

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<sub>2</sub>O
  - C. NO<sub>2</sub>
  - D. N<sub>2</sub>O<sub>5</sub>

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<sub>4</sub> 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<sub>2</sub> is double that of methane Hence density should also be double.

3. 5g of an impure sample of  $\text{CaCO}_3$  reacted with 400 cm<sup>3</sup> of 0.2N HCl. The percentage purity of the sample is
- 80
  - 20
  - 40
  - 60

Ans. A

Solution:

Mass of pure  $\text{CaCO}_3$  = wg Eq. mass of  $\text{CaCO}_3$  = 50

$\therefore$  No. of equivalents of  $\text{CaCO}_3$  = No. of equivalents of HCl reacted

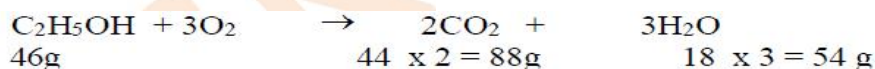
$$\frac{w}{50} = \frac{400 \times 0.2}{1000} \quad \text{or} \quad w = 4\text{g}$$

$$\therefore \% \text{ age purity} = \frac{4 \times 100}{5} = 80$$

4. When 2 moles of ethanol are burnt the amounts of  $\text{CO}_2$  and water obtained will be
- 44 g and 18 g
  - 88 and 18 g
  - 88 g and 54g
  - 46 g and 54g

Ans. C

Solution:



5.  $\text{H}_3\text{PO}_4 + \text{NaOH} \rightarrow \text{NaH}_2\text{PO}_4 + \text{H}_2\text{O}$ . Equivalent mass of phosphoric acid in this reaction
- Molecular mass
  - $\frac{\text{Molecular mass}}{2}$
  - $\frac{\text{Molecular mass}}{3}$
  - $\frac{\text{Molecular mass}}{5}$

Ans. A

Solution:

One molecule of  $\text{H}_3\text{PO}_4$  = 1 NaOH = 1 eq. mass

$\therefore$  Eq. mass of  $\text{H}_3\text{PO}_4$  = Mol. Mass

6. The density of a gas is  $1.964 \text{ g dm}^{-3}$  at  $273 \text{ K}$  and  $76 \text{ cm Hg}$ . The gas is
- $\text{C}_2\text{H}_6$
  - $\text{CH}_4$
  - $\text{Xe}$
  - $\text{CO}_2$

Ans. D

Solution:

$$\begin{aligned}\text{Mass of } 22.4 \text{ dm}^3 \text{ of the gas} &= 1.964 \times 22.4 \\ &= 43.99\end{aligned}$$

This is equal to the molecular mass of the gas. This corresponds to  $\text{CO}_2$

7. Before testing for halogens, the sodium fusion extract is boiled with
- conc.  $\text{HNO}_3$
  - conc.  $\text{H}_2\text{SO}_4$
  - conc.  $\text{HCl}$
  - conc.  $\text{NaOH}$

Ans. A

Solution:

The sodium fusion extract is boiled with concentrated nitric acid so that if nitrogen or sulphur present they are expelled as  $\text{HCN}$  and  $\text{H}_2\text{S}$  respectively

8. **Assertion (A)** Root mean square velocity of  $\text{O}_2$  gas at  $300 \text{ K}$  is

$$\sqrt{\frac{3RT}{M}} = \sqrt{\frac{3 \times 8.314 \times 300}{31 \times 10^{-3}}} \text{ ms}^{-1}$$

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

- Both (A) and (R) are true and (R) is the correct explanation of (A).
- Both (A) and (R) are true but (R) is not the correct explanation of (A)
- (A) is true but (R) is false.
- (A) is false but (R) is true.

Ans. A

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.  $\times 2 = 59.25 \times 2 = 118.5$ . The formula of the chloride  $MCl_p$

Mol. mass = At. mass of M +  $35.5 \times p = \text{Eq. mass of the metal M} \times \text{Valency} + 35.5 \times p$   
(Eq. mass = 4)

$$\therefore \text{Mol. mass} = 4p + 35.5 p = 118.5 \text{ or } p = 3$$

$$\therefore \text{Atomic mass of the metal} = 4 \times 3 = 12$$

10. The density of neon will be highest at
- A. STP
  - B.  $0^\circ\text{C}$ , 2 atm
  - C.  $273^\circ\text{C}$ , 1 atm
  - D.  $273^\circ\text{C}$ , 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 is doubled. Hence volume doubles and density becomes  $d/2$ . In the last option both temperature and pressure is doubled. Hence volume 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.  $6.023 \times 10^{22}$  molecules of benzene
  - B. 0.14 g of  $\text{N}_2$  gas
  - C. 2.24 liter of  $\text{CO}_2$  at STP
  - D. 0.40 g of He gas

Ans. B

Solution:

1. 1 mole =  $6.023 \times 10^{23}$  molecules. Hence option 1 corresponds 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

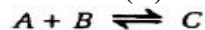
Ans. B

Solution:

No. of equivalents 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



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

$K_c$  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 true 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:

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

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<sup>3</sup>
- B. 200 cm<sup>3</sup>
- C. 400 cm<sup>3</sup>
- D. 20 cm<sup>3</sup>

Ans. B

Solution:

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

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

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

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

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

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

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

$$\text{or } 0.5p + 0.1q = 400$$

$$\text{Further } p + q = 2000$$

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

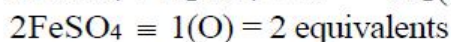
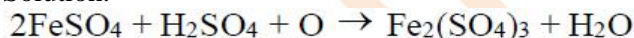
That is  $p = 0.5$  litres and  $q = 1.5$  litres.

17. The formula mass of Mohr's salt is 392. The iron present in it is oxidized by  $\text{KMnO}_4$  in acid medium. The equivalent mass of Mohr's salt is

- A. 31.6  
B. 392  
C. 156  
D. 278

Ans. B

Solution:



Equivalent mass of  $\text{FeSO}_4$  = Molecular mass

Hence equivalent mass of Mohr's salt = molecular mass = 392

18. 1.18 g of an organic compound on Kjeldaliation evolves ammonia which requires 20 cm<sup>3</sup> 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 =  $20 \text{ cm}^3$  of 1 N

$\therefore$  No. of gram equivalent of  $\text{NI}_3 = \frac{201}{1000} = 0.02$

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)**  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

4 g  $\text{H}_2$  react with 2 g  $\text{O}_2$  to form 4 g  $\text{H}_2\text{O}$ .

**Reason (R)**  $\text{H}_2$  and  $\text{O}_2$  react in the molar ratio of 2: 1 to form 2 mol  $\text{H}_2\text{O}$ .

- A. Both (A) and (R) are true and (R) is the correct explanation of (A).
- B. Both (A) and (R) are true 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  $\text{CO}_2$ ?

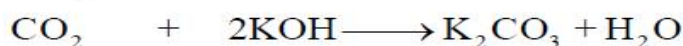
- A. 14g of  $\text{N}_2$
- B. 24g of  $\text{O}_2$
- C. 4g of methane
- D. 14g of carbon monoxide

Ans. C

Solution:



100 g  $22.4 \text{ dm}^3$  at STP



$22.4 \text{ dm}^3$   $56 \times 2 \text{ g}$

$\therefore$  Mass of KOH reacting with  $11.2 \text{ dm}^3$  of  $\text{CO}_2 = 56 \text{ g}$