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The solubility of certain lead salts in human gastric juice, and its bearing on the hygiene of the lead industries.

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1. SOLUBILITY OF WHITE LEADS IN HUMAN GASTRIC JUICE.

WHITE LEAD PAINT DUSTS.

Solubility in pure gastric juice (25 c.c. G.J. to 0.5 gr. lead):
Basic lead carbonate paint dust....46 per cent.
Basic lead sulphate paint dust.... 5.7 per cent.
Solubility in gastric juice+peptone (25 c.c. G.J., 0.1 gr. peptone, 0.5 gr. lead):
Basic lead carbonate paint dust....46 per cent.
Basic lead sulphate paint dust.... 7.3 per cent.
Solubility in gastric juice+milk (G.J. 1–milk 1):
Basic lead carbonate paint dust....none = 0 per cent.
Basic lead sulphate paint dust....none = 0 per cent.
Solubility in 0.5 per cent. HCl (25 c.c. HCl to 0.5 gr. lead):
Basic lead carbonate paint dust....66 per cent.
Basic lead sulphate paint dust.... 6.7 per cent.
Solubility in 0.5 per cent. HCl+milk (HCl 1–milk 1):
Basic lead carbonate paint dust....none = 0 per cent.
Basic lead sulphate paint dust....none = 0 per cent.
Solubility 0.5 per cent. HCl+milk (HCl 2–milk 1):
Basic lead carbonate paint dust....25.4 per cent.
Basic lead sulphate paint dust.... 1.5 per cent.
Solubility in 0.5 per cent. HCl+milk (HCl 4–milk 1):
Basic lead carbonate paint dust....83.5 per cent.
Basic lead sulphate paint dust.... 6.9 per cent.

WHITE LEADS.

Solubility in pure gastric juice (25 c.c. G.J. to 0.5 gr. lead):
Lead carbonate ("Old Dutch Process")....53 per cent.
Basic lead sulphate....25 per cent.
Solubility in gastric juice+peptone (25 c.c. G.J. to 0.5 gr. lead):
Lead carbonate ("Old Dutch Process")....57 per cent.
Basic lead sulphate....27 per cent.
Solubility in pure gastric juice (50 c.c. G.J. to 0.5 gr. lead):
Lead carbonate ("Old Dutch Process")....69 per cent.
Basic lead sulphate....30 per cent.
Solubility in gastric juice+milk (G.J. 4–milk 1):
Lead carbonate....90 per cent.
Basic lead sulphate....34.8 per cent.

2. TOXICITY OF WHITE LEADS WHEN FED TO DOGS AND CATS.

The lead carbonate is much more toxic than the lead sulphate. But both salts produce acute lead poisoning when given in quantities of 0.1 gr. per kilo body weight daily.

3. THE INFLUENCE OF MILK.

When milk and gastric juice is mixed in the proportion of 1–1, the hydrochloric acid of the gastric juice is so completely fixed by the milk proteins or neutralized by the carbonates in the milk that the mixture has virtually no solvent action on the lead salts, but when gastric juice is present in excess the lead salts g. into solution in proportion to the excess of the gastric juice When milk is taken into the stomach there occurs, of course, a similar fixation of the hydrochloric acid, and, in addition, the total quantity of gastric juice is diminished owing to the inhibitory action of the fats in the milk on the processes of secretion.

On the basis of our work we venture to offer these two practical suggestions: (1) The lead carbonate is so much more toxic than the lead sulphate that lead workers as well as the state should aim at the elimination of the use of the carbonate in all industries where this is possible. (2) In addition to taking other important prophylactic measures, the lead workers should drink a glass of milk between meals (say 10 A.M. and 4 P.M.) in order to diminish the chances for any swallowed lead to be dissolved by free hydrochloric acid of the gastric juice, as in some persons there is considerable secretion of gastric juice in the empty stomach.[1]

[1] Hornborg, *Skand. Arch. f. Physiologie*, 1904, XV, p. 209; Carlson, *Am. Jour. of Physiology*, 1912, XXXI, p. 151.