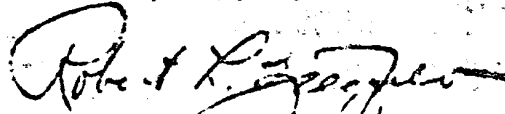


To Members of the Intelligence and Production Division:

For your information, we are enclosing a copy of a reprint of an article on the preparation of lead in contact with phosphoric acid, appearing in the American Society of Chemical Engineers, September, 1934.

Additional copies of this reprint are available upon request.

Very truly yours,



Robert L. Stogdole
Assistant Secretary

Phosphoric Acid vs. Materials of Chemical Plant Construction

W. L. BROWN

Lead Research Engineer,
Lead Industries Assoc.,
New York 17, N. Y.

Lead is stable with phosphoric acid. Lead phosphates are formed only at high temperatures and in the presence of oxygen. Lead phosphates are formed only at high temperatures and in the presence of oxygen. Lead phosphates are formed only at high temperatures and in the presence of oxygen.

Available data show that lead's resistance to phosphoric acid is quite satisfactory and is superior and is completely good. It is employed with pure acid in concentrations up to 80 percent at 200 deg. C. and with impure acid up to 45 percent concentration. As shown below in the table of corrosion rates, lead is especially resistant to both dilute and concentrated grades phosphoric acid.

Lead-lined wood or steel tanks have proved very satisfactory for the construction of agitators, fermenters, storage tanks, troughs and basins. Where design or to be handled, an additional lining of acid-resistant brick should be installed to protect the lead from abrasion and from fluorine attack. The majority of failures of lead-lined chemical equipment have occurred as a result of faulty construction or improper design. Where there are temperature changes, rigging of the lead lining is prevented by lead covered steel strips properly spaced, spacing being dependent upon the temperature differential and other local conditions of design and operation.

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Corrosion Rates of Lead in
Phosphoric Acid

Acid Conc., Percent	Temp., Deg. C.	Corrosion Rate, Mils. per Year
75 pure	200	0.02
60 pure	200	0.02
50 pure	200	0.02
40 pure	200	0.02
30 pure	200	0.02
20 pure	200	0.02
10 pure	200	0.02
5 pure	200	0.02
2 pure	200	0.02
1 pure	200	0.02
0.5 pure	200	0.02
0.2 pure	200	0.02
0.1 pure	200	0.02
0.05 pure	200	0.02
0.02 pure	200	0.02
0.01 pure	200	0.02
0.005 pure	200	0.02
0.002 pure	200	0.02
0.001 pure	200	0.02
0.0005 pure	200	0.02
0.0002 pure	200	0.02
0.0001 pure	200	0.02
0.00005 pure	200	0.02
0.00002 pure	200	0.02
0.00001 pure	200	0.02
0.000005 pure	200	0.02
0.000002 pure	200	0.02
0.000001 pure	200	0.02
0.0000005 pure	200	0.02
0.0000002 pure	200	0.02
0.0000001 pure	200	0.02
0.00000005 pure	200	0.02
0.00000002 pure	200	0.02
0.00000001 pure	200	0.02
0.000000005 pure	200	0.02
0.000000002 pure	200	0.02
0.000000001 pure	200	0.02
0.0000000005 pure	200	0.02
0.0000000002 pure	200	0.02
0.0000000001 pure	200	0.02
0.00000000005 pure	200	0.02
0.00000000002 pure	200	0.02
0.00000000001 pure	200	0.02
0.000000000005 pure	200	0.02
0.000000000002 pure	200	0.02
0.000000000001 pure	200	0.02
0.0000000000005 pure	200	0.02
0.0000000000002 pure	200	0.02
0.0000000000001 pure	200	0.02
0.00000000000005 pure	200	0.02
0.00000000000002 pure	200	0.02
0.00000000000001 pure	200	0.02
0.000000000000005 pure	200	0.02
0.000000000000002 pure	200	0.02
0.000000000000001 pure	200	0.02
0.0000000000000005 pure	200	0.02
0.0000000000000002 pure	200	0.02
0.0000000000000001 pure	200	0.02
0.00000000000000005 pure	200	0.02
0.00000000000000002 pure	200	0.02
0.00000000000000001 pure	200	0.02
0.000000000000000005 pure	200	0.02
0.000000000000000002 pure	200	0.02
0.000000000000000001 pure	200	0.02
0.0000000000000000005 pure	200	0.02
0.0000000000000000002 pure	200	0.02
0.0000000000000000001 pure	200	0.02
0.00000000000000000005 pure	200	0.02
0.00000000000000000002 pure	200	0.02
0.00000000000000000001 pure	200	0.02
0.000000000000000000005 pure	200	0.02
0.000000000000000000002 pure	200	0.02
0.000000000000000000001 pure	200	0.02
0.0000000000000000000005 pure	200	0.02
0.0000000000000000000002 pure	200	0.02
0.0000000000000000000001 pure	200	0.02
0.00000000000000000000005 pure	200	0.02
0.00000000000000000000002 pure	200	0.02
0.00000000000000000000001 pure	200	0.02
0.000000000000000000000005 pure	200	0.02
0.000000000000000000000002 pure	200	0.02
0.000000000000000000000001 pure	200	0.02
0.0000000000000000000000005 pure	200	0.02
0.0000000000000000000000002 pure	200	0.02
0.0000000000000000000000001 pure	200	0.02
0.00000000000000000000000005 pure	200	0.02
0.00000000000000000000000002 pure	200	0.02
0.00000000000000000000000001 pure	200	0.02
0.000000000000000000000000005 pure	200	0.02
0.000000000000000000000000002 pure	200	0.02
0.000000000000000000000000001 pure	200	0.02
0.0000000000000000000000000005 pure	200	0.02
0.0000000000000000000000000002 pure	200	0.02
0.0000000000000000000000000001 pure	200	0.02
0.00000000000000000000000000005 pure	200	0.02
0.00000000000000000000000000002 pure	200	0.02
0.00000000000000000000000000001 pure	200	0.02
0.000000000000000000000000000005 pure	200	0.02
0.000000000000000000000000000002 pure	200	0.02
0.000000000000000000000000000001 pure	200	0.02
0.0000000000000000000000000000005 pure	200	0.02
0.0000000000000000000000000000002 pure	200	0.02
0.0000000000000000000000000000001 pure	200	0.02
0.00000000000000000000000000000005 pure	200	0.02
0.00000000000000000000000000000002 pure	200	0.02
0.00000000000000000000000000000001 pure	200	0.02
0.000000000000000000000000000000005 pure	200	0.02
0.000000000000000000000000000000002 pure	200	0.02
0.000000000000000000000000000000001 pure	200	0.02
0.0000000000000000000000000000000005 pure	200	0.02
0.0000000000000000000000000000000002 pure	200	0.02
0.0000000000000000000000000000000001 pure	200	0.02
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0.0000000000000000000000000000000000000002 pure	200	0.02
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0.0005 pure	200	0.02
0.0002 pure	200	0.02
0.0001 pure	200	0.02
0.005 pure	200	0.02
0.002 pure	200	0.02
0.001 pure	200	0.02
0.0005 pure	200	0.02
0.0002 pure	200	0.02
0.0001 pure	200	0.02
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0.005 pure	200	0.02
0.002 pure	200	0.02
0.001 pure	200	0.02
0.0005 pure	200	0.02
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0.001 pure	200	0.02
0.0005 pure	200	0.02
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0.0005 pure	200	0.02
0.0002 pure	200	0.02
0.0001 pure	200	0.02
0.005 pure	200	0.02
0.002 pure	200	0.02
0.00		