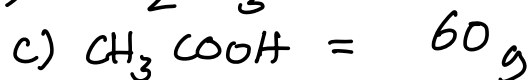
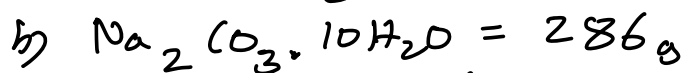


Moles Calculations

Type 1

Formula mass calculations

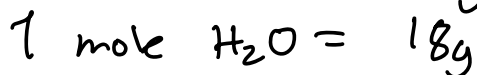
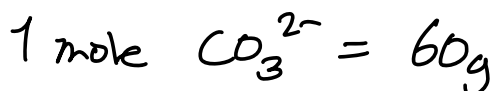


Type-2

$$\text{Percentage of element in compound} = \frac{\text{total mass of that element}}{\text{Formula mass}} \times 100$$

$$\text{Percentage of water in a hydrated salt} = \frac{\text{total mass of water}}{\text{mass of the hydrated salt}} \times 100$$

Type-3



Type - 4

Molar mass of $\text{CO}_2 = 44 \text{ g mol}^{-1}$

Molar mass of $\text{CH}_3\text{CH}_2\text{OH} = 46 \text{ g mol}^{-1}$

Type - 5

$$\text{No. of moles} = \frac{\text{mass}}{\text{molar mass}}$$

a) Mass of 0.23 mol $\text{HNO}_3 = 14.5 \text{ g}$

b) Mass of 3 mol $\text{SO}_2 = 192.3 \text{ g}$

Type - 6

Molar Volume: Volume of + mole any gas at r.t.p is 24 dm^3 .

$$\text{No. of moles} = \frac{\text{Given volume in } \text{dm}^3}{\text{molar volume } (\text{dm}^3)}$$

Type - 7

1 mole of any substance contains 6.02×10^{23} particles

$$\text{number of molecules} = \text{No. of moles} \times 6.02 \times 10^{23}$$

Calculate number of atoms:

$$20\text{g of CH}_4 = \frac{20}{16} \times 5 \times 6.02 \times 10^{23}$$

Calculate the number of ions

$$\text{a) } 20\text{g Al}_2(\text{SO}_4)_3 = \frac{20}{342.3} \times 5 \times 6.02 \times 10^{23}$$

$$\text{b) } 10\text{g Na}_2\text{CO}_3 = \frac{10}{106} \times 3 \times 6.02 \times 10^{23}$$

$$\text{c) } 6\text{g Mg(OH)}_2 = \frac{6}{58.3} \times 3 \times 6.02 \times 10^{23}$$

Calculate number of electrons:

$$\text{a) } 24\text{ dm}^3 \text{ NO} = \frac{24}{24} \times 15 \times 6.02 \times 10^{23}$$

$$\text{b) } 2\text{g CO}_2 = \frac{2}{44} \times 22 \times 6.02 \times 10^{23}$$

Type - 8

Concentration

mol dm^{-3}

g dm^{-3}

1.0 NaOH	40
0.01	3 I ₂
0.5 H ⁺	0.5
0.42	40 SO ₄ ²⁻

No. of moles = concentration mol dm⁻³ × volume dm⁻³

Type-9

Combustion Reaction



$$90 \text{ cm}^3 \quad 3000 \text{ cm}^3$$

$$0.00375$$

$$\begin{array}{r} 3000 \\ - 270 \\ \hline 2730 \\ \hline \hline \end{array}$$

Type-10

$$\text{percentage purity} = \frac{\text{mass of the pure substance}}{\text{mass of the substance including impurity}} \times 100$$

20g of NaHCO_3 (impure) reacts with excess H_2SO_4 (aq).
2 dm³ CO_2 is produced. Calculate the percentage purity

Type 11

Titration Calculation

30 cm³ 0.15 mol dm⁻³ H_2SO_4 reacts completely with 20 cm³ NaOH (aq).
Calculate the concent. of NaOH .



$$\frac{30}{1000} \times 0.15$$

$$= 4.5 \times 10^{-3}$$

$$9 \times 10^{-3} = 0.45 \text{ mol/dm}^3$$

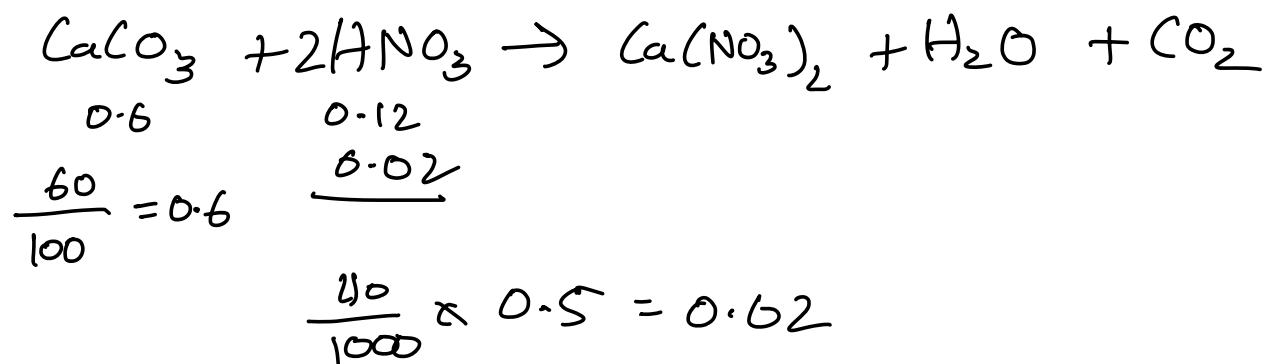
⇒ 4 > 100

$$\frac{20}{1000}$$

Type 12

Limiting Reactant

60g of CaCO_3 reacts with 40 cm^3
 0.5 mol dm^{-3} HNO_3 . Calculate the
volume of CO_2 produced.

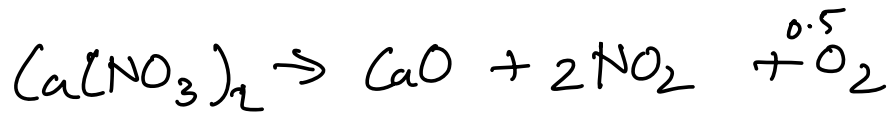
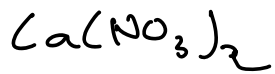


$$0.01 \times 24000 = 240 \text{ cm}^3$$

Type-13

Thermal decomposition

Calculate the volume of gas is produced
due to the decomposition of 250 g



$$\frac{40}{164} = 0.2439 \text{ moles} \quad 11.7 + 2 \cdot 0 = 14.6 \text{ L}^3$$



20g



20g

a) total volume of $\text{O}_2 \rightarrow$ $\frac{20}{148} = \frac{5}{37} = \boxed{\frac{5}{74}}$

$$\frac{5}{74} \times 24 = \underline{\underline{1.62}}$$

$$\frac{20}{261} = \frac{20}{261} = 0.077$$

$$\Rightarrow 2.54 \text{ L}^3$$

$$6.44 + 3.67$$

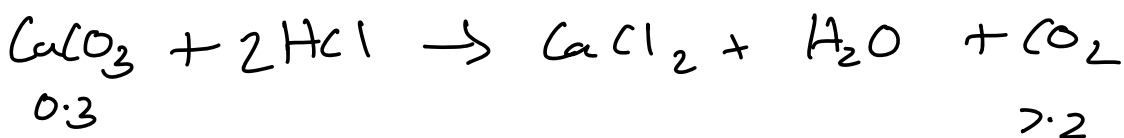
b) 10.11

Type - 14

$$\text{percentage yield} = \frac{\text{experimental value}}{\text{theoretical value}} \times 100$$

30g CaCO_3 reacts with excess HCl (aq) to make 4 L CO_2 .

Calculate the percentage yield of the reaction.



0.3

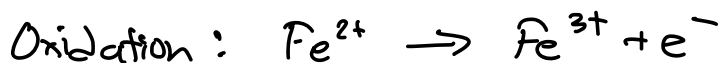
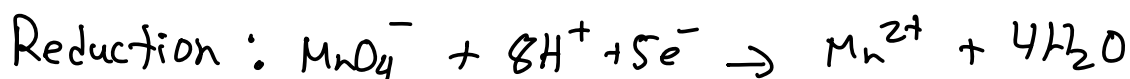
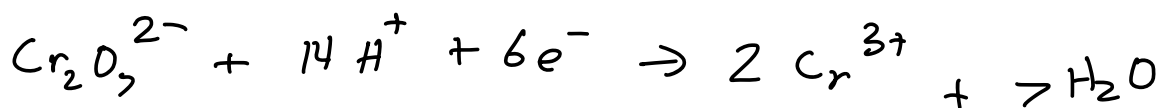
7.2

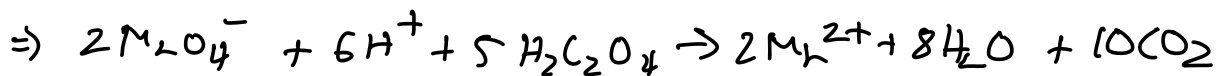
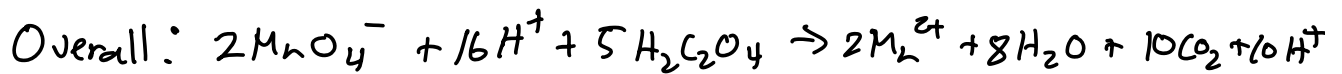
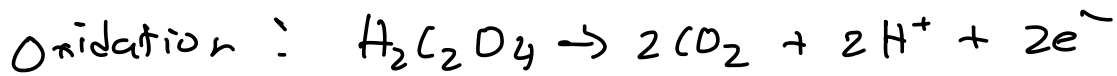
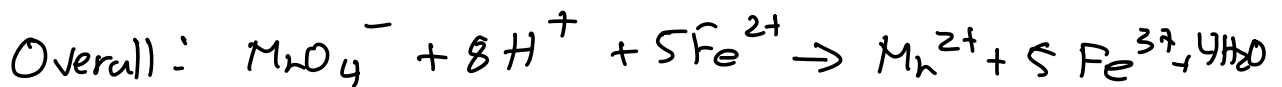
$$\frac{30}{100} = 0.3$$

$$\frac{4}{7.2} \times 100 = 55.6\%$$

Type - 15

Redox Calculation





Type-16

Relative atomic mass

Average mass of an atom relative to $\frac{1}{12}$ the mass of an atom of C-12.

Relative isotopic mass

Mass of an isotope relative to $\frac{1}{12}$ the mass of an atom of C-12.

Relative molecular mass

The average mass of the molecules relative to $\frac{1}{12}$ the mass of an atom of

Carbon-12.

Example-1

Chlorine has two isotopes

Cl-35 \rightarrow 75%

Cl-37 \rightarrow 25%

$$\frac{(35 \times 75) + (37 \times 25)}{75 + 25}$$

$$\Rightarrow 35.5$$

Example-2

$$\frac{35x + 37(100-x)}{100} = 35.5$$

$$35x - 37x = 3550 - 3700$$

$$x = 75\%$$

Cl-35 = 75%

Cl-37 = 25%

Example-3

Isotope	Relative isotopic Mass	Percentage Abundance
---------	------------------------	----------------------

Mg^{24}	24	79
Mg^{26}	26	11
Mg	24.8	10

$$\frac{(79 \times 24) + (11 \times 26) + (10 \times x)}{100} = 24.3$$

$$x = 24.8$$