

contents

Editor's Foreword	i
Introduction by Academician Alexander Yanshin	xvii

essays on geochemistry

the history of geochemistry

Geochemistry as a Science of the Twentieth Century	3
Forms of Existence of Chemical Elements	9

chemical elements in the earth's crust; their forms of existence and classification

Geochemistry Classification of Chemical Elements	35
Forms of Existence of Chemical Elements	54
Geochemistry of Iodine and Bromine	56
Living Organisms in the Earth's Crust	60
The History of Free Oxygen	66
Living Matter	70
Matter in a State of Dispersion	78

carbon and living matter in the earth's crust

Carbon in Different Geospheres and Its Role	85
The Stability of Carbon Minerals	90
Dispersion of Carbides	91
Primary Carbides	98
Petroleum and Its Formation	109
The Primary Geochemical Carbon Cycle	139
Earth's Gases and Living Matter	142
Living Matter and the Geochemical History of Carbon	144
Spreading of Living Matter in the Biosphere and the Geochemical Importance of the Proliferation of Organisms	145
The Quantity of Carbon in Living Matter	155
The Constancy of the Mass of Living Matter	161
Chemical Structure of the Earth's Crust	164
Organisms: Concentrators of Chemical Elements	175
Carbonic Acid as the Main Source of Carbon in Living Matter	177

The Dynamic Balance of the Carbonic Acid in the Atmosphere	182
The Cycle of Life	190
Incomplete Reversibility of the Cycle of Life	192
The Geological Cycle of Calcium Carbonate	196
Redi's Principle	208
The Energy of Living Matter and Carnot's Principle	211
The Free Energy of the Biosphere and Living Matter	216
Geochemical Activities of Man	219

the biosphere

the biosphere in the cosmos

The Biosphere in Its Cosmic Environment	225
The Biosphere as the Reason For the Transformation of Cosmic Energy	235
An Empirical Generalization and a Hypothesis	241
Living Matter in the Biosphere	249
Propagation of Organisms and Geochemical Energy of Living Matter	256
The Green Living Matter	280
Some Remarks on Living Matter in the Mechanism of the Biosphere	300

the domain of life

The Biosphere: the Earth's Envelope	309
The Living Matter of the First and the Second Order in the Biosphere	329
The Limits of Life	345
The Boundaries of Life in the Biosphere	353
Life in the Hydrosphere	367
Geochemical Cycle of Vital Aggregations and Living Films of the Hydrosphere	380
The Living Matter of the Land	393
The Interconnection of the Hydrosphere and the Terrestrial Vital Films	401

a few words about the noösphere 405

Index	419
-------	-----