Chapter 1. Basic concepts of thermodynamics

Important topics and terminology:

system	surroundings	the universe (system + surroundings)
work w	heat q	thermodynamic temperature T
macroscopic system	microscopic system	isolated system
closed system	open system	adiabatic system
thermal equilibrium	mechanical equilibrium	chemical equilibrium
system variables	intensive variables (T, p, V_m, …)	extensive variables (m, V, …)
ideal gas	molar gas constant R	ideal gas law $pV = nRT$, $pV_m = RT$
ideal gas thermometer	real gases	equation of state
van der Waals gas law	virial equation	compression factor $Z = pV_m/RT$

Chapter 2. Heat, work, internal energy and the First Law of thermodynamics

Important topics and terminology:

adiabatic process ($q = 0$)	internal energy U	First Law $\Delta U = q + w$
cyclic process	reversible process	irreversible process
isothermal process ($\Delta T = 0$)	isobaric process ($\Delta p = 0$)	adiabatic process ($q = 0$)
path function	state function	exact differential
test for an exact differential	expansion/compression work	indicator diagram
enthalpy $H = U + pV$	heat capacities C_p, C_V	molar heat capacities C_{pm}, C_{Vm}
isotherm	adiabat	isenthalp

Chapter 3. The importance of state functions. The internal energy and the enthalpy

Important topics and terminology:

ordinary derivatives	partial derivatives	cyclic rule
internal pressure	thermal expansion coefficient β	isothermal compressibility κ
Joule-Thomson experiment	Joule Thomson coefficient	gas liquefaction

Chapter 4. Thermochemistry

Important topics and terminology:

bomb calorimeter	constant pressure calorimeter	enthalpy of reaction
standard state	standard enthalpy of formation	standard enthalpy of reaction
enthalpy of fusion	endothermic	exothermic
adiabatic flame temperature		

Chapter 5. Entropy and the Second Law of Thermodynamics

Important topics and terminology:

heat engine	Carnot cycle	Carnot efficiency
entropy	Clausius inequality	Second Law of thermodynamics
Third Law of thermodynamics	reversible process	irreversible process
spontaneous processes	refrigerator	heat pump

Chapter 6. Chemical Equilibrium

Important topics and terminology:

Helmholtz energy	Gibbs energy	chemical potential
Gibbs energy of mixing	entropy of mixing	criteria for spontaneous processes
Maxwell relations	van't Hoff equation	$\mathrm{d}U = T\mathrm{d}S - p\mathrm{d}V$
$\mathrm{d}H = T\mathrm{d}S + V\mathrm{d}p$	$\mathrm{d}G = -S\mathrm{d}T + V\mathrm{d}p$	$\mathrm{d}A = -S\mathrm{d}T - p\mathrm{d}V$
extent of reaction	reaction quotient Q	reaction equilibrium constant K
homogenous equilibrium	heterogenous equilibrium	Gibbs-Helmholtz equation

Chapter 7. Properties of Real Gases

Important topics and terminology:

compression factor $Z = pV_\mathrm{m}/RT$	van der Waals equation of state	van der Waals a and b coefficients
critical point	critical constants	reduced p, V, T
Maxwell construction	law of corresponding states	Boyle temperature

vapor pressure	virial equation of state	supercritical fluid

Chapter 8. Phase Equilibrium and Surfaces

Important topics and terminology:

boiling point diagram	vapor pressure diagram	coexistence curves
vaporization	sublimation	fusion
critical point	triple point	degrees of freedom
phase rule	Clapeyron equation	Clausius-Clapeyron equation
surface tension	capillary rise	Laplace equation
supercooling	superheating	nucleation