## Contents

Pre	eface	vii
	General Questions Laboratory apparatus, cleaning and calibration 5 Weighing 9 Purification processes 12 Periodic table 14 Laboratory hazards and first aid 15	1
1.	Limit Tests  General questions 18  Limit test for chlorides 22  Limit test for sulphates 25  Limit test for iron 27  Limit test for heavy metals 30	18
2.	Identification Tests for Anions and Cations  Tests for identification of cations 33  Ammonium ion 33  Barium ion 34  Calcium ion 35  Magnesium ion 36  Potassium ion 37  Sodium ion 38  Tests for identification of anions 39  Bicarbonate ion 39  Chloride ion 40  Citrate ion 40  Gluconate ion 42	33

	lodide ion 43	
	Sulphate ion 44	
	Thiosulphate ion 45	
3.	Fundamentals of Volumetric Analysis	46
	General questions 46	
	Molecular weight and equivalent weight 47	
	Normality/molarity/preparation of solutions 49	
	Standard solutions 54	
	Indicators 56	
	Calculations 58	
	Neutralisation titrations 63	
	Preparation and standardization of hydrochloric ac solution 66	id
	Preparation and standardization of sodium hydroxic solution 68	de
	Redox titrations 71	
	Equivalent weight of oxidising and reducing agents	72
	Permanganometry 75	
	Preparation and standardization of potassium	
	permanganate 77	
	lodimetric and iodometric titrations 78	
	Preparation and standardization of sodium	
	thiosulphate solution 80	
	Precipitation titrations 83	
	Mohr's method 84 Volhard's method 85	
	Preparation and standardization of 0.1 M silver nitra	to
	solution 88	16
	Preparation and standardization of ammonium thiocyanate solution 90	
	Complexometric titrations 92	
	General questions 92	
	Preparation and standardization of edetate solution 100	
4.	Assays	105
	Assay of ferrous sulphate 105	
	Assay of calcium gluconate 107	

	Assay of sodium chloride 110 Assay of Ascorbic acid 112 Assay of Ibuprofen 114	
5.	Fundamentals of Preparative Organic Chemistry	116
	General questions 116 Solubility 119 Storage 121 Melting point 122 Boiling point 124	
6.	Preparation of Organic Compounds	126
	Acetylation 126 Bromination 127 Nitration 128 Hydrolysis 130 Esterification 131 Benzoylation 133 Diazotization 134 Oxidation 136 Reduction 136 General questions related to synthesis 137 Preparation of benzoic acid from benzamide 140 Preparation of picric acid from phenol 141	
7.	Identification and Test for Purity of Pharmaceuticals	142
	Identification tests 142 Chemical tests for identification of aspirin 142 Chemical tests for identification of caffeine 143 Chemical tests for identification of sulphanilamide 14 Chemical tests for identification of paracetamol 147	4
8.	Systematic Qualitative Analysis	148
	Preliminary examination 148 Extra elemental detection 151 Functional group detection 156 Carboxylic acids 157 Alcohols/aliphatic hydroxy group 163 Phenols/aromatic or phenolic hydroxy group 166	

## xii Viva Voce in Pharmaceutical Chemistry

Aldehydes 171 Ketones 177 Esters 179 Amides 181 Amines 184 Nitro group 189 Special reagents 191

Bibliography and Further Reading

193