

5. STOICHIOMETRY

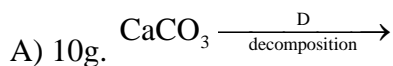
PREVIOUS EAMCET BITS

1. Match the following :

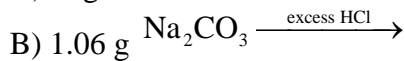
(2008 E)

List – I

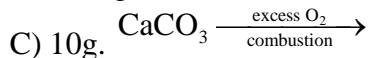
List – II



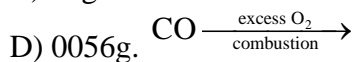
i) 0.224 lit. CO_2



ii) 4.48 lit. CO_2



iii) 0.448 lit. CO_2



iv) 2.24 lit. CO_2

A B C D

A B C D

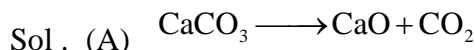
1) iv i ii iii

2) v i ii iii

3) iv i iii ii

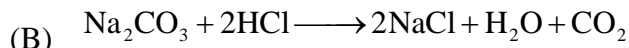
4) i iv ii iii

Ans: 1



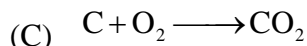
100 gm of CaCO_3 gives 22.4 lit CO_2 at STP

\therefore 10 gm of CaCO_3 gives 2.24 lit of CO_2

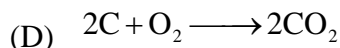


106 gm of Na_2CO_3 gives 22.4 lit of CO_2 at STP

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)

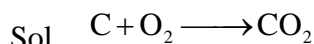
1) 22.4 l

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)

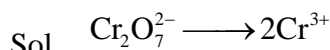
1) $\frac{\text{Molecular weight}}{3}$

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

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

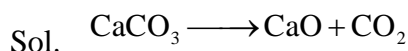
$$\frac{0.1 \times v_1}{2} = \frac{0.25 \times 25}{5}$$

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

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

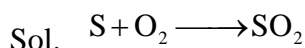
Sol. Element	Atomic ratio = $\frac{\%}{\text{At.wt}}$	Simplest ratio
C	$\frac{92.3}{12} = 7.7$	$\frac{7.7}{7.7} = 1$
H	$\frac{7.7}{1} = 7.7$	$\frac{7.7}{7.7} = 1$

\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

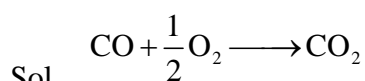
1.5 mole of S is required \longrightarrow ?

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

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

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

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

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

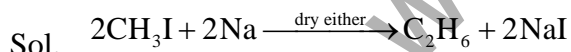
Element	Atomic ratio = $\frac{\%}{\text{At.wt}}$	Simplest ratio
C	$\frac{85.71}{12} = 7.14$	$\frac{7.14}{7.14} = 1$
H	$\frac{14.28}{1} = 14.28$	$\frac{14.28}{7.14} = d$

\therefore EF is CH_2

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



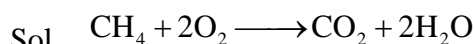
According to equation 1 mole of C_2H_6 is formed from 2 mole of CH_3I

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

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



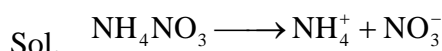
16 gm of CH_4 is required \longrightarrow 2×22.4 lit of O_2 at STP

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



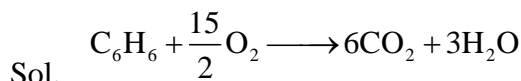
In NH_4^+ oxidation state of N is -3
 $x + 4 = +1$ $x = -3$

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

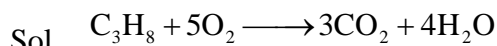
39 gm of C_6H_6 requires $\longrightarrow ?$

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

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



44gm of C_3H_8 gives 3×44 gm of CO_2

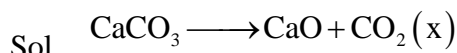
So 4gm of C_3H_8 gives 12 gm of CO_2

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

- III. H₂O₂ (34) 6.8
 IV. SO₂ (64) 1.6
 1) II & IV 2) I & III 3) I & II 4) III & IV

Ans: 1

Sol.
$$\%O = \frac{\text{wt of organic compound}}{\text{gram molecular wt of compound}} \times 100$$

hence, (1) is correct.

17. **Assertion (A)** : 8 grams of methane occupies 11.207 litres of volume at 273 K and 1 atm. pressure.

Reason (R) : One mole of any gas at S.T.P. occupies 22.414 litres of volume.

The correct answer is

(2004 M)

- 1) Both (A) and (R) are true and (R) is the correct explanation of (A)
 2) Both (A) and (R) are true, but (R) is not the correct explanation of (A)
 3) (A) is true and (R) is not true
 4) (A) is not true but (R) is true

Ans: 1

Sol. 8 gms of methane = $\frac{1}{2}$ mole of methane

1 mole occupies 22.4 lit at STP

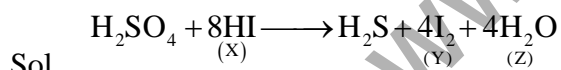
hence half mole occupies 11.2 lit

hence (1) is correct

18. In a balanced equation $\text{H}_2\text{SO}_4 + x\text{HI} \rightarrow \text{H}_2\text{S} + y\text{I}_2 + z\text{H}_2\text{O}$ the values of x, y and z are (2003 M)

- 1) x = 3, y = 5, z = 2 2) x = 4, y = 8, z = 5 3) x = 8, y = 4, z = 4 4) x = 5, y = 3, z = 1

Ans: 3



19. 0.078 grams of a hydrocarbon occupy 22.414 ml volume at STP. The empirical formula of the hydrocarbon is CH. The molecular formula of the hydrocarbon is (2002 M)

- 1) C₂H₂ 2) C₆H₆ 3) C₈H₈ 4) C₄H₄

Ans: 2

Sol. 22.4 ml volume of a hydrocarbon weight is 0.078 gm

22,400 ml volume of a hydrocarbon weight \longrightarrow ?

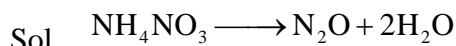
$$\frac{22,400 \times 0.078}{22.4} = 78 \text{ gm (molecular weight)}$$

molecular weight of C₆H₆ = 78 g

20. When ammonium nitrate is gently heated, an oxide of nitrogen is formed. What is the oxidation state of nitrogen in this oxide? (2002 M)

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

Ans: 4



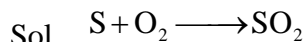
oxidation state of nitrogen in N_2O is +1

21. Two grams of sulphur is completely burnt in 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

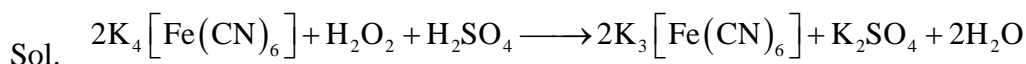
Sol. (1) choice is a correct answer,

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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