

CONTENTS

CHAPTER I. INTRODUCTION

	PAGE
METHODS AND OBJECTIVE OF SCIENCE	1

CHAPTER II. THE ATOMIC AND MOLECULAR THEORIES

ELEMENTS AND COMPOUNDS	4
LAWS OF CHEMICAL COMBINATION BY WEIGHT	5
DALTON'S ATOMIC THEORY	9
THE GAS LAWS AND AVOGADRO'S HYPOTHESIS	11
ENERGY	15
PHYSICAL AND CHEMICAL CHANGE	18
THERMOCHEMISTRY	22

CHAPTER III. STATES OF MATTER

THE GASEOUS STATE : THE EQUATION OF STATE FOR GASES	28
PARTIAL PRESSURE	31
DIFFUSION AND EFFUSION	33
THE KINETIC THEORY OF GASES	36
THE SPECIFIC HEATS OF A GAS	40
THE LIQUID STATE	42
THE CRYSTALLINE STATE	45
ALLOTROPY AND POLYMORPHISM	52
ISOMORPHISM	58

CHAPTER IV.

MOLÉCULAR, EQUIVALENT AND ATOMIC WEIGHTS

DEFINITIONS	66
DETERMINATION OF MOLECULAR WEIGHTS OF GASES	68
DETERMINATION OF MOLECULAR WEIGHTS OF VAPOURS	73
ANOMALOUS VAPOUR DENSITIES AND THERMAL DISSOCIATION	76
MOLECULAR WEIGHTS OF SUBSTANCES IN SOLUTION	79
EQUIVALENTS	88
ATOMIC WEIGHTS	99

CHAPTER V.

ATOMIC STRUCTURE, THE PERIODIC CLASSIFICATION, VALENCY

THE PERIODIC TABLE	110
ATOMIC STRUCTURE	114
ATOMIC STRUCTURE AND THE PERIODIC TABLE	116
VALENCY : THE COVALENT LINK	122
VALENCY : THE ELECTROVALENT LINK	125
VALENCY : THE CO-ORDINATE LINK	128
RELATIONSHIPS IN THE PERIODIC TABLE	131

CHAPTER VI. SOLUTION		PAGE
SOLUTIONS OF SOLIDS IN LIQUIDS		137
SOLUTIONS OF LIQUIDS IN LIQUIDS		146
SOLUTIONS OF GASES IN LIQUIDS		153
OSMOSIS		158
CHAPTER VII.		
VELOCITY OF REACTION, LAW OF MASS ACTION, EQUILIBRIA		
LAW OF MASS ACTION		169
CATALYSIS		172
EQUILIBRIA IN HETEROGENEOUS SYSTEMS : THE PHASE RULE		175
EQUILIBRIA IN HOMOGENEOUS SYSTEMS		178
CHAPTER VIII. ELECTROLYSIS		
LAWS OF ELECTROLYSIS		188
MECHANISM OF ELECTROLYSIS		189
ELECTRODE POTENTIAL		190
ELECTROCHEMICAL SERIES		192
ELECTRICAL CONDUCTIVITY OF SOLUTIONS		195
PROPERTIES OF SOLUTIONS OF ELECTROLYTES		203
SOLUBILITY PRODUCT AND COMMON-ION ACTION		204
CHAPTER IX. ACIDS, BASES, SALTS		
SALTS : DOUBLE SALTS : COMPLEX IONS		209
ACIDS		211
BASES		213
AMPHOTERIC ELECTROLYTES		213
pH		213
INDICATORS		214
HYDROLYSIS		215
CHAPTER X. HYDROGEN		217
CHAPTER XI. OXYGEN AND OZONE		
OXYGEN		224
OZONE		228
OXIDES		232
OXIDATION AND REDUCTION		234
CHAPTER XII. WATER AND HYDROGEN PEROXIDE		
WATER		239
HYDROGEN PEROXIDE		244
CHAPTER XIII. GROUP IA. SODIUM AND POTASSIUM		
GENERAL PROPERTIES OF ELEMENTS IN GROUP IA		251
SODIUM AND ITS COMPOUNDS		254
POTASSIUM AND ITS COMPOUNDS		276

CHAPTER XIV. GROUP IB.

COPPER, SILVER AND GOLD

PAGE

GENERAL PROPERTIES OF ELEMENTS OF GROUP IB	287
METALLIC COPPER	289
GENERAL CHEMISTRY OF COPPER.	295
CUPROUS COMPOUNDS	299
CUPRIC COMPOUNDS	302
METALLIC SILVER	305
SILVER COMPOUNDS	309
GOLD	313

CHAPTER XV. GROUP IIA.

MAGNESIUM, CALCIUM AND BARIUM

GENERAL PROPERTIES OF ELEMENTS IN GROUP IIA	317
MAGNESIUM AND ITS COMPOUNDS	318
CALCIUM AND ITS COMPOUNDS	326
BARIUM AND ITS COMPOUNDS	339

CHAPTER XVI. GROUP IIB. ZINC AND MERCURY

GENERAL PROPERTIES OF ELEMENTS IN GROUP IIB.	342
ZINC AND ITS COMPOUNDS	343
MERCURY AND ITS COMPOUNDS	350

CHAPTER XVII. GROUP IIIB. BORON AND ALUMINIUM

GENERAL PROPERTIES OF ELEMENTS IN GROUP IIIB	358
BORON AND ITS COMPOUNDS	358
ALUMINIUM AND ITS COMPOUNDS	360

CHAPTER XVIII. GROUP IVB. CARBON AND SILICON

GENERAL PROPERTIES OF CARBON AND SILICON	368
CARBON	370
CARBON COMPOUNDS	376
FUEL	386
SILICON AND ITS COMPOUNDS	390

CHAPTER XIX. GROUP IVB (CONTINUED)

TIN AND LEAD

GENERAL PROPERTIES OF TIN AND LEAD	395
TIN AND ITS COMPOUNDS	396
LEAD AND ITS COMPOUNDS	401

CHAPTER XX. GROUP VB. NITROGEN

GENERAL PROPERTIES OF ELEMENTS IN GROUP VB	411
NITROGEN	412
AMMONIA AND AMMONIUM COMPOUNDS	418
OXIDES AND OXYACIDS OF NITROGEN	424
NITRIC ACID	429

CHAPTER XXI. GROUP VB (CONTINUED).	
PHOSPHORUS, ARSENIC AND ANTIMONY	
	PAGE
PHOSPHORUS	437
HYDRIDES OF PHOSPHORUS	442
CHLORIDES OF PHOSPHORUS	444
OXIDES AND OXYACIDS OF PHOSPHORUS	446
ARSENIC AND ITS COMPOUNDS	451
ANTIMONY AND ITS COMPOUNDS	456
CHAPTER XXII. GROUP VIB. OXYGEN AND SULPHUR	
GENERAL PROPERTIES OXYGEN AND SULPHUR	460
SULPHUR	461
HYDRIDES OF SULPHUR	467
OXIDES AND OXYACIDS OF SULPHUR	471
SULPHURIC ACID	475
CHAPTER XXIII. GROUP VII. THE HALOGENS	
GENERAL PROPERTIES OF THE HALOGENS	486
FLUORINE	488
CHLORINE	490
HYDROGEN CHLORIDE	495
OXIDES AND OXYACIDS OF CHLORINE	498
BROMINE	504
HYDROGEN BROMIDE	505
OXIDES AND OXYACIDS OF BROMINE	506
IODINE	507
HYDROGEN IODIDE	510
OXIDES AND OXYACIDS OF IODINE	511
CHAPTER XXIV. GROUP VIII.	
TRANSITION SERIES OF THE FIRST LONG PERIOD	
GENERAL PROPERTIES OF CHROMIUM, MANGANESE, AND IRON	515
CHROMIUM AND ITS COMPOUNDS	517
MANGANESE AND ITS COMPOUNDS	521
IRON : METALLURGY OF IRON AND STEEL	523
COMPOUNDS OF IRON	528
MISCELLANEOUS QUESTIONS	532
INDEX	535
ANSWERS TO NUMERICAL PROBLEMS	547

NOTE

Temperatures (except in a very few cases which are clearly indicated) are expressed in degrees centigrade and the "C." which designates this temperature scale is not printed after the numerical value of the temperature. For example, 15° means 15 degrees centigrade.

Pressures are expressed as millimetres of mercury printed thus: 760 mm.