$$\boxed{P = \frac{RT}{(V_m - b)} - \frac{a}{V_m^{\ 2}}}$$ Ecuación de estado de van der Waals para gases reales

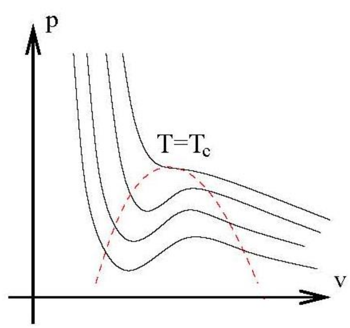
$$\left(P + \frac{a}{V_m^{\ 2}}\right)(V_m - b) = RT$$

$$PV_m - Pb + \frac{a}{V_m} - \frac{ab}{V_m^{\ 2}} - RT = 0$$ multiplicando por $V_m^{\ 2}$

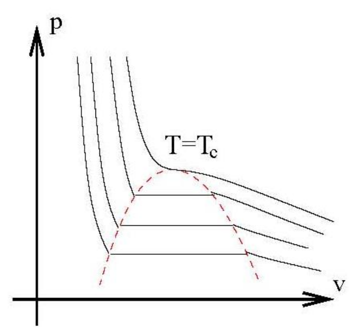
$$PV_m^{\ 3} - PbV_m^{\ 2} + aV_m - ab - RTV_m^{\ 2} = 0$$ dividiendo entre P

$$V_m^{\ 3} - bV_m^{\ 2} + \frac{aV_m}{P} - \frac{ab}{P} - \frac{RT}{P}V_m^{\ 2} = 0$$ factorizando

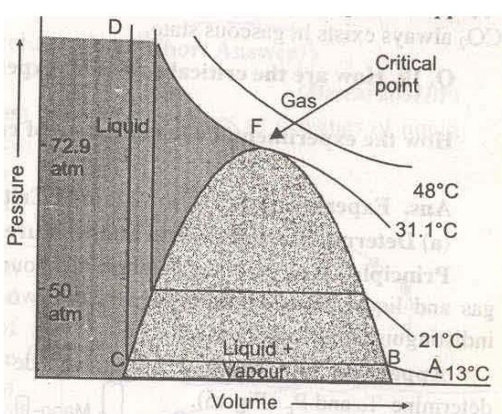
$$\boxed{V_m^{\ 3} - \left(b + \frac{RT}{P}\right)V_m^{\ 2} + \frac{a}{P}V_m - \frac{ab}{P} = 0}$$ **Ecuación cúbica en** V_m



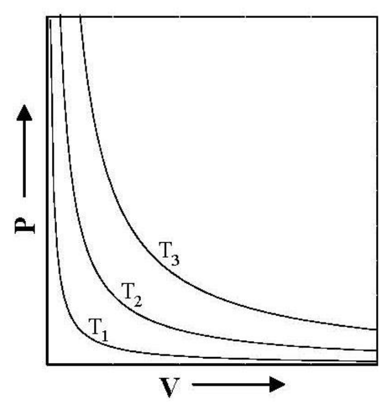
Predicción teórica



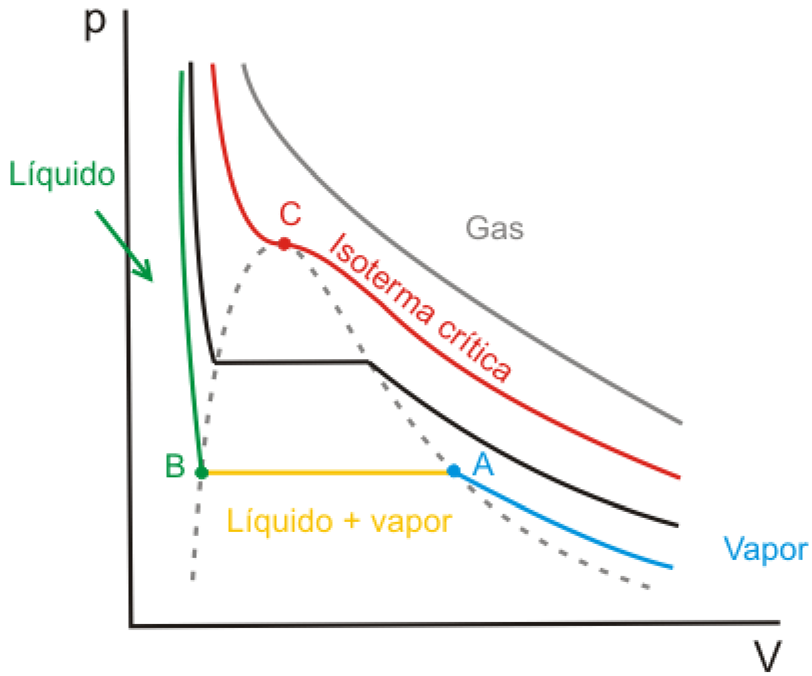
Resultado experimental



Gas real



Gas ideal



Resumiendo en una tabla, las expresiones obtenidas:

a	**b**	P_c	T_c	R
$3P_cV_{m,c}^{\ 2}$	$\frac{V_{m,c}}{3}$	$\frac{a}{27b^2}$	$\frac{8a}{27bR}$	$\frac{8P_cV_{m,c}}{3T_c}$
$\frac{27T_c^{\ 2}R^2}{64P_c}$	$\frac{T_cR}{8P_c}$	Recordar que:		

$$P = \frac{RT}{(V_m - b)} - \frac{a}{V_m^{\ 2}} = \frac{nRT}{(V - nb)} - \frac{an^2}{V^2}$$