

Cambridge University Press

978-0-521-10496-8 - Valency: Classical and Modern, Second Edition

W. G. Palmer

Table of Contents

[More information](#)

CONTENTS

<i>Preface</i>	<i>page vii</i>
<i>List of abbreviated titles</i>	xi
Chapter I. HISTORICAL INTRODUCTION	
Dalton: atomic theory	1
Berzelius: dualistic theory	5
Frankland and Kekulé: discovery of valency	8
Gerhardt, Clausius, and Cannizzaro: gas theory	12
Mendeleeff: the periodic system	14
Chapter II. DEVELOPMENT OF THE DOCTRINE OF VALENCY BEFORE THE RISE OF ELECTRONIC THEORIES	
Selection of elements of standard valency	16
Valency as the foundation of the periodic system	25
Chapter III, Section I. METHODS FOR DETERMINING STRUCTURE AND VALENCY	
Classical methods: stereochemistry	30
Electric moments: molecular polarity	35
Diffraction methods: X-ray and electron diffraction	38
Spectral methods: infra-red spectra	39
Illustrative applications of the methods	40
Section II. VALENCIES IN THE GROUPS OF THE PERIODIC SYSTEM	
Group I A: the alkali metals	49
— B: copper and silver	52
Group II: beryllium, magnesium, mercury	55
Group III A: boron	59
— B: thallium	62
Group IV B: carbon, silicon, tin, lead	62
— A: titanium, zirconium, thorium	72
Group V B: nitrogen, phosphorus, arsenic	73
Group VI B: oxygen, sulphur, selenium, tellurium	80
Group VII B: the halogens	87
The A metals: vanadium, chromium, manganese	99

Cambridge University Press

978-0-521-10496-8 - Valency: Classical and Modern, Second Edition

W. G. Palmer

Table of Contents

[More information](#)

vi	CONTENTS	
<i>Chapter IV. THE ELECTRONIC SPIN THEORY OF VALENCY</i>		
I. The foundations		<i>page</i> 103
II. The spin theory applied to compounds of the elements hydrogen to fluorine		121
The stereochemistry of compounds of the light elements		138
<i>Chapter V. THE SPIN THEORY APPLIED TO THE HEAVIER ELEMENTS</i>		
Spectroscopic basis		143
Octet principle not applicable to the heavier elements		151
Long series		155
Incidence of colour and paramagnetism		158
The transitional elements		162
The actinide elements		165
<i>Chapter VI. SPECIAL TOPICS</i>		
I. Co-ordination compounds		167
II. Bond energies, multiple links, and the method of molecular orbits		177
Multiple links of carbon		193
<i>cyclo</i> Alkanes		203
Benzenoid compounds		206
Aromatic substitution		218
III. Electro-affinity of combined atoms		220
IV. Hydrogen bonds		222
V. Electron-deficient systems		232
<i>Appendix</i>		
I. Constants, signs and conventions		237
II. Bond-lengths		238
<i>Index</i>		239