Abstracts

(A) GENERAL

1 Corrosion-resistant low-alloy steels: A review with particular reference to atmospheric conditions in the United Kingdom—

K. A. Chandler and M. B. Kilcullen (British Corrosion J., 5, No. 1, 24, 1970). Literature review, effects of designs on the performance, painting, theoretical background of their enhanced corrosion resistance. One table, 3 figures, 68 references and supplementary bibliograpy.

2 The oxidation and hot-corrosion resistance of coblat-base superalloys—

A. M. Beltran (Cobalt, No. 46, 3, 1970). Introduction, oxidation of simple and complex cobalt-base alloys, hot corrosion nature of corrosion products, compa rison of cobalt-and nickel-base alloys. One table, 12 figures and 17 references.

3 Corrosion control of gas pipelines—

(Corrosion Prevention and Control, **17**, No. 1, 12, 1970). Introduction, coating procedures, cathodic protection-design parameters.

4 Protection of vehicles used in marine and other corrosive environments—

D. Frank (Australasian Corrosion Engineering, **14**, No. 4, 7, 1970). Parts affected by corrosion and possible remedies, protective measures, surface preparation and additional protection, protection of chromium parts and other unpainted surface, cleaning, code of practice.

5 Experience with the investigation, design and operation of cathodic protection in the serpentine trunk water mains—

J. E. McCoy (Australasian Corrosion Engineering, **14**, No. 4, 13, 1970). A detailed account for the protection on the twin parallel 48 in. and 54 in. buried steel water mains supplying water requirements for Perth.

6 Corrosion problems in the new Rotterdam Metro—

H. de Koning (Bull. Thermish Verzinken, Holland, No. 692, 3, 1969); Zinc Abs., **28**, 149, 1970. Preliminary tests resulted in the decision to galvanize 23 steel joints in the land section and 13 similar structures in the river section of the Metro tunnel. Galvanizing was followed by a three-coat paint system, total thickness of 100", and the parts with the adjoining rubber strips were finally coated with a mineral oil containing a rust inhibitor One table, 5 figures and 2 illustrations: in Dutch.

7 The corrosion or deterioration of concrete—

D. R. Buchanan (Australasian Corrosion Engineering, **14**, No. 5, 5, 1970). Introduction, internal agents, external agencies or environments, cements; 3 tables and 9 references; appendix-effect on concrete by various chemical agents.

8 Infrared studies of surface adsorption of corrosion inhibitors—

L. H. Little (Australasian Corrosion Engineering, **14**, No. 5, 17 1970). Application of infrared spectroscopy to the determination of the molecule structures of inhibitors adsorbed on metal surfaces; 2 figures and 3 references.

9 Use of temporary anti-corrosives in the motor industry—

D. J. Bane (Industrial Finishing 22, No. 264, 21, 1970). Introduction, applications of contact protectives, body shipment by open transporters, non-inflamable protectives, applications of volatile corrosion inhibitors and hot dip protectives, development of wax blends, electrostatic application, underbody protection, interior box sections.

10 The application of electron metallorgraphy to corrosion studies—

G.V.T. Ranzetta (Australasian Corrosion Engineering, **14**, No. 6, 7, 1970.) Introduction; techniques; electron microscopy, electron diffraction, scanning electron beam miscroscopy, electron-probe microanalysis; application to corrosion investigations; uniform corrosion, localized attack, cracking and miscellaneous. One table on equipment, 2 figures and 6 references.

11 Waterside fouling–a major problem in corrosion control—

A. P. Derrick (Australasian Corrosion Engineering, **14**, No. 6, 15, 1970.) Introduction, fouling problem in process and cooling water systems, surface fouling and corrosion control, chemical

methods of deposit control. 2 tables, 2 references and 5 figures.

12 Silicate corrosion inhibitors—

G. Chadzynski and K. Zieborak (Ochrana Przed Korozja, Poland, **13**, No. 1, 19, 1970); Zinc Abs., **28**, 245, 1970. The protective action and use of various types of silicate preparations employed as corrosion inhibitors in aqueous systems. A composition incorporating zinc is suitable for use in cooling installations where the water temperature does not exceed about 70°C. One table and 3 illustrations.

13 Principles of metallic corrosion

H. Kaesche (Z. Metallk., **61**, No. 2, 94, 1970). Theory of metallic corrosion with reference to zinc, iron and other metals; formation of corrosion inhibiting surface films; electrochemical corrosion; examination of the parameters affecting corrosion processes, together with procedures used for their study; 5 figures.

14 Curing polyester finishes on woodwork by ultraviolet radiation—

R. Hindley (Industrial Finishing, **22**, No. 262, 29, 1970). Introduction, the curing process, use and costs, novel application method; 2 illustrations and 3 references.

15 Effluents from metal finishing industry—

S. Krishnamurthy (ISI Bulletin, **22**, 302, 1970). Types of effluents, effluents from metal finishing industry, permissible concentration of contaminants, control of effluent, legal aspects; 6 tables and 8 references.

16 Engineering uses of filament reinforced metal-matrix composites—

J. A. Alexander (Metals Engg. Quarterly, **10**, No. 2, 22–39,1970). Introduction, demonstrated fabrication process including plasma spray, chemical vapour deposition and electrodeposition; consistency, cost, form, filament. Three tables, 15 figures and 111 references.

17 Electropolished stainless steel yields functional advantages—

(Products Finishing, **34**, No. 7, 58, 1970). Advantages are increased corrosion resistance and fatigue life, polishing to close tolerances; deburring; types of alloys.

18 Electropolymerization—

J. Oliver (Products Finishing, **34**, No. 7, 66, 1970). A new technique for applying paint: metal substracts, processes and thermal treatment; 3 references.

19 Electroplating in an ultrasonic field—

R. Walker and J. F. Clements (Metal Finishing J., **16**, 100, 1970). Introduction, current density, throwing power, current efficiency, physical and mechanical properties; 9 figures and 81 references. Deposits of improved properties are obtainable.

20 Quality control of precious metals plating—

S. R. Rosenberg and R. L. Cooley (Metal Finishing **68**, No. 4, 34, 1970). Introduction, microscopic techniques, beta-ray backscatter, deposit variations, other considerations. One table, 5 figures and references.

21 Cadmium-zinc alloy plating—

K. S. Indira and H.V.K. Udupa (Metal Finishing, **68**, No. 4, 44; No. 5, 41, 1970). Results of studies on deposition from sulphamate solutions containing cetyl trimethyl ammonium bromide. The bath is suitable for the deposition of adherent, bright plates containing 0-100 per cent zinc. Three tables, 22 figures and 9 references.

22 Anti-tarnish for silver—

(Metal Finishing 68, No. 5, 59, 1970). Two procedures have been described for producing an electrodeposited anti-discolouration film on silver: (1) potassium dichromate 20, hydroxide 20 and carbonate 40 g/l; room temperature, 8 asf cathodic, 15 seconds; (2) sodium hydroxide 1/8 and 2-mercaptobenzothiazole 1/3 oz/gal; room temperature, 5 asf anodic, 15 seconds.

23 Effect of an ultrasonic field on the anodic dissolution of certain metals—

I. K. Marshakov and V. K. Altukhov (Elektrokhimiya, U. S. S. R., 5, 658, 1969); Metals Abs., 2, 1243, 1969. This effect has been studied on the anodic dissolution of zinc, cadmium and three other metals in solutions of hydrochloric and sulphuric acids, sodium chloride and sulphate. Ultra-sound was found to increase the energy of the atoms in the crystal lattice of the metals and the energy of the ions in solution.

24 Electroplating in phosphoric-sulphuric-lactic acids—

R. Subramanian, R.M. Krishnan and N. V. Parthasaradhy, (Metal Finishing **68**, No.6,90, 1970). The role of lactic acid is discussed; 13 figures, photomicrographs and 21 references.

25 Der gegenwartige techniche stand der galvanischen verzinkung—

W. Immel (Galvanotechnik, **61**, 377, 1970). Review of the current technical status of electrolytic zinc plating: advantages and disadvantages of various electrolytes; 6 figures and 24 references.

26 Metallic coatings for the protection of mild steel from corrosion at ambient temperatures 1. Introduction and zinc coatings—

C. Davies and N. J. Hanford (Anti-Corrosion Methods and Materials **17**, No. 6, 11, 1970). Corrosion of iron, protection, zinc coatings and their characteristics; 3 figures, 3 tables and 16 references.

27 Electroplating the platinum metals—

(Platinum Metals Review, **14**, No. 3, 93, 1970). A recent survey of processes and applications: plating of rhodium, ruthenium, indium and osmium; applications in electronics and high temperature; use in contacts.

28 Anwendungsbereiche und -grenzen korrosions-Schutzender und dekorativer metalluberzuge—

J. Elze (Galvanotechnik, **61**, 448, 1970). Review of various application possibilities of metal deposits, decorative as well as those for corrosion protection; choice of coating, corrosion behaviour of nickel and chrome plated steel; 2 tables.

29 Nickel plating from sulphamate solutions. Part I. The nickel sulphamate solution and its applications—

R.A.F. Hammond (Metal Finishing J., **16**, 169, 1970). The first of a five-part series: Introduction, applications, solutions, functions of some bath constituents, preparation and purification of the plating bath; 5 figures 3 tables and 44 references.

30 Electropainting plant, technology and applications—

G.D.H. Smart (Metal Finishing J. **16**, 179, 1970). Principles, pretreatment, advantages, typical installations; 5 figures.

31 Ultrasonics in metal finishing–

B. A. Shenoi, K. S. Indira and R. Subramanian (Metal Finishing, **68**, No. 7, 40; No. 8, 57, 1970). Review: cleaning, pickling, and descaling, phosphating, plating of cadmium, copper, chromium, nickel, silver, gold, and zinc.

32 The effect of film thickness on the wear of hard electrodeposits

J. M. Georges and E. Rabinowicz (Wear, **14**, No. 3 171, 1969); Cobalt, No. 47, 103, 1970. Various thicknesses of chromium, Cobalt, Cobalt-phosphorus, rhenium and rhodium were electroplated on to nickel and copper substrates, and the wear of the films was measured when sliding against a chromium-steel. For all materials, when a thin film was used the wear rate decreased as the film thickness increased; above a critical film thickness, the wear was independent of thickness. The less brittle films had a larger critical film thickness.

33 Plating and its problems. Part I–Handling and pretreatment–

J. D. Greenwood (Metal Finishing J., **16**, 200, 1970). The first of a four-part series. Introduction, storage and transportation of work, pre-machining; 6 figures.

34 Nickel plating from sulphamate solutions. Part II–Properties of solution, anodes, equipment and operating conditions—

R. A. F. Hammond (Metal Finishing J; **16**, 205, 1970). Table 4-11, figure 6, and references 45-51.

35 A visit to Sweden—

(Metal Finishing J., **16**, 212, 1970). Report on the problems of surface coating based on a visit to Sweden: shipbuilding, automatic shop-priming, colour-coating line; 12 figures. It is concluded that Swedish standards of metal finishing and production engineering are high.

36 Hard anodizing at Acorn Hardas—

(Metal Finishing J., **16**, 218, 1970). Application of hard anodic films to aluminium-alloy components by the Hardas process: properties and specifications; facilities; 3 figures.

37 Effluent and the metal finisher's conscience—

M. Clarke (Electroplating and Metal Finishing **23**, No. 8, 13, 1970). A report of the study session held at the IMF Conference 1970: ion-exchange plant, integrated system, lime versus caustic soda, reverse osmosis.

38 Effluent plant at International Computers Ltd.,—

(Electroplating and Metal finishing, **23**, No. 8, 21, 1970). Description of the integrated method of metal finishing effluent. Plating

facilities installed, effluent treatment systems, treatment of rinse water, spent concentrated solutions, sludge disposal, savings ; 5 figures.

39 Plastisols for coil coating—

M.R. Cave (Industrial Finishing, **22**, No. 265, 7, 1970). Types of machine, plastisol technology ; 1 table and 3 figures.

40 High speed curing of steel can coatings—

(Industrial Finishing, **22**, No. 265,10,1970). Introduction, heated from the inside out, high temperature reactions ; 2 figures.

41 Progress in industrial finishing—

R.A. Fidler (Industrial finishing, **22**, No. 265, 22, 1970). Main requirements, current techniques, areas for improvement, looking at the future.

42 Blistering in water-immersed coatings under the influence of a temperature gradient—

Ir. Th. de Vries (Anti-corrosion Methods and Materials, **17**, No. 7, 11, 1970). Introduction, causes of blistering, thermo-osmosis, calculation of the pressure rise ; 10 tables, 5 figures, 4 graphs and 7 references.

43 Metallic coating for the protection of mild steel from corrosion at ambient temperatures—Part 2. Aluminium coatings—

C. Davies and N J. Hanford (Anti-Corrosion Methods and Materials, **17**, No. 7, 20, 1970). Description of the important processes, corrosion resistance ; figures and references ; to be continued.

44 Cleaning and conversion treatment of ferrous metals and alloys before their protection with anti-corrosive paints—

G. Nedey (Trav. Peinture, France, **25**, No. 3, 99, 1970); Zinc Abs., **28**, 239, 1970. Chemical, mechanical and flame treatment surface preparation procedures; method involving shot blasting zinc giving a thick protective deposited coating ; use of zinc dust paints and chromate coatings; 32 references.

45 Chemical treatment of industrial effluents—

F. Cramer (Baender Bleche Rohre, **11**, No. 2, 84, 1970). Zinc Abs., 260, 1970. Description of the automatic and continuous treatment of industrial effluents containing zinc, cadmium, cyanide and other materials. Eight tables, 7 figures and 3 illustrations.

46 Surface coatings in space—

P. Walker (Paint Technol., **34**, No. 3, 14, 20, 1970). Development work on thermal control coatings for space satellites by the U.K.A.E.A. Silicon resin and potassium silicate based paints pigmented with specially prepared zinc titanate or B. P. zinc oxide were stable under the conditions of the test. Six tables, 7 figures and 4 illustrations.

47 Stainless Steel in Electronics–

(Stainless Steel, No. 14, 3, 1970) Introduction, forms available, applications, future developments; 13 illustrations.

48 Electroslag remelting of superalloys—production melting experience—

C. F. Elliott and coworkers (Metals Engg. Quarterly, **10**, No. 2, 46, 1970). Introduction, comparison of remelting methods ; 3 tables, 3 figures and 6 references.

49 Materials for high-duty electrical contacts—

H. C. Angus (Metallurgical Review 141, 13–26) ; Metals and Materials, 4, 115, 1970. Introduction, contact concepts, functions and forms of contacts, wrought precious metals and their alloys, precious metal electrodeposits, metal removal in service, contact resistance, selection of contact materials : seven tables, 5 figures and 116 references.

50 The challenge of the new materials technology—

H. J. Pick (Metals and materials **4**, 145, 1970). An attempt has been made to draw attention to some implications of the two outstanding features of contemporary materials technology, its economic importance and the rapidity with which it is changing. Materials engineering education is also discussed ; 2 references.

51 The development of non-ferrous melting and casting and its influence on safe working practices—

R. King (Metals and Materials, 4, 197, 1970). Introduction, equipment and processing hazards, protection of personnel, noise as a hazard; 4 figures and 16 references.

52 A contemporary view of cobalt-base alloys—

C. T. Sims (J. Metals **21**, No. 12, 27, 1969). An attempt is made to characterize the problems of using cobalt –base alloys in gas-turbine and jet-engine hot stages,

and to list and evaluate the benefits of cobalt systems, Review of metallurgy, oxidation and hot corrosion.

53 The electrode material in electroextraction of zinc and other metals from sulphate solutions on using direct and reverse current—

I. Encev (Rudodobivi metallurgija, **23**, No. 11, 44, 1968); Abs., Bulgarian Sci. Lit.–Chemistry, **12**, No. 1, 34, 1969. Amongst the cathodes investigated–zinc, titanium and aluminium, the most suitable material is an aluminium alloy containing titanium 0.1, chromium 0.05 and silicon 0.05 per cent. A lead alloy containing silver 1, cobalt 0.024, and antimony or tin 0.26 per cent is the best for the anode. The causes of the positive influence of the reversive current on the anode are examined. Two tables and 1 figure.

54 Open–circuit potentials and microstructure of some binary Co–Cr alloys—

A. Acharya, E. Freise and E.H. Greener (Cobalt, No. 47, 75, 1970). An attempt has been made in this paper to demonstrate the influence of composition, heat treatment, allotropic transformation and precipitation of a second phase on the electrochemical behaviour of a series of cast cobalt-chromium alloys in aqueous electrolytes at a physiological temperature of 37°C. The alloys have a fairly long and successful history of application as medical and dental prostheses. Materials and methods, results and discussion ; 9 figures and 5 references.

55 Anodic and cathodic behaviour of maraging steel in acid solutions—

R. F. Tobias and K. Nobe (Corrosion, **25**, 173, 1969). The polarization behaviour of 250 ksi 18 per cent nickel maraging steel in acidic solutions has been studied by galvanostatic and potentiostatic methods. The corrosion potential was independent of chloride ion concentration, but dependent upon pH; passivity was greatly affected by the former. There was little difference in the behaviour between the annealed and maraged electrodes. Tafel behaviour was not observed in sulphuric acid solution, but held good for maraging steel hydrochloric acid.

56 Manufacturing castings by electroslag remelting process–

G. K. Bhat (Modern Casting, A. F. S. Trans., 56, No. 3, 165, 1969); Cobalt, No. 47, 102, 1970. The electroslag consumable-electrode remelting process can be adapted as a novel technique for producing high-integrity castings. It is of particular interest for minimizing castings defects, especially segregation of certain elements in superalloy and large steel castings. The process improves both the purity of the metal and the structure of the solidified ingot or casting in one continuous operation ; furthermore, the casting surface is smooth and uniform and requires little or no machining.

57 How mineral discovery has kept ahead of population growth—

D. S. Robertson (World Mining 23, No. 7, 74, 1970). United Nations prospecting, gross changes in industry, exploration successes, government activity, exploration practice. Three tables covering statistics, and illustrations.

58 Nickel silver as an engineering material—

B. A. Weldon, J. A. Towers and A. M. Patton (Metals and Materials, **4**, 299, 1970). Introduction, physical and mechanical properties corrosion and oxidation behaviour fabrication characteristics, applications. Eight tables, 6 figures and 7 references.

59 Explosive Welding—

B. Crossland and J.D. Williams (Metallurgical Review. No. 144, 79-100, 1970). Review with 6 tables,61 figures and 95 references.

60 Metallography. A review of current practice—

E. Hornbogen and G. Petzow (Z. Metallk., **61**, No. 2, 81, 1970). Principles, techniques and applications ; bibliography. One table, 15 figures and 19 illustrations.

61 Micro–spectrophotometric titration of cadmium in the presence of sulphate ions—

A. P. Nechiporenko and coworkers Zavodsk. Lab., U.S.S.R., 35, 432, 1969); Zinc Abs., **28**, 130, 1970. Methods of titrating cadmium in the presence of the three standard indicators, sulpharsazene, arsazene and xylene orange are described and compared. The latter two indicators enable cadmium to be determined with a sensitivity of 0.5 to 2.00 μg/ml and an accuracy of 0.1-3.0 per cent. The general

efficiency of the method is comparable with other techniques.

62 Determination of cyanide ions in waters and effluents by an Auto-Analyzer procedure—

P. Casapieri, R. Scott and E. A. Simpson (Anal. Chim. Acta, **49**, 188, 1970). An automated, sensitive and selective colorimetric technique is described for the determination of 0.5 to 10 ppm of cyanide ions in effluents, including those containing the cyanide complexes of zinc and cadmium. It involves the formation of a coloured complex by coupling cyanogen bromide to pyridine and p-phenyldiamine. Four tables and figure.

63 Determination of small amounts of lead in steels by alternating current polarography—

A. M. Dymov, I. G. Ivanov and M. A. Burlova (Izv. Vysshikh Uchebn. Zavednii, Chernaya Met., U. S. S. R., No. 5, 185, 1969) ; Metals Abs., 2. 1651, 1969 A polarographic method is described for the determination of lead in steels which involves the preliminary chromatographic separation of lead. It is reported that 10^{-4} per cent lead can be determined with a mean relative error of $\pm$ 5.15 per cent. Non-interfering elements are listed.

64 Anodic stripping voltametry of cobalt at a platinum eletrode—

G. Henze, R. Geyer and D. Kuprat (Neue Hutte, **14**, No. 3, 185,1969); Cobalt.No.47.106 1970. This procedure is applicable to the determination of small cobalt contents in water and alcohol solutions. Linear calibration curves were obtained between contents of 10^{-5} to 10^{-8}M ; nickel interferes with the determination.

65 Metal-ion complexes and their redox properties—

A. G. Sykes (Chemistry in Britain, **6**, 159, 1970). Factors effecting electron transfer, specific examples, ambidentate ligands, mechanism of electron transfer, substitution controlled reactions, two-equivalent reactions, biological systems, new oxidation states ; 3 tables and 59 references.

66 Acidity of metallic cations in anhydrous acetic acid solution. Variation in the reducing power of metals and amalgams as a function of pH—

J. C. Touller and B. Tremillon (Anal. Chim. Acta, **49**, 115, 1970). Experimental investigations employing techniques such as equilibrium potential measurements are reported, the results being used to evaluate the nature and the formation constants of the acetate complexes of zinc, cadmium, lead and other metals in anhydrous acetic acid solution in the presence of 0.5M lithium perchlorate. The data were processed by computer techniques and the confidence intervals are given A potential-pH diagram is presented to demonstrate the reducing power of the metals and their amalgams. Five tables and 6 figures ; in French.

67 Use of oxygen electrode in the determination of activities of components in silicate slags—

P. D. Parikh, P. S. Kinnerkar and D. L. Roy (Indian Chemical Engineer, **12**, No. 1, Trans. 31, 1970) Oxygen electrode has been used to evaluate the activity of PbO in $PbO-SiO_2$ melts by E. M. F. measurements in the temperature range 850–1050°C; 5 figures.

68 Organic solvents - their effect on chemical reactivity—

M. R. J. Dack (Chemistry in Britain, **6**, 347, 1970). Solvent classification, theories of solvation and empirical correlations ; 4 table and 43 references;

69 High power pulsed lasers—

D. J. Bradley (Physics Bulletin, **21**, 116, 1970). Introduction, ruby and neodymium lasers, picosecond pulses, organic dye lasers, measurement of ultrashort pulse durations, applications, nonlinear optical resonance spectroscopy selective excitation, coherent resonant interactions, electronics – ranging and high speed photography, high temperature laser generated plasmas, atmospheric physics. One table, 17 figures and bibliography.

70 Statistical methods and the chemist—

R. M. Driver (Chemistry in Britain, **6**, 154, 1970). Introduction, raw materials, model building, design of experiments, regression methods, optimization forecasting methods and control, conclusion ; 2 figures and 16 references.

71 Nuclear structure theory—

J. M. Irvine (Physics Bulletin, **21**, 149, 1970). Introduction, shell model basis, nuclear matter, finite nuclei, deformed nuclei; 4 figures and bibliography.

72 Waste control – a must for cost reduction—

G. M. Bhattacharya (Science and Engineering, **23**, 85, 1970). Material, labour, overhead expense and miscellaneous wastages.

73 Preventive maintenance in chemical industries in India—

S. Visweswaran (Indian Chem. Engineer, **12**, No. 1, 12, 1970). Introduction, preventive maintenance practices, costs, personnel; 2 figures and 13 references.

74 Lasers cut machining costs—

(Tooling, **24**, No. 7, 11, 1970). Introduction, thin film machining, automatic dynamic balancing, application of gas laser, gas jet laser cutting; 6 figures.

75 Universities and the community—

M. R. Gavin (Physics Bulletin, **21**, 292, 1970). Introduction, science in the universities and in industry, physics and the community, university autonomy, committees and councils, miscellaneous; 2 tables and bibliography.

76 Review of digital storage technology—

W. Renwick (Physics Bulletin, **21**, 306, 1970). Introduction, magnetic high – speed random–access stores, ferrite cores, flat magnetic films, plated wire, semiconductor arrays, superconducting storage, magnetic surface recording, optical storage techniques; 11 figures and bibliography.

77 A new look at natural rubber—

P. W. Allen, D. Barnard and B. Saville (Chemistry in Britain, **6**, 382, 1970). Introduction, production/consumption R and D, vulcanization chemistry, oxidative degradation of NR, protection against oxidation; two tables on production statistics, 6 illustrations and 13 references.

78 New developments in filtration—

P. H. Schwabe (Chemistry in Britain, **6**, 388, 1970). An approach to respiratory protection, particulate/vapour filtration respirators, large filters. Four tables, 8 figures and 14 references.

—T. L. R.

(B) BATTERIES AND FUEL CELLS

1 A Study of Carbon – tungsten composite electrodes as cathode materials for molten salt batteries—

W. K. Behl, D. D. Beals and G. R. Frysinger (J. Electrochem. Soc. Japan, **37**, 215, 1969). The cathode capacities of the electrodes were determined from a study of the charge and discharge curves of the cells: Li-Al/LiCl-KCl/C and Li-Al/LiCl-KCl/C-W. The electrodes were found suitable; 2 tables, 7 figures and 20 references.

2 Batteries, secondary. Portable lead–acid type—

(Defence Standard, U.K., DEF 61–9: Part 1, November 5, 1969); Lead Abs., **10**, 33, 1970. Requirements are specified for the general design, manufacture, qualification approval, testing and inspection of portable lead–acid batteries other than commercial types, providing electrical power for communication equipment, aircraft servicing, fighting vehicles, mechanical transport, and for miscellaneous services in ships. Related specifications are listed, and particular requirements for each battery are presented in 6 supplements.

3 Opportunity for lead – acid battery manufacture in Missouri—

J. L. Stark (Univ. Missouri Booklet, 1969, 33 pages): Lead Abs., **10**, 51, 1970. The feasibility is examined of additional manufacturing facilities in Missouri for the production of lead – acid batteries – starting, lighting and ignition: market potential, costs, plant layout and newly developed polypropylene containers. Sixteen tables and 7 figures.

4 First commercial electric car—

(Elec. Rev., **185**, 640, 1969): Lead Abs., **10**, 51, 1970. The first electric city car to be designed for quantity production is described. The lead – acid batteries, developed by Oldham International for the Enfield Automotive car, have thin plates which are reinforced to prevent buckling. It is possible to charge the battery at high rate, giving an