ABSTRACTS

1. **The anodic dissolution of binary alloys —**

R. F. Steigerwald and N. D. Greene (J. Electrochem Soc, **109,** 1026, 1962). A method for calculating the anodic polarization curves of binary alloys from those of their components is presented. Potentiostatic anodic polarization curves are used to compare the calculated and experimental curves. Data are presented for the tin-zinc, cadmium-zinc, iron-chromium, titanium-chromium, and iron-titanium systems. Five tables, 13 figures and 40 references.

2. **Study of the anodic behaviour of iron at high potentials in solutions containing chloride ions —**

A. Rius and R. Lizarbe (Electrochimica Acta, **7,** 513, 1962). Galvanostatic and potentiostatic polarization curves of an iron electrode in sulphuric acid containing N/50 to N/500 potassium chloride have been determined. The results have been dicussed with reference to passivation.

3. **Corrosion and electrochemical properties of titanium, zirconium and titanium-zirconium alloys in acid solutions II —**

V. V. Andreeva and A. I. Glukhova (J. Appl. Chem, **12,** 457, 1962). Corrosion rates, potentiostatic polarization and potential-time curves, microstructure.

4. **The polarization curve and anodic protection —**

W. A. Mueller (Corrosion **18,** 359t, 1962). The methods for the measurement of polarization curves are surveyed, and the analysis of these curves and of their components is discussed with respect to pure metals and alloys. In the survey of anodic protection of alkaline pulping digesters the effect of polysulphides as depolarizers and of reducing agents is explained. An equation is given of the extension of anodic protection reached in a pipe with current supply from one point. Stability considerations provide a basis for the choice between anodic and cathodic protection. Fourteen figures and 48 references.

5. **Influence of dew on the rates of corrosion of mild steel —**

B. Sanyal and coworkers (J. Sci. and Ind. Res., **21D,** 422, 1962). A linear relationship has been found between the corrosion rate of mild steel and the amount of dew collected at heights up to 10 feet and on different substrates at the ground level. The results indicate that factors other than dew also influence corrosion.

6. **Corrosion theory and chemical plant protection —**

H. A. Holden (Chem. and Process Engg., **43,** 574, 1962). Current concepts relating to fundamental corrosion mechanisms; recent developments in cathodic protection for chemical plant; new protective coatings; 21 references.

7. **Selection of materials of construction for corrosion prevention —**

F. O. Howard (Australasian Corrosion Engineering, **6,** No. 11, 17, 1962). Review under (1) prior requirements — materials available and their properties, service factors, environmental factors and factors affecting materials used for equipment and structures; (2) standardised procedure — units for measuring corrosion, selection of materials; 32 references.

8. **Effects of radiation on metallic corrosion—**

J. J. Stobbs and A. J. Swallow (Metallurgical Reviews, **7,** No. 25, 95-131, 1962). Review with 285 references.

9. **The use and behaviour of aluminium anodes in alkaline primary batteries—**

S. Zaromb (J. Electrochem Soc. **109,** 1125, 1962). It is concluded that optimum battery performance would result from the use of corrosion inhibitors consisting of alkyldimethyl-benzylammonium salts and/or mercury with or without zinc oxide, as well as from elimination of sulphides and other corrosion accelerators; use of highly pure aluminium or specially resistant alloys with magnesium, zinc or mercury; effective heat removal, operation at high current densities and anode-electrolyte separation during periods of inaction. Two tables, 9 figures and 15 references.

10. **Dissolution of brass in sulphuric acid solutions 1. 85/15 Brass —**

J. Bumbulis and W. F. Graydon (J. Electrochem. Soc, **109,** 1130, 1962). The reaction

proceeded in three successive steps, dezincifation of the brass surface, dissolution of redeposited copper and etching of the brass surface, and dissolution of the etched, dezincified surface. The dissolution of copper from the alloy is similar to that of pure copper, controlled by the rate of oxidation of cuprous ions to cupric.

11. **What management wants to know about corrosion control investments —**

W. B. Crowston and Hu Harries (Materials Protection, **1**, No. 11, 18, 1962). Important considerations significant to management in making calculations designed to prove economic justification for corrosion control are given. Engineering investment concepts: making formal forecasts, calculating economic life, price level changes, techniques of analyzing investments; 4 tables and bibliography.

12. **The prevention of corrosion by use of appropriate design —**

R. B. Mears (Australasian Corrosion Engineering, **6**, No. 12, 9, 1962). Plant layout, material selection, galvanic corrosion, elimination of crevices and pockets, keeping of stacks, chimneys and ducts warm, preventing stray current corrosion, minimizing residual stresses, inhibition of recirculating cooling waters, changes in properties during service. Eight tables, 12 figures and 32 references.

13. **How Monsanto uses technicians in corrosion control —**

O. W. Siebert (Materials Protection, **1**, No. 12, 19, 1962). Advantages and efficiencies of using technical assistants to corrosion engineers working in the chemical processing industry are described, with reference to practice in Monsanto Chemical Co. The kind of work assigned to technicians is explained and illustrated.

14. **Study of stainless steel stress-corrosion cracking by potential measurements —**

B. Anderson (Corrossion, **18**, 425t, 1962). The susceptibility of stainless steel to stress-corrosion cracking in 40 per cent calcium chloride solution is reported as the 'rest-potential' at 15 C during the orientation-polarization which occurs on cooling the electrolyte. The effect of pH and temperature, and of varying mechanical stresses has also been investigated. Two tables, 19 figures and 7 references.

15. **Galvanic corrosion of ferrous and non-ferrous metals in the industrial atmosphere of Jamshedpur —**

S. Rao et al (NML Tech. J. **4**, No. 4, 17, 1962). Studies were made on the galvanic corrosion of metals and alloys, in the atmosphere of Jamshedpur, for a year using bolt and wire specimens. Aluminium and zinc showed the most marked effect of coupling, whereas copper, copper-nickel zinc alloys, steel and brass did not show much effect.

16. **Electrodeposition of tungsten alloys from the pyrophosphate bath: Iron-tungsten —**

K. I. Vasu and T. L. Rama Char (Metalloberflache, **16**, 349, 1962). Iron has been codeposited with tungsten from the pyrophosphate bath. Detailed studies have led to the operating conditions for obtaining satisfactory plates with 17-56 per cent tungsten at current densities up to 6 amp/dm^2 and cathode efficiencies of 44-57 per cent. The cathode potential for tungsten deposition is 0.90-1.05 volt, as calculated from alloy and iron potential data. X-ray patterns of the deposits show the existence of the b.c.c. structure. Five tables, 12 figures and 30 references.

17. **Electrodeposition of copper-tin alloys from the fluoborate bath —**

C. R. Krishnamurthy, J. Balachandra and A. A. Krishnan (J. Sci. and Ind. Res, **21D**, 414, 1962).. Copper-tin alloys containing 0-70 per cent tin have been deposited from the fluoborate bath. The electrode efficiencies are 90-100 per cent, and the limiting current density 8 amp/dm^2. Three tables on effect of variables, and 11 references.

18. **Electrochemistry of fluoride solutions. Part VII. Electrodeposition of cobalt from fluoride solutions —**

A. N. Kappanna and E. R. Talaty (J. Indian Chem. Soc, **39**, 739, 1962). The electrodeposition of cobalt from acid fluoride solutions has been studied. Thiourea has been found to be the most beneficial addition agent.

19. **Science for electroplaters 76, 77 Electroless nickel —**

L. Serota (Metal Finishing, **60**, No. 11, 76; No. 12, 58, 1962). Fundamental reactions, reaction mechanism, atomic hydrogen; deposition rate, efficiency concentration.

20. **Bibliography and abstracts — Plating by thermal decomposition: Part 2—**

R. L. Hoyle (Plating, **49**, 1264, 1962), Abstracts 36 to 138; to be continued.

21. **Effect of cathode rotation on deposition of lead from sodium plumbite solution —**

K. S. Udupa, G. S. Subramanian and H.V.K. Udupa (Plating, **49**, 1274, 1962). A rotating

cathode gives an adherent but rough lead deposit, and the energy of activation is lowered. Cathode potentials have been measured, and hydrogen evolution on electrodeposited lead studied.

22. **Leveling bright nickel plating —**

L. Domnikov (Metal Finishing, **60,** No. 12, 52, 1962). Plating from solutions containing nickel sulphate, sodium chloride and boric acid : coumarin as leveling agent, internal stress, effect of addition agents, elimination of pitting. Seven figures and 12 references.

23. **Electrodeposition of molten metals from glycerine—**

C. Smelt (Industrial Chemist, **38,** 628, 1962). A new method for the electrodeposition of metal soldering beads is described, involving very high deposition rates. Details of operating conditions are given. Twentythree references.

24. **Iron Plating —**

(Industrial Finishing, **14,** No. 174, 43, 1962). Thick coatings for hardness and tensile strength. For some applications there is a definite advantage in depositing iron electrolytically, especially for reconditioning worn parts. Two figures and 10 references.

25. **The electrodeposition of the less-common metals —**

I. A. Menzies (Trans. Inst. Metal Finishing, **39,** 172, 1962). The electrodeposition of metals is reviewed with reference to the position of the various metals in the periodic system and in the electrochemical series ; 137 references.

26. **Engineering applications of electrochemistry 1. The principles of electropolishing, elctrodeburring and electromachining —**

S. C. Boyle (Metal Finishing J. **8,** 381, 1962). Electropolishing and its advantages, electromachining.

2. Some modern methods of hard chromium plating 1, 2 —

J. D. Greenwood (ibid, **8,** 427, 1962 ; **9,** 5, 1963). Plating solution, adhesion; stopping-off, eliminating build-up, use of shim and lead tape, controlled deposits.

27. **Electrolytic polishing of steel. Perchloric acid type electrolytes —**

J. Heyes (Metal Finishing, **60,** No. 12, 36, 1962). Explosive hazards, safe conditions for use, advantages of acetic anhydride-perchloric acid baths, factors Influencing optical clarity of surface, solution composition and polishing technique, water determination, the electropolishing installation. Eight figures and 10 references.

28. **Effect of operating conditions on the properties of sulphuric acid anodic oxide coatings —**

A. Prati, F. Sacchi and G. Paolini (Electroplating and Metal Finishing, **16,** 2, 1963). Factors investigated, gravimetric properties, applicational properties, test programme, preparation of specimens, voltage-time cycle ; continued.

29. **Function of A. C. superimposed on D. C. in the anodic oxidation of lead in sulphuric acid —**

R. Vijayavalli et al (J. Electrochem. Soc., **110,** 1, 1963). Superimposed A. C. is is found to favour the dissolution of lead while D. C. helps the formation of lead dioxide. Its role is similar to that of a forming agent, and this view is supported by measurements of anode potentials and the time needed for passivation. A probe mode of attack of the lead surface is given based on the microscopic examination of the corroded surface.

30. **Some recent developments in metals and alloys for use in chemical plant —**

M. L. Melvill (The Chemical Engineer, No. 163, A78, 1962). A survey is made of some recent developments in the field of corrosion-resisting metals and alloys which makes reference to low-alloy steels, cast irons, stainless steels, high-nickel alloys, silicon-bearing alloys, titanium zirconium and tantalum ; 18 references.

31. **Ultrapure metals at low temperatures**

R. T. Bate (Battelle Technical Review **11,** No. 11, 8, 1962). The availability of ultrapure metals has encouraged study of their electrical properties. Electrical conduction in metals at very low temperatures is discussed and some of the phenomena that are potentially useful considered.

32. **Automatic control in the metal industry—**

G. N. Williams and N.C.G. Guilford (Metallurgical Reviews, **7,** No. 25, 1-41, 1962). Review with 42 references.

33. **A survey of some of the new metals available to the engineer —**

N. P. Inglis (J. Inst. Metals, **91,** 121, 1962-63) Review with 20 references : titanium, zirconium, hafnium, beryllium, niobium and tantalum.

34. **Progress in materials technology —**

(Corrosion Prevention and Control, **10,** No. 1, 42, 1963). Aluminium, beryllium, cast iron,

plastics, surfacing alloys, titanium, magnesium alloys, reinforced plastics, tantalum.

35. **Electrolytically regenerated ceric sulphate for the oxidation of organic compounds I Oxidation of p-xylene to p-tolualdehyde —**

R. Ramaswamy, M. S. Venkatachalapathy and H. V. K. Udupa (Bull. Chem. Soc, Japan, **35**, 1751, 1962). The oxidation of p-xylene to p-tolualdehyde is made cyclic and continuous by regeneration of ceric sulphate at a lead dioxide anode. The overall current efficiency is 23-30 per cent.

36. **Electrolytic reduction of uranyl salt to uranous salt without diaphragm —**

K. Odo, E. Ichikawa and K. Sugino (J. Electrochem. Soc. Japan, **30**, E 57, 1962). An improved process has been accomplished for the production of pure crystals of uranous sulphate by the electrolytic reduction of uranyl sulphate. The total yield was 90 per cent with 72 per cent current efficiency.

37. **On the production of persulphate by electrolysis of sodium sulphate solution—**

S. Yoshizawa, F. Hine and M. Yamashita (J. Electrochem. Soc, Japan, **30**, E60, 1962). Anolyte containing a large amount of bisulphate ion, 15N sulphuric acid solution saturated with sodium sulphate proved to be suitable for the production of persulphate. Cooling the anolyte and anode increased the yield, and electrolyte circulation increased the current efficiency and decreased the electrode potential. With the increase of rotating velocity of disc electrode, the yield of sodium hydroxide increased, while the terminal voltage decreased. Twentyeight figures and 11 references.

—T.L.R.