SECONDARY 3 CHEMISTRY WA3 CRASH COURSE

MOLE CONCEPT CHEATSHEET

Q **Volume of O_2 (g) with 1.5 x 10^{20} oxygen atoms**

A

1 O_2 molecule : 2 oxygen atoms

$n^o O_2$ = 1.5 x 10^{20} ÷ 2 = 7.5 x 10^{19}

$n O_2$ = 7.5 x 10^{19} ÷ 6.02 x 10^{23} = 0.00012458 mol (x 24)

Volume of O_2 = 0.00299 dm^3 (x 1000)

= 2.99 cm^3

n^o PARTICLES

Atom / ion / molecules

x 6.02 x 10^{23}

Q **Find n^o cations in 10g of Na_2O.**

A

$n Na_2O = \frac{10}{62}$ = 0.16129 mol

Na_2O : 2 Na^+ : 1 O^{2-}

$n Na^+$ = 2 x 0.161290 = 0.32258 mol

$n^o Na^+$ = [ ] x 6.02 x 10^{23}

= 1.95 x 10^{23}

Avogadro's Law (only for gases at same T & P):

Mole Ratio = Volume Ratio

VOLUME OF GAS AT RTP (dm^3)

x 24 dm^3/mol

$\frac{dm^3}{mol}$ x mol

AMOUNT (mol)

(A_r OR M_r) g/mol x Molar mass

mol x $\frac{g}{mol}$ = g

MASS (g)

% by mass of *X*

= $\frac{\text{Mass of } X \text{ atoms}}{M_r}$ x 100%

***LIMITING REAGENT**

- Have > Needed : EXCESS
- Have < Needed : LIMITING
  - ↳ Use limiting to calculate $n$products using mole ratio

***GENERAL STEPS**

1. Balanced eq^n (full/ionic/half)
2. Calculate n^o moles of everything given
3. Determine limiting reagent
4. Answer question

÷ Volume (dm^3)

Q ***A*: 50 cm^3 of 1 mol/dm^3 HCl**
***B*: 100 cm^3 of 2 mol/dm^3 HCl**
What is [HCl] in *C* (Mix *A* & *B*)?

A

1. Find total nHCl = $\frac{50}{1000}$ x 1 (*A*) + $\frac{100}{1000}$ x 2 (*B*)
   = 0.250 mol
2. Find total volume = 50 + 100
   = 150 cm^3
3. Find [HCl] = 0.250 ÷ $\frac{150}{1000}$
   = 1.67 mol/dm^3

% yield

= $\frac{\text{Actual}}{\text{Theoretical}}$ x 100%

% purity

= $\frac{\text{Mass of pure}}{\text{Mass of impure}}$ x 100%

CONCENTRATION (mol/dm^3)

= $\frac{\text{Amount of solute}}{\text{Volume of solvent}}$

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