

*File*

# FILE COPY

O T T A W A      January 3, 1945.

R E P O R T  
of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1771.

Progress Report on the Investigation  
of Selenium-Coating Methods for Magnesium.

\*\*\*\*\*

(Copy No. 10.)



O T T A W A

January 3, 1945.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1771.

Progress Report on the Investigation  
of Selenium-Coating Methods for Magnesium.

=====

Introduction:

The Canadian Copper Refiners, Limited, of Montreal, Quebec, produce considerable quantities of selenium as a by-product in their copper-refining operations. It is important to them to find uses for this material. Having decided that selenium could be used as a protective coating on metals such as magnesium, aluminium and steel, arrangements were made with these Laboratories to test a considerable number of metal samples coated with selenium.

At a later date it was decided that these Laboratories should attempt to develop improved methods of coating and pre-treatment. The present brief report gives an account of the progress made to date in this investigation.

Experience with various protective coatings on other metals would indicate that the pretreatment of the metal surface before coating is an important factor in determining the



(Introduction, cont'd) -

protective value of the coating. For this reason, emphasis has been laid upon the pretreatment of the magnesium surface in the experimental work which has been performed to date. The "Mangasel" coating treatment has been used in all cases.

Experimental Work:

1. A considerable number of different pretreatment procedures were investigated, using the A.S.T.M. magnesium alloys 18, 11 and 8. The procedures which have given the best results so far are as follows:

For the 18 Alloy -

Pretreatment in ammonium chloride solution.

For the 11 Alloy -

Pretreatment in ammonium chloride solution.

For the 8 Alloy -

Pretreatment in a solution containing triethanolamine citrate and sodium citrate at a pH of 9.

2. Samples of the three alloys, pretreated by the preferred procedures mentioned above and then selenium-coated by the "Mangasel" treatment, were tested by the intermittent corrosion method, using a 5 per cent sodium chloride solution and a temperature of 93° F. (34° C.). At the end of a month in this test the 18 Alloy samples were rather badly corroded. However, there is no doubt that the selenium had given considerable protection. The 11 Alloy samples stood up very well, as shown in Figure 1 (see Samples Nos. 3 and 4). The 8 Alloy samples had deteriorated more than the 11 Alloy samples but they still were in fairly good condition, with the exception of a few spots around the edges (see Figure 1, Samples Nos. 1 and 2).

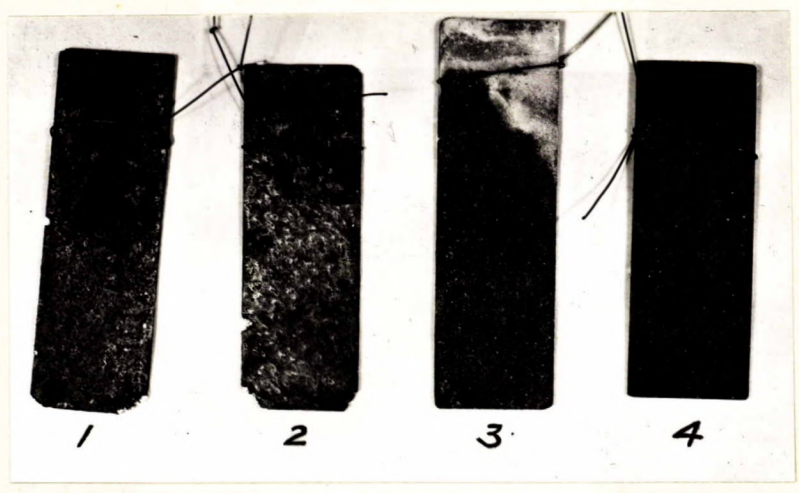
(Continued on next Page)



1771  
12cc  
R.R.R.

(Experimental Work, cont'd) -

Figure 1.



SELENIUM-COATED MAGNESIUM ALLOY SAMPLES AFTER ONE MONTH IN THE INTERMITTENT IMMERSION TEST, USING A 5 PER CENT SODIUM CHLORIDE SOLUTION AS CORRODING AGENT AND A TEMPERATURE OF 93° F. (34° C.).

Samples Nos. 1 and 2 - B Alloy.  
Samples Nos. 3 and 4 - 11 Alloy.

Conclusions:

It is felt that some progress has been made in this investigation. However, there is no doubt that much further research must be performed before the final goal is attained.

Future Work:

It is planned to investigate a number of other pretreatments. When it is felt that a satisfactory pretreatment has been obtained, attempts will be made to produce a coating process which is satisfactory from the point of view of both corrosion resistance and cost.

oooooooooooo  
ooooo  
o