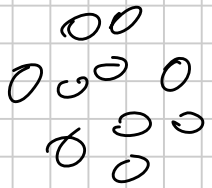
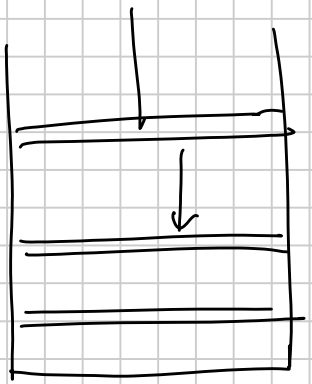
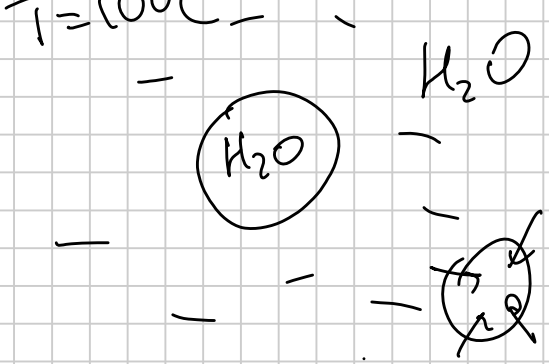
Phase transitions

Note Title 12/12/2011







2.27 kg of CO_2 $\quad M = 44 \frac{g}{mol}$

$V \sim 5\,L$

$T = 300\,K$ $\quad n = \frac{2.27\,kg}{0.044 \frac{kg}{mol}} = 51.2\,mol$

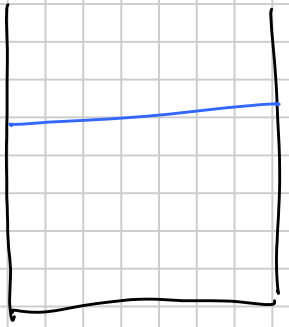
$$PV = nRT$$

$$P = \frac{nRT}{V} = \frac{51.2 \cdot 8.31 \cdot 300}{0.005} = 25.5 \cdot 10^6 \text{ Pa}$$

$$1 \text{ atm} = 100 \text{ kPa} = 10^5 \text{ Pa}$$

$$P = 255 \text{ atm}$$

EX:

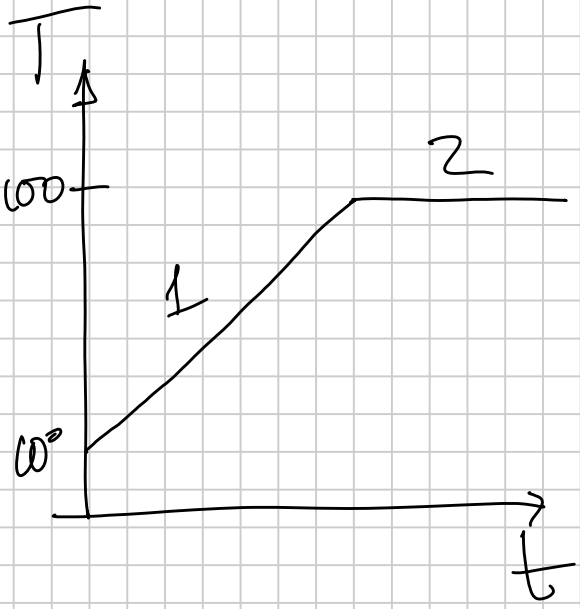


$T_1 = 10°C \xrightarrow{10 \text{ min}} 100°C$

time to evaporate ?

$$c = 4187 \frac{J}{kg \cdot K}$$

$$L_v = 2256 \frac{kJ}{kg}$$



$$\frac{Q}{t}$$

$$\frac{Q_1}{t_1} = \frac{cm\Delta T}{t_1} \quad (\Delta T = 90°C) \qquad \frac{Q_2}{t_2} = \frac{mL_v}{t_2}$$

$$\frac{Q_1}{t_1} = \frac{Q_2}{t_2} \Rightarrow \frac{cm\Delta T}{t_1} = \frac{mL_v}{t_2}$$

$$t_2 = \frac{L_v \cdot t_1}{c\Delta T} = \frac{2256 \cdot 10^3 \cdot 10 \cdot 60}{4187 \cdot 90} = 3.6 \cdot 10^3 s$$

$$= 3600_s = 1\,h$$