

CONTENTS

INTRODUCTION	xiii
CHAPTER 1. Methods for Measuring Vapor Pressure	1
A. Static Methods (Direct and Indirect)	1
1. Direct Methods	1
2. Indirect Methods	20
B. Boiling Point Method	29
C. Method of Vapor Transfer by a Current of Inert Gas (Flow Method)	34
D. Evaporation From an Open Surface in Vacuum (Langmuir Method)	35
E. The Knudsen Effusion Method	47
1. Determination of Vapor Pressure From Loss in Weight of the Effusion Chamber	53
2. Determination of Vapor Pressure From the Quantity of Condensed Vapor	56
3. Determination of Vapor Pressure From the Density of the Molecular Beam	66
F. Isotopic Exchange Method	75
1. Isotopic Exchange Between the Surfaces of Solid Bodies Without Self-Diffusion ($D = 0$)	76
2. Isotopic Exchange Between Liquid Surfaces ($D = \infty$)	80
3. Isotopic Exchange Between the Surfaces of Solid Bodies, Self-Diffusion Taken Into Account	84
4. Isotopic Exchange Between a Pure Substance and its Solution	94
Influence of the Langmuir Coefficient and the Molecular Composi- tion of the Vapor on the Results of Vapor Pressure Measure- ments	101
1. The Coefficient α and Methods For Determining It	102
2. Vapor Composition and Methods For Measuring It	110
CHAPTER 2. Vapor Pressure of the Elements of Group I of the Periodic Table	122
Alkali Metals	122
Lithium	122
Sodium	128
Potassium	137
Rubidium	144
Cesium	146
Francium	150
Copper Subgroup	150
Copper	150
Silver	158
Gold	167

CHAPTER 3. Vapor Pressure of the Elements of Group II of the Periodic Table	171
Beryllium	171
Magnesium	174
Alkaline-Earth Metals	178
Calcium	178
Strontium	184
Barium	186
Radium	189
Zinc Subgroup	189
Zinc	189
Cadmium	201
Mercury	209
CHAPTER 4. Vapor Pressure of Elements of Group III of the Periodic Table	227
Boron	227
Aluminum	231
Gallium Subgroup	236
Gallium	236
Indium	238
Thallium	241
Scandium Subgroup	245
Scandium	245
Yttrium	246
Rare-Earth Elements	246
Lanthanum	246
Cerium	247
Praseodymium	247
Neodymium	247
Samarium	248
Europium	248
Gadolinium	248
Dysprosium	248
Erbium	248
Thulium	249
Ytterbium	250
Lutetium	250
Actinium	250
CHAPTER 5. Vapor Pressure of Elements of Group IV of the Periodic Table	251
Carbon	251
Silicon	263
Germanium Subgroup	266
Germanium	266
Tin	269
Lead	273
Titanium Subgroup	278
Titanium	278
Zirconium	281

Hafnium	283
Thorium	283
CHAPTER 6. Vapor Pressure of Elements of Group V of the Periodic Table	286
Phosphorus	286
Arsenic Subgroup	292
Arsenic	292
Antimony	295
Bismuth	299
Vanadium Subgroup	306
Vanadium	306
Niobium	307
Tantalum	309
Protactinium	313
CHAPTER 7. Vapor Pressure of Elements of Group VI of the Periodic Table	314
Sulfur	314
Selenium Subgroup	322
Selenium	322
Tellurium	327
Polonium	331
Chromium Subgroup	332
Chromium	332
Molybdenum	337
Tungsten	340
Uranium and the Transuranium Elements	342
Uranium	342
Neptunium	344
Plutonium	344
Americium	345
Elements With Atomic Numbers Above 95	347
CHAPTER 8. Vapor Pressure of Elements of Group VII of the Periodic Table	348
Halogens	348
Fluorine	348
Chlorine	350
Bromine	354
Iodine	358
Astatine	363
Manganese Subgroup	363
Manganese	363
Technetium	365
Rhenium	365
CHAPTER 9. Vapor Pressure of the Elements of Group VIII of the Table	368
Iron Family	368
Iron	368
Cobalt	373

Nickel	377
Platinum Metals	384
Ruthenium	384
Rhodium	384
Palladium	385
Osmium	385
Iridium	385
Platinum	386
CHAPTER 10. Theoretical Vapor Pressures and Heats of Sublimation of Elements	388
1. Vapor Pressure as a Function of Temperature	388
Equations Relating Vapor Pressure and Temperature	388
Comparative Methods for Calculating Vapor Pressure as a Function of Temperature	390
2. Relationship Between Vapor Pressure, Standard Heat of Sub- limination, and Reduced Thermodynamic Potential	393
3. Practical Calculations of Vapor Pressure and Heats of Sub- limination Based on Published Data	393
REFERENCES	398

Reference Tables

TABLE I. References to vapor pressure, composition of vapor, and heat of sublimation for elements	419
TABLE II. Coefficients of equations $\lg p_{\text{mm}} = A - B/T + CT + D \lg T$ for ele- ments in solid (s) and liquid (l) state	423
TABLE III. Physico-chemical constants of elements	432
TABLE IV. Boiling point of elements at different pressures in $^{\circ}\text{K}$	439
TABLE Va. Vapor pressure of the alkaline metals	444
TABLE Vb. Vapor pressure of the alkaline metals	445
TABLE VI. Vapor pressure of copper, silver and gold	446
TABLE VII. Vapor pressure of magnesium, calcium, strontium, barium and radium	446
TABLE VIII. Vapor pressure of zinc, cadmium and mercury	447
TABLE IX. Vapor pressure of beryllium, aluminium, gallium, indium and thallium	447
TABLE X. Vapor pressure of scandium, ytterbium, lanthanum, neo- dymium and lutecium	448
TABLE XI. Vapor pressure of europium, samarium, gadolinium, thulium and ytterbium	448
TABLE XII. Vapor pressure of boron and carbon	449
TABLE XIII. Vapor pressure of silicon, germanium, tin and lead	449
TABLE XIV. Vapor pressure of titanium, zirconium and hafnium	450
TABLE XV. Vapor pressure of phosphorus	450
TABLE XVI. Vapor pressure of arsenic	451
TABLE XVII. Vapor pressure of antimony	451
TABLE XVIII. Vapor pressure of bismuth and polonium	452
TABLE XIX. Vapor pressure of vanadium, niobium and tantalum	452

TABLE XX. Vapor pressure of sulfur	453
TABLE XXI. Vapor pressure of selenium and tellurium	453
TABLE XXII. Vapor pressure of chromium, molybdenum, tungsten and uranium	454
TABLE XXIII. Vapor pressure of halogens and astatine	455
TABLE XXIV. Vapor pressure of manganese, technetium, rhenium and iron family metals	456
TABLE XXV. Vapor pressure of the platinum metals	456
TABLE XXVI. Vapor pressure of elements at their melting points	457
INDEX	458

