LEAD INDUSTRIES ASSOCIATION

420 LEXINGTON AVENUE

NEW YORK 17, N. Y.

METALLIC LEAD PRODUCTS DIVISION

September [illegible]

To Members of the Metallic Lead Products Division:

We are attaching a reprint from the Corrosion Forum of the "Chemical Engineering" magazine. This was sent to you as Chemical Bulletin No. 12. However, a correction to the last paragraph of the article has been added and was carried by "Chemical Engineering" in an addendum to the Corrosion Forum.

The attached reprint takes the place of Chemical Bulletin No. 12 and should be substituted for it.

Very truly yours,

Robert L. Ziegfeld
Acting Secretary

Wet and Dry Chlorine vs. Materials of Chemical Plant Construction

LEAD

M. M. CHURCH
[illegible]

[illegible] as a material [illegible] dioxide up to 2[illegible] concentration, and [illegible] chlorine [illegible] up to 60 deg. C. [illegible] concentrations of chlorine, such as are used in water treatment, have no effect on lead. For handling hydrochloric acid, the use of lead is not generally recommended, but at normal temperatures there is only slight corrosion in concentrations up to 30 percent, and at 212 deg. F. concentrations as high as 20 percent have been used. Thus, when chlorine with some moisture present results in the formation of small amounts of dilute hydrochloric acid, there is a possibility of slight corrosion depending in amount upon other conditions.

Chlorine is a gas at room temperature and is inert to most metals when cool and dry, but the dry gas when heated attacks all metals to a certain extent. Hydrochloric and hypochlorous acids, formed in the presence of moisture, attack most metals except platinum, silver, lead, and certain special alloys. A protective layer of lead chloride forms over the lead and further corrosion is resisted while the film remains intact. This protective film permits lead's use with moist chlorine up to 230 deg. F. with only slight corrosion.

Lead pipe is used to introduce chlorine, gas or liquid, into a bath of caustic in a concrete tank in the manufacture of sodium hypochlorite. Pure lead tubing gives satisfactory length of service without undue expense. In general, at room temperature, corrosion of lead by wet or dry chlorine, either liquid or gaseous, is sufficiently moderate to recommend its use from an economic standpoint.

In some cases there has been [illegible] corrosion [illegible] tanks of 40 mm. [illegible] when a mixture containing 1.9 g. per l. of chlorine, [illegible] and sodium, is heated. This solution is at approximately 120 deg. F. and is saturated with sodium chloride.

Relatively rapid corrosion takes place if lead contains a trace of chloride or is immersed in a relatively strong solution of a chloride and is subsequently exposed to the air. This is the result of a catalytic action in which the chloride acts as an intermediary with the formation of sodium carbonate and lead chloride which is subsequently attacked by the moisture and carbon dioxide in the air to form lead carbonate and sodium chloride.

Correction

In our original article for the symposium on chlorine (Chem. Eng., January 1947, page 211) the statement was made that lead is subject to rather rapid corrosion if exposed first to relatively strong chloride solution and then to the air. This is incorrect. The error dates back to a garbled 1912 abstract. While the reference is not directly pertinent to the subject, we feel an explanation is nevertheless in order.

It occasionally happens that lead objects in museums suffer in appearance from corrosion, with the formation of a white lead coating. C. Matignon in 1912 concluded that such corrosion might be attributed to sodium chloride in the air as a contributing factor. We believe other contributing factors to be: water vapor in the air, traces of organic acid vapors of the acetic acid type, oxygen and carbon dioxide

M. M. CHURCH.

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