

5. STOICHIOMETRY

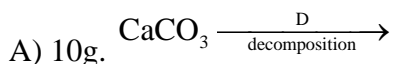
PREVIOUS EAMCET BITS

1. Match the following :

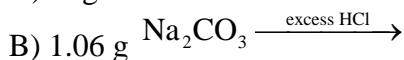
(2008 E)

List – I

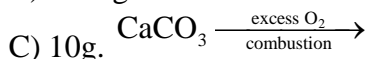
List – II



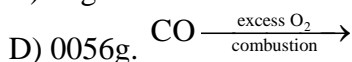
i) 0.224 lit. CO_2



ii) 4.48 lit. CO_2



iii) 0.448 lit. CO_2



iv) 2.24 lit. CO_2

A B C D

1) iv i ii iii

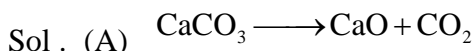
A B C D

2) v i ii iii

3) iv i iii ii

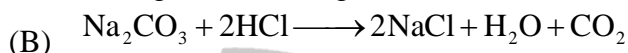
4) i iv ii iii

Ans: 1



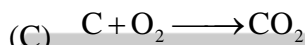
100 gm of CaCO_3 gives 22.4 lit CO_2 at STP

\therefore 10 gm of CaCO_3 gives 2.24 lit of CO_2

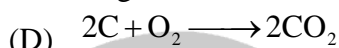


106 gm of Na_2CO_3 gives 22.4 lit of CO_2 at STP

1.06 gm of Na_2CO_3 gives 0.224 lit of CO_2



12 gm of 'C' on combustion gives 22.4 lit of CO_2 at STP 2.4 gm of 'C' give 4.4 lit of CO_2



2x 28 gm of CO gives 2 x 22.4 lit of CO_2 at STP

\therefore 0.56 gm of CO gives 0.448 lit CO_2

2. 40 grams of a sample of carbon on combustion left 10% of it unreacted. The volume of oxygen required at STP for this combustion reaction is (2008 M)

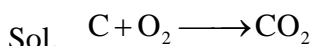
1) 22.4 l

2) 67.2 l

3) 11.2 l

4) 44.8 l

Ans: 2



Amount of 'C' reacts = 40 - 4 = 36 gm

According to equation 12 gm of C requires 22.4 lit of O_2

\therefore 36 gm of 'C' requires $3 \times 22.4 = 67.2$ lit of O_2

3. In an oxidation reduction reaction, dichromate ($\text{Cr}_2\text{O}_7^{2-}$) ion is reduced to Cr^{+3} ion. The equivalent weight of $\text{K}_2\text{Cr}_2\text{O}_7$ in this reaction is (2008 7)

$\frac{\text{Molecular weight}}{3}$

$\frac{\text{Molecular weight}}{6}$

1) $\frac{\text{Molecular weight}}{3}$

2) $\frac{\text{Molecular weight}}{6}$

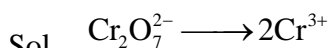
$\frac{\text{Molecular weight}}{1}$

$\frac{\text{Molecular weight}}{2}$

3) $\frac{\text{Molecular weight}}{1}$

4) $\frac{\text{Molecular weight}}{2}$

Ans: 2



change in oxidation number of Cr = 6 units

$\frac{\text{molecular weight}}{6}$

\therefore Equivalent weight = $\frac{6}{6}$

4. In the redox reaction, $2\text{KMnO}_4 + 3\text{H}_2\text{SO}_4 + 5\text{H}_2\text{C}_2\text{O}_4 \longrightarrow \text{K}_2\text{SO}_4 + 2\text{MnSO}_4 + 8\text{H}_2\text{O} + 10\text{CO}_2$

the volume of 0.1 M. KMnO_4 required to oxidises 25mL of 0.25 M $\text{H}_2\text{C}_2\text{O}_4$ solution

- 1) 25 L 2) 125 mL 3) 25 mL 4) 1.25 L

Ans : 3

Sol.
$$\frac{M_1 v_1}{n_1} (\text{KMnO}_4) = \frac{M_2 v_2}{n_2} (\text{H}_2\text{C}_2\text{O}_4)$$

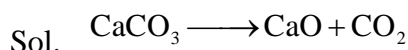
$$\frac{0.1 \times v_1}{2} = \frac{0.25 \times 25}{5}$$

$$\frac{0.5 \times 25}{0.5} = 25 \text{ml}$$

5. 'X' grams of calcium carbonate was completely burnt in air. The weight of the solid residue formed is 28 g. What is the value of 'X' (in grams) (2005 E)

- 1) 44 2) 200 3) 150 4) 50

Ans: 4



56 gm of CaO is formed from \longrightarrow 100 gm of CaCO_3

28 gm of CaO is formed from \longrightarrow ?

$$= \frac{28 \times 100}{56} = 50 \text{gm}$$

6. An organic compound containing C and H has 92.3% of carbon. Its empirical formula is

- 1) CH 2) CH_3 3) CH_2 4) CH_4 (2004 E)

Ans: 1

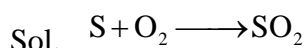
Element	Atomic ratio = $\frac{\%}{\text{At.wt}}$	Simplest ratio
C	$\frac{92.3}{12} = 7.7$	$\frac{7.7}{7.7} = 1$
H	$\frac{7.7}{1} = 7.7$	$\frac{7.7}{7.7} = 1$

\therefore EF is CH

7. What is the volume (in litres) of oxygen required at S.T.P. to completely convert 1.5 moles of sulphur into sulphur dioxide? (2003 E)

- 1) 11.2 2) 22.4 3) 33.6 4) 44.8

Ans: 3



1 mole of S required \longrightarrow 22.4 lit of O_2 at STP

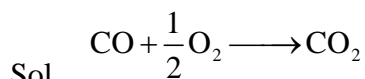
1.5 mole of S is required \longrightarrow ?

$$= \frac{1.5 \times 22.4}{1} = 33.6 \text{lit}$$

8. 'X' litres of carbon monoxide is present at STP. It is completely oxidized to CO_2 . The volume of CO_2 formed is 11.207 litres at STP. What is the value of 'X' in litres? (2002 E)

- 1) 22.414 2) 11.207 3) 5.6035 4) 44.828

Ans: 2



According to equation 22.4 lit of CO_2 is formed from \longrightarrow 22.4 lit of CO

11.207 lit of CO_2 is formed from \longrightarrow ?

$$= \frac{11.207 \times 22.4}{22.4} = 11.207 \text{ lit of CO} = X$$

9. 4gms of a hydrocarbon on complete combustion give 12.571 gms of CO_2 and 5.143 gms of water. What is the empirical formula of the Hydrocarbon? (2002 E)

- 1) CH 2) CH_2 3) CH_3 4) C_2H_3

Ans: 2

Sol. $\%C = \frac{12}{44} \times \frac{\text{wt of } \text{CO}_2}{\text{wt of O.C}} \times 100$

$$= \frac{12}{44} \times \frac{12.571}{4} \times 100 = 85.71\%$$

$$\%H = \frac{2}{18} \times \frac{\text{Wt of } \text{H}_2\text{O}}{\text{Wt of O.C}} \times 100$$

$$= \frac{2}{18} \times \frac{5.143}{4} \times 100 = 14.28\%$$

Element	Atomic ratio = $\frac{\%}{\text{At. wt}}$
C	$\frac{85.71}{12} = 7.14$
H	$\frac{14.28}{1} = 14.28$

\therefore EF is CH_2

Simplest ratio

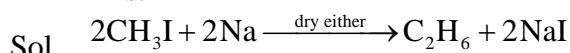
$$\frac{7.14}{7.14} = 1$$

$$\frac{14.28}{7.14} = d$$

10. What is the minimum quantity (in grams) of Methyl iodide required for preparing 1 mole of ethane by Wurtz reaction? (Atomic weight of iodine = 127) (2002 E)

- 1) 142 2) 568 3) 326 4) 284

Ans: 4



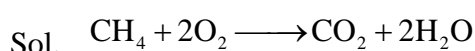
According to equation 1 mole of C_2H_6 is formed from 2 mole of CH_3I

$$\therefore \text{Wt of 2 moles of } \text{CH}_3\text{I} = 2 \times 142 = 284\text{g}$$

11. What is the volume (in litres) of oxygen at STP required for complete combustion of 32 gms of CH_4 ? (Molecular wt. Of CH_4 is 16) (2002 E)

- 1) 44.8 2) 89.6 3) 22.4 4) 179.2

Ans: 2



16 gm of CH_4 is required \longrightarrow 2×22.4 lit of O_2 at STP

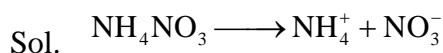
32 gm of CH_4 is required \longrightarrow ?

$$= \frac{32 \times 2 \times 22.4}{16} = 44.8 \text{ lit of } \text{O}_2$$

12. What are the oxidation nos. of nitrogen in NH_4NO_3 ? (2002 E)

- 1) +3, -5 2) -3, +5 3) +3, -6 4) +2, +2

Ans: 2



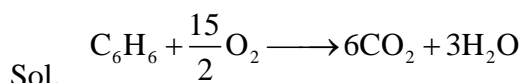
In NH_4^+ oxidation state of N is -3
 $x + 4 = +1$ $x = -3$

In NO_3^- oxidation state of N is $+5$
 $x - 6 = -1$ $x = +5$

13. How many litres of oxygen (at STP) are required for complete combustion of 39 gms of liquid Benzene? (Atomic weights : C = 12, H = 1, O = 16) (2002 E)

- 1) 84 2) 22.4 3) 42 4) 11.2

Ans: 1



78 gm of C_6H_6 requires $\frac{15}{2} \times 22.4$ lit of O_2 at STP

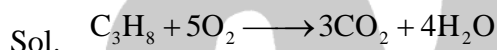
39 gm of C_6H_6 requires $\longrightarrow ?$

$$39 \times \frac{15}{2} \times \frac{1 \times 22.4}{78} = 84$$

14. Four grams of hydro carbon (C_xH_y) on complete combustion gave 12 grams of CO_2 . What is the empirical formula of the hydro carbon ? (C = 12; H = 1) (2005 M)

- 1) CH_3 2) C_4H_9 3) CH 4) C_3H_8

Ans: 4



44 gm of C_3H_8 gives 3×44 gm of CO_2

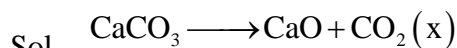
So 4 gm of C_3H_8 gives 12 gm of CO_2

15. 10 grams of CaCO_3 is completely decomposed to x and CaO. 'x' is passed into an aqueous solution containing 0.1 mole of sodium carbonate. What is the number of moles of sodium bicarbonate formed?

(mol. wts : $\text{CaCO}_3 = 100$; $\text{Na}_2\text{CO}_3 = 106$; $\text{NaHCO}_3 = 84$) (2004 M)

- 1) 0.2 2) 0.1 3) 0.01 4) 10

Ans: 1



100 gm CaCO_3 gives 1 mole of CO_2

\therefore 10 gm CaCO_3 gives 0.1 mole of CO_2



1 mole of CO_2 gives 2 moles of NaHCO_3

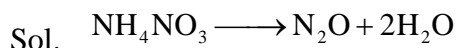
\therefore 0.1 mole of CO_2 gives 0.2 mole of NaHCO_3

16. Study the following table: Which two compounds have least weight of oxygen (molecular weights of compounds are given in brackets) (2004 M)

Compound (mol. wt.)	Weight of compound (in g) taken
I. CO_2	(44) 4.4
II. NO_2	(46) 2.3

- 1) +4 2) +2 3) +3 4) +1

Ans: 4



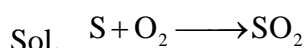
oxidation state of nitrogen in N_2O is + 1

21. Two grams of sulphur is completely burnt is oxygen to form SO_2 . In this reaction, what is the volume (in litres) of oxygen consumed at STP ? (2002 M)

(At. Wts. of sulphur and oxygen are 32. and 16 respectively)

- 1) 16/22.414 2) 22.414/16 3) 22.414/30 4) 32/22.414

Ans: 2



32 gm of S consumes 22.4 lit of O_2 at STP

$$2 \text{ gms of S consumes} = \frac{22.4 \times 2}{32} \text{ lit of } \text{O}_2 \text{ at STP}$$

$$= \frac{22.4}{16}$$

22. Which one of the following is an example for exothermic reaction? (2002 M)

- 1) $\text{H}_2(\text{g}) + \text{Cl}(\text{g}) \rightarrow 2\text{HCl}(\text{g}) \Delta H = -184.6\text{KJ}$
 2) $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{NO}(\text{g}) \Delta H = +180.80$
 3) $\text{C}(\text{graphite}) + \text{H}_2\text{O}(\text{g}) \rightarrow \text{CO}(\text{g}) + \text{H}_2(\text{g}) - 181.4 \text{ KJ}$
 4) $\text{C}(\text{graphite}) + 2\text{S}(\text{s}) + 91.9\text{KJ} \rightarrow \text{CS}_2(\text{l})$

Ans: 1

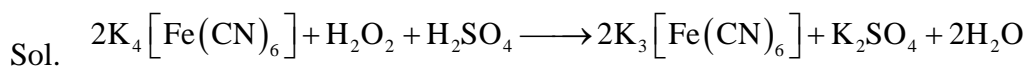
Sol. (1) choice is a correct answer,

Because exothermic reaction have ΔH value negative

23. What is the oxidation state of Fe in the product formed when acidified potassium ferrocyanide is treated with H_2O_2 ? (2002 M)

- 1) +2 2) +6 3) +1 4) +3

Ans: 4



Oxidation state of Fe in $\text{K}_3[\text{Fe}(\text{CN})_6]$ is + 3

$$x + 3 - 6 = 0 \Rightarrow x = +3$$

24. What the oxidation state of chlorine in hypochlorous acid? (2001 M)

- 1) +7 2) +5 3) +3 4) +1

Ans: 4

Sol. Hypochlorous acid = HOCl

$$x + 1 - 2 = 0$$

$$x = +1$$

25. 50 grams of calcium carbonate was completely burnt in air. What is the weight (in grams) of the residue? Atomic weights of Ca, C and O are 40, 12 and 16 respectively) (2001 M)

1) 2.8

2) 28

3) 4.4

4) 44

Ans: 2

Sol. $\text{CaCO}_3 \longrightarrow \text{CaO} + \text{CO}_2$

100 gm of CaCO_3 gives 56 gm of CaO

$$50 \text{ gm of } \text{CaCO}_3 \text{ gives } \frac{50 \times 56}{100} = 28$$



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