

NEWS BULLETIN

DEPARTMENT OF MINES, OTTAWA, CANADA

MINES BRANCH

Memorandum Series

DEPARTMENT OF MINES

Number 37

OTTAWA - CANADA

COKE AS A FUEL FOR DOMESTIC PURPOSES

by
C. E. Baltzer

SYNOPSIS.

COKE AS A FUEL

FOR DOMESTIC PURPOSES

by

C. E. Baltzer

Notwithstanding the weather just ahead, our heating stoves are still with us, and therefore, a short talk on "Coke as a Fuel for Domestic Purposes" may yet be of interest to you.

During the past few years there has been a marked increase in the use of coke for domestic purposes, and this fact has led to become a serious rival of anthracite, which has long been regarded as the standard fuel for this purpose at least, in the provinces of Ontario and Quebec. The demand for coke was primarily stimulated by the recurrent shortages of anthracite and the high prices secured for this fuel, and since then, in a certain measure, by other considerations.

Memorandum Series
No. 37

March, 1929.

Prepared by _____, Chief, Mines Branch, Ottawa, Ontario.

MINES BRANCH
LIBRARY

This document was produced by scanning the original publication.
Ce document est le produit d'une numérisation par balayage de la publication originale.

MINES BRANCH

DEPARTMENT OF MINES, OTTAWA, CANADA

Memorandum Series

March, 1929

Number 37

COKE AS A FUEL FOR DOMESTIC PURPOSES *

by

C. E. Baltzer **

INTRODUCTORY.

Notwithstanding the approach of Spring, with the promise of warmer weather just ahead, our heating worries are still with us, and therefore, a short talk on "Coke as a Fuel for Domestic Purposes" may yet be of interest to you.

During the past few years there has been such a marked increase in the use of coke for domestic purposes, that this fuel bids fair to become a serious rival of anthracite, which has long been regarded as the standard fuel for this purpose at least, in the provinces of Ontario and Quebec. The demand for coke was primarily stimulated by the recurrent shortages of anthracite and the higher prices demanded for this fuel, and since then, in a certain measure, by better appreciation and understanding, on the part of the householder, of its merits and use as a domestic fuel.

* Prepared for broadcasting through Radio Station C. N. R. O., Ottawa, March 25th., 1929, with the approval of B. F. Haanel, Chief, Division of Fuels and Fuel Testing - by permission of the Director, Mines Branch.

** Assistant Engineer, Division of Fuels & Fuel Testing.

A few years ago when coke was not so well known for this purpose many people were, without due cause, prejudiced against its use. Happily, this prejudice, to a large extent, has been turned to praise by most people who have given coke fuel a fair trial, a fact which augurs well for its increased popularity.

COKE A SUBSTITUTE
FOR ANTHRACITE.

In general, it may be said, that of all fuels available as substitutes for American Anthracite, coke is, so far as we know, the best for Canadian conditions when all the factors concerned are taken into consideration. It has none of the disadvantages that the public associate with its use, except its greater bulk, which should not be a serious drawback, provided the heater in which it is used has a firebox of ample capacity. Coke is a clean, smokeless fuel; more readily adapted for use in present house heating equipment than any other substitute; and, contrary to general opinion, it will last as long in a fire as the same weight of anthracite coal, requiring no more attention than anthracite coal, when properly used; and in addition, may be obtained at a lower price than the domestic sizes of anthracite. For these reasons an increasing number of householders prefer it to anthracite for both heating and cooking purposes.

TWO KINDS OF COKE.

Coke is the solid residue resulting from the dry distillation of soft coals of certain classes. It consists chiefly of carbon and ash which remains after the volatile gases have been distilled from the raw coal, and is produced either in retorts or ovens. Retort coke is sometimes called gas house coke, or more commonly gas coke; while oven coke, which is produced either in beehive or by-product ovens, is commonly called metallurgical or by-product coke. When gas is made by the retort method, gas coke is produced, a certain amount of which is available for domestic use. Generally speaking,

with this process gas is the primary product, and the resultant coke is really a by-product which is usually disposed of locally. On the other hand, with the beehive or the by-product oven process, coke is the primary object, and the gas and other products are incidental to the production of coke.

DIFFERENCES IN GAS
AND BY-PRODUCT COKES.

Although coke made by these various processes from any given coal will be chemically very similar, there exists a difference in physical characteristics, which is of great importance. Absence of volatile matter in coke fuels makes them harder to ignite than bituminous or semi-bituminous coals; moreover, due to the harder and denser structure of by-product coke it is more difficult to ignite than gas coke. These properties also enable by-product coke to withstand a great deal of handling without appreciable breakage and production of fines, and to hold a fire for a longer period than gas coke. Furthermore, in the use of gas coke closer furnace regulation will be required than with by-product coke. In general, however, these two cokes behave in exactly the same manner when burned in the ordinary domestic furnace, with the exception that gas coke will ignite a little more readily and will burn more freely than by-product coke.

CHARACTERISTICS
OF COKE.

Coke is a light porous fuel, having a weight per cubic foot of a little more than half that of American Anthracite, and a heating value equal to the anthracite now being sold in Ontario. It is evident, therefore, that in order to supply the same amount of heat, the volume of coke charged to the furnace at one time must be about twice that of anthracite. Coke fuel ignites much more readily, and forms a more porous fuel bed than anthracite, and therefore, when once burning freely, requires less draught to support combustion. Furthermore, it may be said that the characteristics of coke fuel just mentioned have a very definite bearing on the design and operation of

the heater in which it is to be burnt.

FURNACE BEST SUITED
TO COKE

On account of the large volume of coke fuel which it is necessary to charge into the heater at one time, the hot-air furnace is better suited for burning this fuel than the hot-water boiler, since the main difference between the two heaters, so far as the burning of coke is concerned, is that in the hot-air furnace, with a high radiation dome above the fire-pot, there is more space for fuel than in the hot-water boiler, which has the first water section resting directly on top of the fire-pot, in which position it is close to the top of the fire. Furnaces equipped with a coil over the fire-pot for heating the domestic hot water supply should have this coil removed or placed as high as possible above the fuel bed, before an attempt is made to burn coke in them, otherwise, there will not be sufficient room to charge the quantity of fuel required for one eight-hour fire period, which is the usual interval allowed between firings.

USE OF COKE.

When using either gas or by-product coke the same general method of procedure is followed as when burning anthracite coal, except that the draughts are kept more nearly shut, and a thin layer of ashes, 3 or 4 inches thick, is allowed to remain on the grates in order to protect them, and to reduce still further the draught through the fuel bed. When building a coke fire use paper and kindling in the usual manner, and when this is burning briskly charge 3 or 4 shovelfuls of coke directly on top of the burning wood, leaving the draughts and fire-door grid wide open until this coke is well ignited. Then completely fill the fire-pot with coke - all it will hold - and wait until blue flames appear over the top of the fuel bed. Immediately on the first showing of red through the fuel bed regulate the dampers

so that the fire will supply a steady heat output to keep the house comfortable for the weather conditions prevailing. Such a fire should last for eight hours without further attention.

When the fire needs replenishing, first open the draughts, then gently shake or rock the grates until a red glow appears in the ash-pit, and again completely fill the fire-pot with coke. If, however, very little live fuel remains on the grates after shaking, it will first be necessary to fire a small quantity of coke and let it become well ignited before putting in the main charge, after which proceed as before mentioned.

In order that a coke fire will last for a long time it is necessary to completely fill the fire-pot and combustion space with coke. Since no two heaters have exactly the same operating characteristics, no hard and fast rules can be given for the draught settings. Therefore, some experimentation is necessary in order to determine the proper settings for each installation. However, by using a little care the most suitable conditions can readily be found.

RULES.

If the following simple rules are followed with ordinary care, the use of coke should give complete satisfaction, provided there are no existing peculiarities in your particular heating system which militate against the use of this fuel. Of course, in giving these instructions it must be assumed that you have a heating plant of proper size, properly installed.

- (1) Buy only clean, uniformly-sized coke - never mix different grades of coke. For small fire-pots the coke should be about nut size, whereas for larger fire-pots stove or egg size may be satisfactorily used.
- (2) Regular attention should be given to the fire, preferably by only one member of the family.
- (3) At all times carry a deep fuel bed; when firing, completely fill

the fire-pot. Do not be afraid to pile the coke in. It is a mistaken idea to assume that a low fire effects an economy. The chances are that you will burn more coke by being niggardly about it than you will by being generous.

- (4) After the fire is started use as little draught as possible, consistent with the combustion rate necessary for the prevailing weather conditions.
- (5) Keep two or three inches of ashes on the grates, and in mild weather increase the depth of this layer. This serves to protect the grates and also to reduce the draught through the fuel bed.
- (6) Do not shake your fire too often, too long, or too violently, especially in mild weather. Generally, one shaking a day is sufficient, except in extreme weather.
- (7) Keep the ash-pit clear of ashes to protect the grates from being warped or burned out. The use of coke will not harm your grates, as some people think; nothing will cause your grates to burn out except your own carelessness in not following this instruction.
- (8) Provide means for supplying moisture to the atmosphere of the house. This may be done with hot-air furnaces by keeping the water-pan filled with water; with hot-water boilers other means must be provided, such as placing pans of water on the radiators.

SUMMARY.

To sum up, it may be said that coke is a good domestic fuel, clean and smokeless, having approximately the same heating value as present-day anthracite, and a much greater useful heating value than soft coal, peat, lignite, wood, etc., when used in the average hot-air furnace or hot-water boiler. In addition, coke may be purchased at a lower price than anthracite, and this fact will enable the winter's fuel bill to be reduced. Tests show conclusively that coke has a useful heating value equivalent to anthracite and

is superior to many other fuels when used in domestic furnaces. Coke fuel is bulky, and therefore, if it is required to operate the furnace for eight hours without attention, a large amount of fuel must be fired. If it is required to operate the furnace for twelve hours without attention the firepot should be completely filled. The bin for storing coke fuel must be about double the size required for the same weight of anthracite. Difficulty may at first be experienced in controlling the fire - either it will burn through too quickly, or else it will go out because of too little draught, or because of too thin a fuel bed. The proper draught settings commensurate with the proper combustion rate for the weather conditions prevailing at the time can be determined only by trial. Within limits, however, the smaller the size of the coke used, and the more compact the fuel bed, the more easily the fire can be controlled.

The Mines Branch, Department of Mines, Ottawa, will shortly issue a pamphlet on "The Use of Gas and By-Product Cokes for Domestic Heating Purposes", copy of which may be obtained free on request by those interested.
