Solutions

Solub~

m - molality	$\dfrac{gram\ mol}{1000g}$	
M - molarity	$\dfrac{gram-mol}{1L}$	
N - normality	$\dfrac{gram-eq}{1L}$	
x - mol fracn	$\dfrac{mol}{mol-bulk}$	

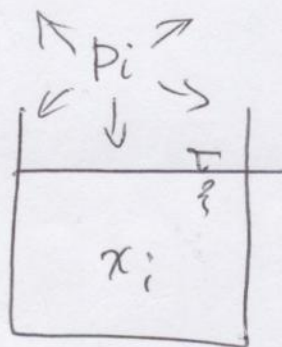## Henry's Law (Gas in Liquid)

HL constant

$$P_i = h\,x_i$$

partial
pressu
of gas
in atm

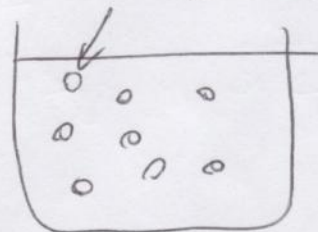mol fracn
in
liquid

Solubility (Solid in Liquid)

$$AgCl_{(s)} \rightleftharpoons Ag^+ + Cl^-$$
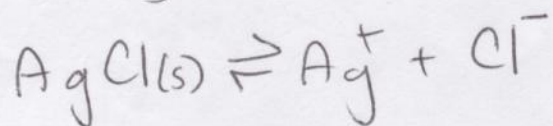
$$K_{sp} = [Ag][Cl]$$

↑ Usually very small

Applies $\underline{\underline{if}}$ solid phase
still present!

suspension (separat)
emulsion phase

dissolved
(solutn)

precipitate

Enthalpy (heat of rx)

ΔH_f ← energy absorbed to make compound from elements

ΔH_r ← energy absorbed in chemical reacts at constant volume.

$$\Delta H_r = \sum \Delta H_{f\ prod} - \sum \Delta H_{f\ reactnts}$$

$\Delta H_r < 0$ Exothermic (bang - gives off heat)

$\Delta H_r > 0$ Endothermic (needs heat)

$\Delta H_\bigcirc$ means heat of solutn.

↑ Energy absorbed when substnce is dissolved.

Boil / Freeze change in Solutns

"Raoult's Law — review on own.

Know that solutes in a solvent raise boiling point and lower freezing point.
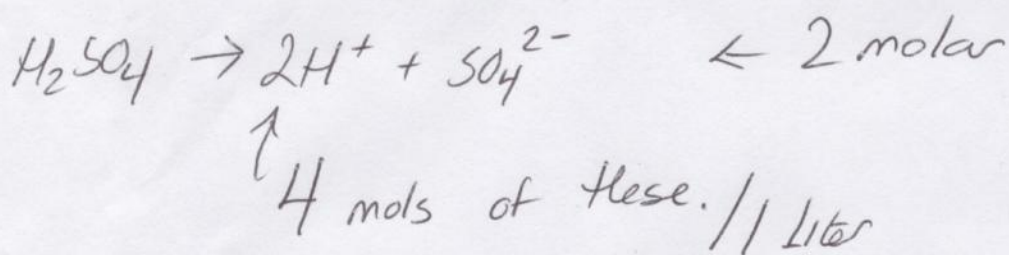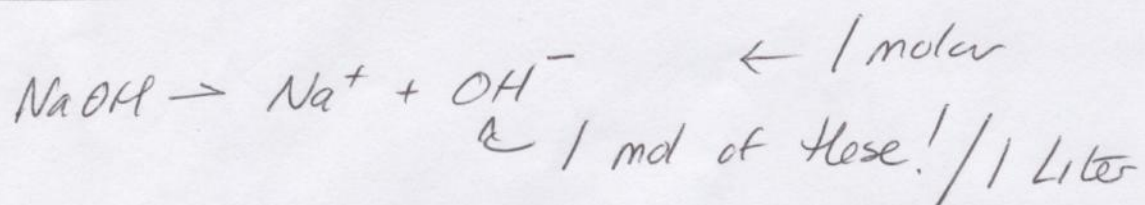
① How many mL of 1.0M NaOH will 25mL of 2M H_2SO_4 neutralize?

(a) 25 mL
(b) 50 mL
(c) 75 mL
(d) 100 mL

$NaOH \rightarrow Na^+ + OH^-$ ← 1 molar
  ↖ 1 mol of these! / 1 Liter

$H_2SO_4 \rightarrow 2H^+ + SO_4^{2-}$ ← 2 molar
  ↑
  4 mols of these. // 1 Liter

$\dfrac{4 \, mol \, H^+}{1 \, liter} \cdot 0.0025 \, L = 0.1 \, mol \, H^+$

$\dfrac{1 \, mol \, OH^-}{liter} * X = 0.1 \, mol \, OH^-$

$0.1 \, Liters = 100 \, mL$

choose (d)

(a) H_r at 25°C for

$$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$$

$\Delta H_f \; C_2H_6 = -20.24 \; kcal/mol$

$\Delta H_f \; O_{2r} = 0$

$\Delta H_f \; CO_2 = -94.05$

$\Delta H_f \; H_2O = -57.8$

(a) -680 kcal/mol

(b) -340

(c) 130 X

(d) 340 X   combustn is exothermic

ΔH_r is per mol of C_2H_6

$$C_2H_6 + \frac{7}{2}O_2 \rightarrow \frac{4}{2}CO_2 + \frac{6}{2}H_2O$$
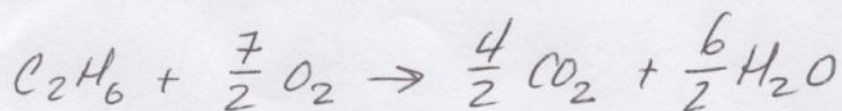
$3(-57.8) + 2(-94.04) - (-20.24)$

$-173 - 188 + 20.24$

~ -340 choose B

K_{sp} $SrSO_4$ is $2.8 \cdot 10^{-7}$.

How many grams $SrSO_4$ must be dissolved
to make a 1 L saturated solution?

(a) 0.00005 g

(b) 0.0005 g

(c) 0.1 g

(d) 2 g.

$$K_{sp} = [Sr^+][SO_4^-] = 2.8 \cdot 10^{-7}$$

In water $[Sr^+] = [SO_4^-] = \sqrt{2.8 \cdot 10^{-7}} = 0.000529$
$\underset{mol/L}{\uparrow}$

$0.000529 \text{ mols} \; \dfrac{184 g}{mol} = 0.09 g \approx 0.1 g$ choose Ⓒ

$Sr = 88 g/mol$

$S = 32 g/mol$

$O_4 = 4(16) = 64 g/mol$

$\overline{}$

$184 g/mol$

$\begin{array}{r} 64 \\ 32 \\ 96 \\ 88 \\ \hline 184 \end{array}$