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Class: XI
Subject: chemistry
Topic: Some Basic Concepts Of Chemistry
No. of Questions: 20
Duration: 60 Min
Maximum Marks: 60

1. 0.15 g of a certain oxide of nitrogen is found to contain 0.07 g of nitrogen. The formula of the oxide is
   A. NO
   B. N_2O
   C. NO_2
   D. N_2O_5

   Ans. A

   Solution:

$$\text{Mass of oxygen} = 0.15 - 0.07 = 0.08 \text{ g}$$

$$\text{Equivalent mass of nitrogen} = \frac{0.07 \times 8}{0.08} = 7$$

$$\text{Valency} = \frac{\text{Atomic mass}}{\text{Equivalent mass}} = \frac{14}{7} = 2. \text{ Hence the formula is NO.}$$

2. Density of CH_4 under certain conditions of temperature and pressure is y. density of oxygen under the same conditions is
   A. Y/2
   B. 2y
   C. 32y
   D. Y

   Ans. B

   Solution:

   Mol. Mass of O_2 is double that of methane Hence density should also be double.

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3. 5g of an impure sample of $CaCO_3$ reacted with 400 cm_3 of 0.2N HCl. The percentage purity of the sample is
   A. 80
   B. 20
   C. 40
   D. 60

   Ans. A

   Solution:

$$\text{Mass of pure } CaCO_3 = \text{wg Eq. mass of } CaCO_3 = 50$$
$$\therefore \text{No. of equivalent s of } CaCO_3 = \text{No. of equivalent s of HCl reacted}$$
$$\frac{w}{50} = \frac{400 \times 0.2}{1000} \quad \text{or} \quad w = 4g$$
$$\therefore \quad \% \text{ age purity} = \frac{4 \times 100}{5} = 80$$

4. When 2 moles of ethanol are burnt the amounts of CO_2 and water obtained will be
   A. 44 g and l8 g
   B. 88 and l8 g
   C. 88 g and 54g
   D. 46 g and 54g

   Ans. C

   Solution:

$$C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$$
$$46g \qquad 44 \times 2 = 88g \qquad 18 \times 3 = 54\ g$$

5. H_3PO_4+ NaOH $\rightarrow NaH_2PO_4$ H2O.Equivalent mass of phosphoric acid in this reaction
   A. Molecular mass
   B. $\frac{\text{Molecular mass}}{2}$
   C. $\frac{\text{Molecular mass}}{3}$
   D. $\frac{\text{Molecular mass}}{5}$

   Ans. A

   Solution:

   One molecule of H_3PO_4 = 1 NaOH = 1 eq. mass
   ∴ Eq. mass of H_3PO_4 = Mol. Mass

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6. The density of a gas is 1.964 g dm^{-3} at 273 K and 76 cm Hg. The gas is
   A. C_2H_6
   B. CH_4
   C. Xe
   D. CO_2

   Ans. D

   Solution:

   Mass of 22.4 dm^3 of the gas = 1.964 x 22.4
   = 43.99
   This is equal to the molecular mass of the gas. This corresponds to CO_2

7. Before testing for halogens, the sodium fusion extract is boiled with
   A. conc. HNO_3
   B. conc. H_2SO_4
   C. conc. HCl
   D. conc. NaOH

   Ans. A

   Solution:

   The sodium fusion extract is boiled with concentrated nitric acid so that if nitrogen or sulphur present they are expelled as HCN and
   H_2S respectively

8. **Assertion (A)** Root mean square velocity of O_2 gas at 300 K is

$$\sqrt{\frac{3RT}{M}} = \sqrt{\frac{3x8.314x300}{31x10^{-3}}} ms^{-}$$

   Reason (R) R, T and M have been taken in SI unit.

   A. Both (A) and (R) are true and (R) is the correct explanation of (A).
   B. Both (A) and (R) are frue but (R) is not the correct explanation of (A)
   C. (A) is true but (R) is false.
   D. (A) is false but (R) is true.

   Ans. A

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9. The equivalent mass of a metal is 4. Vapor density of its chloride is 59.25. It's Atomic mass is
   A. 8
   B. 16
   C. 12
   D. 20

   Ans. C

   Solution:

   Let the valency of the metal M be p.
   Mol. mass = V.D. x 2 = 59.25 x 2 = 118.5. The formula of the chloride MClp
   Mol. mass = At. mass of M + 35.5 x p = Eq. mass of the metal M x Valency + 35.5 x p
   (Eq. mass = 4)
   ∴ Mol. mass = 4p + 35.5 p = 118.5 or p = 3
   ∴ Atomic mass of the metal = 4 x 3 = 12

10. The density of neon will be highest at
    A. STP
    B. 0°C, 2 atm
    C. 273°C, I atm
    D. 273°C, 2 atm

    Ans. B

    Let d be the density at STP. In option 2 the pressure is doubled. Hence density doubles and becomes 2d. In option 3 temperature isdoubled. Hence volume doubles and density becomes d/2. In the last option both temperature and pressure is doubled. Hencevolume remains the same and hence density remains at d. So the right option is 2

11. Which of the following does not constitute 0.1 g mole?
    A. 6.023×10^{22} molecules of benzene
    B. 0.14 g of N_2 gas
    C. 2.24 liter of CO_2 at STP
    D. 0.40 g of He gas
    Ans. B
    Solution:

1. 1 mole $= 6.023 \times 10^{23}$ molecules. Hence option1 correspond s to 0.1 mole.

2. 0.14 g of $N_2 = \frac{0.14}{28}$ moles $= 0.005$ mole

3. 1 mole $= 22.4$ litre at STP

$\therefore$ 2.24 litre at STP 0.1 mole

4. 0.4 g of $He = \frac{0.4}{4} = 0.1$ mole.

Since He is monoatomic , At. mass of He = Mol. mass

Hence only option 2 does not correspond to 0.1 mole

12. The amount of NaOH present in 500 cc of 0.2 N NaOH solution is
    A. 2g
    B. 4g
    C. 8g
    D. 40g

    Ans. B

    Solution:

$$\text{No. of equivalent s of NaOH presents in 500 cc of 0.2 N solution}$$

$$= \frac{500 \times 0.2}{1000} = 0.1 \quad \text{Mass of NaOH} = 0.1 \times 40 = 4 \text{ g.}$$

13. **Assertion (A)** For the reaction

$A + B \rightleftharpoons C$

equilibrium constant $K_c = \frac{[C]}{[A][B]}$

K_c is unitless.

Reason (R) K_c is constant and constant has no unit.

    A. Both (A) and (R) are true and (R) is the correct explanation of (A).
    B. Both (A) and (R) are frue but (R) is not the correct explanation of (A)
    C. (A) is true but (R) is false.
    D. (A) and (R) both are false.

    Ans. D

14. 9g of a trivalent element M combines with one-gram atomic mass of bromine (8g). Hence atomic weight of M is
    A. 118
    B. 9
    C. 27
    D. 35.3

    Ans. C

    Solution:

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$$\text{Eq. mass of bromine} = \frac{\text{Atomic mass}}{\text{Valency}} = \frac{80}{1} = 80$$

$$\text{Since 9g of M combines with 1 eq. mass of bromine, equivalent mass of } M = 9$$

$$\therefore \text{At. mass of x} = 9 \times 3 = 27$$

15. What volume of 0.5 N NaOH neutralizes 6.3 g of oxalic acid crystals?
    A. 100 cm^3
    B. 200 cm^3
    C. 400 cm^3
    D. 20 cm^3
    Ans. B

    Solution:

$$\text{Let p cm}^3 \text{ of NaOH of strength 0.5 N react with 6.3 g of oxalic acid.}$$

$$\text{No. of equivalent s of NaOH} = \frac{\text{Volume of the base} \times \text{strength of the base}}{1000} = \frac{p \times 0.5}{1000}$$

$$\text{No. of equivalent s of oxalic acid} = \frac{\text{Mass}}{\text{Eq. mass}} = \frac{6.3}{6.3} = 0.1$$

$$\text{Since equivalent amounts react } 0.1 = \frac{P \times 0.5}{1000} \quad \text{or} \quad p = 200 cm^3.$$

16. Hydrochloric acid solutions A and B have concentrations 0.5 N and 0.1N respectively. The volume of solution A and B required to make 2 liters of 0.2N Hydrochloric acid are
    A. 0.5 L of A+1.5 L of B
    B. 1.5 L of A+0.5 L of B
    C. 1.0 L of A +1.0 L of B
    D. 0.75 L of A + 1.25 L of B
    Ans. A
    Solution:

Let p cm^3 of A and q cm^3 of B be mixed. Then number of equivalents in 2 litres of the mixture is $\left[\frac{p\times 0.5}{1000}+\frac{q\times 0.1}{1000}\right]$

No. of equivalents of HCl in the mixture $=\frac{2000\times 0.2}{1000}$ (given)

$\therefore \frac{p\times 0.5}{1000}+\frac{q\times 0.1}{1000}=\frac{2000\times 0.2}{1000}$

or $0.5p+0.1q=400$

Further $p+q=2000$

Solving for p and q we get, $p=500\ cm^3$ litres & $q=1500\ cm^3$

That is $p=0.5$ litres and $q=1.5$ litres.

17. The formula mass of Mohr's salt is 392. The iron present in it is oxidized by $KMnO_4$ in acid medium. The equivalent mass of Mohr's salt is
    A. 31.6
    B. 392
    C. 156
    D. 278
    Ans. B
    Solution:
    $2FeSO_4 + H_2SO_4 + O \rightarrow Fe_2(SO_4)_3 + H_2O$
    $2FeSO_4 \equiv 1(O) = 2$ equivalents
    Equivalent mass of $FeSO_4$ = Molecular mass
    Hence equivalent mass of Mohr's salt = molecular mass = 392

18. 1.18 g of an organic compund on Kjeldalisation evolves ammonia which requires 20 cm^3 of 1 N HCl. The percentage of nitrogen is
    A. 46%
    B. 64%
    C. 23.7%
    D. 50%
    Ans. A
    Solution:

Mass of organic compound $= 1.18\ g$

Volume of HCl consumed $= 20\ cm^3$ of $1\ N$

$\therefore$ No. of gram equivalent of $NH_3 = \frac{201}{1000} = 0.02$

Mass of nitrogen $= 0.02 \times 14 = 0.28$ ($\because$ Eq. mass of nitrogen $= 14$)

Percentage of nitrogen $= \frac{0.28}{1.18} \times 100 = 23.7\%$

19. **Assertion (A)** $2H_2 + O_2 \rightarrow 2H_2O$
4 g H_2 react with 2 g O_2 to form 4 g H_2O.
Reason (R) H_2 and O_2 react in the molar ratio of 2: 1 to form 2 mol H_2O.

A. Both (A) and (R) are true and (R) is the correct explanation of (A).
B. Both (A) and (R) are frue but (R) is not the correct explanation of (A)
C. (A) is true but (R) is false.
D. (A) is false but (R) is true.
Ans. D

20. Which of the following contains same number of molecules as found in 11 g of CO_2?
A. 14g of N_2
B. 24g of O_2
C. 4g of methane
D. 14g of carbon monoxide
Ans. C
Solution:

$$CaCO_3 \longrightarrow CaO + CO_2$$

$100\ g \qquad\qquad 22.4\ dm^3$ at STP

$$CO_2 + 2KOH \longrightarrow K_2CO_3 + H_2O$$

$22.4\ dm^3 \qquad 56 \times 2\ g$

$\therefore$ Mass of KOH reacting with $11.2\ dm^3$ of $CO_2 = 56\ g$