Gas Laws

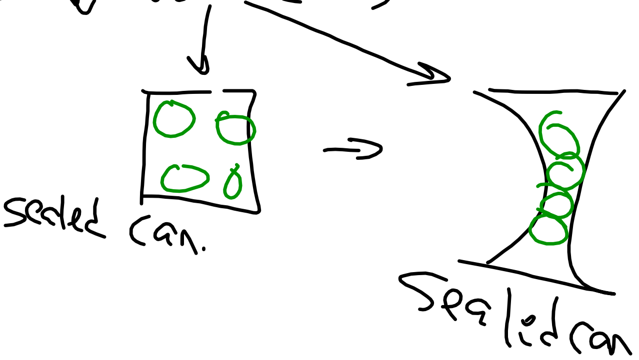
Ideal Gas - best possible, utopic gas.

→ Conditions → Move Fast!

1. High Temp. , ↑KE.
2. Low Pressure
3. Large Volume
4. No mass.

Dec 5-7:37 AM

① ↓ Volume , ↑ Pressure.



Boyle's Law

Indirect
P↑, V↓

$P * V = \text{constant}$

$10 * 2 = 20$ (÷2)

$5 * 4 = 20$ (*2)

Dec 5-7:57 AM

② Volume ↑ Temperature ↑ Charles' Law

$\frac{V}{T}$ = constant

Direct → Division

Dec 5-8:00 AM

③ Pressure ↑ Temp. ↑ Guy-Lussac's law

Direct

$\frac{P}{T}$ = constant

Please Combined Gas Law vomit

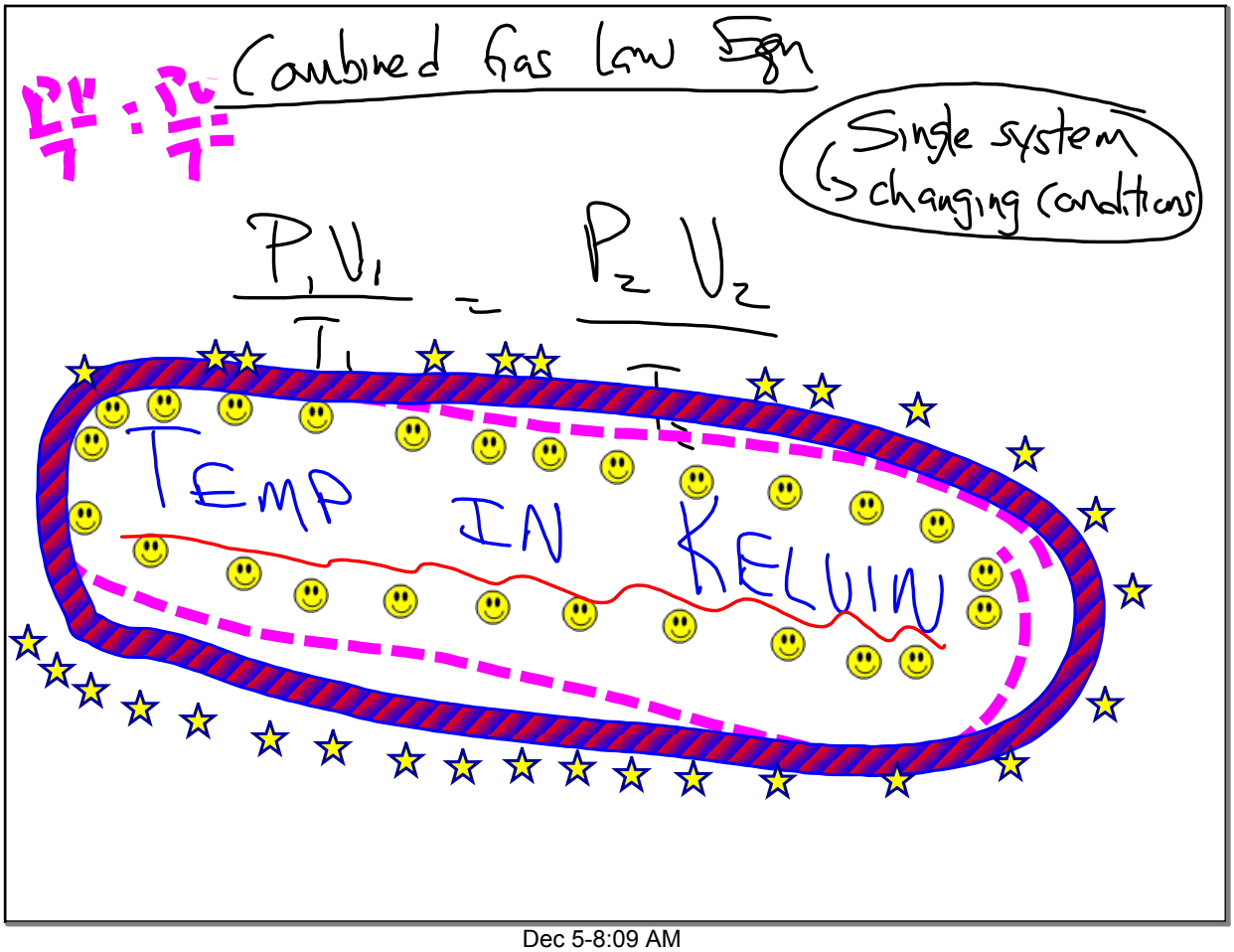
$\frac{PV}{T}$ over 1

$P \times V = K$

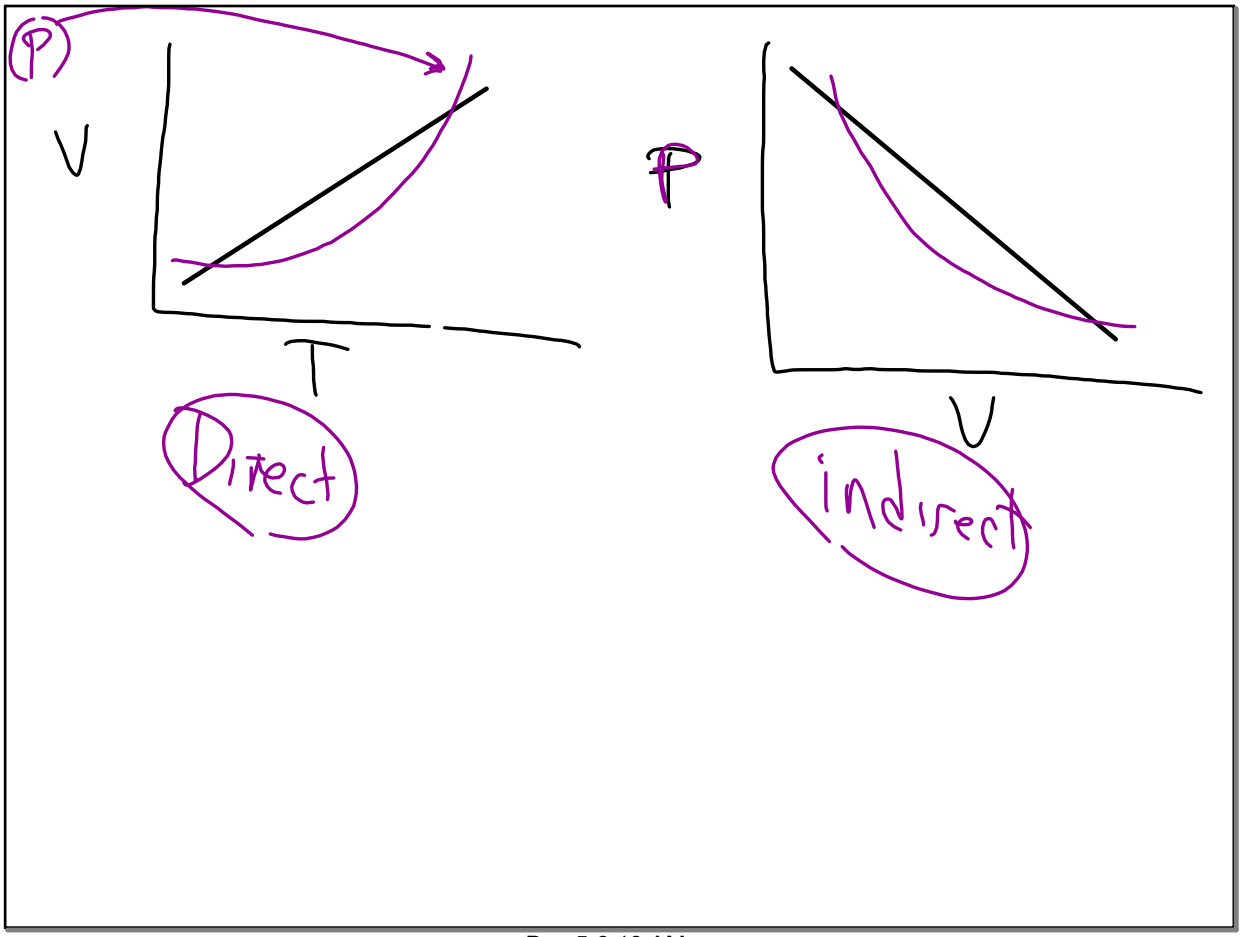
$\frac{V}{T} = K$

$\frac{P}{T} = K$

Dec 5-8:06 AM



Dec 5-8:09 AM



Dec 5-8:13 AM

1 mole of any gas = 22.4 L

AT STP

0°C
273 K

1 atm
101.35 KPa
760 torr
760 mm Hg

If ΔP or ΔT
Volume of 1 Mole will Δ.

Dec 5-8:21 AM

R = universal Gas Constant

$$R = \frac{L * atm}{Mole * K} = \frac{P * V}{n * T}$$

R = 0.08206

$$\frac{R}{1} = \frac{PV}{nT} \rightarrow PV = nRT$$

Ideal gas eqn

Dec 5-8:42 AM

$CaCO_{3(s)} \longrightarrow CaO_{(s)} + CO_{2(g)}$

$V = 250\,ml$ $0.25\,l$

$P = 1.3\,atm$

$T = 31^{\circ}C$ $304\,K$

$n =$? moles collected

$K = {}^{\circ}C + 273$

$PV = nRT$

$$n = \frac{PV}{RT} = \frac{(1.3)(0.25)}{(0.08206)(304)}$$

$= 0.013$ Mole $(O_{2(g)})$ collected.

Dec 5-8:46 AM

1.5 atm at 25°C

at 450°C

(P) (T)

aerosol can

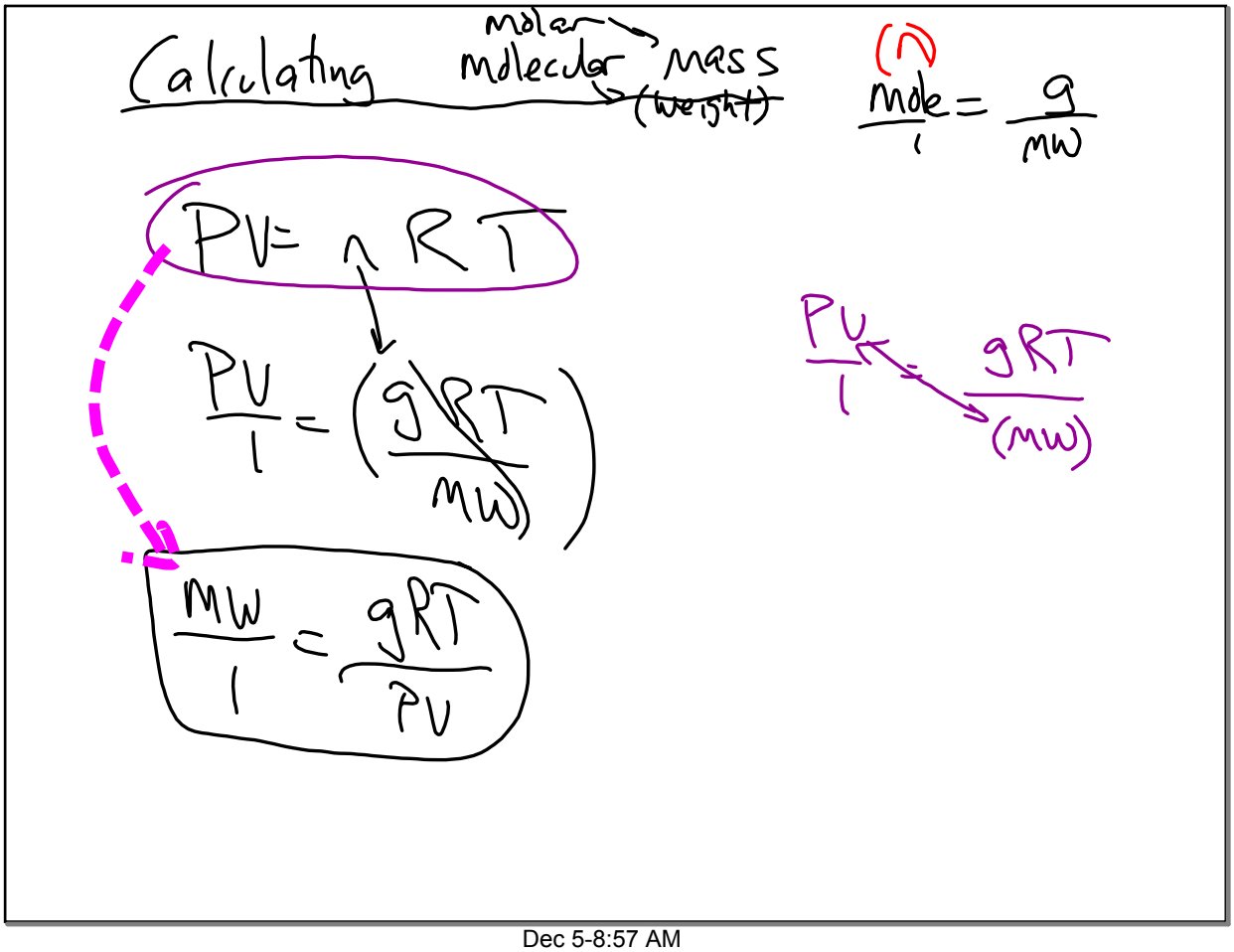
No Δ Volume.

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

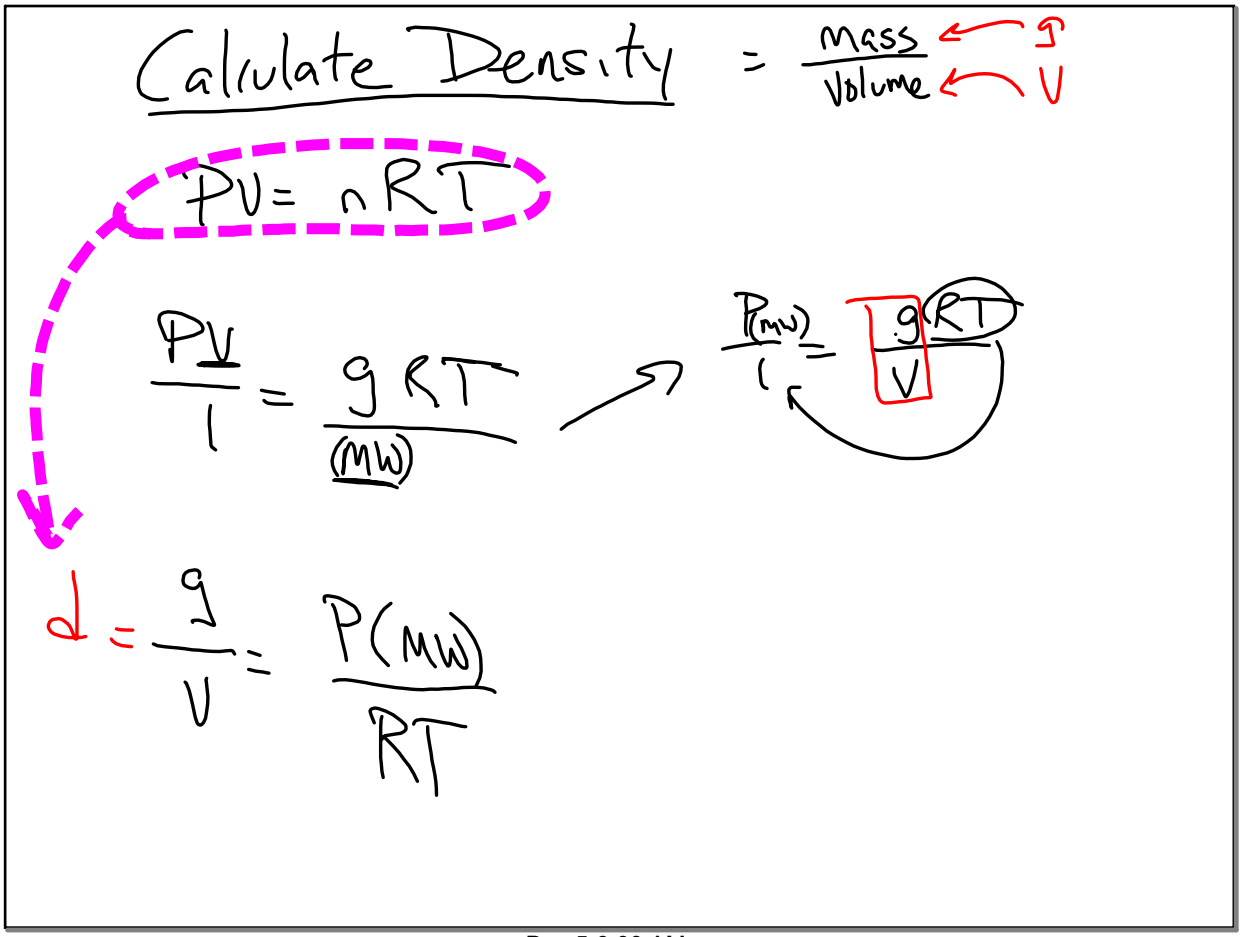
$$\frac{1.5}{298} = \frac{P_2}{723}$$

$P_2 = 3.6\,atm$

Dec 5-8:54 AM



Dec 5-8:57 AM



Dec 5-9:00 AM

Find density of CCl_4 at 714 torr and 25°C

$PV = nRT$

$PV = \frac{g}{MW}RT$

$d = \frac{g}{V} = \frac{P(MW)}{RT} = \frac{(0.94)(152)}{(0.08206)(298)} = 5.84\ g/l$

Dec 5-9:04 AM

$2NaN_{3(s)} \rightarrow 2Na_{(s)} + 3N_{2(g)}$ (AIRBAG)

___ g

1.69 Moles N_2	2 Mole NaN_3	65 g NaN_3
	3 Mole N_2	Mole NaN_3

= 73.2 g

V = 36 l

P = 1.15 atm

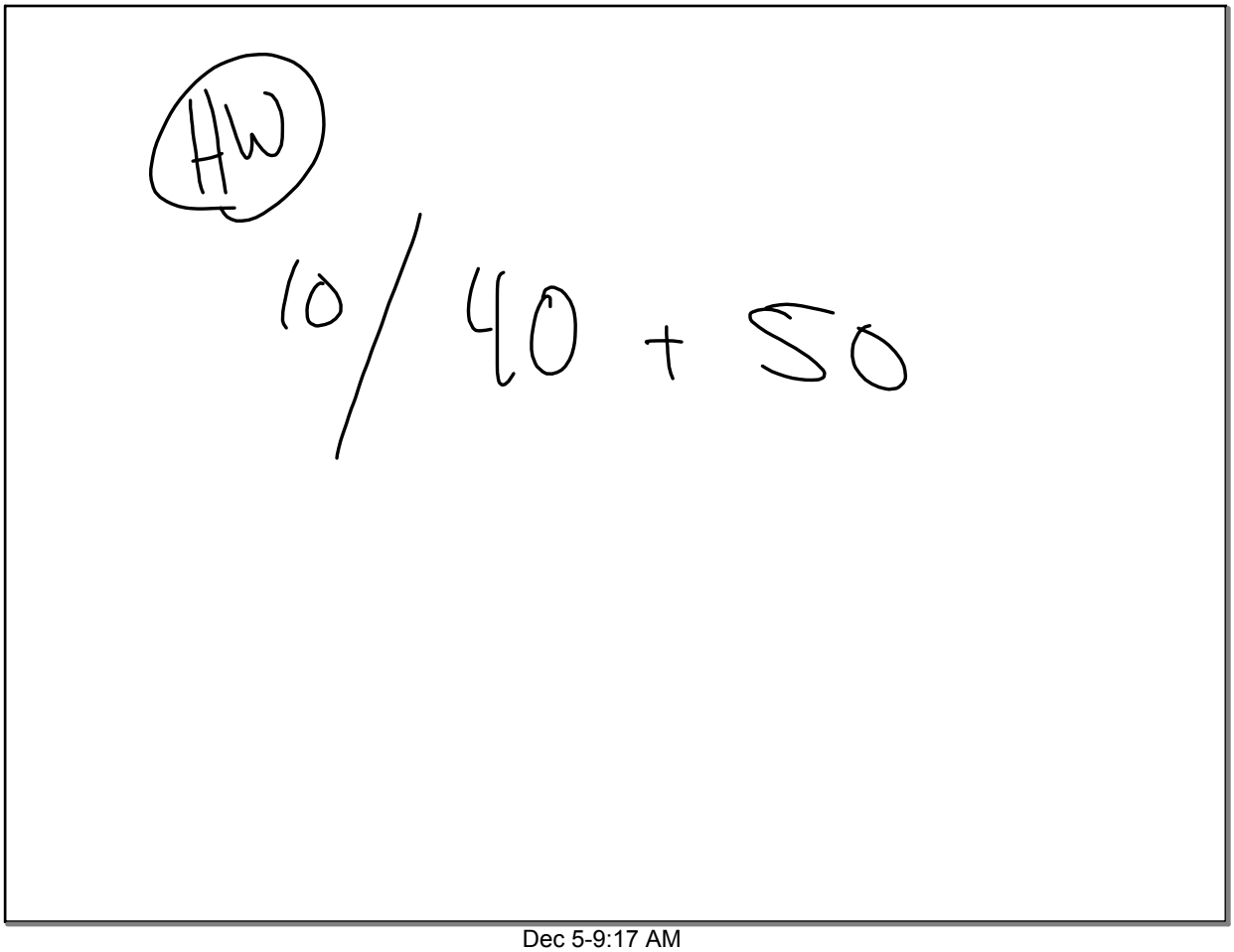
T = 26°C

$PV = nRT$

$n = \frac{PV}{RT} = \frac{(1.15)(36)}{(0.08206)(299)}$

1.69 Moles N_2

Dec 5-9:09 AM



Dec 5-9:17 AM