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)

$$\overset{-TS}{\longrightarrow}$$

$+PV \downarrow$

U	F
H	G

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

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