v

Foreword · · · · · · · · · · · · · · · · · · ·
CHAPTER I OPTICAL METHODS AND APPARATUS
FOR INVESTIGATING THE PROPAGATION AND
ABSORPTION OF ULTRASONIC WAVES IN LIQUIDS
AND GASES
Theoretical Principles of Optical Methods of Studying
the Velocity and Absorption of Ultrasonic Waves 1
Autoclaves and Thermostats for Studying the Propa-
gation and Absorption of Ultrasonic Waves by the
Optical Method
The Electrical Part and Optics of Apparatus in Gen-
eral Use
CHAPTER II PULSE METHOD AND PULSE-TYPE
EQUIPMENT FOR STUDYING THE PROPAGATION
AND ABSORPTION OF ULTRASONIC WAVES IN
LIQUIDS AND GASES
Theoretical Basis of the Pulse Method 47
Pulse-Type Ultrasonic Apparatus 80
The Fixed-Distance Pulse Method
Universal Autoclave for Studying the Propagation and
Absorption of Ultrasonic Wayes by the Pulse Method.
the Optical Method, and Electro-Mechanical Method 102

CHAPTER III STUDY OF THE PROPAGATION OF	
ULTRASONIC WAVES IN LIQUIDS	109
The Velocity of Ultrasonic Waves Along a Saturation	
Line	117
The Velocity of Ultrasonic Waves in Liquids Near the	
Solidification Point	. 123
The Velocity of Ultrasonic Waves in Liquids at Con-	
stant Density and Pressure	125
The Velocity of Ultrasonic Waves in Liquid Solutions	
over a Broad Range of Temperatures and Concen-	
trations	129
Adiabatic Compressibility of Liquids and Liquid	
Systems	146
The Velocity of Sound and the Law of Corresponding	
States	159
The Velocity of Sound and the Fundamental Physico-	
Chemical Characteristics of Liquids	187
The Use of the Kinetic Theory of Molecules in the	
Study of the Propagation of Ultrasonic Waves in	
Liquids	210
CHAPTER IV PROPAGATION OF ULTRASONIC WAVES	
IN THE CRITICAL REGION OF INDIVIDUAL SUB-	
STANCES AND BINARY MIXTURES	229
The Equation of State for the Critical Region of a	
Substance	230
Problems Related to the Methods of Studying the	
Critical Region	241
The Velocity of Ultrasonic Waves in the Critical Re-	
gion of a Liquid-Vapor System	24 8
The Adiabatic Compressibility in the Critical Region.	255
The Computation of the Velocity of Sound from the	
"Diameters" of the Velocity of Sound and the Wave	
Impedance	259

The Problem of Determining the Specific Heat in the	
Critical Region from Acoustic Data	265
The Use of Ultrasonics in the Study of Generalized	
Critical Phenomena	277
CHAPTER V PROPAGATION OF ULTRASONIC WAVES	
IN SATURATED AND SUPERHEATED VAPOR OF	
ORGANIC LIQUIDS	287
The Study of the Propagation of Illtrasonic Waves	
in Saturated Vapor of Organic Liquids	290
The Dropagation of Illtrasonic Wayes in Superheated	
Vonor of Organia Liquids	298
The Compressibility of Seturated and Superheated	200
Veron	308
Vapor,	300
Application of Thermodynamics and the Kinetic	
Theory of Molecules to the Study of the Propagation	
of Ultrasonic Waves in Saturated and Superheated	. 1 .
Vapor	312
The Problem of Determining the Specific Heats of	
Vapor from Acoustic Data	334
The Velocity of Ultrasonic Waves in Gases and	
Fluctuations in the Density and Energy	343
CHAPTER VI STUDY OF THE ABSORPTION OF ULTRA	۹
SONIC WAVES IN PURE AND MIXED ORGANIC	-
LIQUIDS OVER A WIDE RANGE OF TEMPERATURES	S.
CONCENTRATIONS AND FREQUENCIES	353
The Cleasical Theory and the Belayation Theory of	000
the Absorption of Ultragonic Woyos in Liquids	354
the Absorption of Oltrasonic waves in Liquids .	361
The Mechanism of Altragania Wayag in Seturated	001
The Absorption of Ultrasonic waves in Saturated	970
Hydrocarbons	310
The Absorption of Ultrasonic Waves in Aromatic	907
Hydrocarbons	381

The Absorption of Ultrasonic Waves in Halogen	
Derivatives of Benzene	392
The Absorption of Ultrasonic Waves in Alcohols.	395
The Absorption of Ultrasonic Waves in Mixtures	
of Normal Organic Liquids	402
The Absorption of Ultrasonic Waves in Acetic Acid	
Esters and Formic Acid Esters	419
The Absorption of Ultrasonic Waves in the Critical	
Region of Liquid-Vapor Systems and Liquid-Liquid	
Systems	439
Appendix: Tables of Acoustical Values of Numerous	
Substances \ldots \ldots \ldots \ldots \ldots 4	53

xiv