

CONTENTS

Preface

PART I. GENERAL

Principles and significance of activation analysis

1. Neutron activation analysis

- 1.1. Properties of neutrons important in activation analysis 8
- 1.2. The use of nuclear reactors as sources of neutrons in neutron activation analysis 21
- 1.3. The use of charged particle accelerators as neutron sources in neutron activation analysis 40
- 1.4. Small laboratory neutron sources 54
- 1.5. Preparation and packing of samples and standards for activation 63
- 1.6. Activation 81
- 1.7. Chemical procedures 133
- 1.8. Detection 172
- 1.9. Checking the accuracy of the method 209
- 1.10. Precision of neutron activation analysis 216

2. Activation analysis by charged particles and gamma rays

- 2.1. Reactions of charged particles and gamma rays 221
- 2.2. Sources of charged particles and gamma rays 227
- 2.3. Analytical procedure 228

PART II. SPECIAL SECTION	244
1. Introduction	245
2. Analysis of various metals and their alloys (the use of activation analysis in metallurgy and metal chemistry)	248
2.1. Analysis of iron and its alloys	248
2.2. Analysis of gold, silver, platinum metals and their alloys	250
2.3. Analysis of aluminium, magnesium, beryllium and their alloys	251
2.4. Analysis of alkali metals	253
2.5. Analysis of other metals and their alloys (copper, zinc, lead, titanium, zirconium, antimony, tungsten, nickel, thallium, niobium, bismuth, tantalum, tin, gallium)	254
3. Analysis of non-metallic elements (the use of activation analysis in the technology of semi-conductors, inorganic chemistry and in other fields)	261
3.1. Analysis of silicon	261
3.2. Analysis of germanium	262
3.3. Analysis of selenium and tellurium	263
3.4. Analysis of phosphorus	263
3.5. Analysis of iodine	264
3.6. Analysis of sulphur	264
3.7. Analysis of carbon	264
4. Analysis of inorganic compounds (the use of activation analysis in inorganic chemistry and technology, the physics of monocrystals, semi-conductors and other fields)	267
4.1. Analysis of zinc sulphide and other crystals	267
4.2. Analysis of compounds of the rare earth elements and of mineral materials containing rare earths	268
4.3. Analysis of various oxides, acids, and hydroxides	269
4.4. Analysis of various inorganic salts	270
4.5. Analysis of silicates	270
4.6. Analysis of carbides	271
5. Analysis of organic materials (the use of activation analysis in organic chemical technology and fuel technology)	274
5.1. Analysis of cellulose, paper and similar materials	274
5.2. Analysis of the raw materials and products of rubber and plastics technology	275

5.3. Analysis of polyphenyls	275
5.4. Analysis of liquid fuels, lubricants and similar materials	276
5.5. Analysis of various organic compounds	277
6. Analysis of reactor materials (the use of activation analysis in nuclear engineering)	280
6.1. Analysis of zirconium and its alloys	280
6.2. Analysis of aluminium for reactors	280
6.3. Analysis of reactor steels	281
6.4. Analysis of graphite	281
7. Analysis of meteorites (the use of activation analysis in cosmochemistry)	283
8. Analysis of minerals, sediments, rocks and similar materials (the use of activation analysis in geology, mineralogy and similar fields)	286
9. Analysis of water (the use of activation analysis for the determination of elements in various samples of water)	293
10. Analysis of biological materials (the use of activation analysis in biology, medicine, biochemistry, agriculture, foodstuff and similar fields)	296
10.1. Analysis of human and animal tissues	296
10.2. Analysis of human and animal fluids	298
10.3. Analysis of plant materials	300
10.4. Analysis of foods	301
11. Analysis of miscellaneous materials for the purposes of forensic science, archaeology and history (the use of activation analysis in scientific fields other than the technical, natural and medical sciences)	307
PART III. TABLES	313
Bibliography	327
Index	329