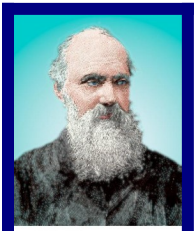
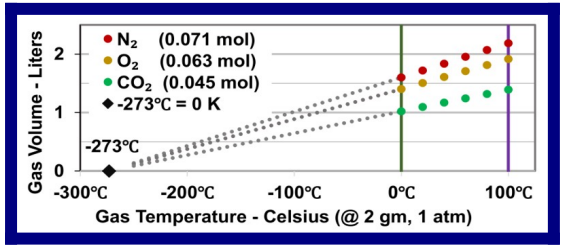
Finding Absolute Zero



W Thomson
1824 – 1907

From the thermometer invented in 1714, ideal gas behavior was given in Charles's Law by 1787:

$T_1/V_1 = T_2/V_2$



The Ideal Gas Law approximates certain gases @ molecular mass (m), temperature (T_i), volume (V_i) w/restrictions:

a) average Kinetic Energy $\equiv \langle \frac{1}{2}mv^2 \rangle \propto T$.

b) point particles w/no interactions.

c) constant motion w/elastic collisions.

In 1848, William Thomson (Lord Kelvin) proposed an Absolute Zero (0 K) @ -273°C extrapolated from near ideal gas data between 0°C & 100°C.

local		add ⇨ ⇦ subtract	absolute	
Celsius	(°C)	±273.15	Kelvin	(K)
Fahrenheit	(°F)	±459.67	Rankine	(R)

At Absolute Zero, particle thermal kinetic energy stops. A "Zero-Point Energy" of random quantum motion remains:

$\Delta x_i \Delta p_i = \frac{1}{2}\hbar$ & $\Delta E \Delta t = \frac{1}{2}\hbar$

Wikipedia.org