ABSTRACTS

DEPARTMENT OF METALLURGY

1. ELECTRODEPOSITION OF CADMIUM FROM FLUOBORATE SOLUTIONS. T. R. Anantharaman and J. Balachandra, *Journ. Electrochem. Soc.*, 1953, **100**, 232–36.

The optimum conditions for electroplating cadmium from its fluoborate solution have been arrived at by a systematic study of the effects of all types of variables on its plating characteristics. The best deposits of cadmium are obtained from a bath containing 210 g./l. of cadmium fluoborate, 25 g./l. of sodium fluoborate, 25 g./l. of boric acid, and 1 g./l. of sodium-betanaphthalene sulfonate at a pH of 3·2–3·6 and temperatures of 20–30° C., and at current densities of 2·2–6·5 amp./dm.^{2} (20–60 amp./ft.^{2}). The deposits which are obtained on steel, brass, or copper are uniform, bright, fine-grained, adherent, and of pleasing appearance. The current efficiency of the process is 98–100 per cent. cathodic and 102–04 per cent. anodic. The bath is non-poisonous, stable, and easily controlled. The new bath is slightly inferior to the cadmium cyanide bath in the throwing power and resistivity but vastly superior in all other respects.

2. ELECTROGALVANIZING FROM FLUOBORATE SOLUTIONS. T. R. Anantharaman and J. Balachandra, *Journ. Electrochem. Soc.*, 1953, **100**, 237–39.

The optimum conditions for electroplating zinc from its fluoborate solution have been deduced by a systematic study of the effects of all types of variables on its plating characteristics. The best deposits of zinc are obtained from a bath containing 108 g./l. of zinc fluoborate, 30 g./l. of ammonium fluoborate, 25 g./1. of boric acid, and 1·0 g./1 of betanaphthol at a pH of 5·0–5·4 and temperatures of 20–30° C. and at current densities of 4·3–9·7 amp./dm.^{2} (40–90 amp./ft.^{2}). The deposits which are obtained on steel, brass, or copper are uniform, fine-grained, adherent, and of pleasing appearance. The current efficiency of the process approximates 98–100 per cent. cathodic and 102 to 105 per cent. anodic. The bath is non-poisonous, stable, and easily controlled. The new bath is comparable to the zinc cyanide bath, and is vastly superior to the zinc sulfate bath.

3. AUSTENITIC HEAT-RESISTANT ALLOYS FOR HIGH TEMPERATURES. Brahm Prakash, *Commet*, 1953, **2**, 43–55.

This paper summarises the composition, physical and mechanical properties of important wrought and cast high-temperature alloys, developed

during recent years for application in the gas turbines. In considering the service conditions and the criteria by which suitability for such service can be evaluated, the importance of density, coefficient of expansion, coefficient of thermal conductivity, creep resistance, fatigue resistance, scaling resistance and grain size is discussed. The present trends in gas turbine materials research are examined and the importance of metallic-nonmetallic compacts by sintering and infiltration, is stressed.

4. POLYNUCLEAR COMPLEXES. N. R. Srinivasan, *Proc. Ind. Acad. Sci.*, 1952, **36 A**, 185.

It has been found that in aqueous solutions on vigorous boiling, the 2-tartrato-2-niobates and the corresponding free acid are degraded, giving rise to new complexes of niobium. The conditions of formation and the mechanism of the reaction have been studied. Adequate explanation has been offered for the phenomenon. The compounds are regarded as polynuclear complexes and suitable structures are given for the compounds prepared.

5. TARTRATOTANTALATES. N. R. Srinivasan, *Proc. Ind. Acad. Sci.*, 1952, **36 A**, 278.

It has been shown that literature does not reveal the existence of any complex compound of tantalum with tartaric acid. Experiments conducted yielded tartratocomplexes with sodium and potassium tantalates. The complexes have been analysed and their properties found to be similar to those of the tartratoniobates. The mode of formation of these compounds has been explained. They are formulated with heteropolyacid structures of the general type

$$MH_4 \left[\begin{matrix} & O_4 \\ Ta & \\ & (C_4H_6O_6) \end{matrix} \right] nH_2O$$

where M = Na or K and n = a varying number.

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