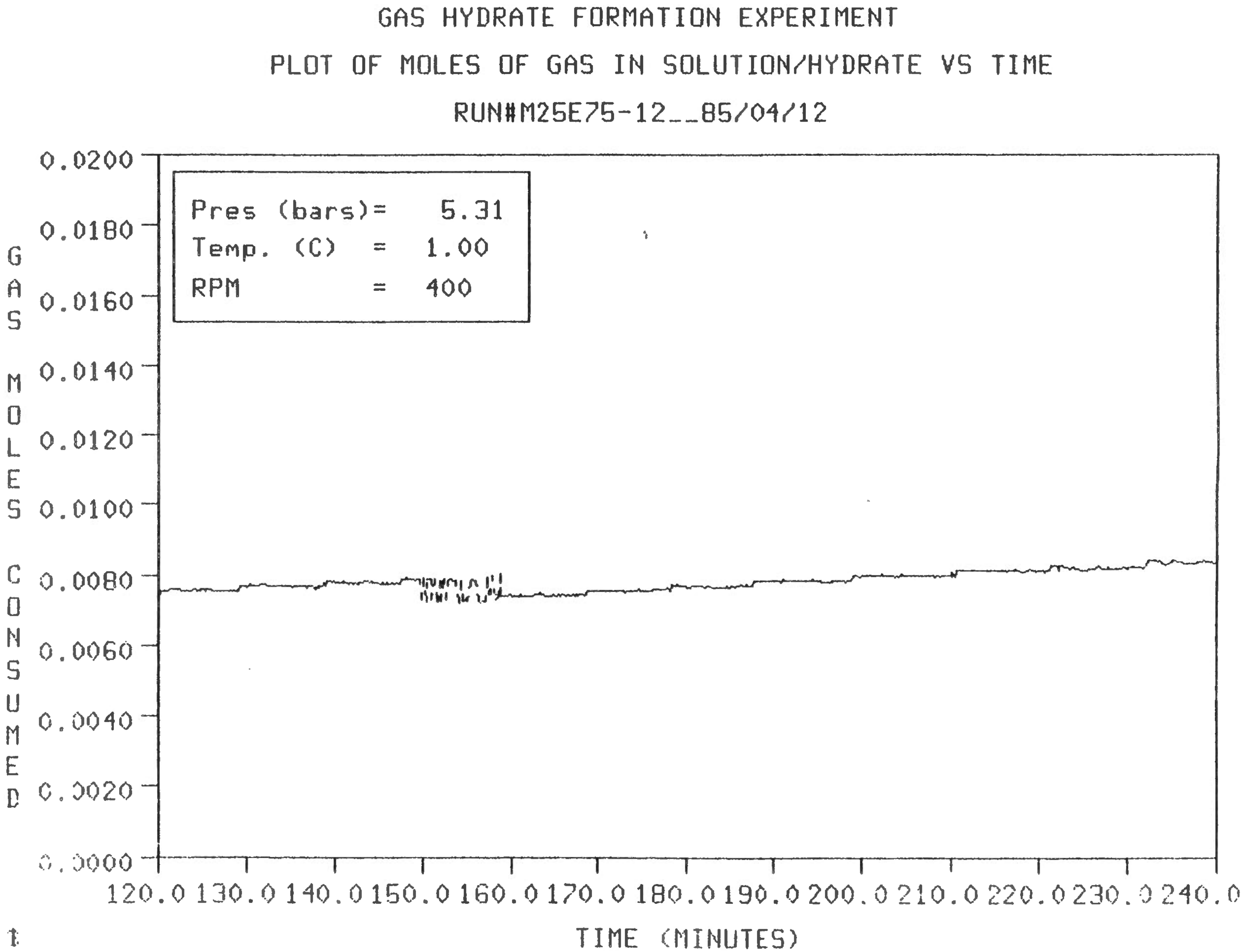

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-11__85/04/11
Pres (bars)= 6.82
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
960.0 970.0 980.0 990.0 1000.0 1010.0 1020.0 1030.0 1040.0 1050.0 1060.0 1070.0 1080.0
TIME (MINUTES)

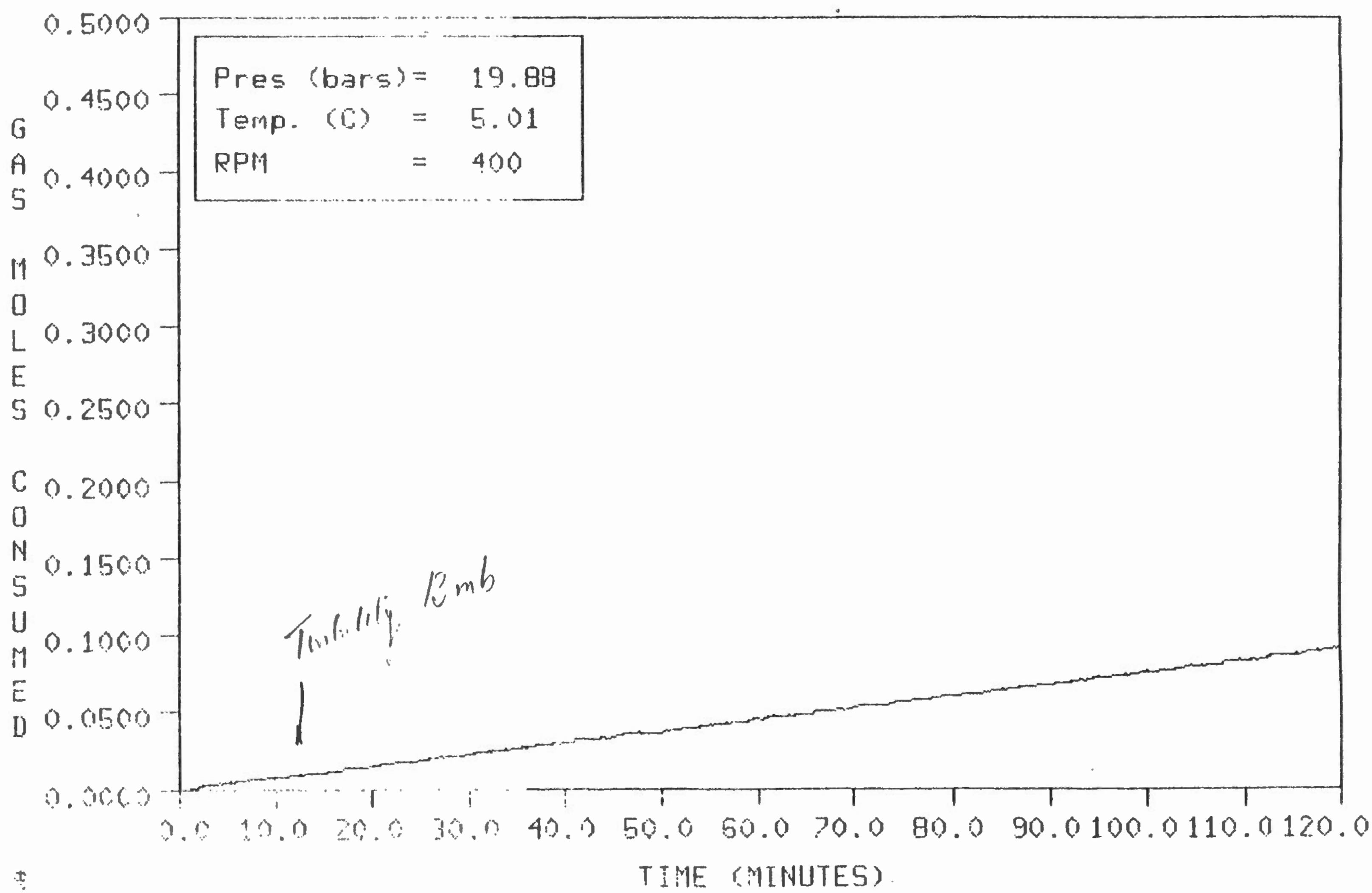
$

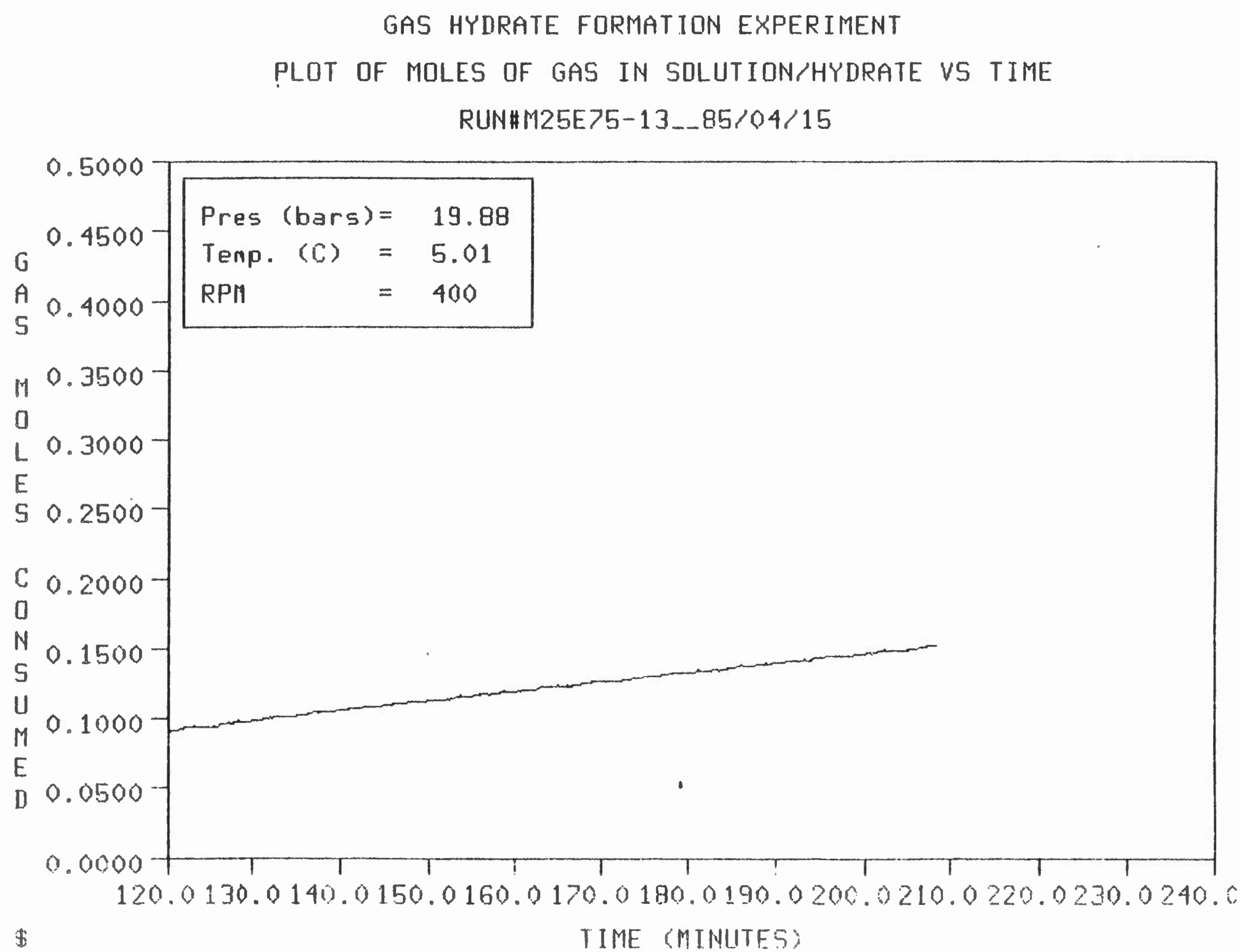


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-11__85/04/11
Pres (bars)= 6.82
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
1080.0
1100.0
1120.0
1140.0
1160.0
1180.0
1200.
TIME (MINUTES)


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-12__85/04/12
Pres (bars)= 5.31
Temp. (C) = 1.00
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0020
0.0040
0.0060
0.0080
0.0100
0.0120
0.0140
0.0160
0.0180
0.0200
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-12__85/04/12
Pres (bars)= 5.31
Temp. (C) = 1.00
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)

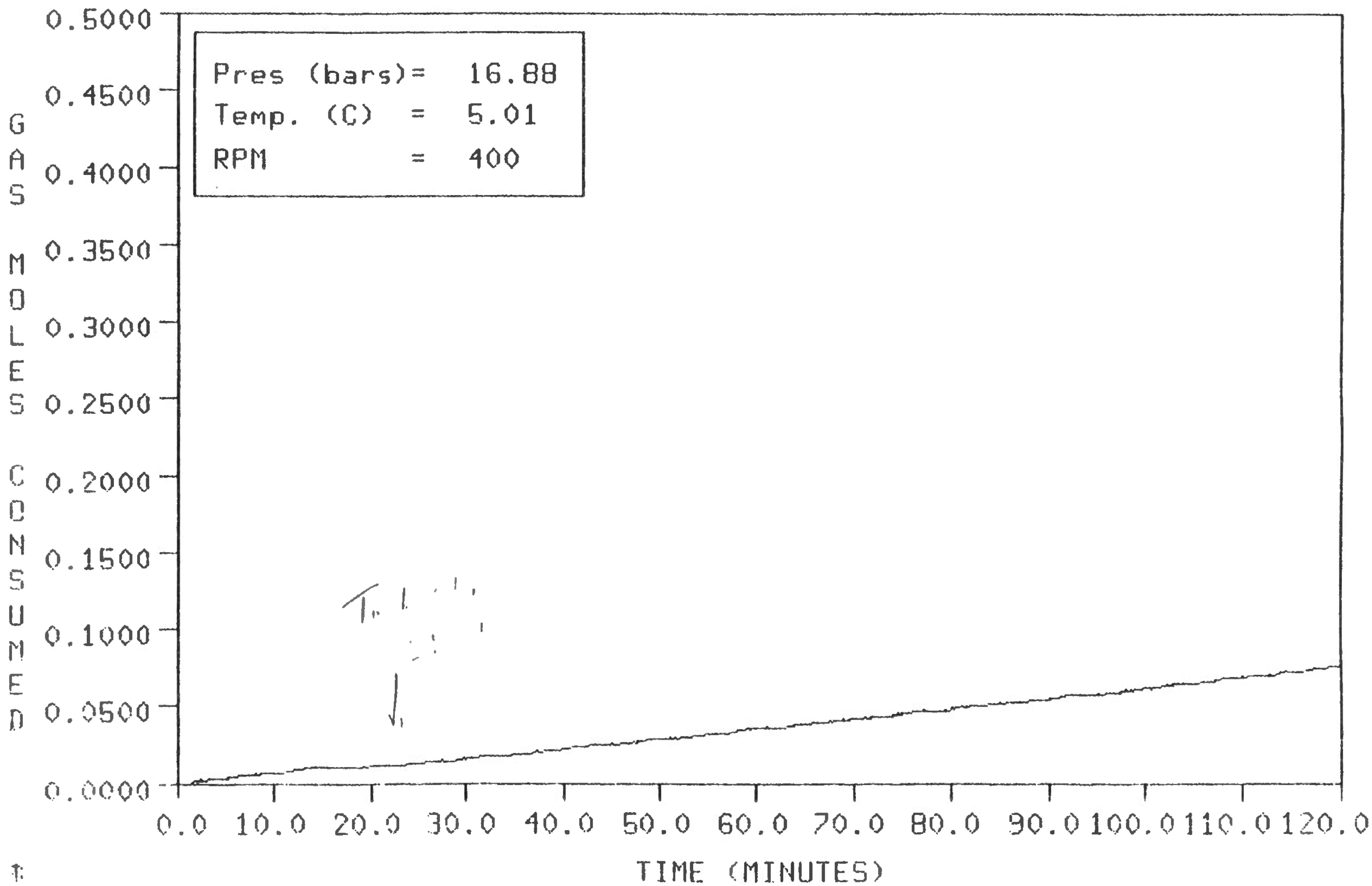

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-13__85/04/15
Pres (bars)= 19.88
Temp. (C) = 5.01
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)

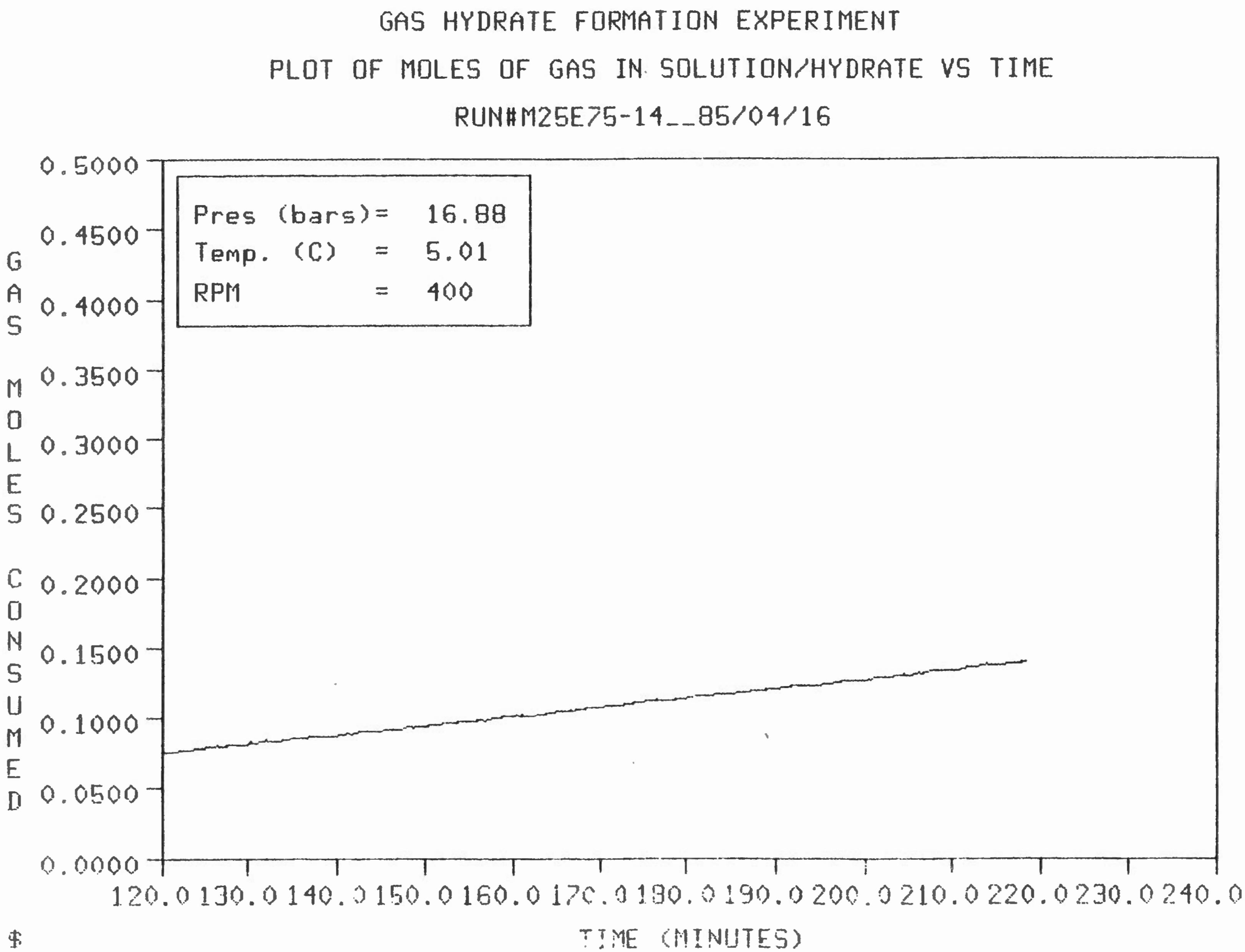

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-13__85/04/15
Pres (bars)= 19.88
Temp. (C) = 5.01
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

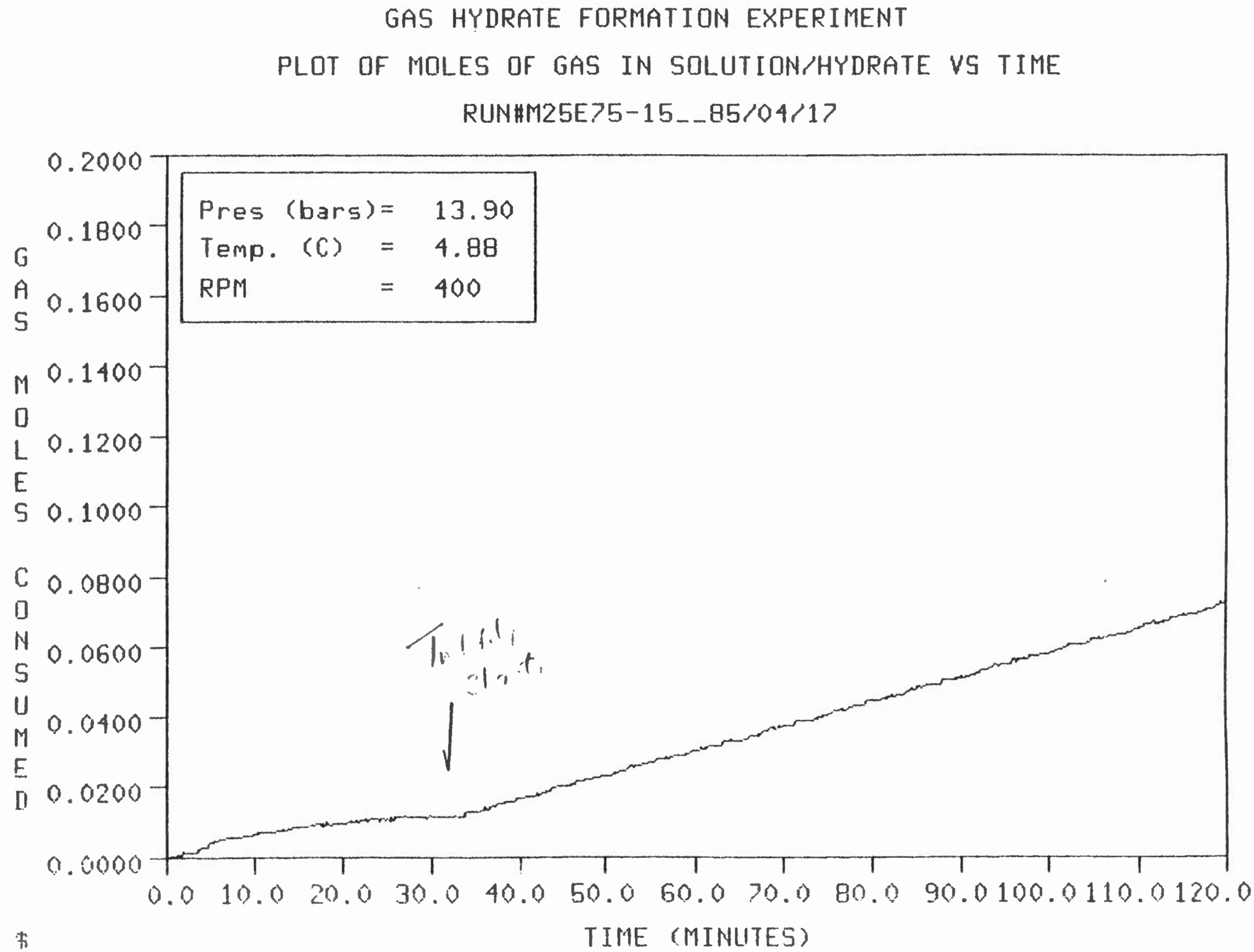
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-14__85/04/16



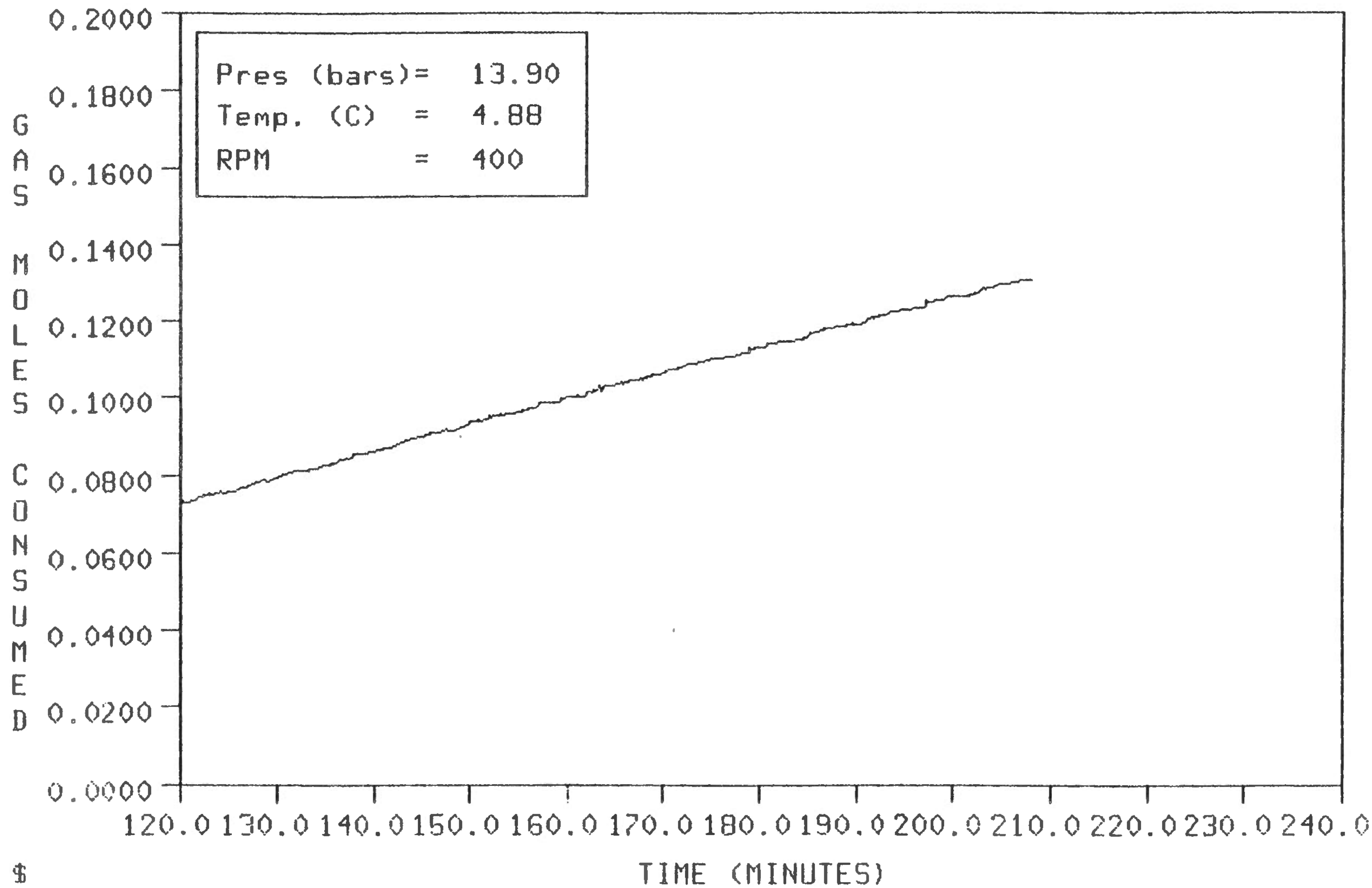

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-14__85/04/16
Pres (bars)= 16.88
Temp. (C) = 5.01
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-15__85/04/17
Pres (bars)= 13.90
Temp. (C) = 4.88
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

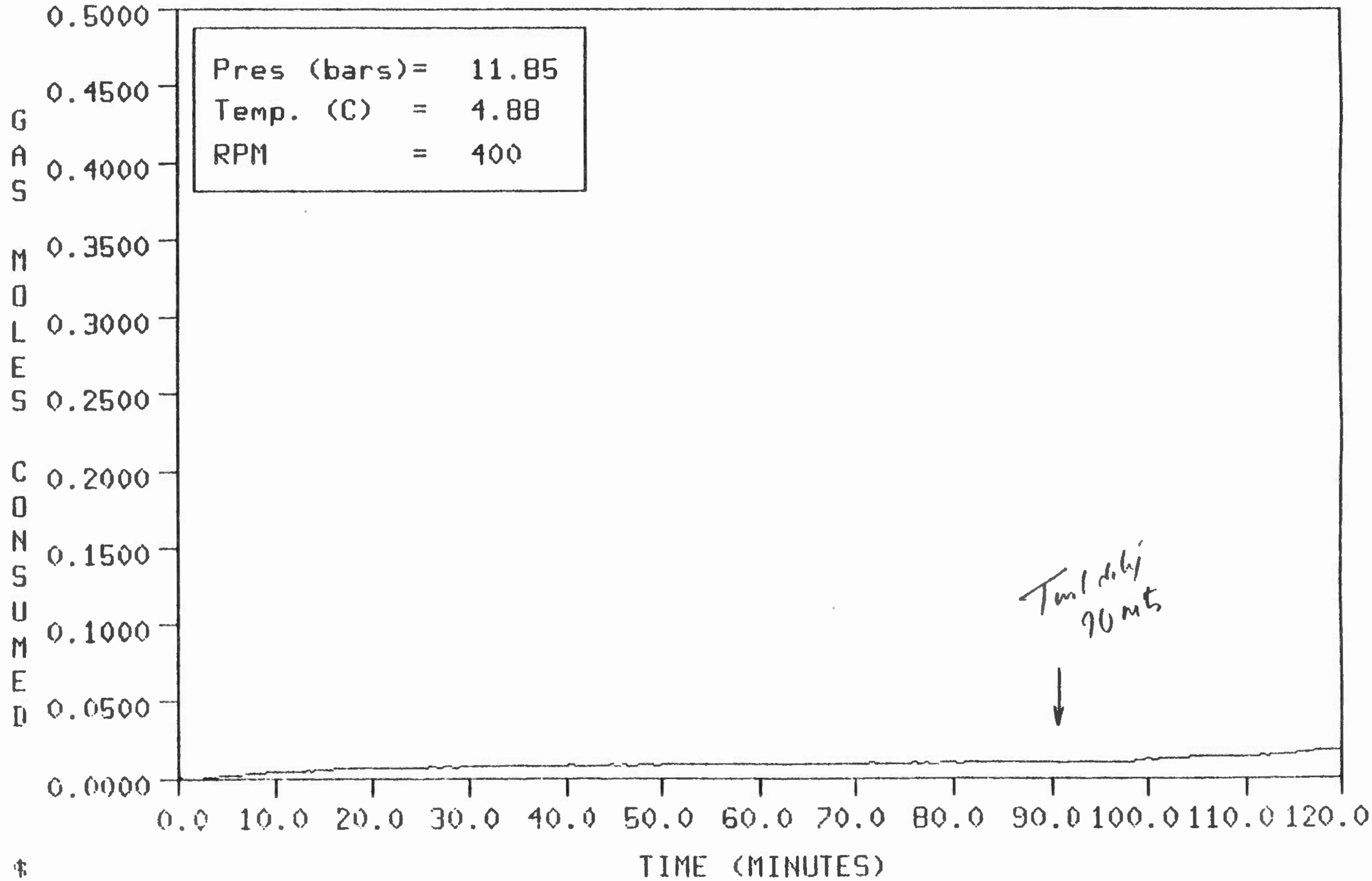
RUN#M25E75-15__85/04/17

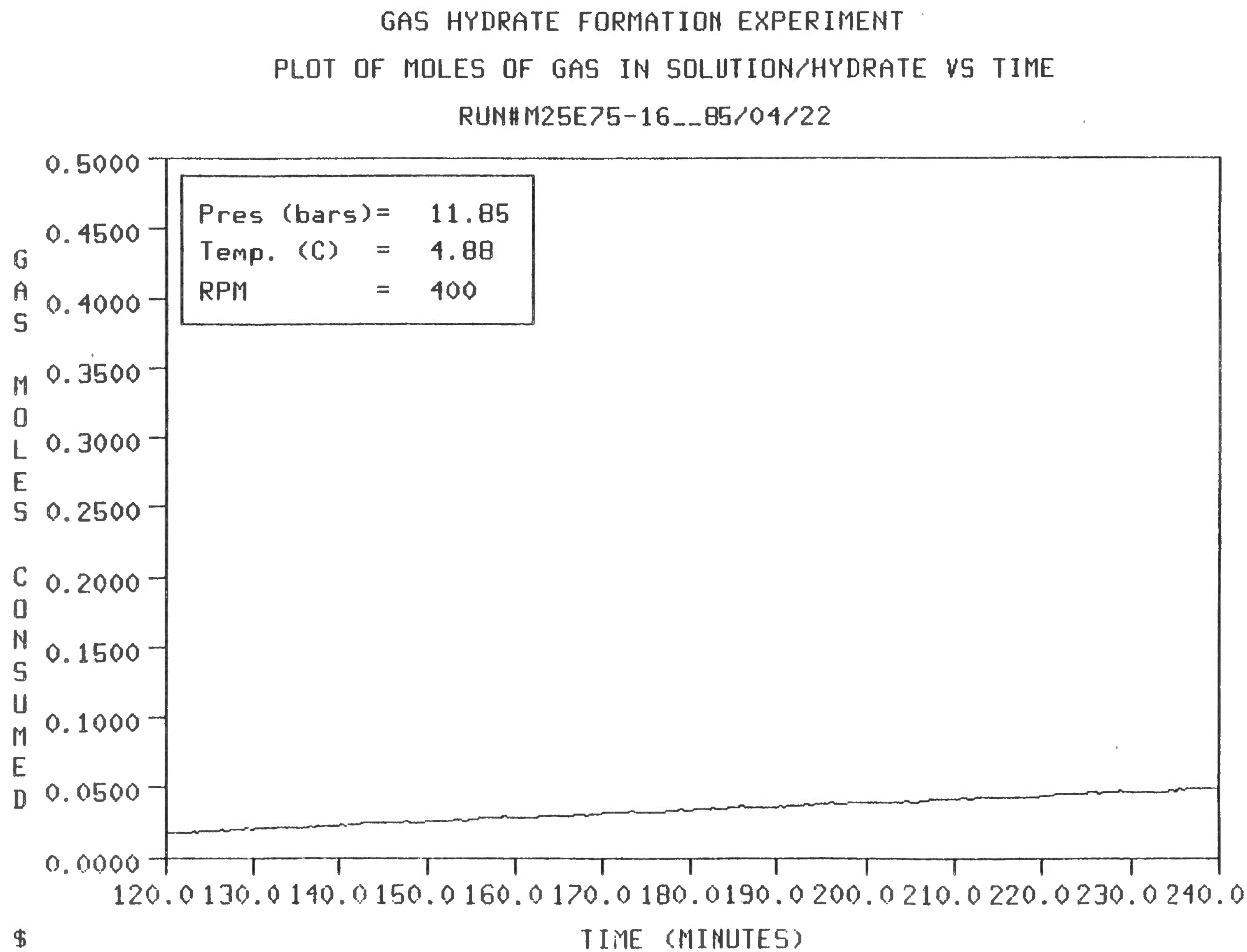


GAS HYDRATE FORMATION EXPERIMENT

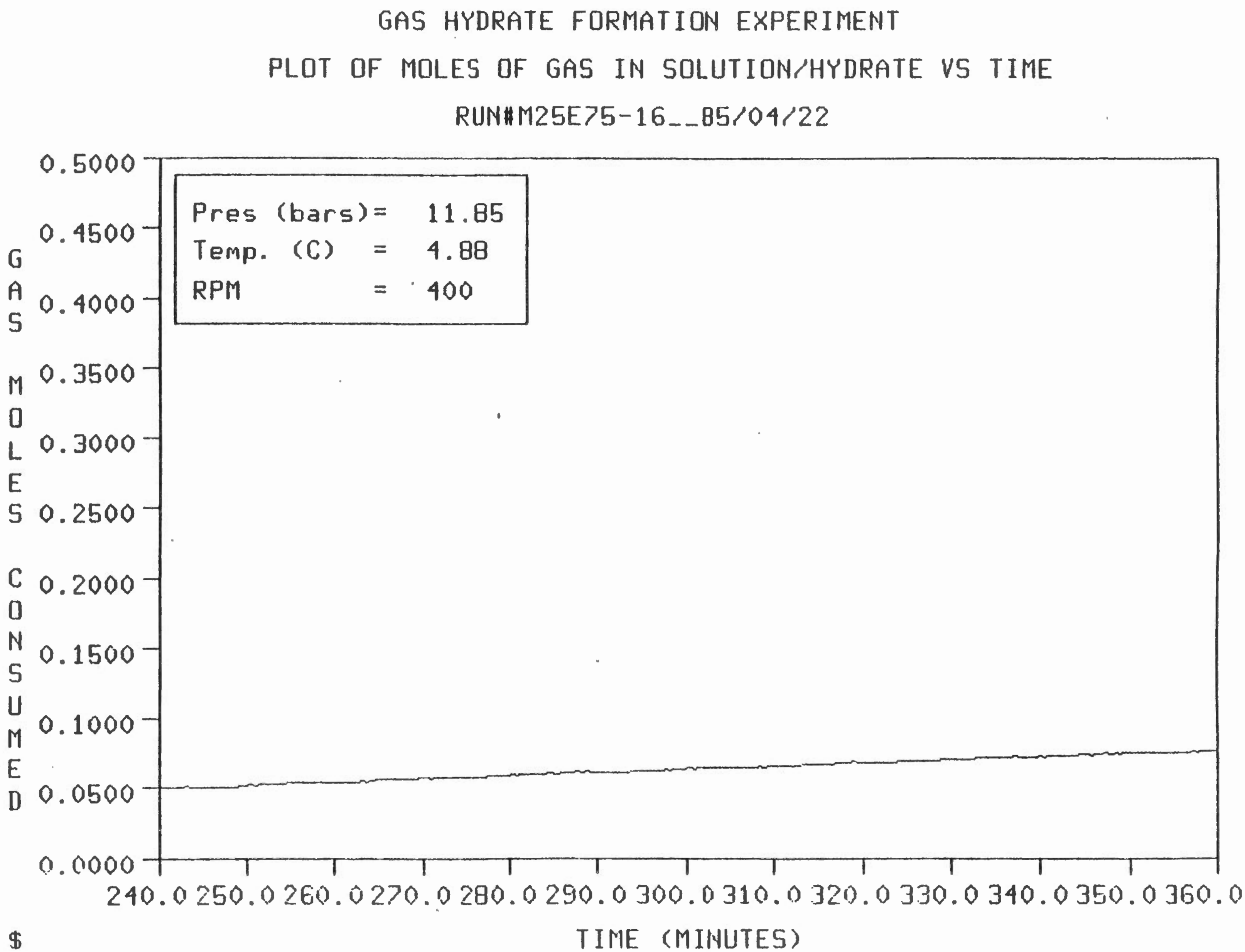
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

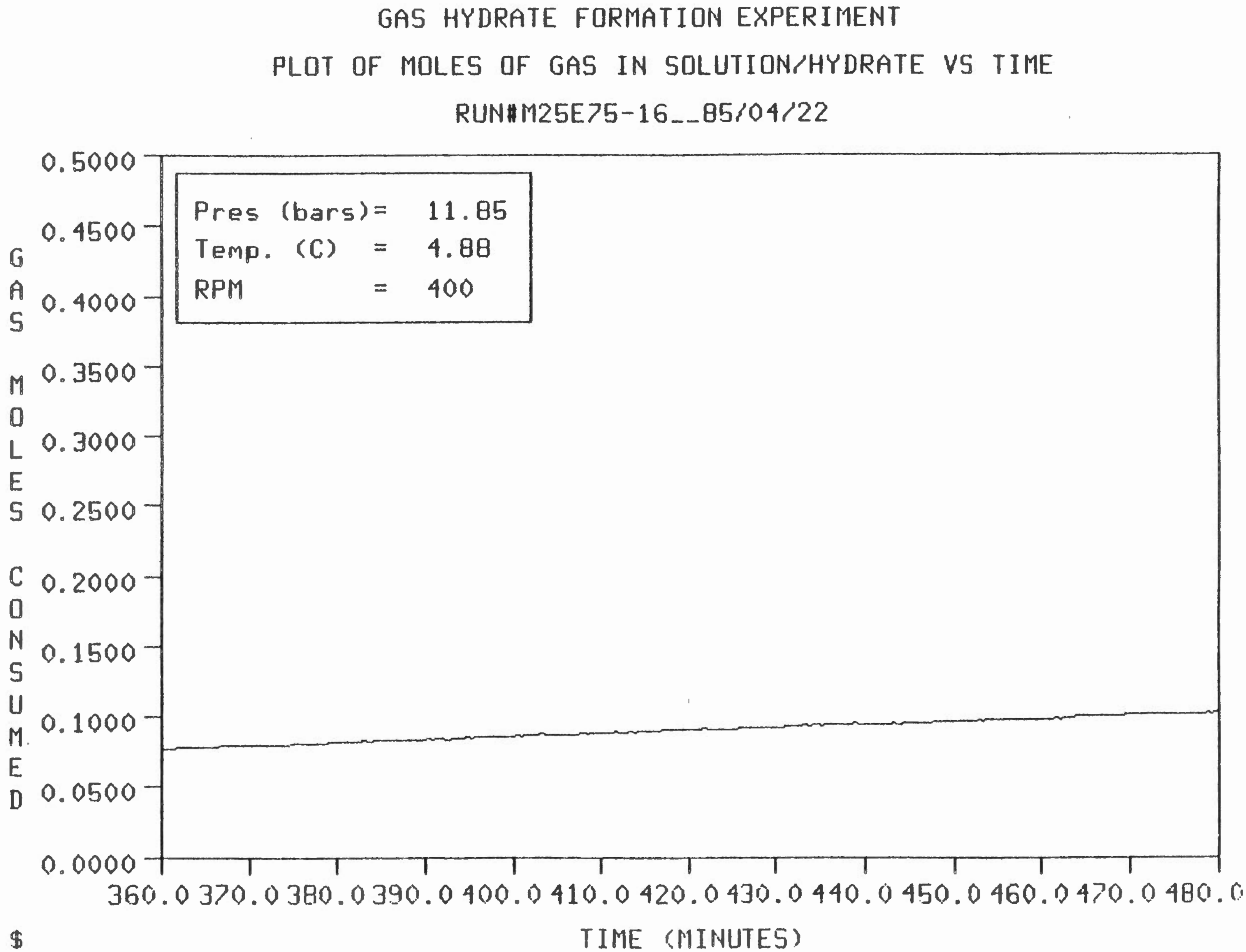
RUN#M25E75-16__85/04/22





GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-16__85/04/22
Pres (bars)= 11.85
Temp. (C) = 4.88
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

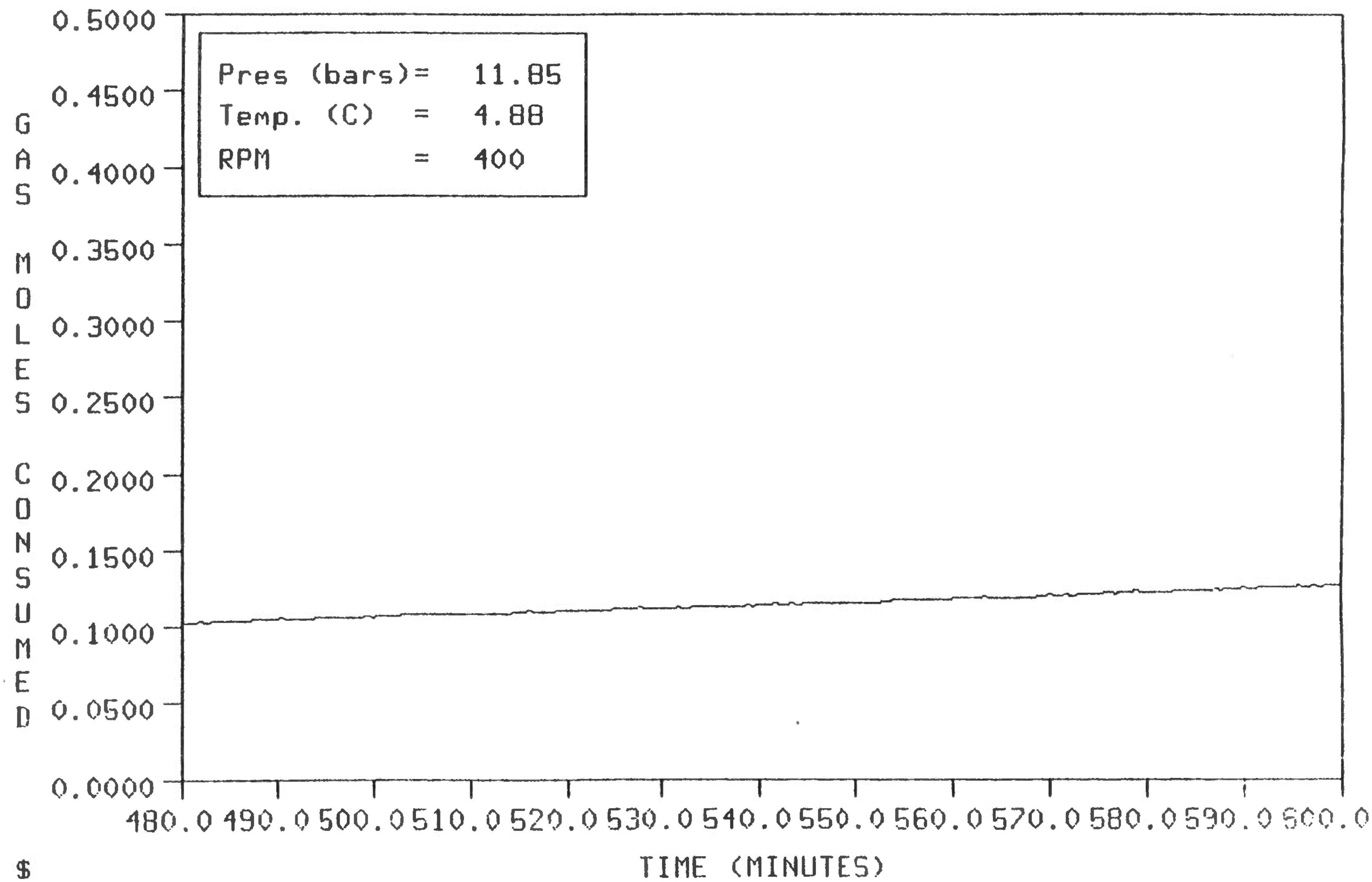

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-16__85/04/22
Pres (bars)= 11.85
Temp. (C) = 4.88
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-16__85/04/22
Pres (bars)= 11.85
Temp. (C) = 4.88
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-16__85/04/22



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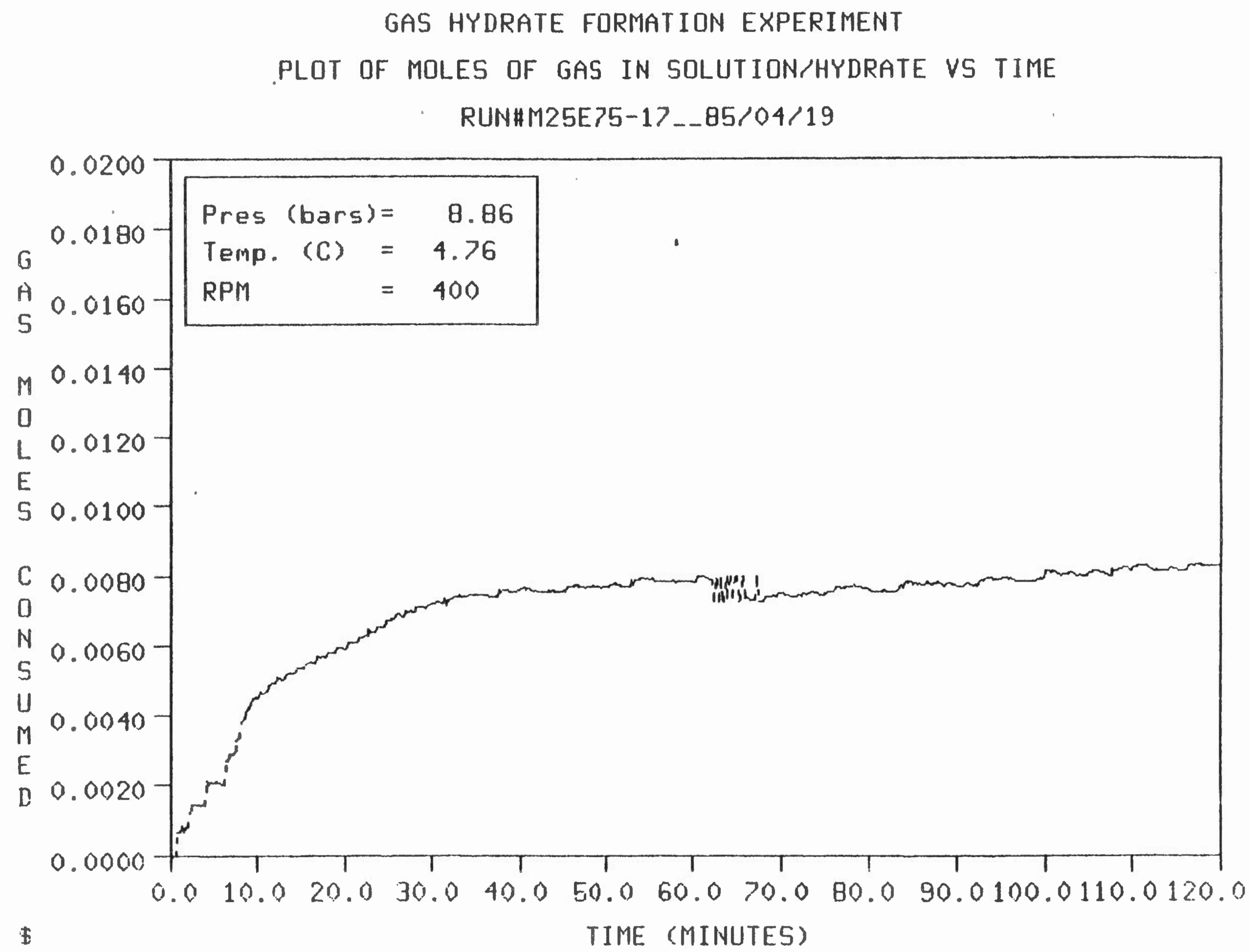
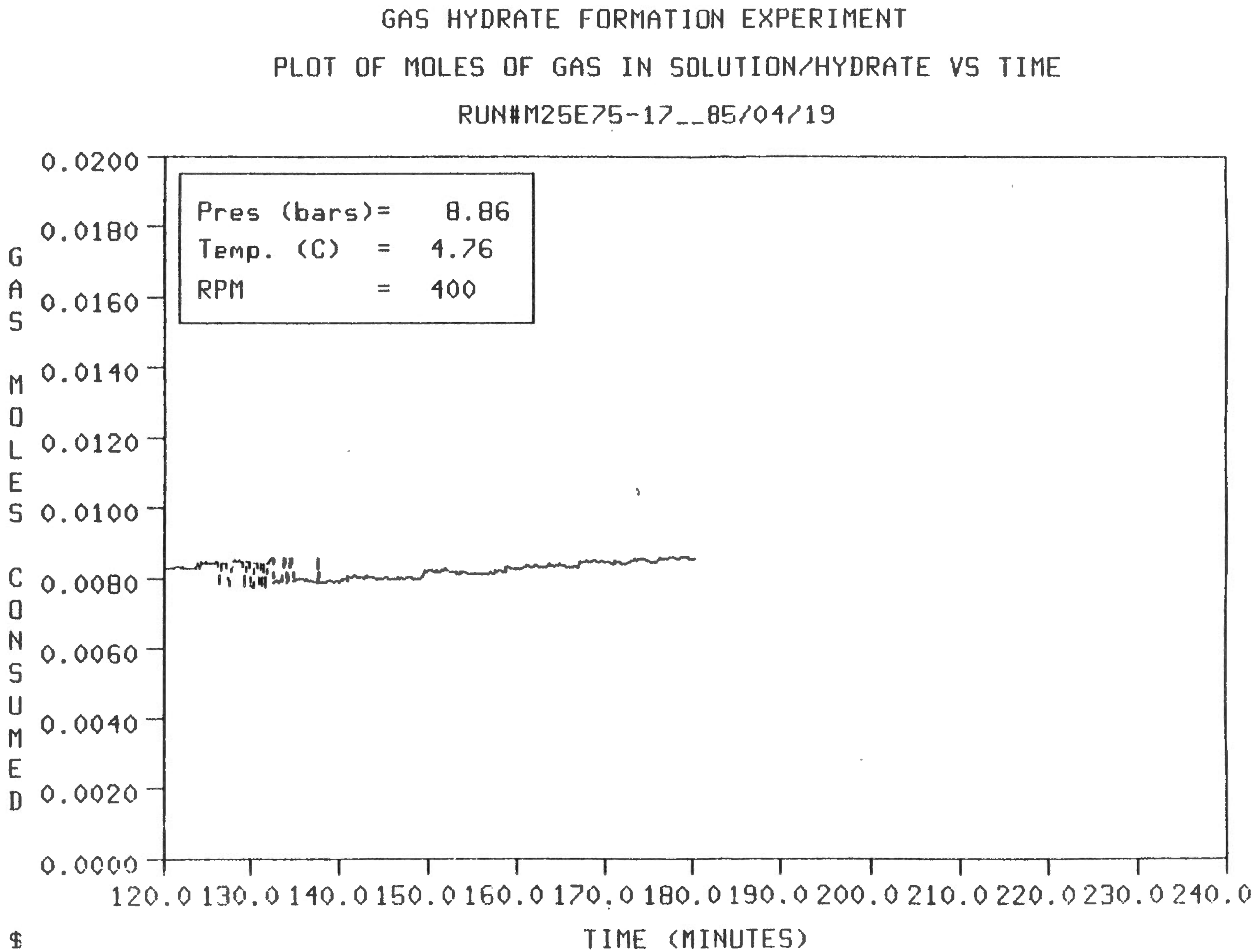


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-17__85/04/19
Pres (bars)= 8.86
Temp. (C) = 4.76
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

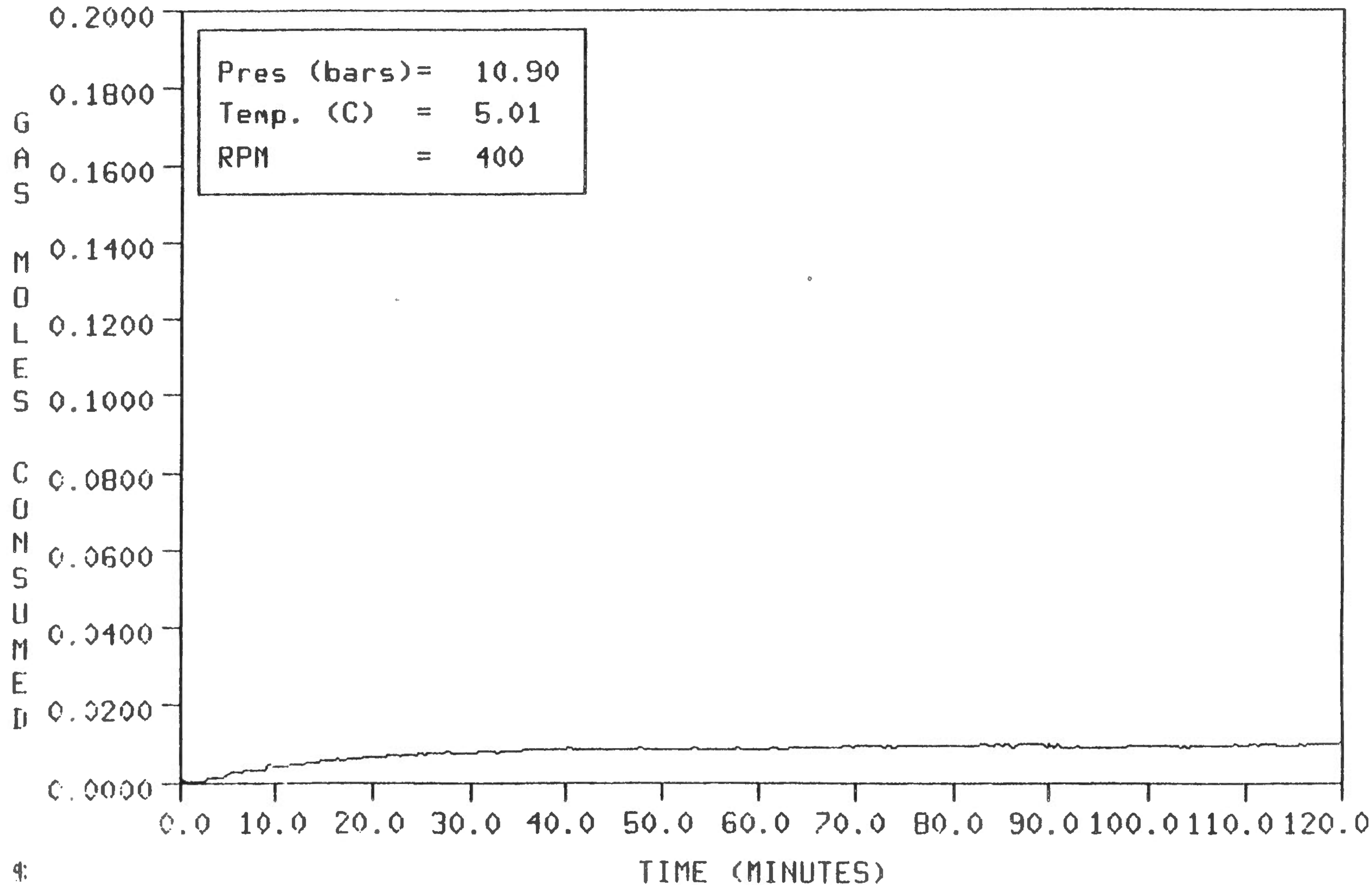

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-17__85/04/19
Pres (bars)= 8.86
Temp. (C) = 4.76
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)

$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

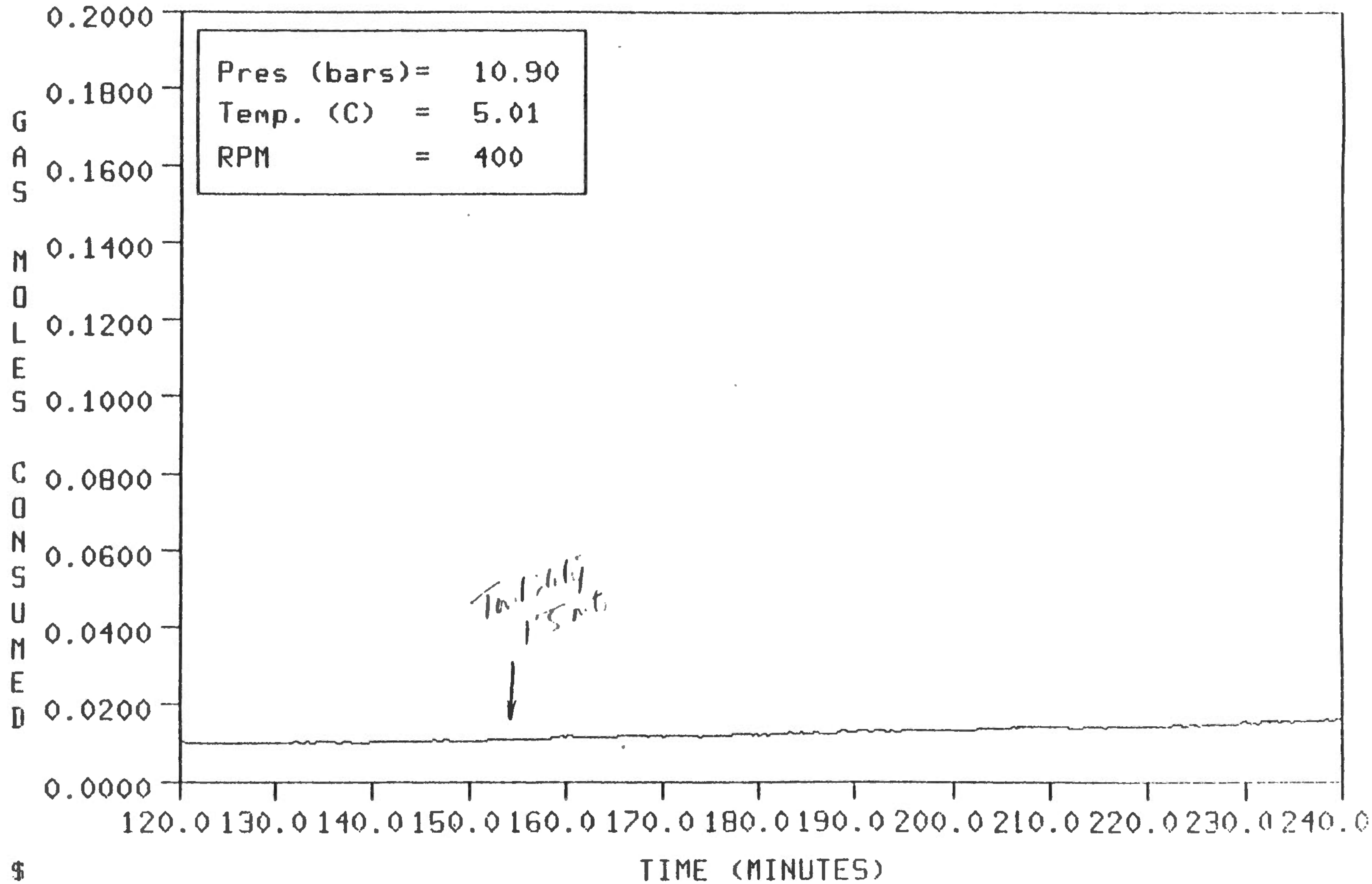
RUN#M25E75-18__85/05/06

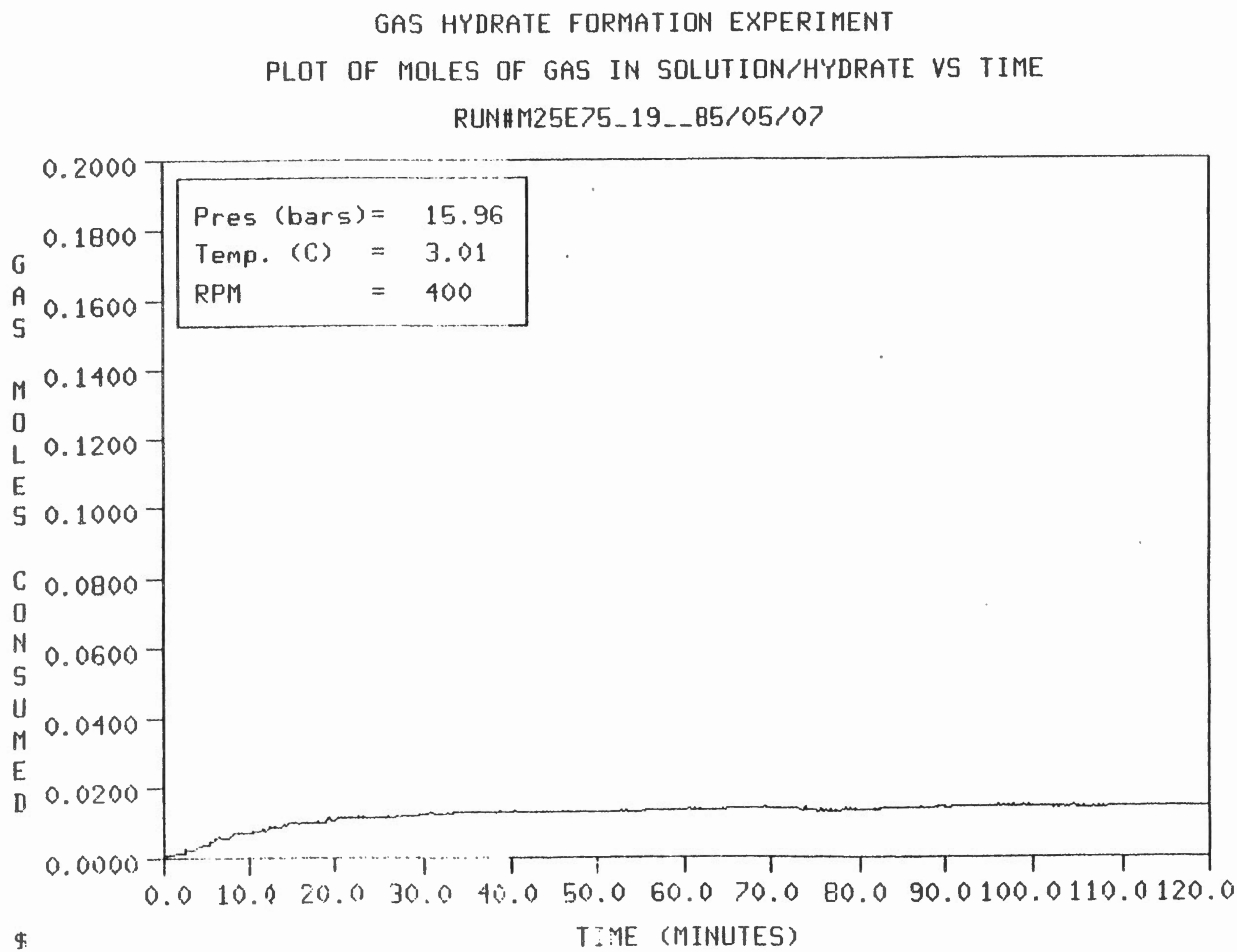


GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-18__85/05/06



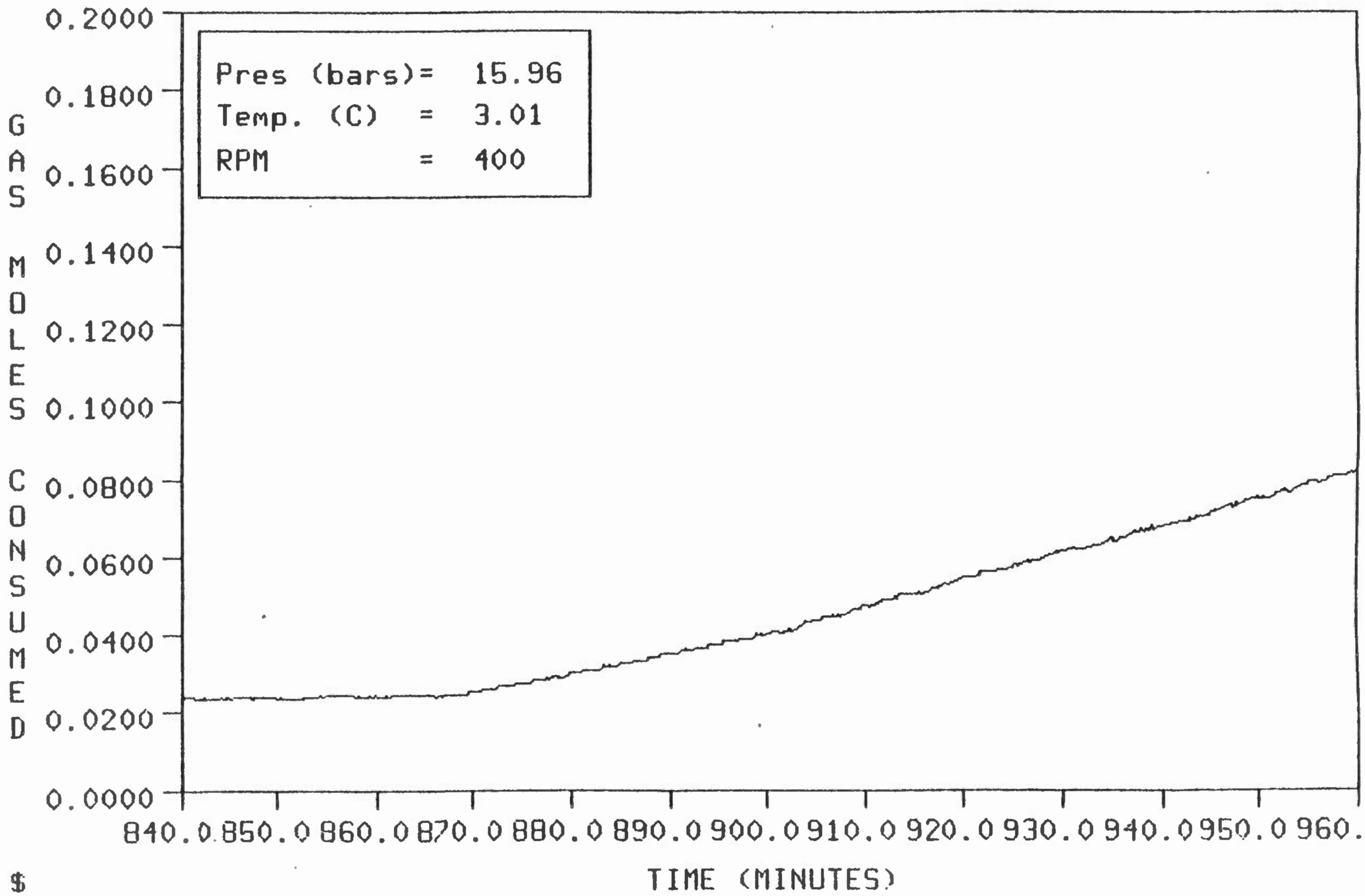

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75_19__85/05/07
Pres (bars)= 15.96
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)

$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75_19__85/05/07



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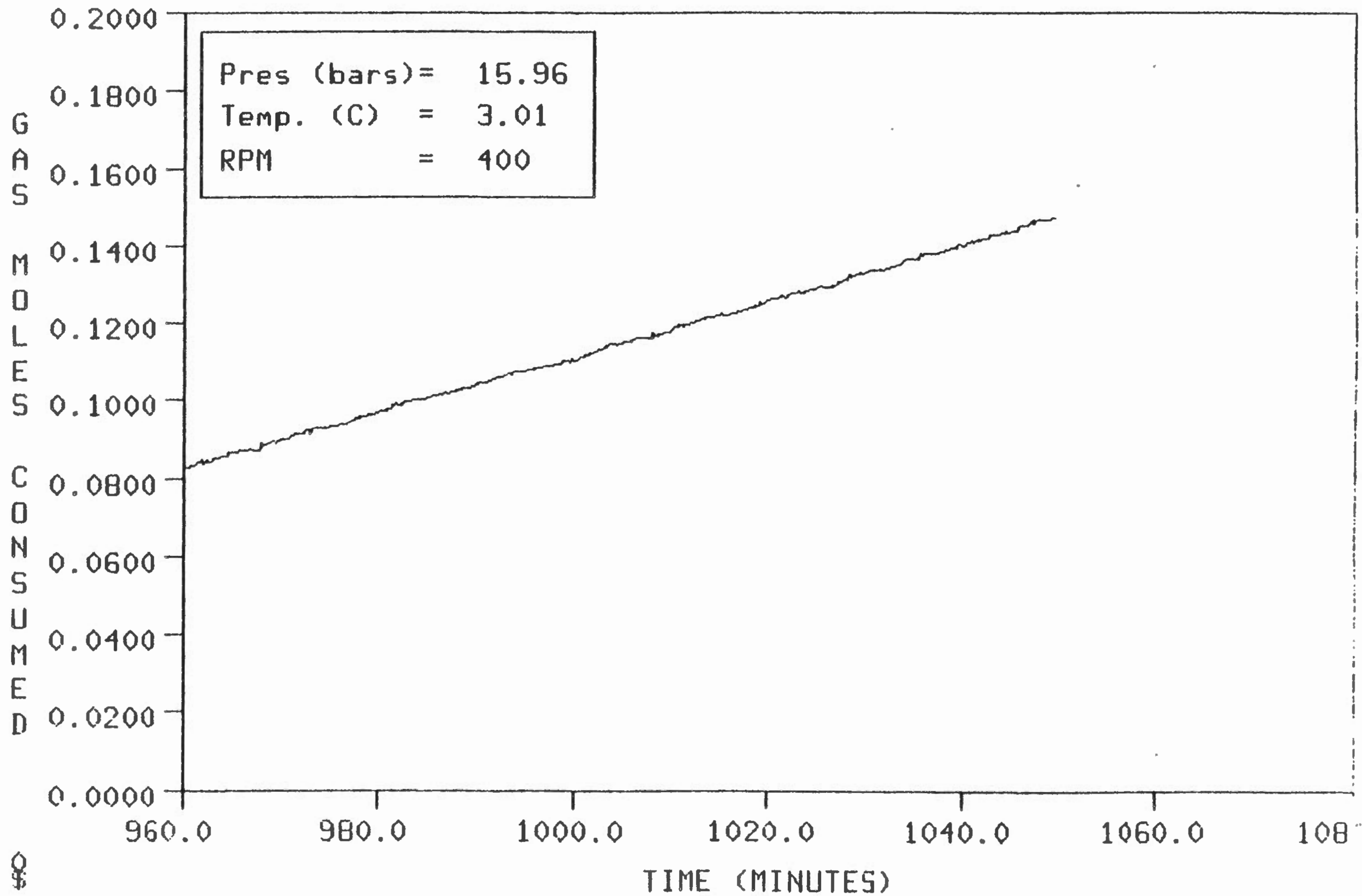
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

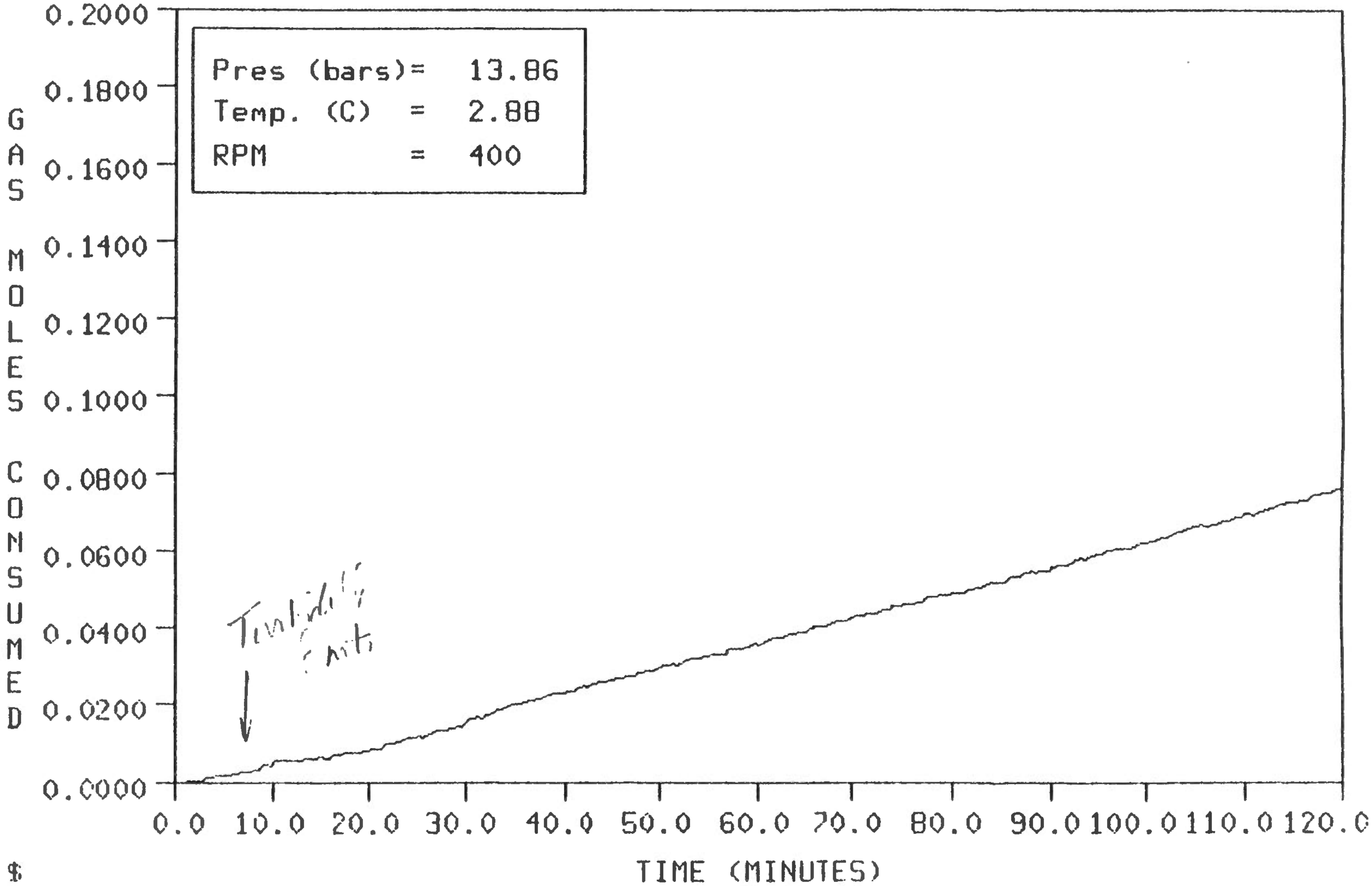
RUN#M25E75_19__85/05/07

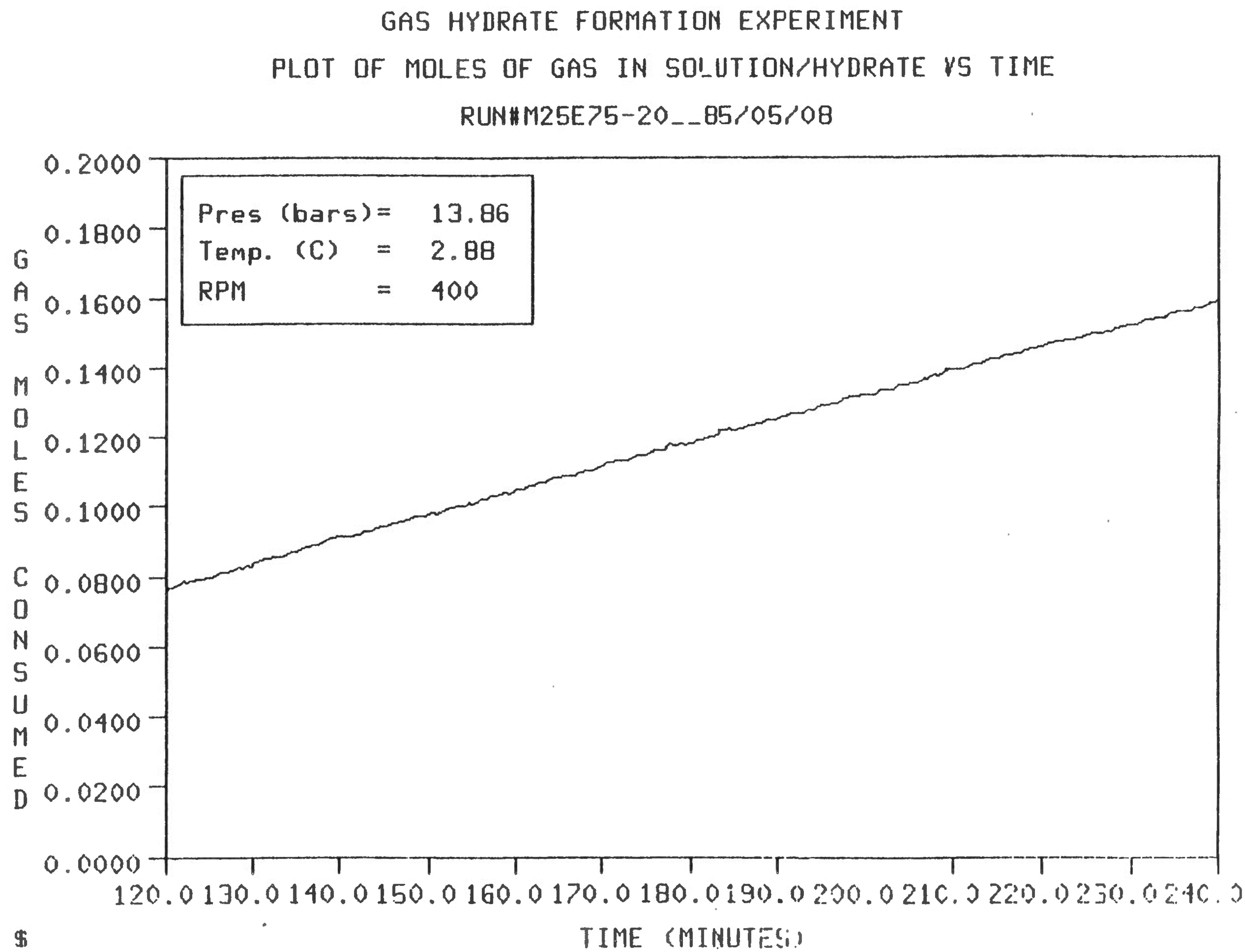


GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-20__85/05/08

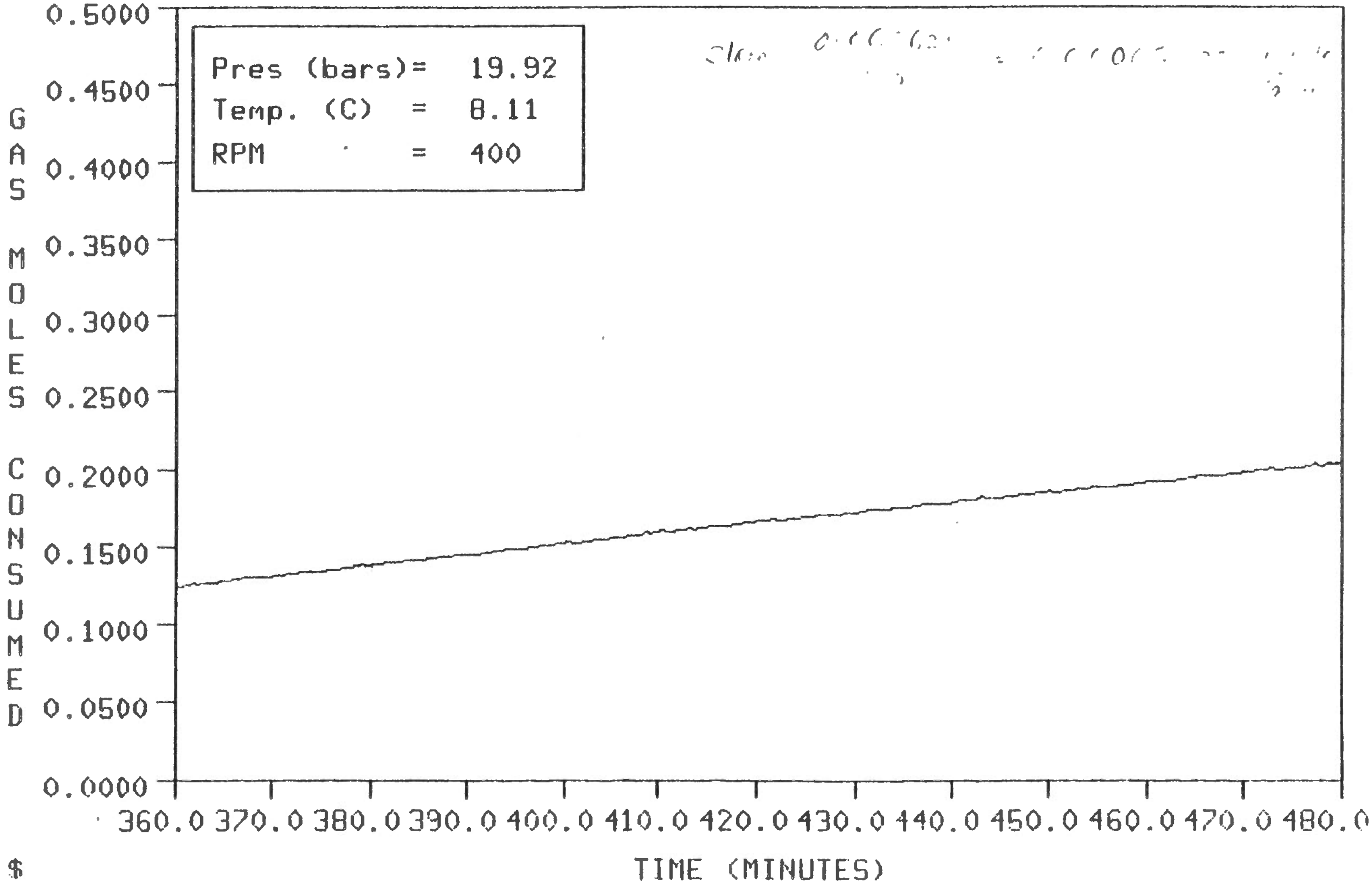



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-20__85/05/08
Pres (bars)= 13.86
Temp. (C) = 2.88
RPM = 400
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
GAS MOLES CONSUMED
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-03__85/03/27

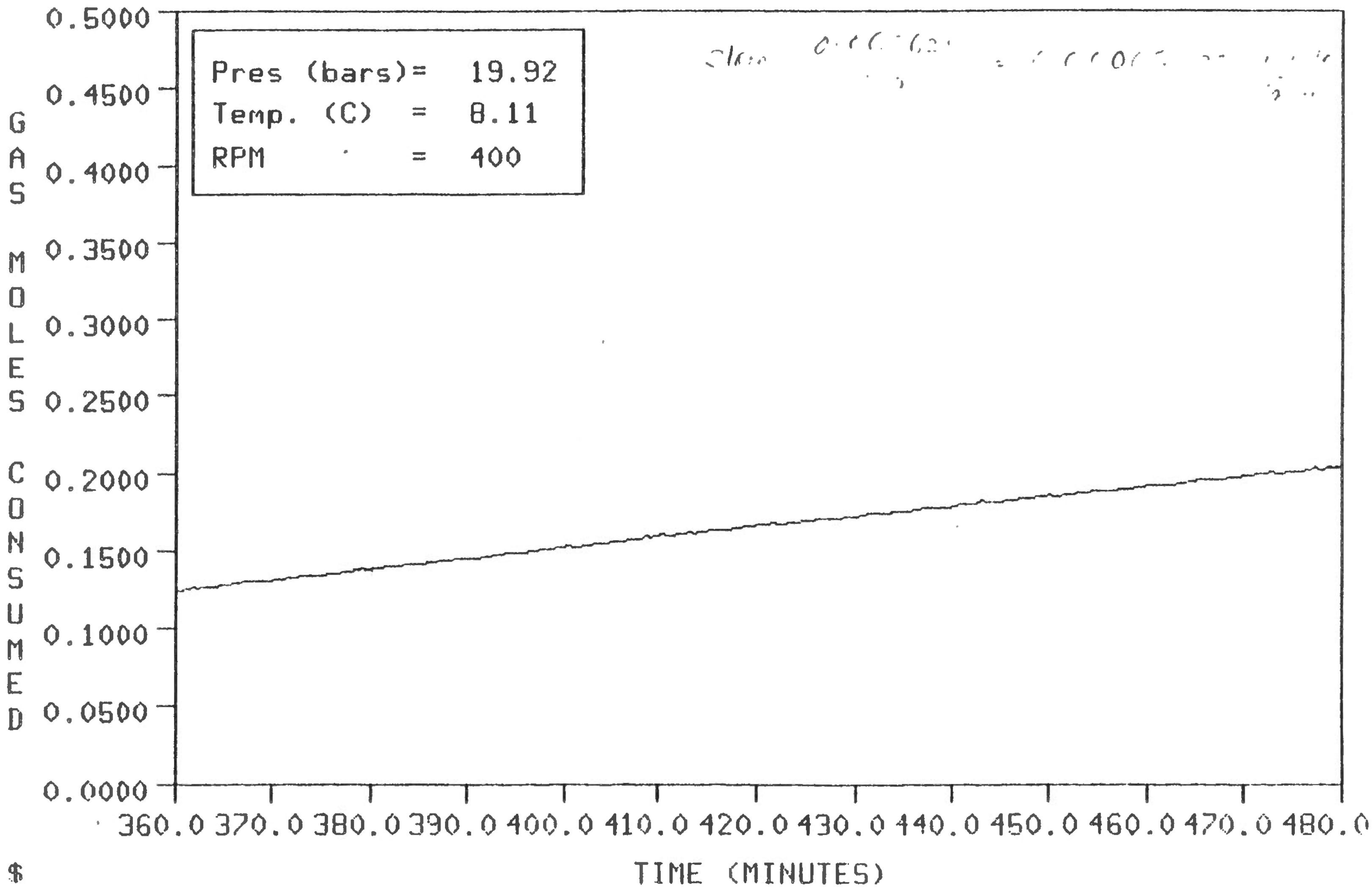


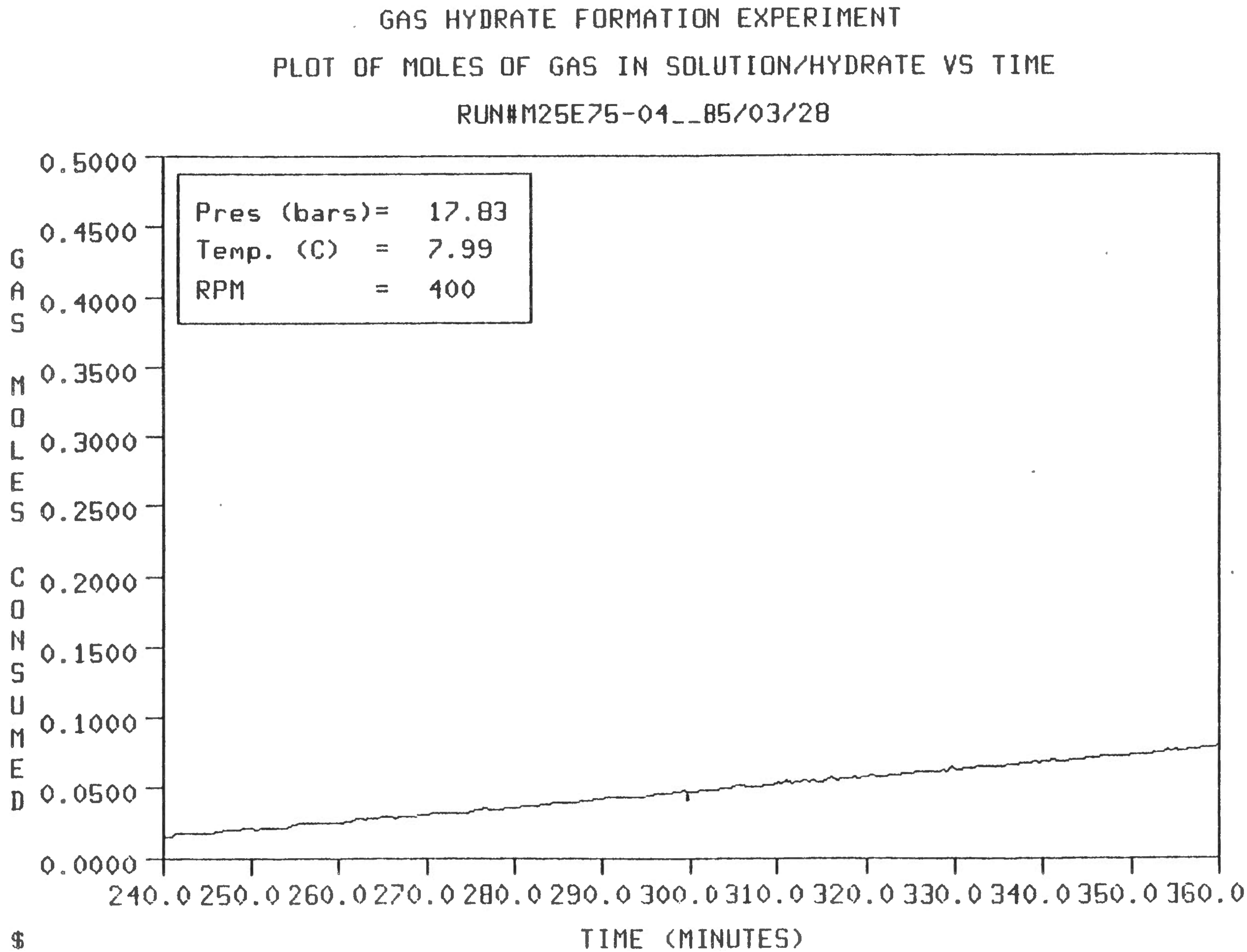
$

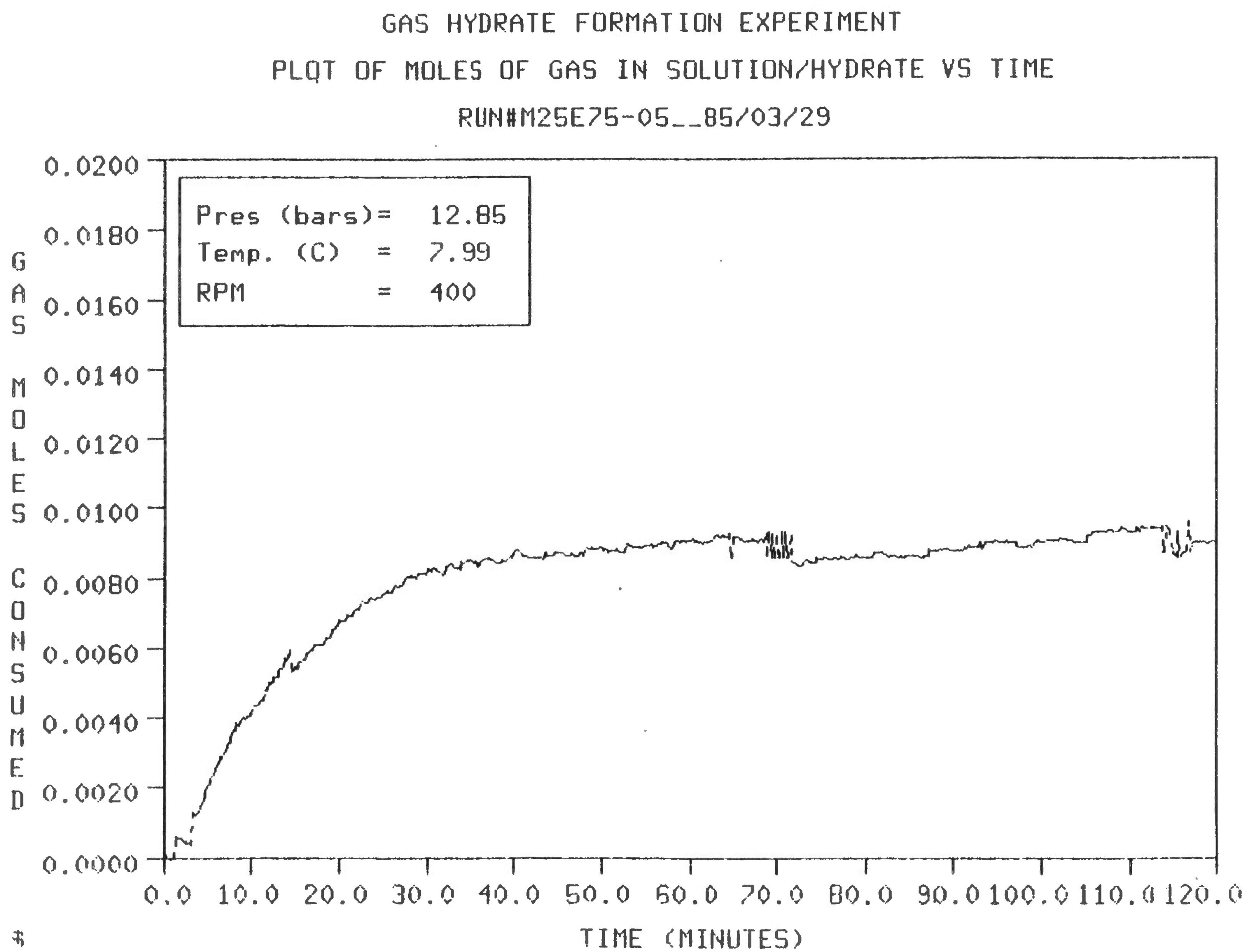
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-03__85/03/27




GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-04__85/03/28
Pres (bars)= 17.83
Temp. (C) = 7.99
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$

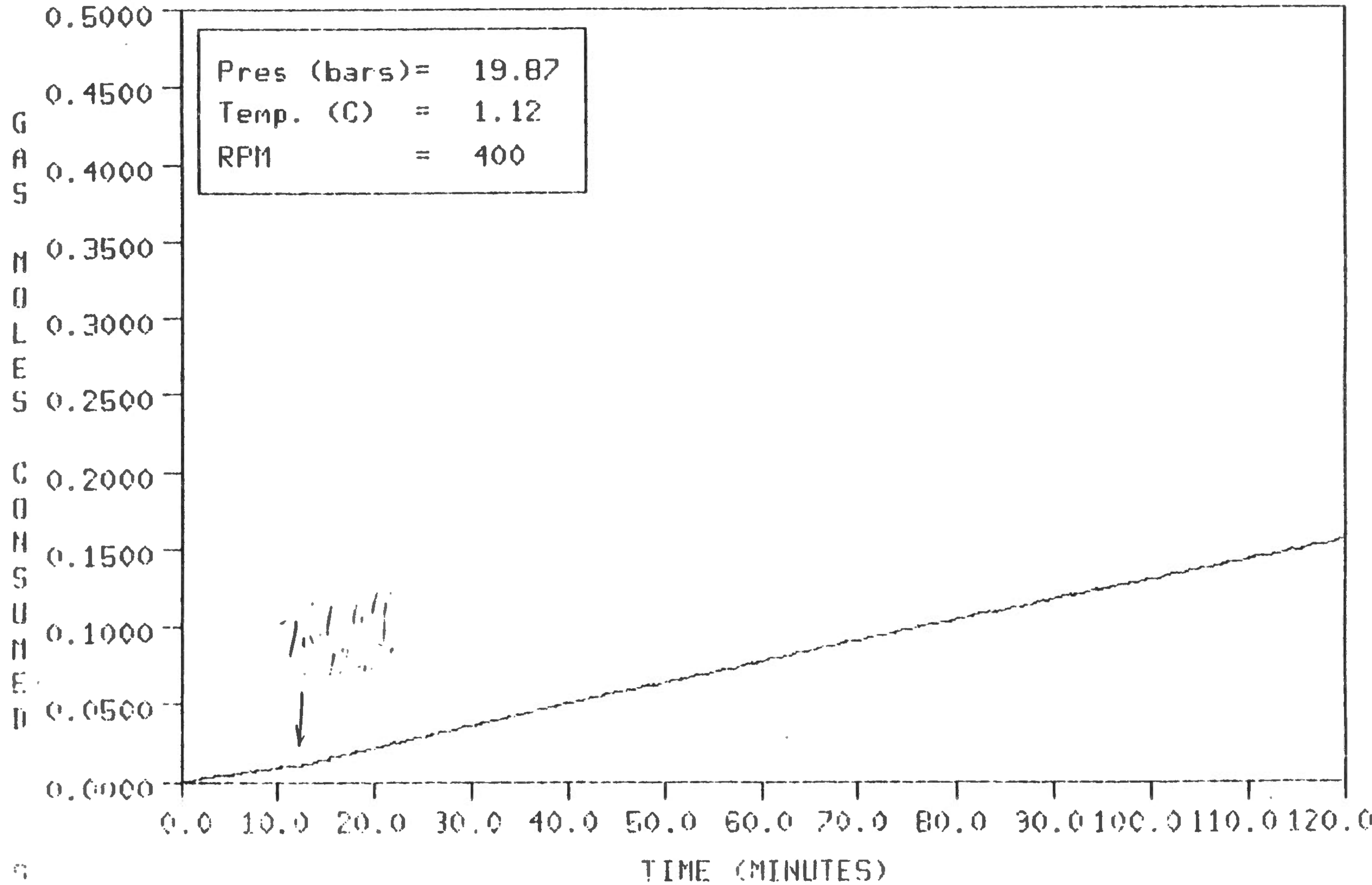

GAS HYDRATE FORMATION EXPERIMENT
PLQT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-05__85/03/29
Pres (bars)= 12.85
Temp. (C) = 7.99
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)

$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

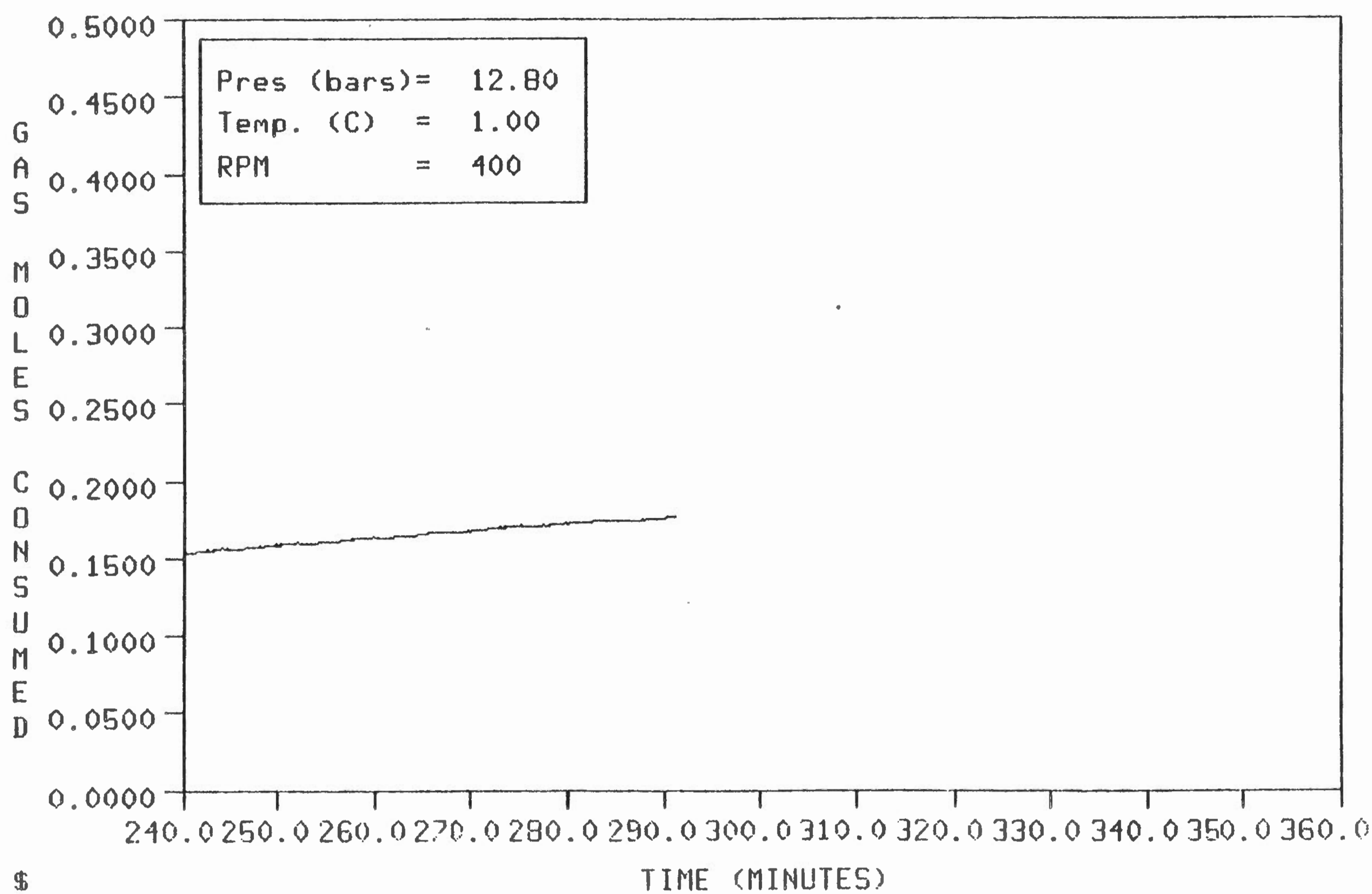
RUN#M25E75-07__85/04/04



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-08__85/04/08



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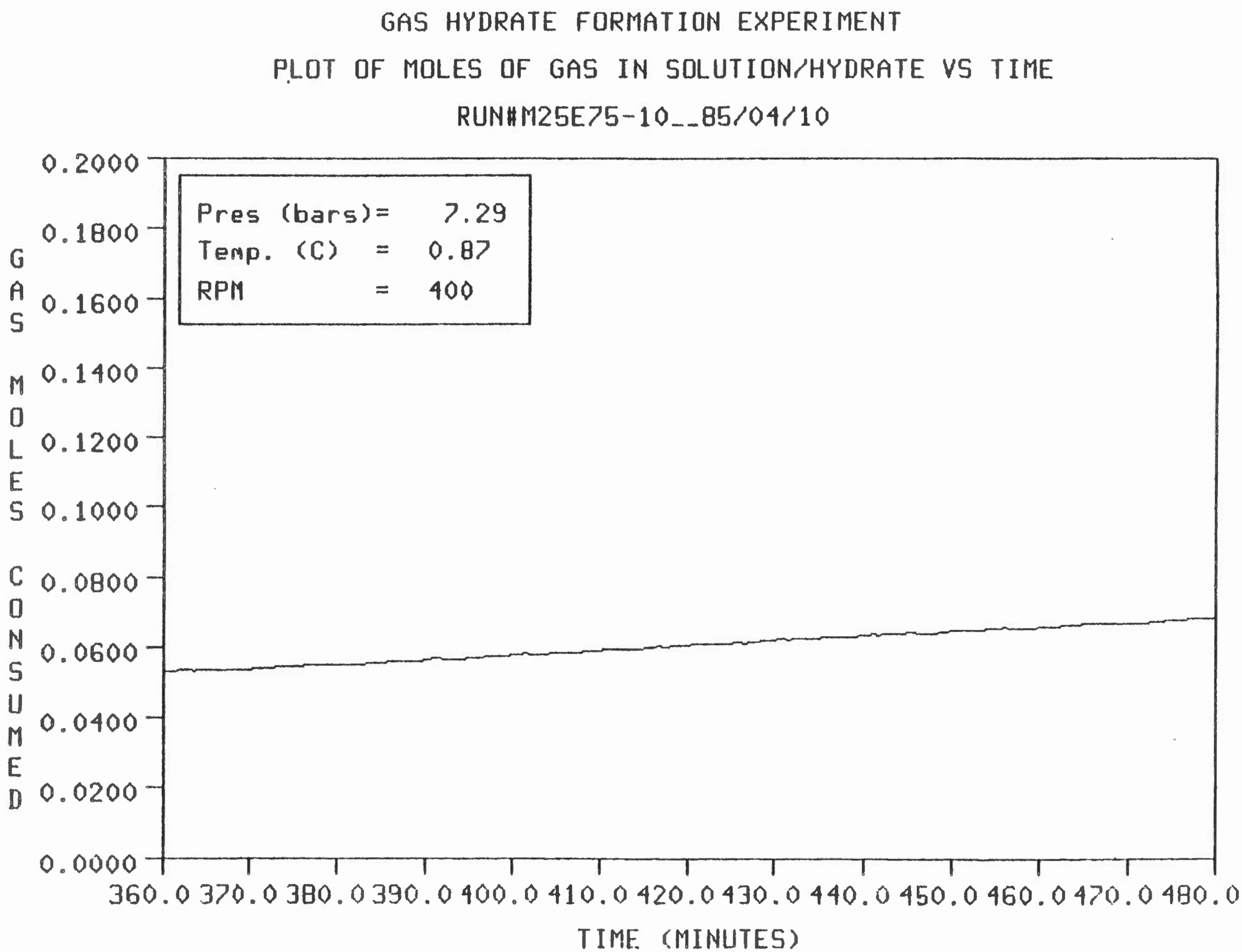
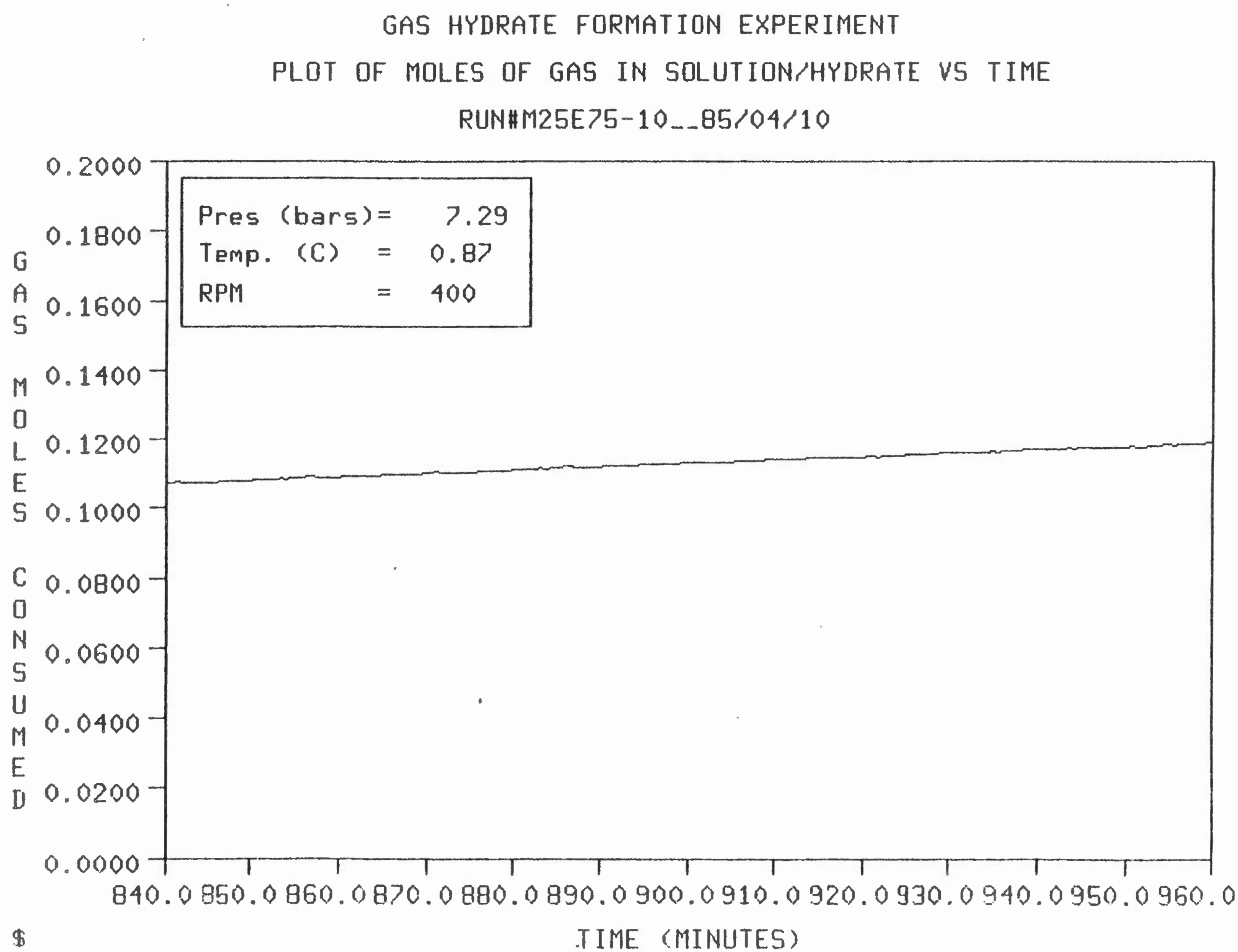
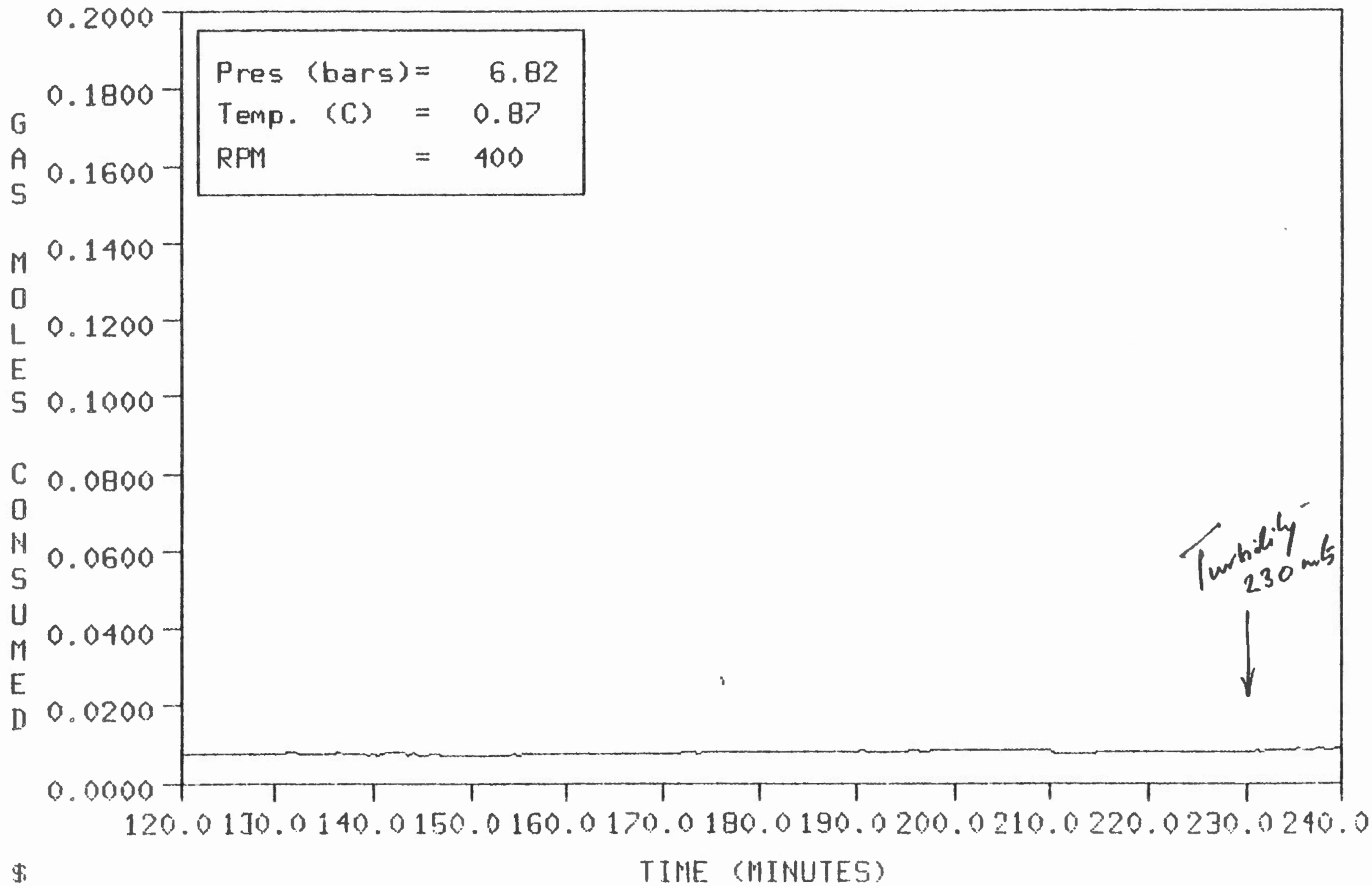

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0200
0.0400
0.0600
0.0800
0.1000
0.1200
0.1400
0.1600
0.1800
0.2000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)

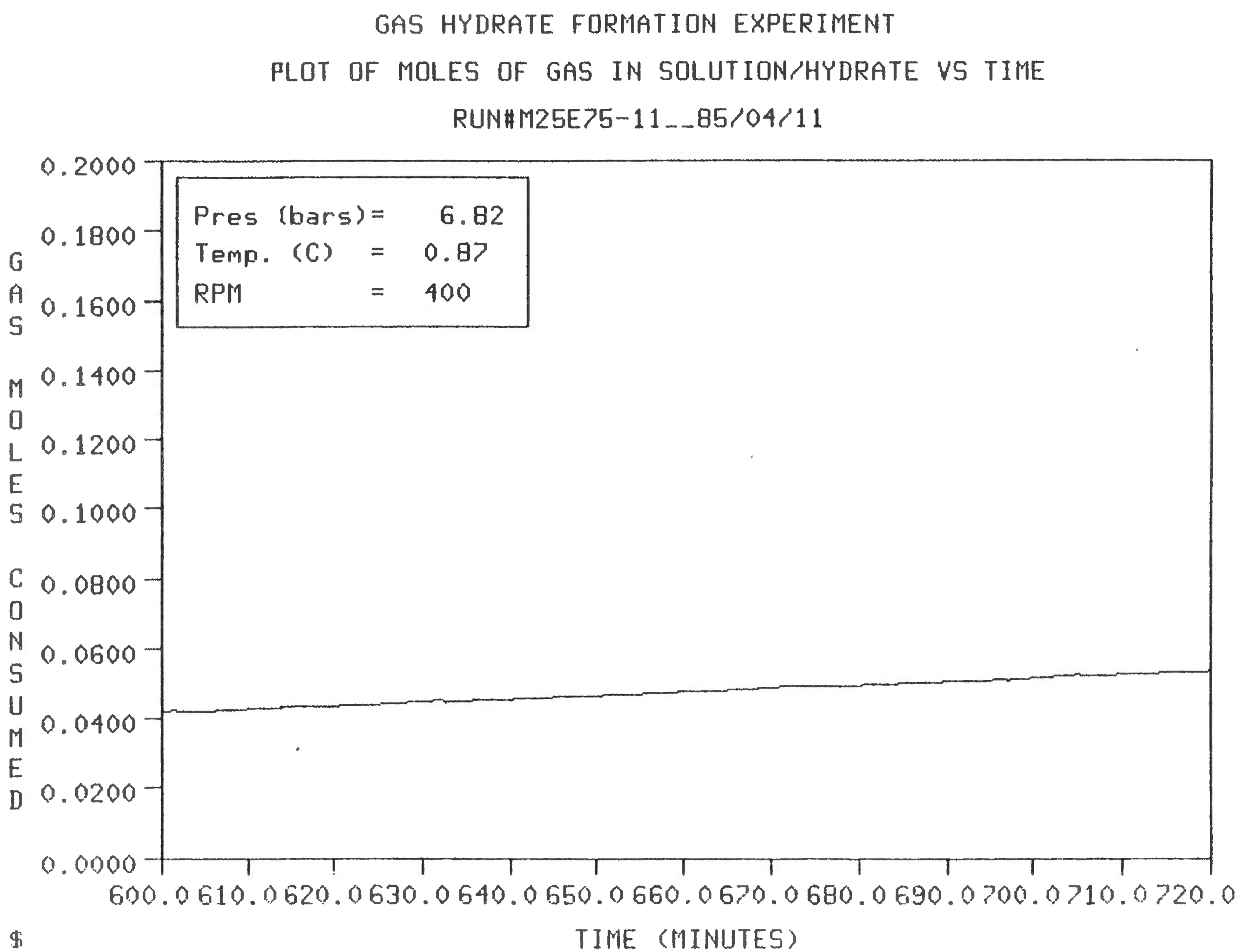

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0200
0.0400
0.0600
0.0800
0.1000
0.1200
0.1400
0.1600
0.1800
0.2000
840.0 850.0 860.0 870.0 880.0 890.0 900.0 910.0 920.0 930.0 940.0 950.0 960.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

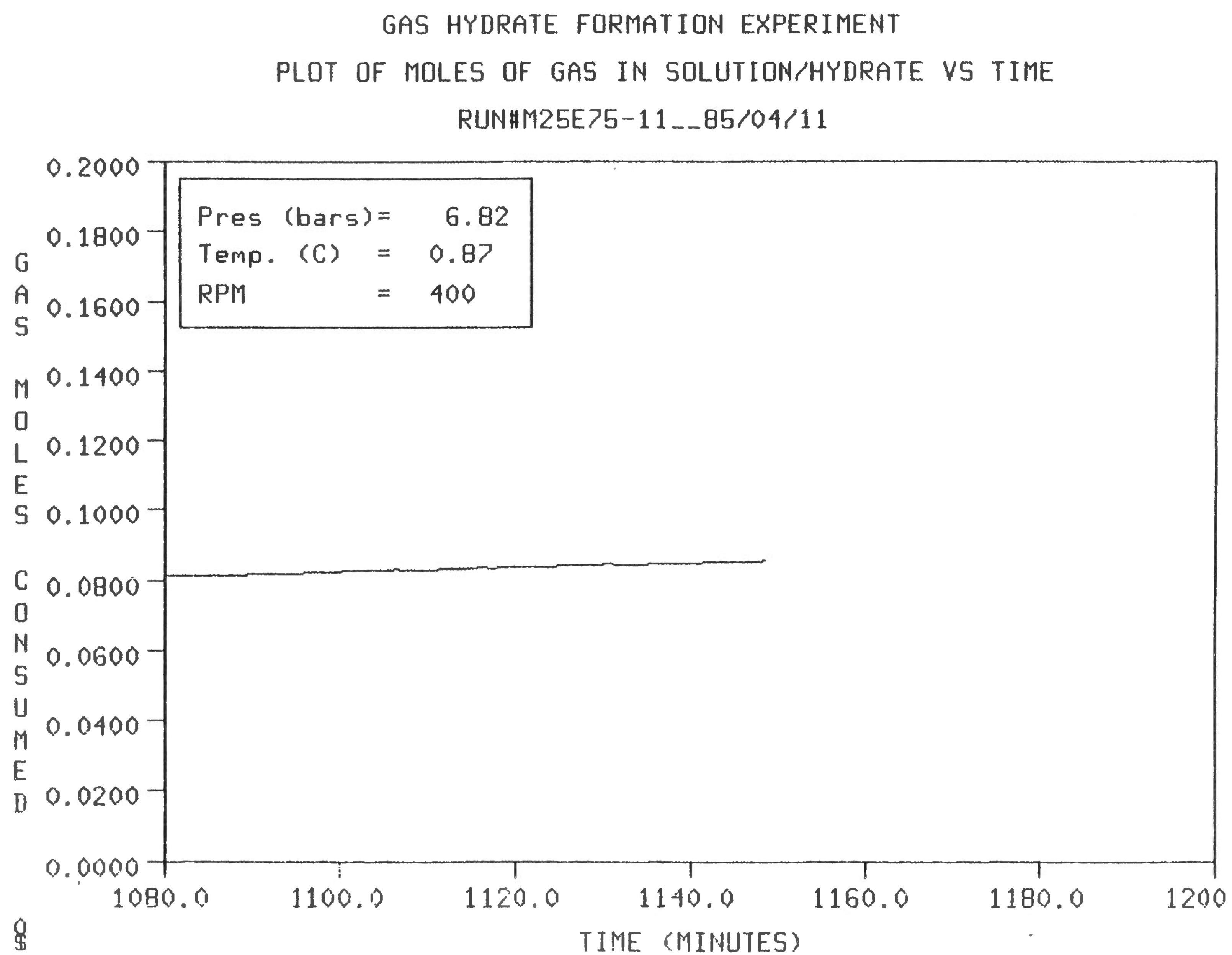
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

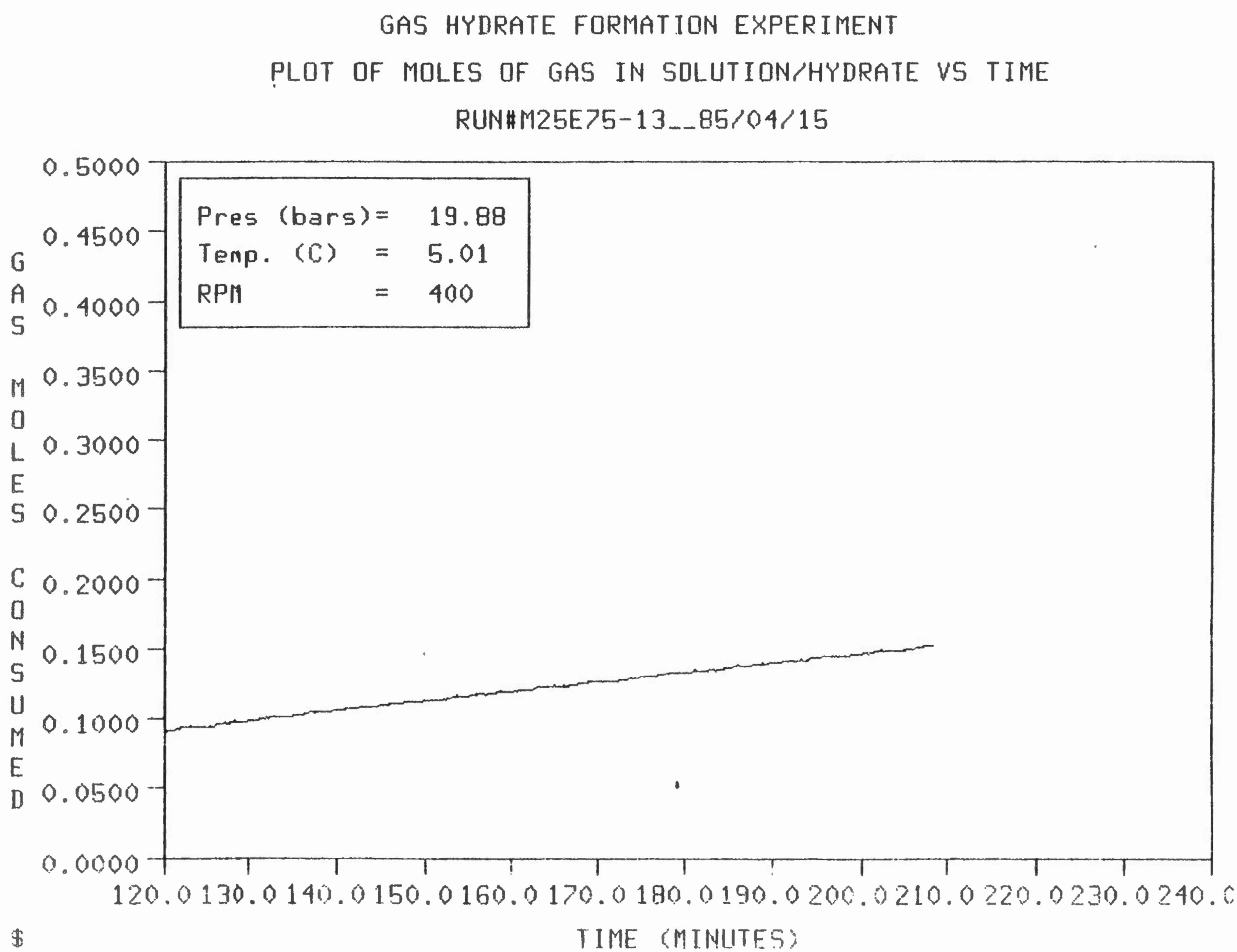
RUN#M25E75-11__85/04/11




GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-11__85/04/11
Pres (bars)= 6.82
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
600.0 610.0 620.0 630.0 640.0 650.0 660.0 670.0 680.0 690.0 700.0 710.0 720.0
TIME (MINUTES)

$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-11__85/04/11
Pres (bars)= 6.82
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
1080.0
1100.0
1120.0
1140.0
1160.0
1180.0
1200.
TIME (MINUTES)

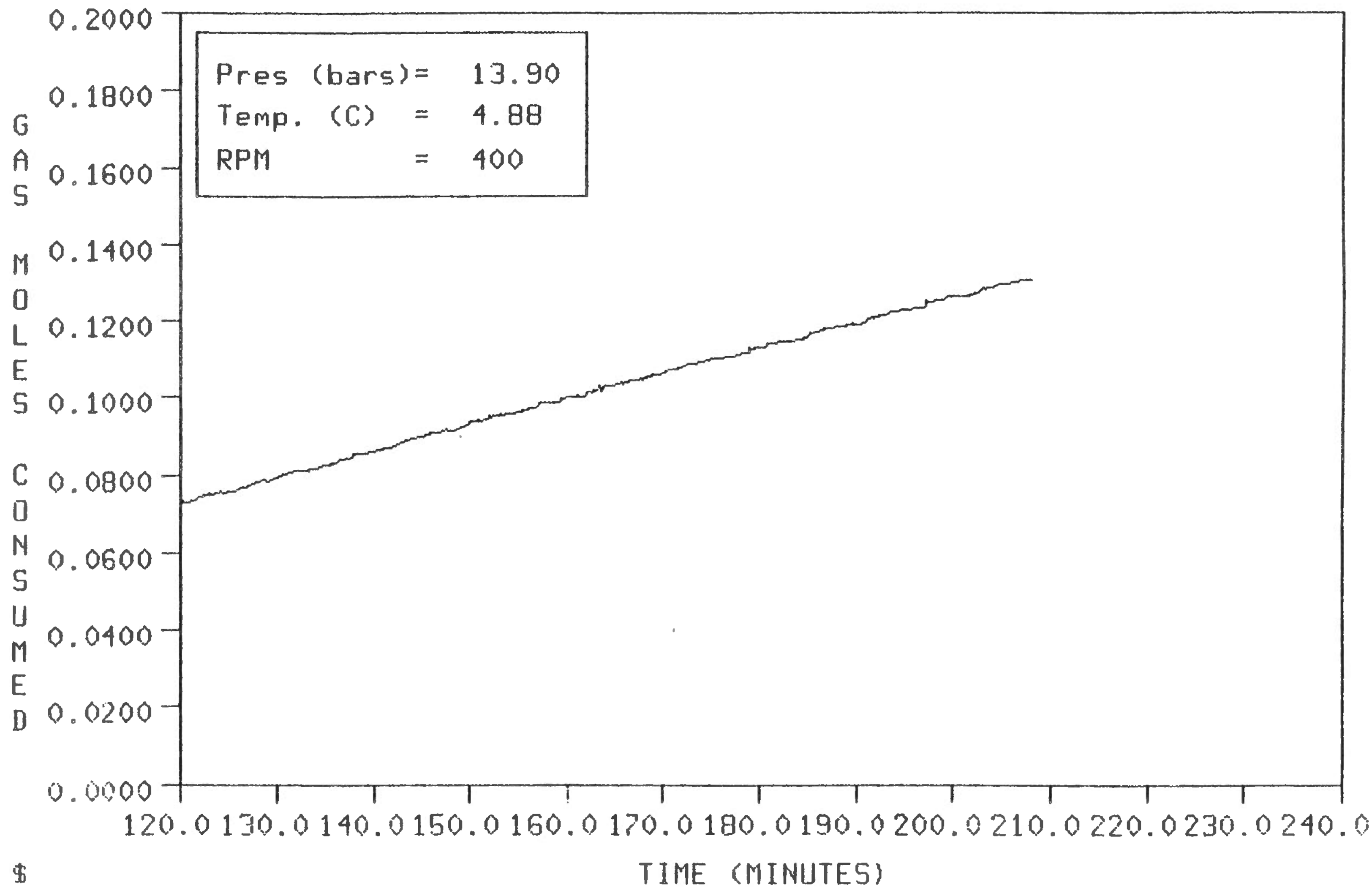


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-13__85/04/15
Pres (bars)= 19.88
Temp. (C) = 5.01
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

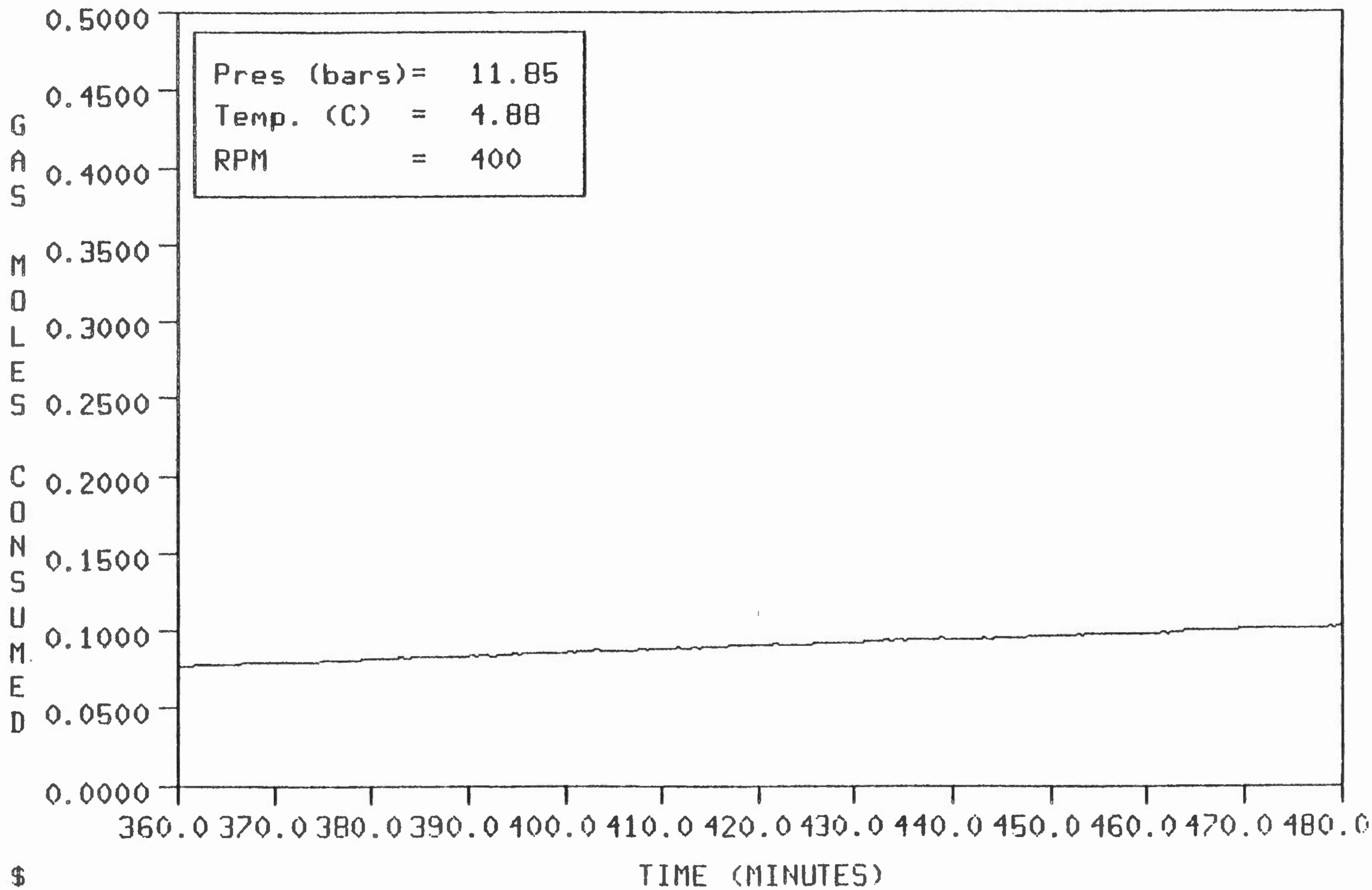
RUN#M25E75-15__85/04/17



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

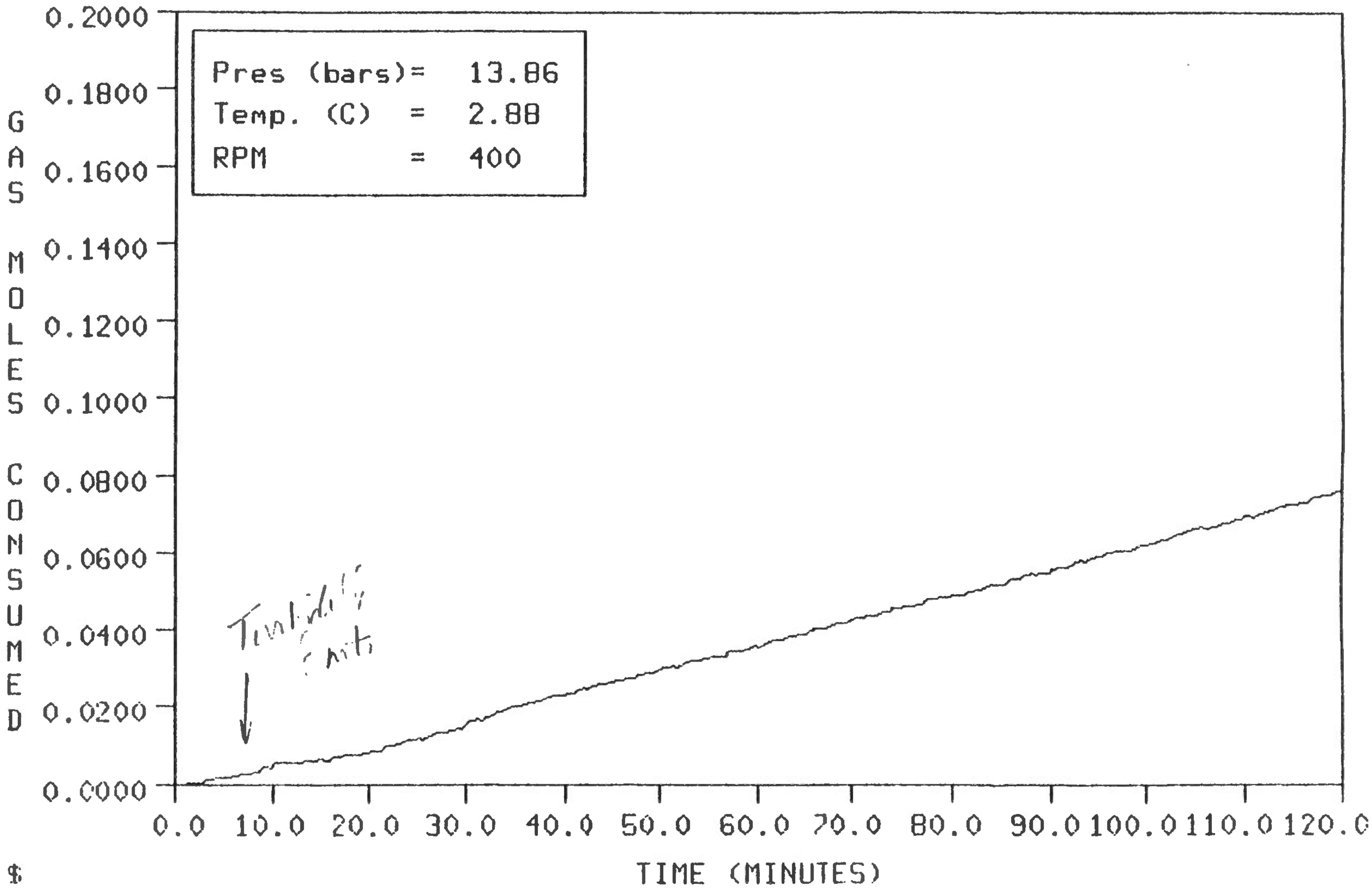
RUN#M25E75-16__85/04/22



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-20__85/05/08



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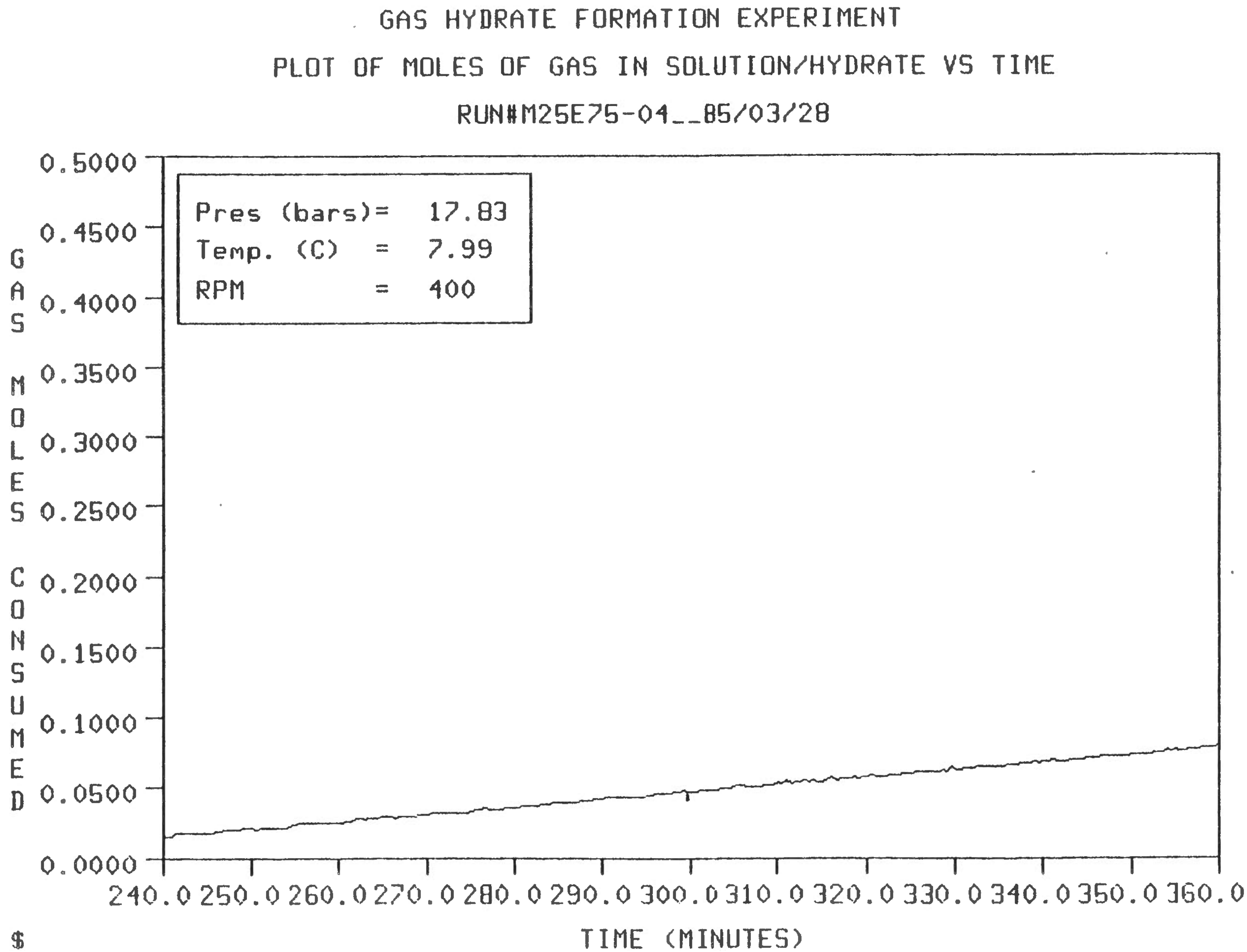
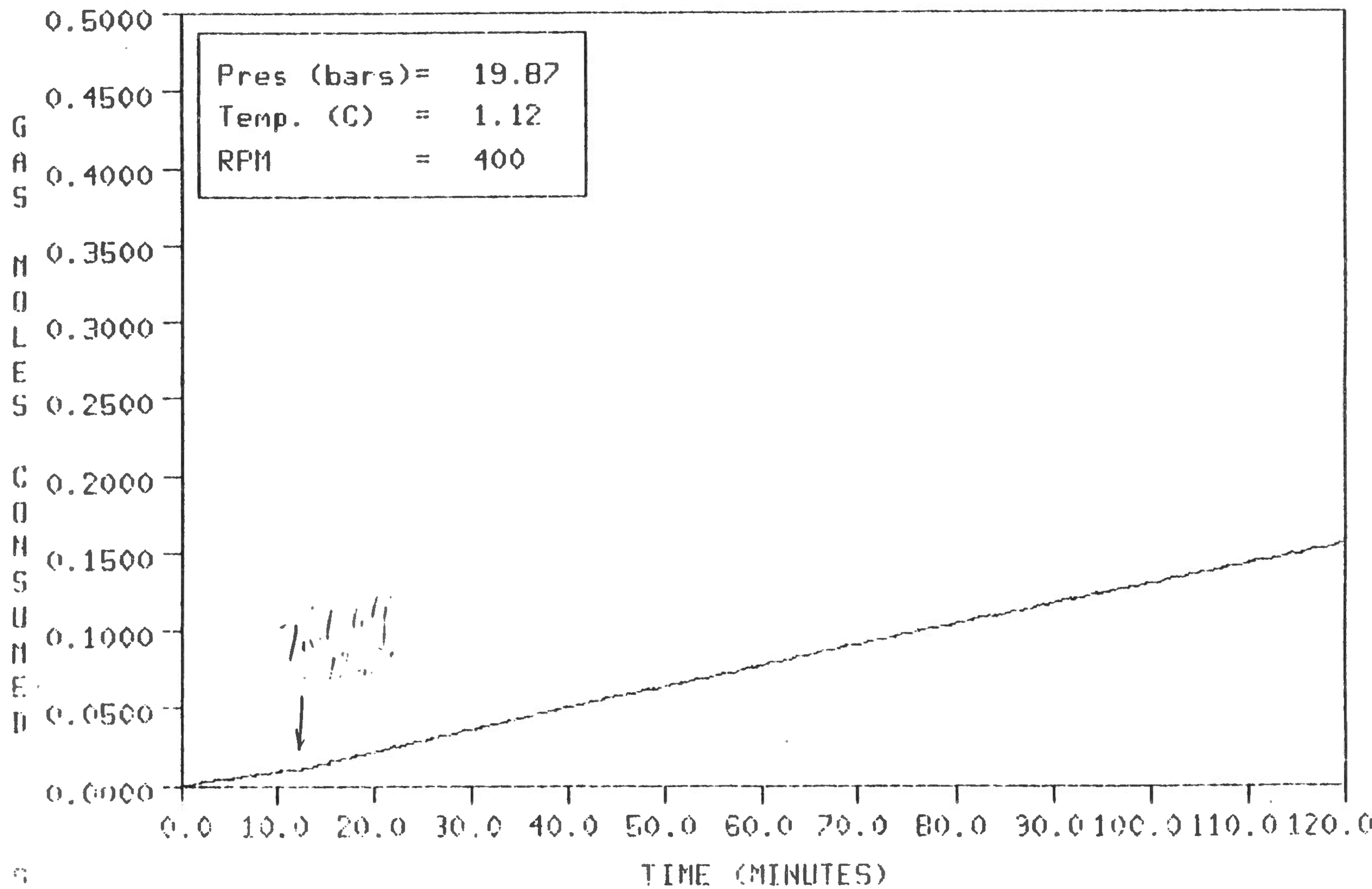
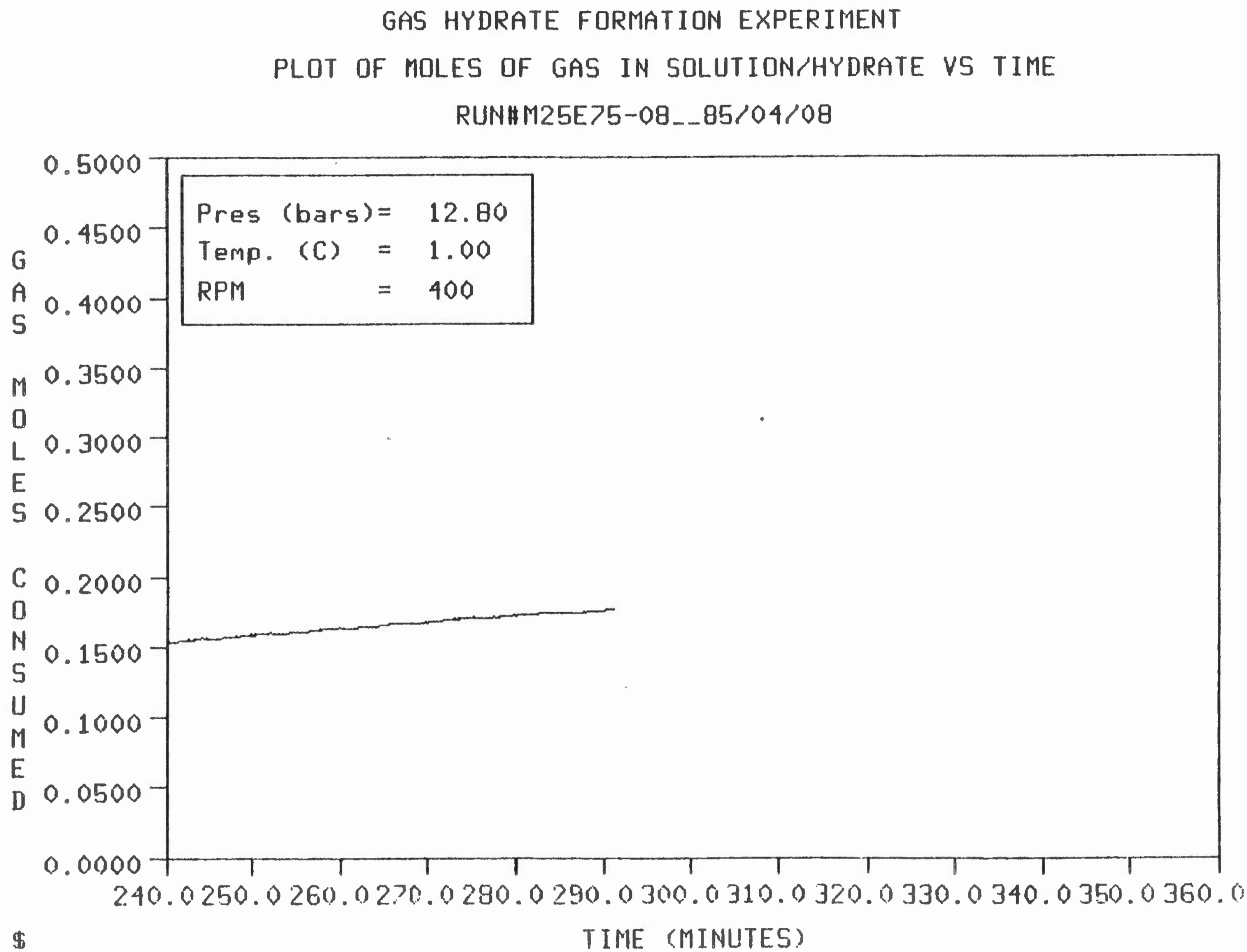

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-04__85/03/28
Pres (bars)= 17.83
Temp. (C) = 7.99
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

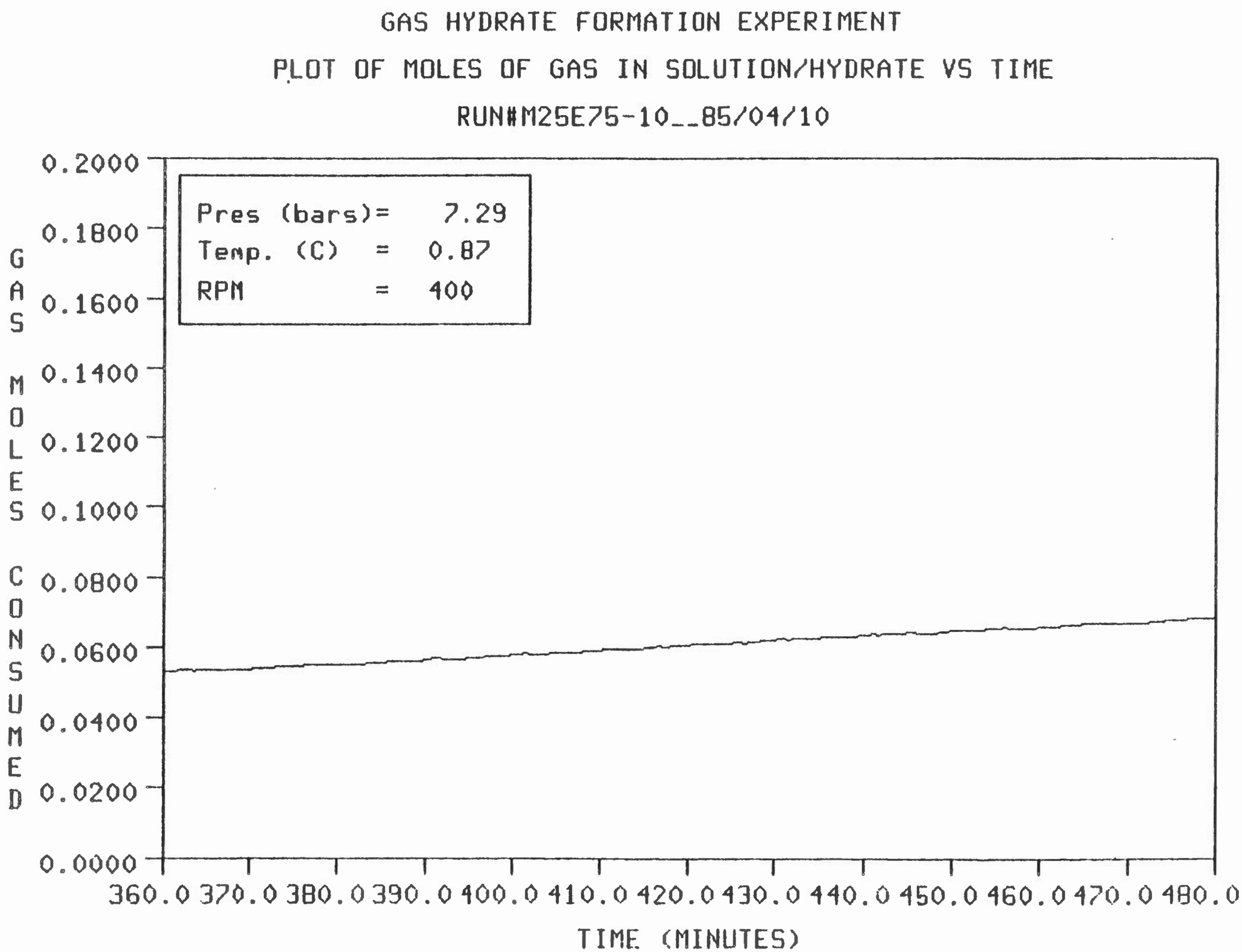
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-07__85/04/04





GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-08__85/04/08
Pres (bars)= 12.80
Temp. (C) = 1.00
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$

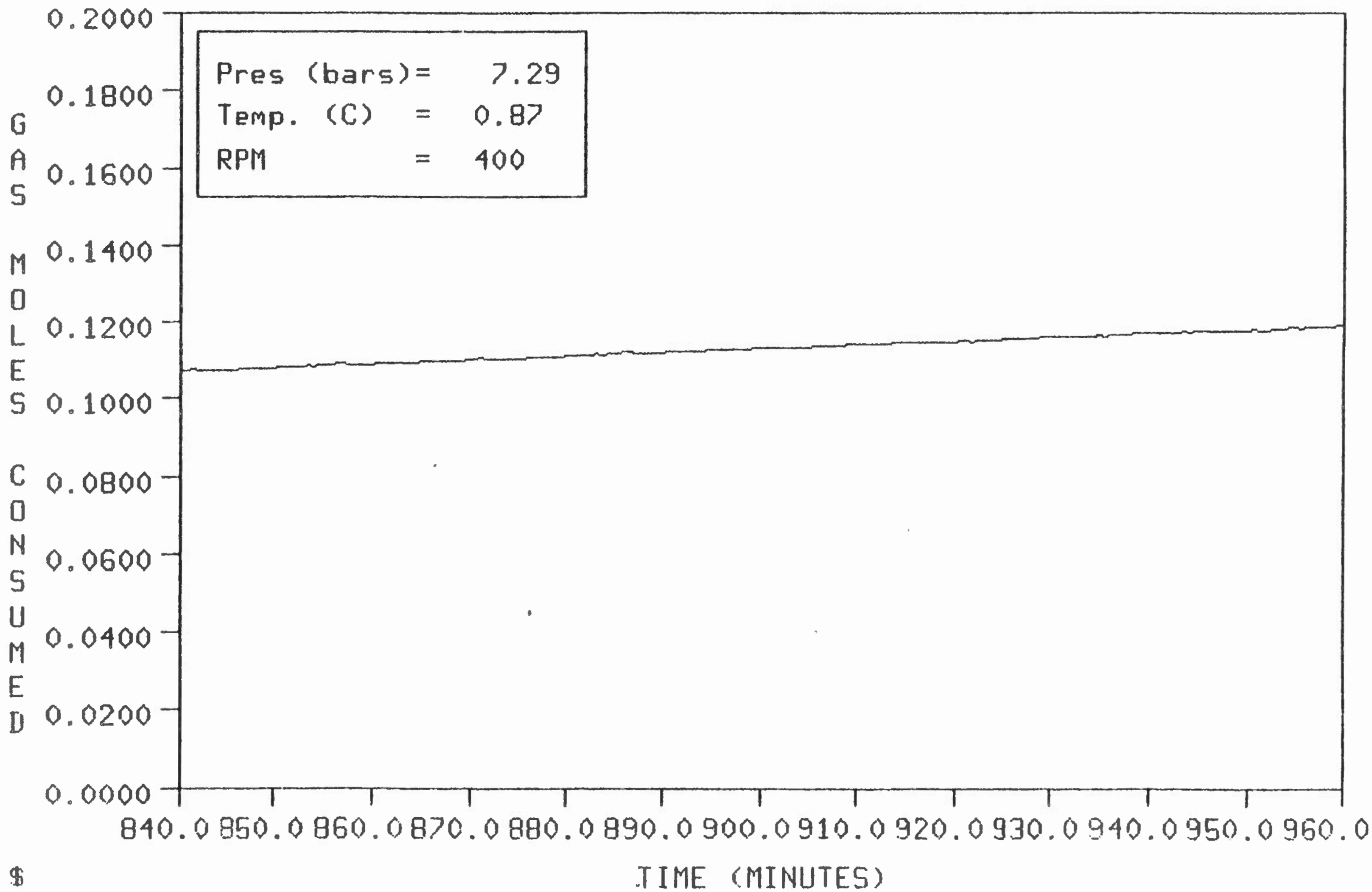


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-10__85/04/10

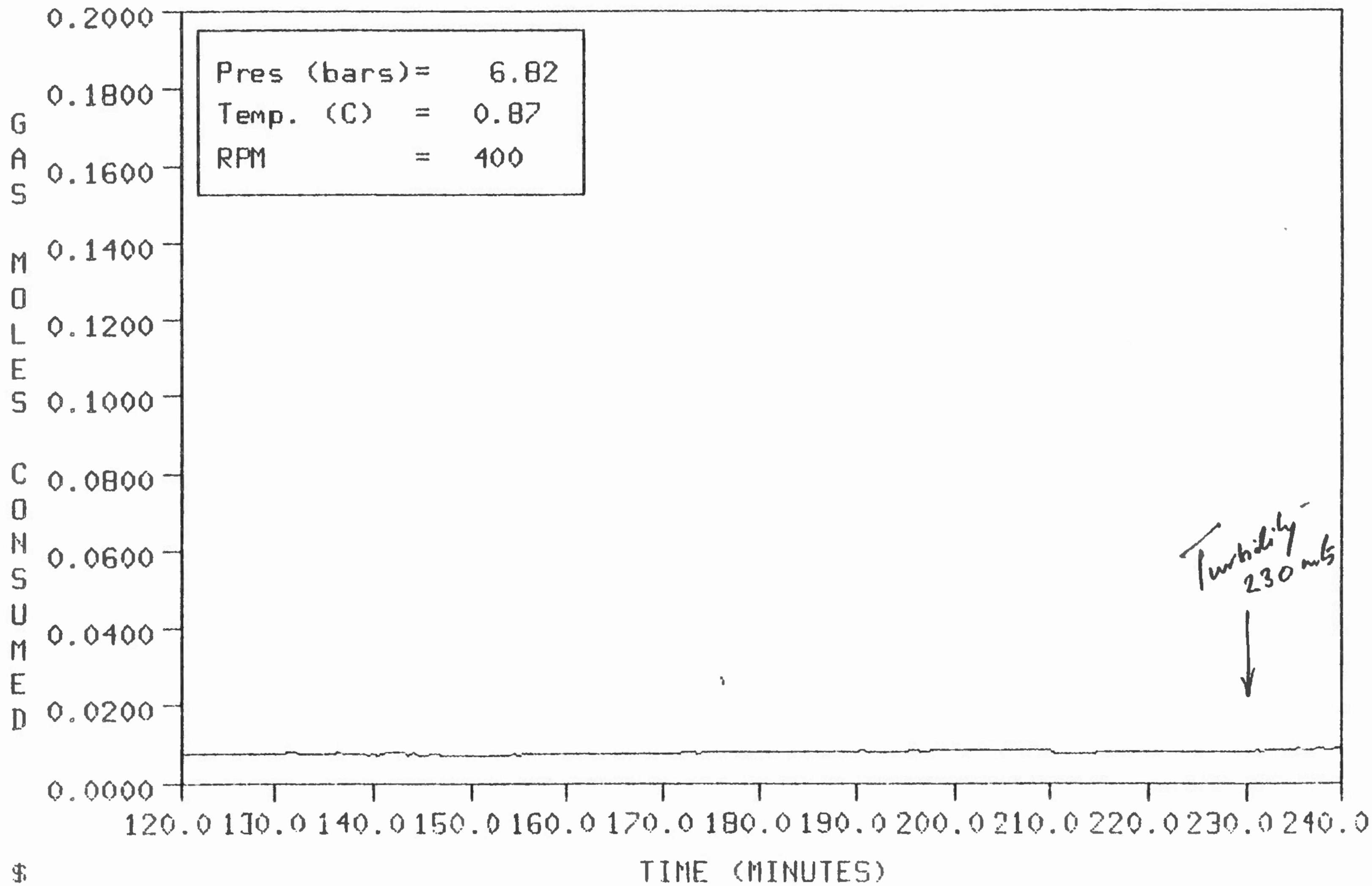


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

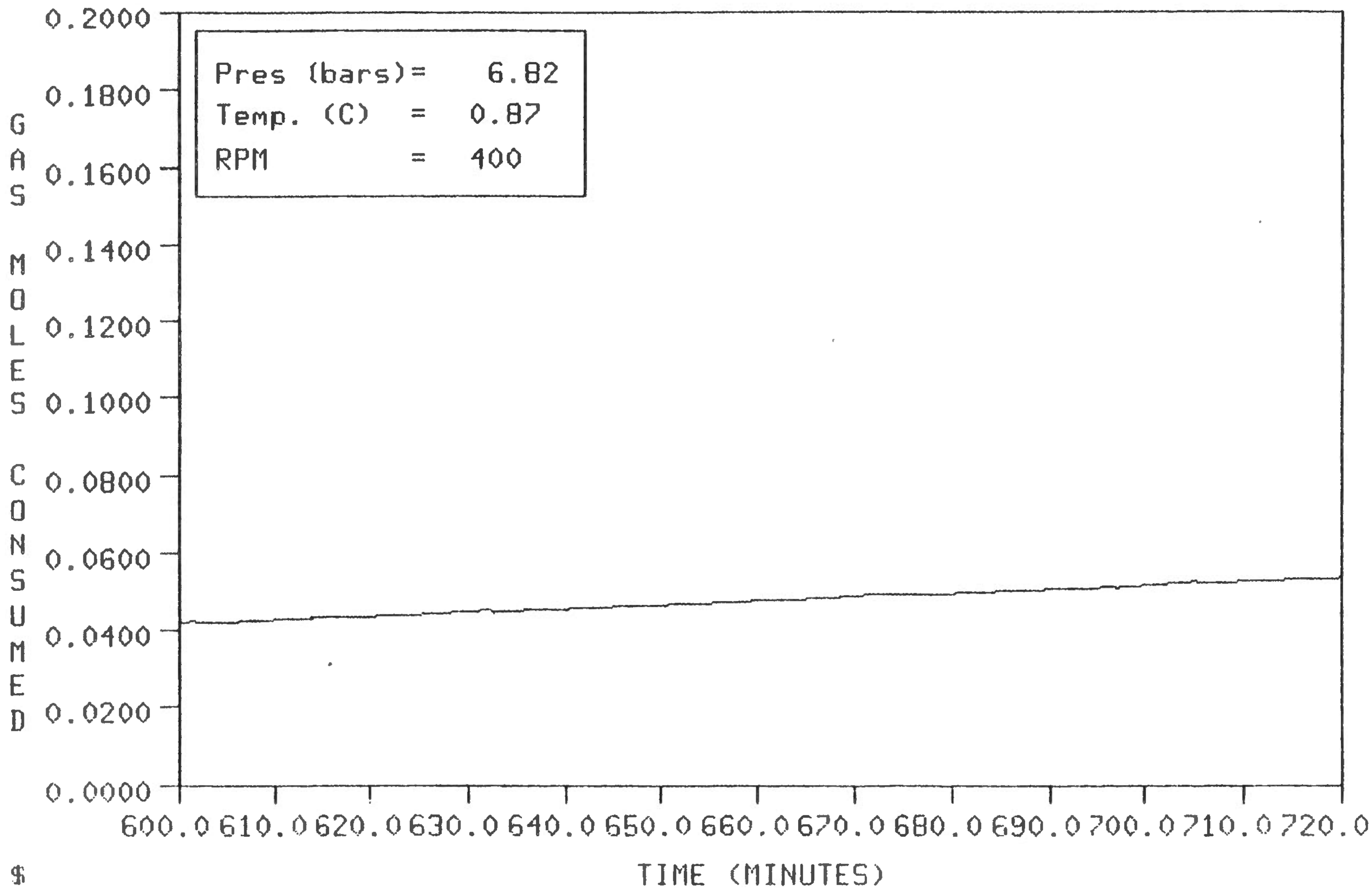
RUN#M25E75-11__85/04/11



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-11__85/04/11



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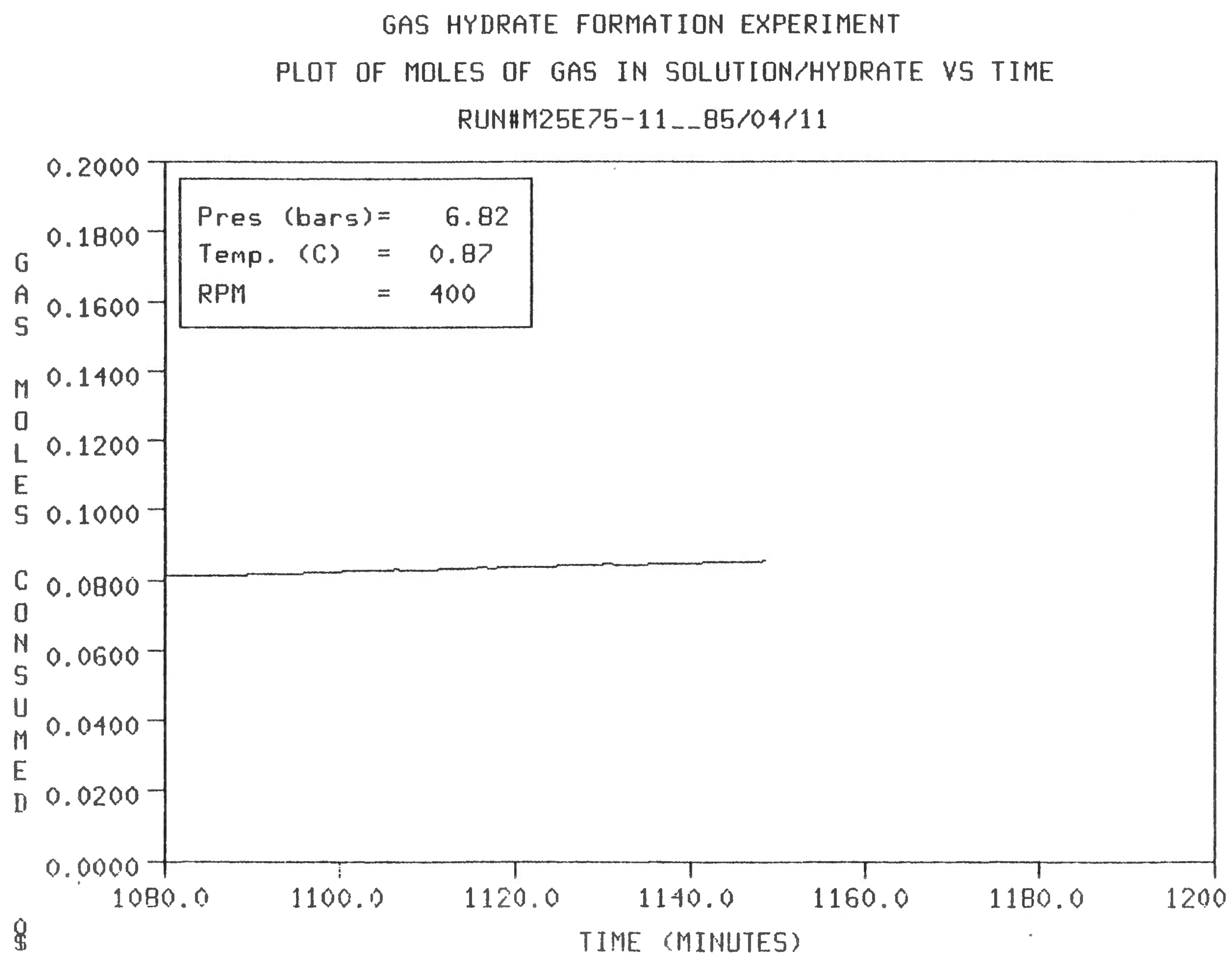
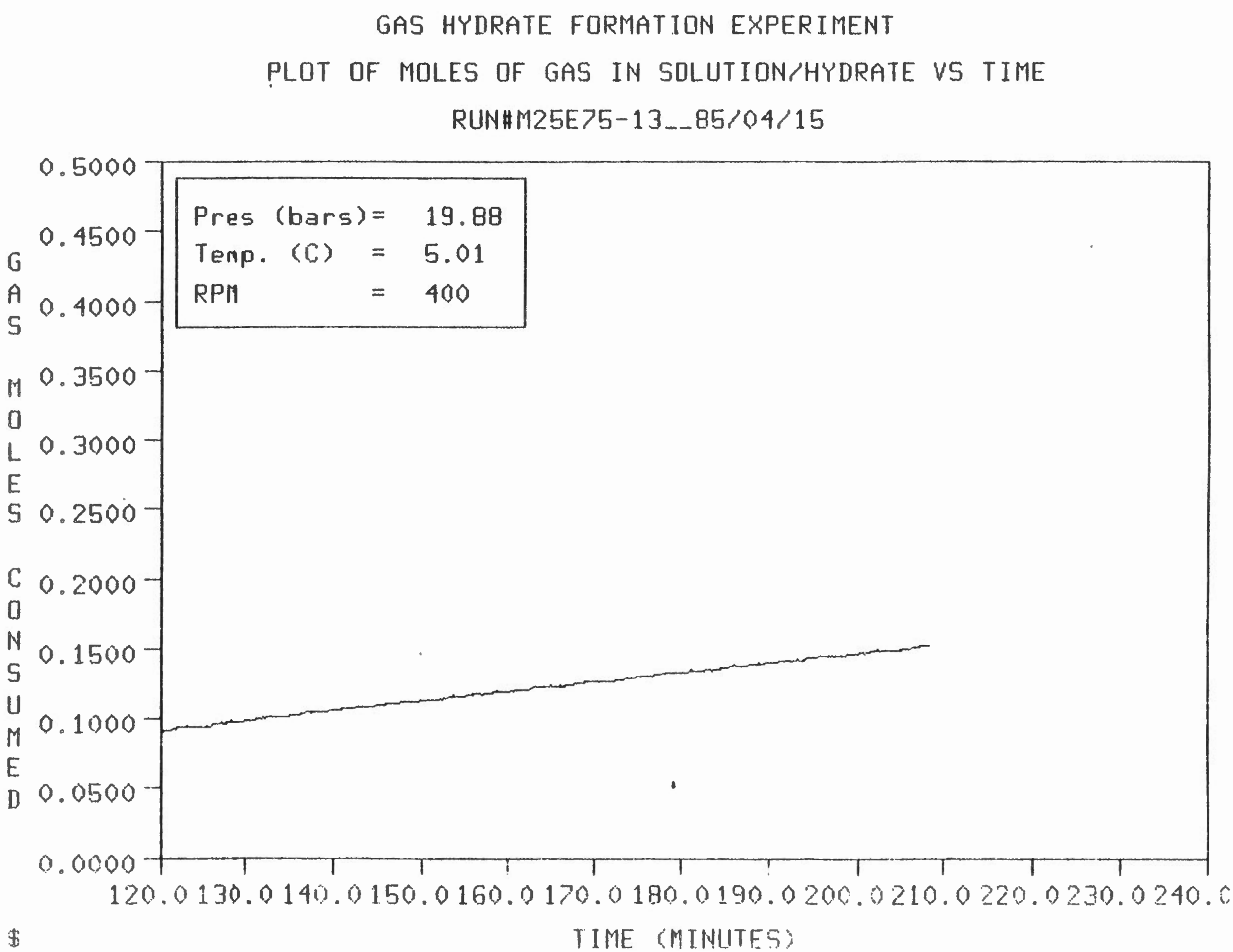
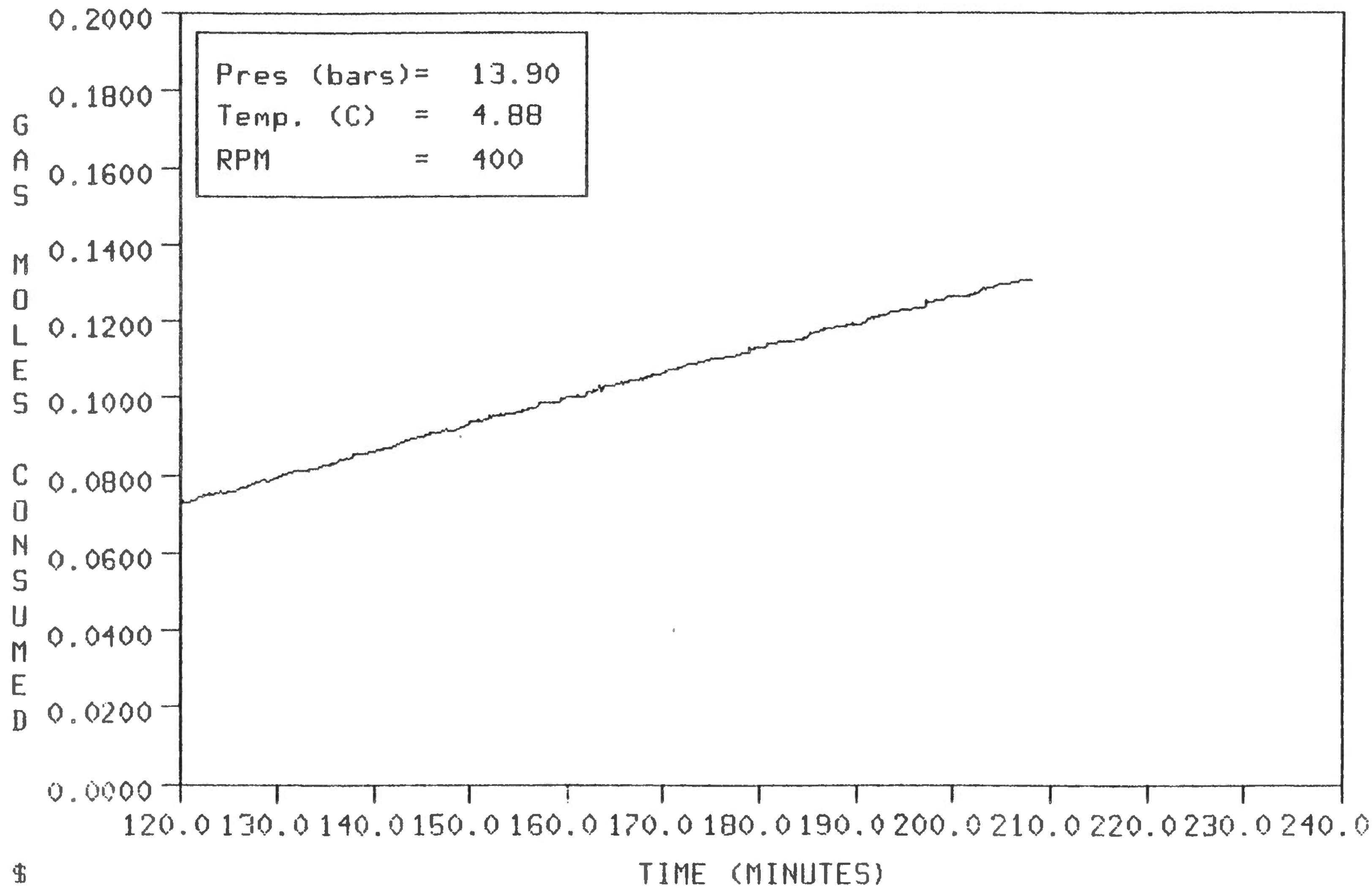

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-11__85/04/11
Pres (bars)= 6.82
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
1080.0
1100.0
1120.0
1140.0
1160.0
1180.0
1200.
TIME (MINUTES)


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-13__85/04/15
Pres (bars)= 19.88
Temp. (C) = 5.01
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

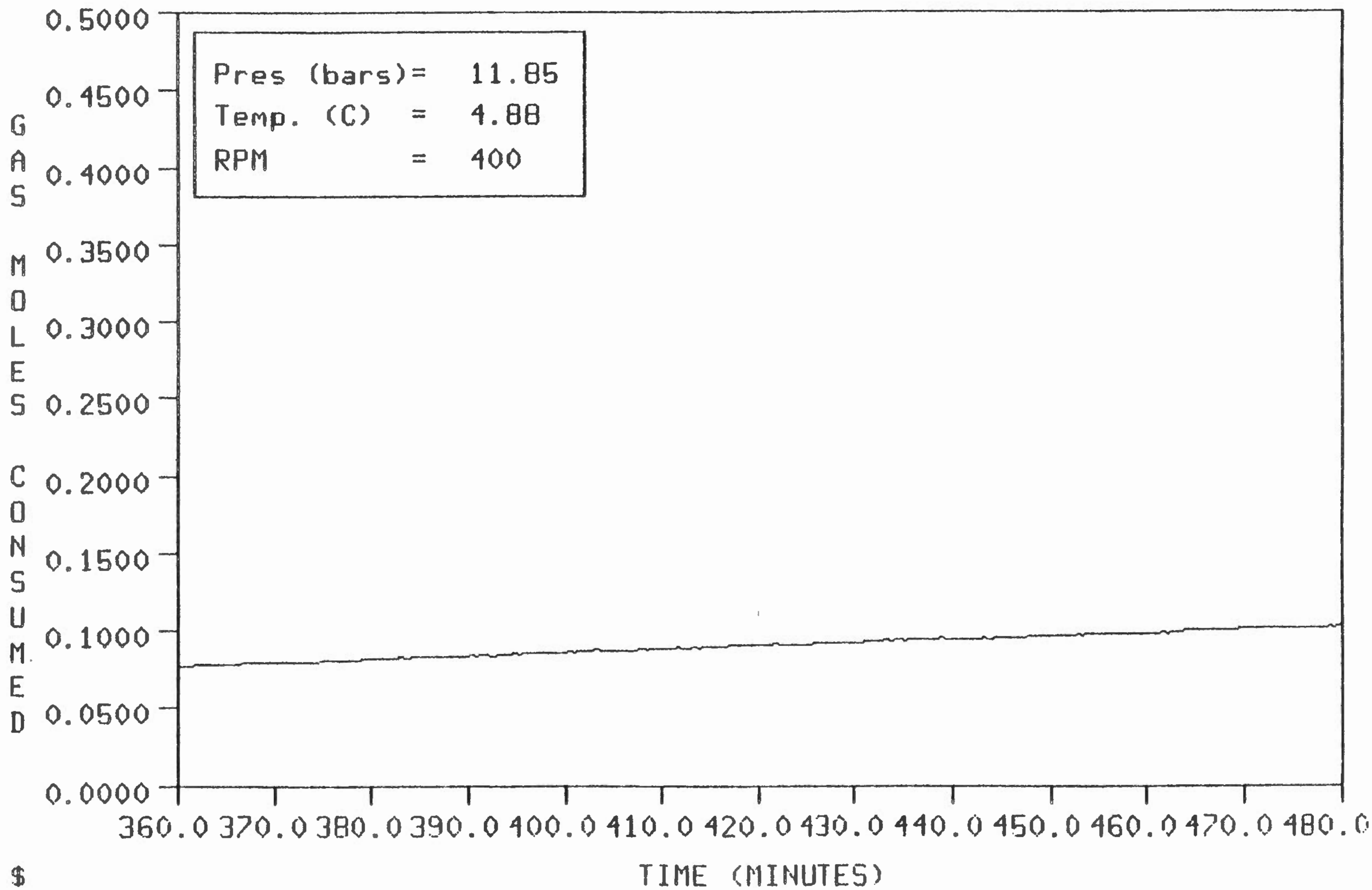
RUN#M25E75-15__85/04/17



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-16__85/04/22



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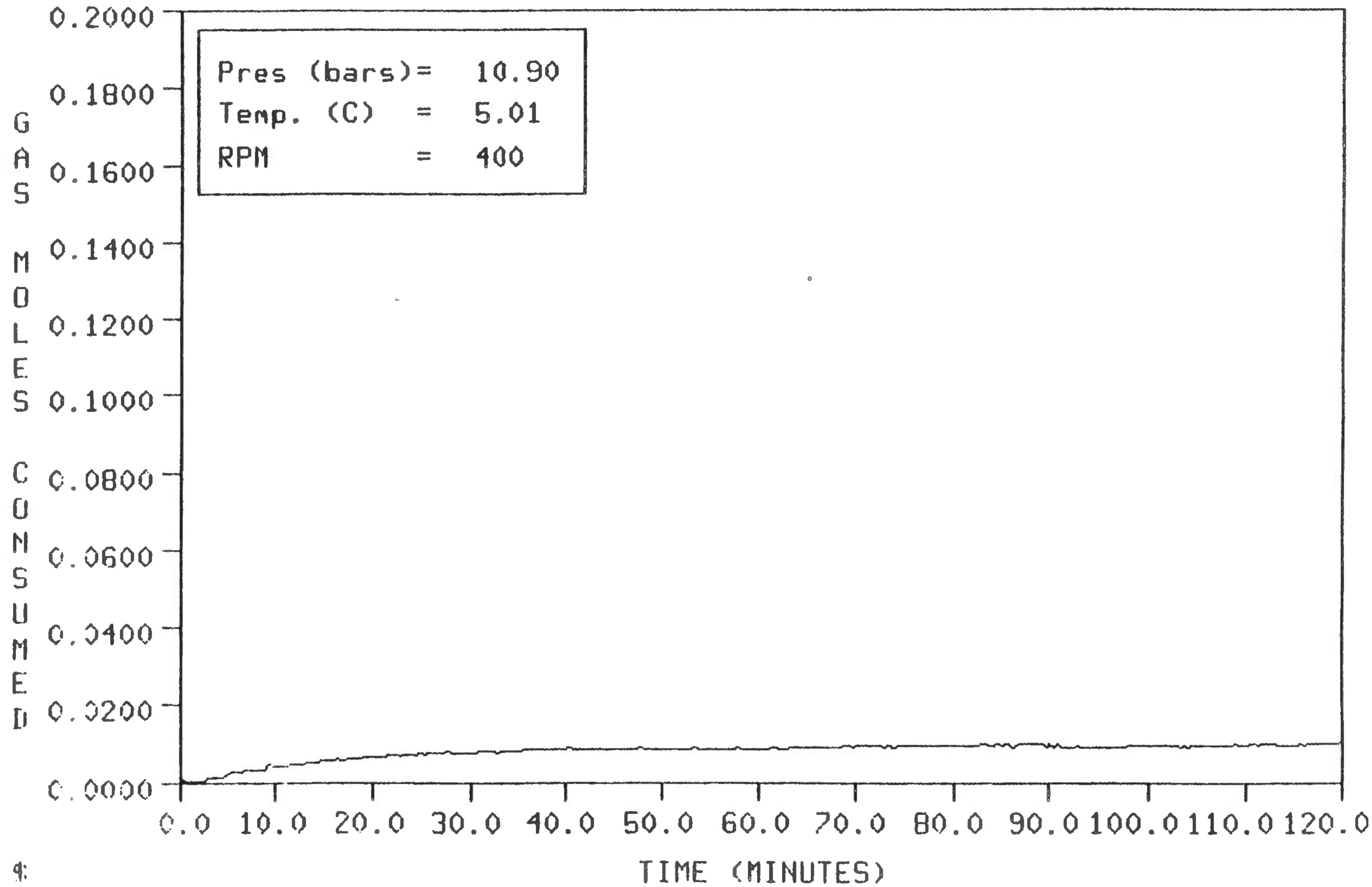
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

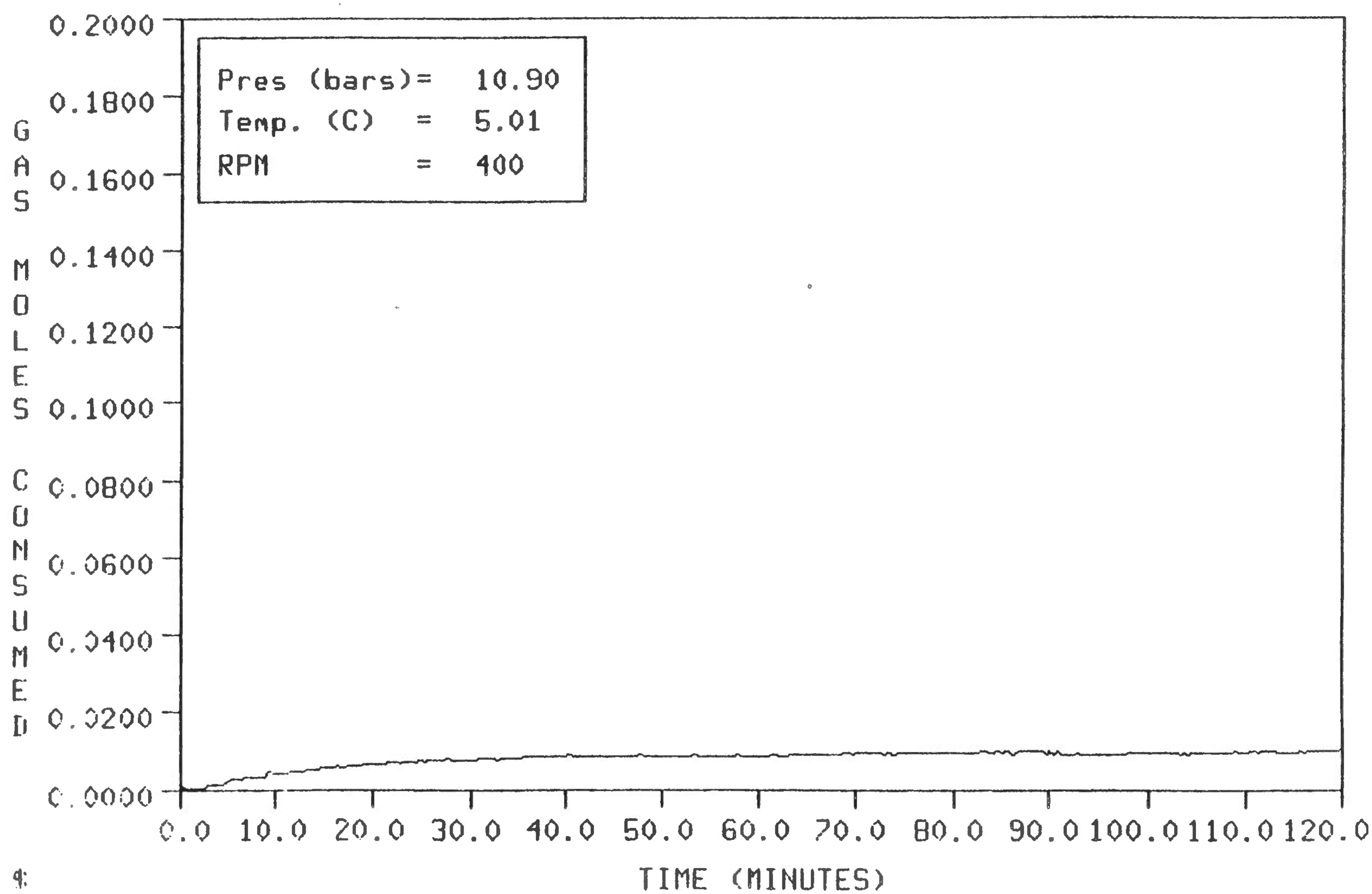
RUN#M25E75-18__85/05/06



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

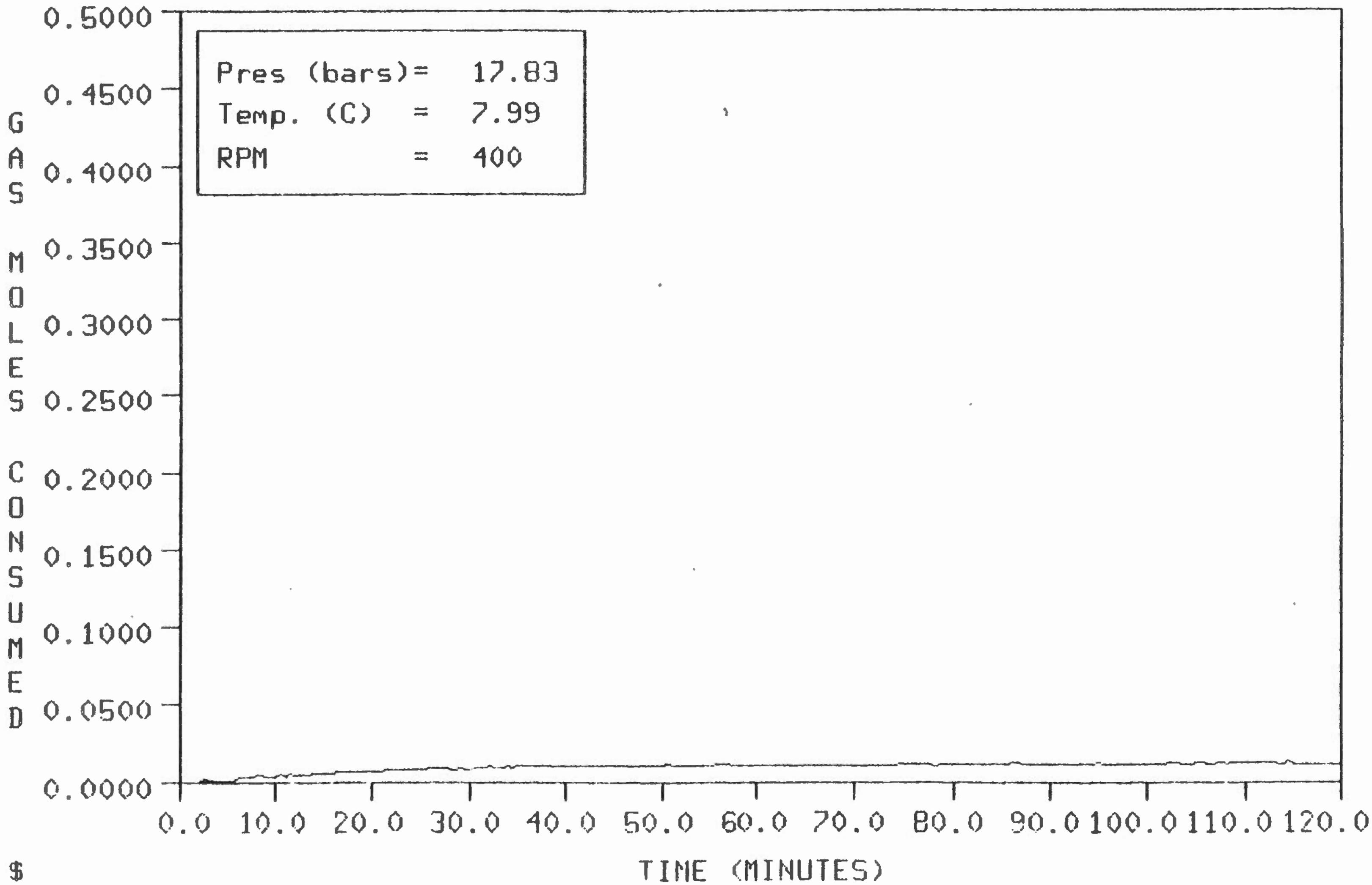
RUN#M25E75-18__85/05/06



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-04__85/03/28



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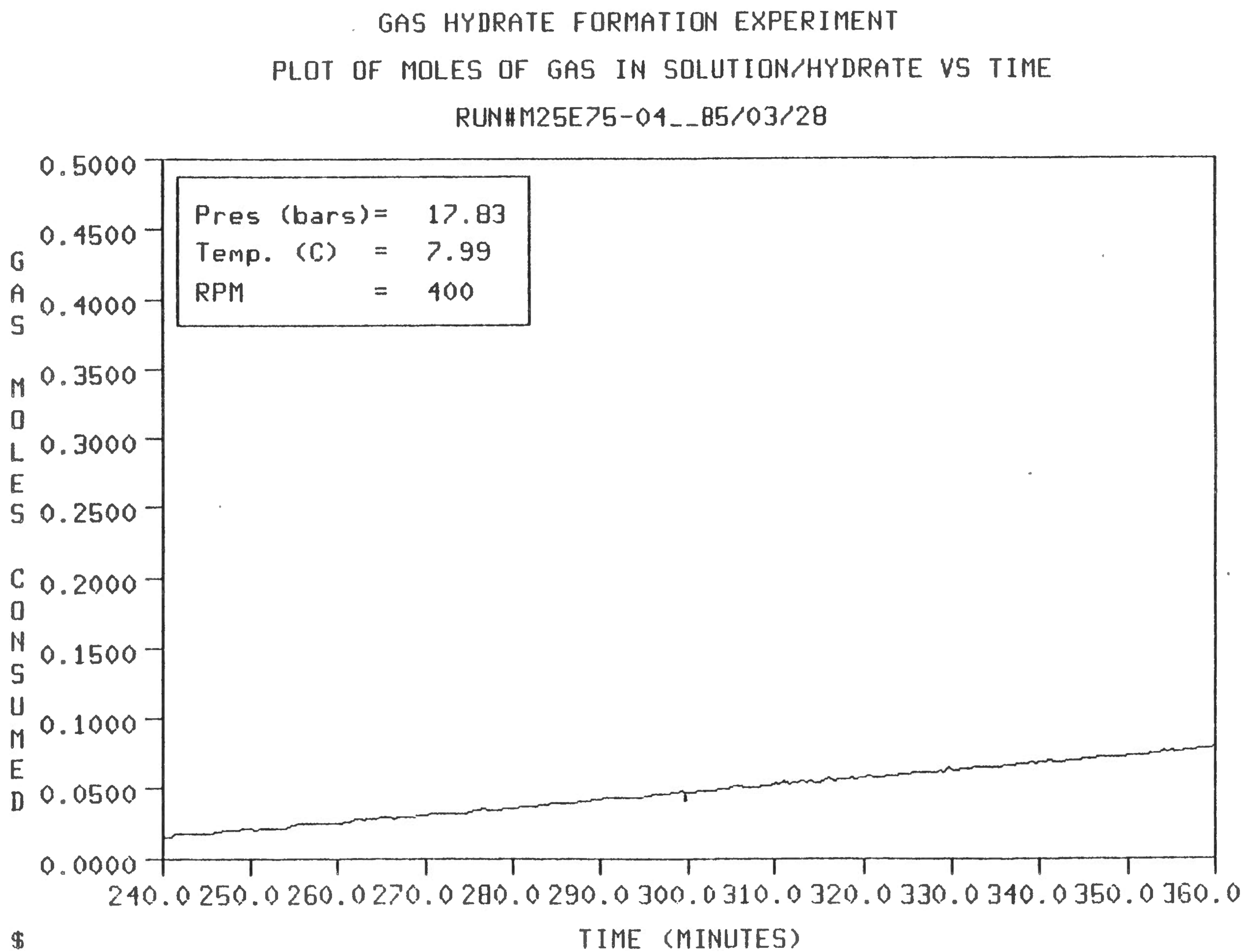
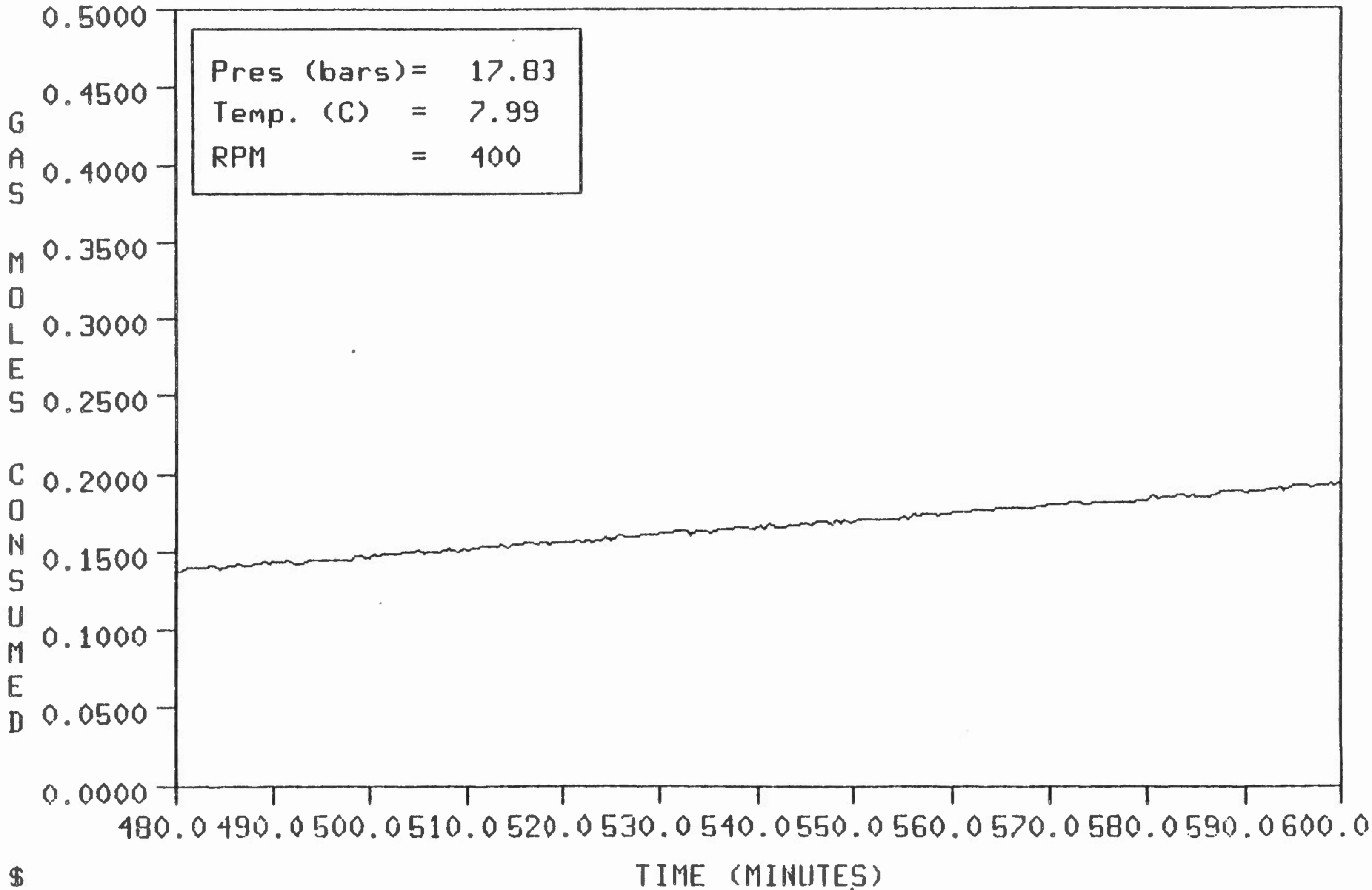

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-04__85/03/28
Pres (bars)= 17.83
Temp. (C) = 7.99
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-04__85/03/28



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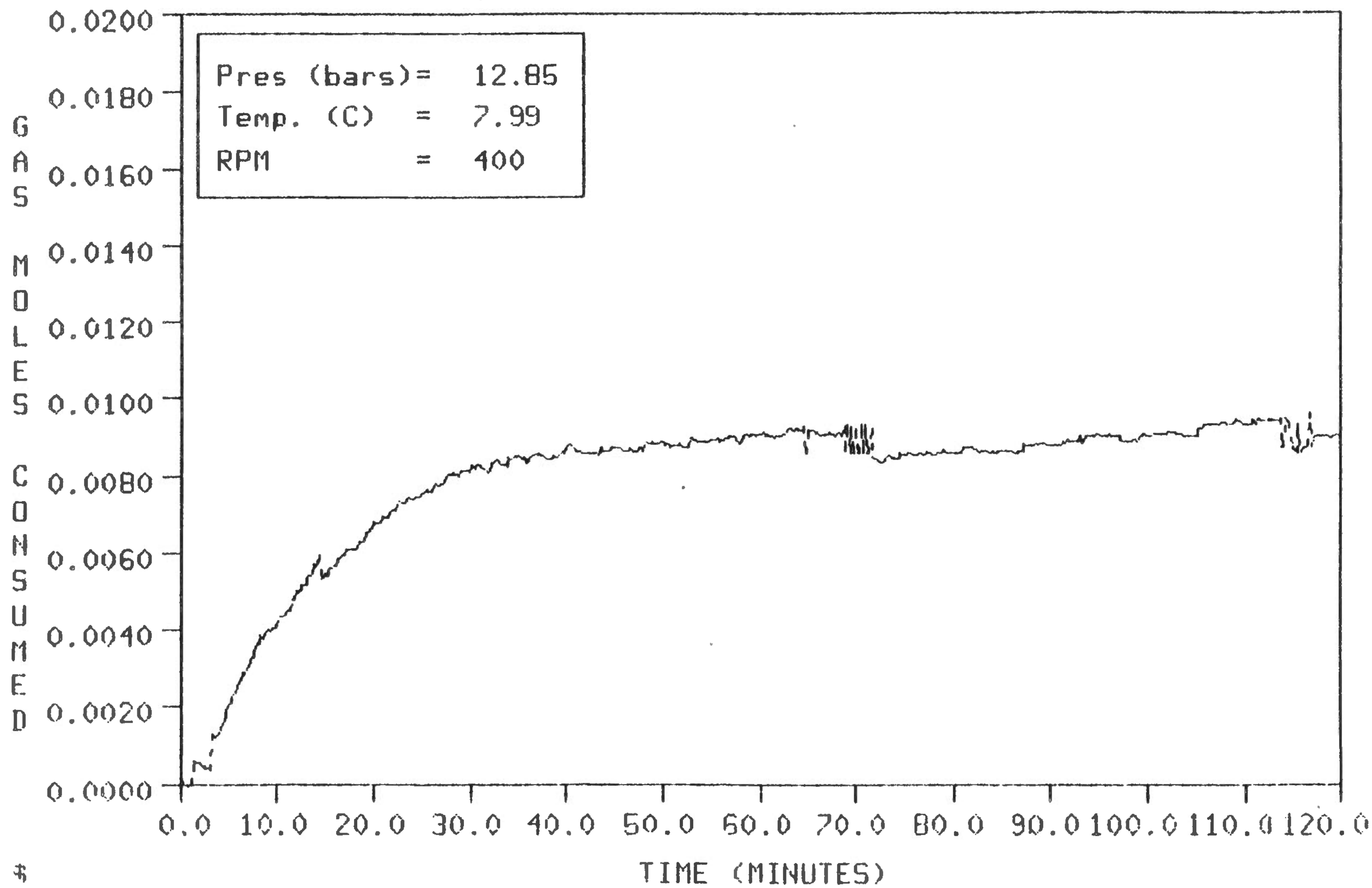
GAS HYDRATE FORMATION EXPERIMENT

PLQT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-05__85/03/29



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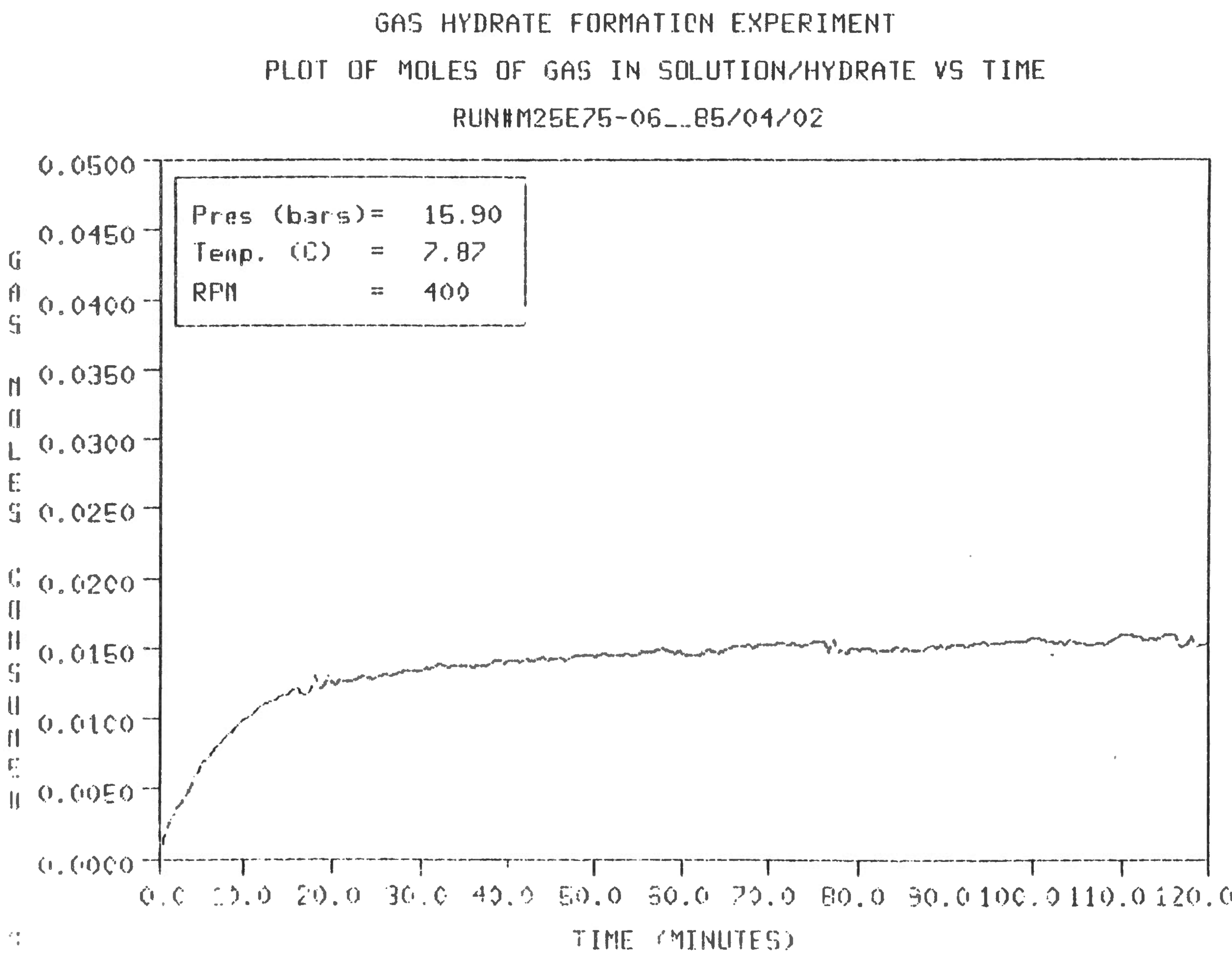
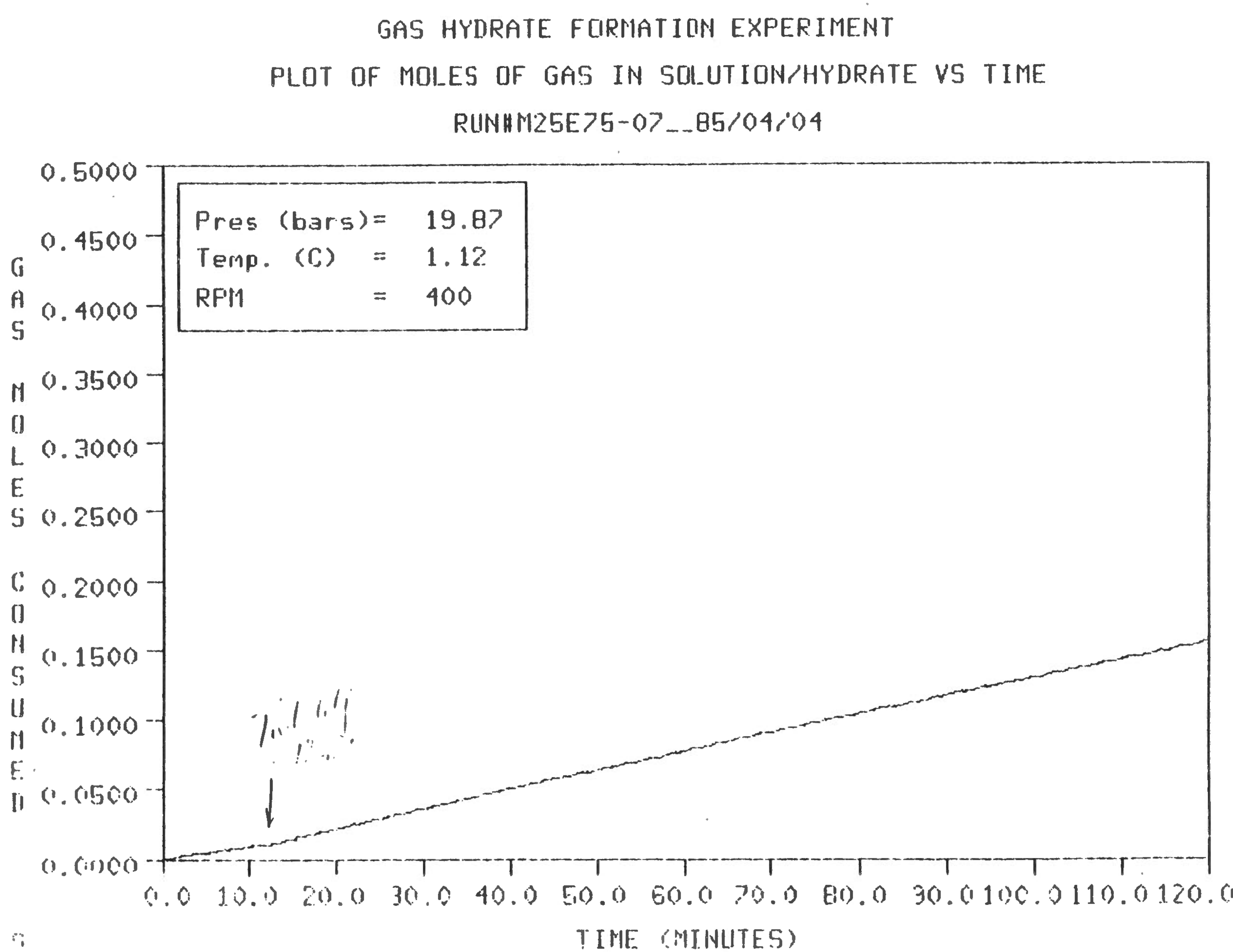
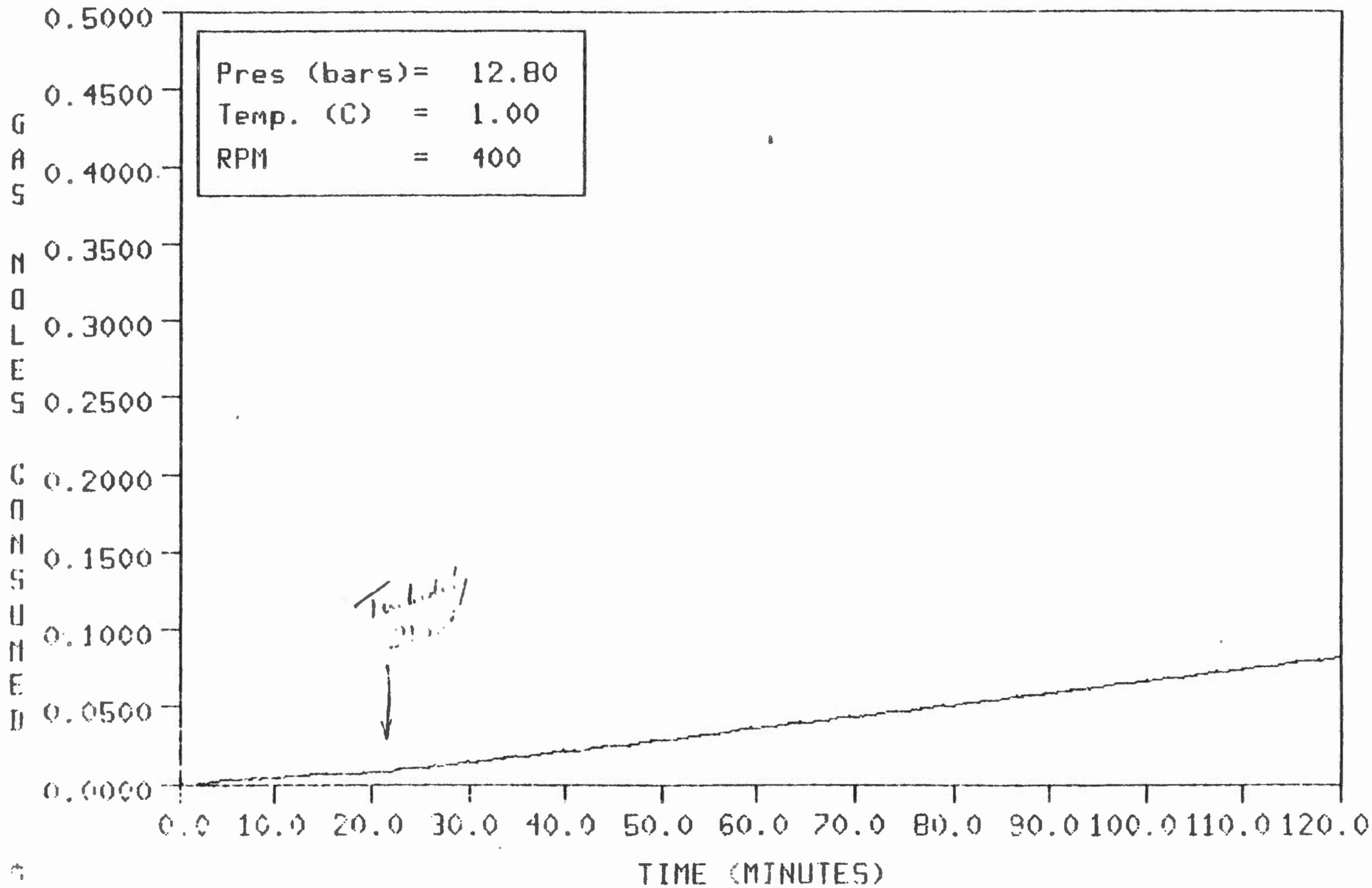

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-06__85/04/02
Pres (bars)= 15.90
Temp. (C) = 7.87
RPM = 400
GAS MOLES CONSUMED
0.0500
0.0450
0.0400
0.0350
0.0300
0.0250
0.0200
0.0150
0.0100
0.0050
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-07__85/04/04
Pres (bars)= 19.87
Temp. (C) = 1.12
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

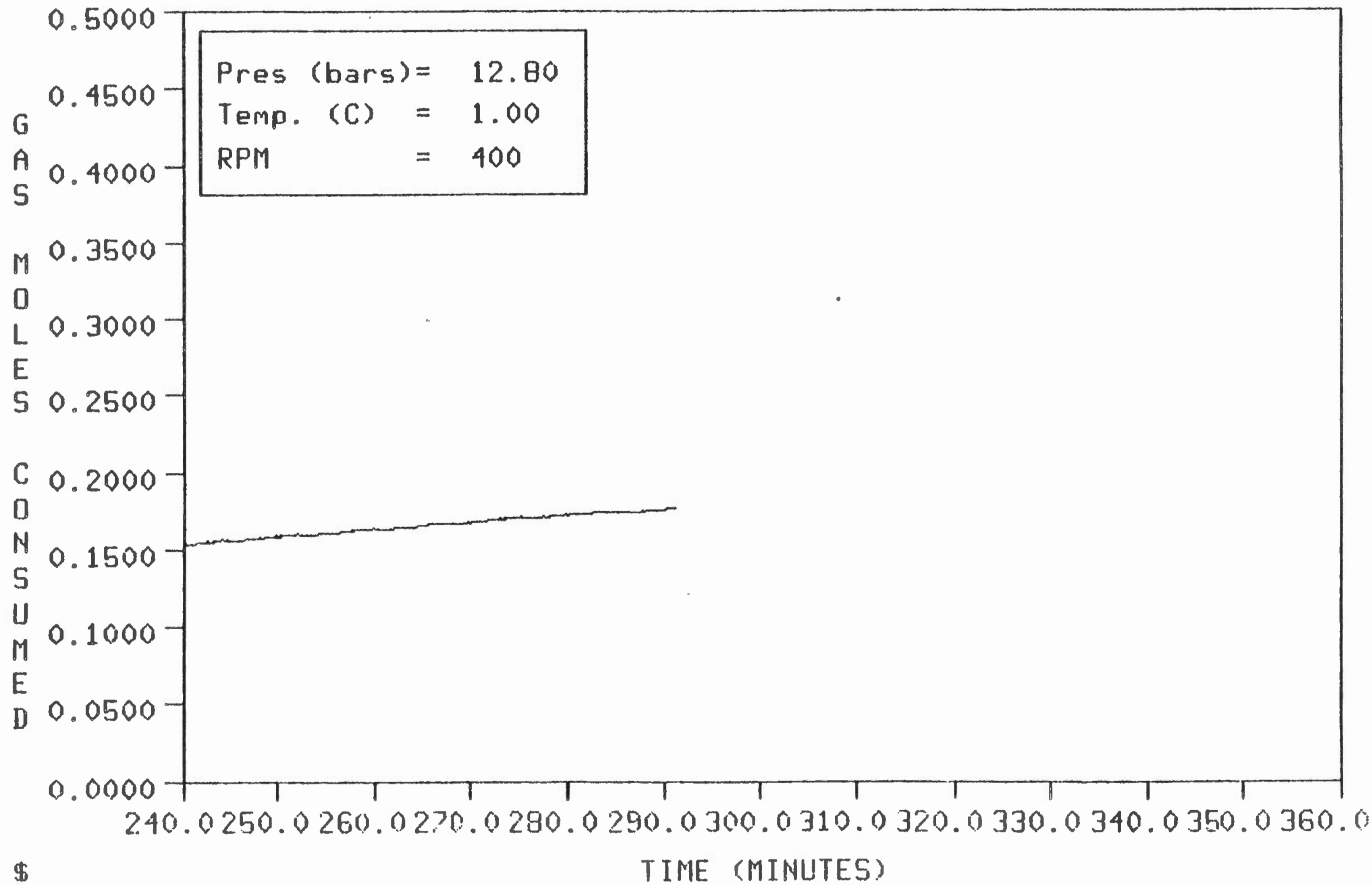
RUN#M25E75-08__85/04/08



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-08__85/04/08



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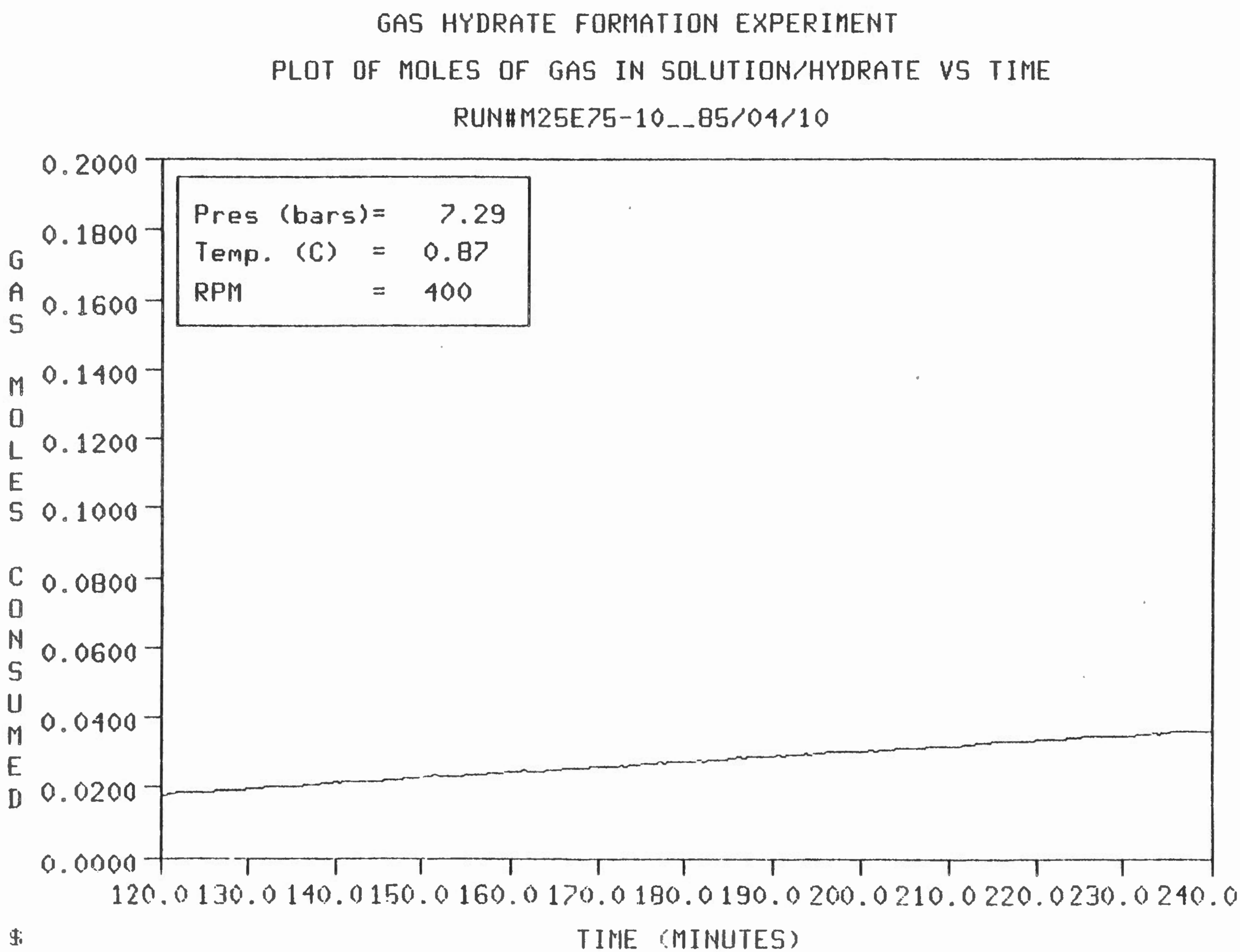
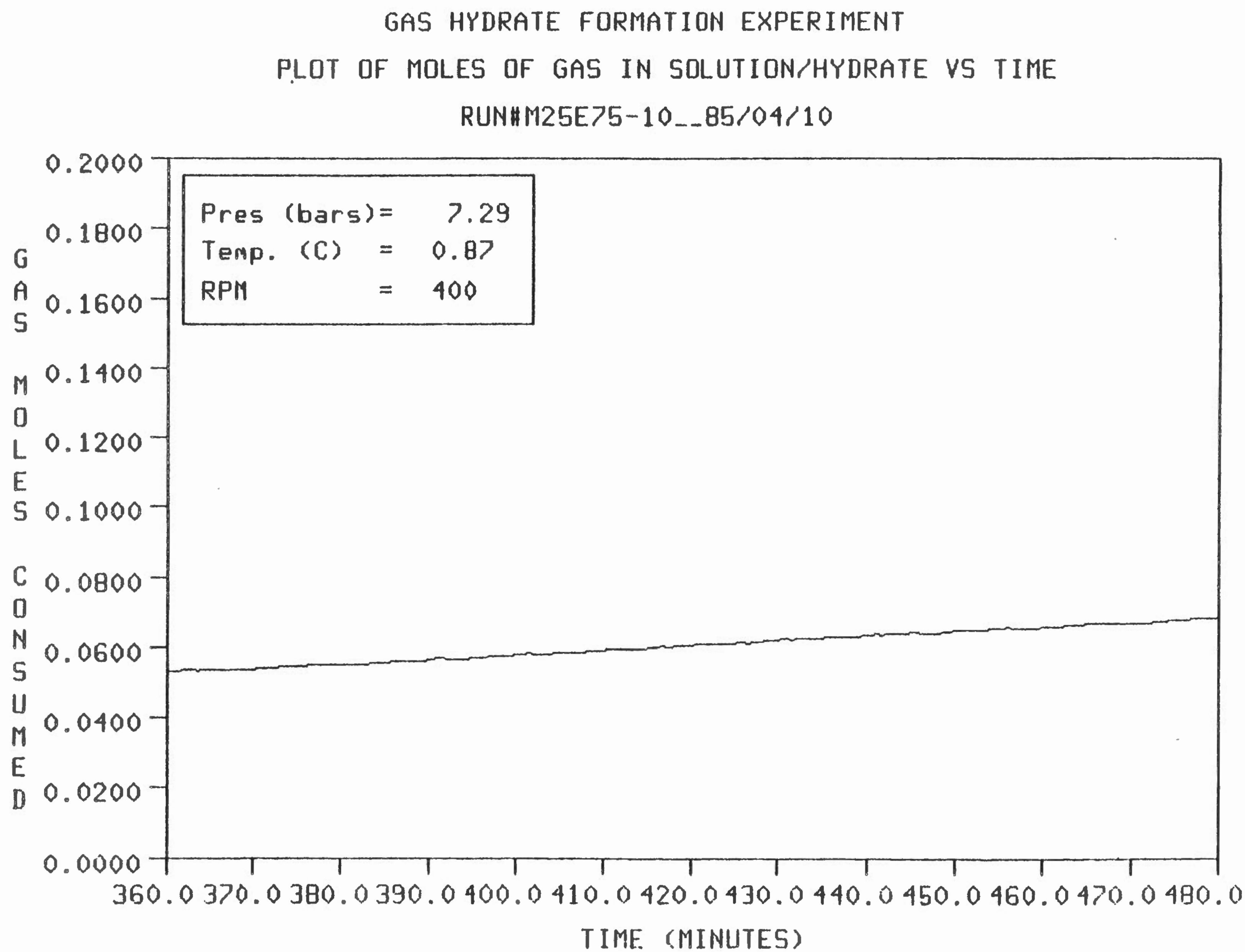
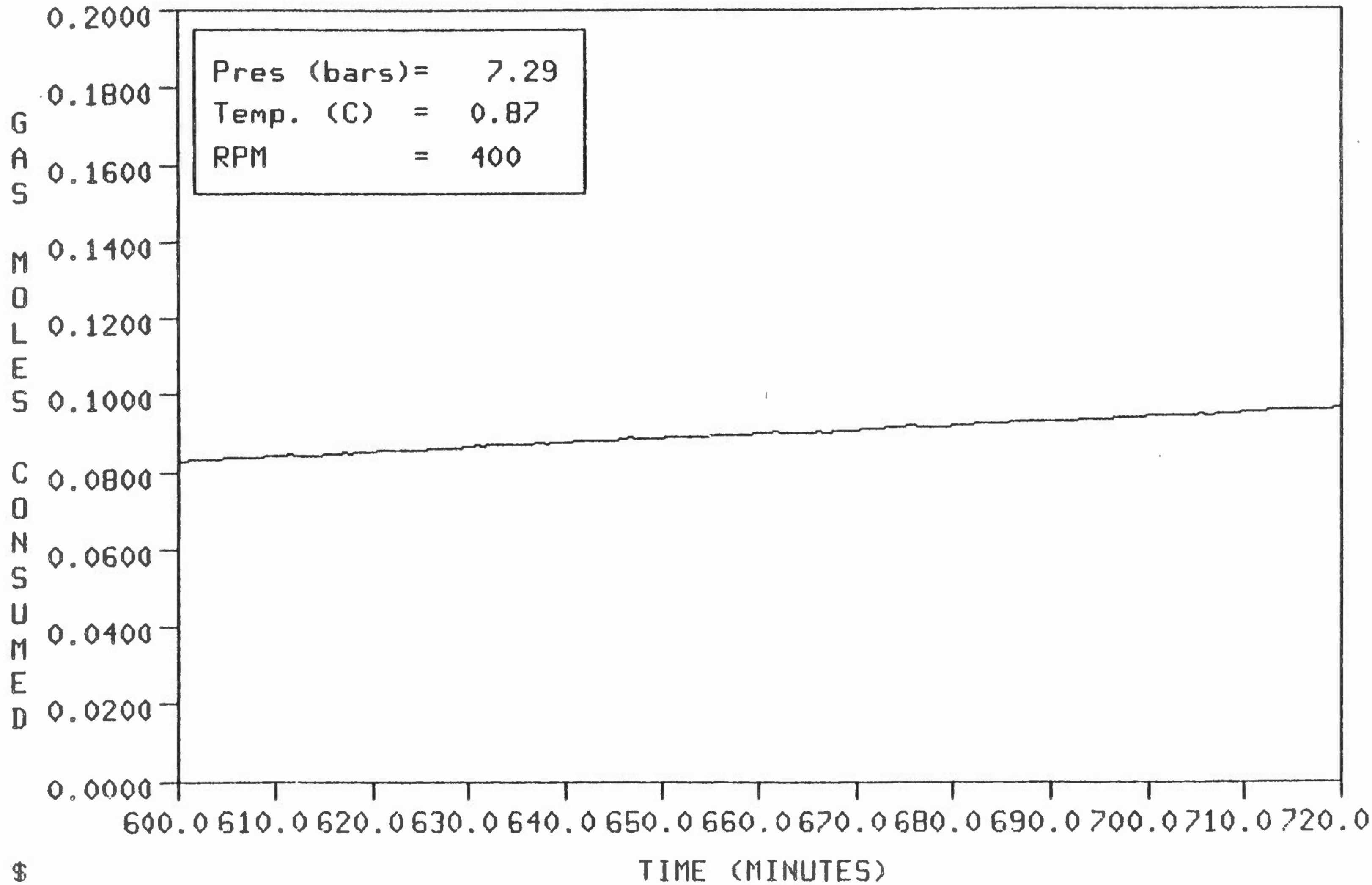

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-10__85/04/10
Pres (bars)= 7.29
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

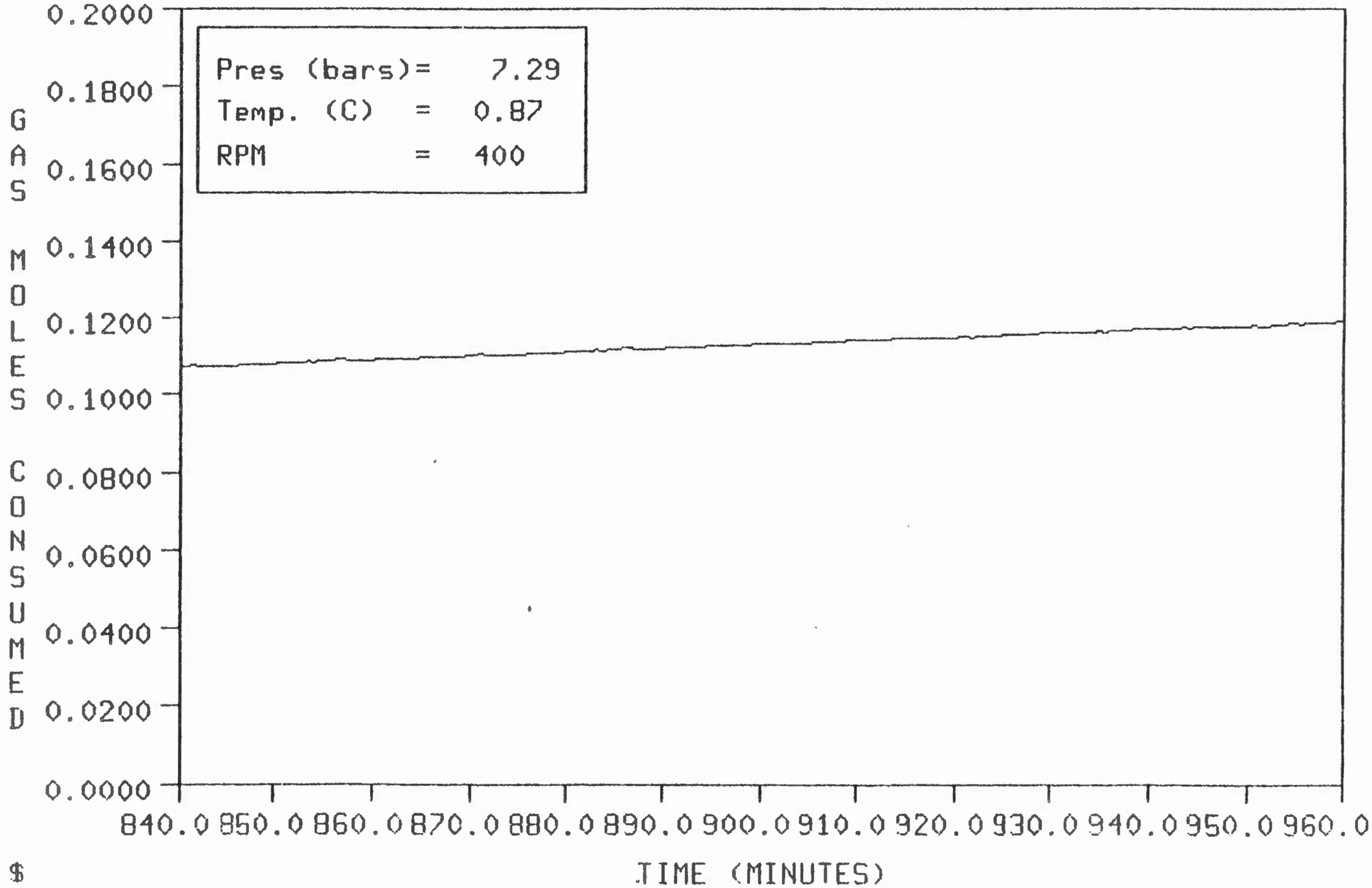
RUN#M25E75-10__85/04/10



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

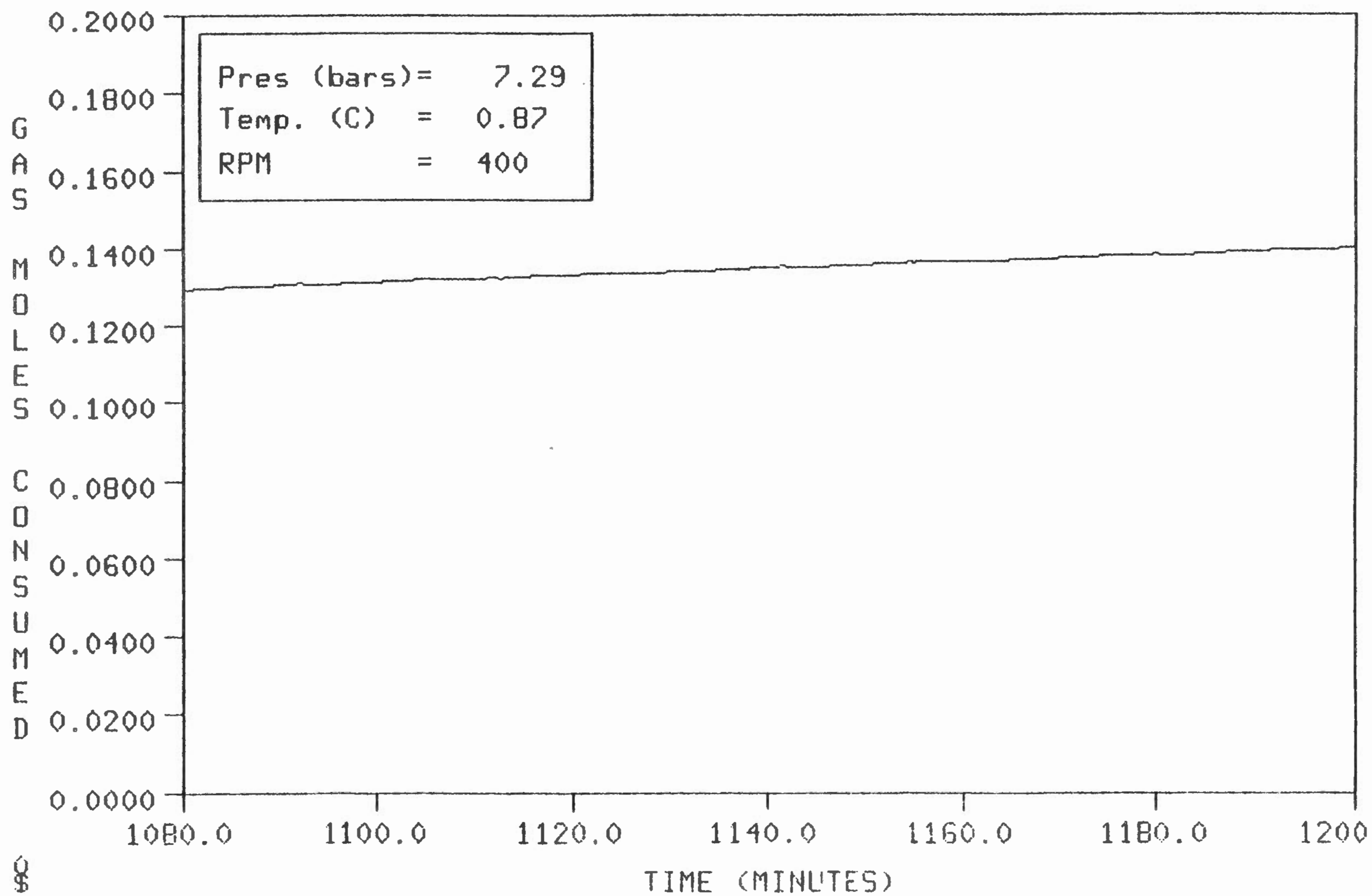
RUN#M25E75-10__85/04/10



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

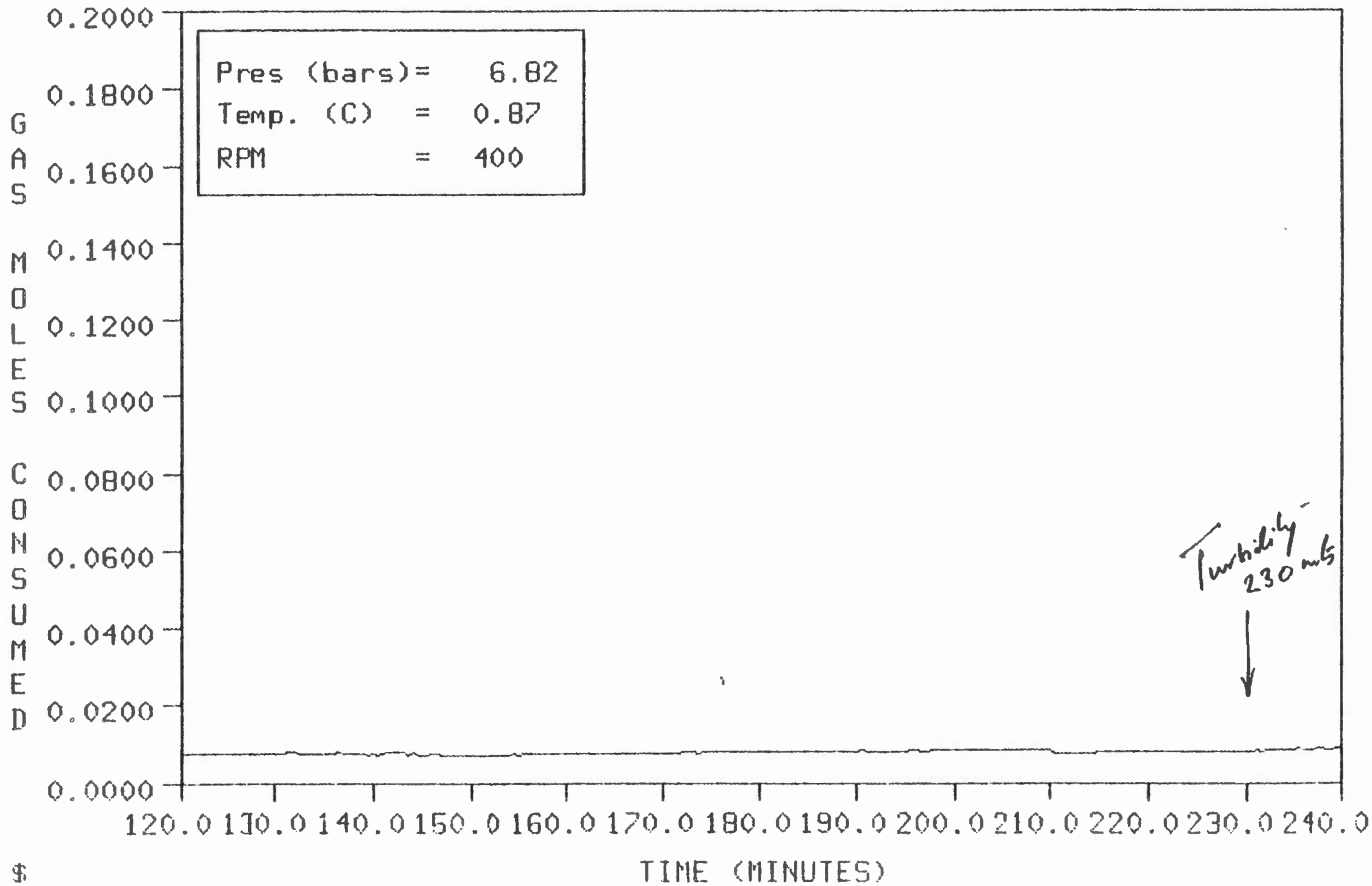
RUN#M25E75-10__85/04/10



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-11__85/04/11



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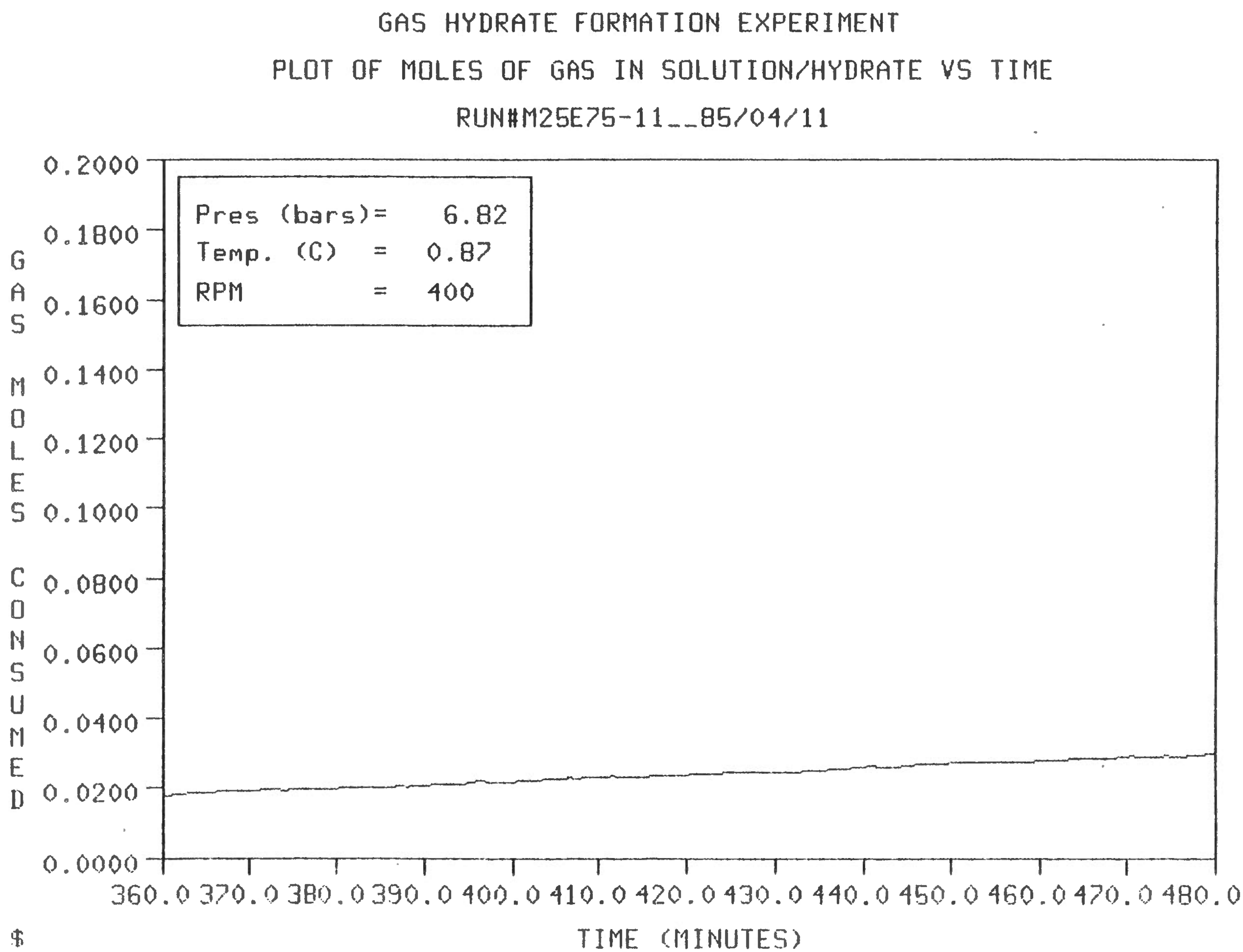
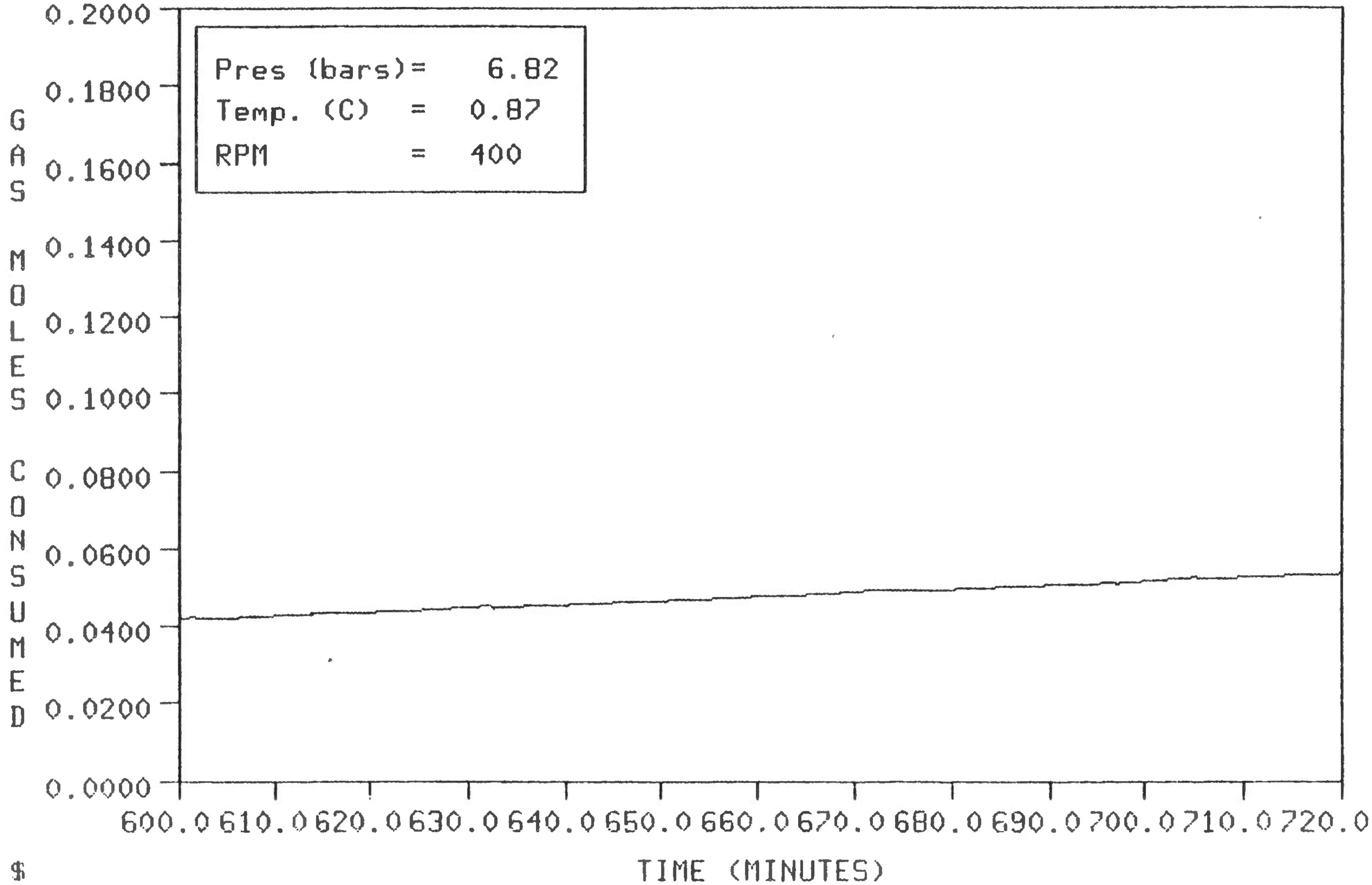

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-11__85/04/11
Pres (bars)= 6.82
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-11__85/04/11



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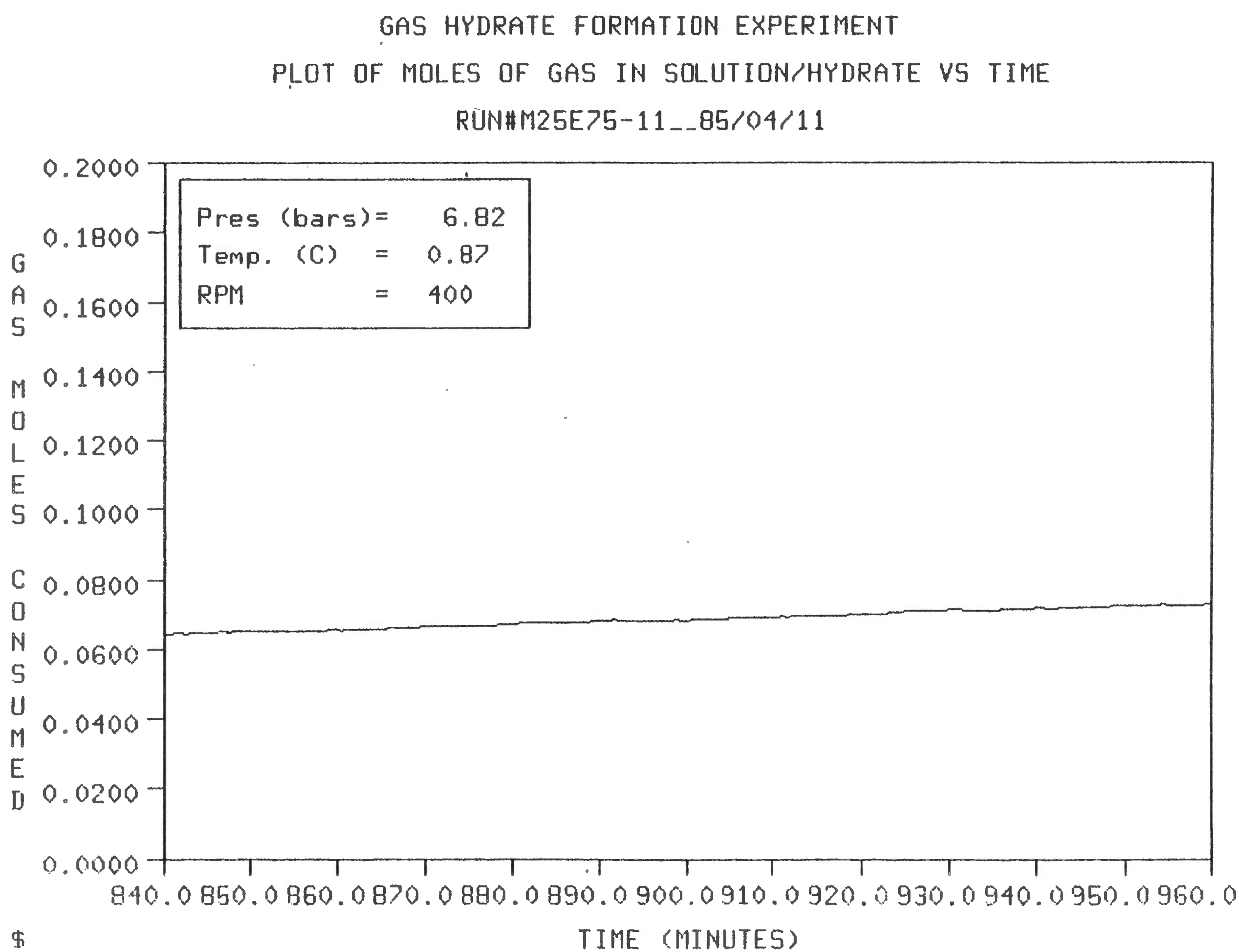
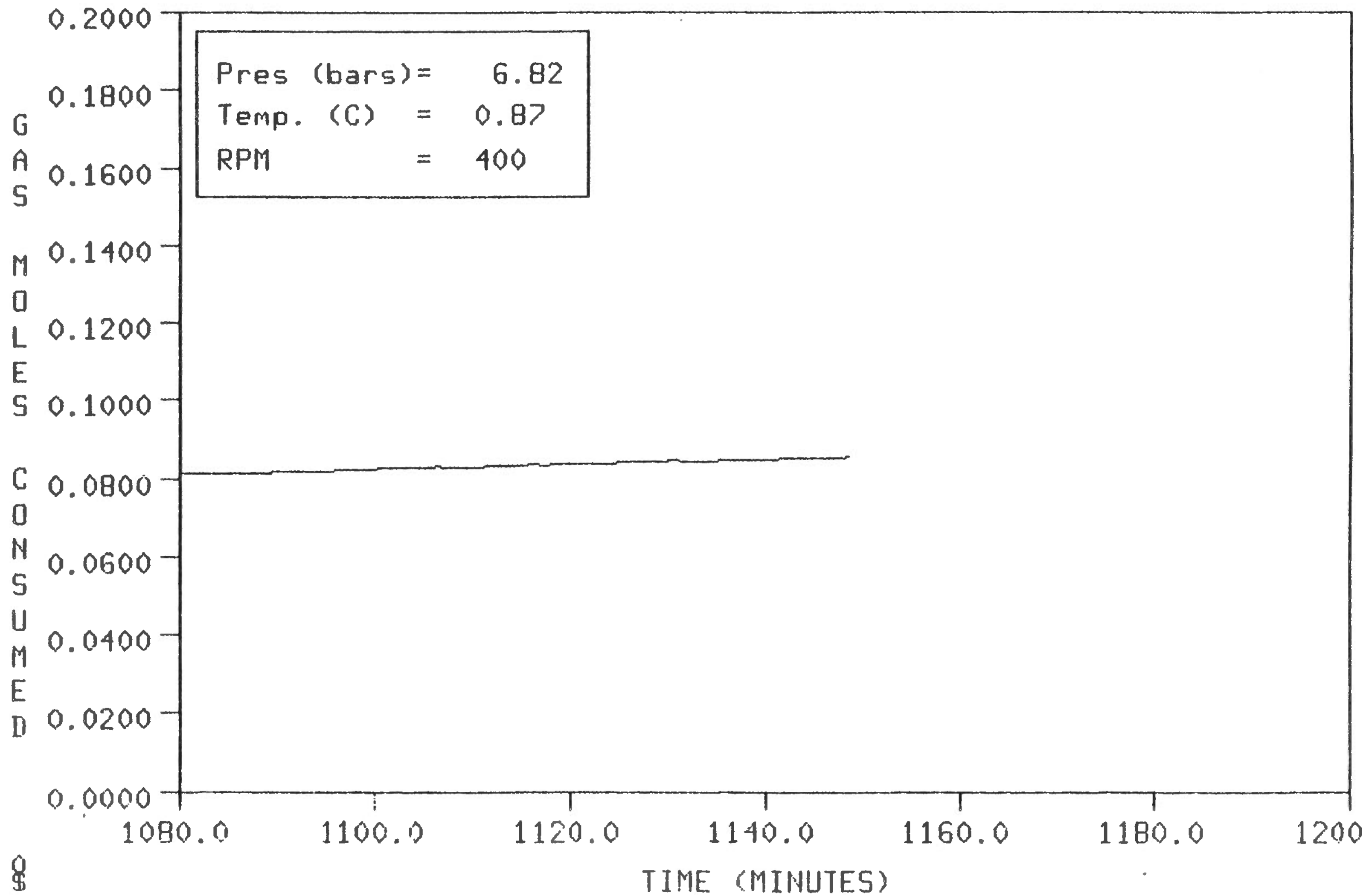
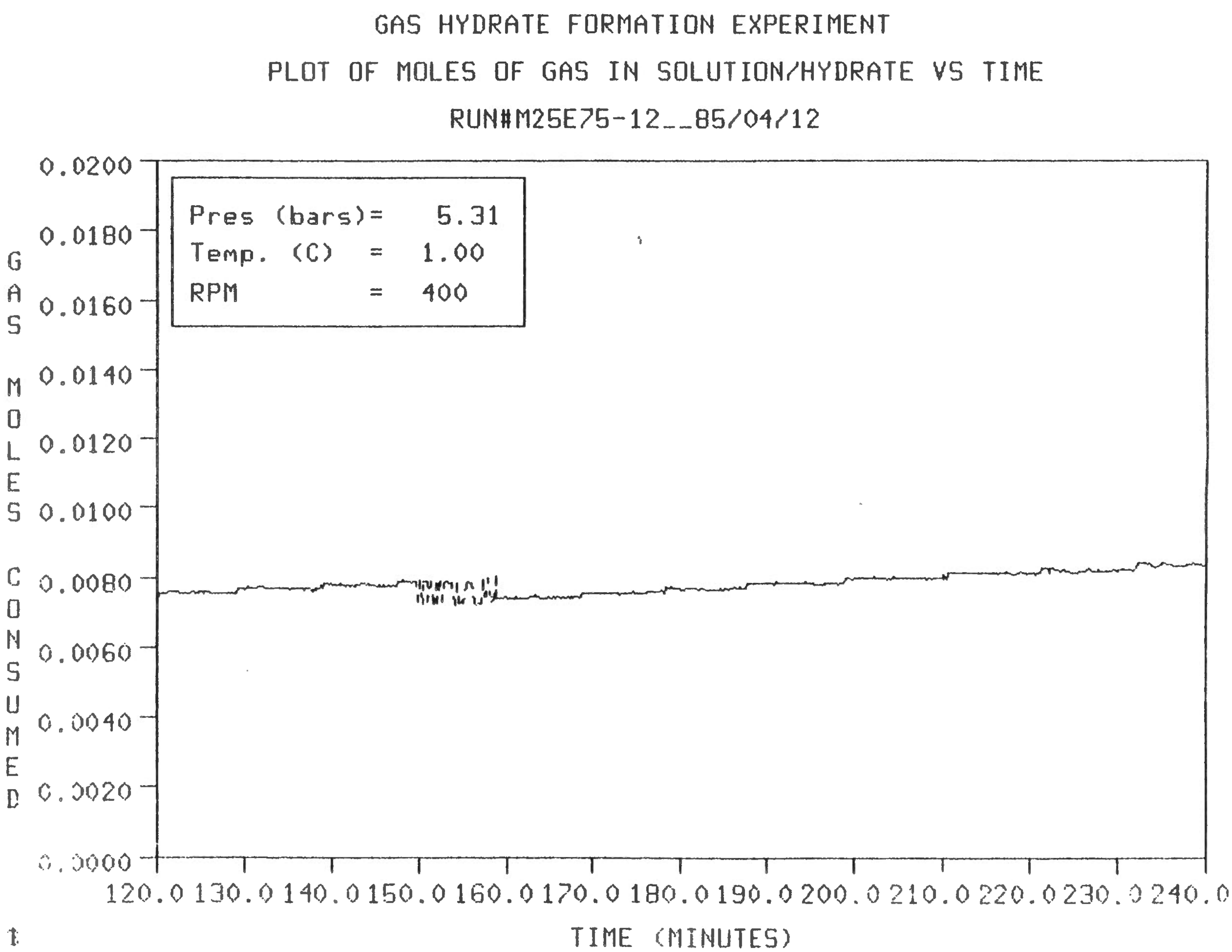

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-11__85/04/11
Pres (bars)= 6.82
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
840.0 850.0 860.0 870.0 880.0 890.0 900.0 910.0 920.0 930.0 940.0 950.0 960.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-11__85/04/11

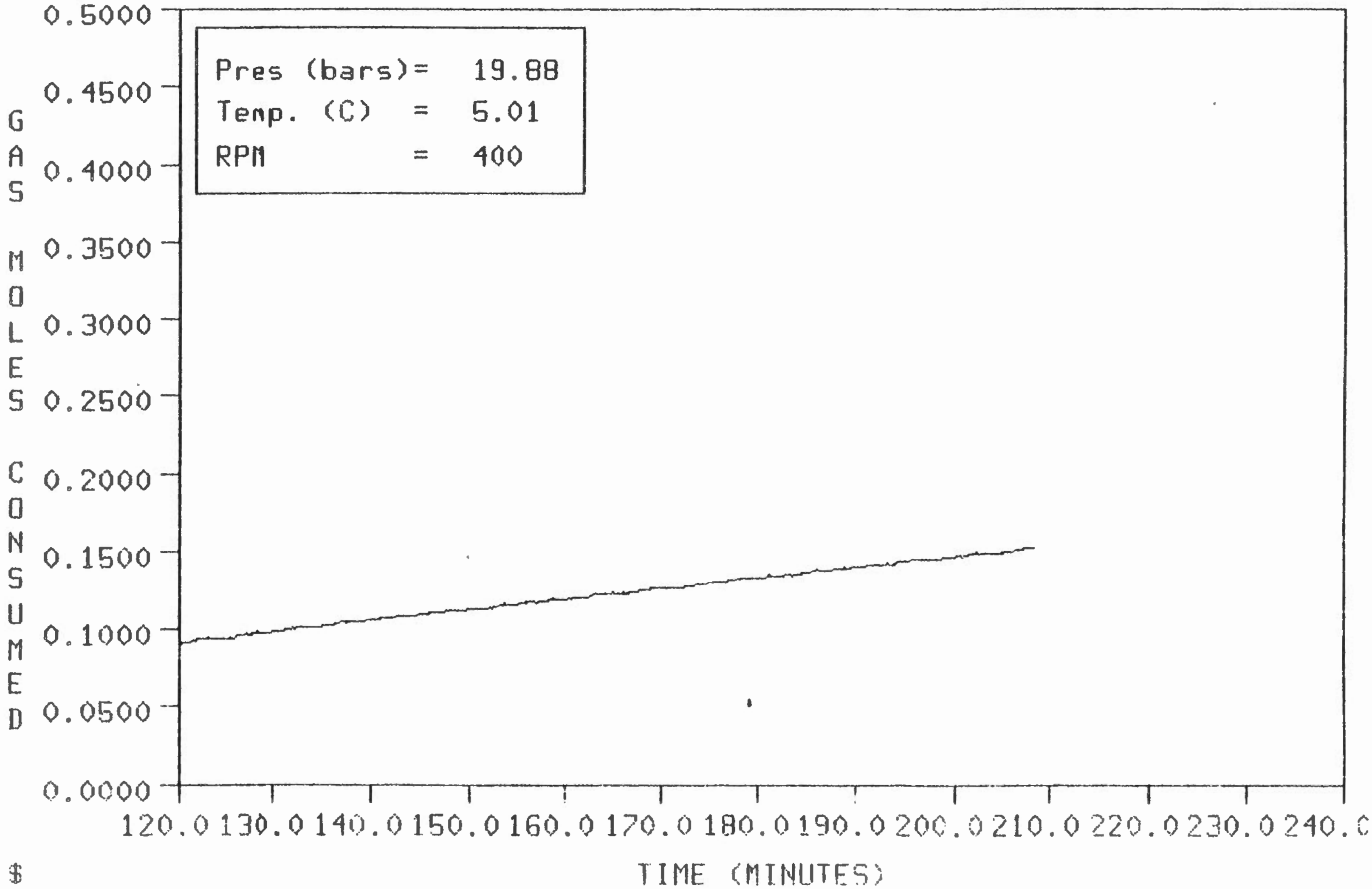



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-12__85/04/12
Pres (bars)= 5.31
Temp. (C) = 1.00
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-13__85/04/15



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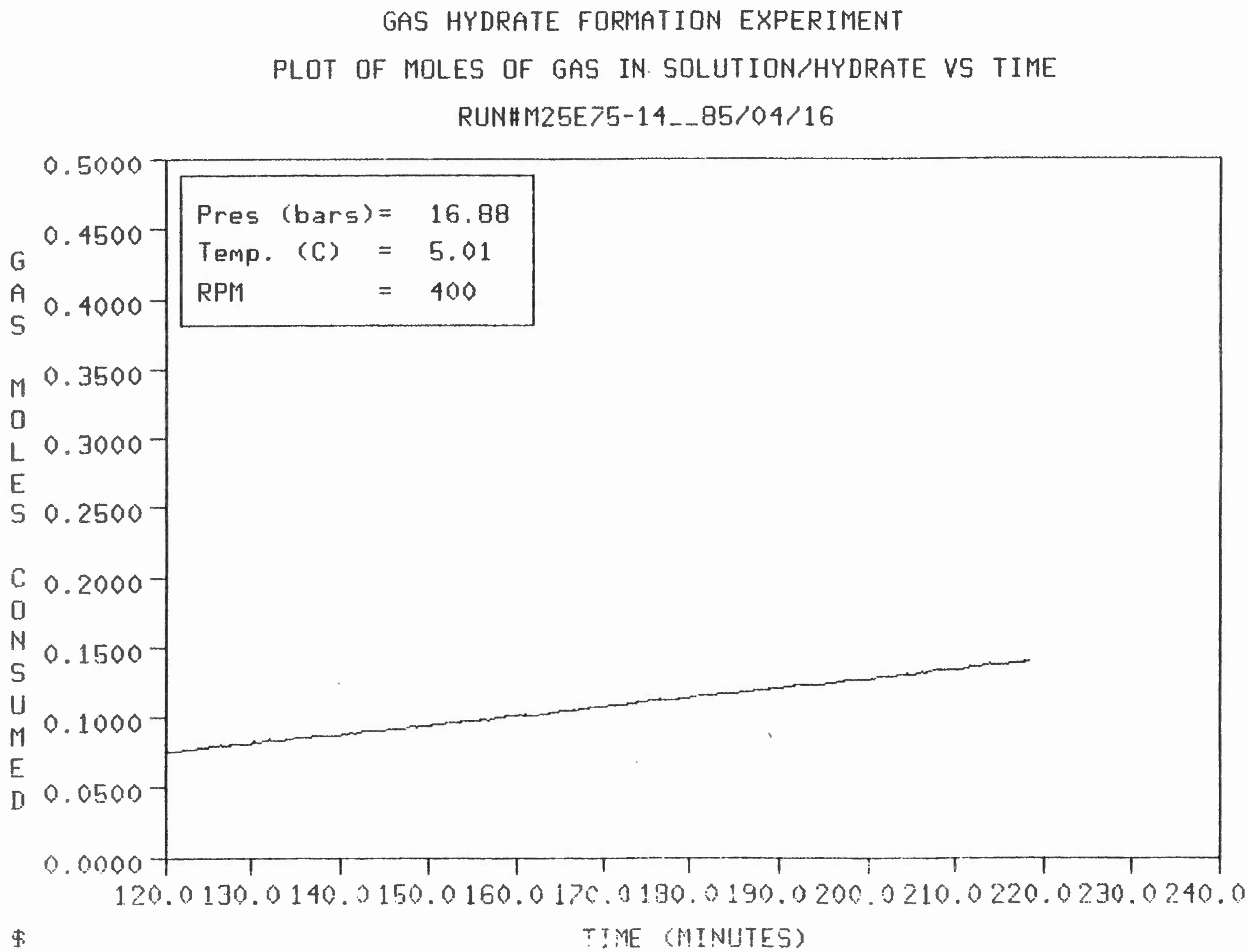
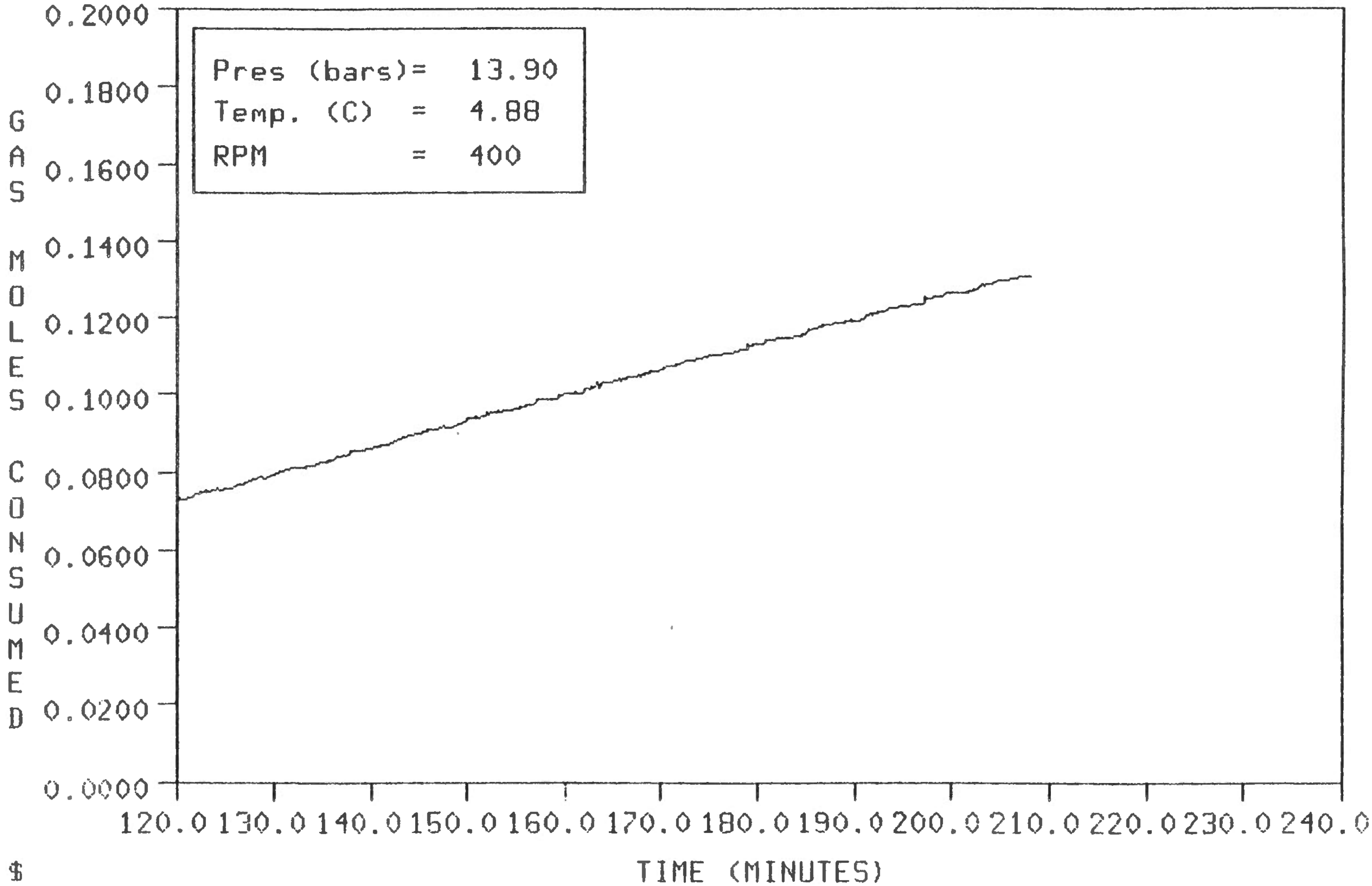

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-14__85/04/16
Pres (bars)= 16.88
Temp. (C) = 5.01
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-15__85/04/17



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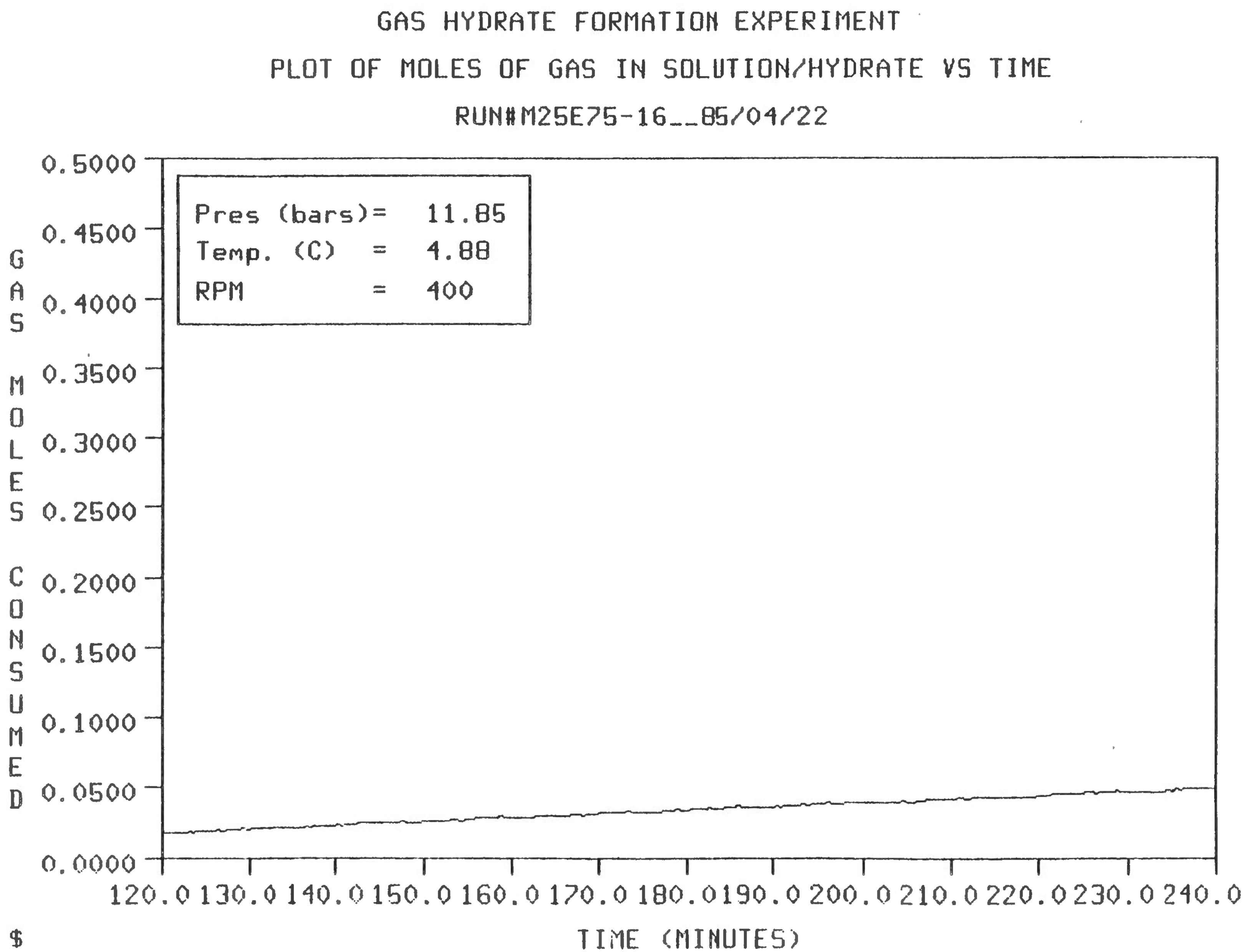
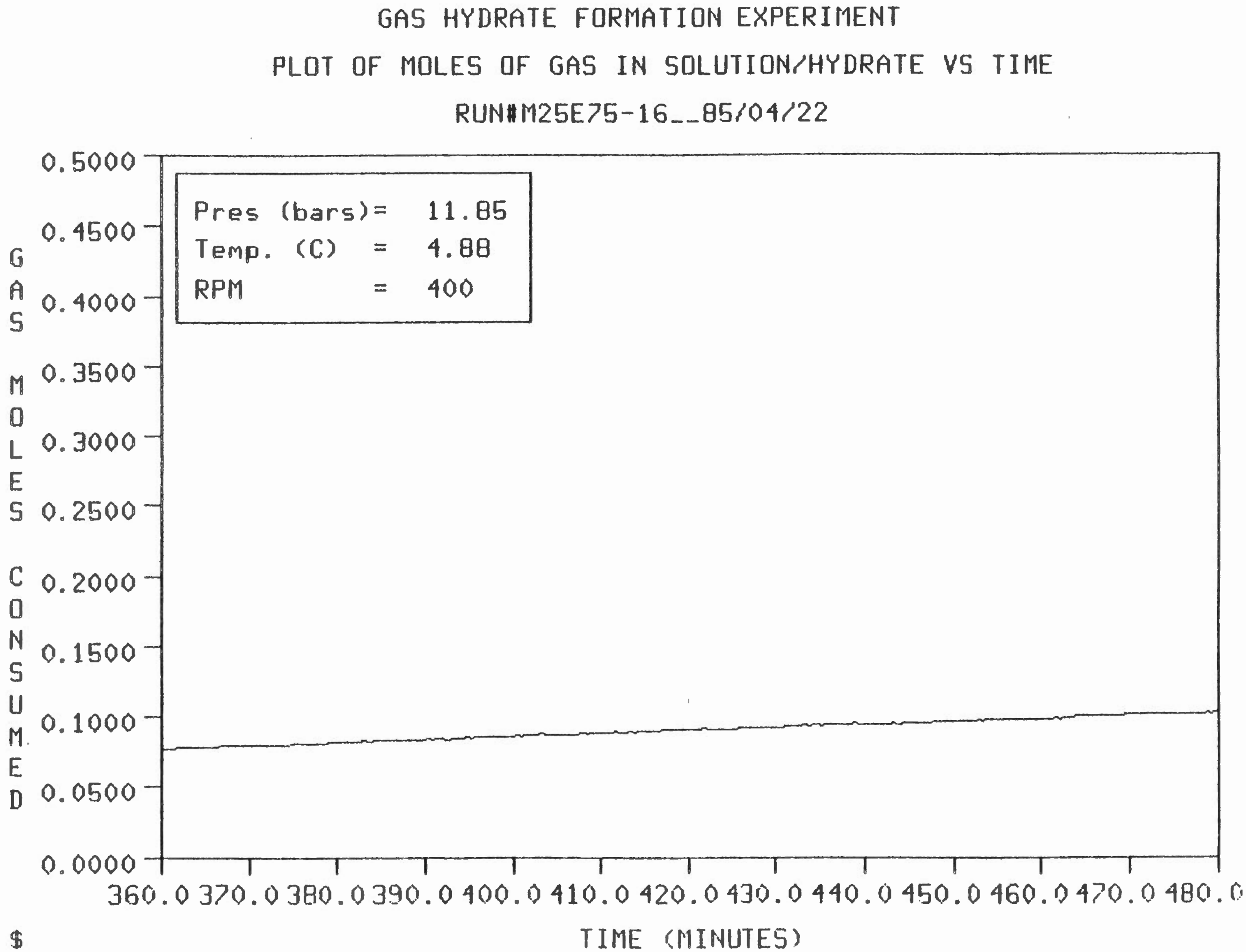
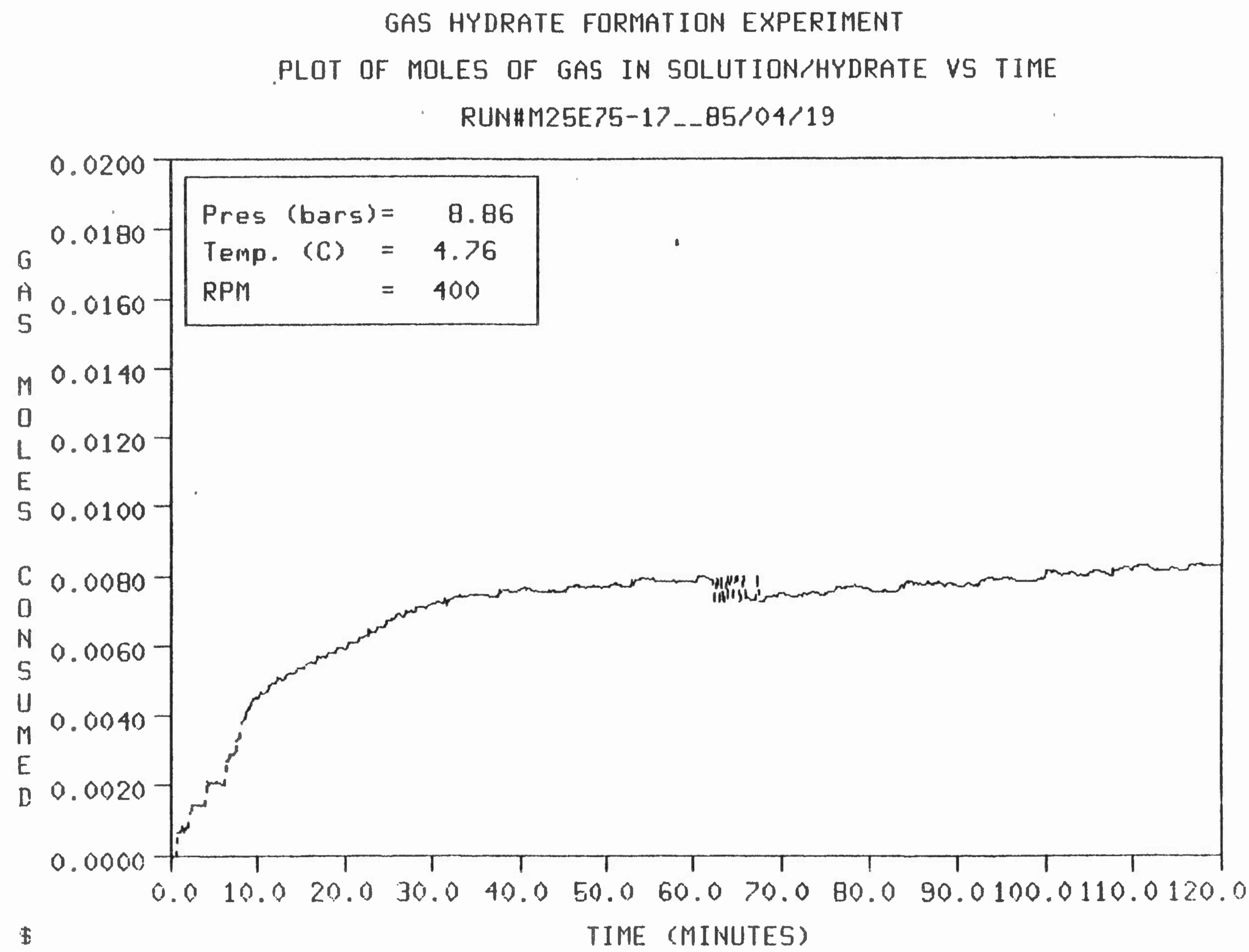

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-16__85/04/22
Pres (bars)= 11.85
Temp. (C) = 4.88
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)

$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-16__85/04/22
Pres (bars)= 11.85
Temp. (C) = 4.88
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)

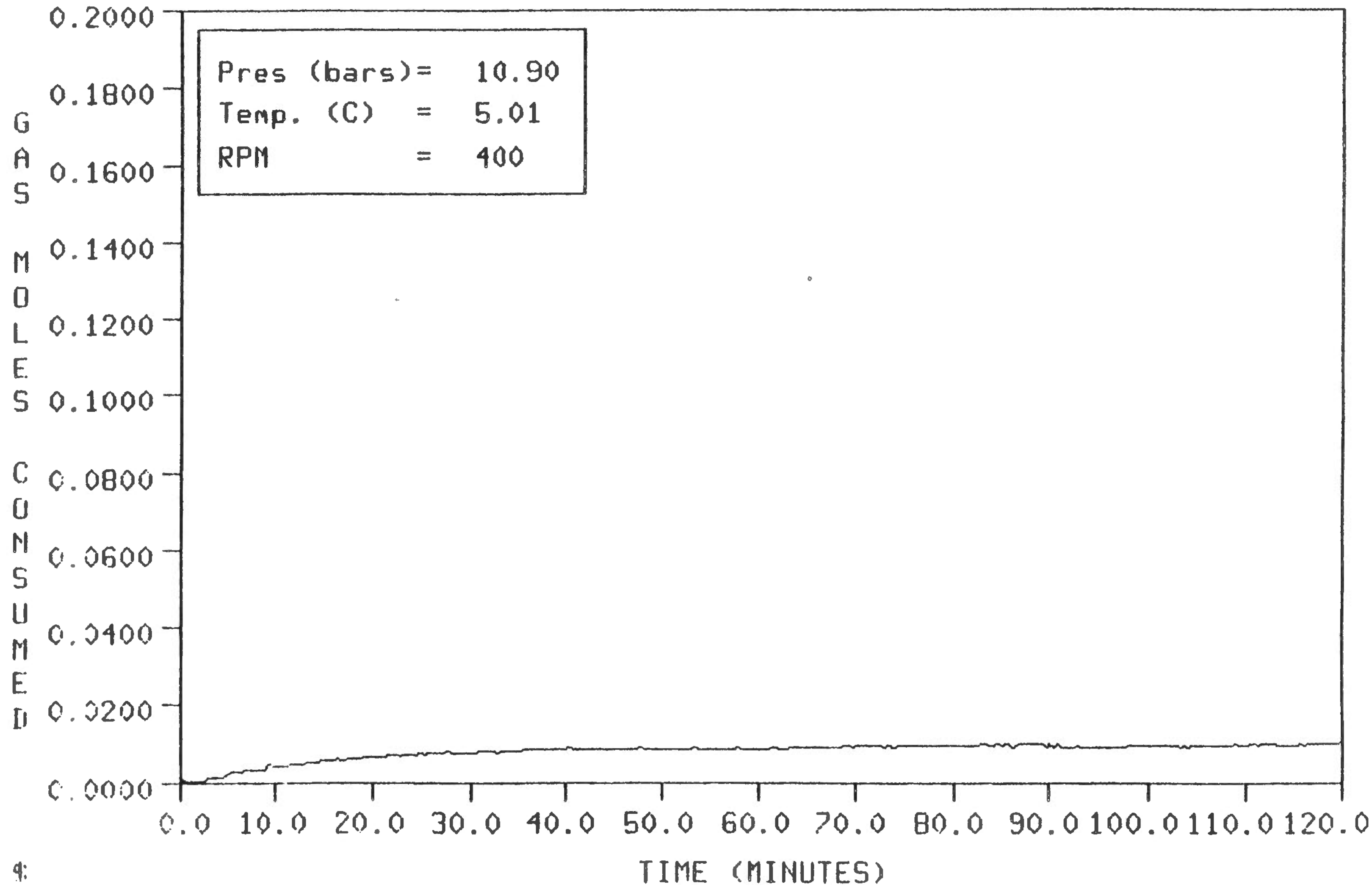
$

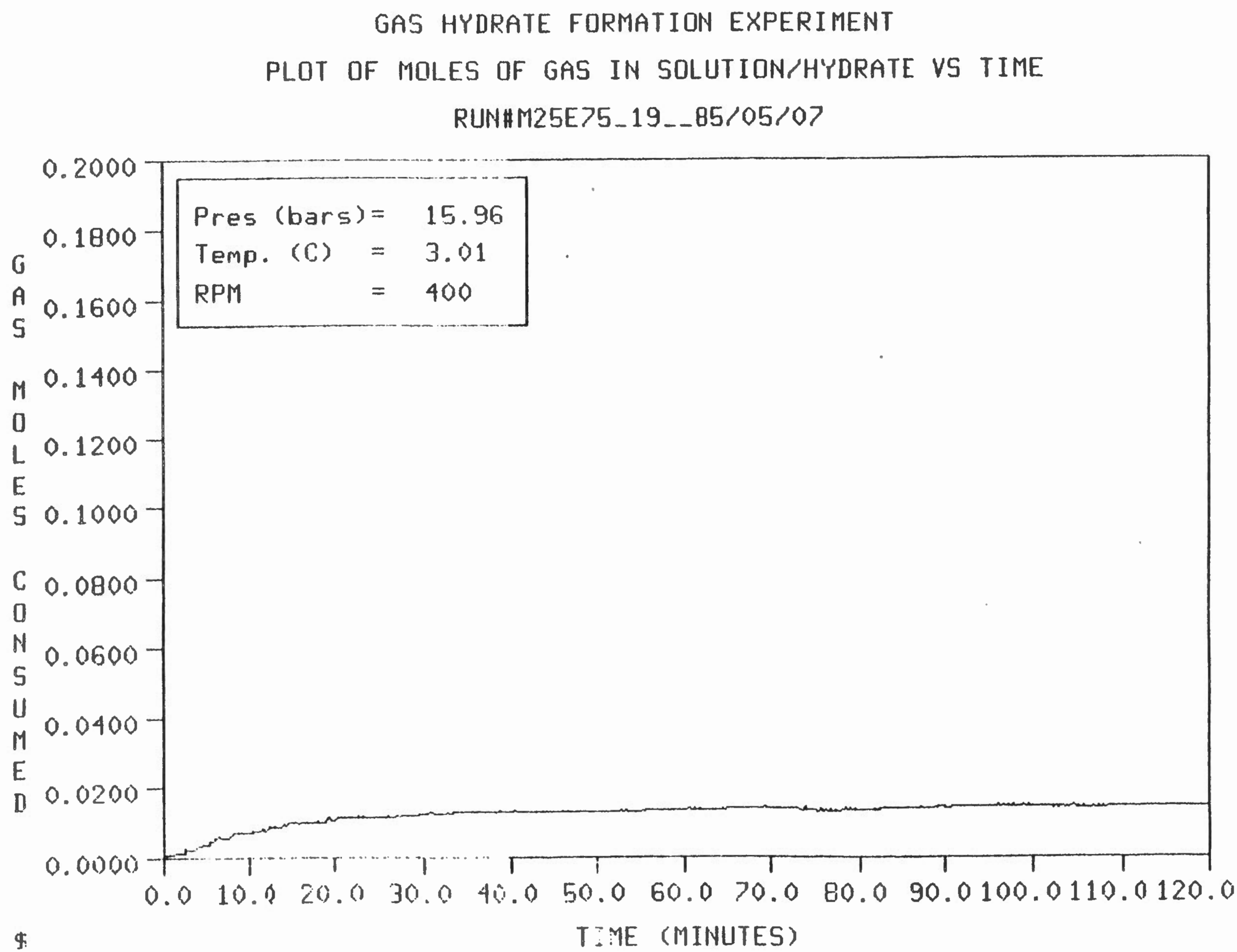

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-17__85/04/19
Pres (bars)= 8.86
Temp. (C) = 4.76
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

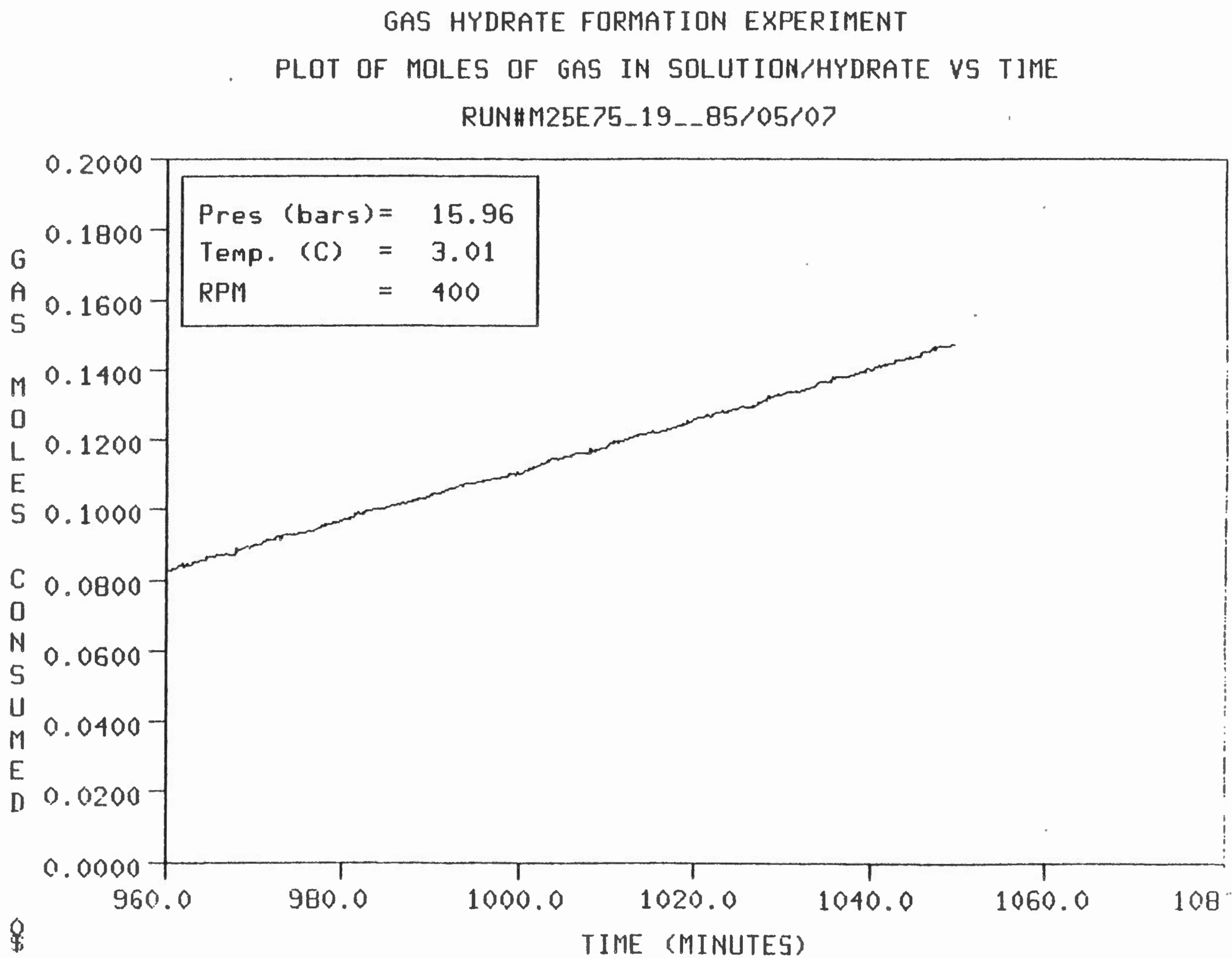
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

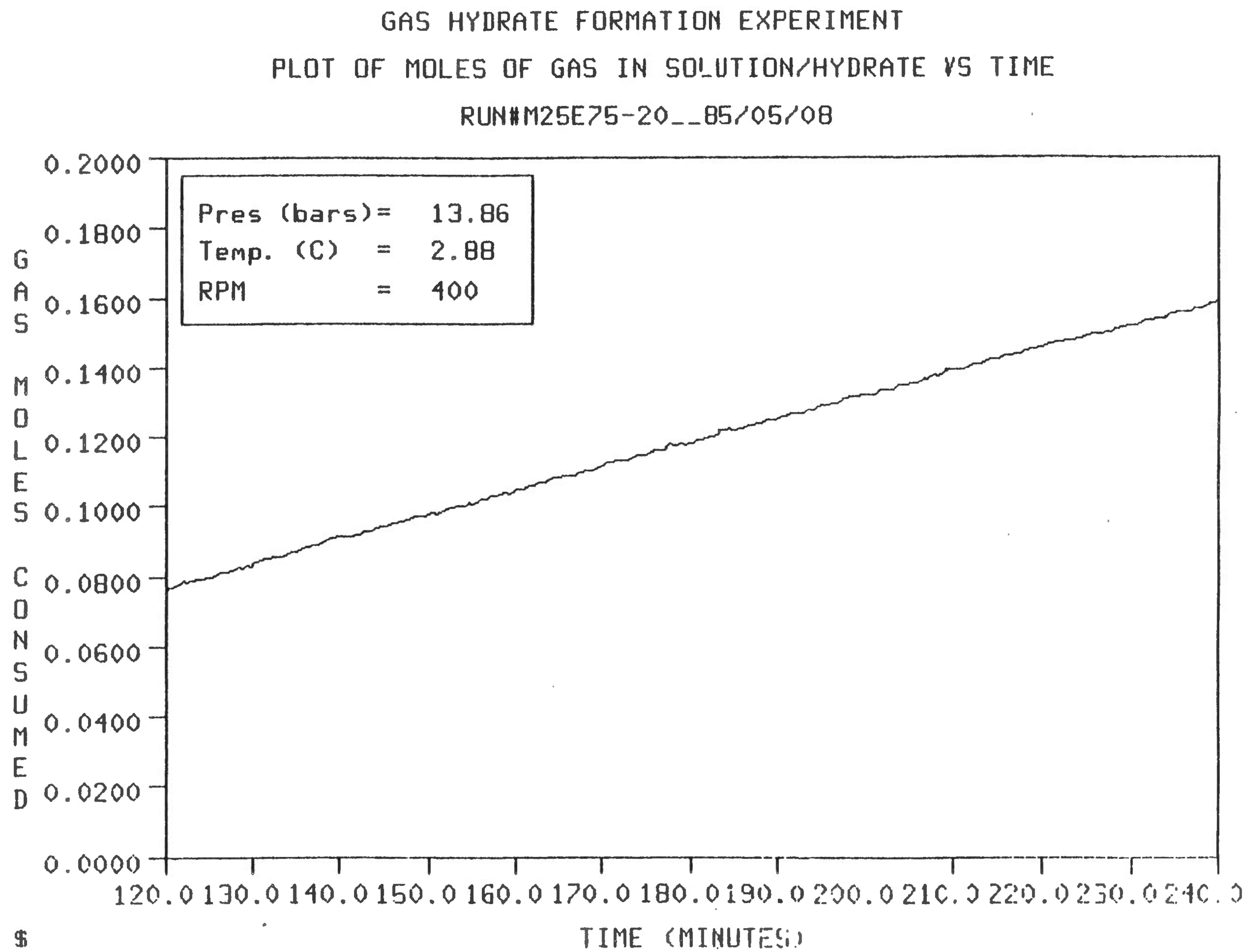
RUN#M25E75-18__85/05/06



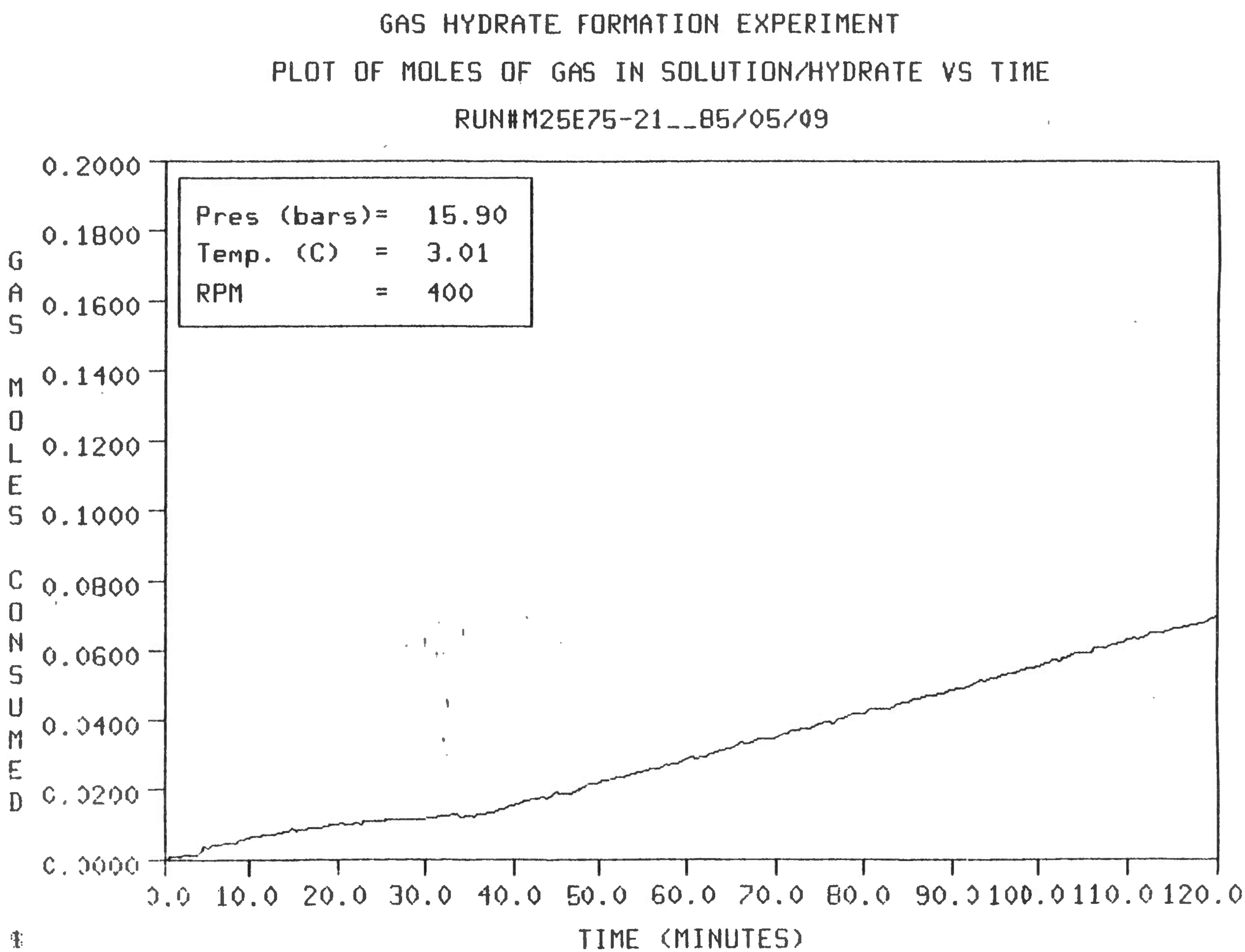

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75_19__85/05/07
Pres (bars)= 15.96
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)
$

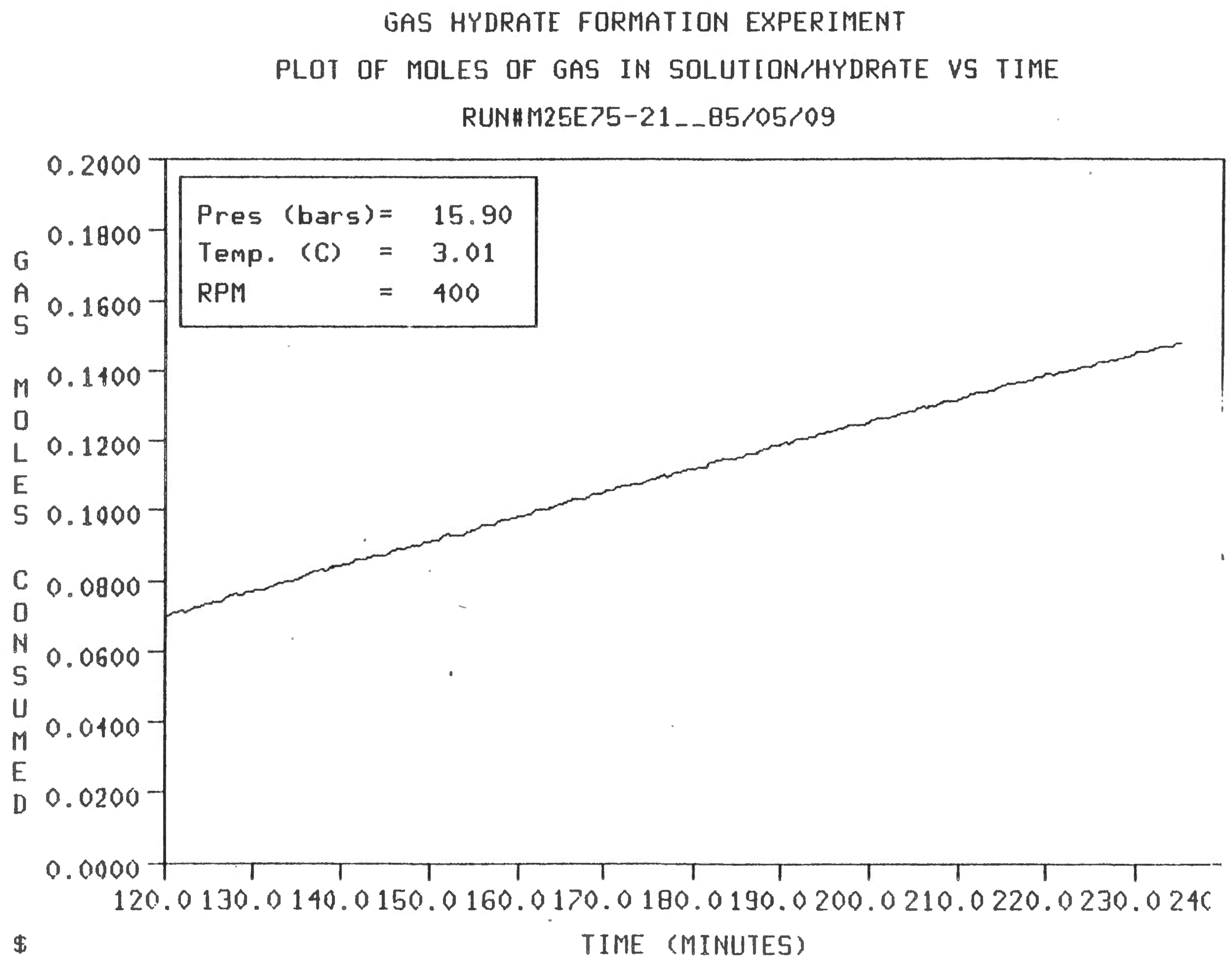


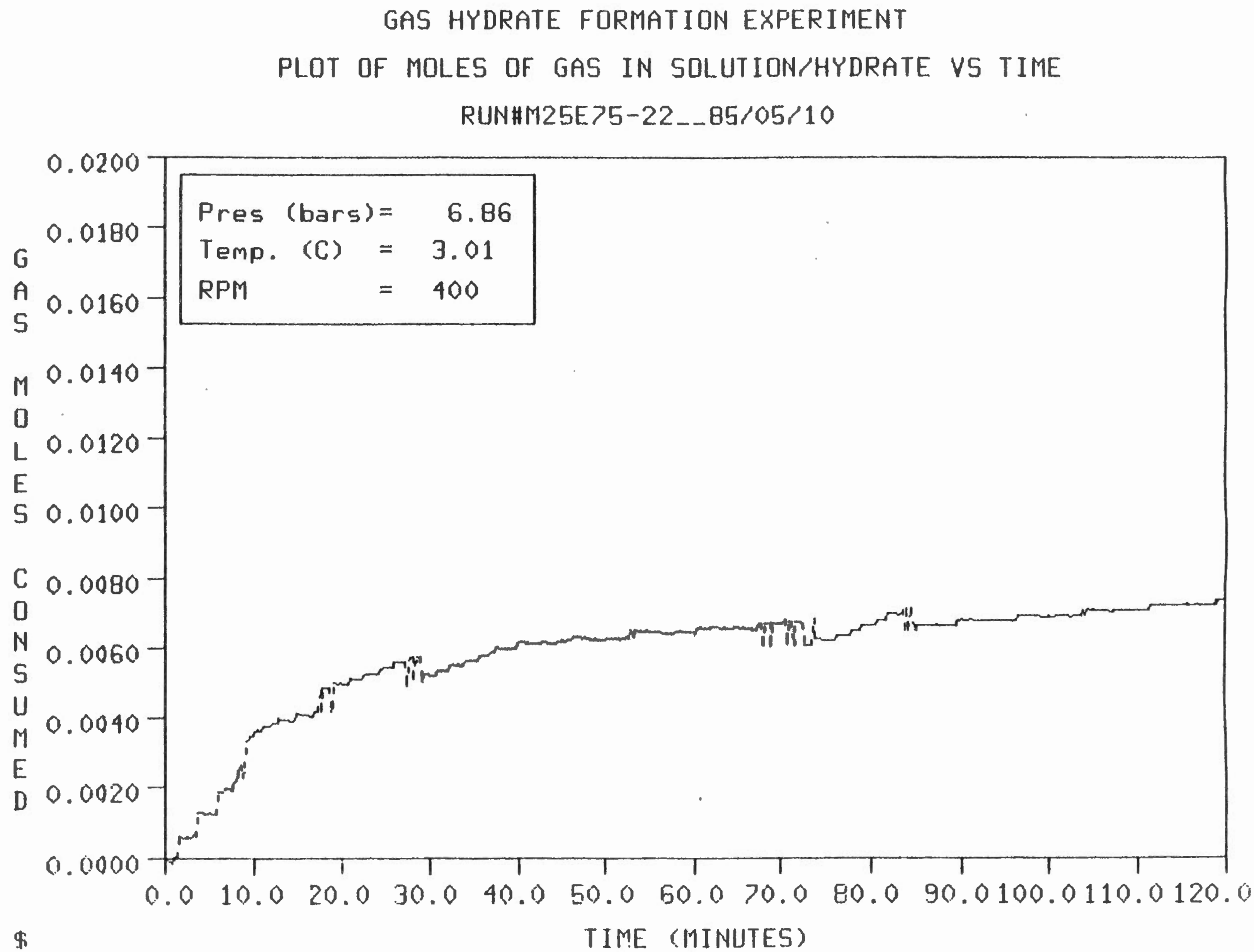
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75_19__85/05/07
Pres (bars)= 15.96
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
960.0
980.0
1000.0
1020.0
1040.0
1060.0
108
TIME (MINUTES)

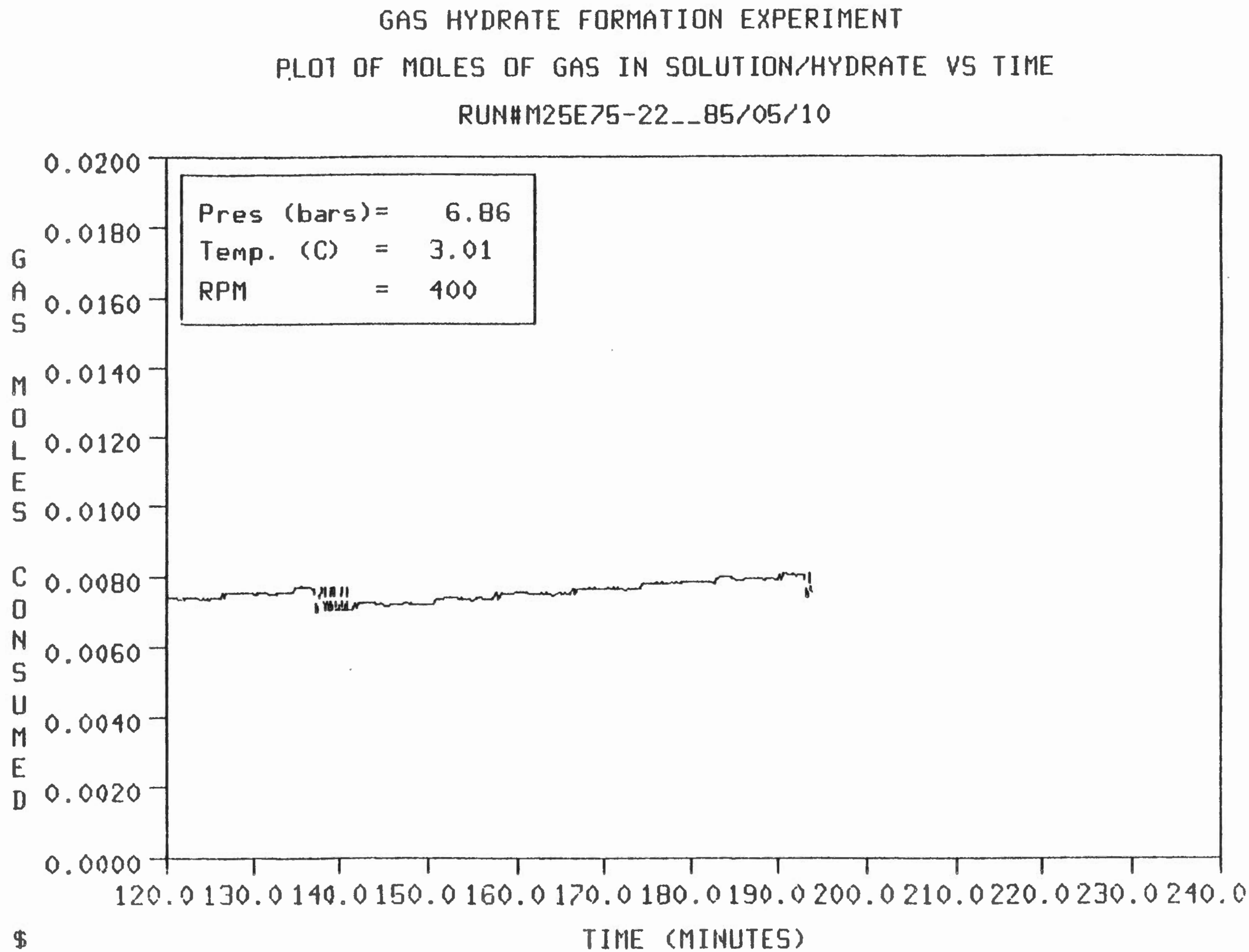


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-20__85/05/08
Pres (bars)= 13.86
Temp. (C) = 2.88
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-21__85/05/09
Pres (bars)= 15.90
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-21__85/05/09
Pres (bars)= 15.90
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0
TIME (MINUTES)
$

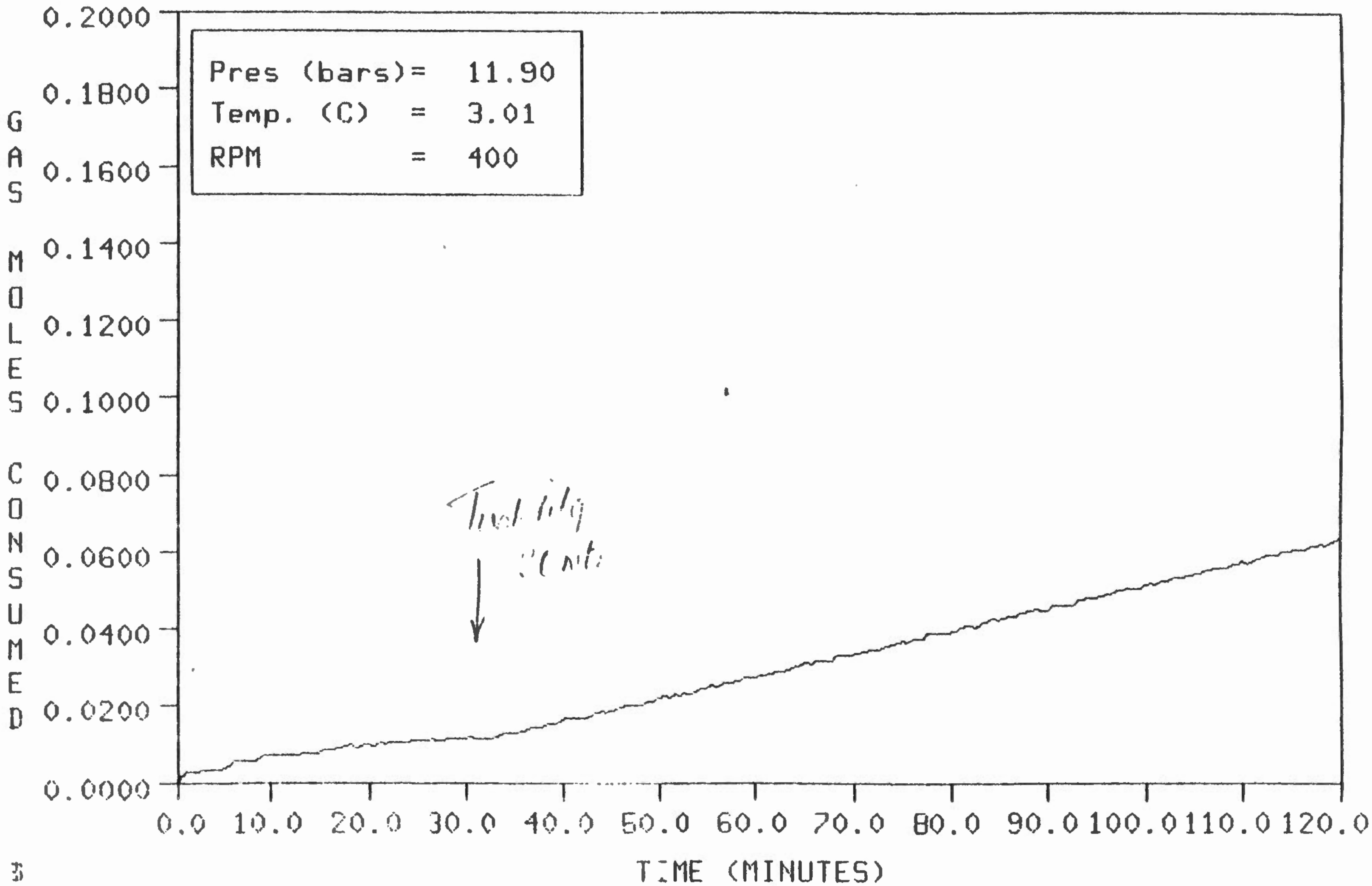

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-22__85/05/10
Pres (bars)= 6.86
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0020
0.0040
0.0060
0.0080
0.0100
0.0120
0.0140
0.0160
0.0180
0.0200
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)
$

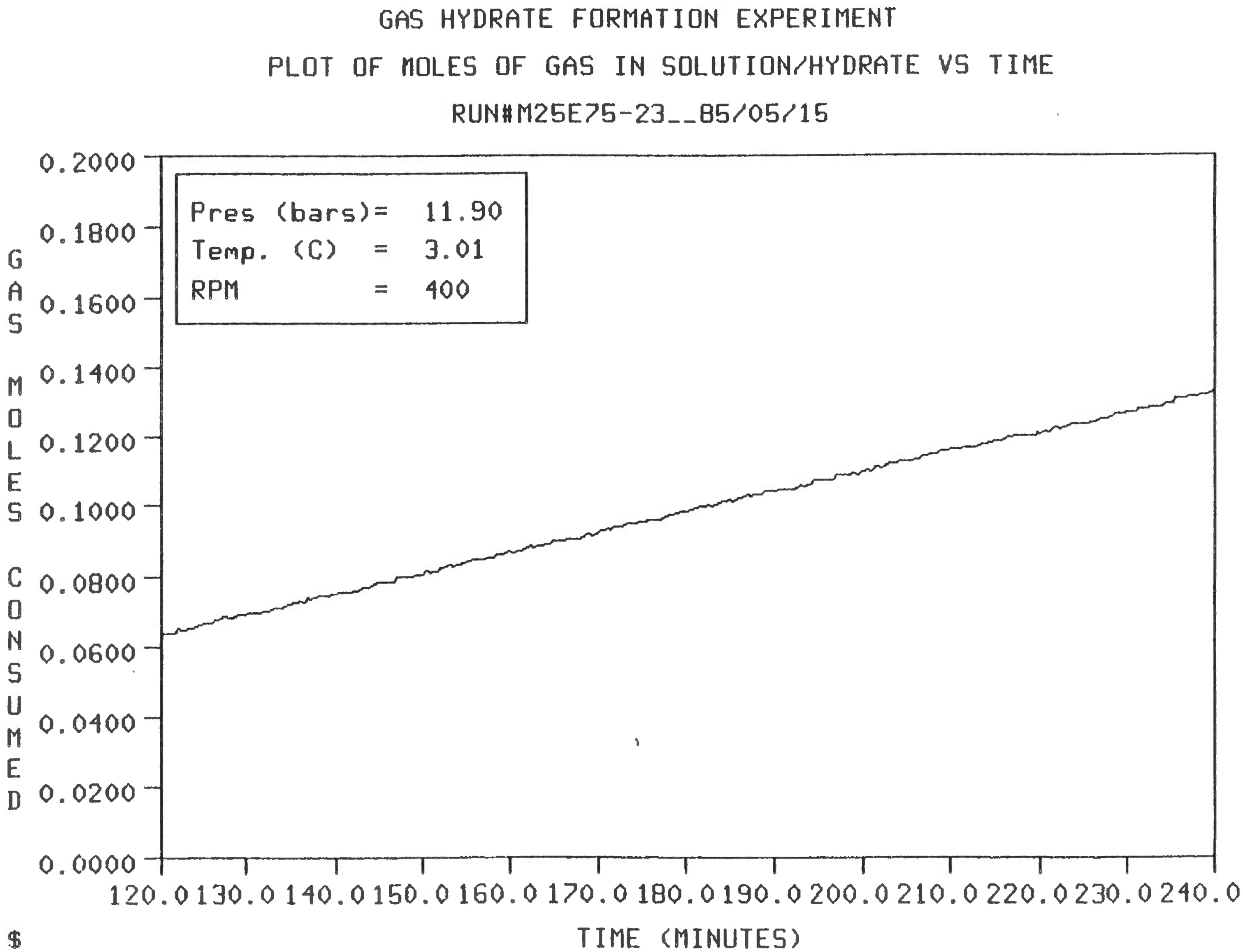

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-22__85/05/10
Pres (bars)= 6.86
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.0200
0.0180
0.0160
0.0140
0.0120
0.0100
0.0080
0.0060
0.0040
0.0020
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-23__85/05/15

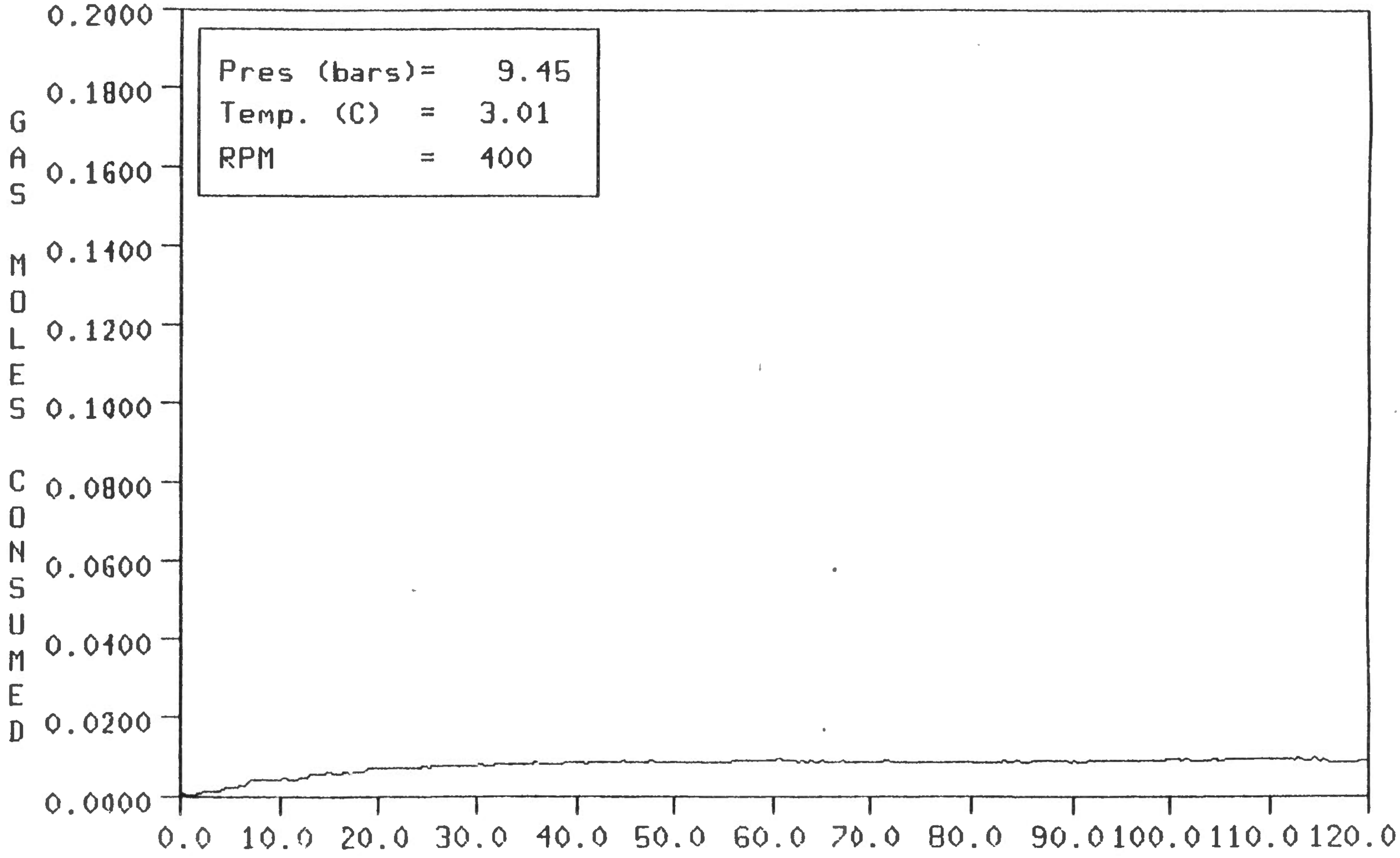



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-23__85/05/15
Pres (bars)= 11.90
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-24__85/05/16



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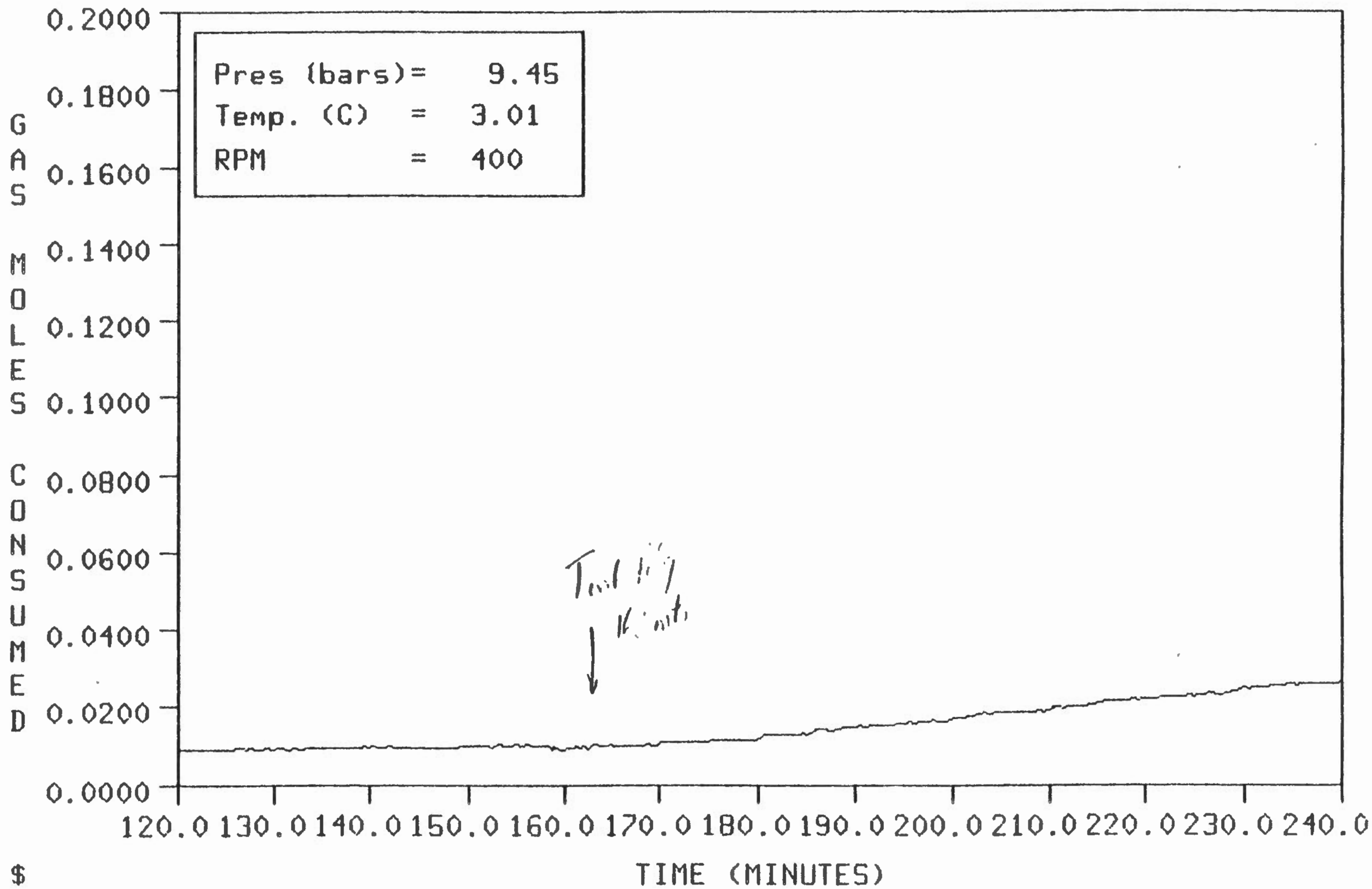
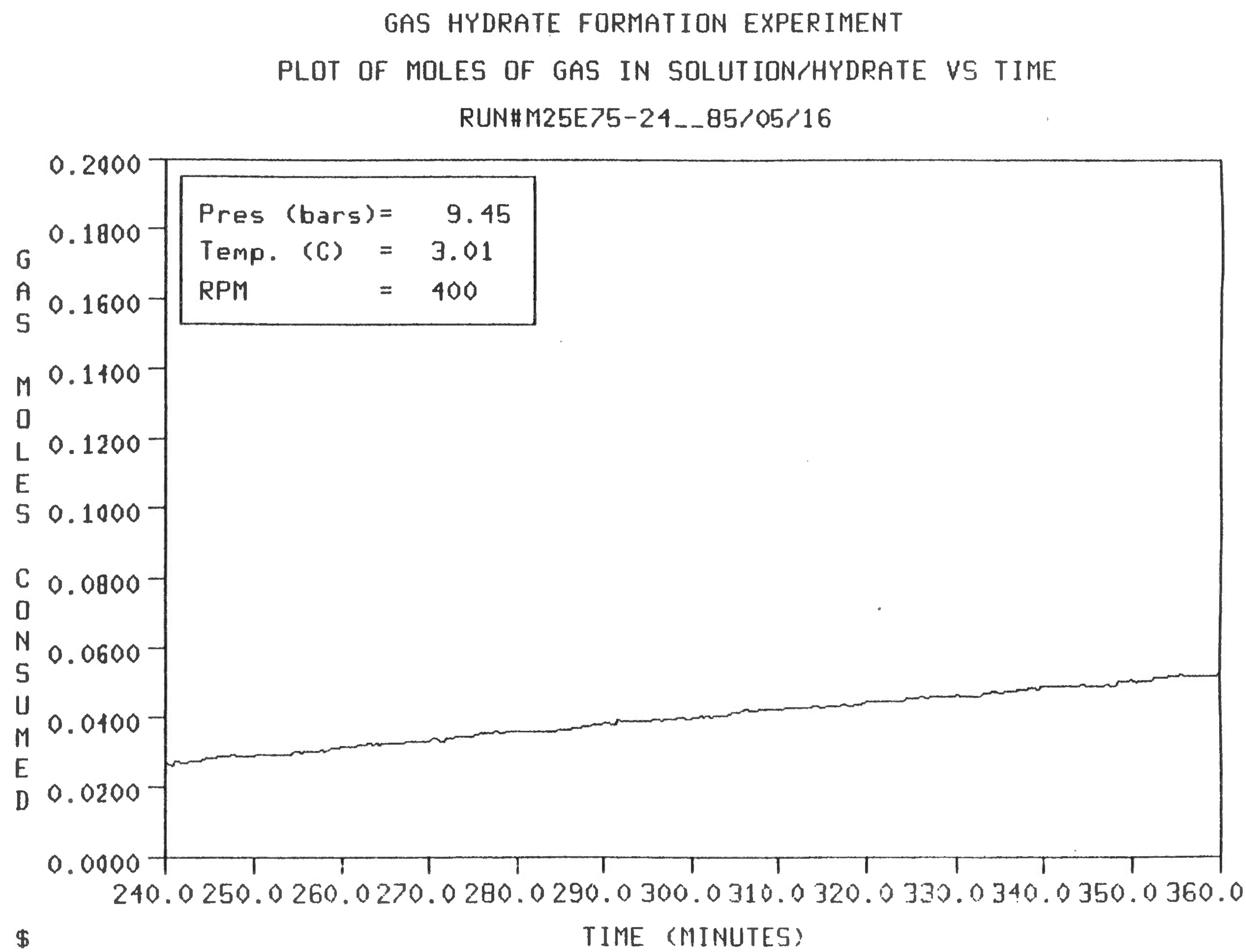
[redacted]

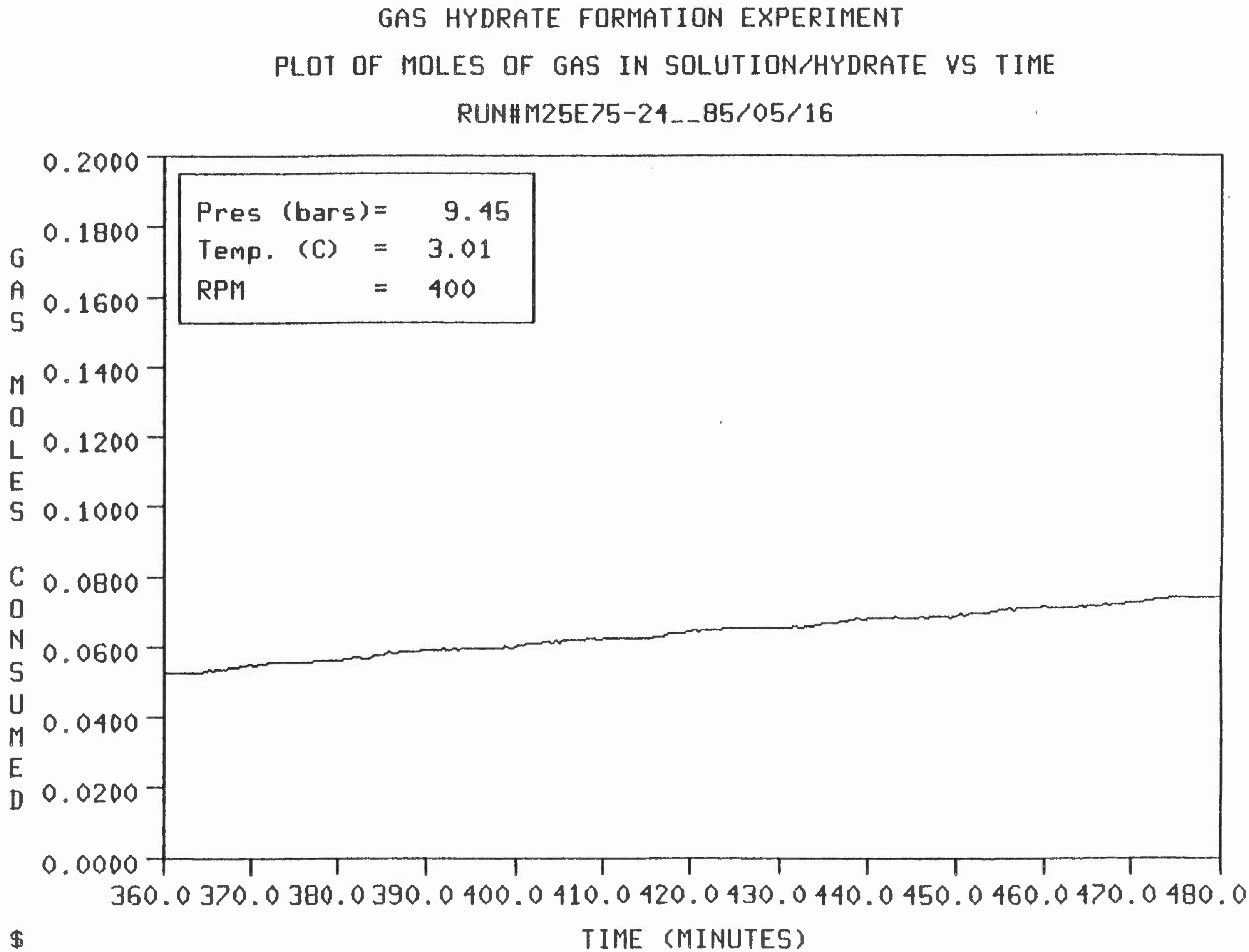
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

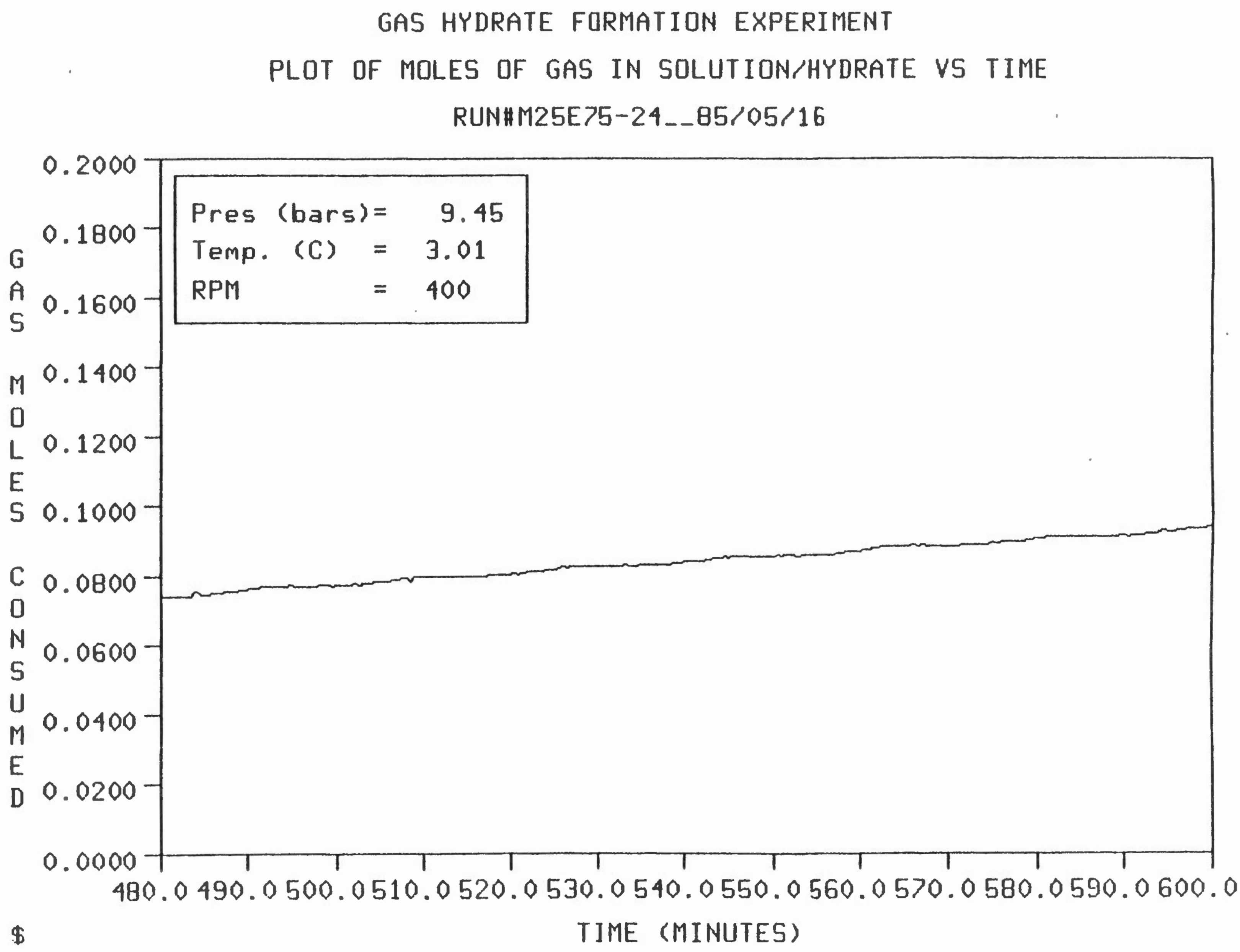
RUN#M25E75-24__85/05/16



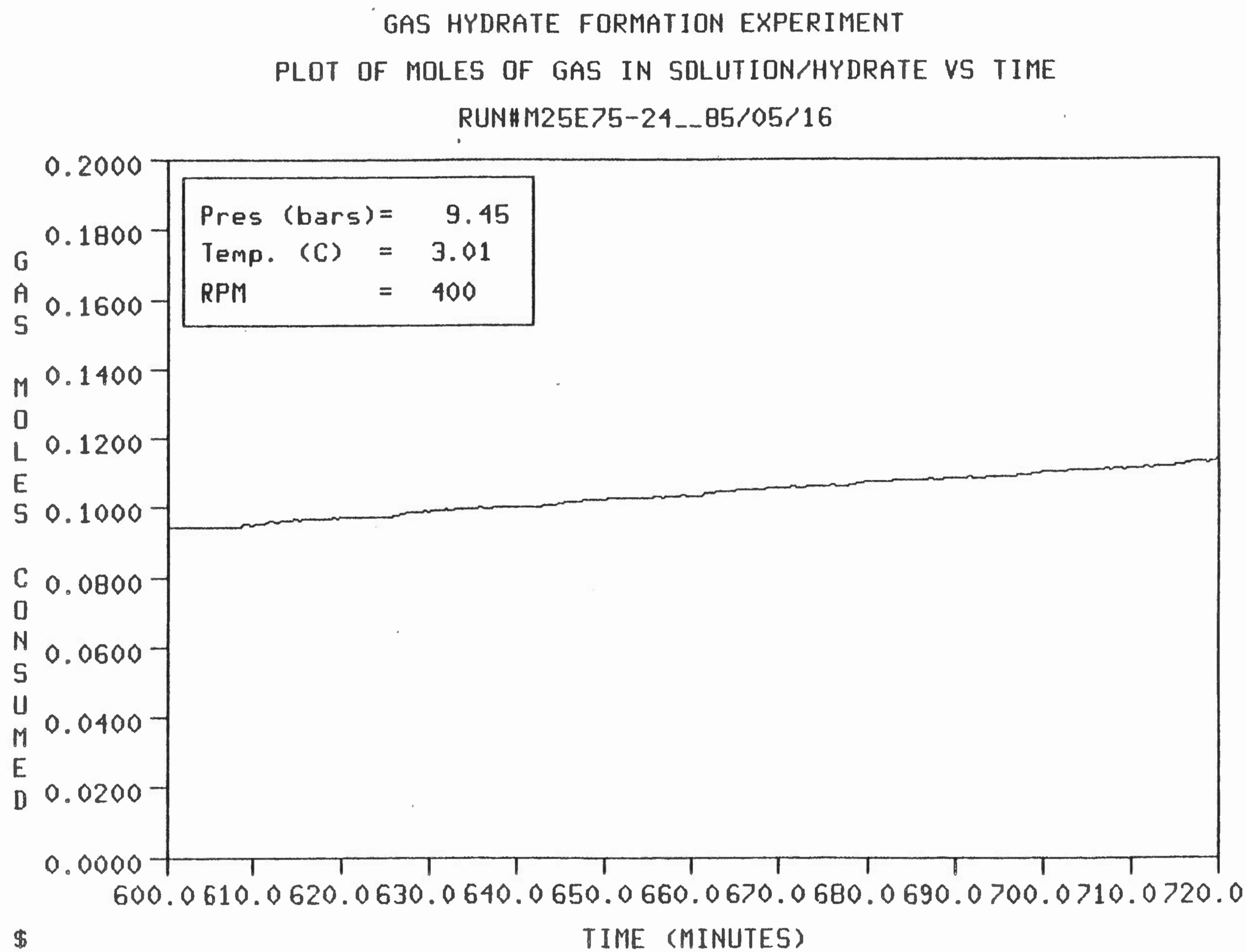

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-24__85/05/16
Pres (bars)= 9.45
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
240.0 250.0 260.0 270.0 280.0 290.0 300.0 310.0 320.0 330.0 340.0 350.0 360.0
TIME (MINUTES)
$

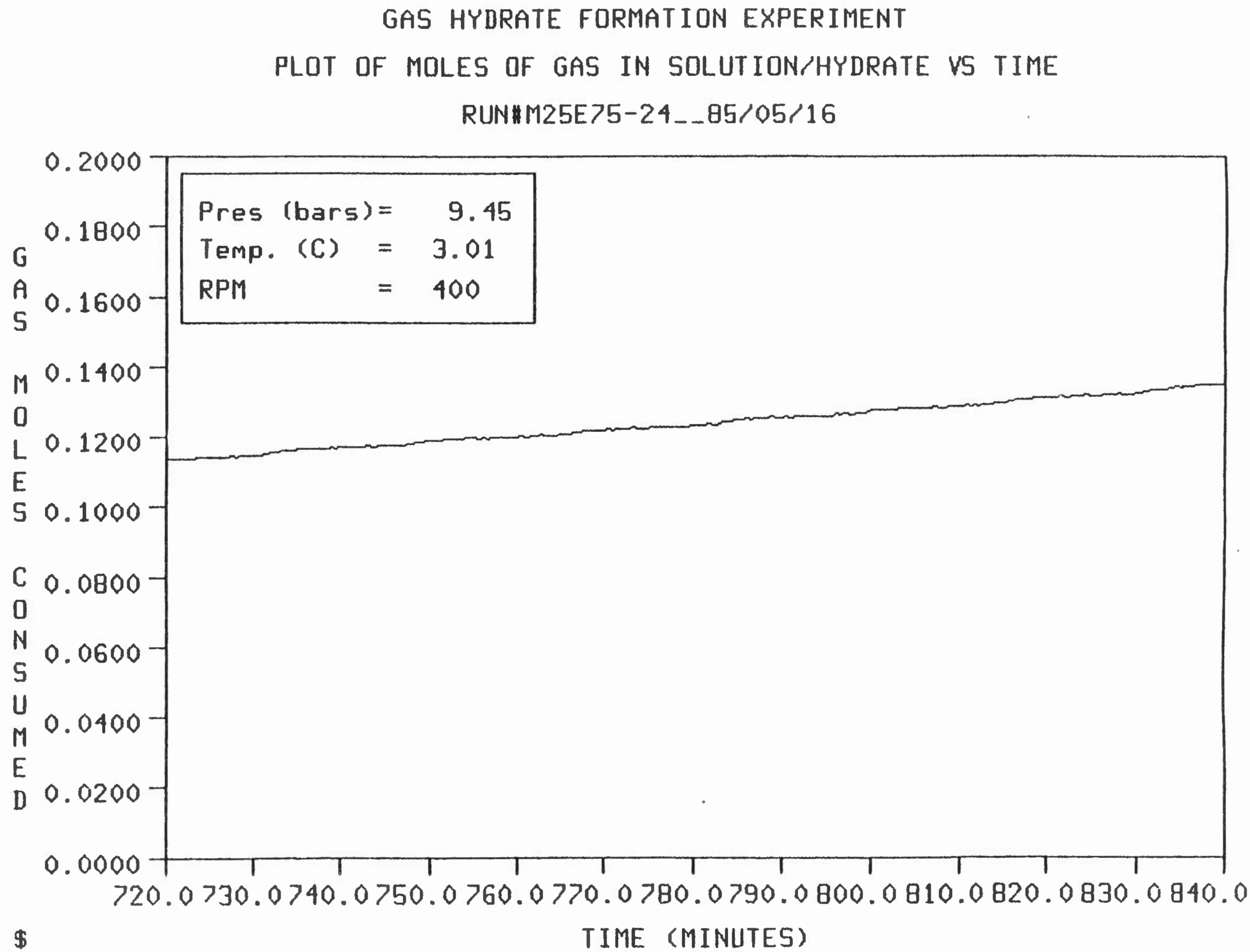


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-24__85/05/16
Pres (bars)= 9.45
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)
$



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-24__85/05/16
Pres (bars)= 9.45
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
480.0 490.0 500.0 510.0 520.0 530.0 540.0 550.0 560.0 570.0 580.0 590.0 600.0
TIME (MINUTES)
$

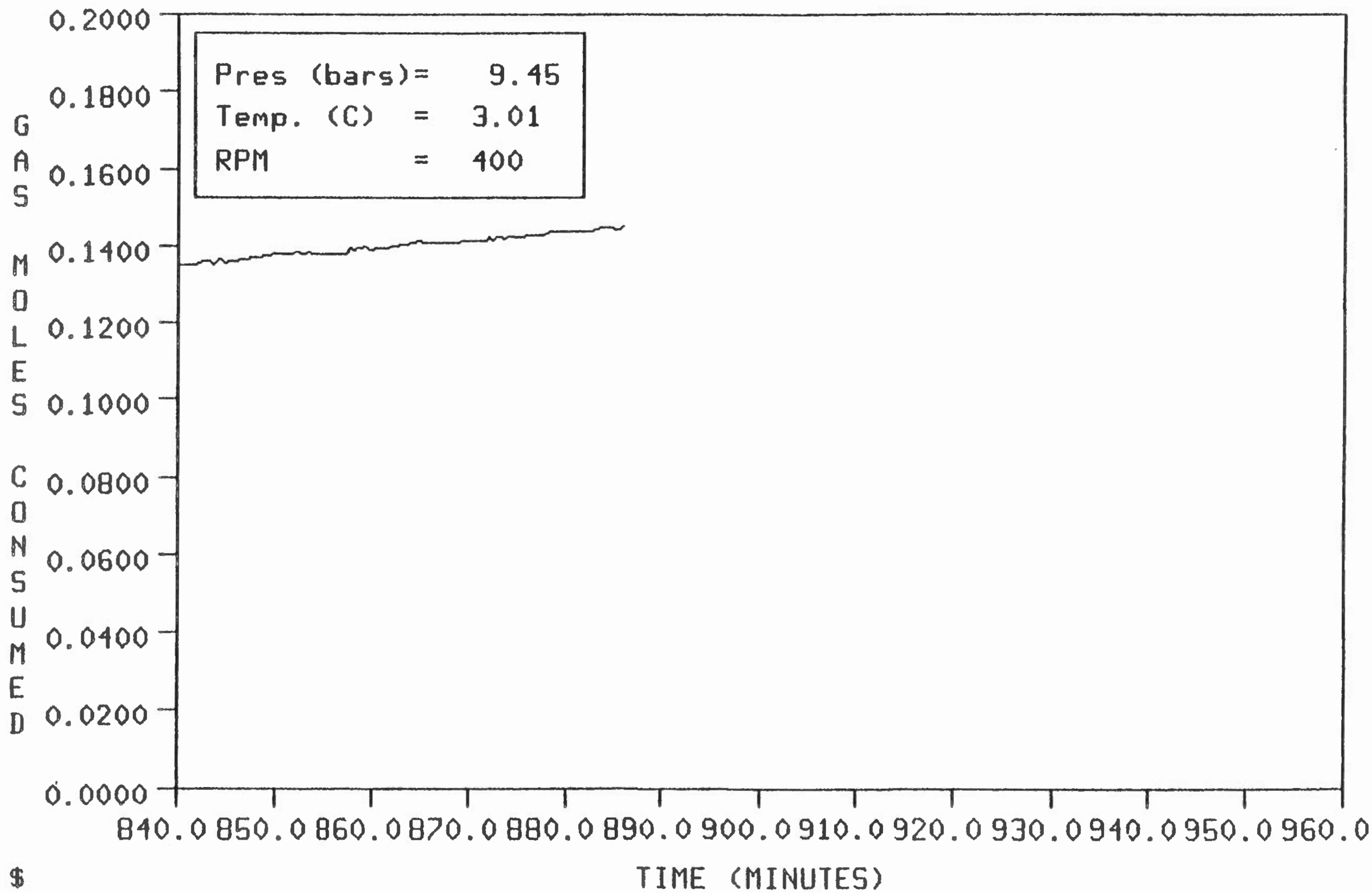

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-24__85/05/16
Pres (bars)= 9.45
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
600.0 610.0 620.0 630.0 640.0 650.0 660.0 670.0 680.0 690.0 700.0 710.0 720.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-24__85/05/16
Pres (bars)= 9.45
Temp. (C) = 3.01
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
720.0 730.0 740.0 750.0 760.0 770.0 780.0 790.0 800.0 810.0 820.0 830.0 840.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-24__85/05/16

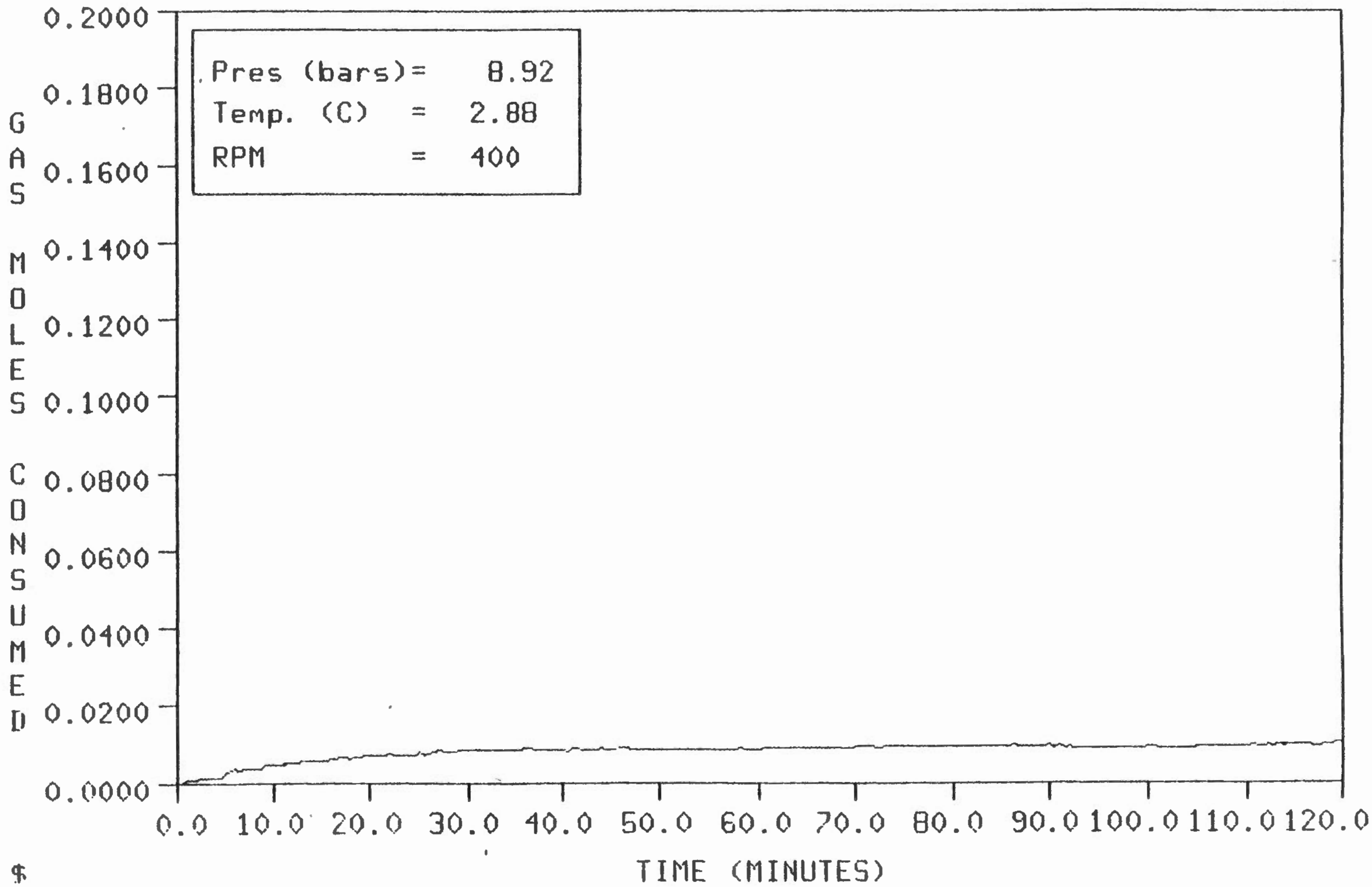


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-25__85/05/17

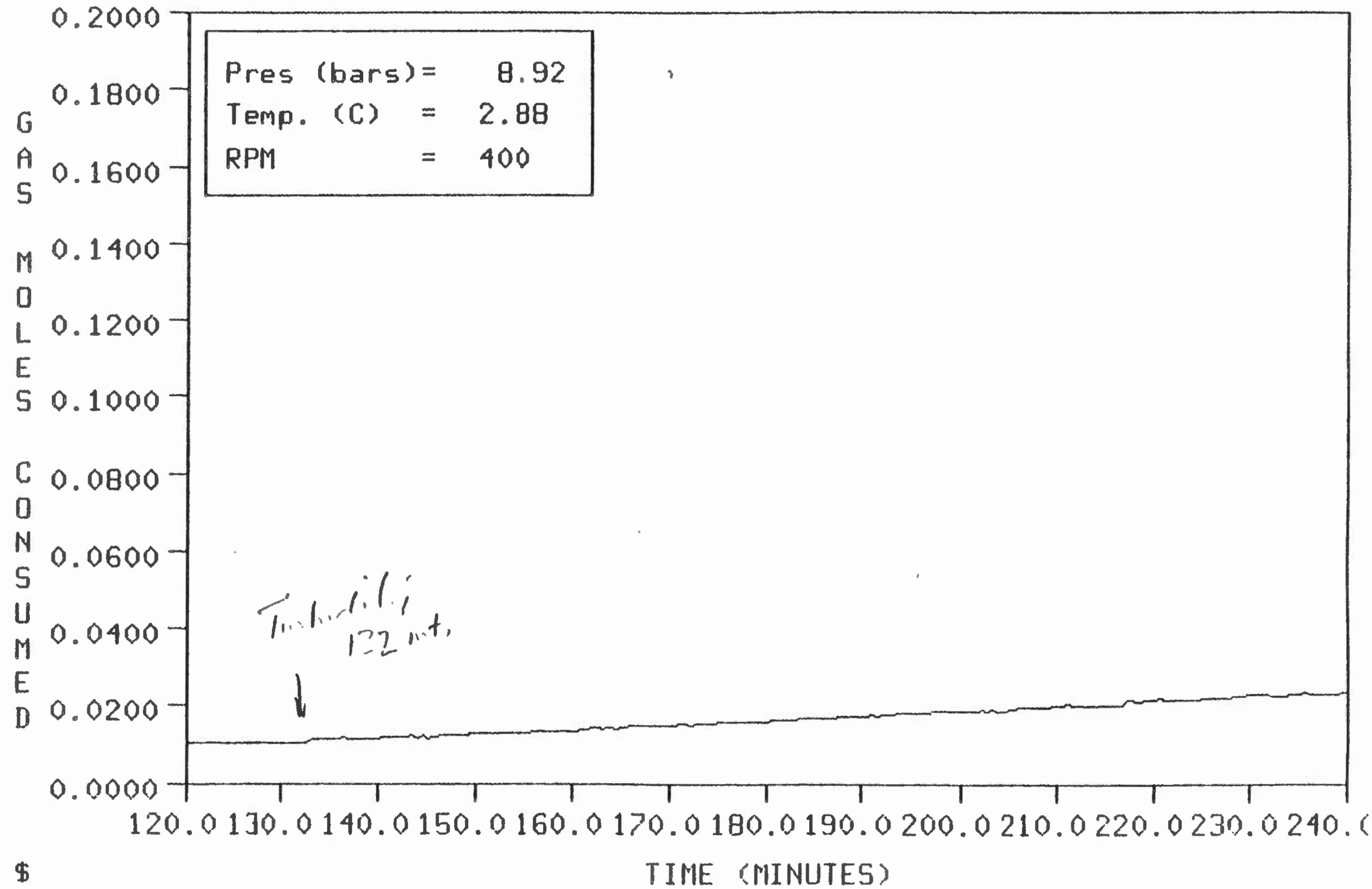


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

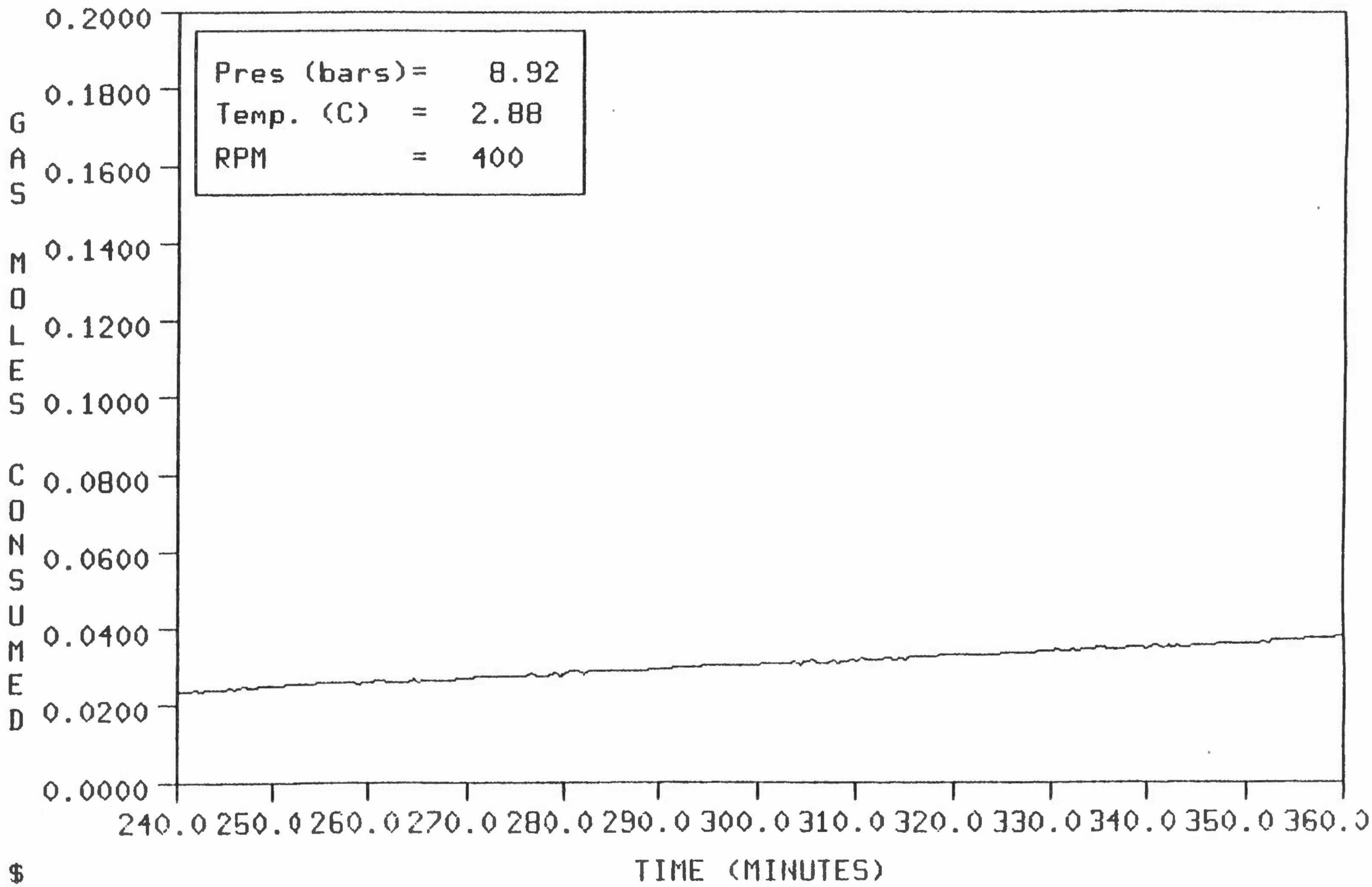
RUN#M25E75-25__85/05/17



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-25__85/05/17



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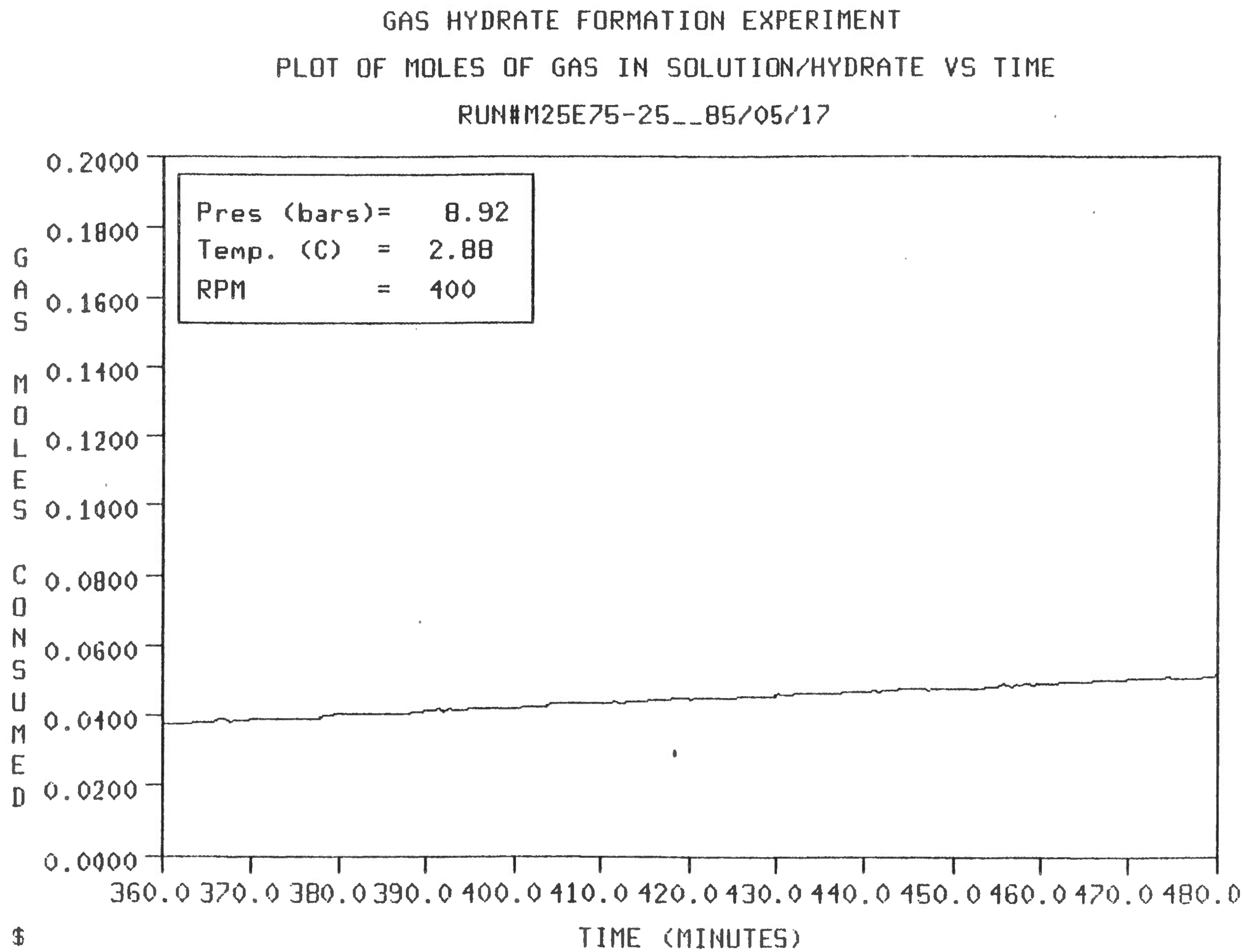
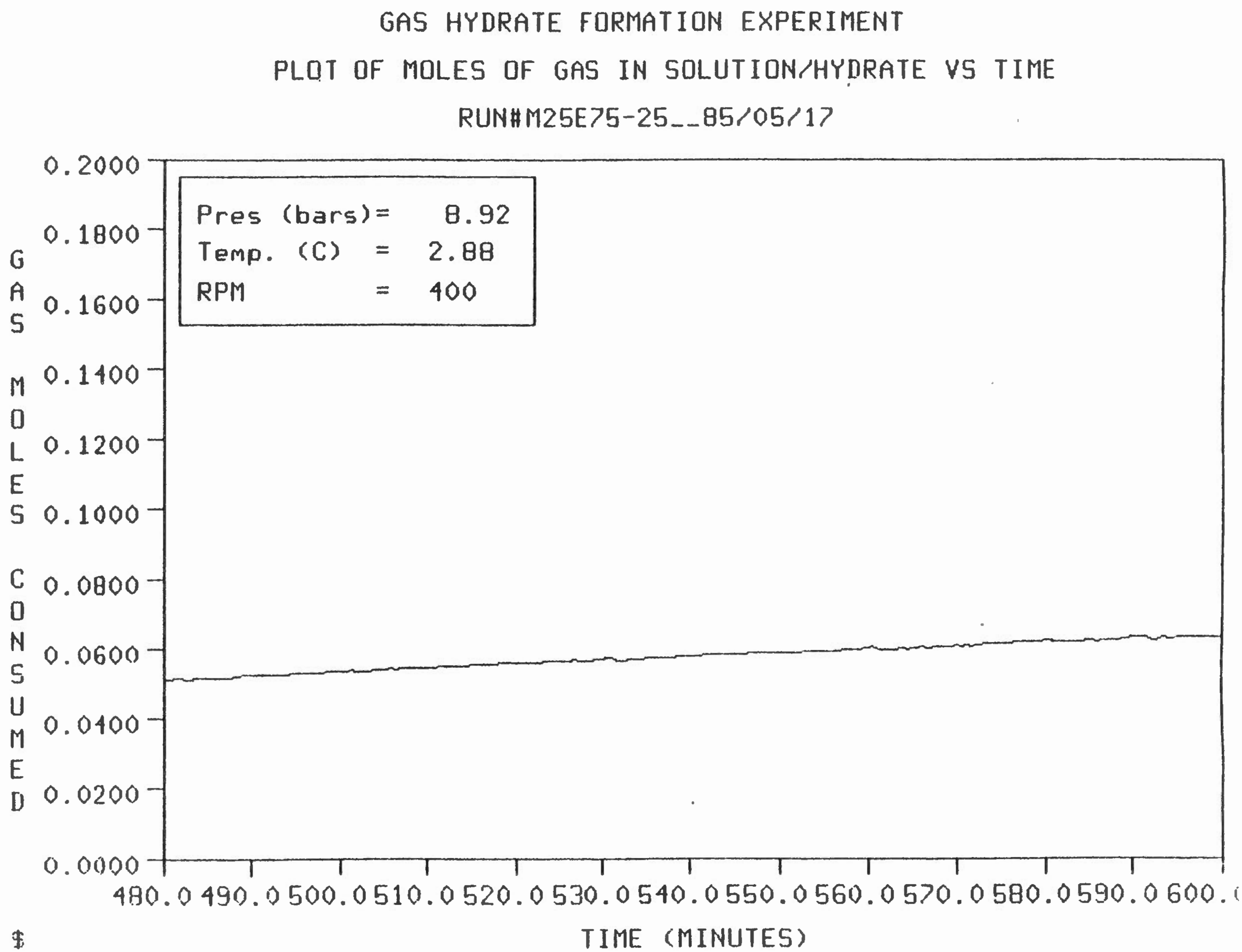


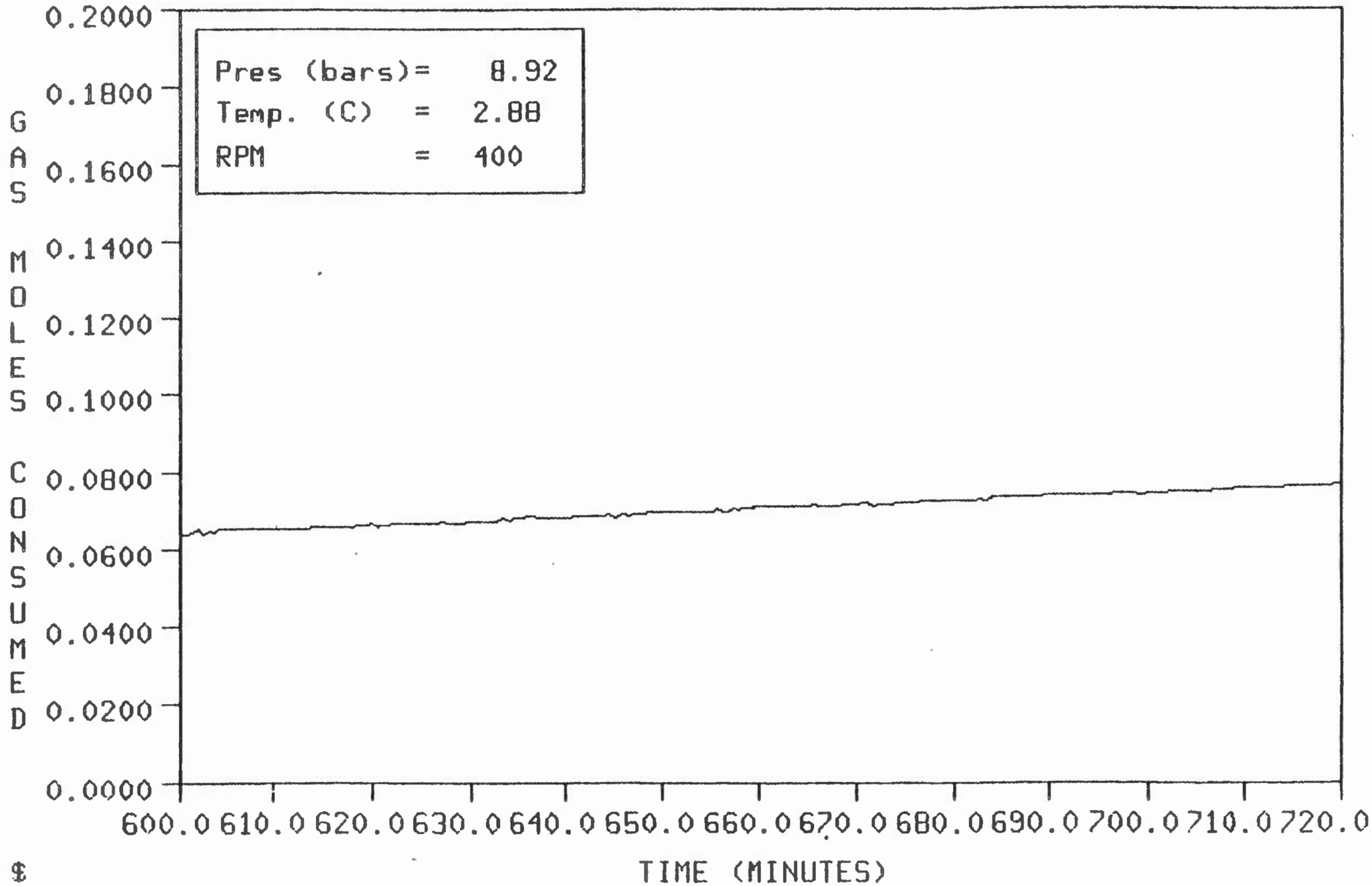
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-25__85/05/17
Pres (bars)= 8.92
Temp. (C) = 2.88
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-25__85/05/17
Pres (bars)= 8.92
Temp. (C) = 2.88
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
480.0 490.0 500.0 510.0 520.0 530.0 540.0 550.0 560.0 570.0 580.0 590.0 600.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-25__85/05/17



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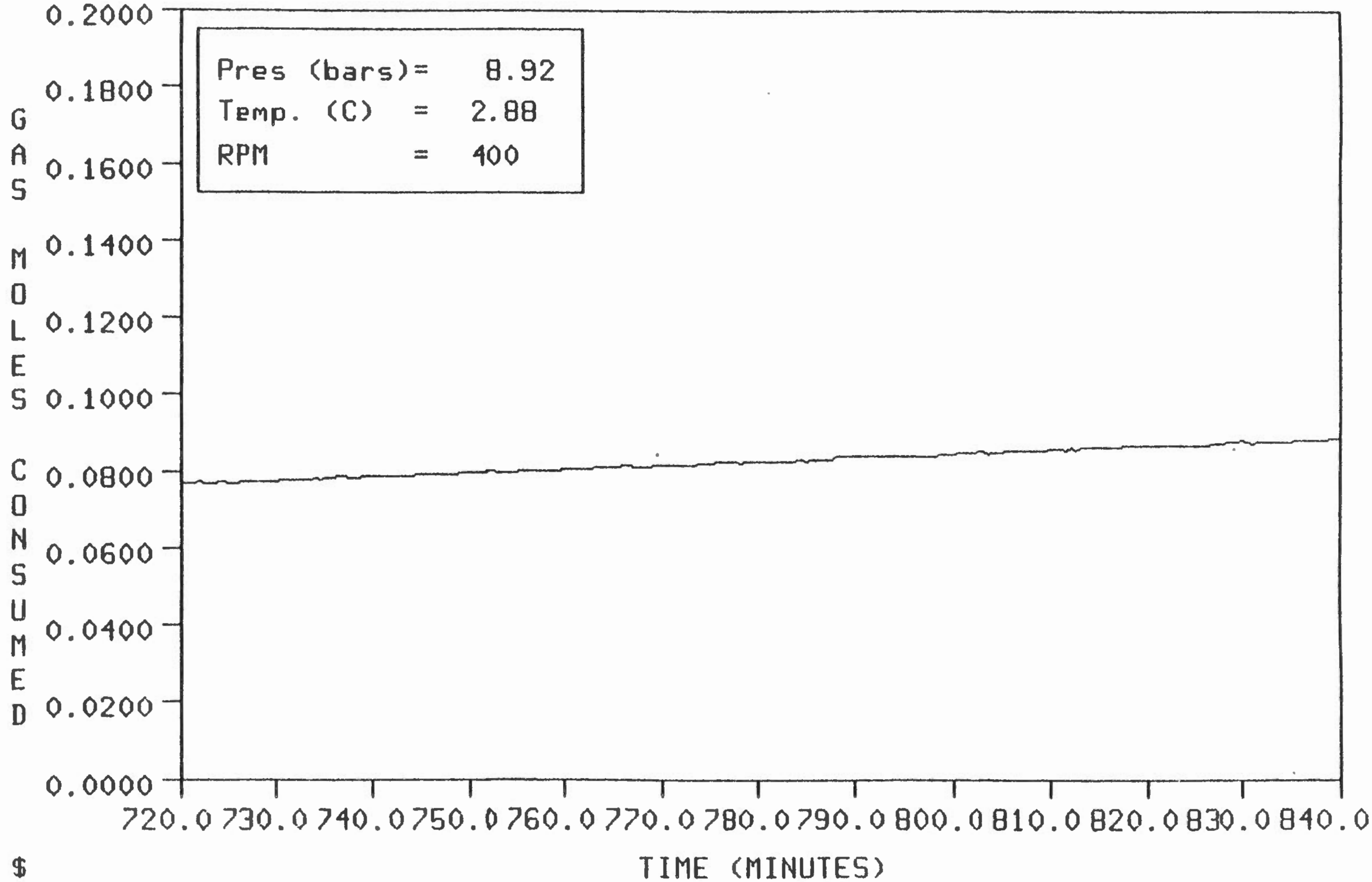
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-25__85/05/17



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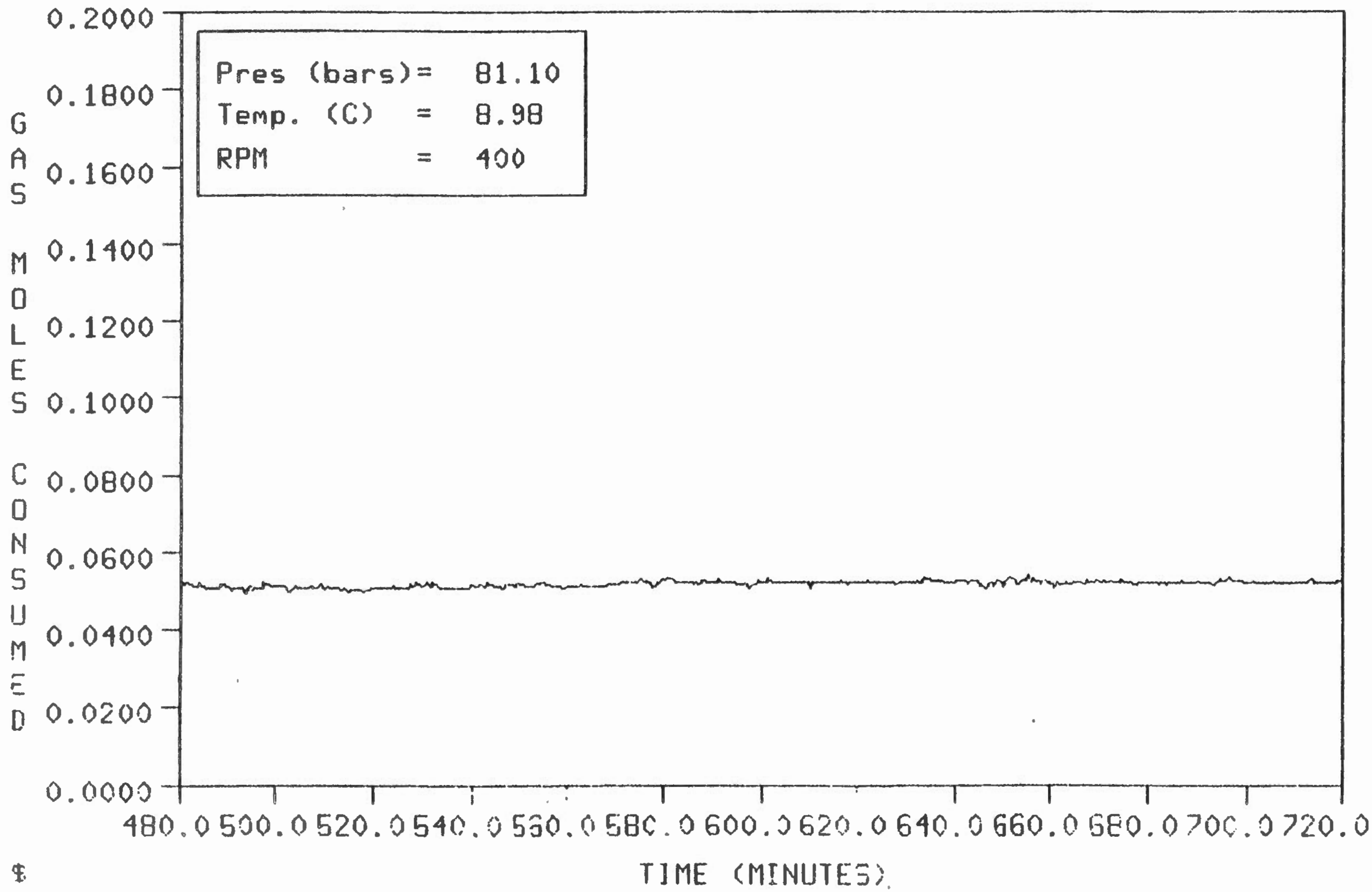
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-05__85/06/04



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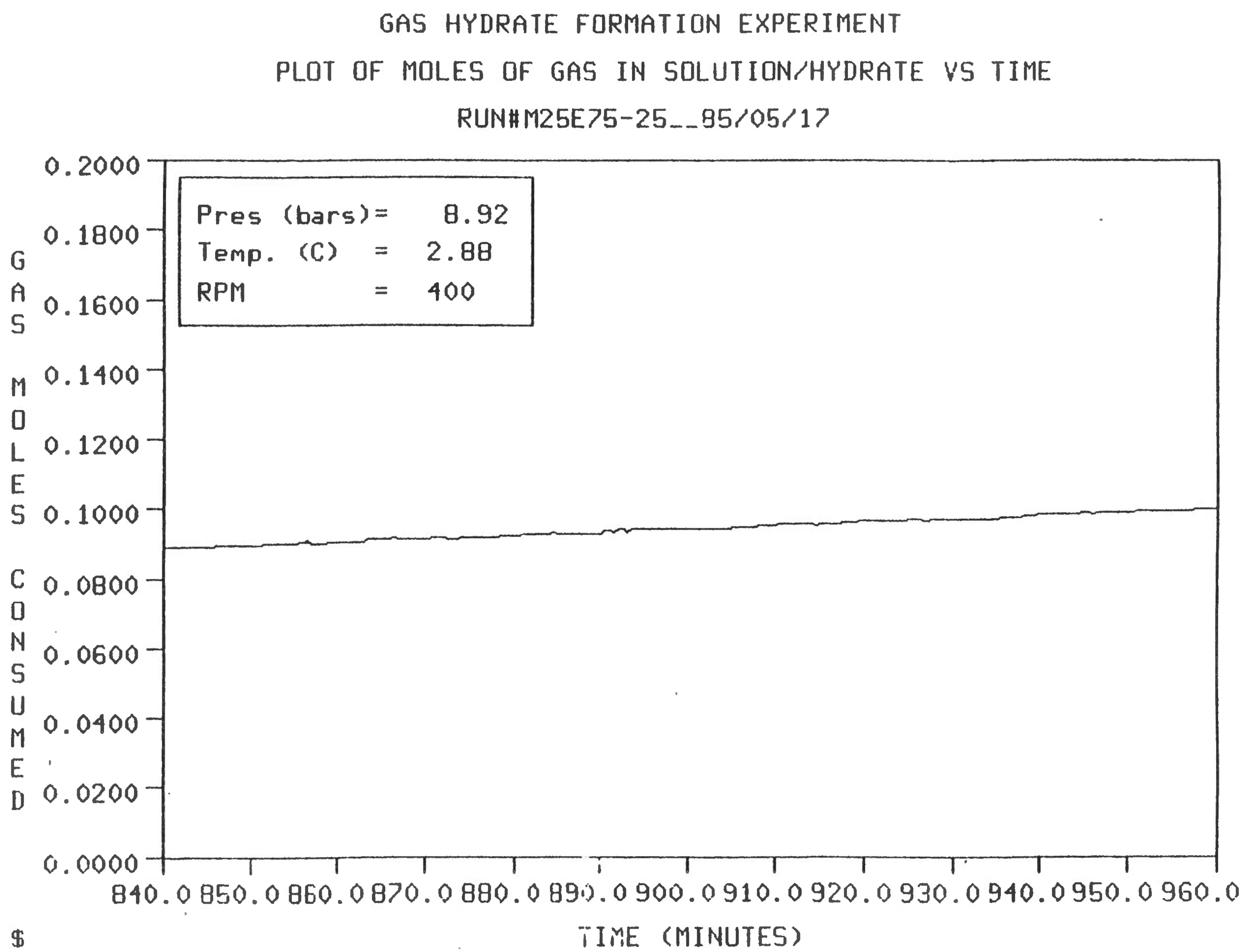
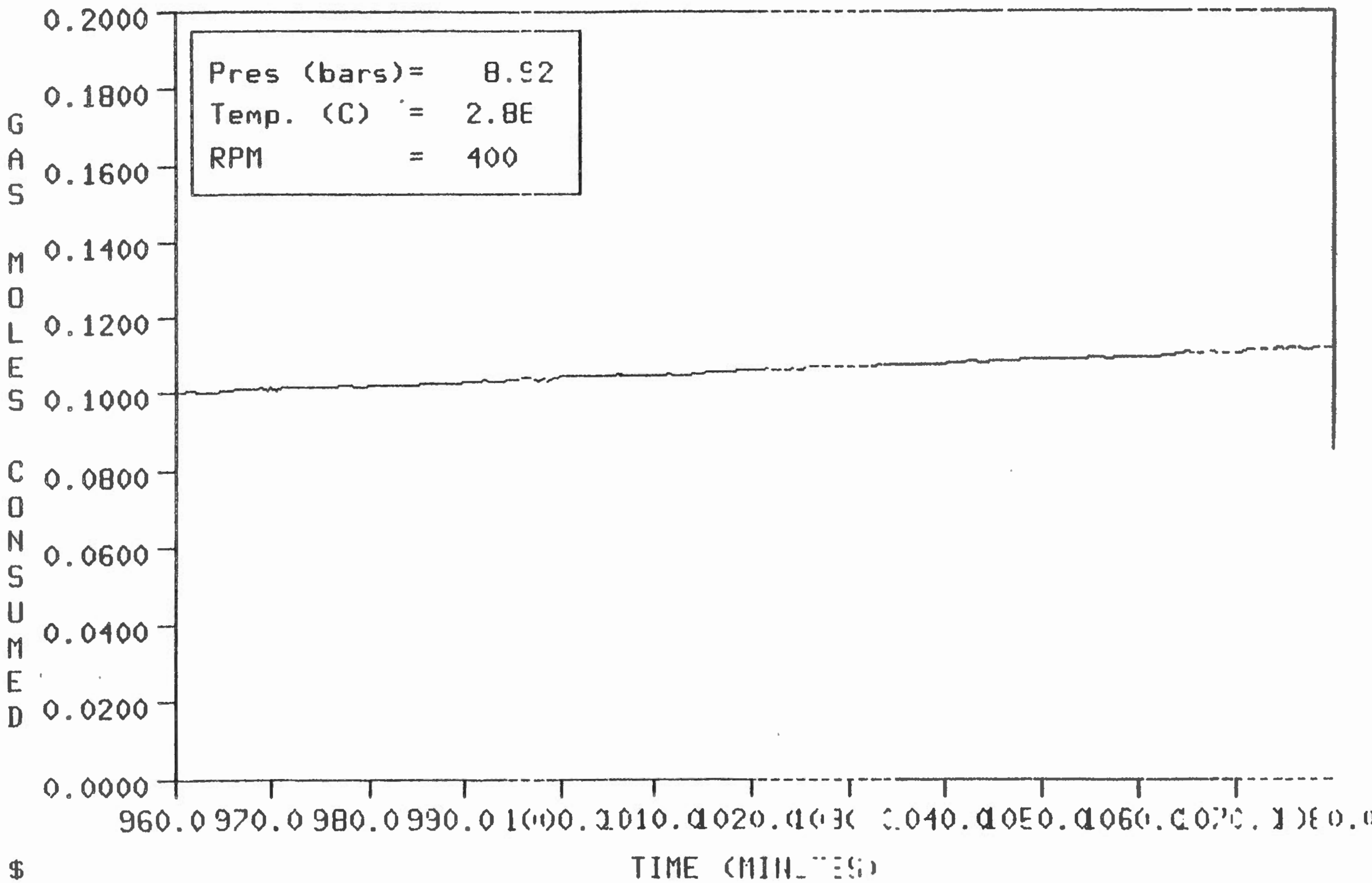


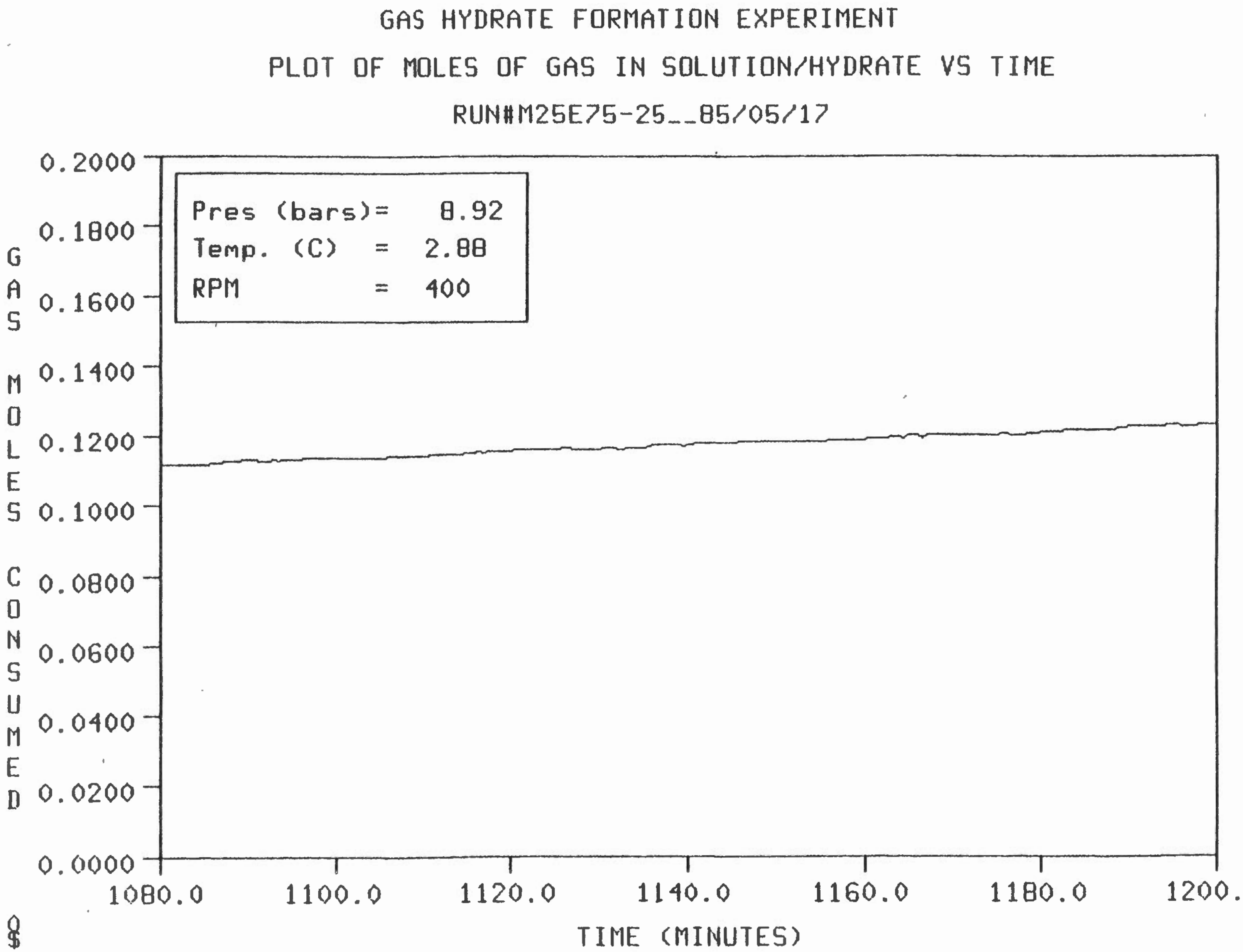
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-25__85/05/17
Pres (bars)= 8.92
Temp. (C) = 2.88
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
840.0 850.0 860.0 870.0 880.0 890.0 900.0 910.0 920.0 930.0 940.0 950.0 960.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M25E75-25__85/05/17

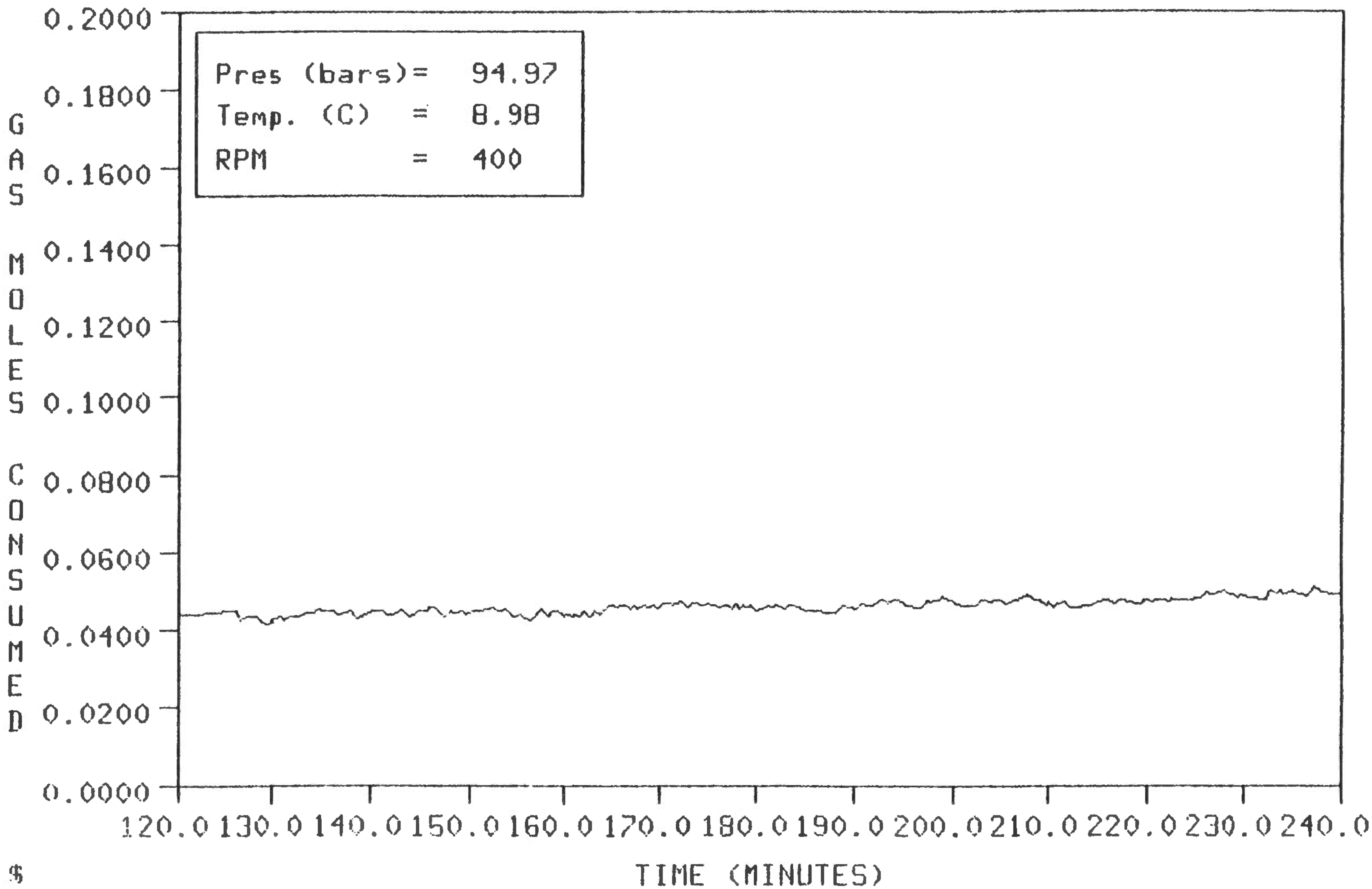



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M25E75-25__85/05/17
Pres (bars)= 8.92
Temp. (C) = 2.88
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
1080.0
1100.0
1120.0
1140.0
1160.0
1180.0
1200.
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

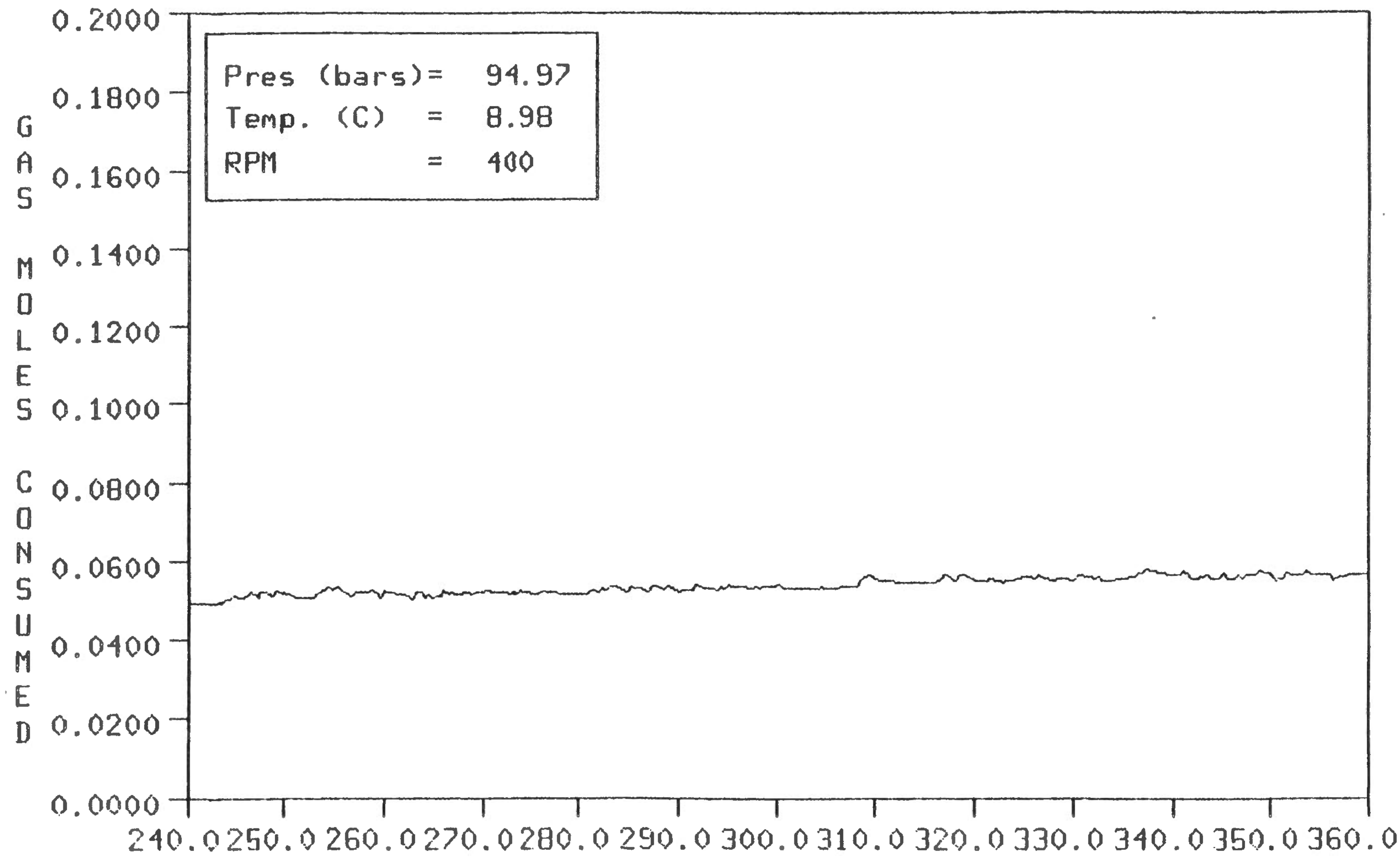
RUN#M100-01____85/05/24



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#M100-01____85/05/24



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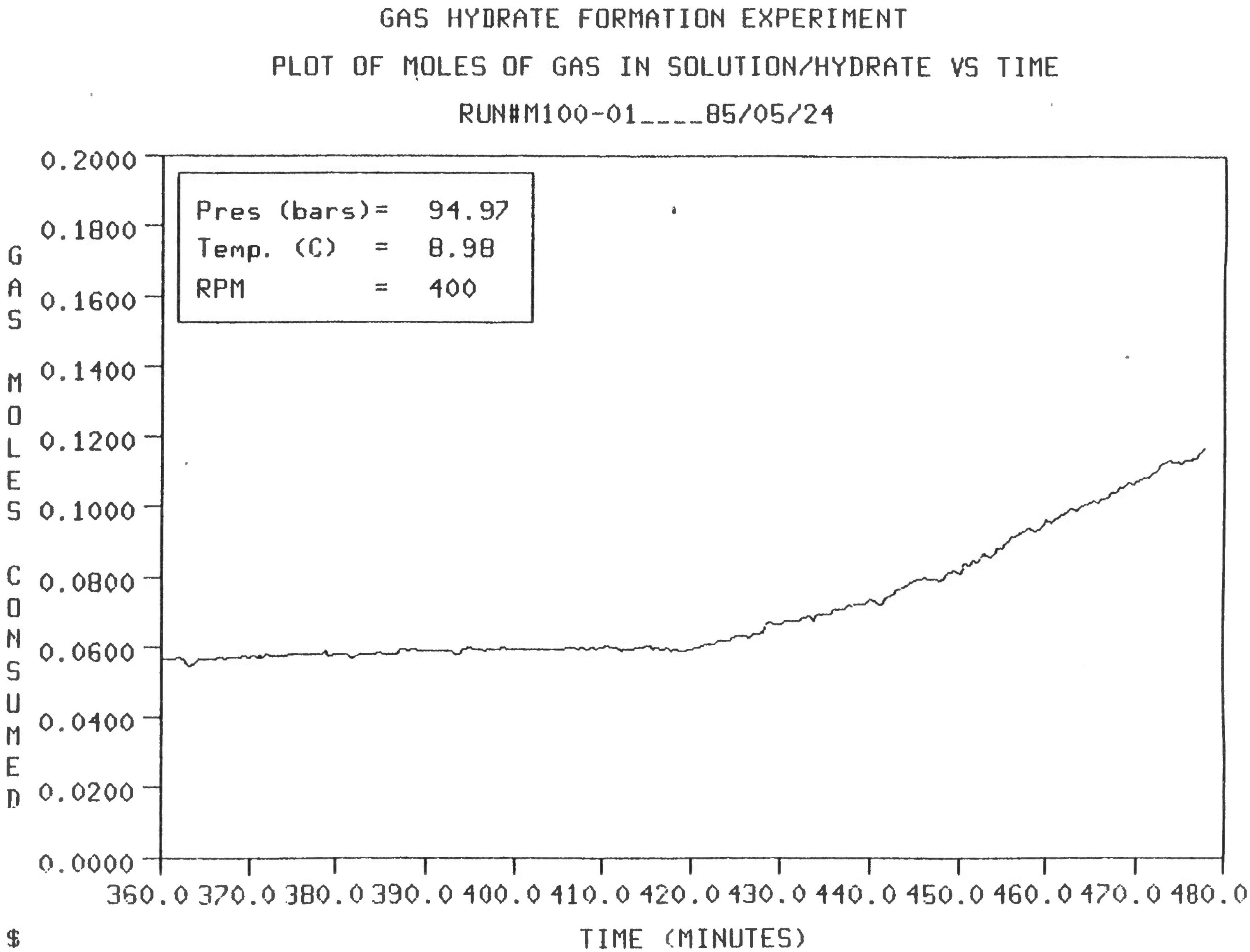
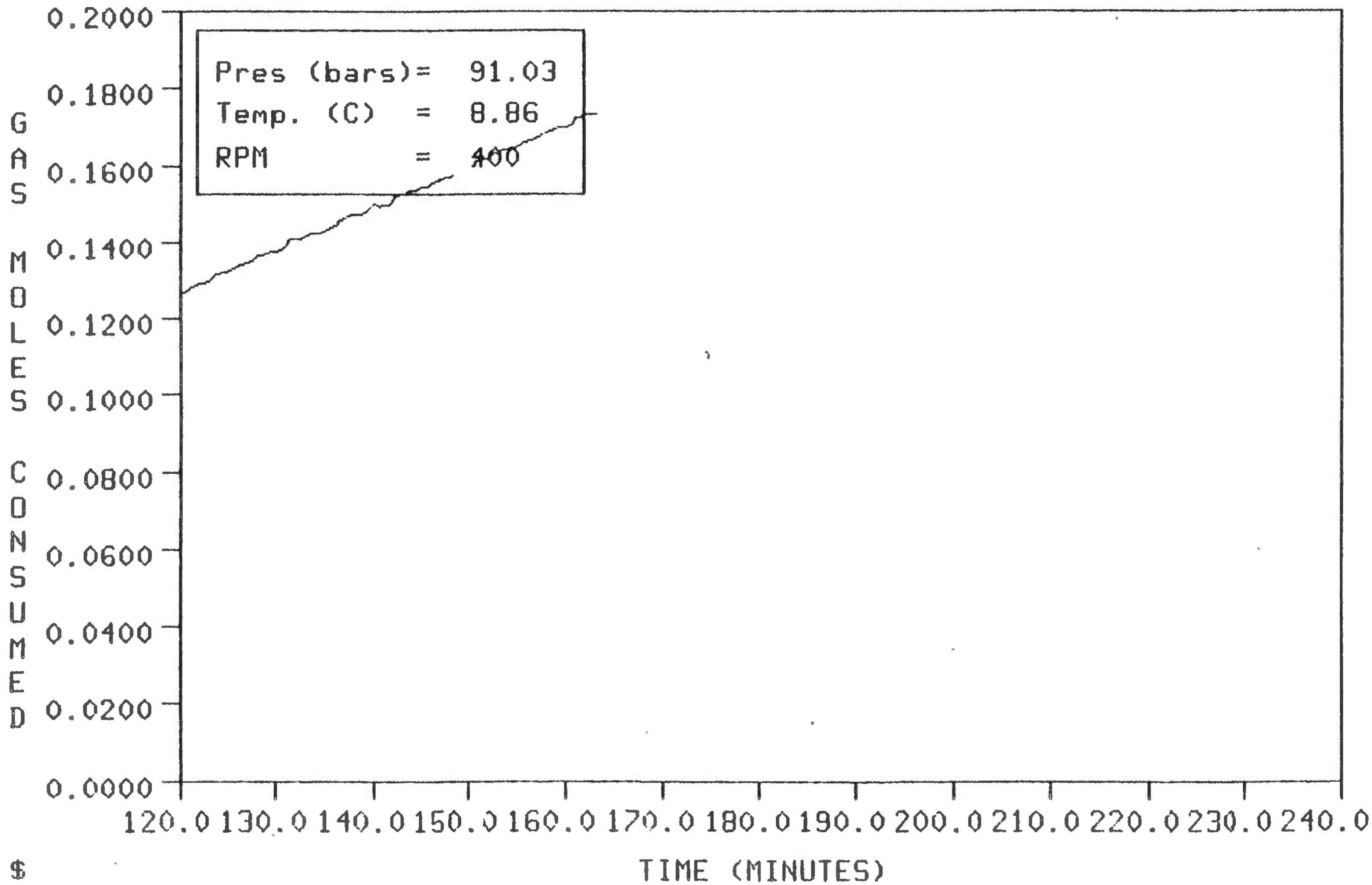

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#M100-01____85/05/24
Pres (bars)= 94.97
Temp. (C) = 8.98
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

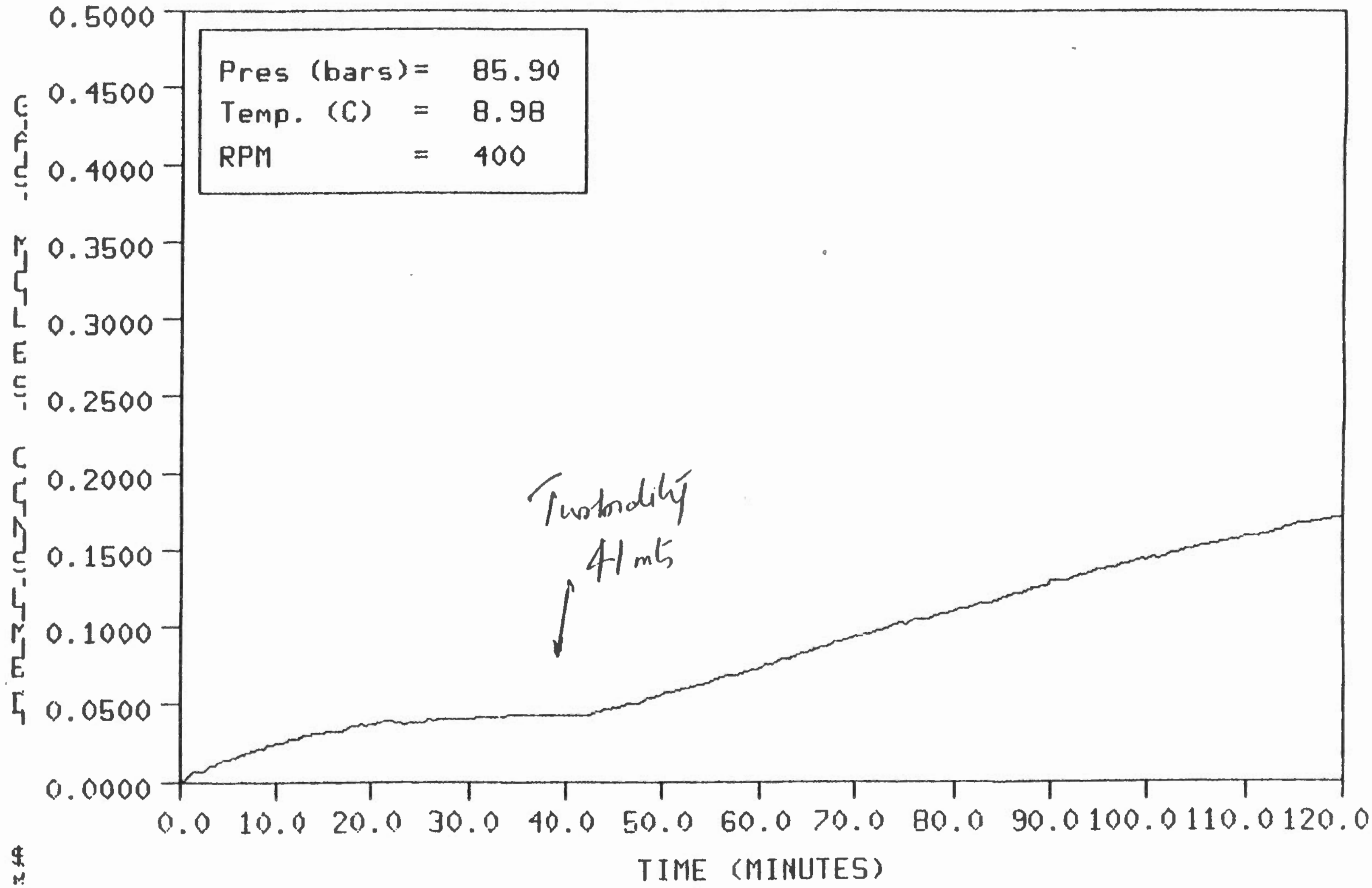
RUN#MTH100-02__85/05/28

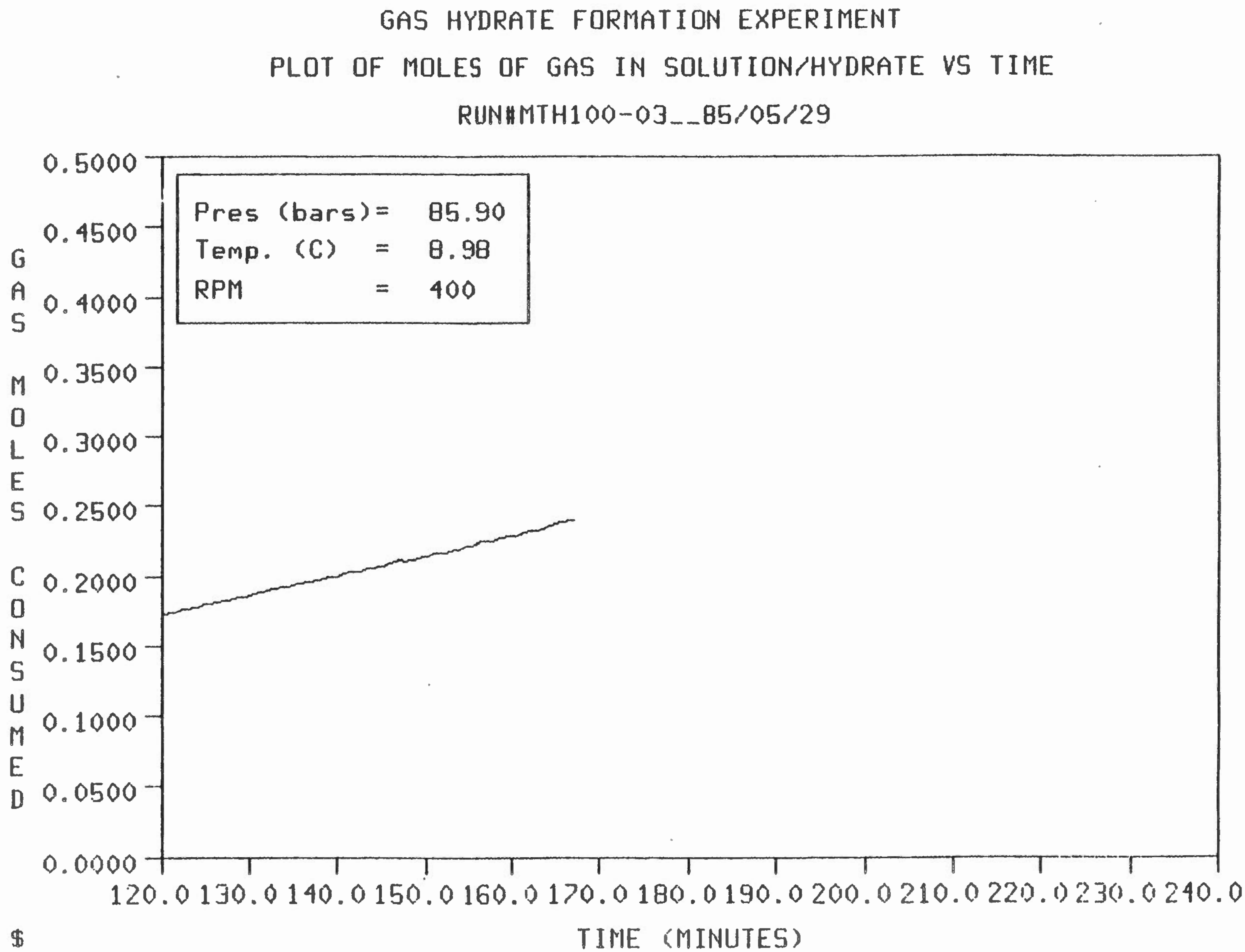


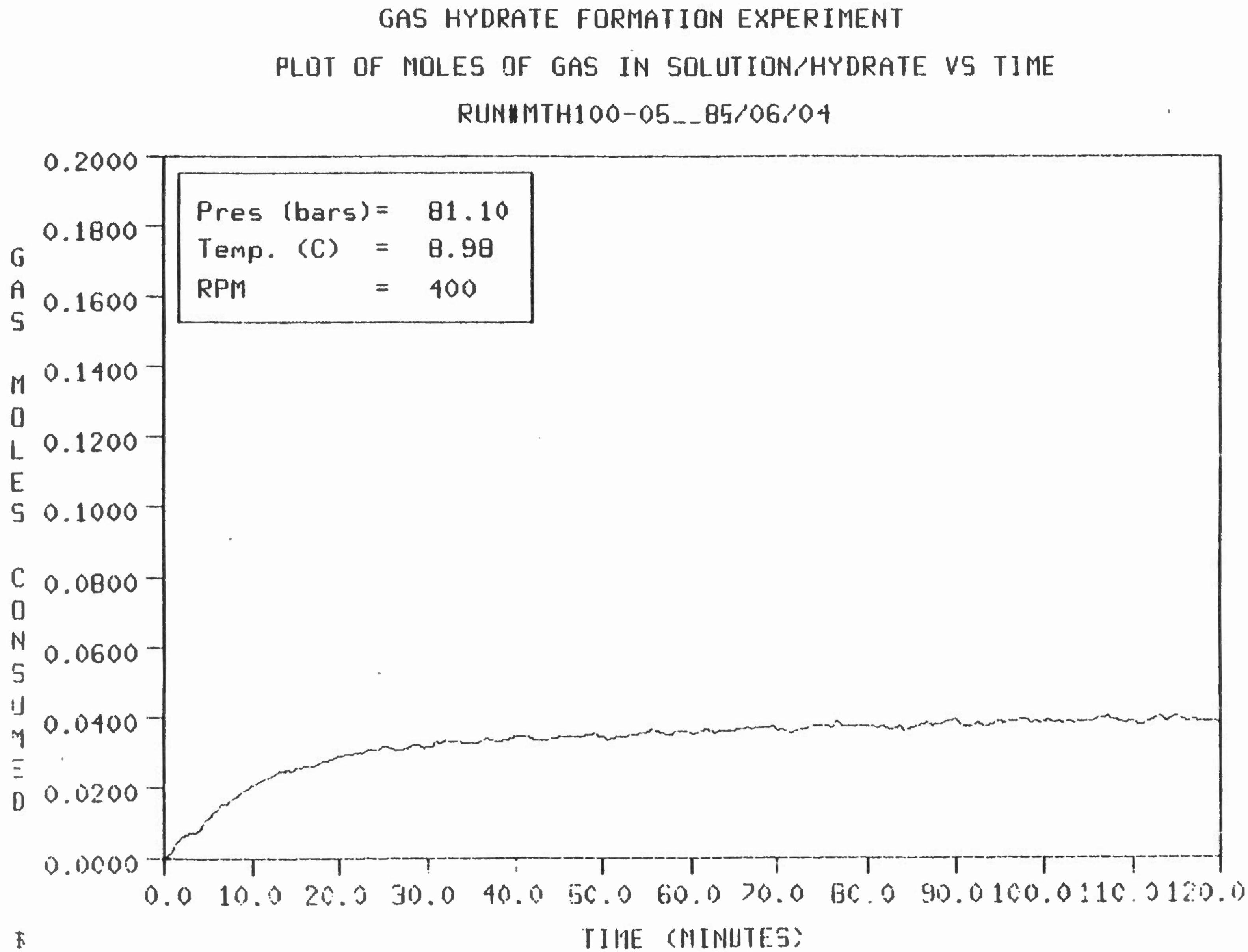
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-03__85/05/29



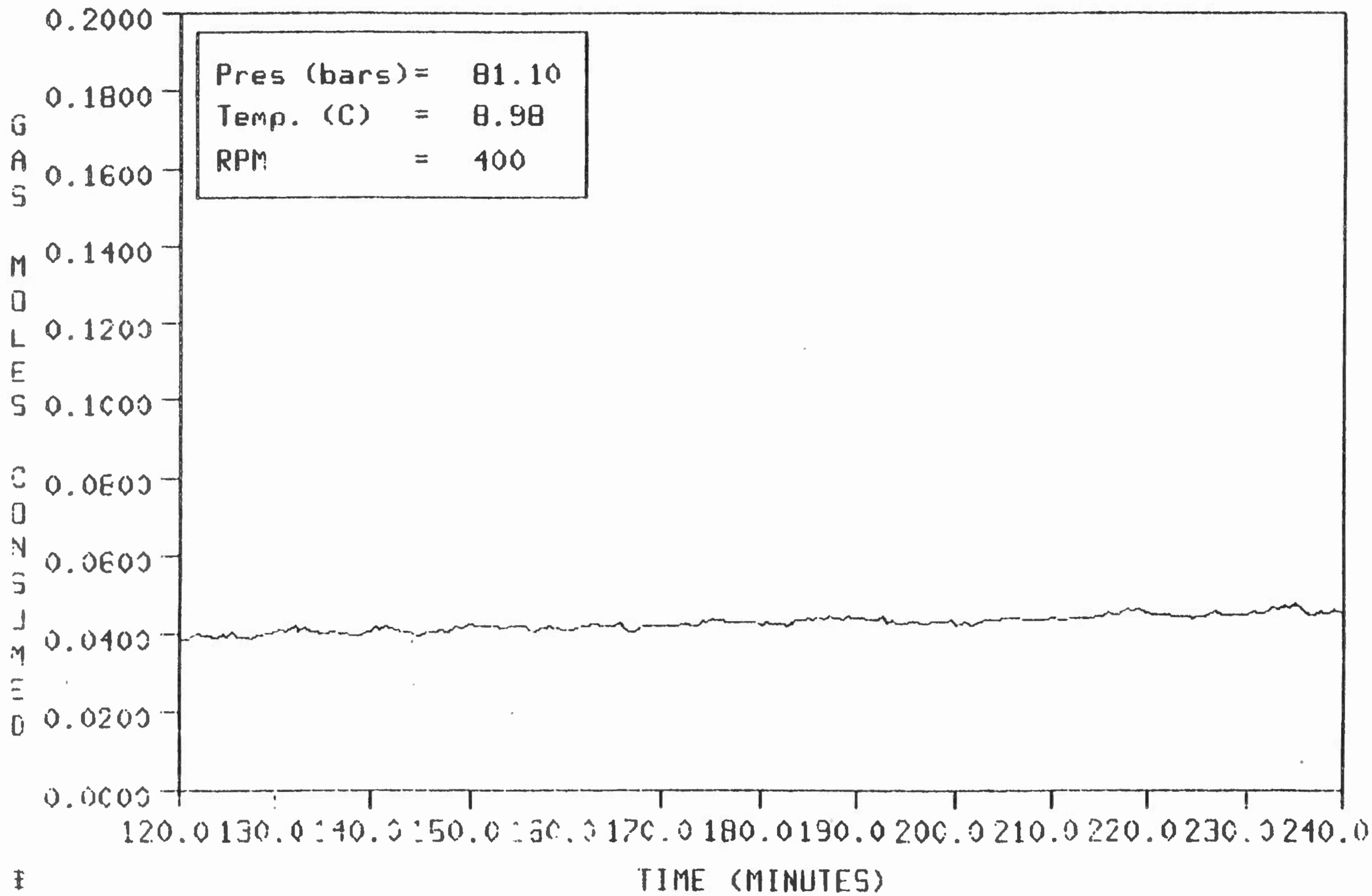

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-03__85/05/29
Pres (bars)= 85.90
Temp. (C) = 8.98
RPM = 400
GAS MOLES CONSUMED
0.5000
0.4500
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-05__85/06/04
Pres (bars)= 81.10
Temp. (C) = 8.98
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

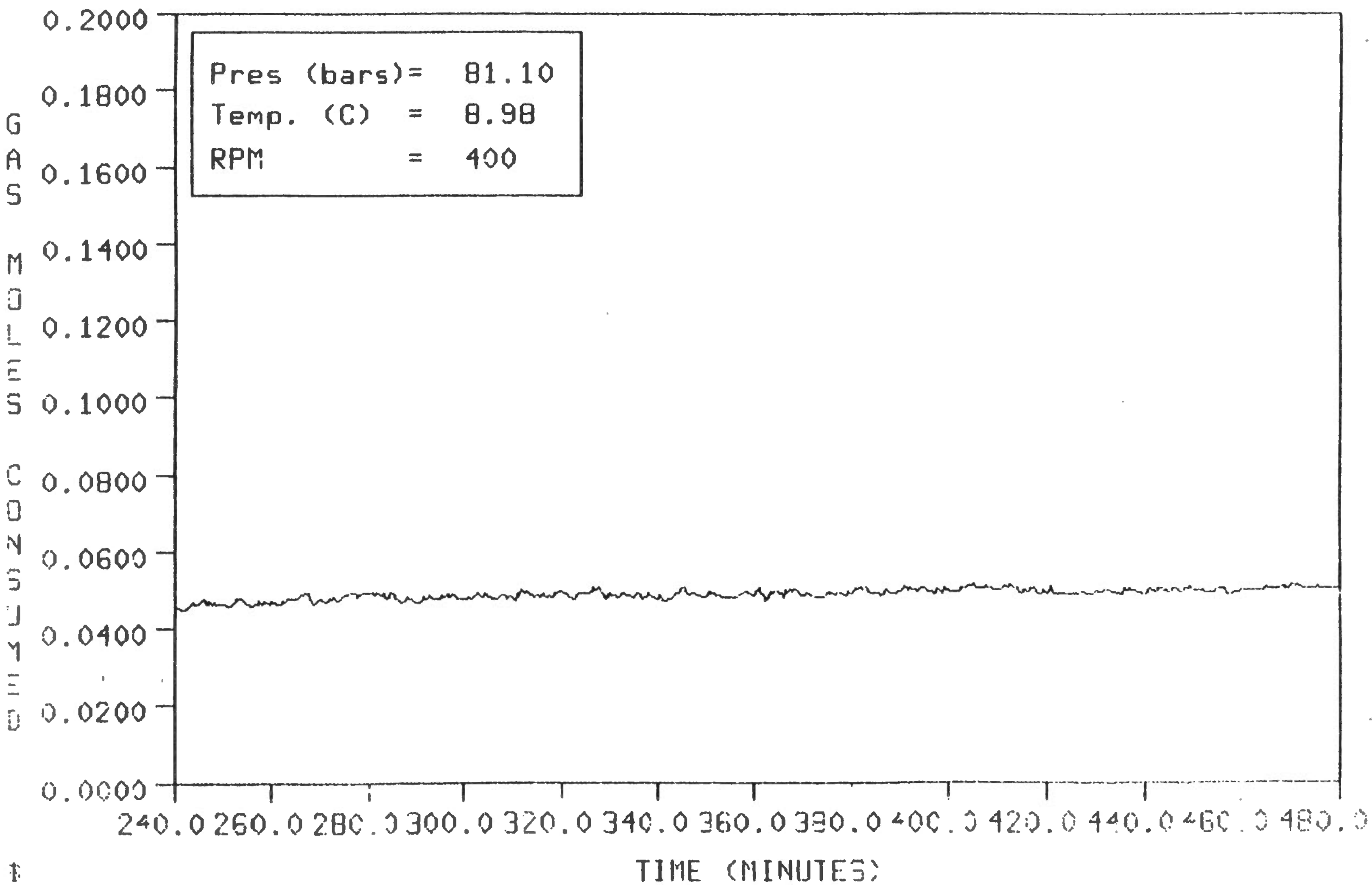
RUN#MTH100-05__85/06/04



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

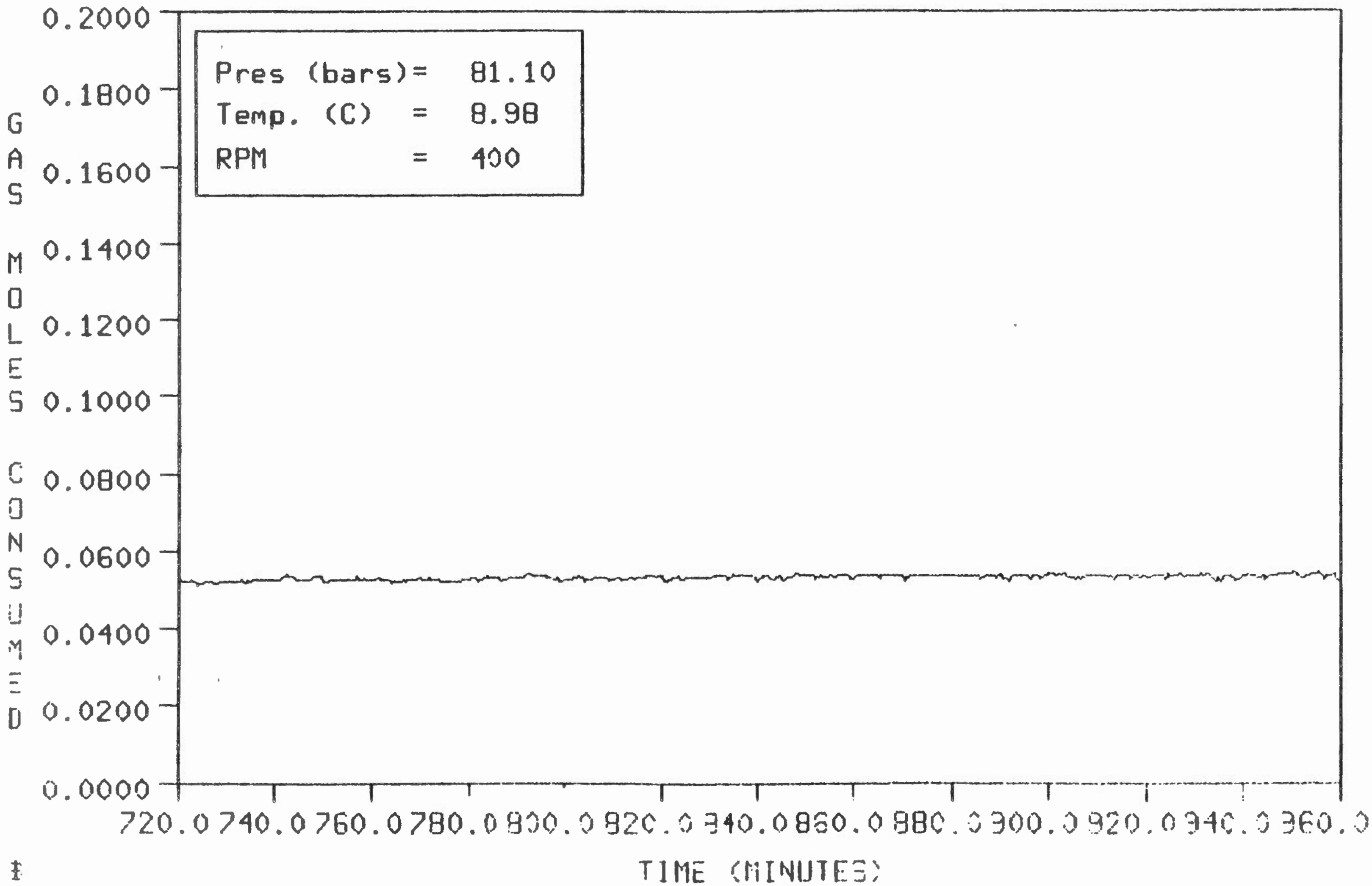
RUN#MTH100-05__85/06/04

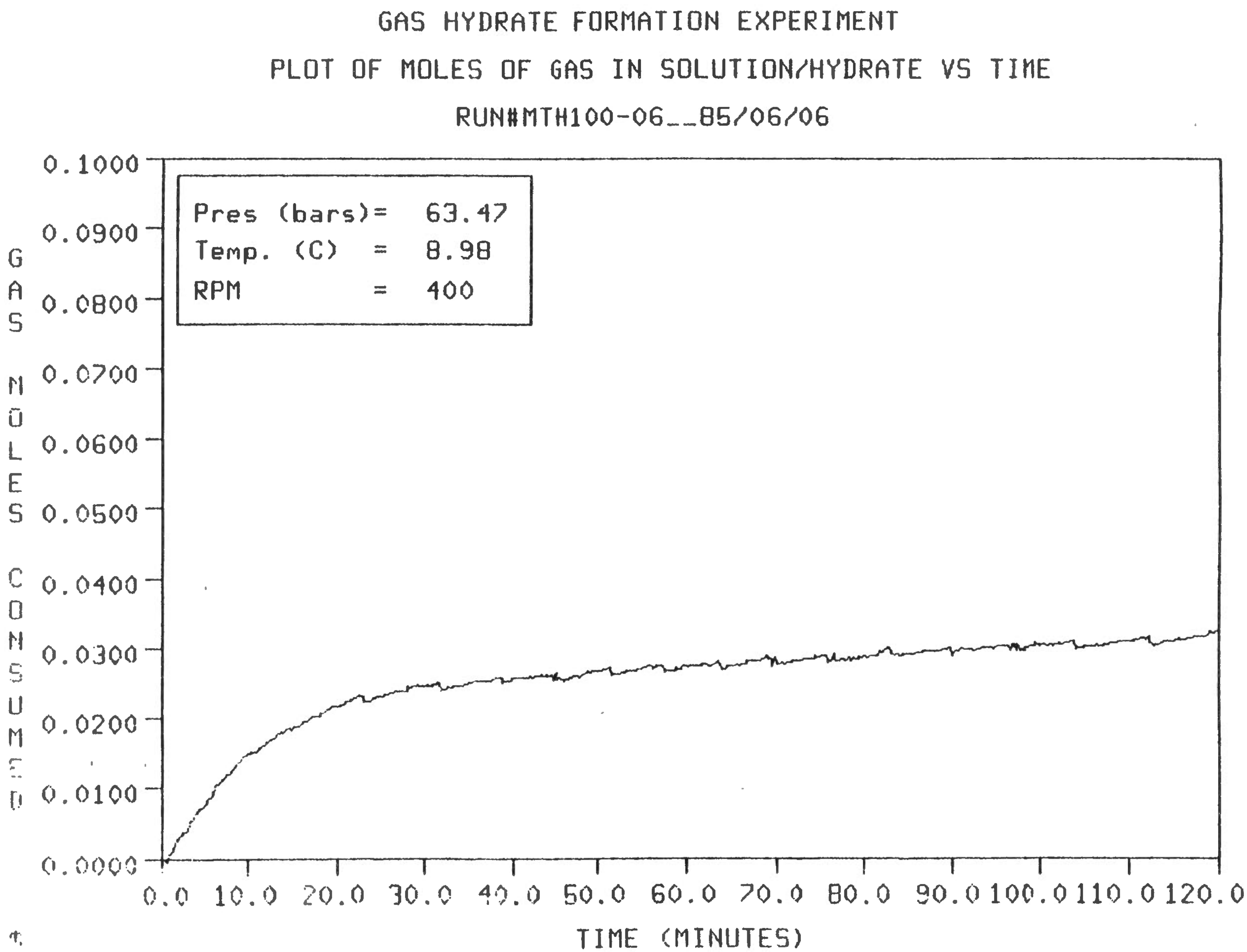


GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-05__85/06/04



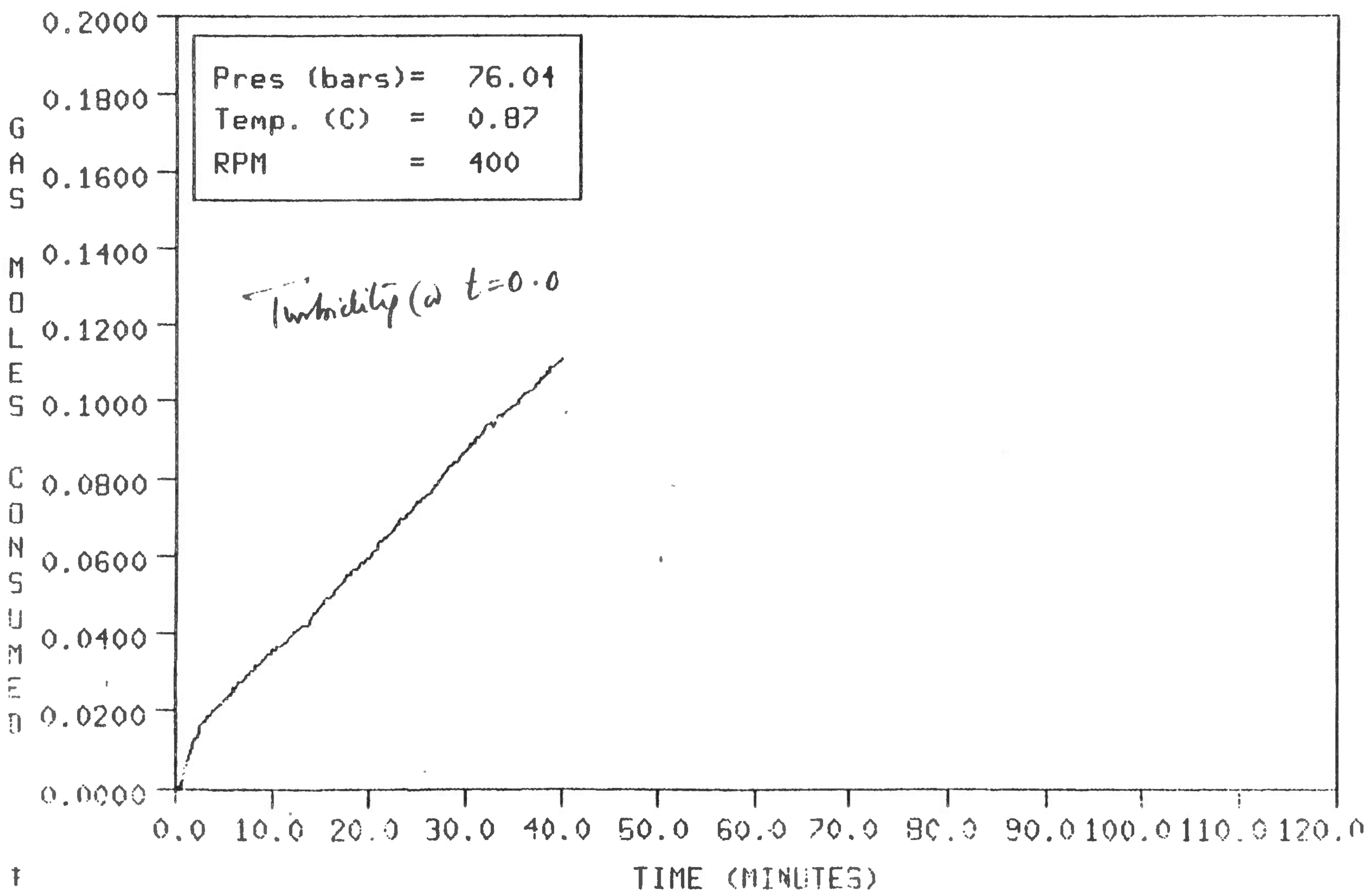


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-06__85/06/06
Pres (bars)= 63.47
Temp. (C) = 8.98
RPM = 400
GAS MOLES CONSUMED
0.1000
0.0900
0.0800
0.0700
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

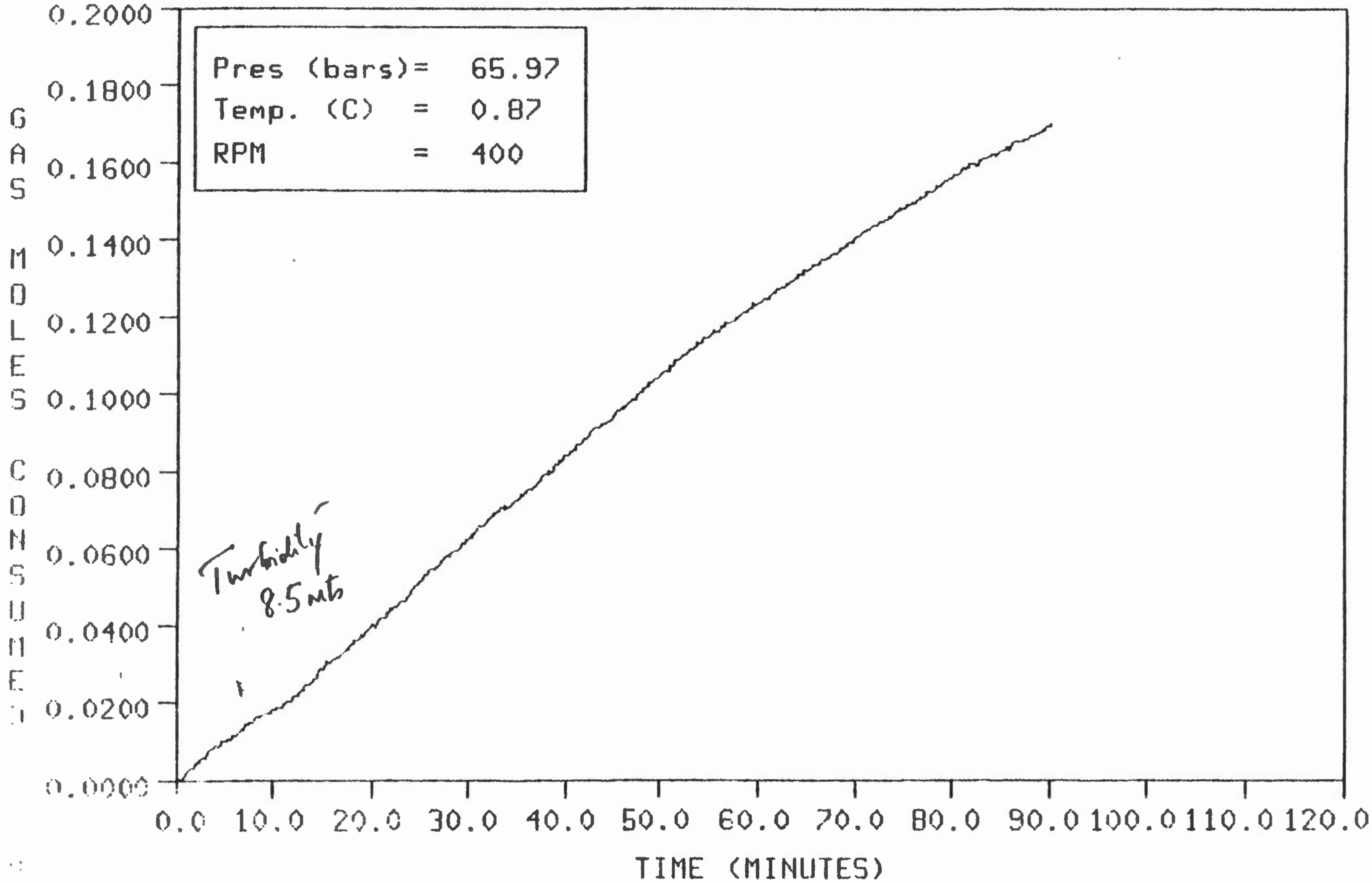
RUN#MTH100-07__85/06/07

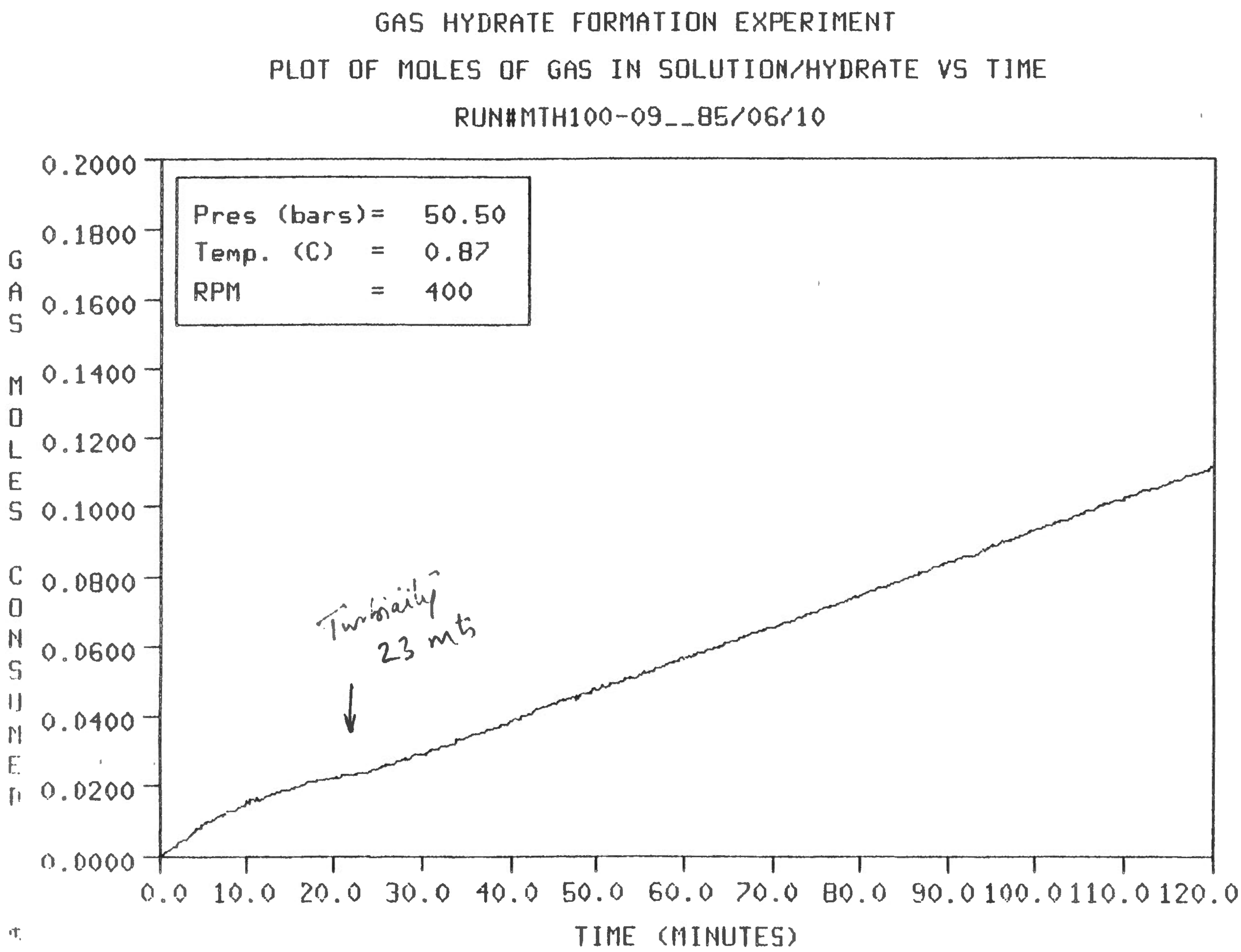


GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-08__850610

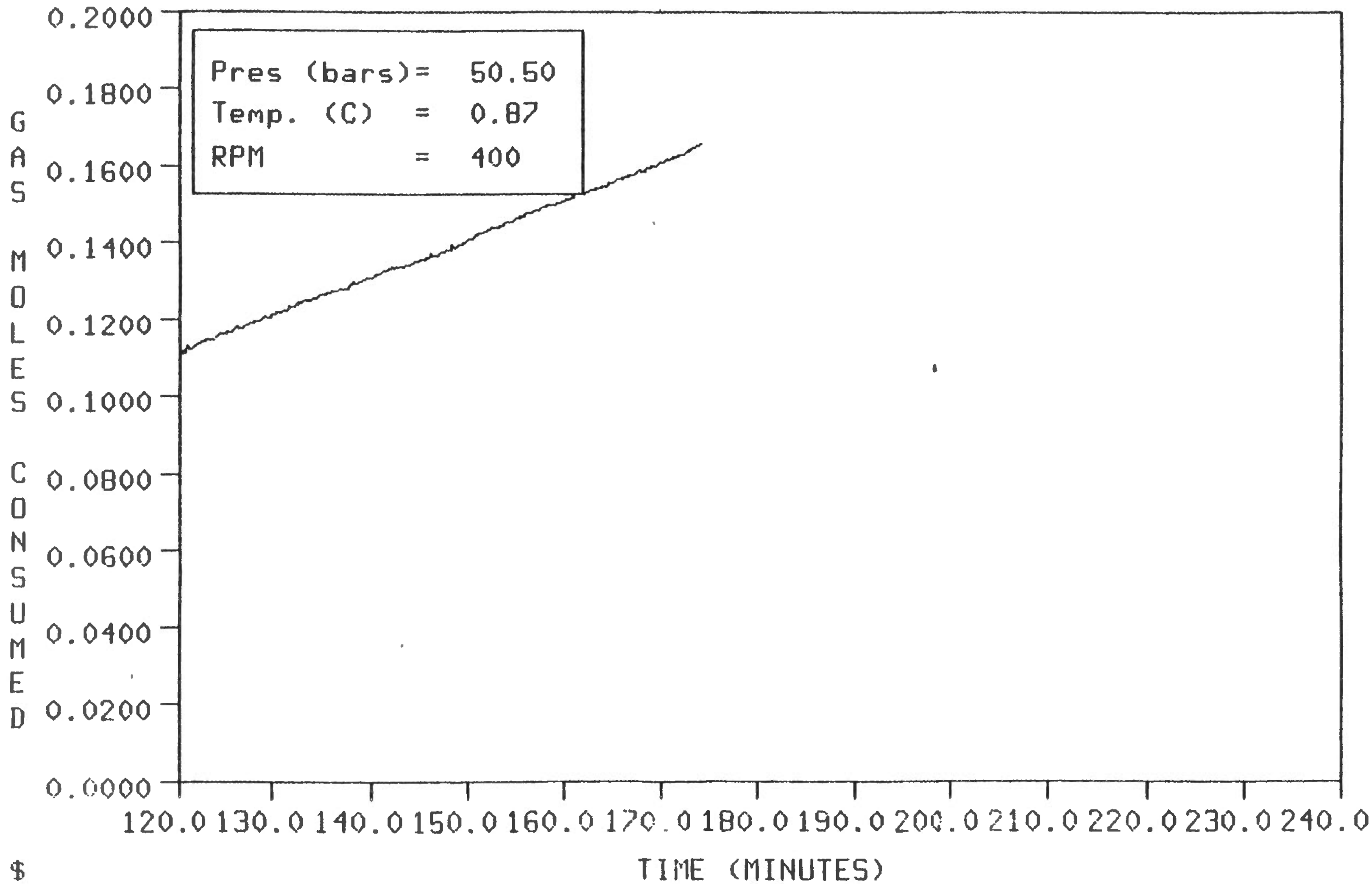



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-09__85/06/10
Pres (bars)= 50.50
Temp. (C) = 0.87
RPM = 400
Turbidity
23 mts
GAS MOLES CONSUMED
0.0000
0.0200
0.0400
0.0600
0.0800
0.1000
0.1200
0.1400
0.1600
0.1800
0.2000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-09__85/06/10

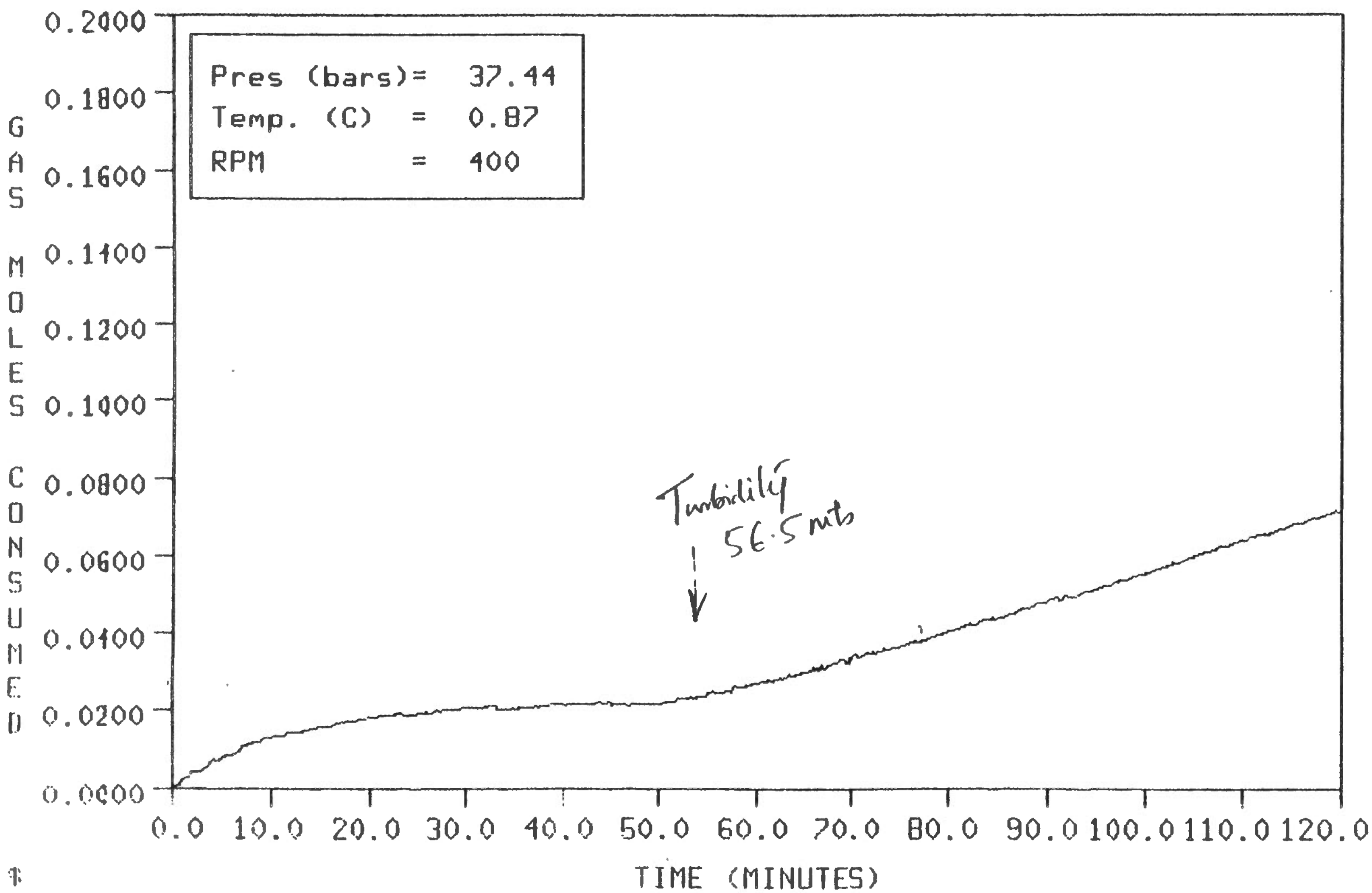


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

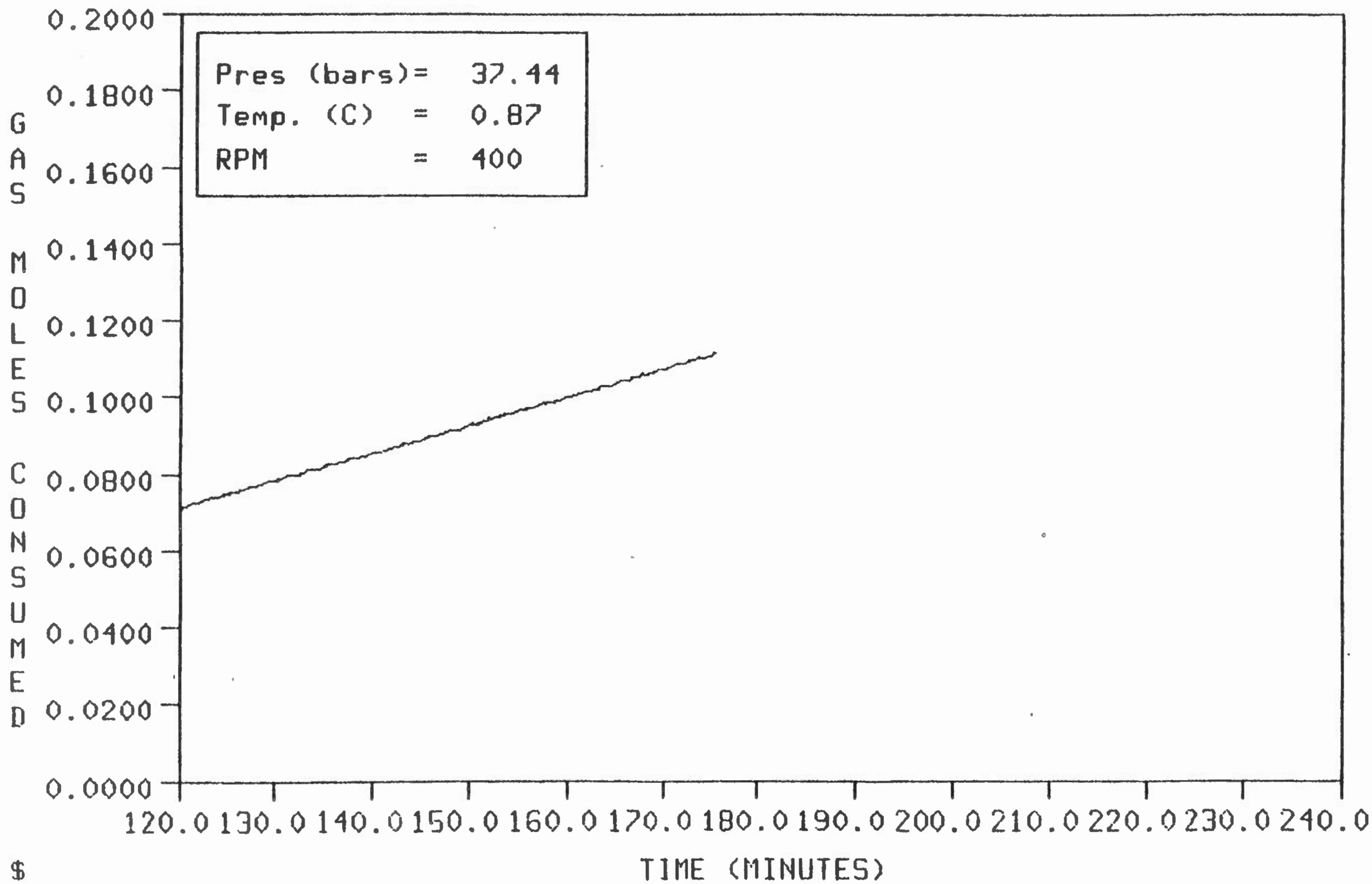
RUN#MTH100-10__85/06/11



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-10__85/06/11

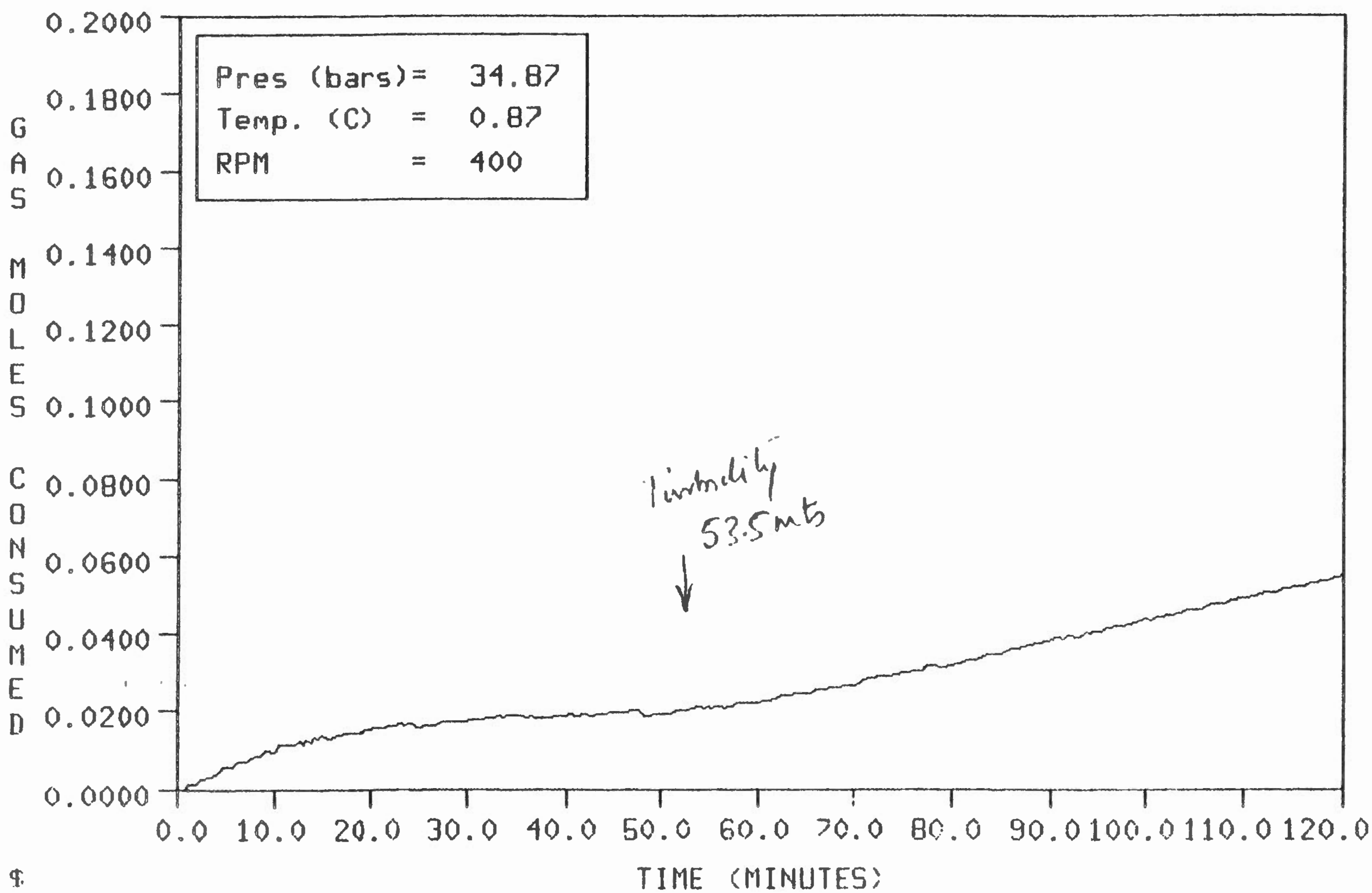


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

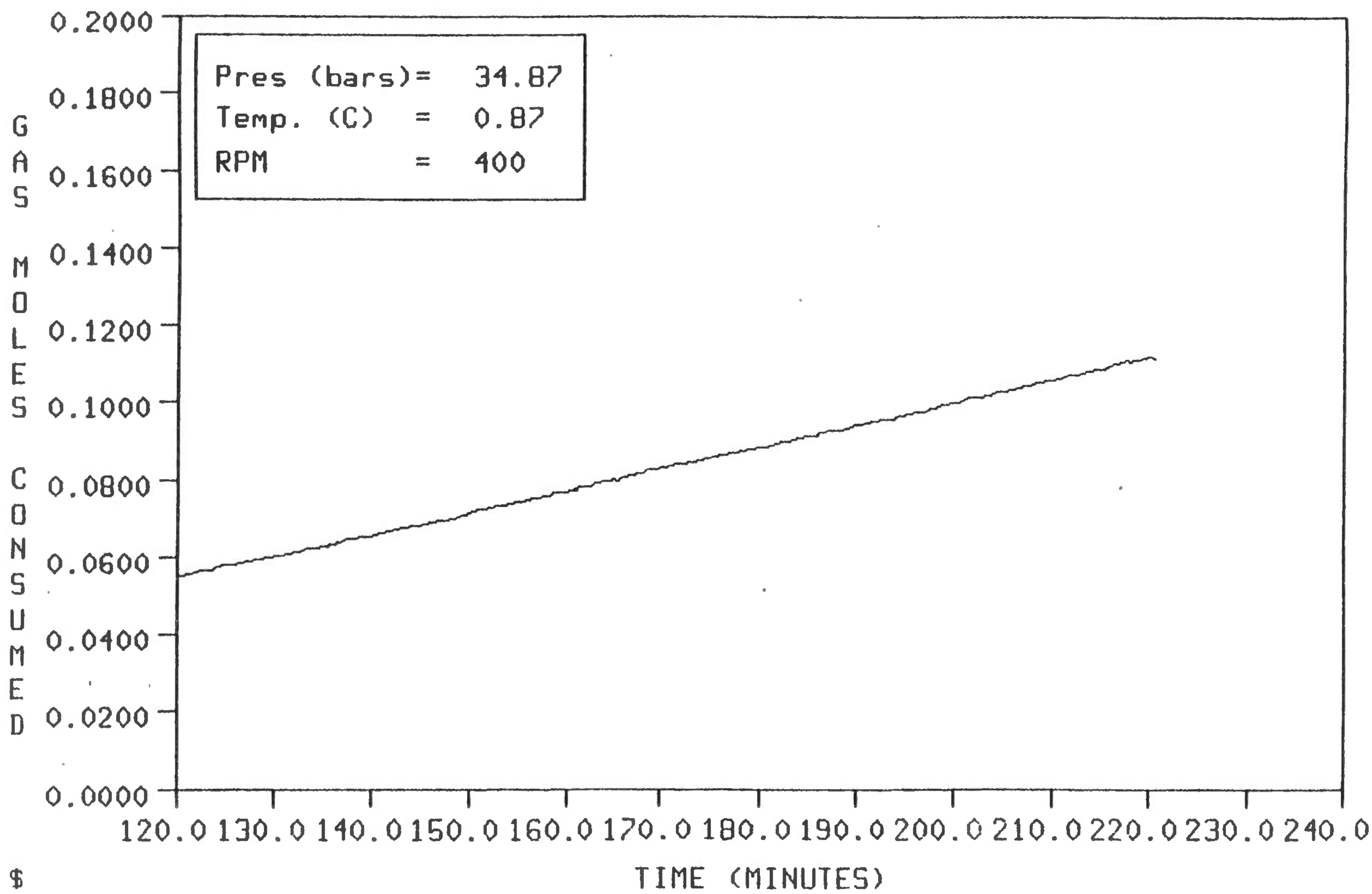
RUN#MTH100-11__85/06/12



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-11__85/06/12



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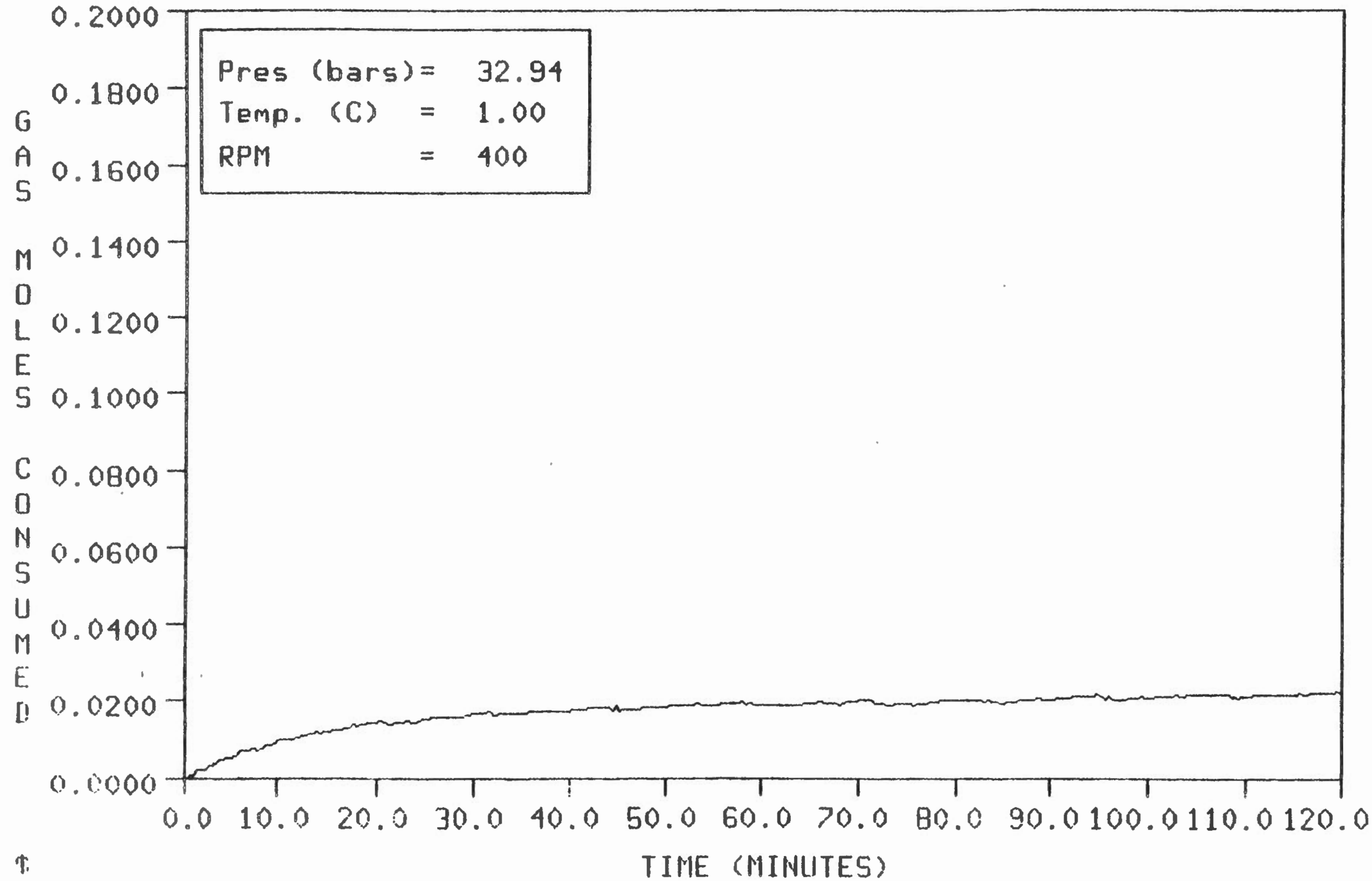
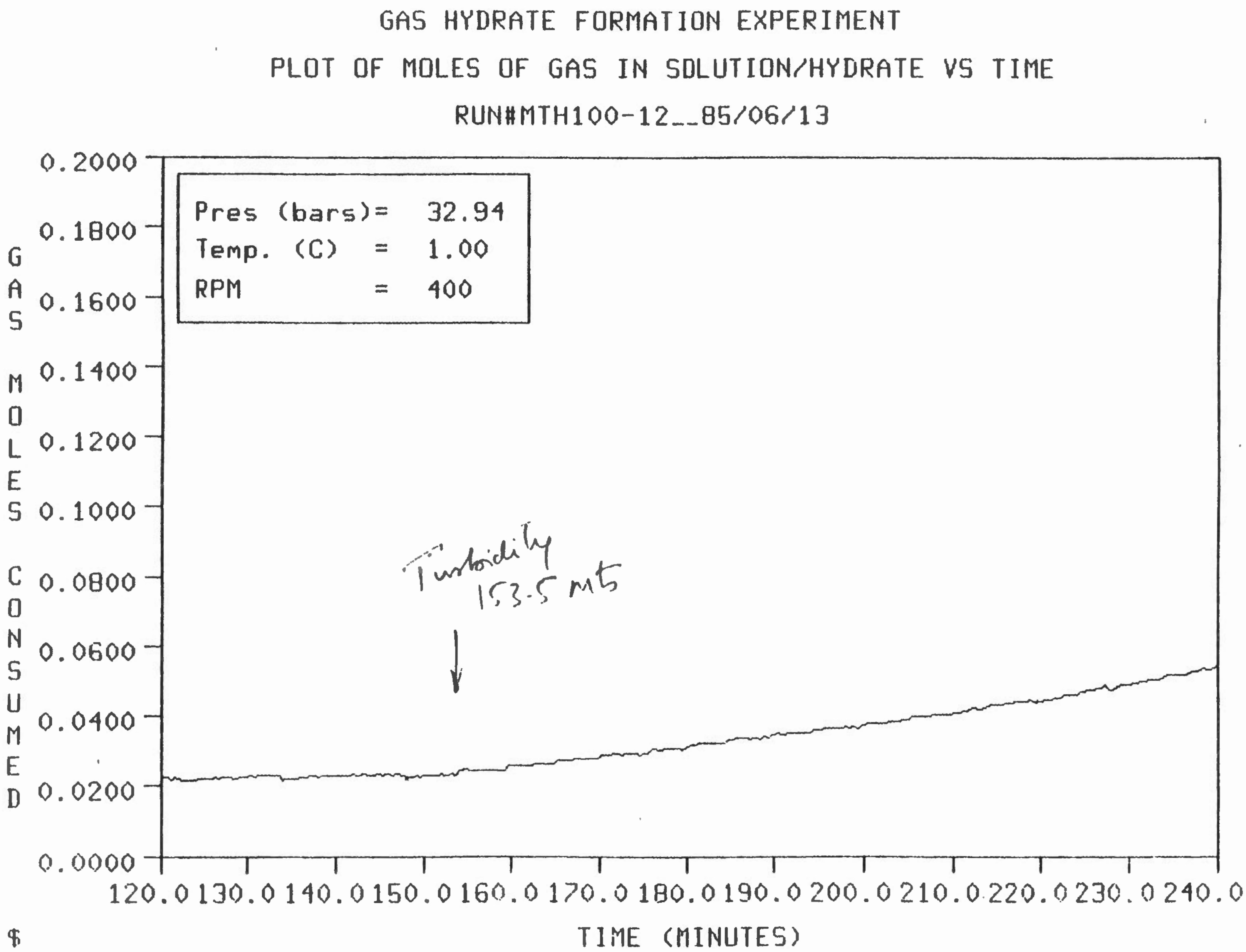
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-12__85/06/13





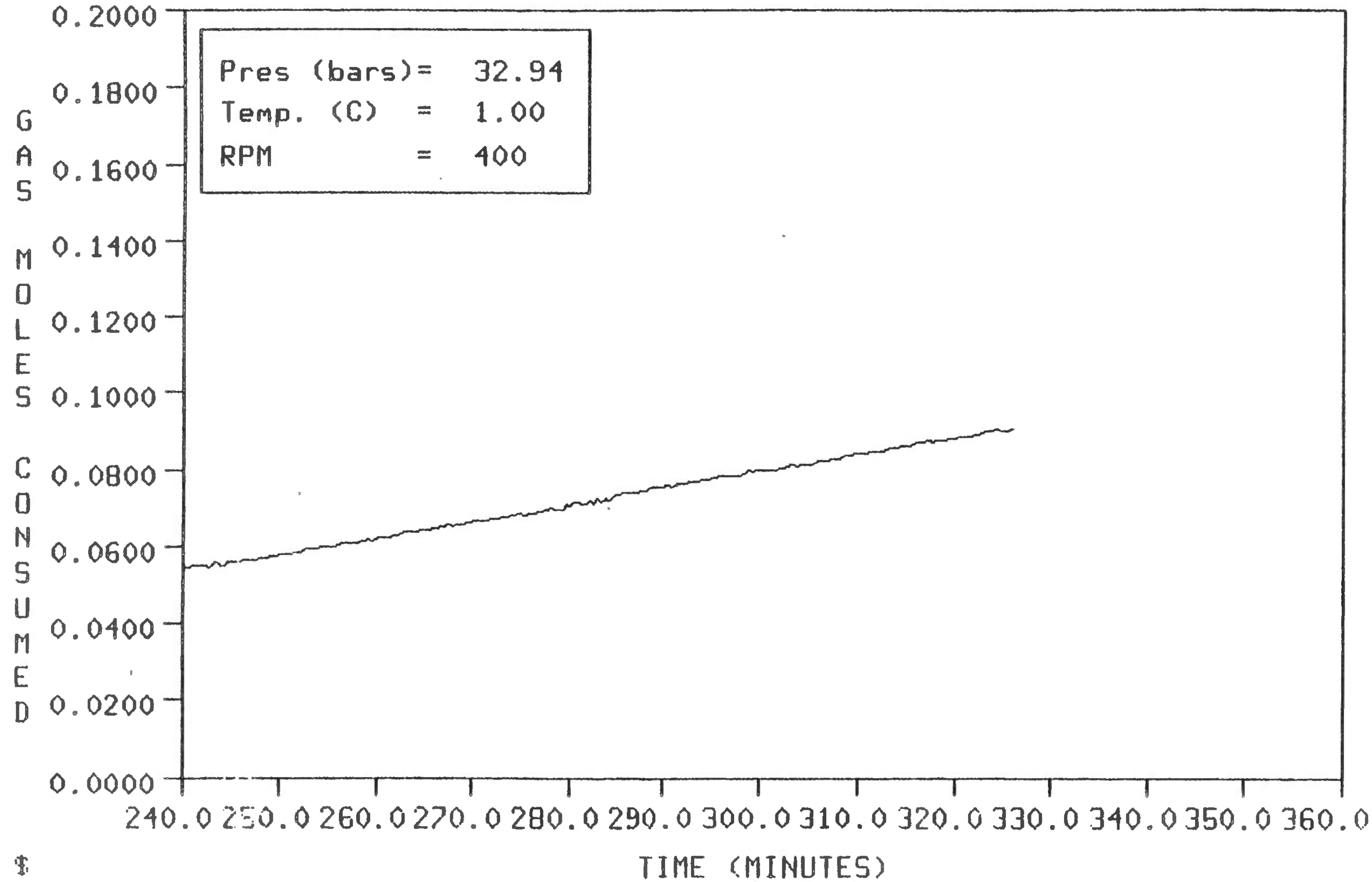
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-12__85/06/13
Pres (bars)= 32.94
Temp. (C) = 1.00
RPM = 400
Turbidity 153.5 mts
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)

$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

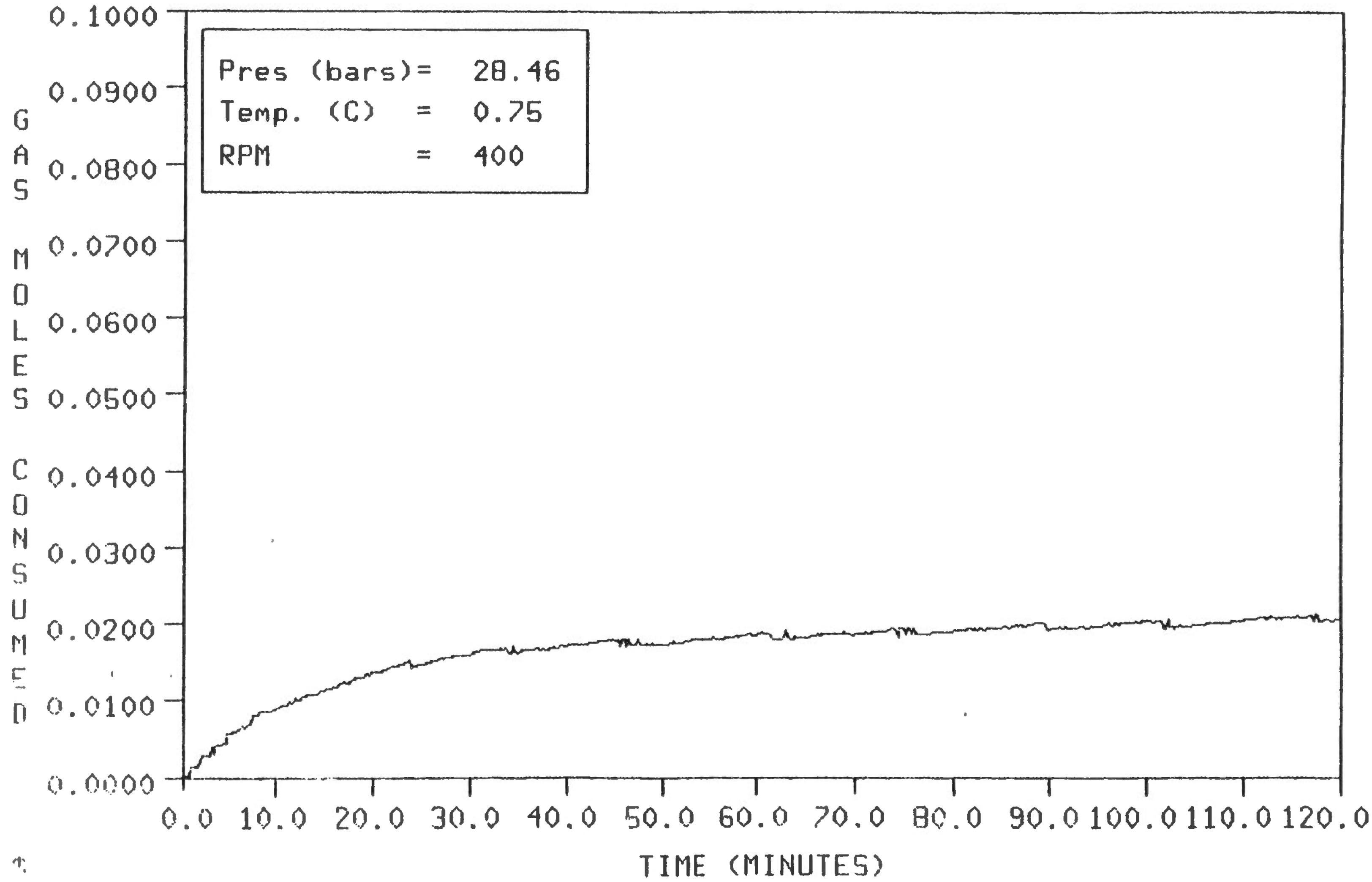
RUN#MTH100-12__85/06/13

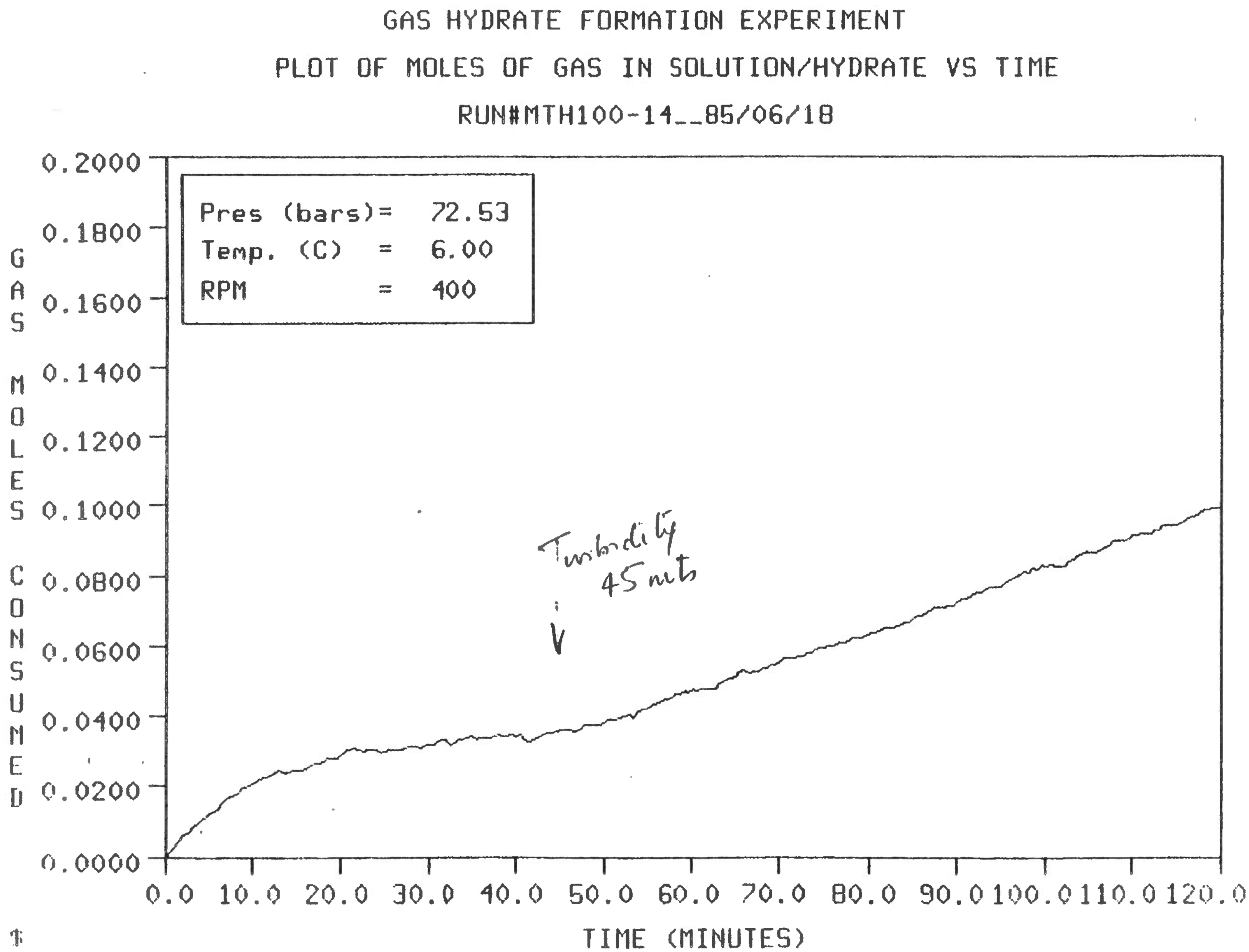


GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-13__85/06/14

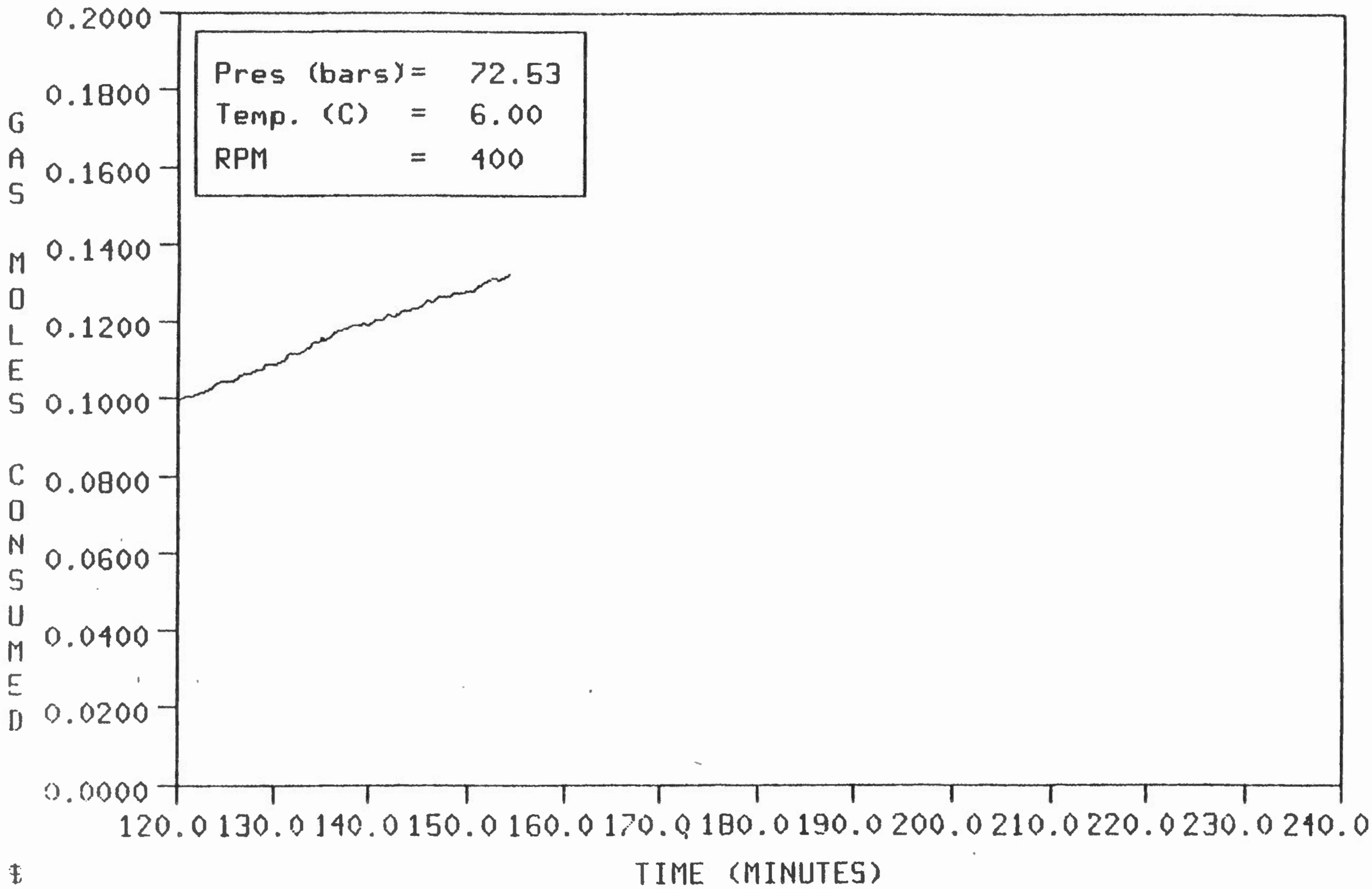



GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-14__85/06/18
Pres (bars)= 72.53
Temp. (C) = 6.00
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0200
0.0400
0.0600
0.0800
0.1000
0.1200
0.1400
0.1600
0.1800
0.2000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
TIME (MINUTES)
Turbidity
45 mts

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

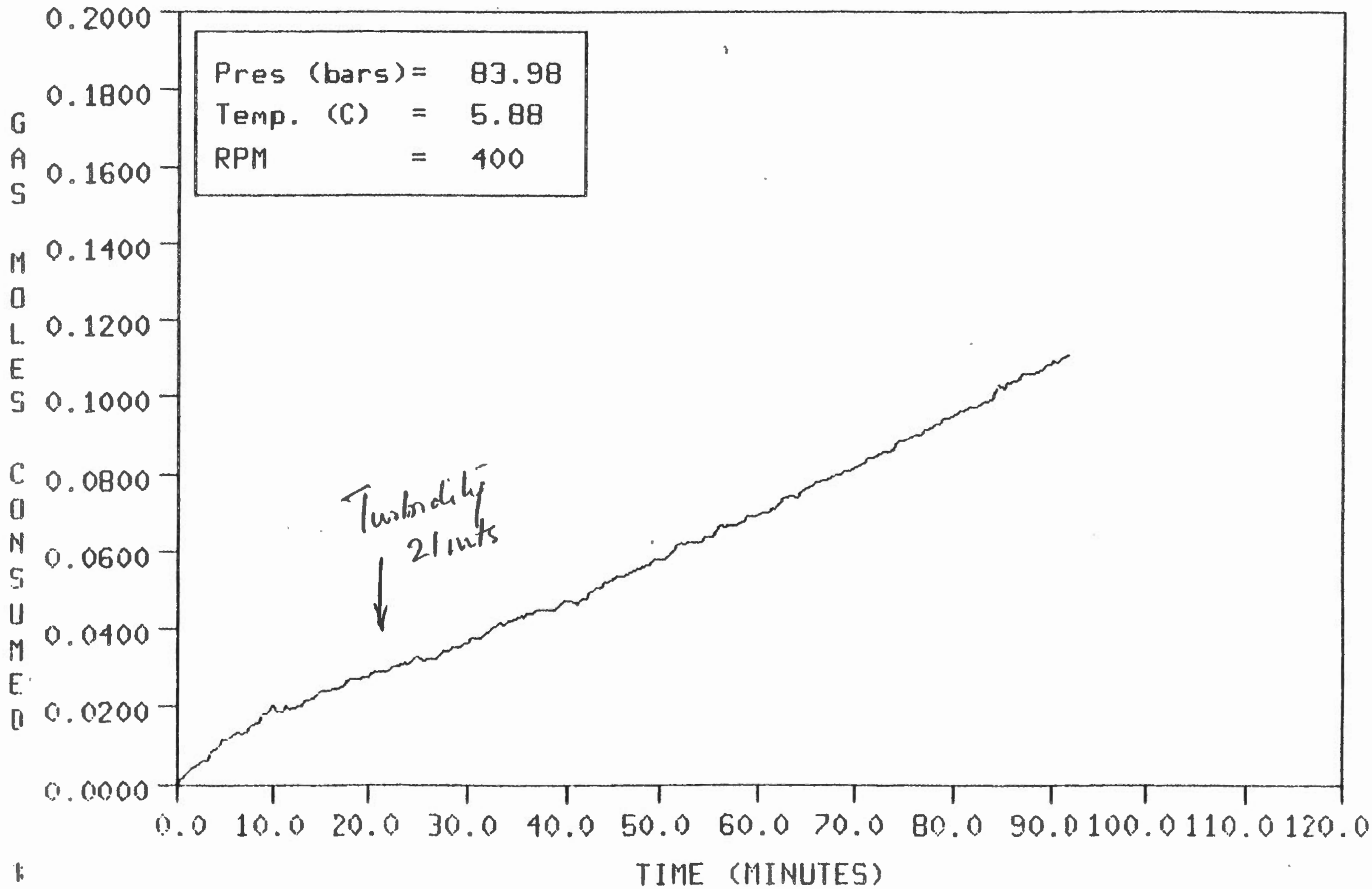
RUN#MTH100-14__85/06/18



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

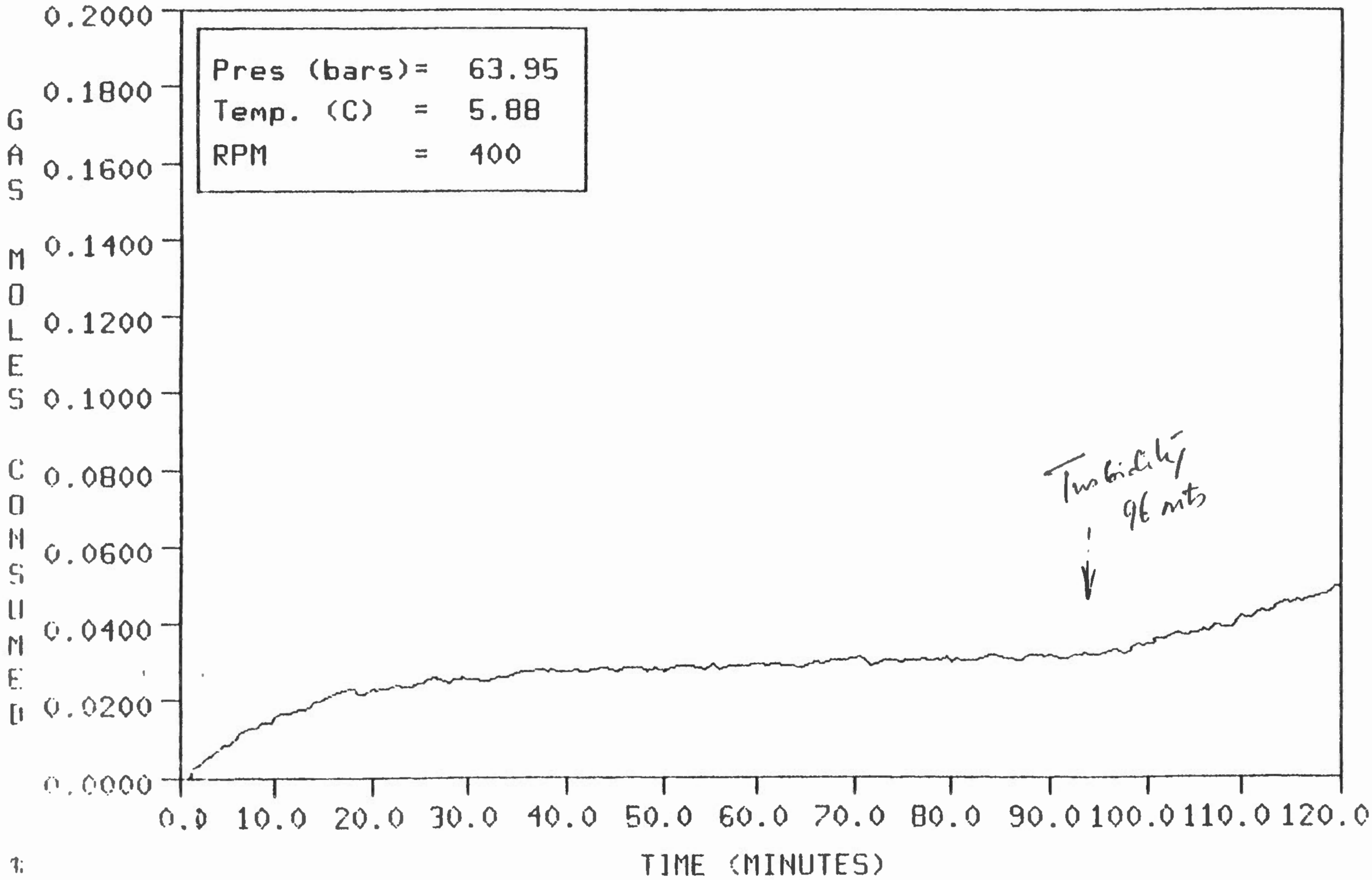
RUN#MTH100-15__85/06/20



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

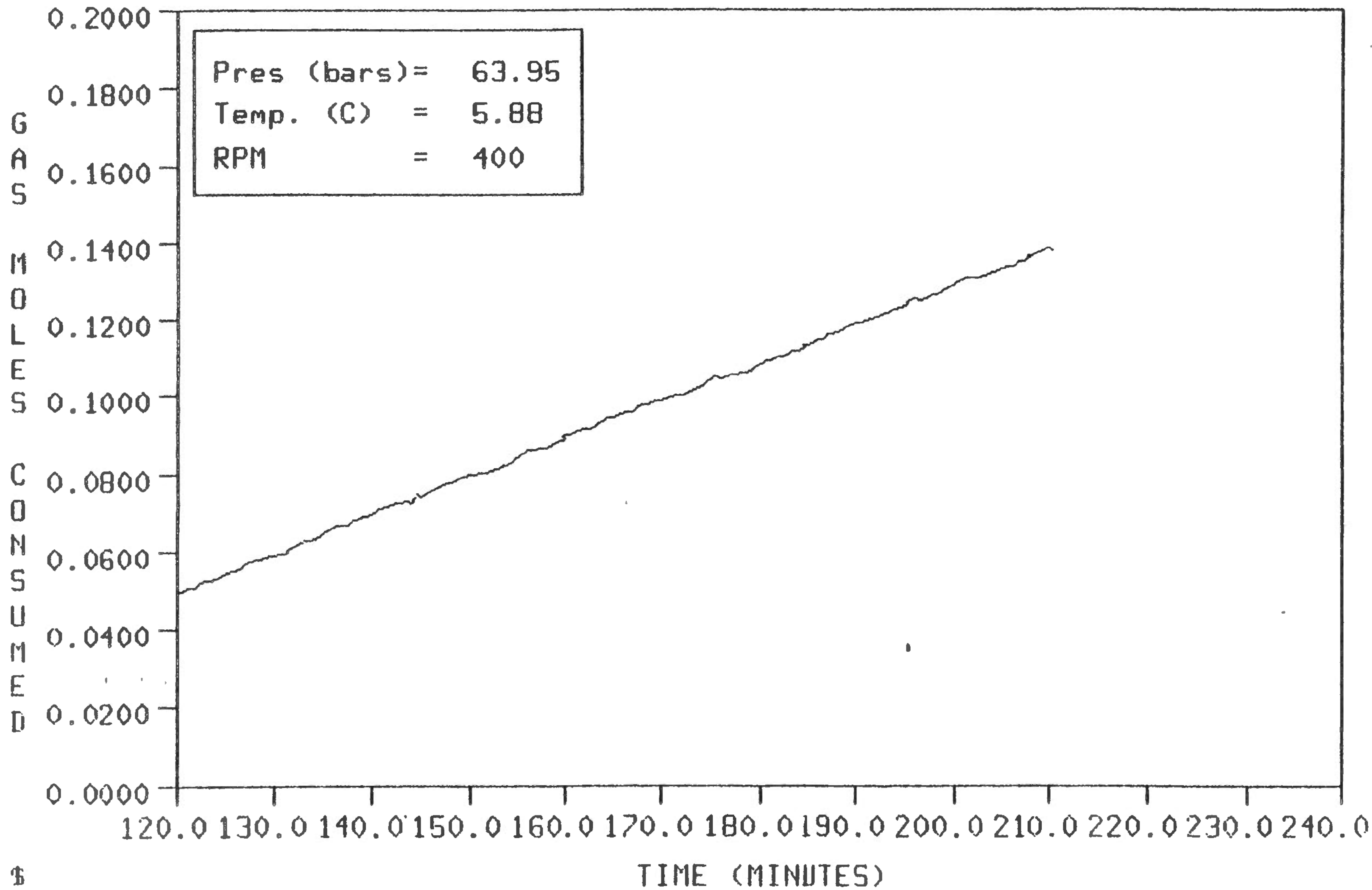
RUN#MTH100-16_85/06/20



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

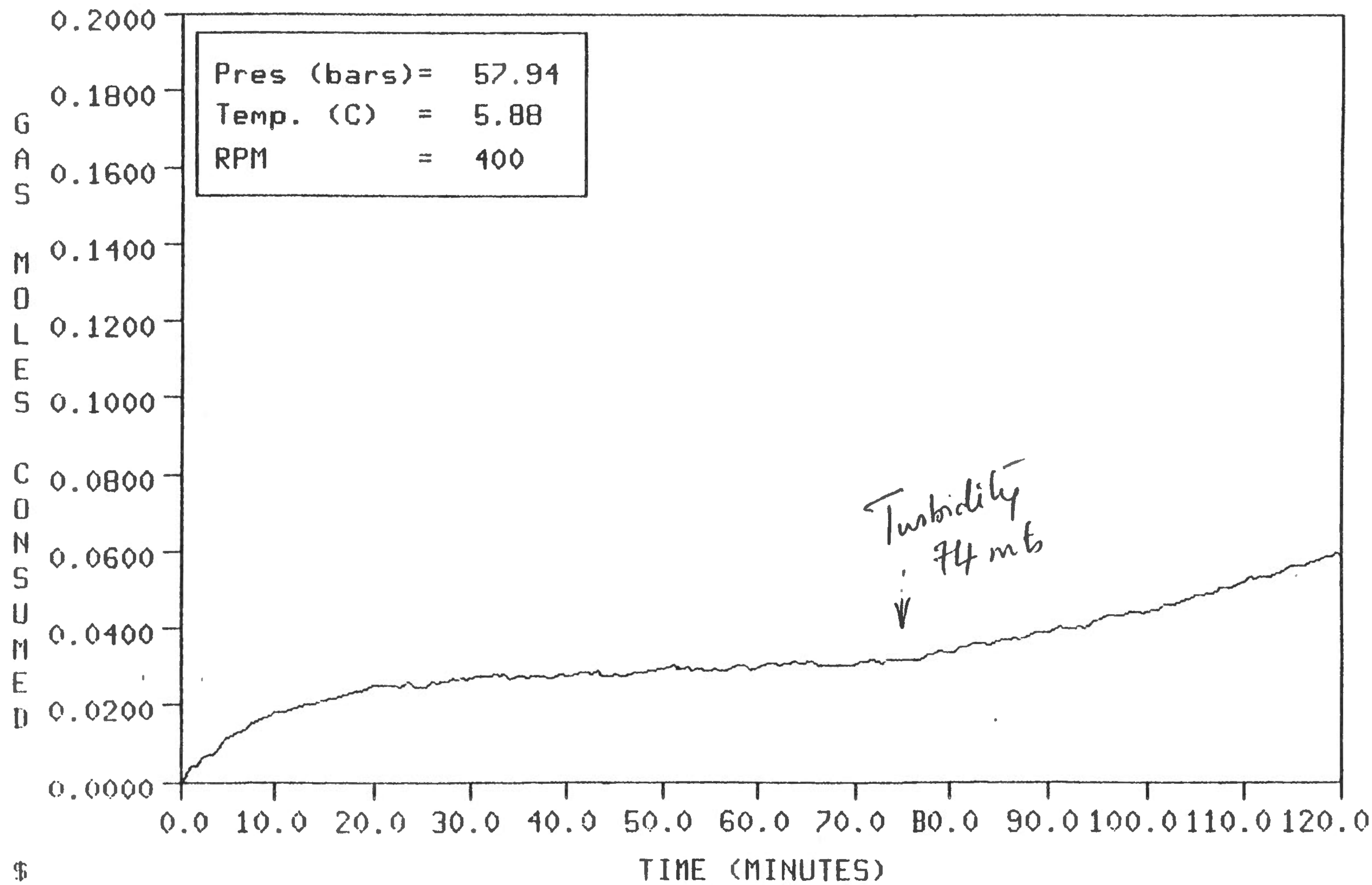
RUN|~~METH~~MTH100-16_85/06/20

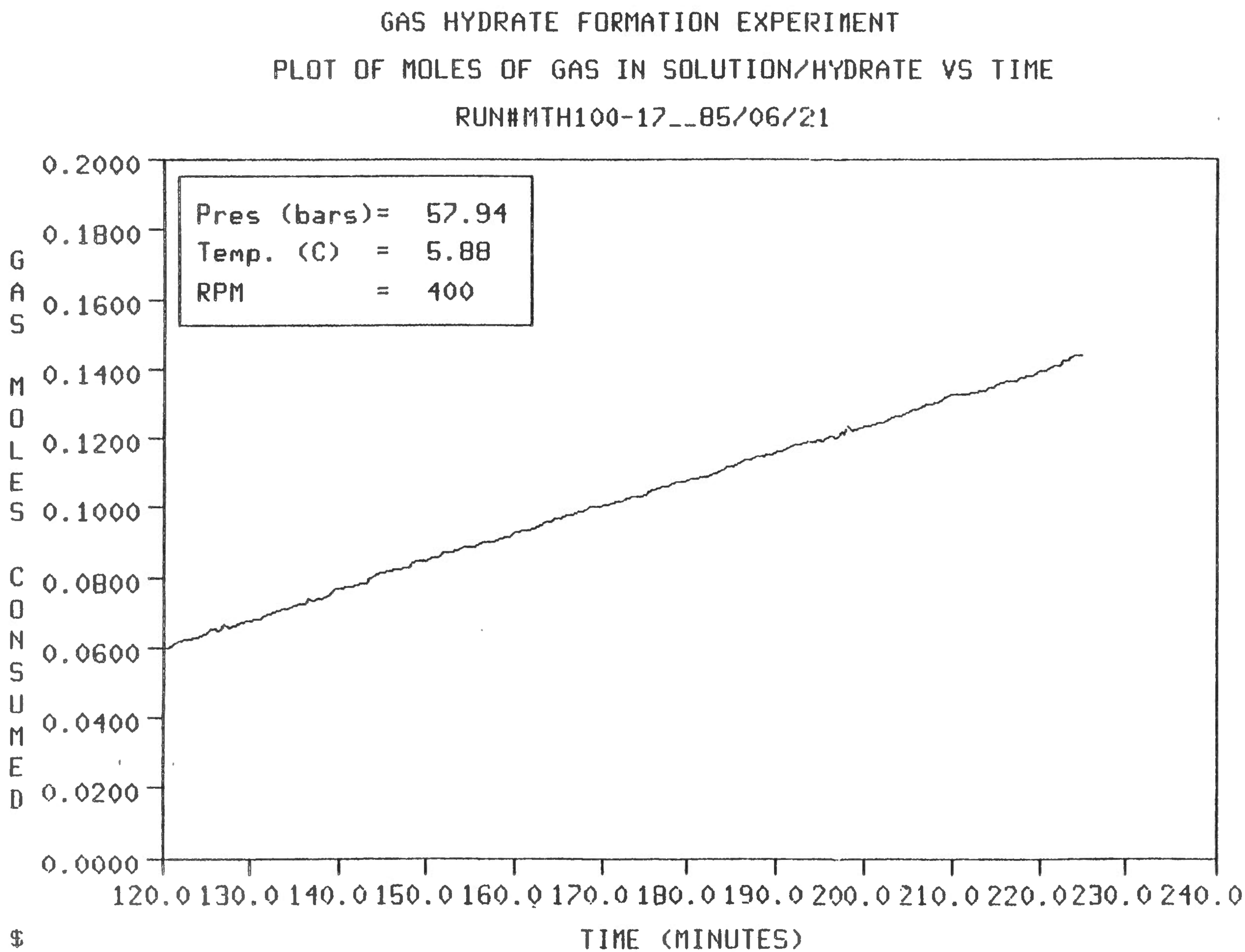


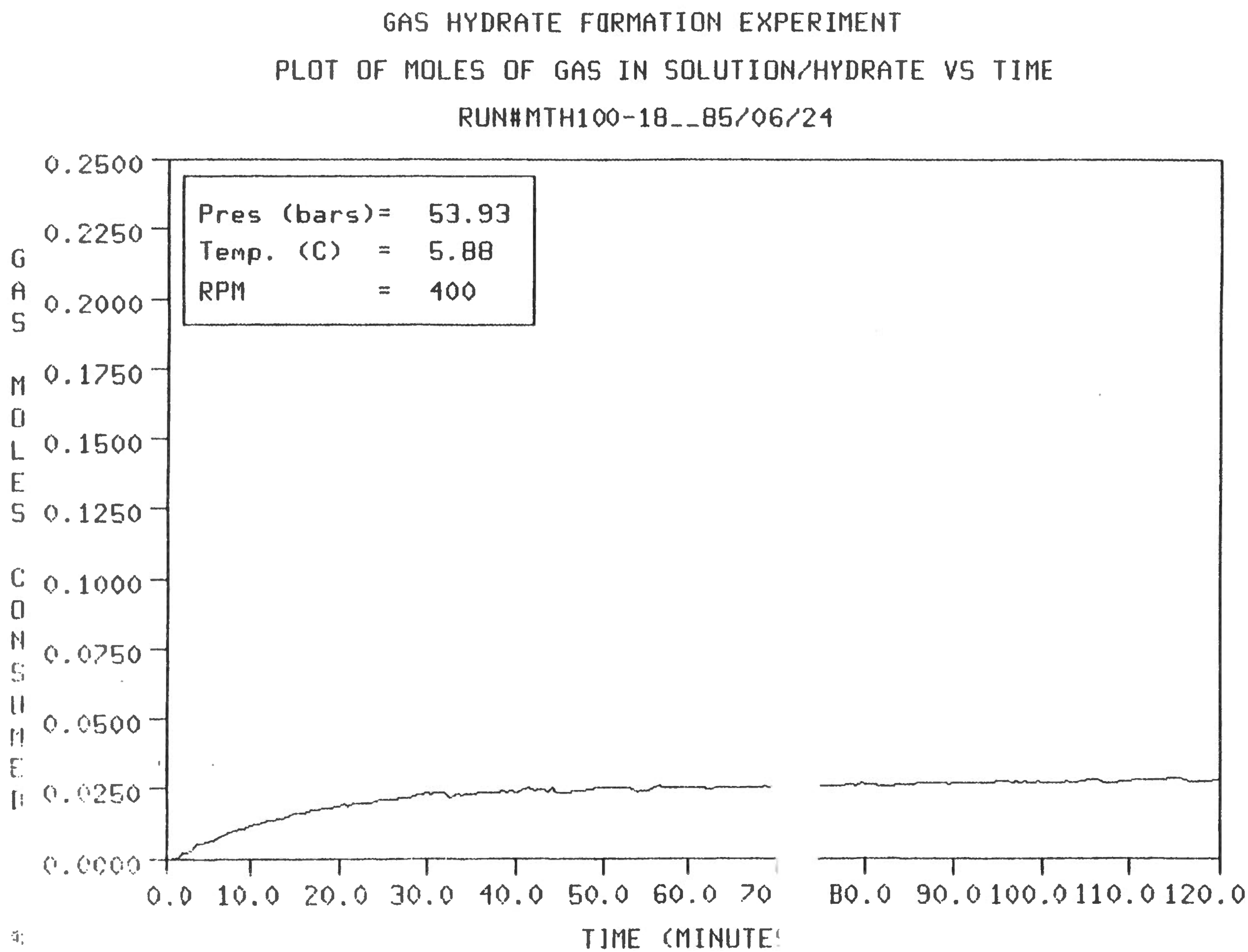
GAS HYDRATE FORMATION EXPERIMENT

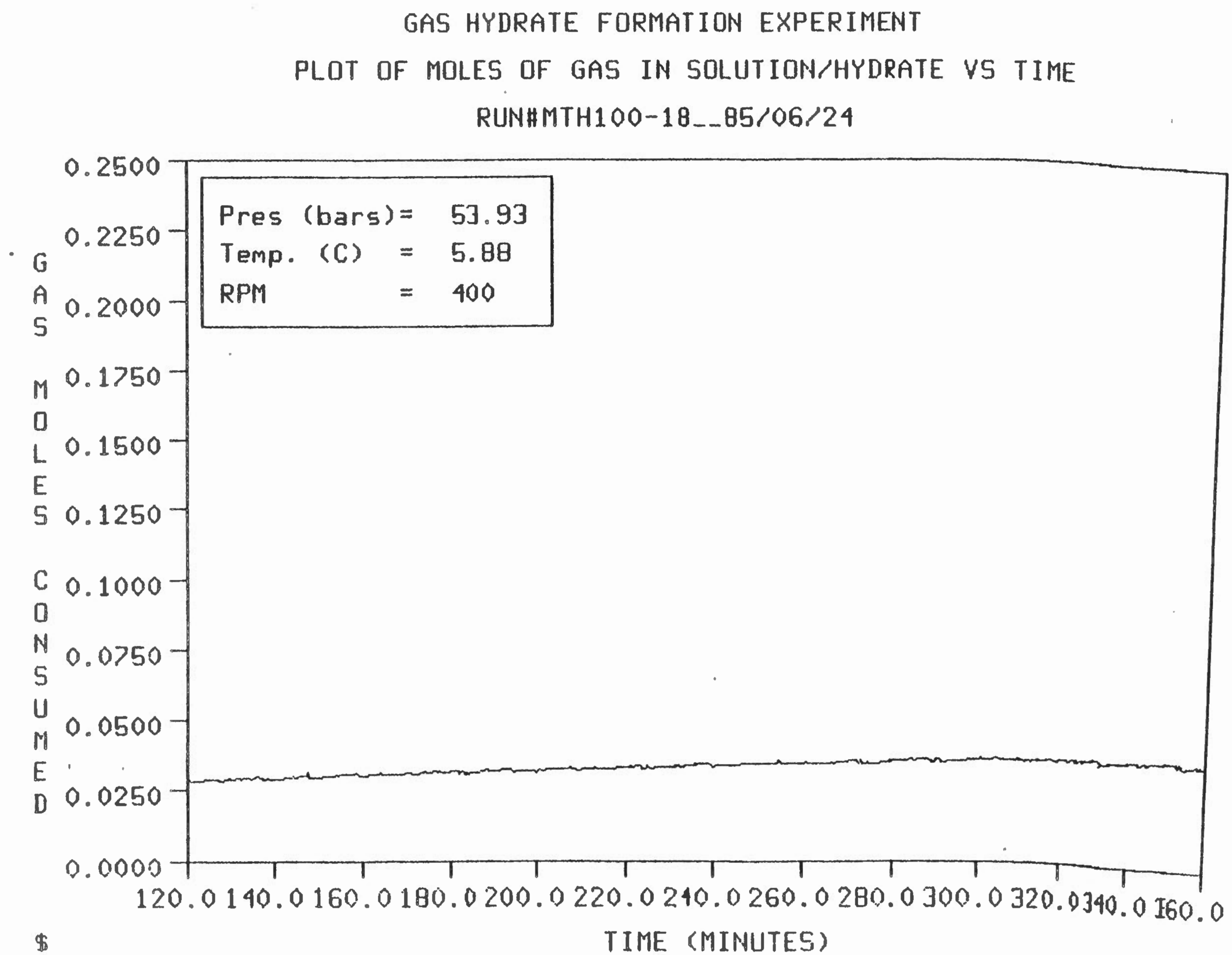
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

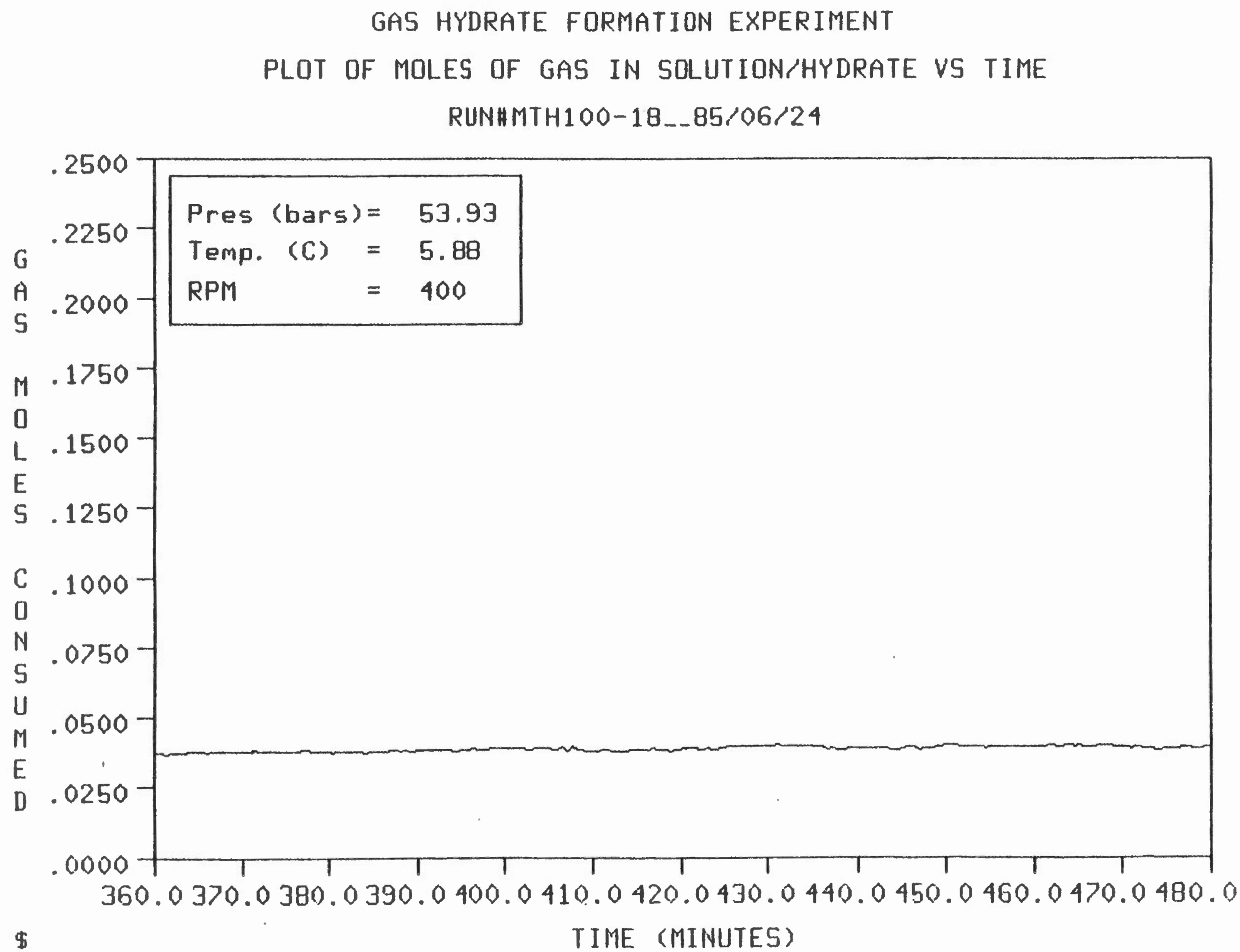
RUN#MTH100-17__85/06/21




GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-17__85/06/21
Pres (bars)= 57.94
Temp. (C) = 5.88
RPM = 400
GAS MOLES CONSUMED
0.0000
0.0200
0.0400
0.0600
0.0800
0.1000
0.1200
0.1400
0.1600
0.1800
0.2000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-18__85/06/24
Pres (bars)= 53.93
Temp. (C) = 5.88
RPM = 400
GAS MOLES CONSUMED
0.2500
0.2250
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70
80.0
90.0
100.0
110.0
120.0
TIME (MINUTE


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-18__85/06/24
Pres (bars)= 53.93
Temp. (C) = 5.88
RPM = 400
GAS MOLES CONSUMED
0.2500
0.2250
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0000
120.0 140.0 160.0 180.0 200.0 220.0 240.0 260.0 280.0 300.0 320.0 340.0 360.0
TIME (MINUTES)
$

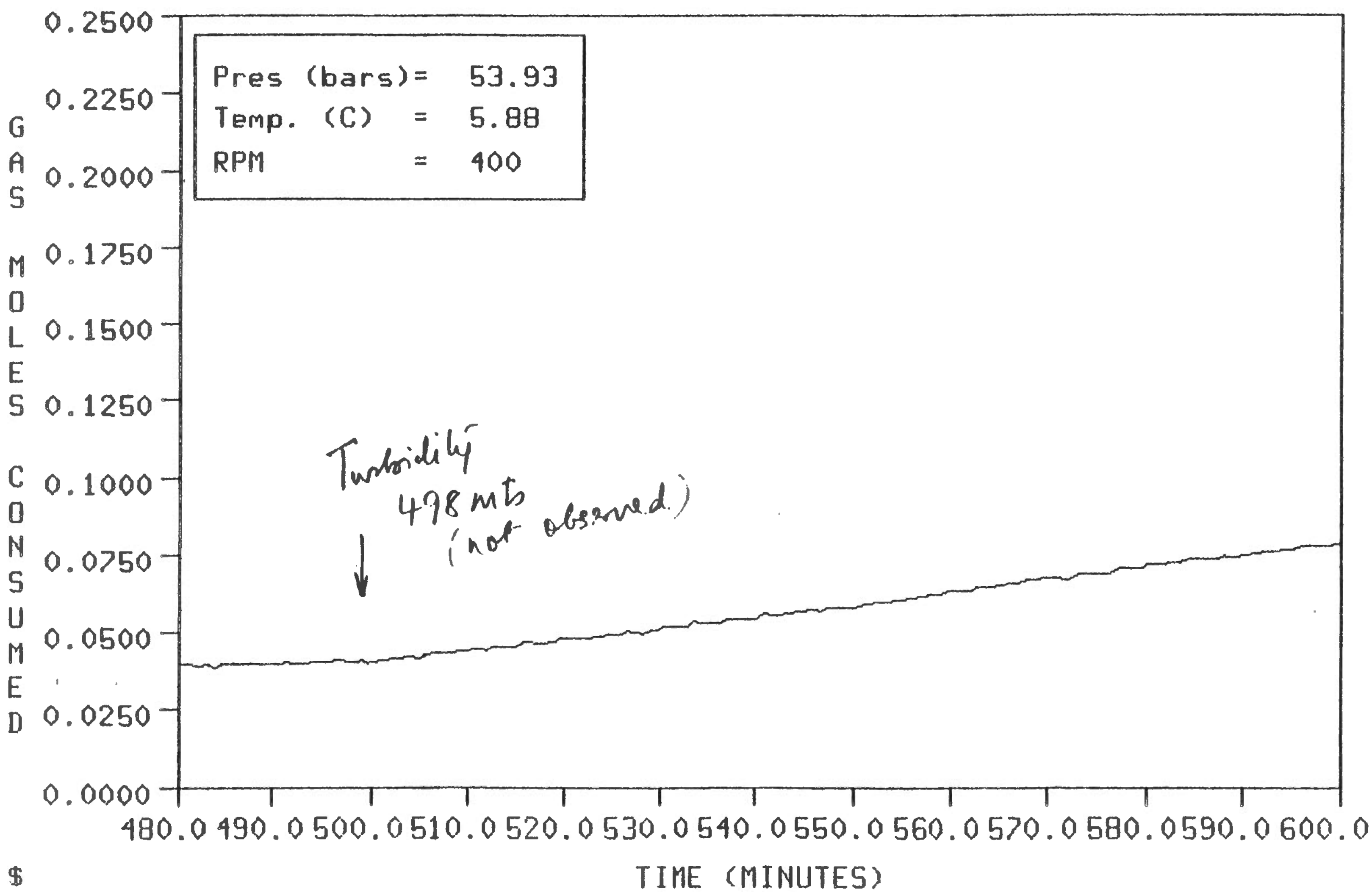


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-18__85/06/24
Pres (bars)= 53.93
Temp. (C) = 5.88
RPM = 400
GAS MOLES CONSUMED
.2500
.2250
.2000
.1750
.1500
.1250
.1000
.0750
.0500
.0250
.0000
360.0 370.0 380.0 390.0 400.0 410.0 420.0 430.0 440.0 450.0 460.0 470.0 480.0
TIME (MINUTES)
$

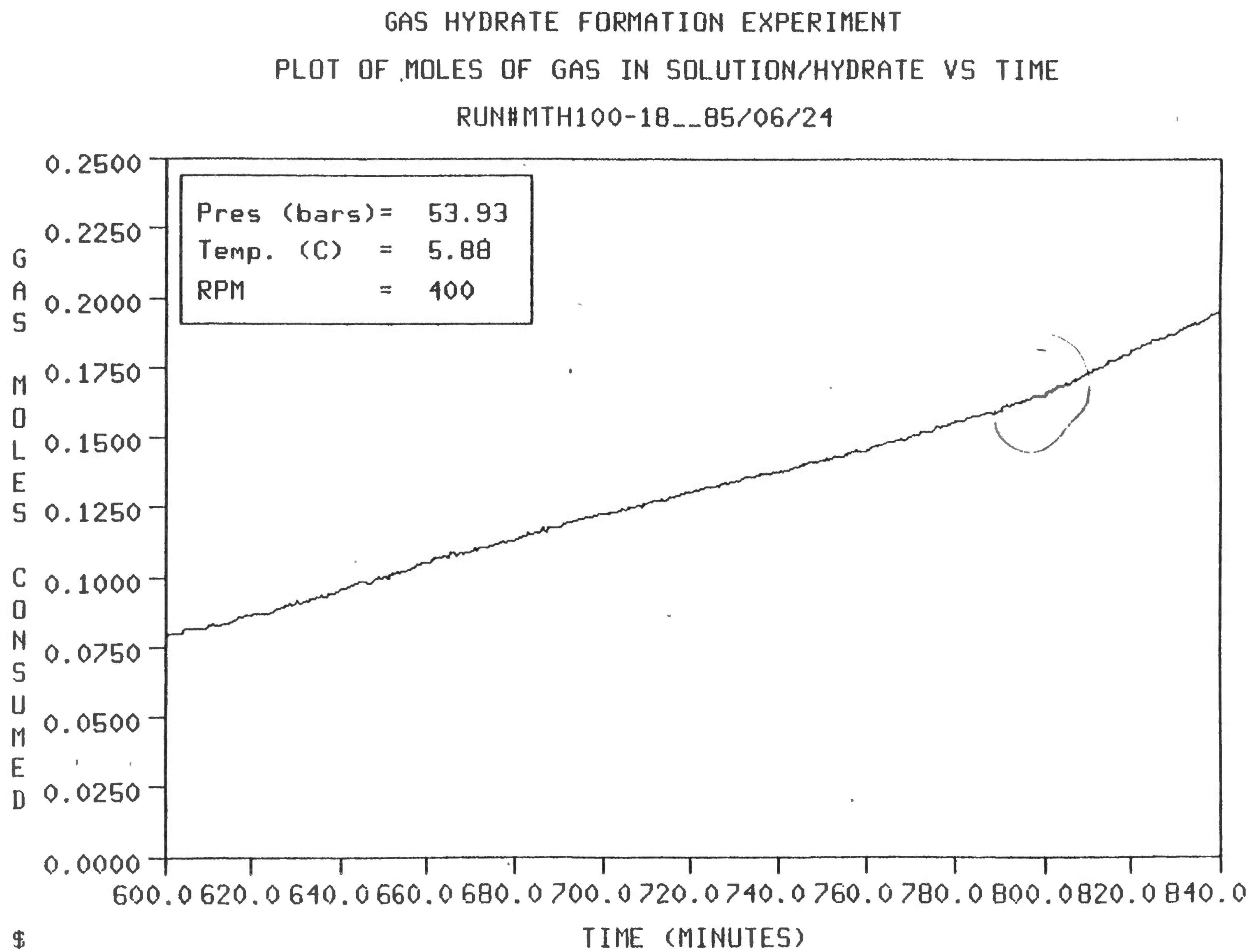
GAS HYDRATE FORMATION EXPERIMENT

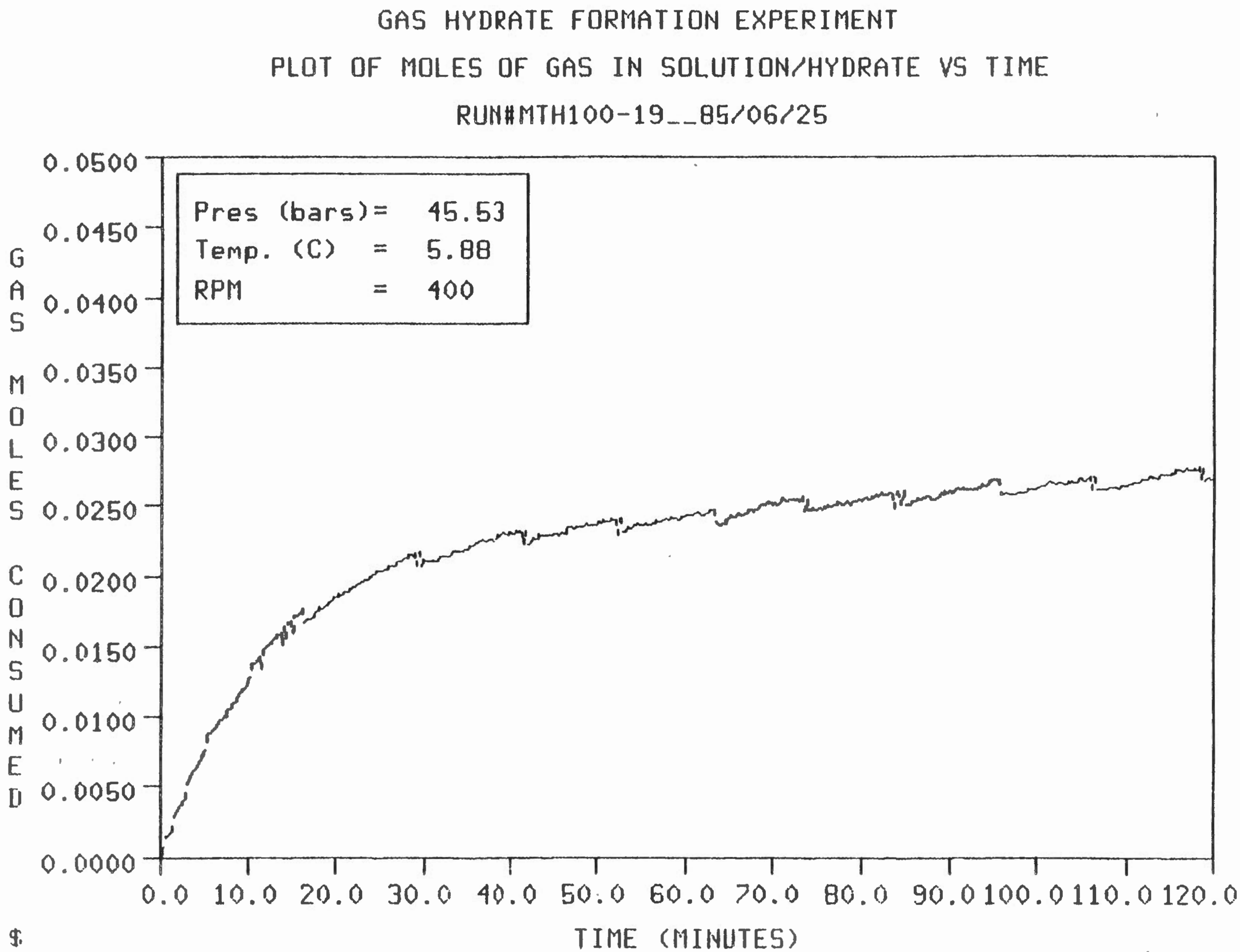
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-18__85/06/24



$


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-18__85/06/24
Pres (bars)= 53.93
Temp. (C) = 5.88
RPM = 400
GAS MOLES CONSUMED
0.2500
0.2250
0.2000
0.1750
0.1500
0.1250
0.1000
0.0750
0.0500
0.0250
0.0000
600.0 620.0 640.0 660.0 680.0 700.0 720.0 740.0 760.0 780.0 800.0 820.0 840.0
TIME (MINUTES)
$

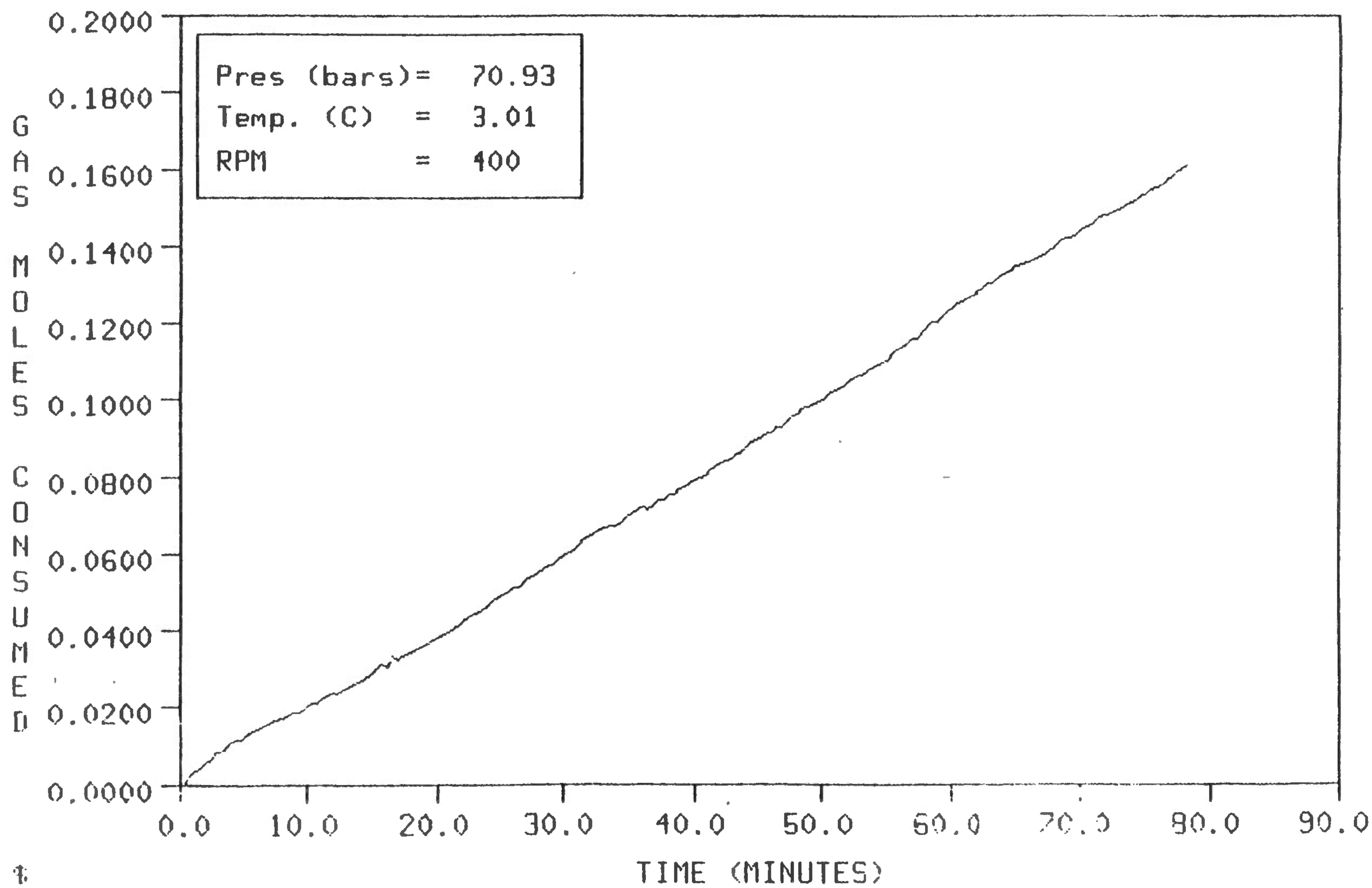

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-19__85/06/25
Pres (bars)= 45.53
Temp. (C) = 5.88
RPM = 400
GAS MOLES CONSUMED
0.0500
0.0450
0.0400
0.0350
0.0300
0.0250
0.0200
0.0150
0.0100
0.0050
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)

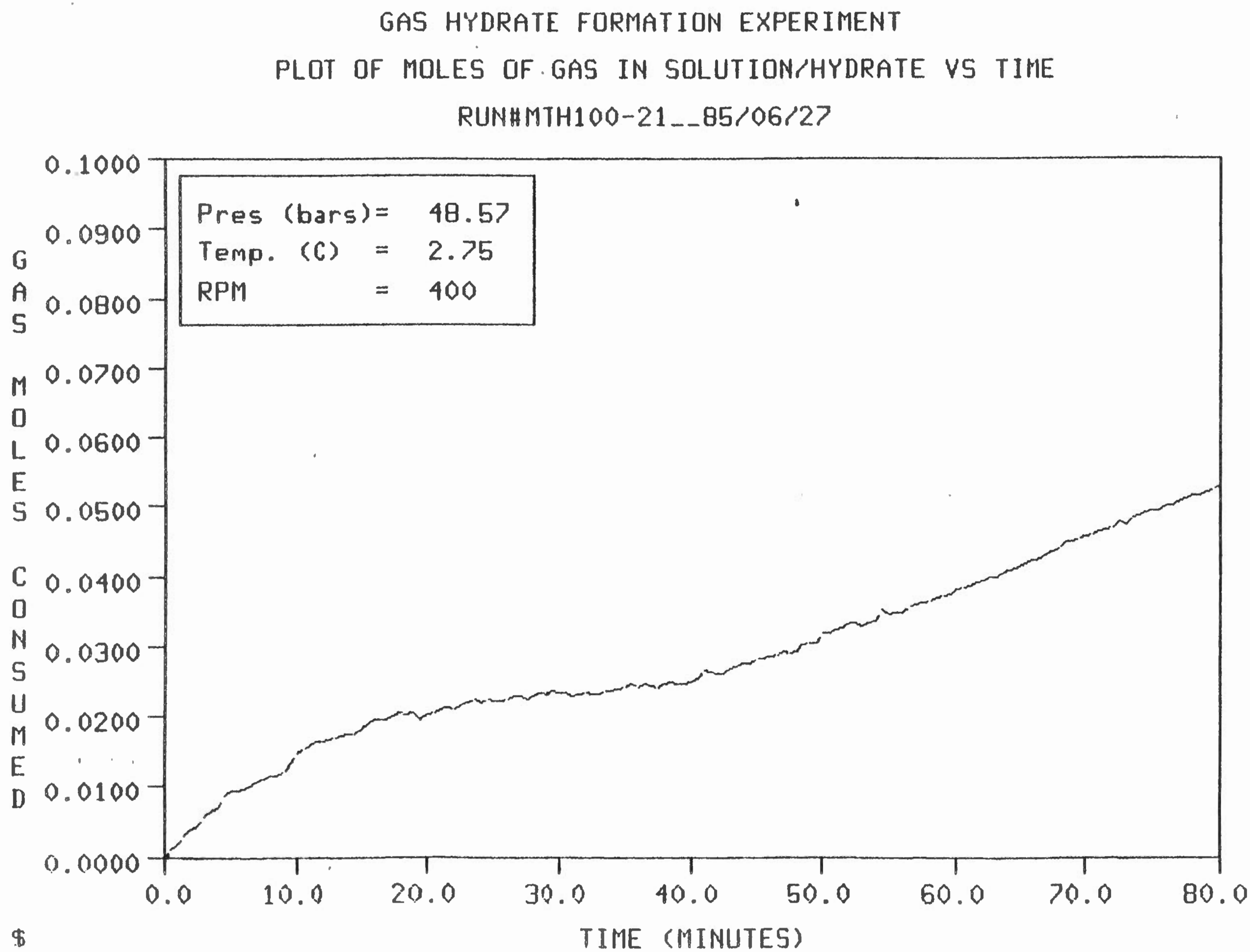
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-20__85/06/26





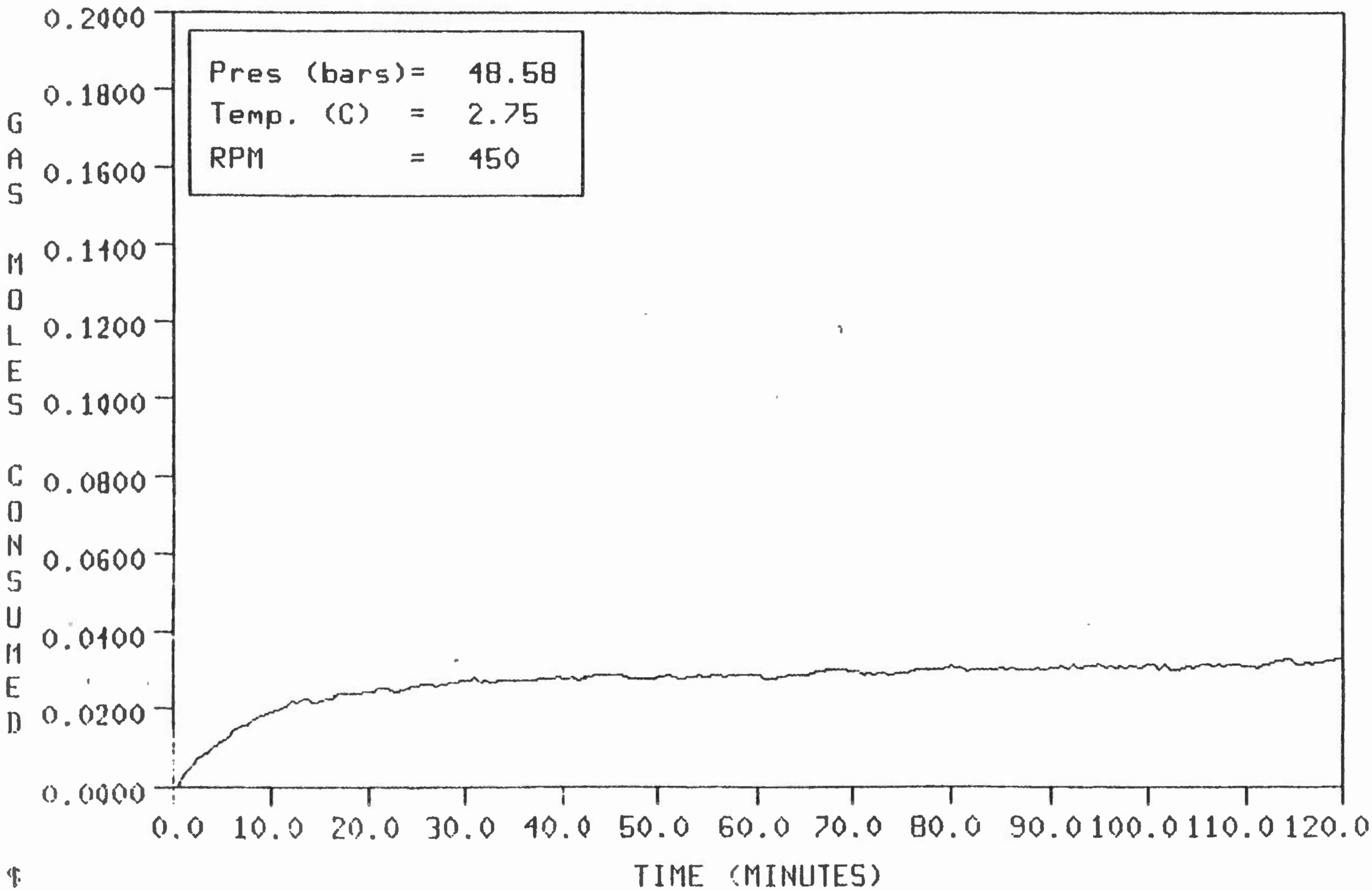
GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-21__85/06/27
Pres (bars)= 48.57
Temp. (C) = 2.75
RPM = 400
GAS MOLES CONSUMED
0.1000
0.0900
0.0800
0.0700
0.0600
0.0500
0.0400
0.0300
0.0200
0.0100
0.0000
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
TIME (MINUTES)

$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

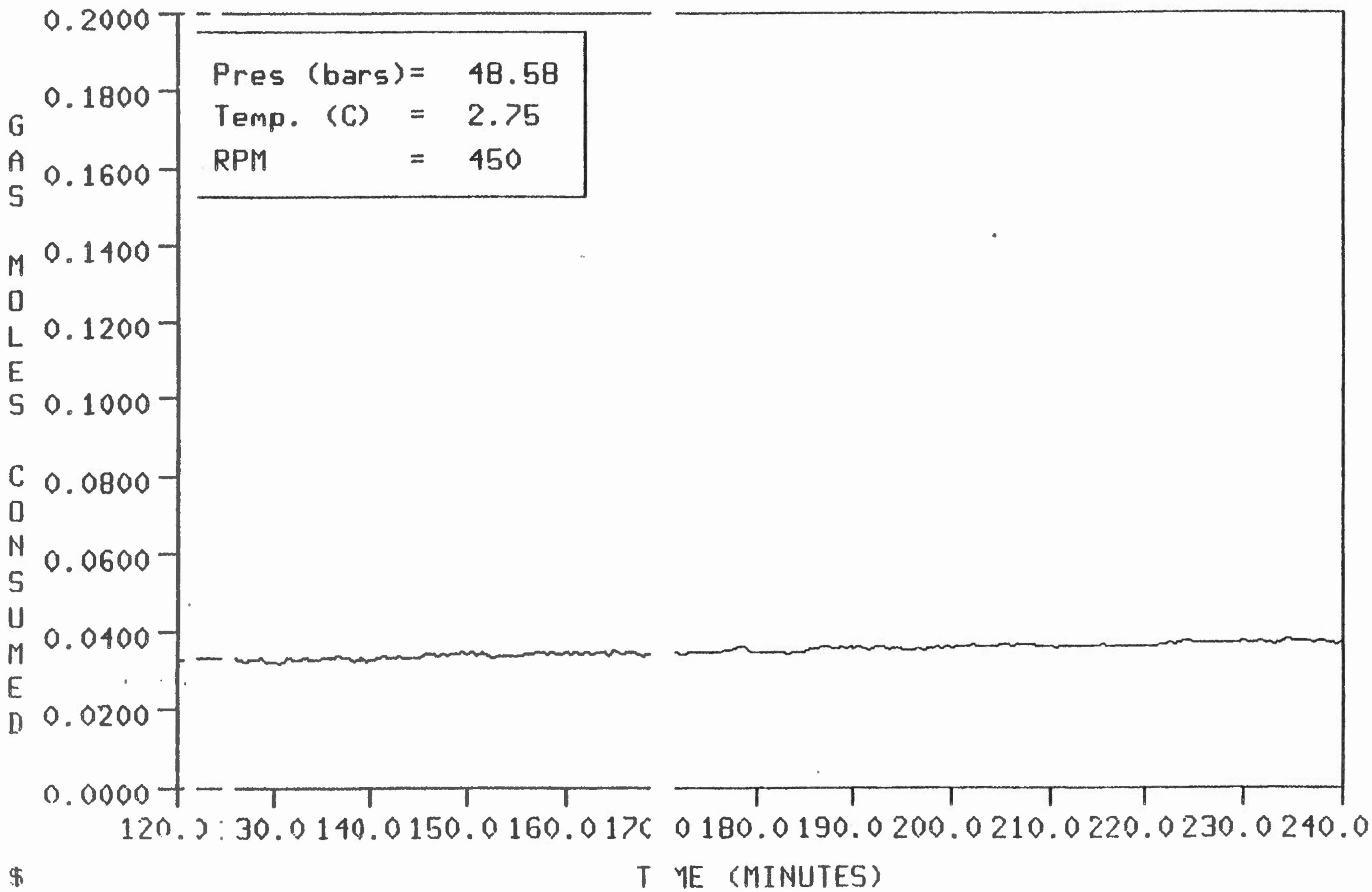
RUN#MTH100-22__85/06/28



GAS HYDRATE F RMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

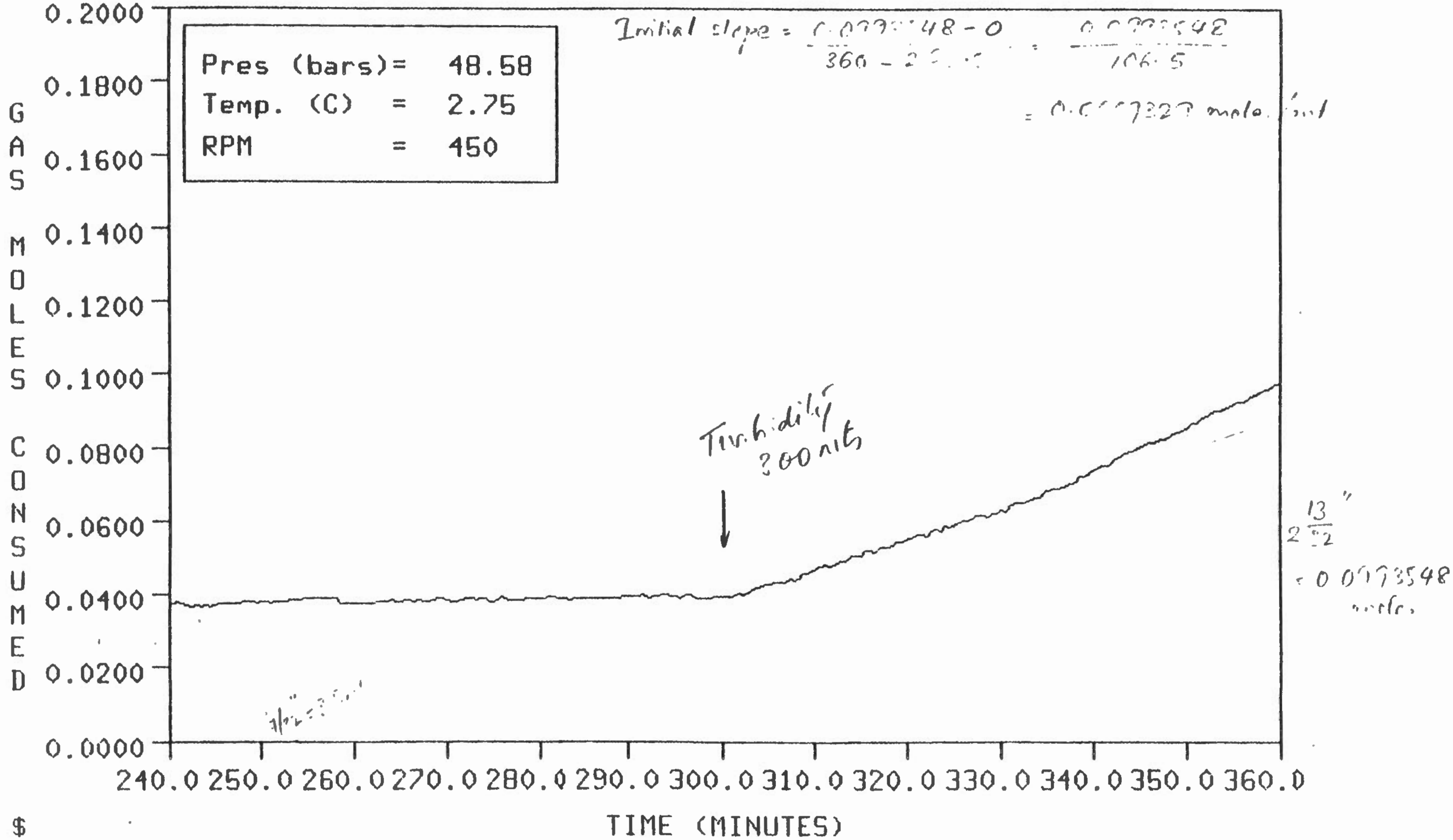
RUN#MTH1 -22__85/06/28



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

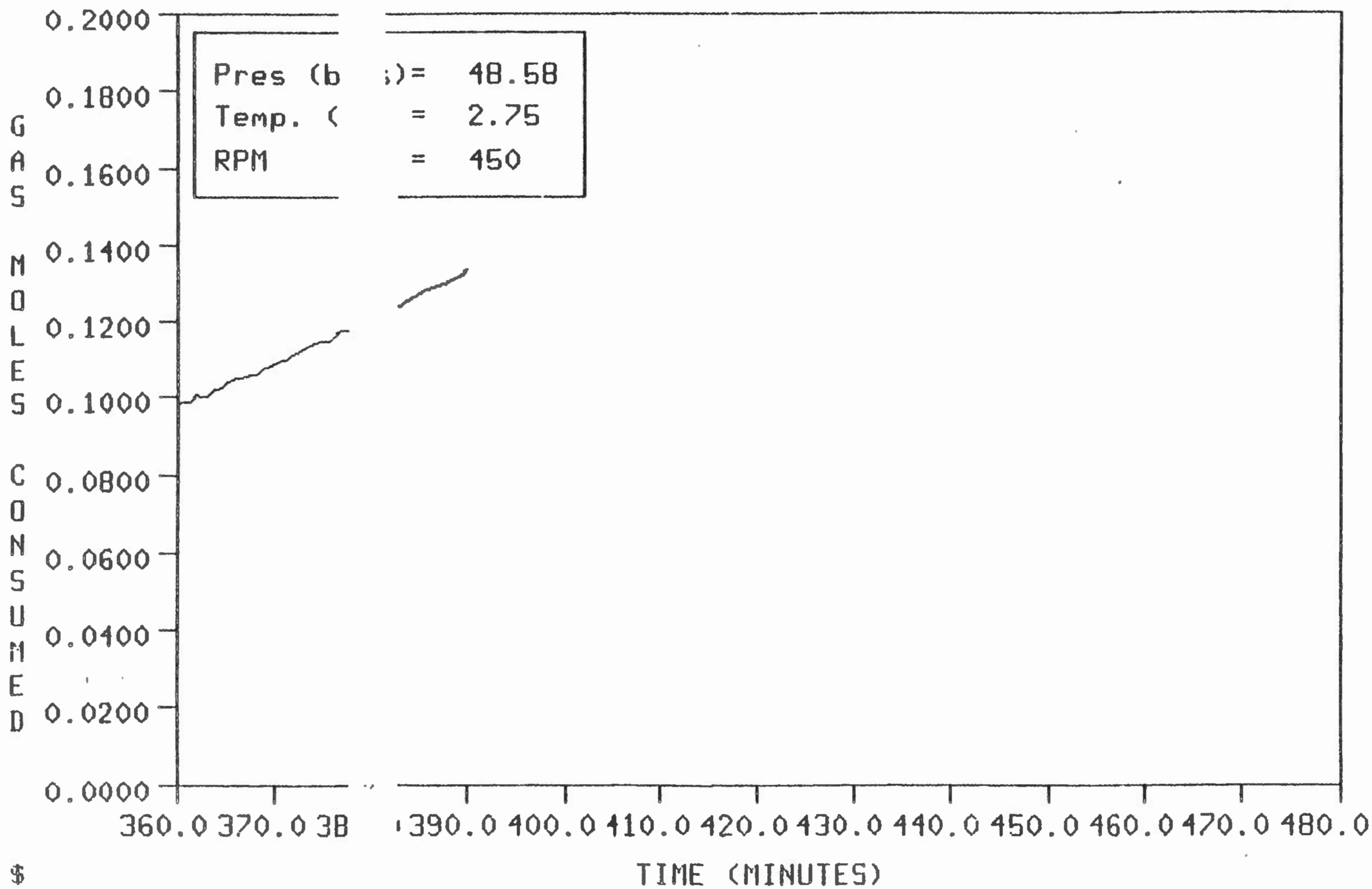
RUN#MTH100-22__85/06/28



GAS HYDRATE FORMATION EXPERIMENT

PL.. OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-22__85/06/28



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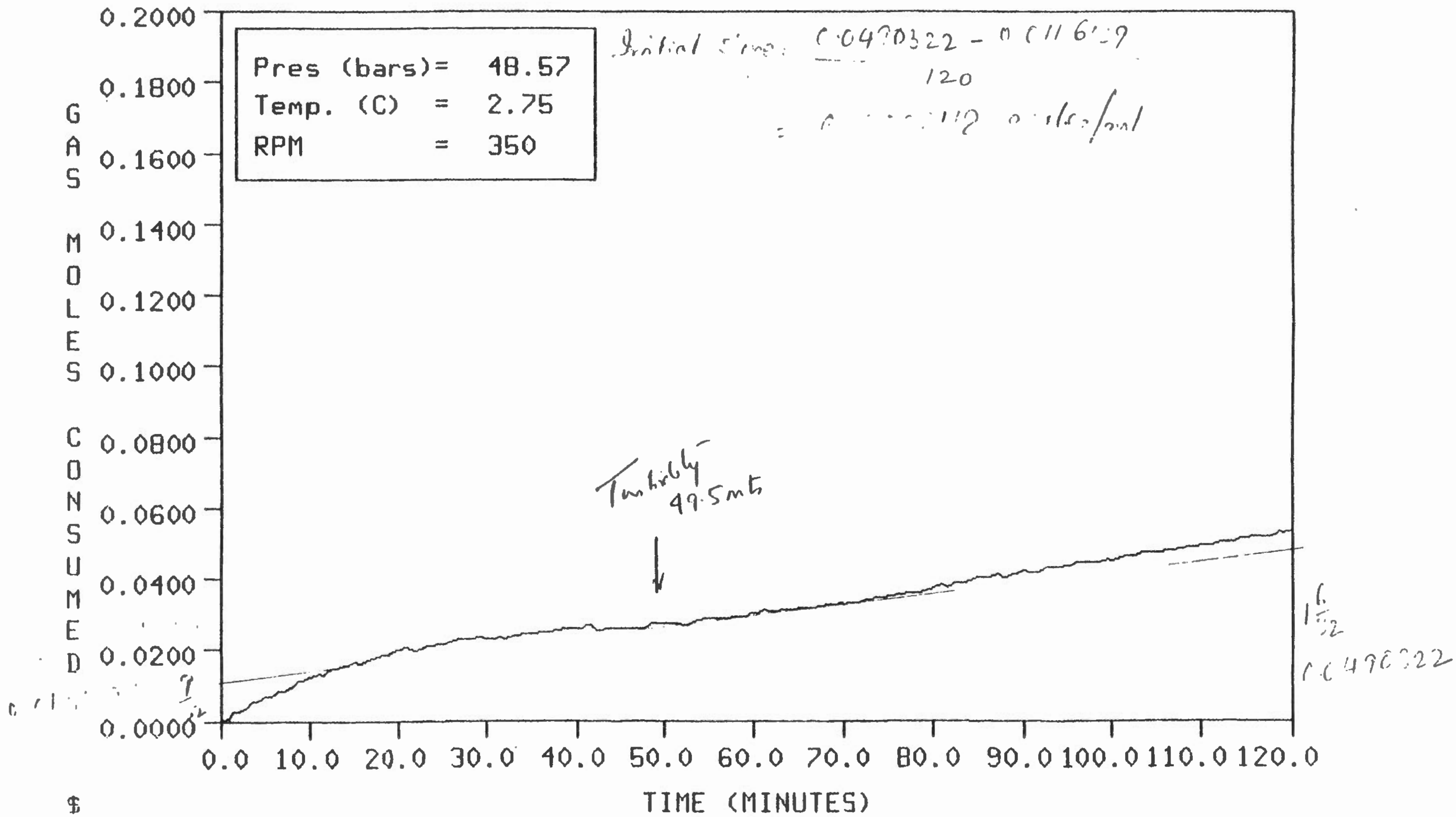
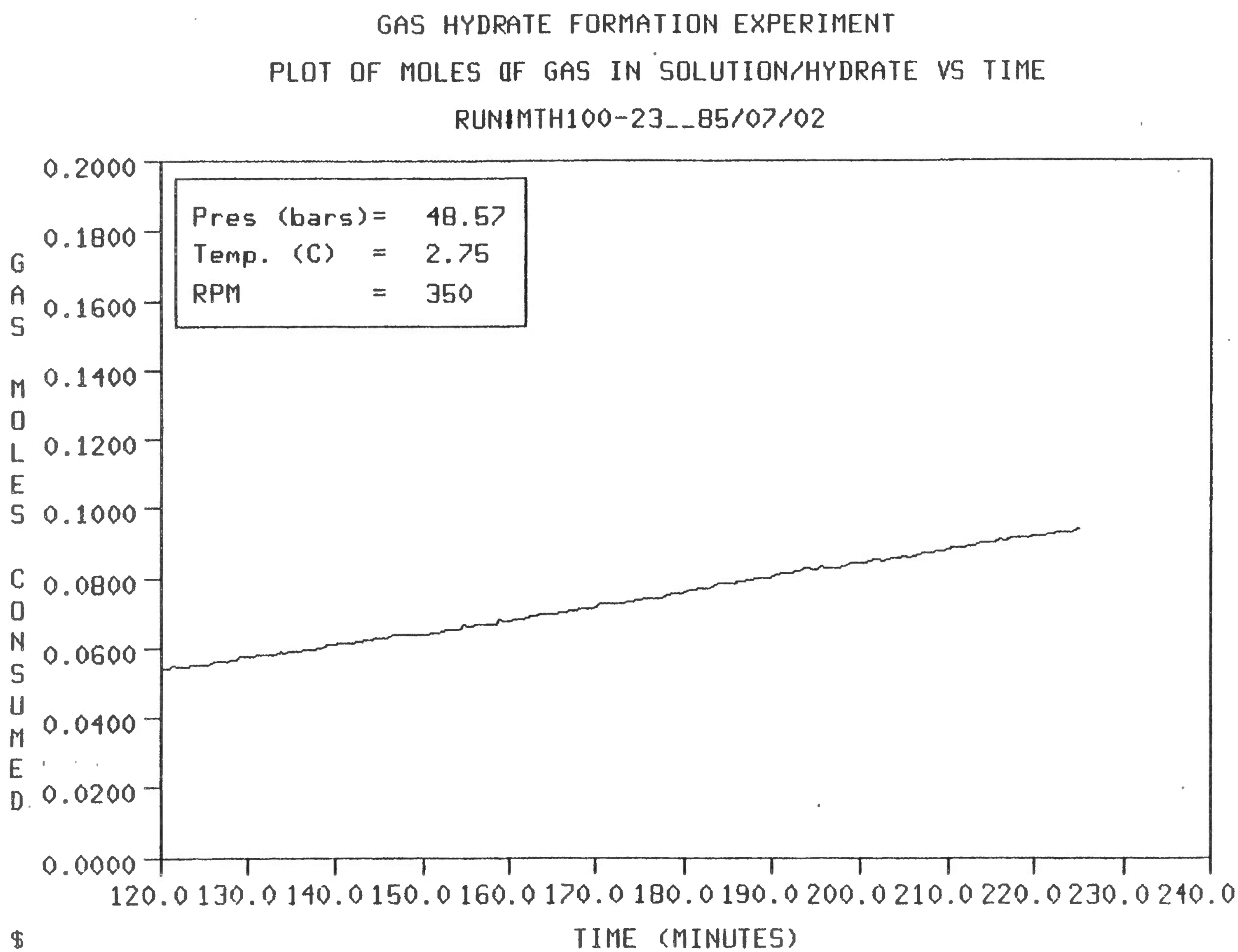
GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-23__85/07/02



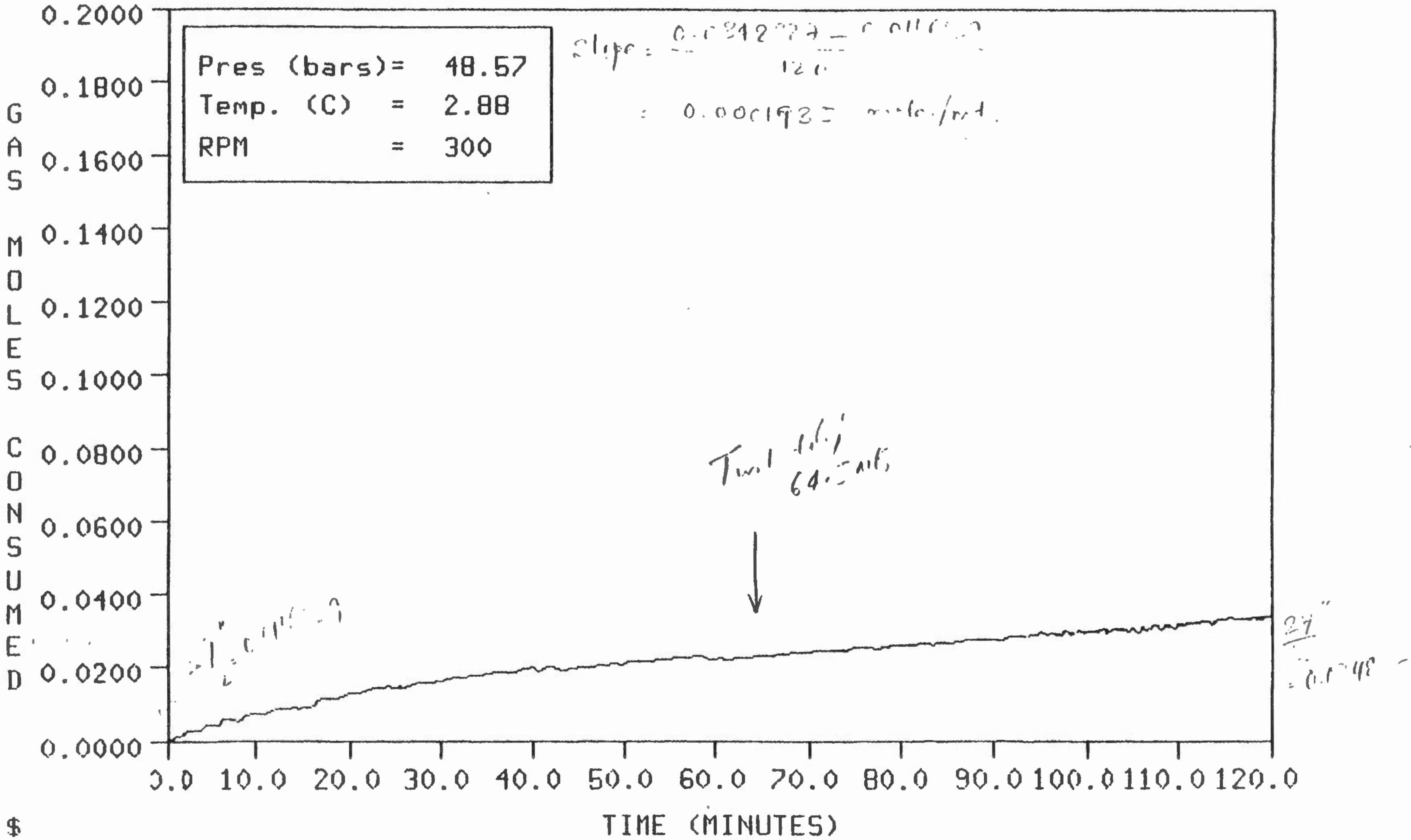


GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-23__85/07/02
Pres (bars)= 48.57
Temp. (C) = 2.75
RPM = 350
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-24__85/07/03



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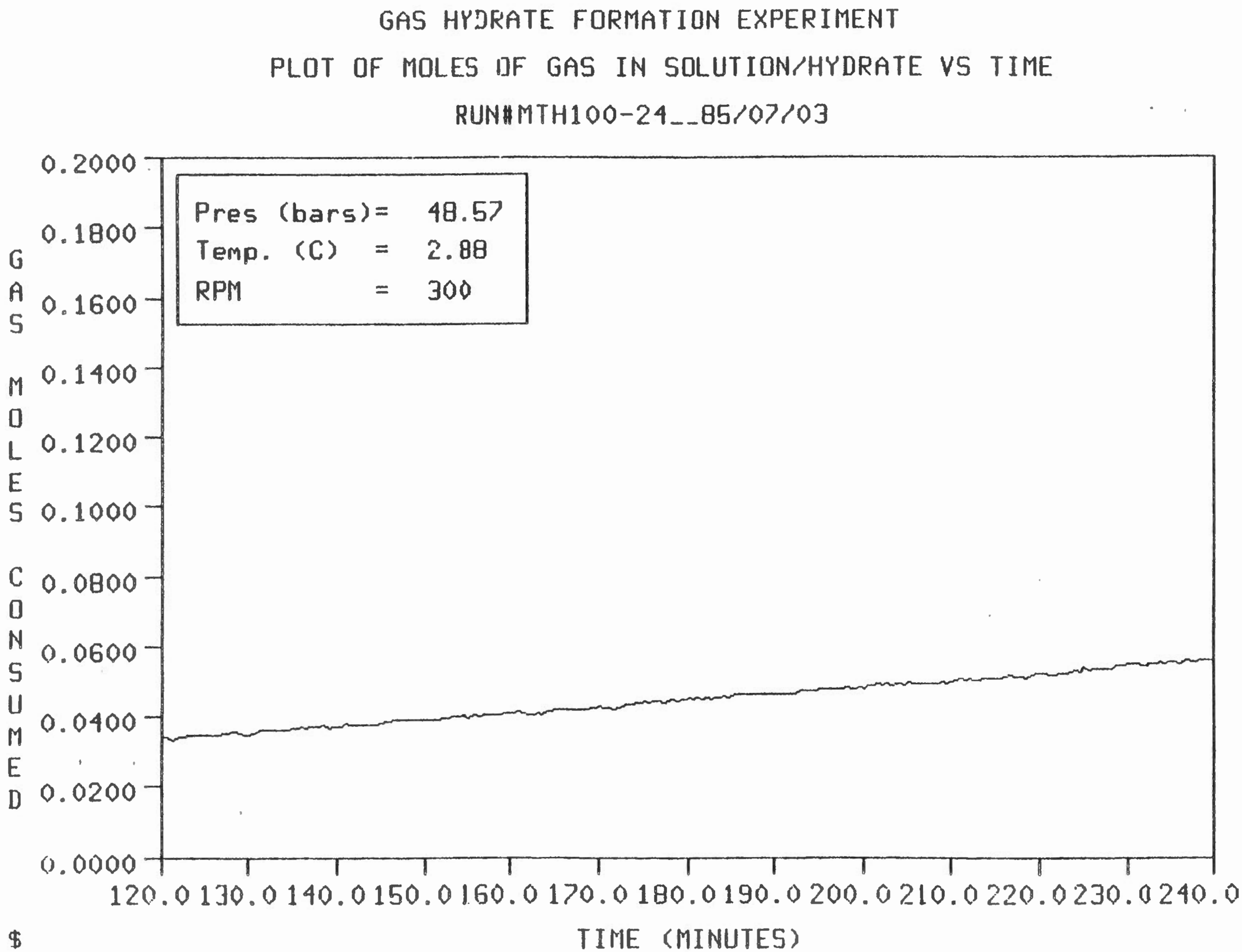
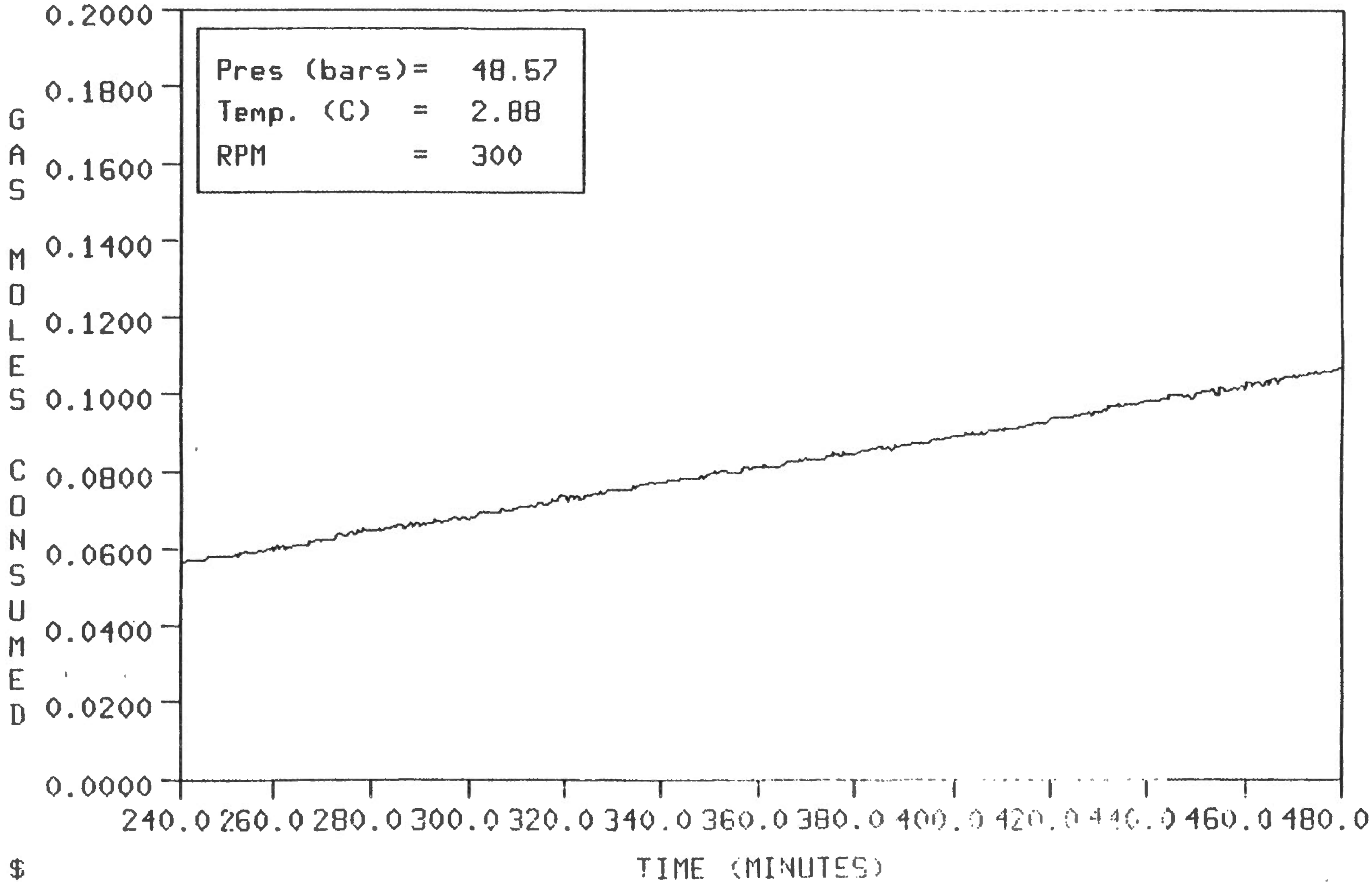

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-24__85/07/03
Pres (bars)= 48.57
Temp. (C) = 2.88
RPM = 300
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

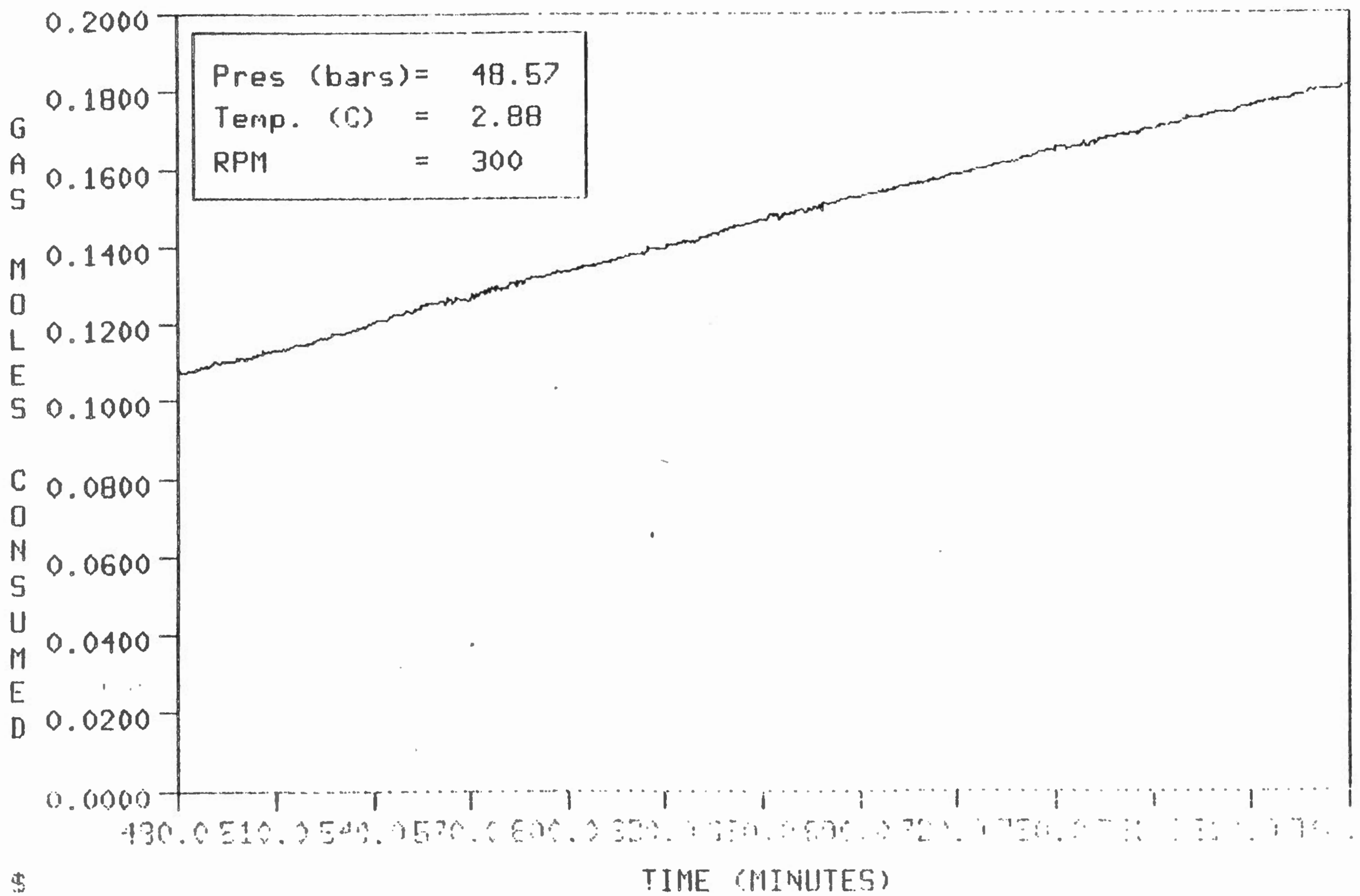
RUN#MTH100-24__85/07/03



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-24__85/07/03

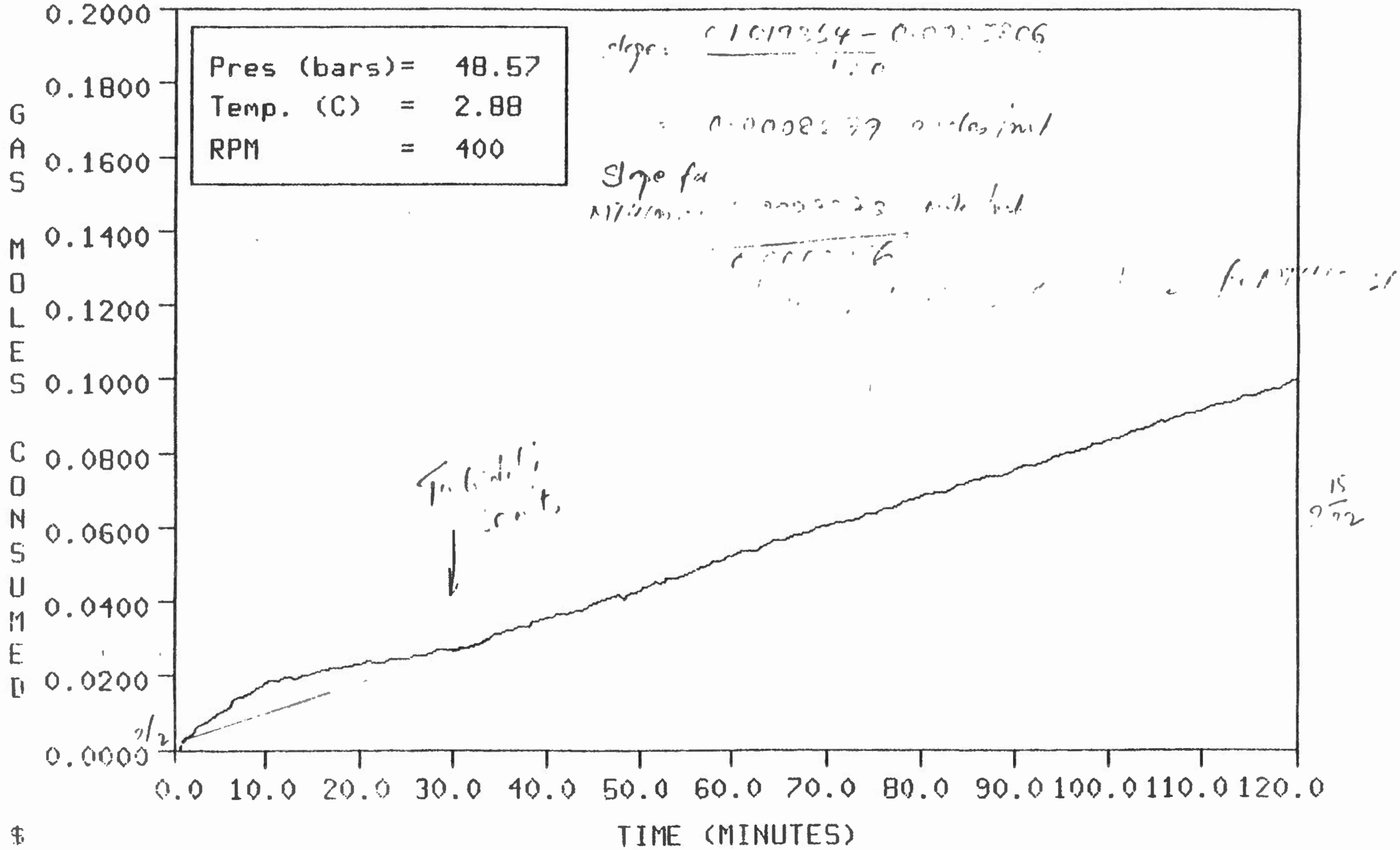


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

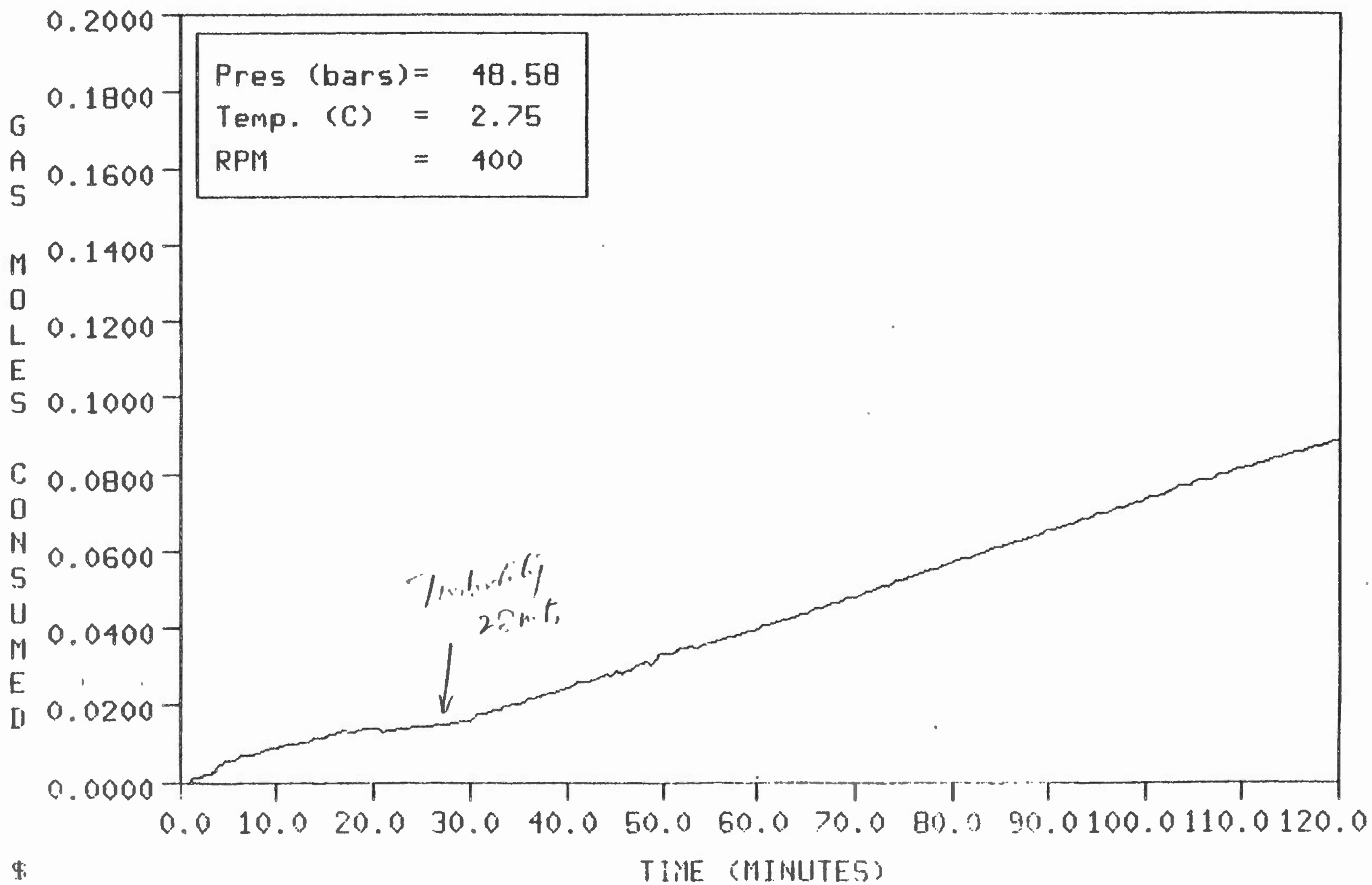
RUN#MTH100-25__85/07/04



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-26__85/07/09



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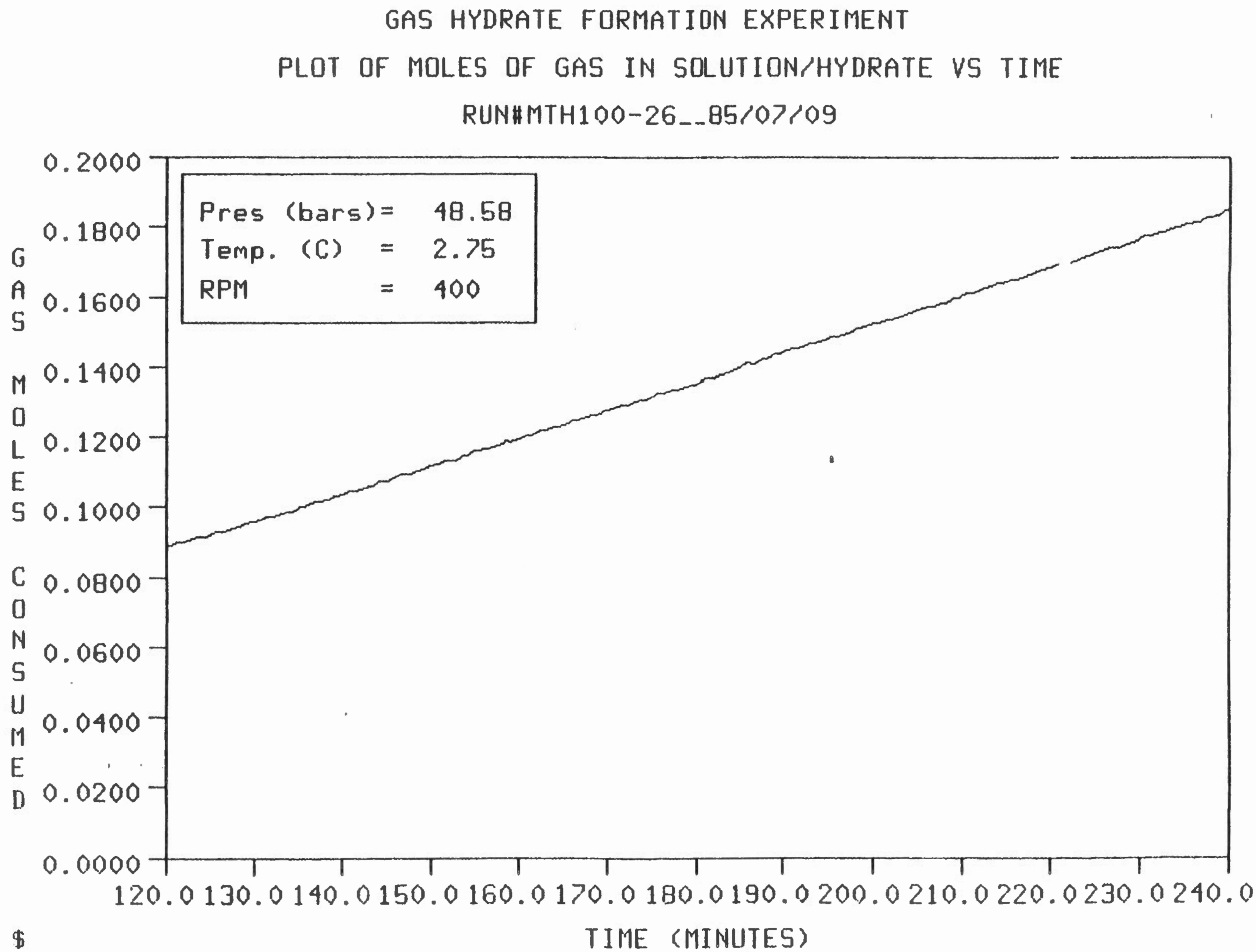
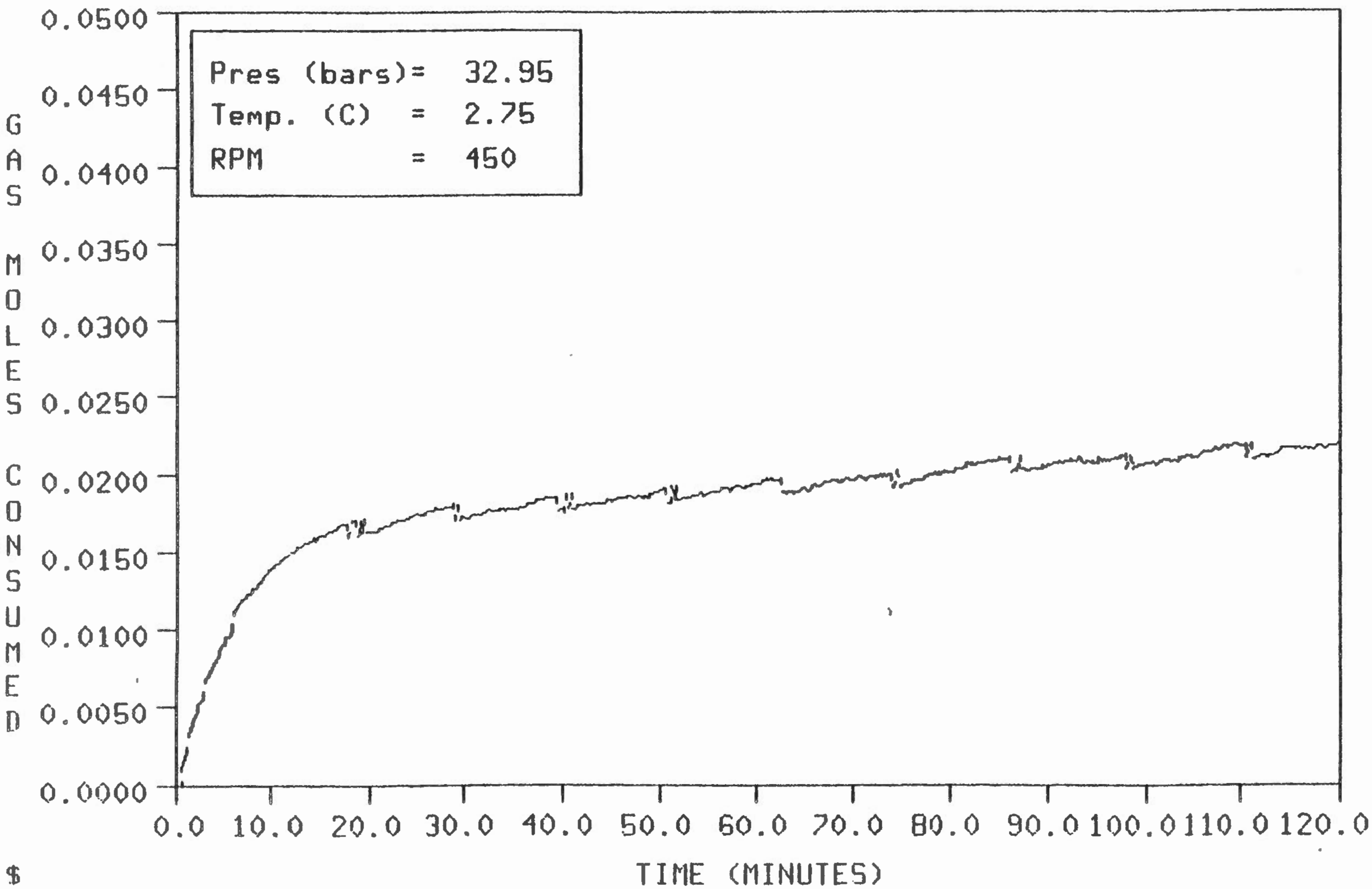

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-26__85/07/09
Pres (bars)= 48.58
Temp. (C) = 2.75
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-27__85/07/10



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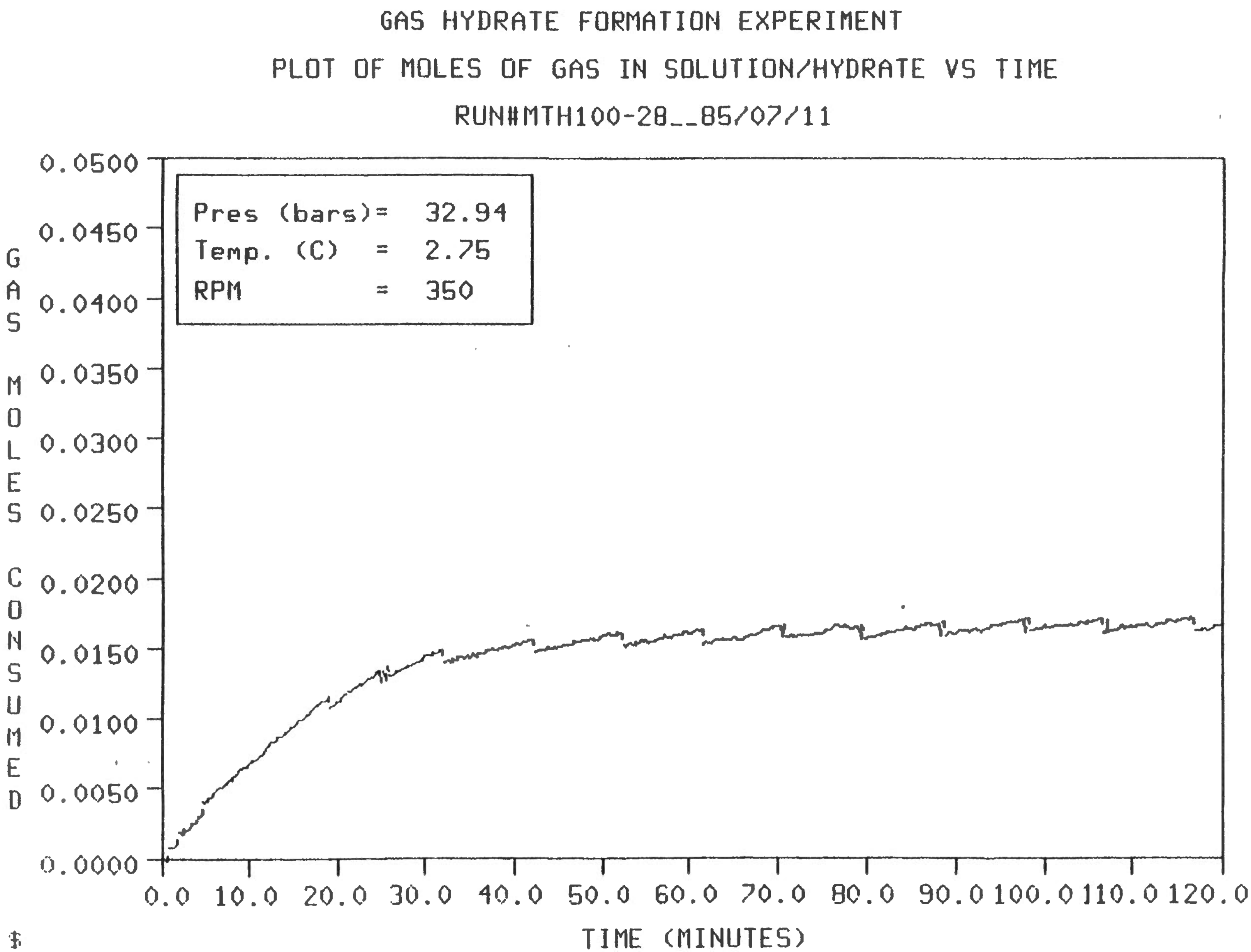
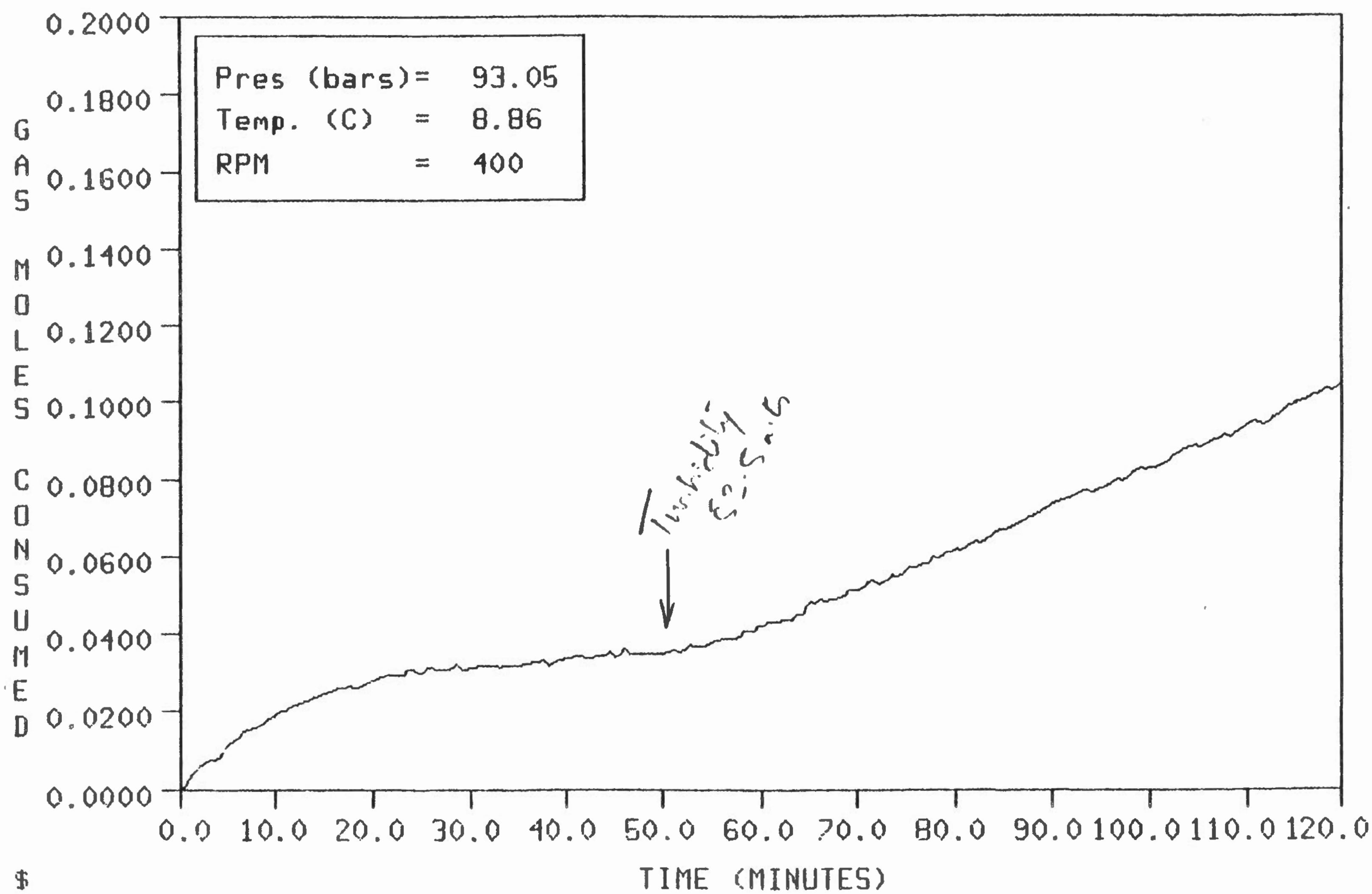

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-28__85/07/11
Pres (bars)= 32.94
Temp. (C) = 2.75
RPM = 350
GAS MOLES CONSUMED
0.0500
0.0450
0.0400
0.0350
0.0300
0.0250
0.0200
0.0150
0.0100
0.0050
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 80.0 90.0 100.0 110.0 120.0
TIME (MINUTES)

$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

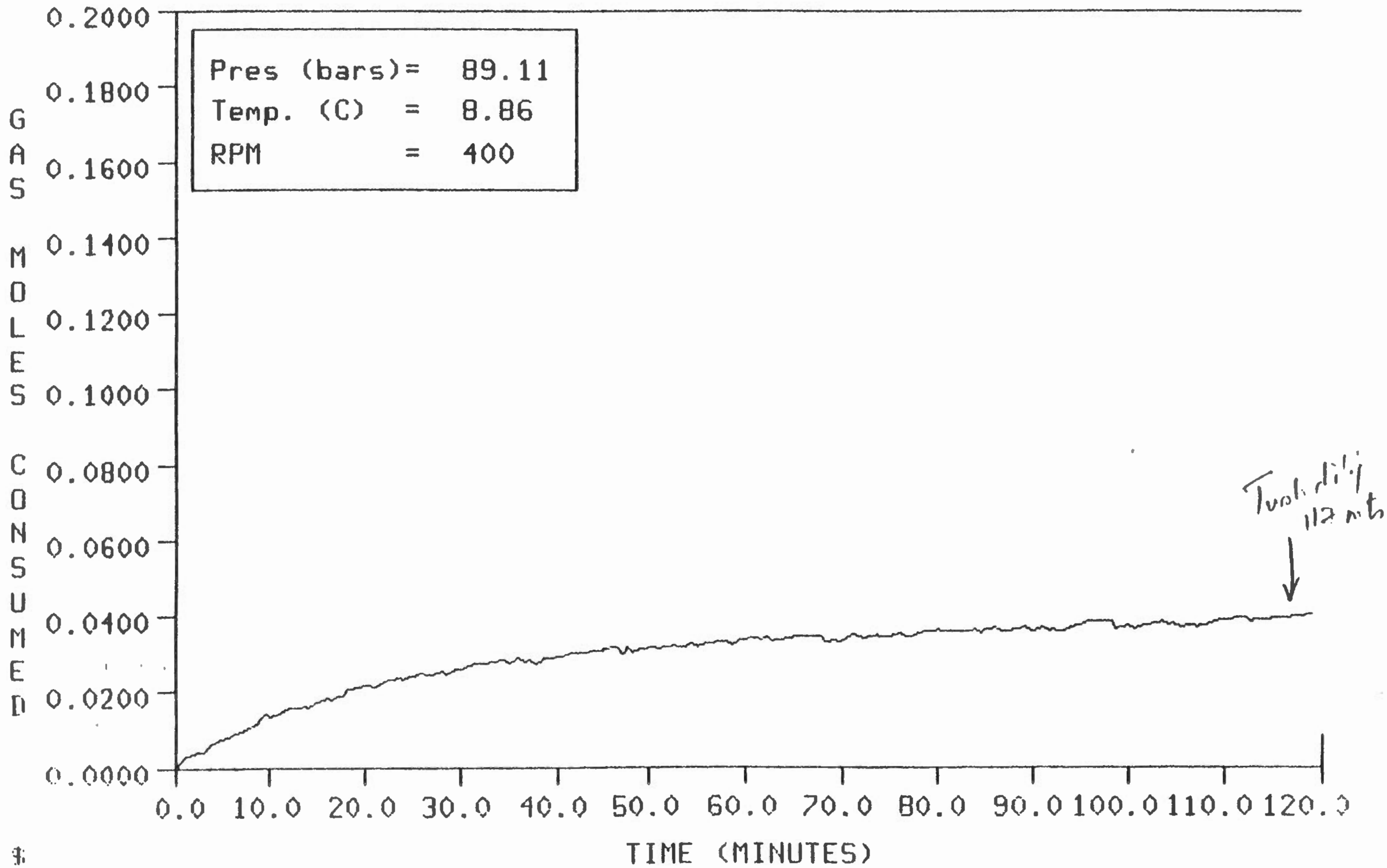
RUN#MTH100-29__85/07/17

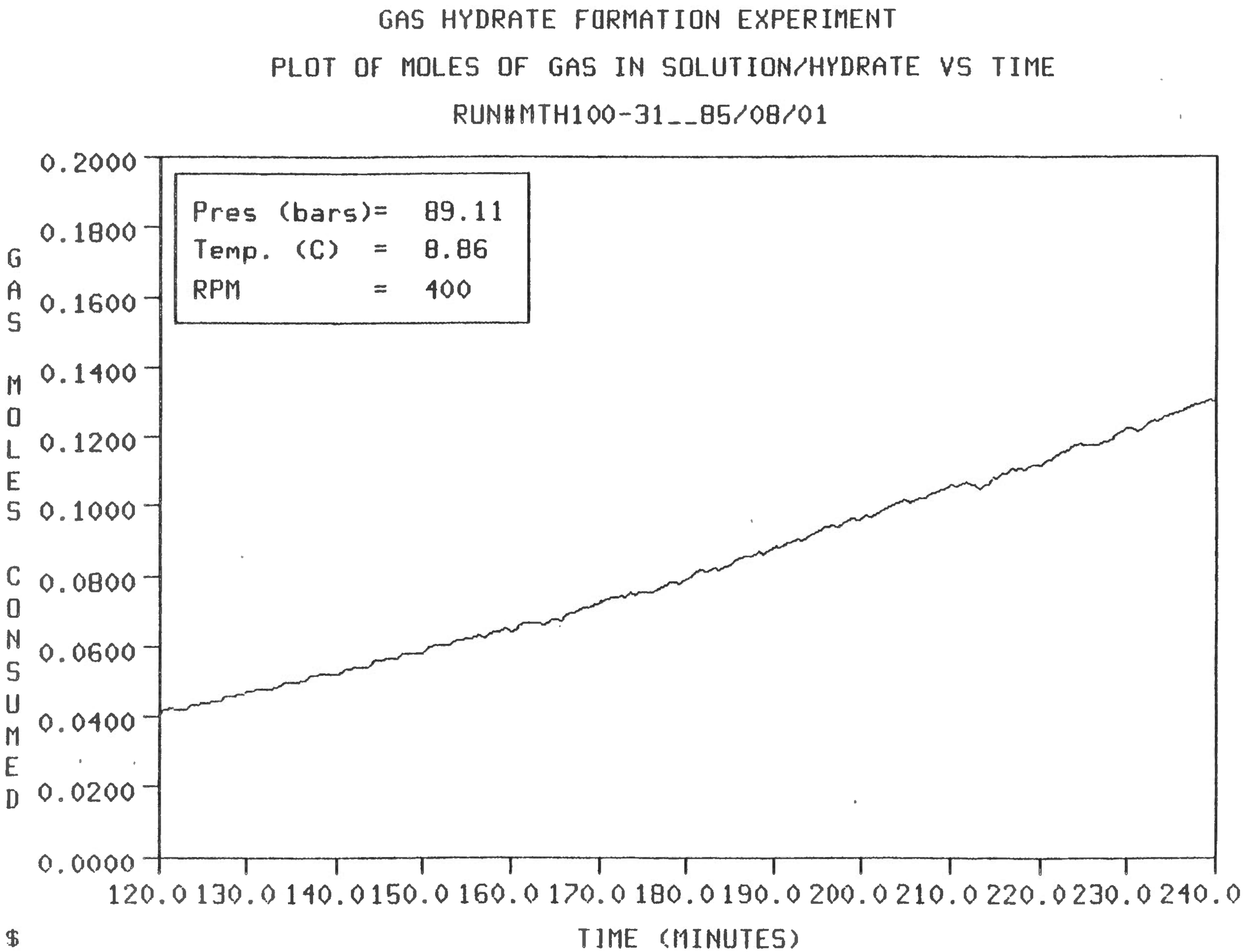


GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-31__85/08/01



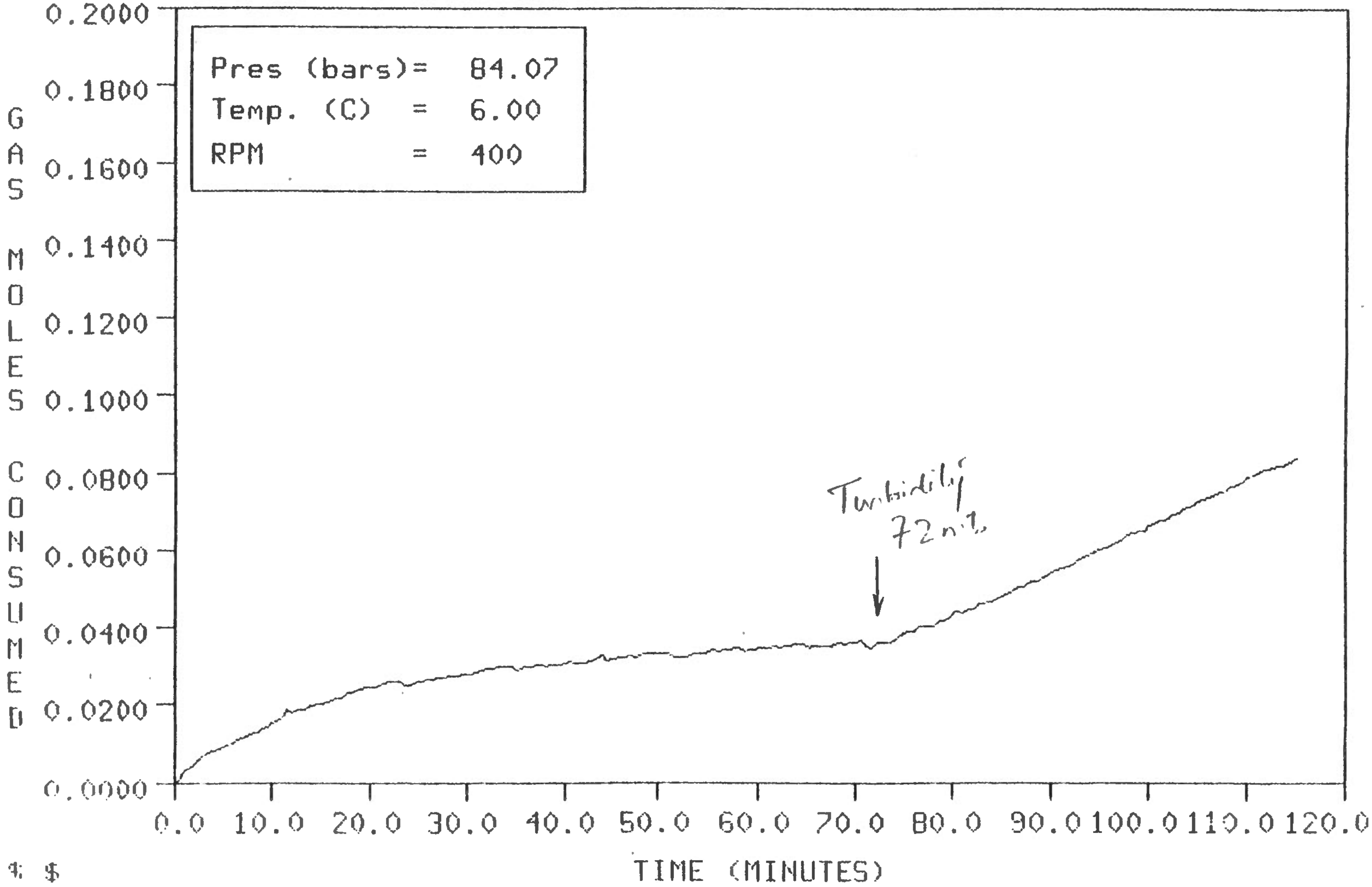

GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-31__85/08/01
Pres (bars)= 89.11
Temp. (C) = 8.86
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
120.0 130.0 140.0 150.0 160.0 170.0 180.0 190.0 200.0 210.0 220.0 230.0 240.0
TIME (MINUTES)

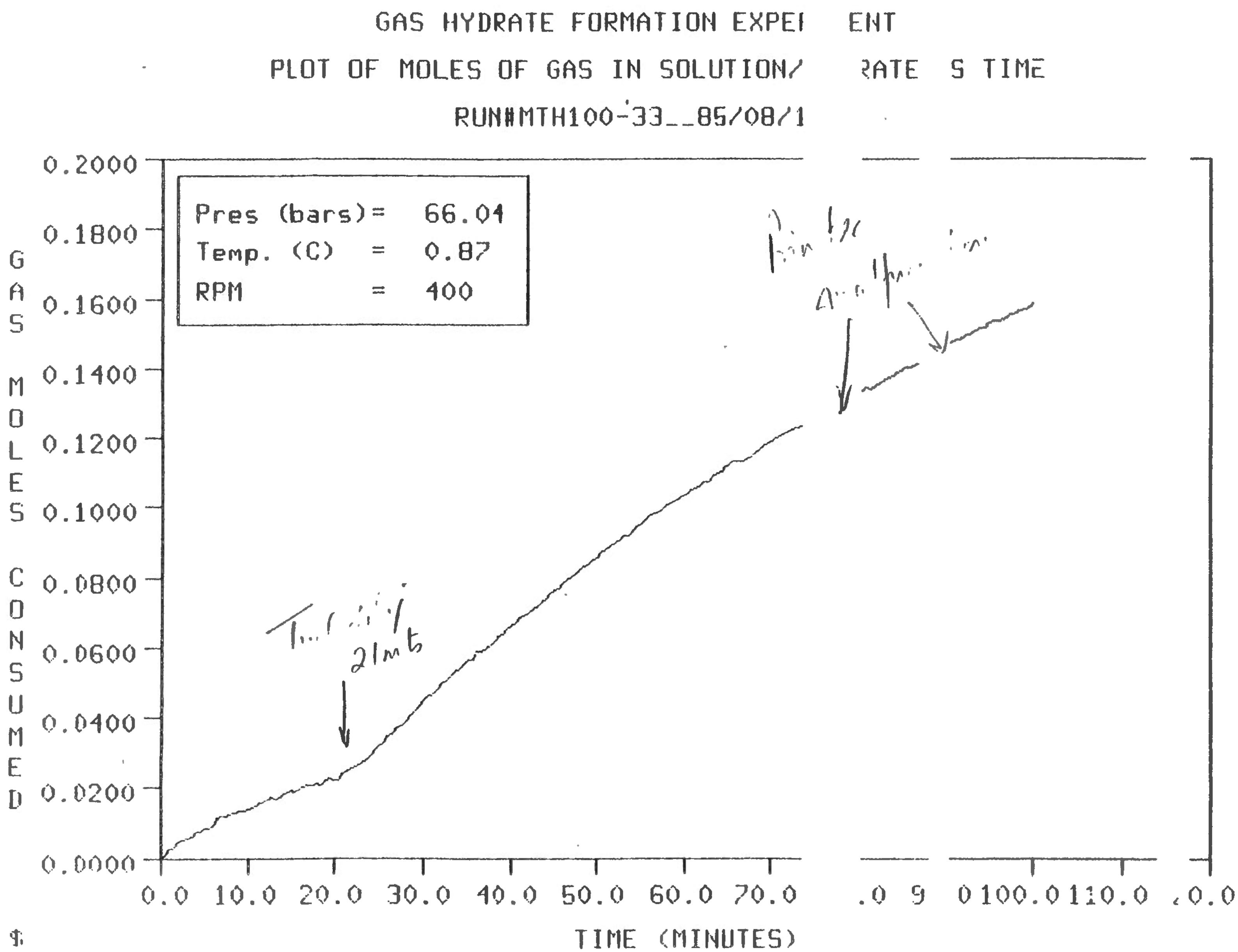
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-32__85/08/09





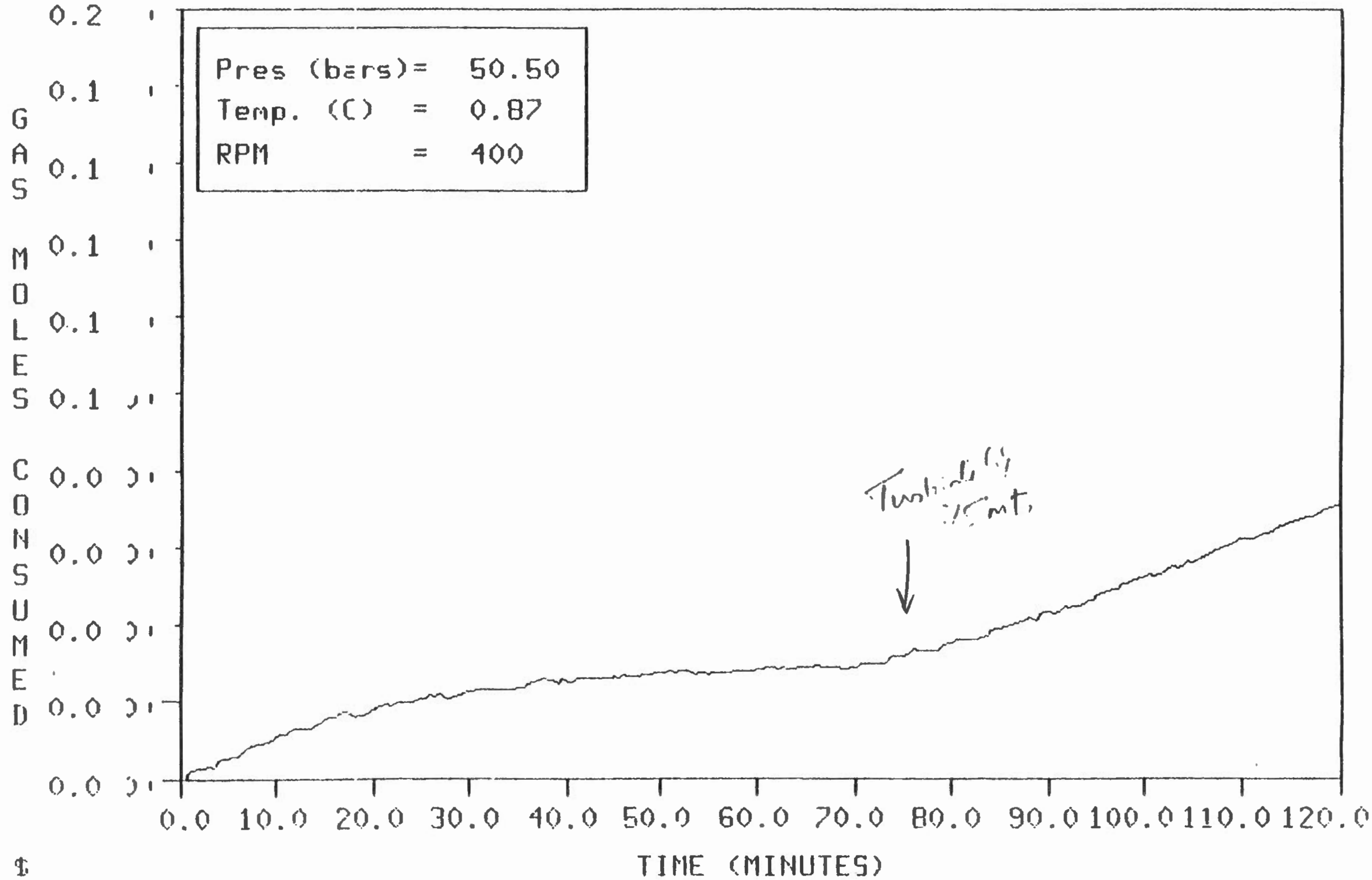
GAS HYDRATE FORMATION EXPEI ENT
PLOT OF MOLES OF GAS IN SOLUTION/ RATE S TIME
RUN#MTH100-33__85/08/1
Pres (bars)= 66.04
Temp. (C) = 0.87
RPM = 400
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
0.0 10.0 20.0 30.0 40.0 50.0 60.0 70.0 .0 9 0 100.0 110.0 .0.0
TIME (MINUTES)
21mts

$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

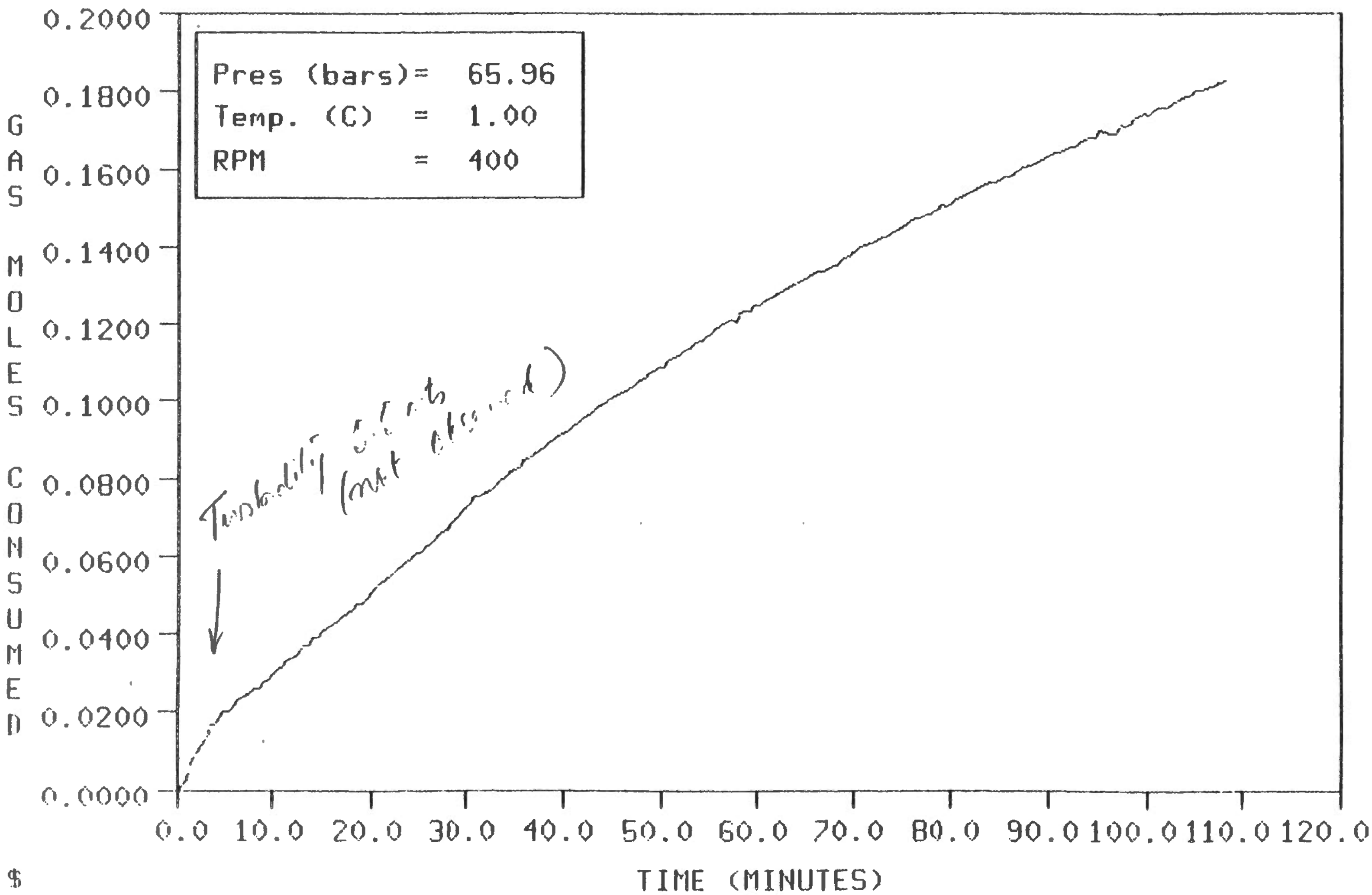
RUN#MTH100-34__85/08/13



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-35__85/08/14

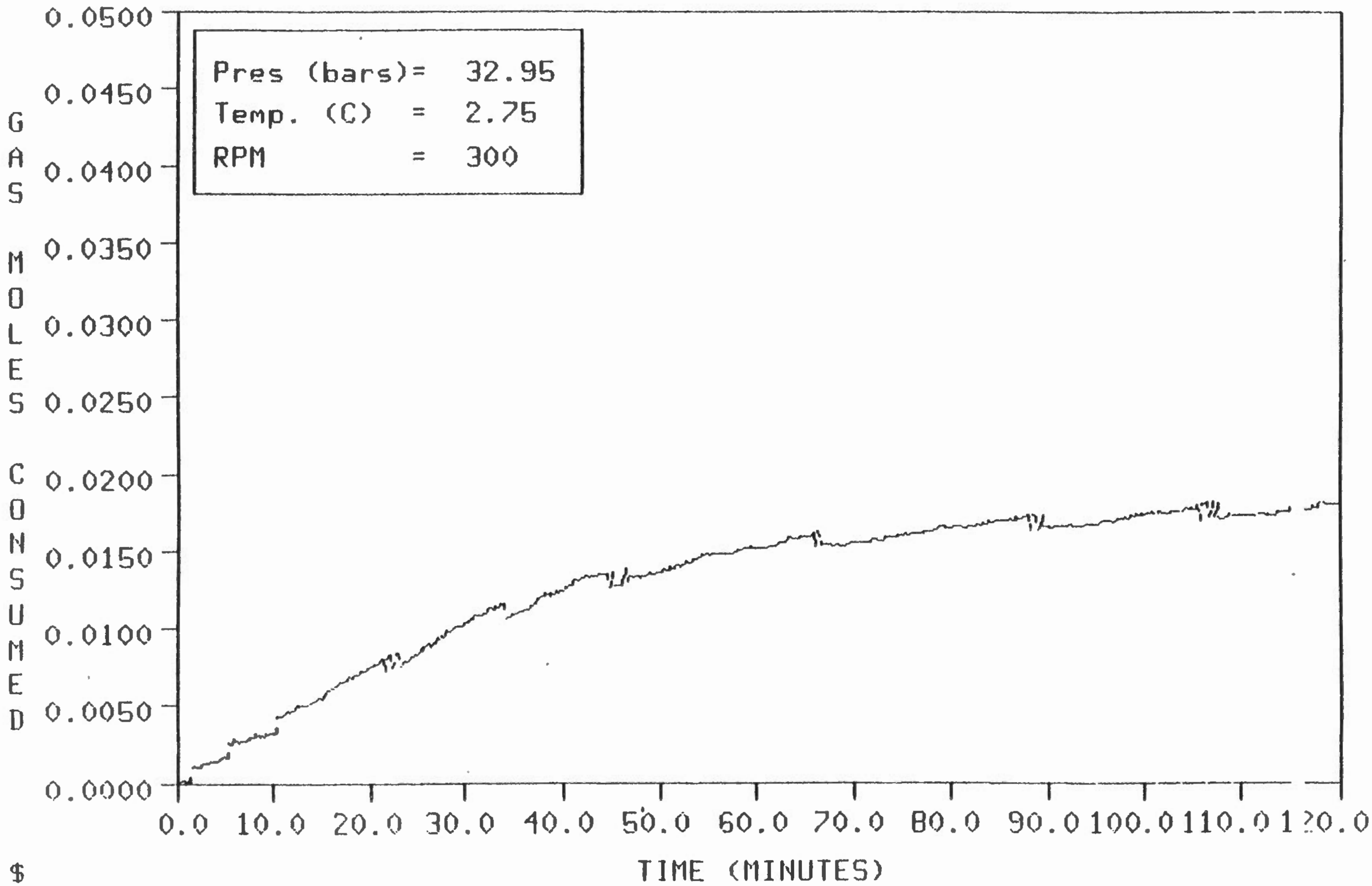


$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

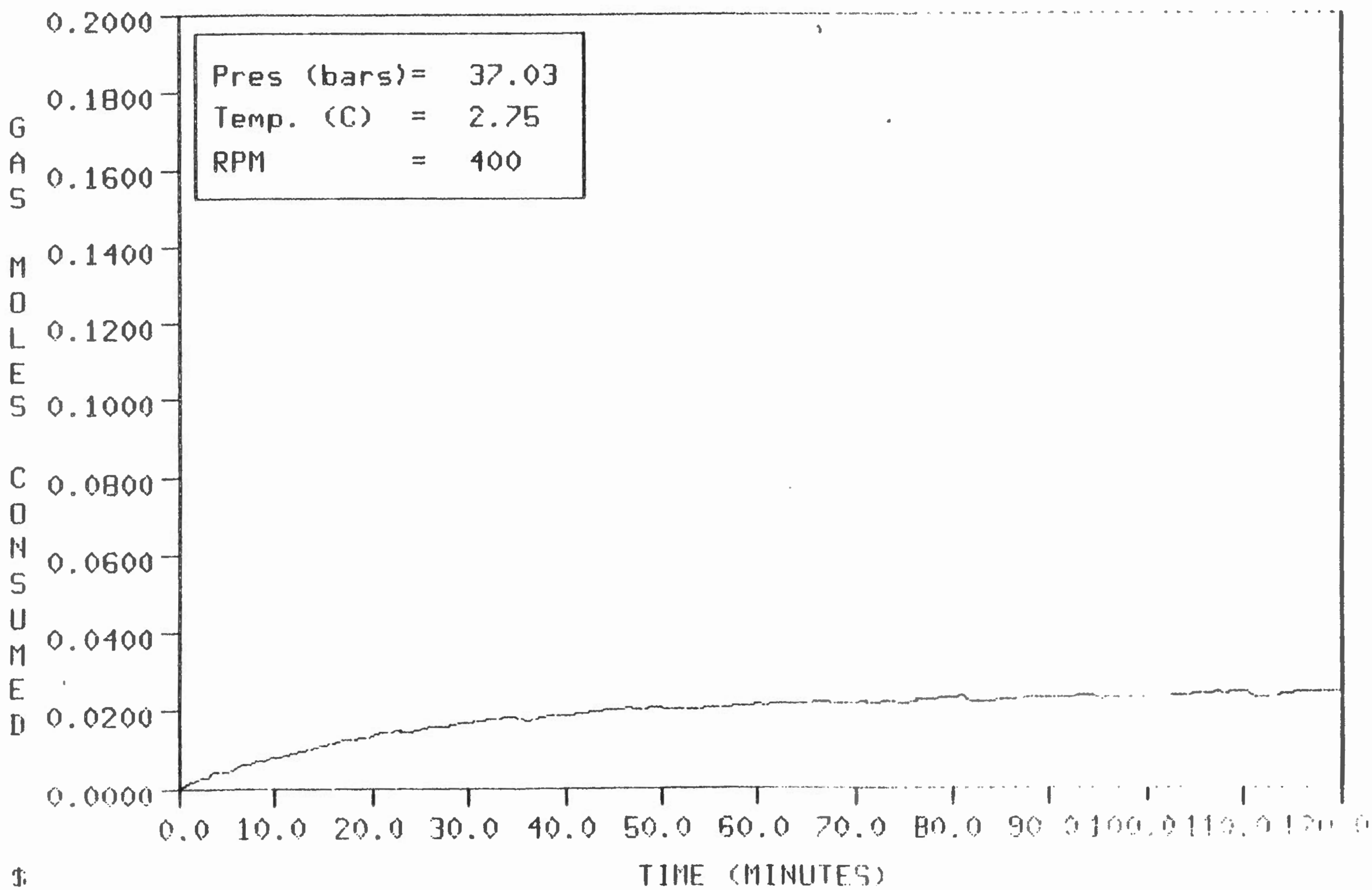
RUN#MTH100-36__85/08/15



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

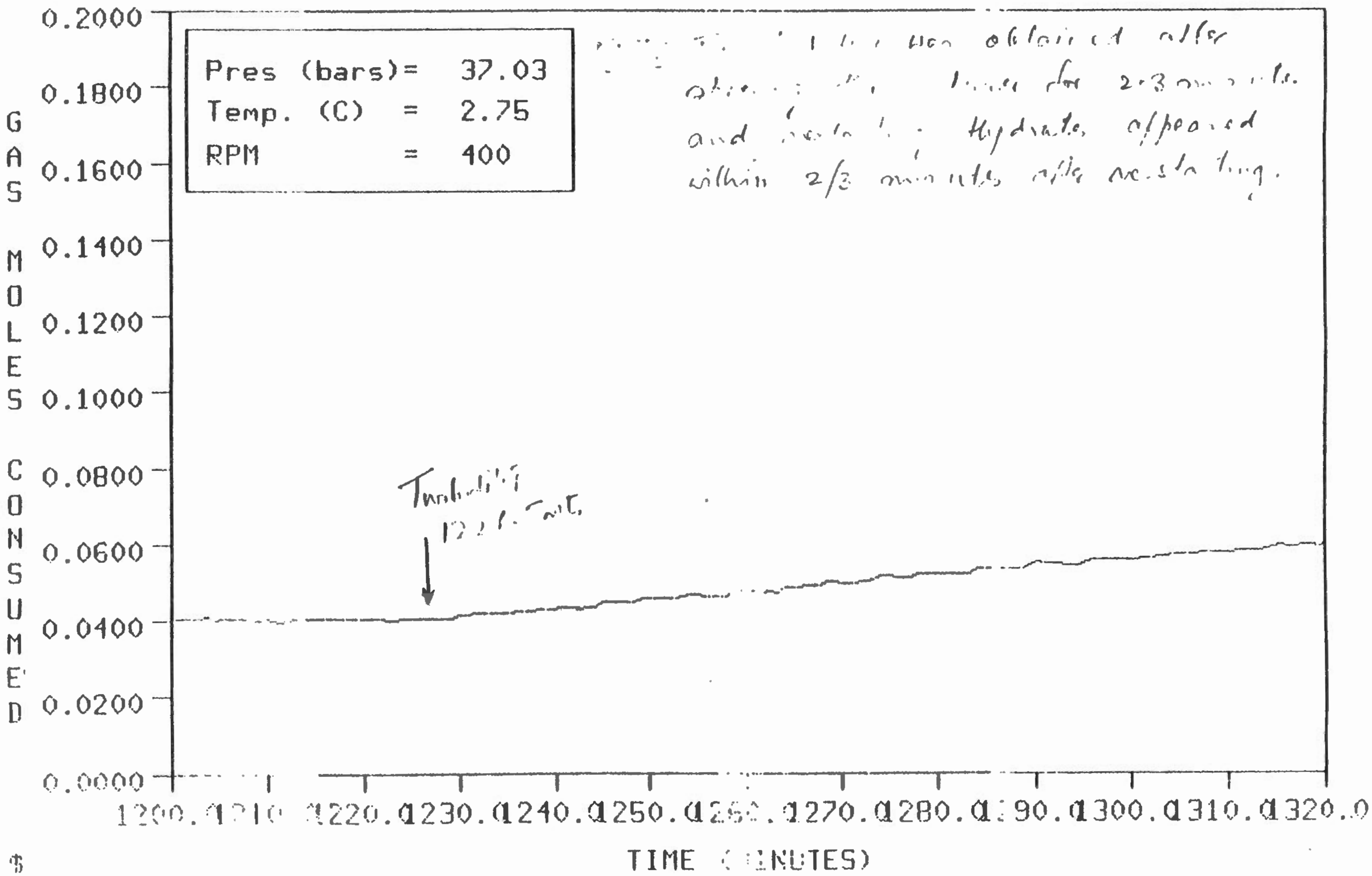
RUN#MTH100-39__85/08/20



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-3 85/08/20

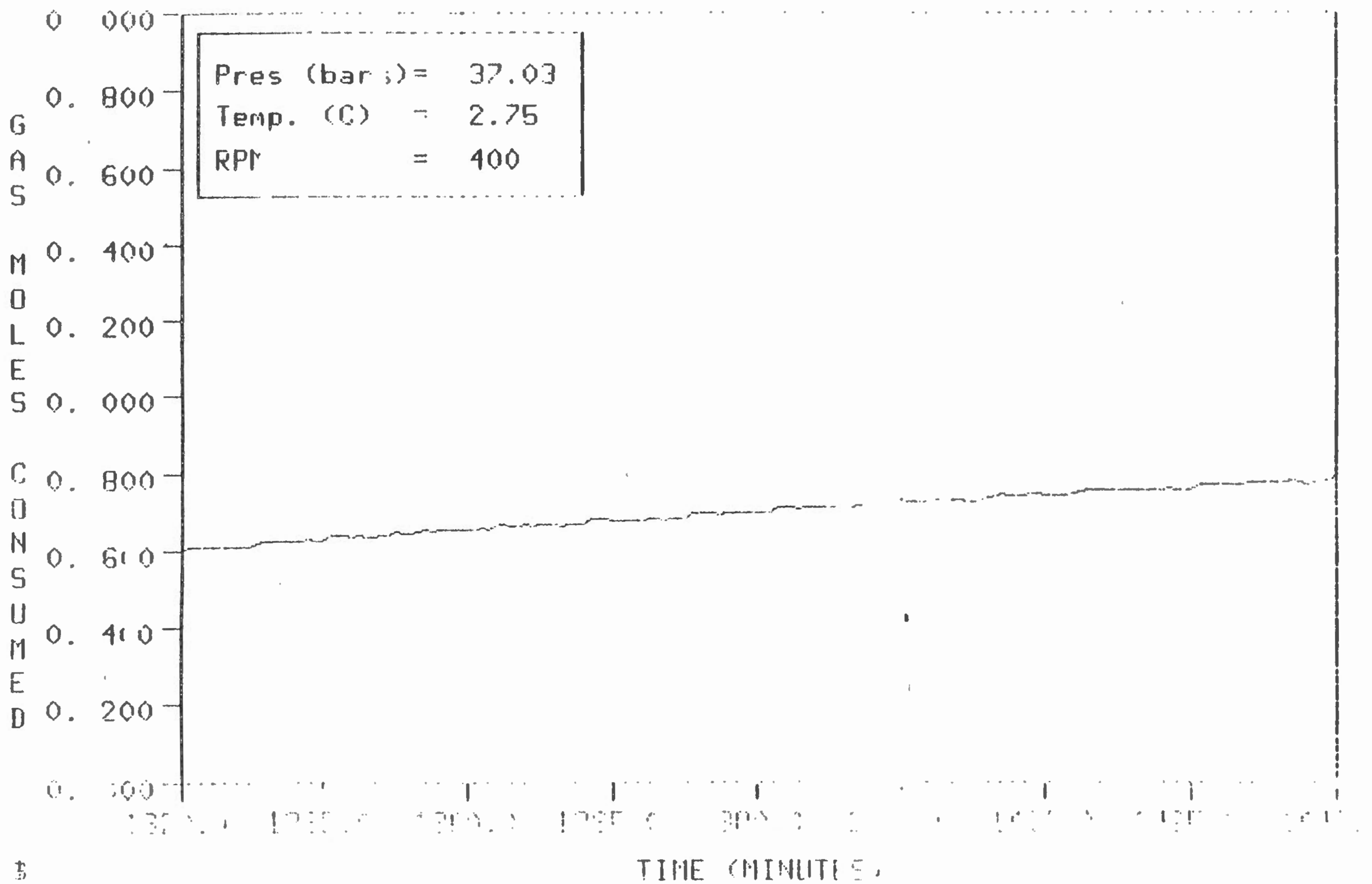


$

GAS HYDRATE FORMATION EX[illegible]

PLOT OF MOLES OF GAS IN SOLUTI[illegible] TE VS TIME

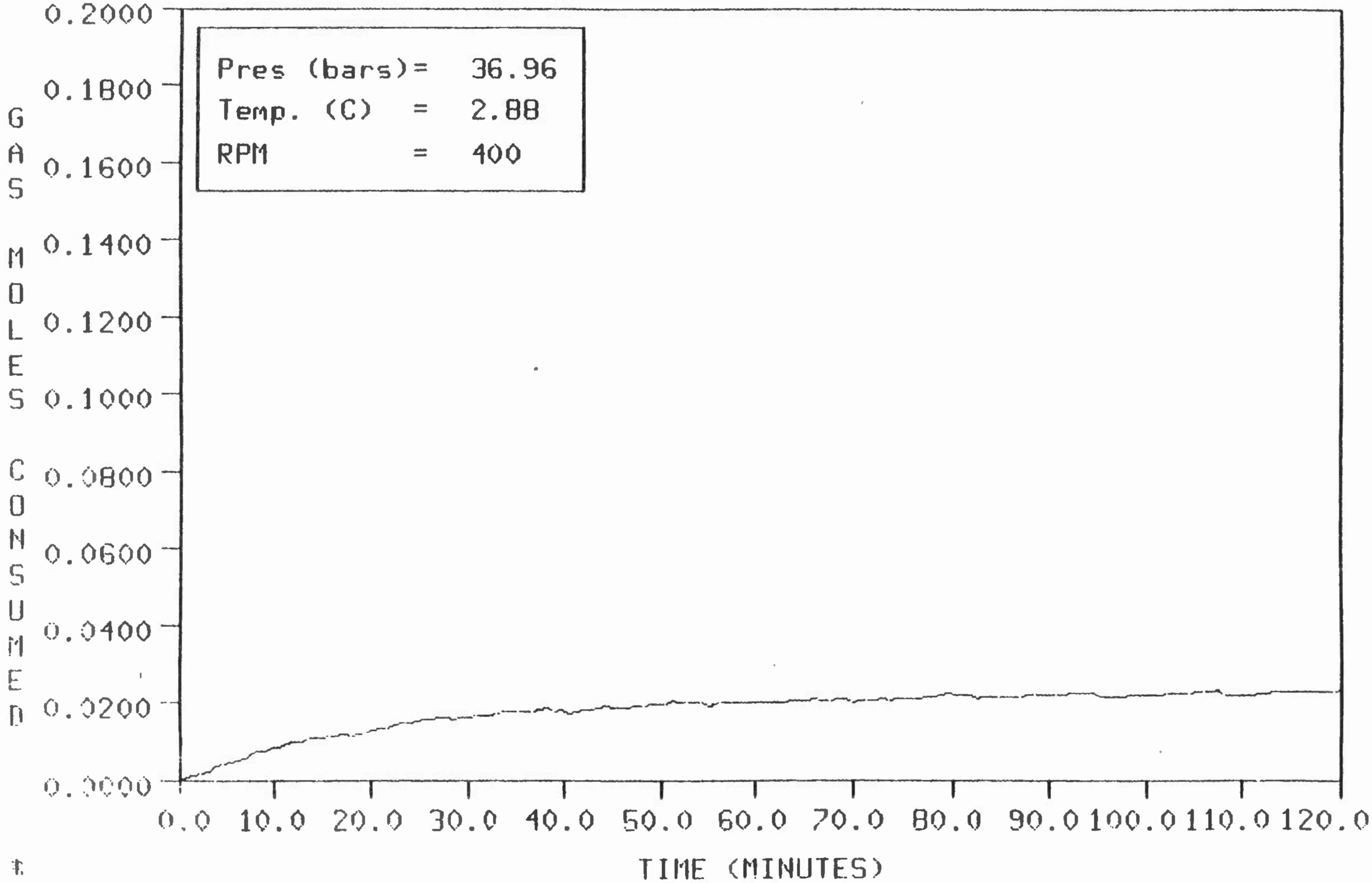
RUN#MTH100-39_ _85/03[illegible]



GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

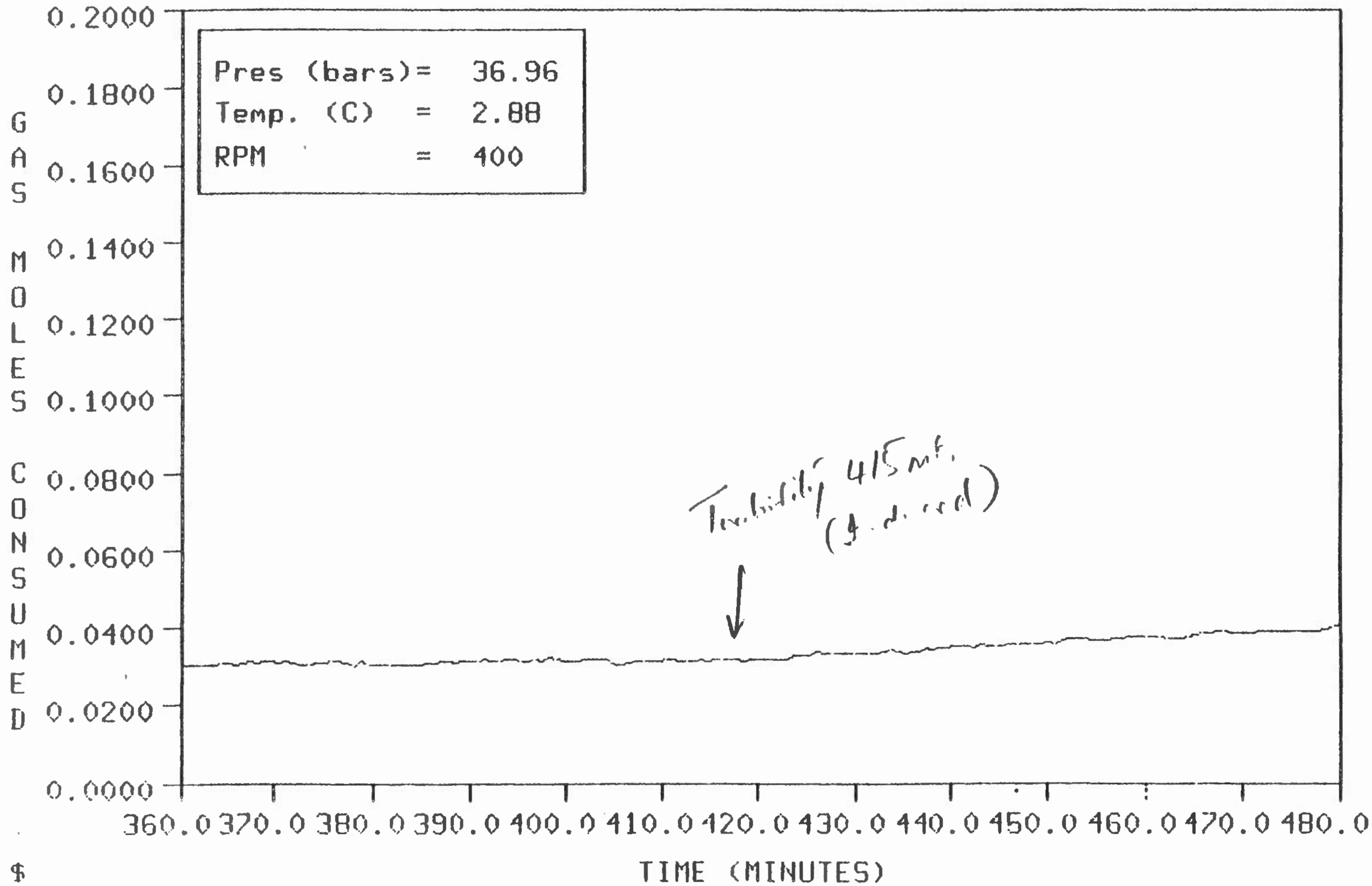
RUN#MTH100-40__85/08/23

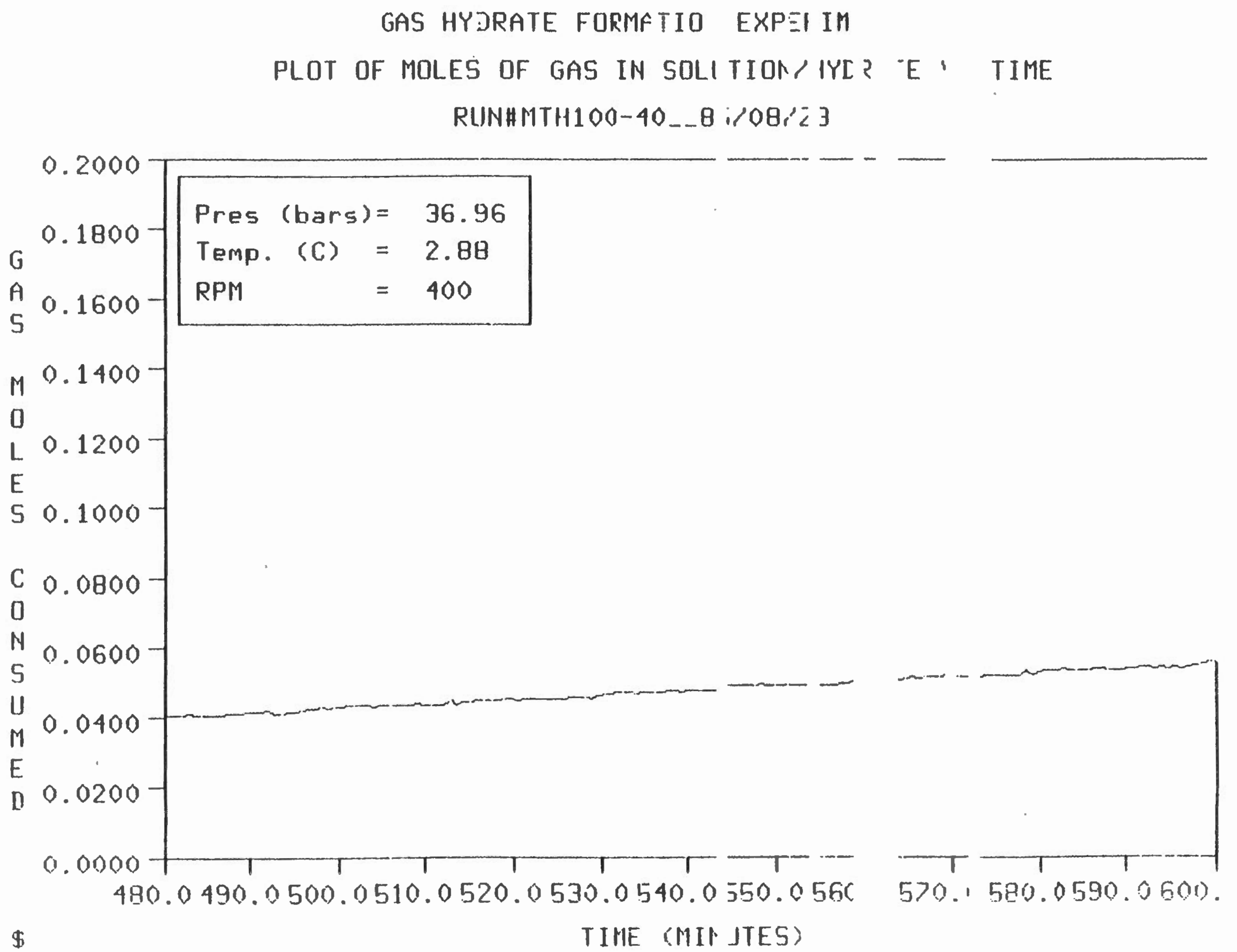


GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

RUN#MTH100-40__85/08/23

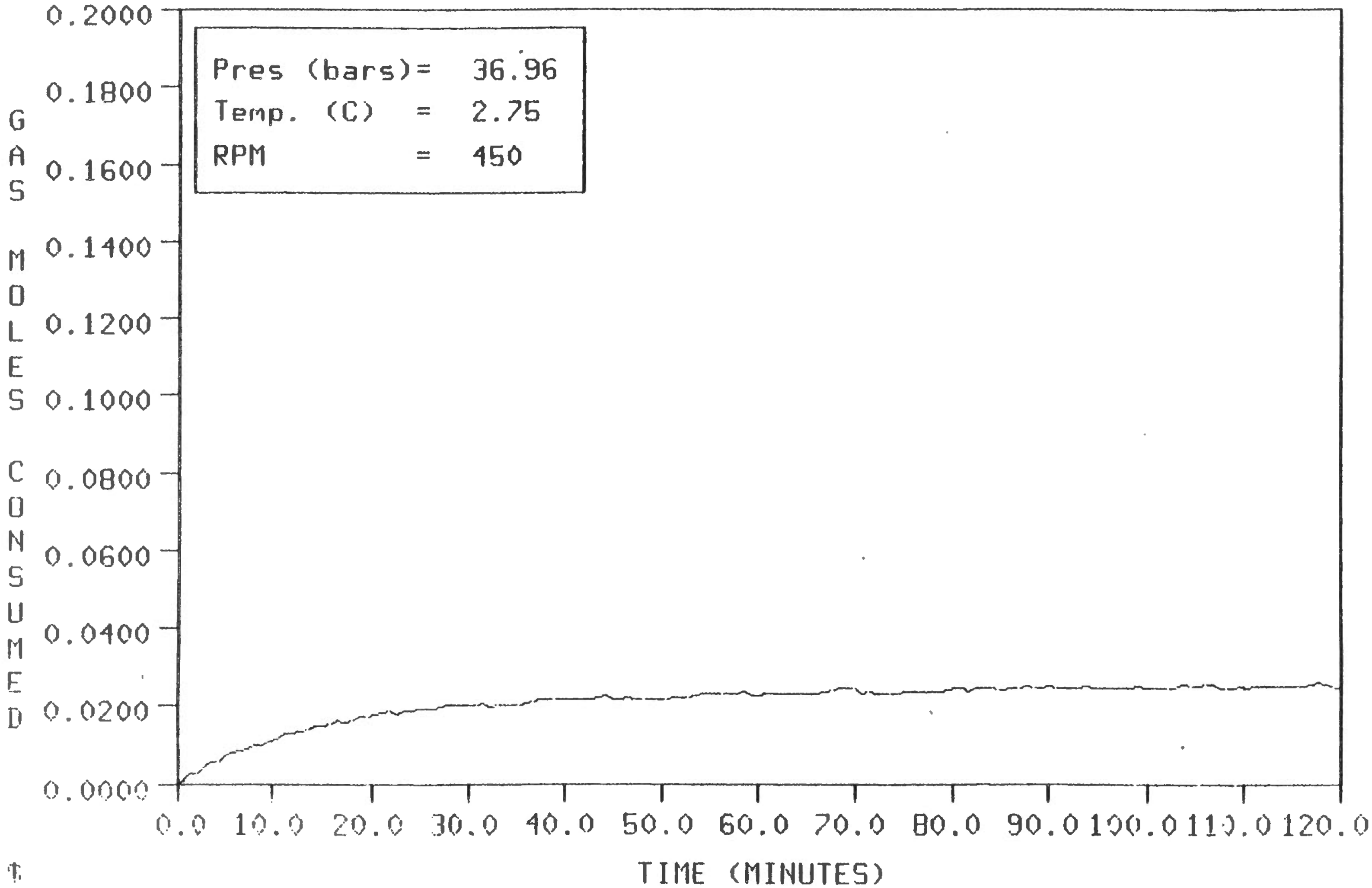



GAS HYDRATE FORMATIO EXPE IM
PLOT OF MOLES OF GAS IN SOL TION/ YD E TIME
Pres (bars)= 36.96
Temp. (C) = 2.88
RPM = 400
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
GAS MOLES CONSUMED
480.0
490.0
500.0
510.0
520.0
530.0
540.0
580.0
590.0
TIME
$

GAS HYDRATE FORMATION EXPERIMENT

PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME

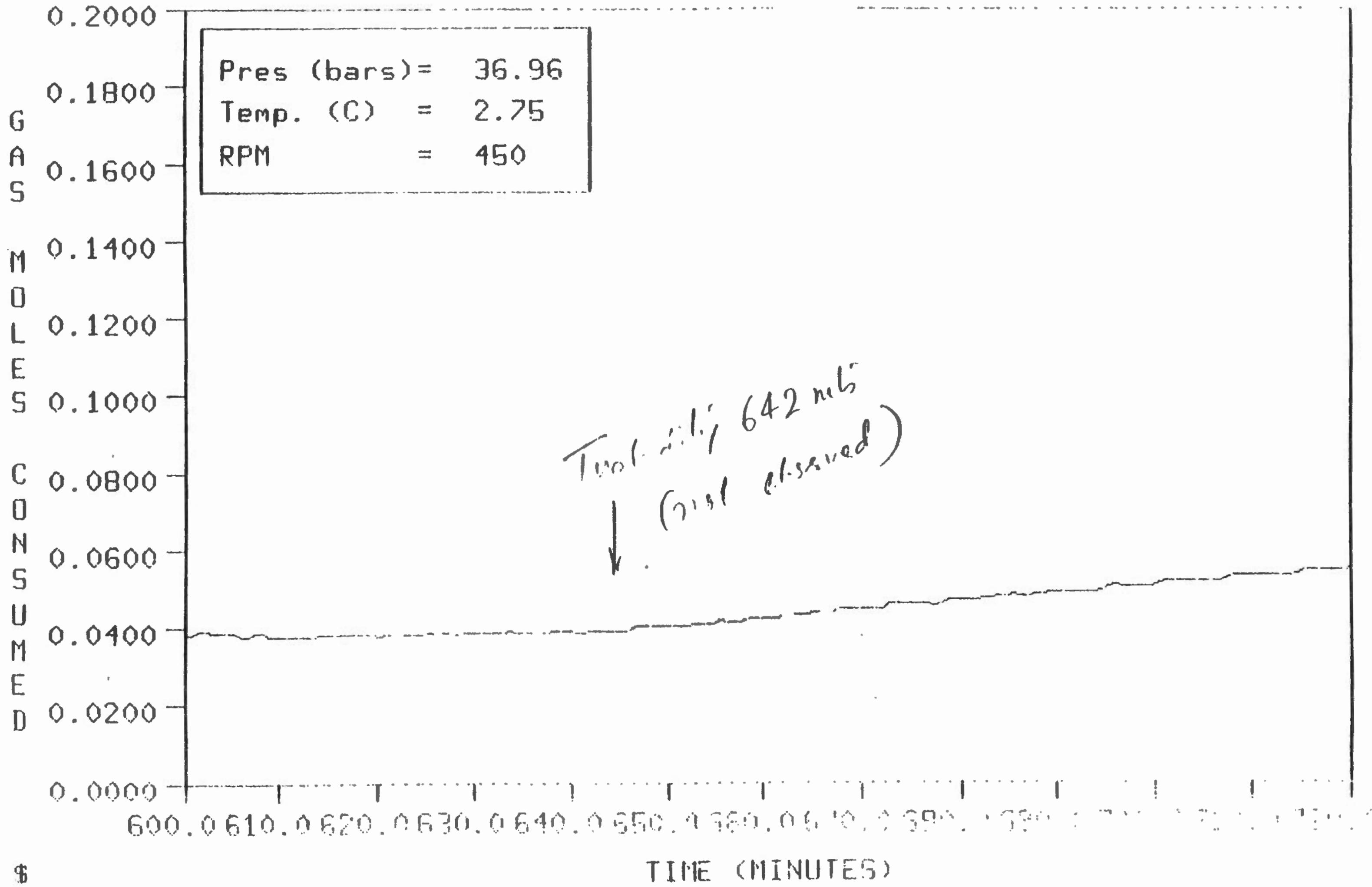
RUN#MTH100-41__85/08/26

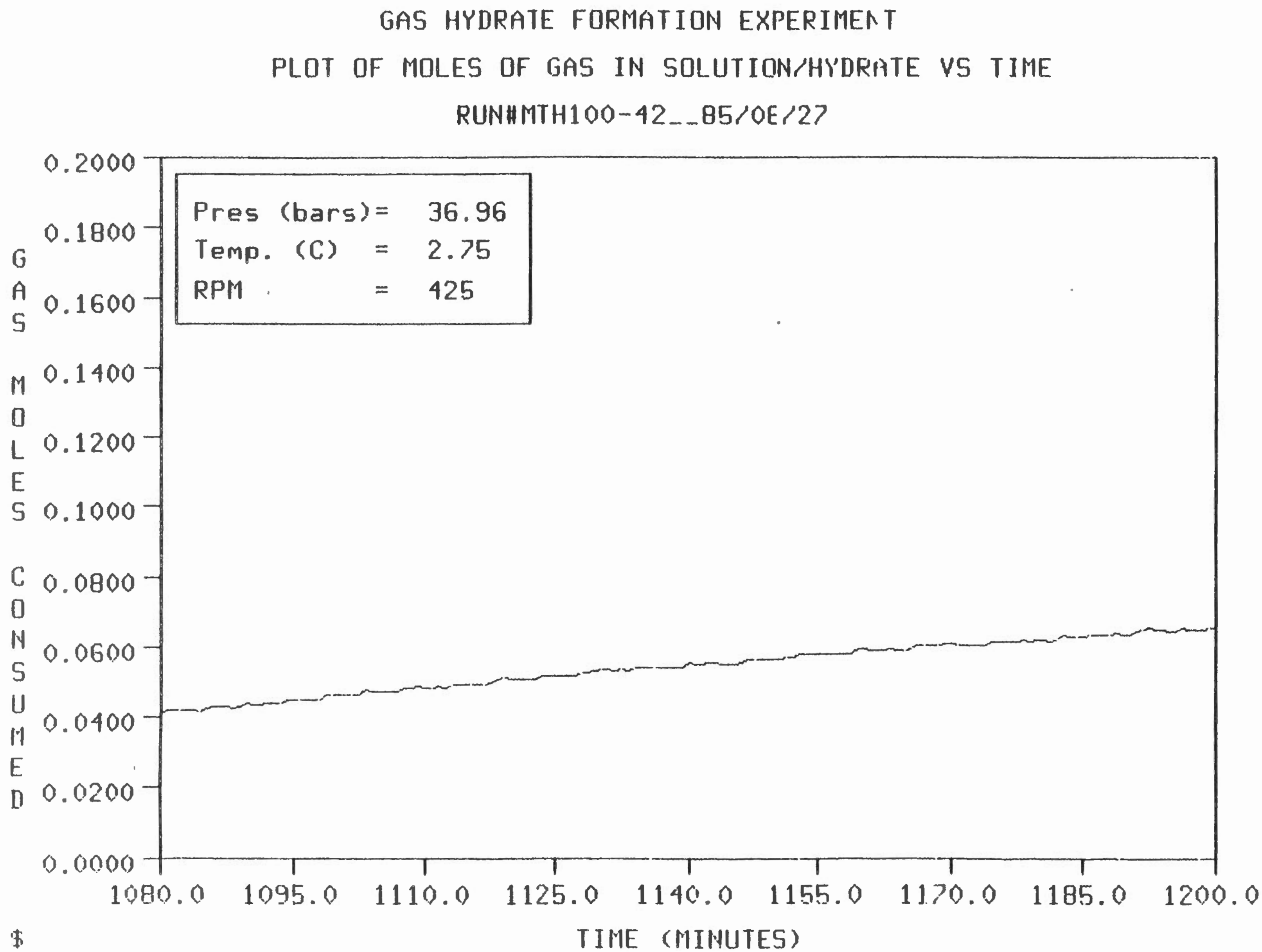


GAS HYDRATE FORMATIO PERIMENT

PLOT OF MOLES OF GAS IN SOL N/HYDRATE VS TIME

RUN#MTH100-41 3/26




GAS HYDRATE FORMATION EXPERIMENT
PLOT OF MOLES OF GAS IN SOLUTION/HYDRATE VS TIME
RUN#MTH100-42__85/0E/27
Pres (bars)= 36.96
Temp. (C) = 2.75
RPM = 425
GAS MOLES CONSUMED
0.2000
0.1800
0.1600
0.1400
0.1200
0.1000
0.0800
0.0600
0.0400
0.0200
0.0000
1080.0
1095.0
1110.0
1125.0
1140.0
1155.0
1170.0
1185.0
1200.0
TIME (MINUTES)
$