1 Introduction

The origins of electrochemistry · Electronic and electrolytic conductors · Systems of units · Faraday's laws of electrolysis · Coulometers

2 Electrolytic Conduction

Resistivity and conductivity \cdot Measurement of the conductance of electrolytes \cdot Cell constant \cdot Molar conductivity \cdot Variation of molar conductivity with concentration \cdot Theories of ionisation \cdot Limiting molar conductivities of ions \cdot Ionic mobility and ionic conductance \cdot Transport numbers \cdot Determination of transport numbers \cdot Hydration of ions \cdot True and apparent transport numbers \cdot Complex ions

3 Ionic Equilibria

The Lowry-Brønsted theory of acids and bases \cdot Influence of the solvent on the strengths of acids and bases \cdot The concept of activity \cdot Dissociation constants of acids and bases \cdot Units of dissociation constants \cdot Self-ionisation of solvents \cdot Relationship between the strength of conjugate acids and bases \cdot Acidity and alkalinity of aqueous solutions \cdot Neutralisation and hydrolysis \cdot Buffer solutions \cdot Theory of acid-base indicators \cdot The working range of indicators \cdot The use of indicators in acid-base titrations \cdot Solubility products and solubilities

4 Reversible Electrode Potentials

Half cells · Activity of gases · Variation of electrode potential with activity · Electrochemical cells and cell reactions · Liquid junction potentials · Measurement of e.m.f. · Sign conventions · The hydrogen scale of electrode potentials · Subsidiary reference electrodes · Relationship between potential and activity · Thermodynamics of cells · Thermodynamic aspects of the sign convention · Mean ionic activities · Concentration cells · Redox systems · Standard potentials and equilibrium constants · Redox titrations · Redox indicators 88

48

1

CONTENTS

5 Applications of Conductance Measurements Determination of limiting molar conductivity · Determination of the solubility of a sparingly soluble salt · Determination of dissociation constants · Determination of hydrolysis constant · Conductimetric titrations

6 Applications of e.m.f. Measurements

7 Electrolysis

Electrode processes \cdot The electrical double layer \cdot The kinetic treatment of reversible electrode potentials \cdot Activation overpotential \cdot Measurement of the potential of a working electrode \cdot The significance of exchange current density \cdot Concentration overpotential \cdot Transport in electrolysis \cdot Limiting diffusion currents \cdot Decomposition voltages and discharge potentials \cdot Polarography \cdot Amperometric titrations

Index

138

187

240

241