

Thin deposits of iron from dilute sulfamate baths

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As already published for nickel** and cobalt***, bright flashes can be obtained also for iron at room temperature, e.g. on copper cathodes, from baths at very low $\text{Fe}\sigma_2$ **** concentration, at low pH and current density in the range of 1,000/2,000 A/m².

At the beginning, the current efficiencies are high (0.8/0.9); afterwards the hydrogen evolution increases. The best results have been obtained in the following conditions:

$\text{Fe}\sigma_2$	0.2 M
pH	≈ 1.4
temperature	20 °C
current density	1,500 A/m ²
agitation	strong

When the current density is raised up to 2,000/2,500 A/m², the deposits get bright.

Pitting can be avoided by a strong agitation and addition of wetting agents.

It is possible to improve the brightness of the deposits by adding H_3BO_3 and $\text{NH}_4\sigma$. Recommended concentrations are: 0.8 M for $\text{NH}_4\sigma$ and 30 g/l for H_3BO_3 . A comparison between the conditions in which bright flashes can be obtained for nickel, cobalt and iron, shows that for iron the range of conditions is the narrowest. In particular, as far as pH is concerned, the range is strongly limited on the one side by the local precipitation of hydroxides or basic salts, and on the other by the fall of the current efficiency.

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** R. Piontelli, F. Siniscalco, P. Pedeferrri - *Electrochimica Metallorum I*, 254 (1966).

*** L. Cadorna, P. Cavallotti - *Electrochimica Metallorum I*, 364 (1966).

**** $\sigma = \text{NH}_2\text{SO}_3$.