Equation

Ideal Gas Law

Thermodynamics

Equation

Van der Waals Equation

Thermodynamics

Definition

Coefficient of Volume Expansion
β

Thermodynamics

Definition

Isothermal Compressibility
κ

Thermodynamics

Equation

Volume Differential
dV

Thermodynamics

Definition

Exact Differential

Thermodynamics

Law

First Law of Thermodynamics

Thermodynamics

Definition

Enthalpy

Thermodynamics

Definition

Heat Capacity

Thermodynamics

Equation

Thermodynamic Potentials

Thermodynamics

$$\left(P + \frac{a}{v^2}\right)(v - b) = RT$$

$$Pv = nRT$$

$$\kappa = -\frac{1}{V}\left(\frac{\partial V}{\partial P}\right)_T$$

$$\beta = \frac{1}{V}\left(\frac{\partial V}{\partial T}\right)_P$$

The following two properties are equivalent ways of determining exactness:
1. Mixed second order partial derivatives are equal e.g.:

$$\frac{\partial^2 V}{\partial P \partial T} = \frac{\partial^2 V}{\partial T \partial P}$$

2. Integral is independent of path

$$\int_{V_1}^{V_2} dV = V_1 - V_2 \qquad \oint dV = 0$$

A quantity whose differential is *not* exact is not a thermodynamic property.

$$dV = \left(\frac{\partial V}{\partial T}\right)_P dT + \left(\frac{\partial V}{\partial P}\right)_T dP$$

$$H = U + PV$$

$$\Delta U = Q - W$$

$$dU = d'Q - d'W$$

(Where the primes denote inexact differentials)

$-TS$ $\longrightarrow$

$+PV \downarrow$

U	F
H	G

$$C = \lim_{\Delta T \to 0} \frac{Q}{\Delta T} = \frac{d'Q}{dT}$$

$$Q = C(T_2 - T_1) = nc(T_2 - T_1)$$