

Contents

Chapter 1	The Atom	1
	Electronic Structure of the Atom	1
	Chemical Bonds	4
	Structure of the Nucleus	8
Chapter 2	Radioactive Decay	13
	Decay of Radionuclides	13
	Radioactive Decay Equations	19
	Successive Decay Equations	24
	Statistics of Counting	28
Chapter 3	Production of Radionuclides	33
	Cyclotron-Produced Radionuclides	34
	Reactor-Produced Radionuclides	37
	Target and Its Processing	40
	Equation for Production of Radionuclides	41
	Specific Activity	47
Chapter 4	Radionuclide Generators	51
	Principles of a Generator	51
	Important Radionuclide Generators	54
Chapter 5	Radiopharmaceuticals	65
	Ideal Radiopharmaceutical	67
	Dosage Forms	71
	Design of New Radiopharmaceuticals	71
Chapter 6	Radiolabeling of Compounds	79
	Methods of Labeling	79
	Important Factors in Labeling	82

Specific Methods of Labeling	84
Colloids and Labeled Particles	91
Additives	92
Chapter 7 Characteristics of Specific Radiopharmaceuticals	95
^{99m} Tc-Labeled Compounds	95
Radioiodinated Compounds	104
Miscellaneous Compounds of Clinical Interest	109
Chapter 8 Quality Control of Radiopharmaceuticals	117
Physicochemical Tests	118
Biologic Tests	134
Record Keeping	139
Chapter 9 Radiopharmacy	143
Concept	143
Design of a Radiopharmacy	144
Operation of a Radiopharmacy	147
Centralized Radiopharmacy	152
Chapter 10 Radiation Dosimetry, Safety, and Regulations	155
Radiation Dosimetry	155
Radiation Safety	160
Radiation Regulations	170
Chapter 11 In Vitro Tests	175
Radioimmunoassay	175
Schilling Test	179
Blood Volume	179
Red Blood Cell Survival	181
Plasma Iron Clearance and Turnover Rate	182
Chapter 12 Radiopharmacology in Nuclear Medicine	185
Central Nervous System	185
Thyroid	192
Lung	198
Liver	205
Spleen	212
Pancreas	213
Kidney	215
Skeleton	224
Bone Marrow	228
Heart	230
Miscellaneous Imaging	238
Radionuclide Therapy	242

Appendix A	Abbreviations Used in Text	247
Appendix B	Terms Used in Text	249
Appendix C	Units and Constants	255
Appendix D	Radioactive Decay of ^{99m}Tc	257
Appendix E	Radioactive Decay of ^{131}I	259
Appendix F	Generic Names, Brand Names, and Suppliers of Kits	261
Appendix G	Answers to Questions	263
Index		265