73. **Shipping containers for irradiated reactor, fuels—**

J. D. Rollins and E. C. Lusk (Battelle Tech. Review, **17**, No. 8, 9, 1968). Introduction, regulatory criteria, design requirements, role of economics in shipping container design, a look to the future. One table, 4 figures and 8 references.

74. **Lattice energies of salts and their significance in chemistry—**

A. G. Sharpe (Endeavour, **27**, 120, 1968). This article considers the factors that influence relative values of lattice energies, and shows how knowledge of these factors helps the chemist faced with such problems as how best to effect a halogen-exchange reaction, obtain a salt of a given gaseous base, or synthesize a salt of a previously unknown ion. One table, 1 figure and 7 references.

75. **Electrical conduction in thin insulating films—**

J. G. Simmons (Endeavour, **27**, 138, 1968). Introduction, the energy band picture, metal-insulator-metal system, Porle-Frenkel effect, negative resistance and memory effects in thin insulating films. One table, 14 figures and 12 references.

76. **The physics—chemistry interaction—**

G. G. Hall (Physics Bull., **19**, 297, 1968). Introduction, the situation 50 years ago, scientific instrument explosion, computer, era, theoretical revolution, quantum chemistry today-distant prospects.

77. **Electrochemical determination of the specific surface and the activity of porous platinum—**

H. Binder and coworkers (Chem.-Ing.-Tech., **40**, 586, 1968). The specific surface area of Raney platinum depends on aluminium content and decreases with use. Results were obtained from measurements of cathodic adsorption and anodic desorption of hydrogen atoms by potentiostatic sweep methods and were compared with those obstained from BET surface area measurements.

78. **Surface oxidation and reduction of platinum electrodes: coverage, kinetic and hysteresis studies—**

D. Gilroy and B.E. Conway (Canadian, J. Chem., **46**, 875, 1968). Polarization and hysteresis effects were used to study the nature and extent of surface oxidation of three sorts of platinum surface. The quality of reducible oxide depends on potential and time of anodice polarization. Galvanostatic and potential sweep techniques were compared.

79. **Colloid science: Cinderalla or fairy godmother?**

D. H. Everett (Chemistry in Britain, **4**, 390, 1968). Colloid and surface chemistry are interdisciplinary in nature. They are academic subjects, but also improve a whole range of technological porcesses. Here is an outline of the developments in the U.K.

—T.L.R.

(B) Corrosion

1. **Stainless steel resists stress corrosion cracking—**

(Metals and Materials, **2**, 185, 1968). Type 702 stainless steel containing chromium 16, nickel 2.5 and molybdenum 1 per cent has been recently developed. Corrosion resistance with 2 tables, welding and availability.

2. **The potential of the diffusion processes for metals protection—**

(Metals and Materials, **2**, 187, 1968). Metalliding principle and process, scope of the diffusion process.

3. **Control of corrosion in refinery distillation units—**

K. Reiser (J. Inst. Petroleum, **53**, 352, 1967). Internal surface electrochemical corrosion is discussed. The effects of (*a*) presence of water in the process stream, (*b*) presence of some aggressive ions such as sulphide or chloride in the water, (*c*) freely accessible surface for corrosion and (*d*) surface material susceptible to electro-chemical attack are dealt with. Typical flow diagrams are shown and distribution of corrosion and methods of control noted; 12 references.

4. **Electrochemistry of corrosion—**

R. F. Steigerwald (Corrosion, **24**, 1, 1968). Principles involved in analyzing a corrosion situation according to electrochemical methods are described. The basic formulae of reactions are given, together with an explanation of their implications and use. The commonly accepted theories of inhibition and passivation are discussed. Fifteen figures and 23 references.

5. **Effect of pH on the stable passivity of stainless steels—**

H. P. Leckie (Corrosion, **24**, 70, 1968). Critical pH values—below which active corrosion occurs and above which the steels exhibit passivity, determined from electrochemical polarization measurements were found to agree well with those obtained under long-term natural corrosion conditions. The results show the validity of a critical pH value in ranking stainless steels as to their resistance to acid corrosion. Three tables, 8 figures and 5 references.

6. **Chromaluminisation and tantalisation of refractory materials for gas turbines—**

P. Galmiche (Metals and Materials, **2**, 241, 1968). Techniques involving the diffusion treatment of refractory alloys by tantalum and/or chromium: aluminium offers a promising solution to the problems of erosion and corrosion in high temperature environments. Two tables and 11 figures.

7. **Aluminium alloys for forgings—**

E. Stewart-Jones (Aluminium Courier, No.82, 14, 1968). Introduction, high and medium strength, strength at elevated temperature, general and marine corrosion resistance, wear resistance, dimensional stability, weldability, machinability, foregeability, appearance, electrical conductivity and allied properties. Twelve figures and table.

8. **Stress corrosion testing—**

W. Peter and E. G. Gondolf (Werkstoffe u. Korrosion, **19**, 576, 1968). Survey of the different methods used in stress corrosion testing of materials of construction; requirements to be met by an optimum method for plant use.

9. **Stress corrosion cracking of high strength steels—**

J. W. Kennedy and J. A. Whittaker (Corrosion Science, **8**, 359, 1968). Review: introduction, experimental variables, prevention of cracking, mechanism of failure; 3 tables, 6 figures and 22 references.

10. **Thermodynamics of corrosion in fused sulphates—**

G. Bombara, G. Baudo and A. Tauba (Corrosion Science, **8**, 393, 1968). Thermodynamic diagrams have been constructed for iron in contact with lithium sulphate—potassium sulphate eutectic at 600°C, and equilibrium potentials are plotted against the activity of oxide pO^{2-}. The regions outlined the corrosion and immunity of iron in relation to the redox and acid-base conditions of the melt. Three figures and 25 references.

11. **Cleaning and etching aluminium—**

S. Spring (Metal Finishing, **66**, No. 8, 66, 1968). Inhibition of alkali attack, effect of non-uniform oxide film, detergency factors in cleaning, emulsion and solvent cleaning, etching, prevention of scaling in the etchant bath, acid etching and desmutting; 1 table and 3 references.

12. **Descaling titanium and titanium alloys—**

L. F. Spencer (Metal Finishing, **66**, No. 8, 52, 1968). Introduction, molten salt baths, acid pickling baths, mechanical scale removal. Three tables, 4 figures and 13 references.

13. **Corrosion fatigue and stress-corrosion cracking in aqueous environments—**

D. E. Piper, S. H. Smith and R. V. Carter (Metals Engg. Quarterly, **8**, No. 3, 50, 1968). Investigations covering titanium alloys: fracture mechanics in material evaluation, corrosion fatigue test panels, experimental results—stress corrosion cracking and corrosion fatigue, conclusions. Twenty seven figures and 10 references.

14. **To rust or not to rust—**

K. Bromage (Copper, **2**, No. 4, 6, 1968). Advantages of the new corrosion resistant copper-containing steels; recent applications.

15. **Tubes for condensers and heat exchangers, Part 3, Section 2—**

P. Fracchia (Rame, **5**, 1967); Copper Abstracts No. 7920 in Copper, **2**, No. 4. 1968. Principal types of corrosion to which condenser tubes may be susceptible, with particular references to stress corrosion cracking and corrosion fatigue. Metallographic features of these forms of corrosive attack are discussed and illustrated, and methods of prevention are described.

16. **Properties of black oxide films on iron—**

R. Tomono (Products Finishing, **32**, No. 11, 60, 1968). Black oxide films formed on iron treated in a strong alkaline solution at 266-320°F are discussed with respect to corrosion resistance, uniformity of colour shade or tone,

abrasion resistance and rubbing. Nine tables and 6 figures.

17. **Corrosion of zinc and of tin, and of their alloys in acid media—**

F. Barbulescu and L. Roller—Popescu (Rev. Roum. Chim., Roumania, **12**, 929, 1967); Chem. Abs., **68**, 62228, 1968. A study was made of the corrosion of zinc, tin and their alloys at 25°C in aqueous 10 per cent hydrochloric acid, with or without Auramine, deaerated with purified electrolytic hydrogen by gravimetric and galvanostatic techniques. The inhibitory effect of the amine was ascribed to the formation of protective films of insoluble complexes. The anodic polarization curves shifted towards more positive potentials with increasing tin content.

18. **Anodic dissolution of passive zinc in alkali solutions containing zincates—**

T. I. Popova, N. A. Simonova and B. N. Kalanov (Elektrokhimiya, ., 1419, 1967); Metal Abs., **1**, 455, 1968. In non-supersaturated zincate solutions, the higher the zincate concentration in solution the smaller was the dissolution of the oxide film in the total rate of zinc corrosion. In supersaturated solutions the oxide film growth was restricted by mechanical failure. The direct electrochemical dissolution of zinc continued at the same time as the growth of the film.

19. **Basic cooling water inhibitor guide—**

R. V. Comeaux (Hydrocarbon Process. Petrol Refiner, U.S.A., **46**, No. 12, 129, 1967); Zinc Abstracts, **26**, No. 7, 226, 1968. Most chemical blends used for the inhibition of dissolved oxygen corrosion in cooling systems contain at least two of the three ions—zinc, chromate and phosphate. Attention is drawn to the successful use of steel tubes in service involving waters treated with the inhibitors. A major steel tubing installation at a refinery was in continuous service for more than six years without cleaning.

20. **Prevention of corrosion failures in bridge members—**

B. Balala (ATM Tech. Rept. No. GG 6-1.3, 1967, 11 pages); Zinc Abstracts, **26**, No. 7, 226, 1968. Corrosion failure in reinforced concrete, prestressed concrete, steel and aluminium bridge structures is discussed. Methods for preventing such failure are described, the techniques considered including galvanizing, painting and the use of zinc rich resin coatings.

21. **Improvements in the production of ferrous constructions against corrosion—**

(Brit. Patent 1, 095, 832, 1965); Zinc Abstracts, **26**, No. 7, 227, 1968. Report of a process for the protection of ferrous construction against corrosion in which the ferrous construction is short circuited with a zinc alloy containing 0.02-5 per cent lanthanum. Additions of the latter or of cerium are reported to provide very considerable activation of zinc in grades ranging from very high purity down to 98.5 per cent. A corresponding anode effectively reduces the polarization and masking or covering effect and therefore helps to maintain the activity of the anode surface fairly constant.

22. **Internal cathodic protection of salt water pipelines with aid of platinized titanium anodes—**

J. W. Kuhn (Werkstoffe u. Korrosion, 19, 473, 1968). The current density required for the protection of bare pipeline surfaces is in the order of 150 milliamps/sq.m. for the salt water injecting or flooding pipelines in petroleum production. This can be considerably reduced by combining the active protection with a passive protection by a coating. The economics of the process is discussed.

23. **Role of the aerospace research laboratory in the chemical coatings field—**

L. J. Bailin (Am. Paint J., **52**, No. 40, 27, 1968). Zinc Abstracts, **26**, 255, 1968). The self-cured, inorganic silicon base, cathodic zinc primer offers improved corrosion resistant properties in marine environments. The other advantageous features include resistance to high temperature, wind and humidity, and a high degree of adhesion to sandblasted metal surfaces.

24. **Corrosion resistance of high zinc content aluminium alloys—**

R. Ciach (Rudy Metale Niezalazne, **13**, 184, 1968); Zinc Abstracts, **26**, 255, 1968. A study was made of the resistance of high zinc content aluminium alloys, stabilized by heat treatment, to intercrystalline and surface corrosion under simulated industrial conditions. For best performance the zinc used in the alloys should be at least 99.99 per cent pure, the range for aluminium being 99.5—99.85 per cent. Alloys containing about aluminium 60 and copper 2 per cent exhibited very good mechanical

as well as corrosion resistance characteristics. Two tables, 4 illustrations and 3 figures.

25. **Possibility of using some intermetallic compounds as protectors—**

V. I. Vigdorovich and coworkers (Protect. Metals, USSR, **3**, No. 2, 182, 1967); Zinc Abstracts, **26**, 257, 1968. Data on the behaviour of magnesium, zinc and magnesium-zinc alloys containing 70, 80 and 93 per cent zinc are presented. The efficiency of the second alloy was much higher than that of magnesium. The zinc content can be considerably increased, 75-90 per cent range, without affecting the electrochemical and corrosion characteristics. One table and 2 figures.

26. **Zinc zeros in an anodizing market—**

(Iron Age, **201**, Nol 17, 73, 1968). A zinc anodizing line installed in the U.S.A. has been used for the anodizing of washing machine pump and door lock components. The four colour anodizing process is applicable to wrought or die cast zinc parts, galvanized steel or zinc sprayed products. The technical advantages such as the excellent corrosion resistance are indicated, and the operation is described with a diagram of the layout. The installation costs are considered. One table and 1 figure.

27. **Cathodic protection of pipelines—**

W. K. Woodberry (Australasian Corrosion Engineering, **12**, No. 8, 3, 1968). Detailed outline of the application of cathodic protection to pipelines: fundamentals; cathodic protection-coatings, current requirements, design and structures, instruments.

28. **Australasian Corrosion Association-Library—**

(Australasian Corrosion Engineering, **12**, No. 8, 11, 1968). List of publications of the corrosion library: journals, general text books, bibliographies, atmospheric corrosion, corrosion resistant materials, corrosion of structures and equipment, surface treatment and coatings, underground corrosion and cathodic protection, mechanical and metallurgical factors in corrosion, marine corrosion, oil ash corrosion, corrosion inhibitors, corrosion testing.

29. **Corrosion and fatigue studies of extended 7075—T6 spar caps—**

I. S. Shaffer and coworkers (J. Materials, **3**, 400, 1968), The presence of cracks was detected by ultrasohic inspection, and they run parallel to the extrusion direction. The primary cause of the cracks is exfoliation, which starts at the rivet holes. The presence of internal exfoliation reduced the fatigue strength 40 to 60 per cent over that of uncorroded spar caps. It was concluded that a full scale fatigue test of the entire wing assembly of the air-sea rescue military aircraft should be conducted. Three tables and 19 figures.

30. **Cathode processes in the corrosion of metals with hydrogen depolarization under conditions in which the surface is continuously removed—**

N. D. Tomashov, V. M. Strukov and L. P. Vershimina (Zashchita, Metallov, **3**, No. 5, 531, 1967); Metals Abs, **1**, 71, 1968. With metals like iron, nickel and palladium tending to adsorb hydrogen there was a considerable reduction in the hydrogen overvoltage on cleaning the surface. The proportion of the overvoltage associated with the removal of hydrogen from the cathode was estimated in each case. The practical importance of these results in relation to corrosion mechanisms is considered; 10 references.

31. **Corrosion problem in aircarft—Parts I, II, III—**

(HTS Digest, **7**, No. 4, 35, 1967; **8**, No. 1, 33; No. 3, 28, 1968). What is corrosion, electrochemical activity, direct chemical attack; forms of corrosion, uniform attack, localized corrosion, pitting, selective attack; corrosion and mechanical factors, corrosion fatigue, fretting corrosion, common corrosive agents. One table and 15 figures.

32. **Stress corrosion cracking: its significance in aeronautical engineering—**

T. N. Chandrasekhara (HTS Digest, **8**, No. 2, 25, 1968). Introduction, history; 1 table, 7 figures and 6 references.

33. **Microelectrodes for corrosion studies—**

H. J. Cleary (Corrosion, **24**, 159, 1968). The possibilities of applying microelectrode technology to investigations of corrosion phenomena are examined. Techniques for the construction, storage, calibration and use of stable electrodes are described. Probe dimensions and very high impedance characteristics lead to positioning and electrical measurement difficulties. One table, 5 figures and 7 references.

34. **Influence of silver and thallium on the anodic corrosion of lead alloys in sulphuric acid—**

D. Parlov and T. Rogastschev (Werkstoffe u. Korrosion. **19,** 677, 1968). Anodic oxidation in 7N sulphuric acid indicates that the corrosion rate decreases as the silver content increases; increasing antimony content has little effect. The influence of thallium is considerably smaller and is largely suppressed by antimony; addition of arsenic results in corrosion rates, exceeding those obtained with the thallium-free metal.

35. **Industrial enemy No. 1—Corrosion—**

C. R. Palkie (Plating, **55,** 774, 1968). Importance of the corrosion problem; finishing industry—floor grates, ventilation systems, plating tanks, combat corrosion with coatings, the unseen enemy.

36. **The application of automation and computer techniques in corrosion research—**

W. Matthewman and W. E. Heaton (Corrosion Science, **8,** 453, 1968). A digital data recorder is described, which is used in the measurement and recording of the electrochemical and physical parameters involved in the study of the corrosion and cathodic protection of metals in flowing sea water. Three tables, 5 figures and 8 references.

37. **The electrochemical parameters of stress corrosion cracking—**

J. C. Scully (Corrosion Science, **8,** 513, 1968). Failure to passivate of a slip step produced at the tip of a transgranular stress corrosion crack is discussed in detail. The importance of ionic strength, anodic polarization, alloy compositional alterations and pH changes is considered; One table, 2 figures and 38 references.

38. **Corrosion resistance of nickel and two nickel alloys to gaseous bromine—**

P. D. Miller and coworkers (U.S. A.E.C., BMI-X-489, 1968, 12 pages); Battelle Tech. Review, **17,** Nol 8, 29, 1968. Specimens of Nickel 201, Duranickel 301 and Huyck Feltmetal were much more resistant than Monel.

39. **Oxidation protection of molybdenum by means of a $MoSi_2$/SnAl protective layer—**

P. Stecher and B. Lux (J. Less Common Metals, **14,** No. 4, 407, 1968). The production and structure of a new kind of protective coating—porous $MoSi_2$ layer impregnated with a low-melting tin—aluminium alloy, are described. It is particularly interesting in view of its increased reliability with respect to possible failure arising through the occurrence of local defects after short oxidation time.

40. **The use of lead in chemical plant—**

J. A. von Fraunhofer (Anti-Corrosion Methods and Materials, **15,** No. 8, 4, 1968). Principles of corrosion, lead in chemical plant, metallurgical factors, corrosion behaviour, lead in sulphuric acid, alkali and chemicals, conclusions, chemicals conveyed or contained by lead. Two tables, 6 figures and 17 references.

41. **The fastener problem (part 2)—**

(Anti-Corrosion Methods and Materials, **15,** No. 8, 8, 1968). Factors affecting selection, other considerations, corrosion resistant finishes, fasteners made from corrosion-resistant materials, aluminium, bronze; 2 tables and 6 references.

42. **Education in corrosion—**

C. L. Wilson (Anti-Corrosion Methods and Materials. **15,** No. 8, 10, 1968). Education as aim, summer school including topics,scope of lectures, prescribing qualifications.

43. **Corrosion and protection of pipes and pipelines—**

(Anti-Corrosion Methods and Materials, **15,** No. 8, 12, 1968). Summary of 17 papers presented at a Conference held in London in 1968.

44. **Cathodic protection of pipelines: case history of an insulating flange—**

H. M. Hatley (Anti-Corrosion Methods and Materials, **15,** No. 8, 15, 1968). Case history including diagramatic layout and economics.

45. **Metals in airframe-retreat of advance Part III—**

F. W. Page (HTS Digest, **8,** No. 4, 27, 1968). Behaviour of materials in service-magnesium and aluminium, fatigue, notch-sensitivity, stress corrosion, temperature-titanium alloys, steel; figures.

46. **Corrosion problem in aircaft—Part IV—**

(HTS Digest, **8,** No. 4, 32, 1968). Corrosion detection: inspection—visual, liquid dye, magnetic, ultrasonic and X-ray inspection; corrosion appraisal; figures.

47. **The steam condenser—**

(Copper, **2**, No. 5, 15, 1968). Summary of tube materials for steam condenser applications. Table showing water conditions and velocity; material—brass, cupro-nickel and copper-nickel-iron, British standard and nominal composition; heat transfer coefficient and factor. The information is intended to make the selection for a given set of design conditions a reasonably precise and straight forward exercise.

48. **Structure, mechanical and physical properties, corrosion resistance and workability of copper-nickel-zinc alloys—**

C. Vollers (Constructiematerialen, **1**, 12, Dec. 1967); Copper Abstracts No. 8043 in Copper, **2**, No. 5, 1968. Physical and mechanical properties, corrosion and heat resistance, and ductility at low temperature are described. The resistance of copper—22 per cent—nickel-zinc to acetic acid was studied, and the resistance of copper—18 per cent nickel-zinc alloy to 0.5 per cent hydrochloric and sulphuric acid is compared with that of copper.

49. **Effect of nickel on the resistance of copper-aluminium alloys to de-aluminization—**

(Cuivre Laitons Alliages, No. 99, 21, Sept.-Oct. 1967); Copper Abstracts No. 8054 in Copper, **2**, No. 5, 1968. Tafel curves from potentiometric studies permit classification of 80-89/10/0.1-5.3 copper-aluminium-nickel alloys as a function of the corrosion rate in terms of phase dissociation with redeposition of copper, the nickel-poor and nickel-rich 1N3 and aluminium alloys (nickel 0.18 and 5.26 per cent) being the least and most resistant respectively.

50. **Cathodic protection of pipelines: missed couplings—**

H. M. Hatley (Anti-Corrosion Methods and Materials, **15**, No. 9, 5, 1968). A brief account of the mode of tackling this problem; 2 figures.

51. **Atmospheric corrosion of metals. Part 1—**

Th. Worner and H. Laub (Anti-Corrosion Methods and Materials, **15**, No. 9, 12, 1968.) Measures for their protection with special reference to zinc and cadmium electrolytic coatings on steel. Concept and economic importance of corrosion, causes and phenomena of corrosion, atmospheric corrosion, corrosion prevention; 4 tables.

52. **Plastic coating chart for design engineers—**

(Anti-Corrosion Methods and Materials, **15**, No. 9, 24, 1968). General physical data of coatings: detailed chart for 17 coatings cover, ing physical properties, chemical resistance, etc.; 12 illustrations.

53. **Stress corrosion cracking of titanium alloys, II. An electrochemical mechanism—**

T. R. Beck (J. Electrochem. Soc. **115**, 890 1968). Kinetic measurements were made under potentiostatic conditions for hydrogen ion reduction on and oxidation of newly generated surfaces of a titanium alloy in aqueous solution. The data were used in an approximate model to simulate the electrochemical events in a stress corrosion crack propagating through the alloy. One table, 8 figures and 15 references.

54. **Passivation of anodic reactions—**

S. Schuldiner (J. Electrochem. Soc., **115**, 897, 1968). It is shown that initiation of passivation of a platinum electrode for the hydrogen oxidation reaction can be explained by small amounts, fraction of a monolayer, of adsorbed anions. Two figures and 8 references.

55. **Passivity in Cu-Ni-Al alloys—a confirmation of the electron configuretion theory—**

F. Mansfeld and H. H. Uhlig (J. Electrochem. Soc., **115**, 900, 1968). The primary and secondary passive films are considered to have an adsorbed structure consisting mainly of oxygen in mono-and multilayers which increase the overvoltage for anodic dissolution of the alloy. Both films are considered to be intermediates in the formation of stoichiometric metal oxides. Two tables, 6 figures and 17 references.

56. **Critical potentials for pitting corrosion of Ni, Cr-Ni, Cr-Fe, and related stainless steels—**

J. Horvath and H. H. Uhlig (J. Electrochem Soc., **115**, 791, 1968). The critical pitting potentials for the binary alloys in sodium chloride become more noble, correspondingly more resistant to pitting, with increasing chromium content. Similar data are obtained for other alloys. The overall results are explained on the basis of competitive adsorption at the metal surface and an effect of temperature on the structure of the double layer. Two tables, 8 figures and 24 references.

57. **Corrosion of silver in fused nitrates: applications of E/pO^{2-}- diagrams—**

A. Conte and M. D. Ingram (Electrochim. Acta, **13,** 1551, 1968). Some results are reported and compared with predictions drawn from the appropriate diagrams. Three tables, 14 figures and 14 references.

58. **Effect of halogens on passivity of nickel. II. Bromide ions—**

I. A. Ammar, S. Darwish and S. Riad (Electrochim. Acta, **13,** 1875, 1968). Potentiostatic method indicates that activation begins at potentials below the discharge potential for the halogen, and is primarliy initiated by ions. One table, 6 figures and 7 references.

59. **Zinc protects against corrosion. Related techniques, new applications—**

M. Puech (Corrosion, France, **16,** No. 2, 63, 1968); Zinc Abstracts, **26,** 285, 1968. Developments in France on zinc as a protective coating for steel; methods for assembling hot dip galvanized or sprayed zinc steels, such as arc welding, bronze welding and the use of high strength bolts. The advantages of zinc coated steel for use in prestressed concrete are discussed and examples of the corrosion of unprotected steel in concrete in atmospheric and marine environments are presented. Test results are discussed. Seven tables, 12 illustrations and 1 figure.

60. **Paint adhesion failure mechanism of steel in corrosive environments—**

R. R. Wiggle, A. G. Smith and J. V. Petrocelli (J. Paint Technol., U.S.A., **40,** No. 519, 174, 1968). The causes and mechanisms of paint adhesion failure on steel in cars resulting from corrosion processes were investigated. Electrochemical techniques were employed to separate the corrosion reactions and study their individual and combined effects at a discontinuity in the paint film. The effect of galvanic couples involving zinc on the behaviour of the films were examined. Zinc phosphate conversion coatings very effectively retarded anodic undercutting of the paint coatings and gave very good adhesoin of the paint. Iron phosphate retarded adhesion failure due to the cathodic reduction of oxygen. The findings are discussed and the requirements for optimum corrosion protection are indicated. Direct current polarization and/or a.c. impedance measurements can be used in corrosion protection studies involving conversion coatings and painted steel. One table, 8 illustrations and 7 figures.

61. **Advances in epoxy marine coatings—**

C. H. J. Klaren (Surface Coatings, **4,** No. 5, 150, 1968); Zinc Abstracts, **26,** 300, 1968. Improvements in the use of epoxy zinc-rich paints for marine applications are reported. A binder-rich intercoat is effective in preventing blister formation and also improves the corrosion resistance. Two tables, 3 illustrations and 2 figures.

62. **Cathodic protection by the automatic control of impressed current—**

K. Ueda, H. Ogawa and M. Yanagi, (Mitsubishi Tech. Rev., Japan, **4,** No. 3, 1 1967); Lead Abstracts, **8,** No. 9, 162, 1968. The potential distribution on planes such as a ship's hull is examined and the anode arrangement in cathodic protection is considered. Two types of automatic protecting device are described, and its use is considered to be restricted where corroding conditions change constantly, for example, on ships which navigate both in sea water and fresh water. Two tables and 15 figures.

—T.L.R.