NEET Important Questions with Solutions from Some Basic Concepts of Chemistry

Q.1. The number of atoms in $3.2\ \mathrm{g}$ of oxygen gas is

A) 6.02×10^{22}

B) 6.02×10^{23}

C) 12.04×10^{22}

D) 12.04×10^{23}

Answer: 12.04×10^{22}

Solution: Given, the mass of oxygen $(\mathrm{O_2}) = 3.2\ \mathrm{g}$.

We know that,

$\mathrm{moles} = \frac{\mathrm{given\ mass}}{\mathrm{molar\ mass}}$

Thus, the moles of oxygen $= \frac{3.2}{32} = 0.1\ \mathrm{moles}$.

Applying the formula,

Number of molecules of oxygen $= \mathrm{moles} \times \mathrm{N_A}$

$= 0.1 \times 6.02 \times 10^{23}$

$= 6.02 \times 10^{22}$ molecules.

Since 1 molecule of $\mathrm{O_2}$ contains 2 oxygen atoms,

So, 6.02×10^{22} molecules of $\mathrm{O_2}$ will contain$= 2 \times 6.02 \times 10^{22}$.

$= 12.04 \times 10^{22}$ oxygen atoms.

Q.2. In which of the following pairs do $1\ \mathrm{g}$ of each have an equal number of molecules?

A) $\mathrm{N_2O}$ and CO

B) $\mathrm{N_2}$ and $\mathrm{C_3O_2}$

C) $\mathrm{N_2}$ and CO

D) $\mathrm{N_2}$ and $\mathrm{CO_2}$

Answer: $\mathrm{N_2}$ and CO

Solution: Since mole is also used to represent the number of molecules, thus, equal number of molecules also means equal number of moles.

We know that,

number of moles $= \frac{\text{given mass}}{\text{molar mass}}$.

According to the question, we are taking equal mass (1 g) of all compounds. Thus, if the compounds have the same molar mass, they will have the same number of moles.

Atomic masses of $\text{N} = 14$, $\text{O} = 16$ and $\text{C} = 12$.

Thus,

the molar mass of $N_2O = 2 \times 14 + 1 \times 16$
$= 28 + 16$
$= 44 \text{ g mol}^{-1}$

The molar mass of $CO = 1 \times 12 + 1 \times 16$
$= 12 + 16$
$= 28 \text{ g mol}^{-1}$

The molar mass of $N_2 = 2 \times 14$
$= 28 \text{ g mol}^{-1}$

The molar mass of $C_3O_2 = 3 \times 12 + 2 \times 16$
$= 36 + 32$
$= 68 \text{ g mol}^{-1}$

The molar mass of $CO_2 = 1 \times 12 + 2 \times 16$
$= 12 + 32$
$= 44 \text{ g mol}^{-1}$

Clearly, the molar masses of N_2 and CO are equal, so they have an equal number of molecules.

Q.3. The charge on 1 gram-ion of Al^{3+} is

A) $\frac{1}{27} N_A e$ coulombs.

B) $\frac{1}{3} \times N_A e$ coulombs.

C) $\frac{1}{9} \times N_A e$ coulombs.

D) $3 \times N_A e$ coulombs.

Answer: $3 \times N_A e$ coulombs.

Solution: Charge on a single Al^{3+} ion $= 3e$ coulombs.

One gram-ion of aluminium is same as one mole of aluminium ion.

Since one mole of a substance contains Avogadro's number of particles,

Charge on one gram-ion of aluminium $= N_A \times 3e$ coulombs.

Q.4. Given that the abundance of isotopes ^{54}Fe, ^{56}Fe and ^{57}Fe in nature are 5%, 90% and 5%, respectively. The atomic mass of Fe is

A) 55.85

B) 55.95

C) 55.75

D) 56.05

Answer: 55.95

Solution: The average atomic mass of the isotopic mixture,

Average atomic mass$= \frac{m_1 \times a + m_2 \times b + m_3 \times c}{a+b+c}$

Where, $m_1,\ m_2$ and m_3 are the molar mass of the isotope and $a,\ b$ and c are their percent abundance.

Given,

$m_1 = 54\ g\ mol^{-1}$

$m_2 = 56\ g\ mol^{-1}$

$m_3 = 57\ g\ mol^{-1}$

And their percentage abundance $a,\ b$ and c are $5\%,\ 90\%$ and 5%, respectively.

Now,

Average atomic mass $= \frac{54 \times 5 + 56 \times 90 + 57 \times 5}{100} = 55.95\ g\ mol^{-1}$.

Q.5. Prefix Giga means:

A) 10^{-9}

B) 10^{9}

C) 10^{6}

D) 10^{-6}

Answer: 10^{9}

Solution: Giga is prefix in the metric system, which denotes a factor of a billion.

It has the symbol G.

Giga is derived from the Greek word "giant."

It is frequently used information unit in computing.

$1\ \text{giga} = 10^{9}$.

Q.6. There are two common oxides of Sulphur, one of which contains $50\%\ O_2$ by weight, the other almost exactly 60%. The weights of Sulphur which combine with $1\ g$ of O_2 (fixed) are in the ratio of:

A) $1:1$

B) $2:1$

C) $2:3$

D) $3:2$

Answer: $3:2$

Solution: If, the first oxide of Sulphur contains 50% Oxygen by weight, then the percentage of Sulphur in this oxide should be 50%.

Similarly, the second oxide contains 60% Oxygen and 40% Sulphur by weight.

If we assume, both oxides of Sulphur be 100 g each then:

- In first oxide, 50 g of Oxygen combine with 50 g of Sulphur.

So, 1 g of Oxygen should combine with 1 g of Sulphur.

- In the second oxide, 60 g of Oxygen combine with 40 g of Sulphur.

So, 1 g of Oxygen should combine with 0.67 g of Sulphur.

Hence, the ratio of weights of Sulphur $= 1 : 0.67 = 1 : \frac{2}{3} = 3 : 2$.

Q.7. When 10 mL of propane (gas) is combusted completely, the volume of $CO_2(g)$ obtained in similar condition is:

A) 10 mL

B) 20 mL

C) 30 mL

D) 40 mL

Answer: 30 mL

Solution: The Gay Lussac's law of gaseous volumes states that when gases combine or are produced in a chemical reaction, that they do in a simple ratio by volume, provided all gases are at the same temperature and pressure.

In combustion of Propane, the resultant products are $CO_2(g)$ and $H_2O(l)$.

$$\underset{\text{(Propane)}}{C_3H_8(g)} + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$$

As per the balanced chemical reaction and the Gay Lussac's law:

1 mL of Propane produce 3 mL of $CO_2(g)$.

So, 10 mL of Propane should produce 30 mL of $CO_2(g)$.

Q.8. Torr is a unit of:

A) Temperature

B) Pressure

C) Volume

D) Density

Answer: Pressure

Solution: Torr is a unit of pressure. It is named after the name of scientist Evangelista Torricelli.

$$1 \text{ Torr } = \frac{1}{760} \text{ atmosphere}$$

$$1 \text{ Torr } = \frac{101325}{760} \text{ Pascal } \left(\text{or Pa}\right) = 133.3224 \text{ Pa}$$

Q.9. Which property of an element may have non-integral value?

A) Atomic weight

B) Atomic number

C) Mass number

D) Both (1) and (3)

Answer: Atomic weight

Solution: Atomic weight involves the contribution of weight of isotope of that element due to which atomic weight can be fractional. For example atomic weight of chlorine is 35.5.

Atomic number is the number of protons in the nucleus of an atom so, the number of protons can only be integral values.

Mass number is sum of number of protons and neutrons in nucleus so, it can be integer only.

Q.10. The weight of one atom of Uranium is 238 amu. Its actual weight is_____g.

A) 3.95×10^{-22}

B) 3.96×10^{-22}

C) 2.95×10^{-22}

D) 3.98×10^{-20}

Answer: 3.95×10^{-22}

Solution: Atomic mass is the no. of protons or no. of electrons in the atom.

1 amu is $1/12^{\text{th}}$ weight of a neutral atom of ^{12}C.

$1\ \text{amu} \ = 1.66 \times 10^{-24}\ \text{g}$

Therefore, actual weight $= 238 \times 1.66 \times 10^{-24} = 3.95 \times 10^{-22}\ \text{g}$

Q.11. The molar ratio of Fe^{2+} to Fe^{3+} in a mixture of $FeSO_4$ and $Fe_2(SO_4)_3$ having equal number of sulphate ion in both ferrous and ferric sulphate is

A) $1 : 2$

B) $3 : 2$

C) $2 : 3$

D) cannot be determined

Answer: $3 : 2$

Solution: Let's suppose we have $1\ \text{mol}$ sulfate ions in each sulfate.

$FeSO_4$ contains one Fe^{2+} ion per molecule, hence the number of moles of $Fe^{2+} = 1\ \text{mol}$ in 1 mol of sulfate.

$Fe_2(SO_4)_3$ contains two Fe^{3+} ions per molecule, hence the number of moles of $Fe^{3+} = 2 \times \frac{1}{3} = \frac{2}{3}\ \text{mol}$ in 1 mol of sulfate.

So, the ratio will be $\frac{1}{\frac{2}{3}} = \frac{3}{2} = 3 : 2$.

Q.12. 1.00 g of a pure element contains 4.39×10^{21} atoms. The element is

A) U

B) Ce

C) Ba

D) Au

Answer: Ba

Solution: We know that, one mole of the pure element contains 6.022×10^{23} atoms.

$1\ \mathrm{g} \rightarrow 4.39 \times 10^{21}$ atoms
$\mathrm{x}\ \mathrm{g} \rightarrow 6.022 \times 10^{23}$ atoms

$\mathrm{x} = \frac{6.022 \times 10^{23}}{4.39 \times 10^{21}} = 137\ \mathrm{g}$

Out of all options, only atomic weight of barium is equal to $137\ \mathrm{g}$.

Hence, that pure element is Ba.

Q.13. $4.4\ \mathrm{g}$ of an unknown gas occupies 2.24 litres of volume at STP. The gas may be

A) N_2O

B) CO

C) CO_2

D) A and C both

Answer: A and C both

Solution: 1 mole of a gas occupies $22.4\ \mathrm{L}$ volume at STP.

1 mol of gas $\rightarrow 22.4\ \mathrm{L}$

x mol of gas $\rightarrow 2.24\ \mathrm{L}$

$\mathrm{x} = \frac{2.24}{22.4} = 0.1\ \mathrm{mol}$

Now,

$0.1\ \mathrm{mol} \rightarrow 4.4\ \mathrm{g}$
$1\ \mathrm{mol} \rightarrow \mathrm{x}\ \mathrm{g}$
$\mathrm{x} = \frac{4.4}{0.1} = 44\ \mathrm{g}$

The molecular weight of the compounds in options:

$N_2O = 14(2) + 16 = 44\ \mathrm{g}$

$CO = 12 + 16 = 28\ \mathrm{g}$

$CO_2 = 12 + 16(2) = 44\ \mathrm{g}$

Here, 1 and 3 have a molecular weight equal to $44\ \mathrm{g}$.

Q.14. The volume of a gas in a discharge tube is $1.12 \times 10^{-7}\ \mathrm{ml}$ at STP, then the number of molecules of the gas in the tube is

A) 3.01×10^{4}

B) 3.01×10^{15}

C) 3.01×10^{12}

D) 3.01×10^{16}

Answer: 3.01×10^{12}

Solution: We know that, 1 mole of a gas occupies 22.4 L of volume at STP and contains 6.022×10^{23} molecules.

1 mole of gas $\rightarrow 22.4$ L

6.022×10^{23} molecules $\rightarrow 22400$ mL

x molecules $\rightarrow 1.12 \times 10^{-7}$ mL

$$x = \frac{6.022 \times 10^{23} \times 1.12 \times 10^{-7}}{22400} = 3.01 \times 10^{12} \text{ molecules}$$

Q.15. The mole fraction of water in a solution containing 117 g sodium chloride and 900 g of water is?

A) 0.0632

B) 0.038

C) 0.9615

D) 1.000

Answer: 0.9615

Solution: The molar mass of sodium chloride $= 23 + 35.5 = 58.5$ g

The molar mass of water $= 2 \times 1 + 16 = 18$ g

Number of moles of sodium chloride: $n_{NaCl} = \frac{\text{given mass}}{\text{Molar mass}} = \frac{117}{58.5} = 2$ mol

Number of moles of water: $n_{H_2O} = \frac{\text{given mass}}{\text{Molar mass}} = \frac{900}{18} = 50$ mol

Now mole fraction of a component in solution is the ratio of moles of that component to the total moles of all the components in the solution.

The mole fraction of water $= \frac{n_{H_2O}}{n_{H_2O} + n_{NaCl}} = \frac{50}{2+50} = \frac{50}{52} = 0.9615$

Q.16. Which of the following concentration factor is affected by change in temperature?

A) Molarity

B) Molality

C) Mole fraction

D) Weight fraction

Answer: Molarity

Solution: Molarity is a term used for concentration and is defined as the number of moles of solute per litre of solution.

Molality is a term used for concentration and is defined as the number of moles of solute per kilogram of solvent.

Mole fraction is the ratio of the number of mole of substance to the total number of moles in solution.

Weight fraction is a fraction of the weight of a substance to the total weight of the solution.

Among above all mentioned quantities molarity is only that depends on the volume of the solution. Volume is dependent on temperature. Hence, molarity also depends on temperature.

Q.17. The percentage of Se in peroxidase anhydrous enzyme is 0.5% by weight (atomic weight $= 78.4$). Then minimum molecular weight of peroxidase anhydrous enzyme is

A) 1.568×10^4

B) 1.568×10^3

C) 15.68

D) 3.316×10^4

Answer: 1.568×10^4

Solution: The weight percentage of selenium in peroxidase anhydrous enzyme $= 0.5\%$

The atomic weight of selenium $= 78.4$

To calculate the minimum molecular weight of peroxidase anhydrous enzyme; we consider that 1 peroxidase anhydrous enzyme contains 1 selenium atom.

Then,

Percentage weight of selenium $= \frac{\text{Atomic weight of selenium}}{\text{Minimum Molecular weight of enzyme}} \times 100$

$0.5 = \frac{78.4}{\text{Minimum Molecular weight of enzyme}} \times 100$

Minimum molecular weight of enzyme $= \frac{78.4 \times 100}{0.5} = 15680 = 1.568 \times 10^4$

Q.18. The mass of carbon anode consumed (giving only carbon dioxide) in the production of 270 kg of aluminium metal from bauxite by the Hall process is:
(Atomic mass: $\text{Al} = 27$)

A) 90 kg

B) 540 kg

C) 180 kg

D) 270 kg

Answer: 90 kg

Solution: In Hall Process:

$2\ Al_2O_3 + 3\ C \rightarrow 4\ Al + 3\ CO_2$

From a balanced chemical equation

$\frac{\text{moles of C}}{3} = \frac{\text{moles of Al}}{4}$

No of moles $= \frac{\text{given mass in g}}{\text{molecular or atomic mass}}$

Let the mass of carbon $=$ w kg

$\frac{w \times 1000}{12 \times 3} = \frac{270 \times 1000}{4 \times 27}$

Hence, $w = 90$ kg

Q.19. An element X has the following isotopic composition:

$^{200}X: 90\%$
$^{199}X: 8.0\%$
$^{202}X: 2.0\%$

The weighted average atomic mass of the naturally occurring element X is closest to

A) 199 amu

B) 200 amu

C) 201 amu

D) 202 amu

Answer: 200 amu

Solution: Average atomic mass is given by

$$A_{average} = \frac{\sum_{A\times n}}{\sum_{n}} = \frac{A_1n_1 + A_2n_2 + A_3n_3}{n_1+n_2+n_3}$$

$A_1 = 200;\ A_2 = 199;\ A_3 = 202$ (in amu)

$n_1 = 90\%;\ n_2 = 8\%;\ n_3 = 2\%$

$$A_{average} = \frac{200\times90 + 199\times8 + 202\times2}{100} = 199.96 \approx 200 \text{ amu}$$

Q.20. How many moles of Lead (II) Chloride will be formed from a reaction between 6.5g of PbO and 3.2g of HCl

Given the atomic mass of $(Pb = 207.2)$

A) 0.044

B) 0.333

C) 0.011

D) 0.029

Answer: 0.029

Solution: From the balanced chemical equation:
$PbO + 2\ HCl \rightarrow PbCl_2 + H_2O$

Molar mass of $PbO = 223.2\ {}^{g}/_{mol}$

Moles of PbO given $= \frac{6.5}{223.2} = 0.029$ mol

Molar mass of $HCl = 36.5\ {}^{g}/_{mol}$

Moles of HCl given $= \frac{3.2}{36.5} = 0.087$ mol

So, PbO is the limiting reagent.

Now, moles of $\frac{PbO}{1} = \frac{\text{mol of } PbCl_2}{1}$

So, moles of $PbCl_2 = 0.029$ mol

Q.21. An organic compound contains carbon, hydrogen and oxygen. Its chemical analysis gave $C = 38.71\%$ and $H_2 = 9.67\ \%$.
The empirical formula of the compound would be:

A) CH_3O

B) CH_2O

C) CHO

D) CH_4O

Answer: CH_3O

Solution: From percentage analysis:

Assume the mass of organic compound is $100\ g$.

$\%\ of\ C = 38.71,\ moles\ of\ C = \frac{38.71}{12} = 3.226$
$\%\ of\ H = 9.67,\ moles\ of\ H = \frac{9.67}{1} = 9.67$
$\left(\%\ of\ O = 100 - 38.71 - 9.67 = 51.62\right)$
$\%\ of\ O = 51.62,\ moles\ of\ O = \frac{51.62}{16} = 3.226$

From the above calculated moles, the simplest ratio of $C : H : O$

$C : H : O = \frac{3.226}{3.226} : \frac{9.67}{3.226} : \frac{3.226}{3.226} = 1 : 3 : 1$

So, empirical formula will be CH_3O.

Q.22. What volume of oxygen gas (O_2) measured at $0^{\circ}C$ and $1\ atm$ is needed to burn completely $1\ L$ of propane gas (C_3H_8) measured under the same conditions?

A) $7\ L$

B) $6\ L$

C) $5\ L$

D) $10\ L$

Answer: $5\ L$

Solution: From balanced chemical equation:

$C_3H_8 + 5\ O_2 \rightarrow 3\ CO_2 + 4\ H_2O$

Under similar temperature and pressure conditions:

Volume of gas α Number of moles

$\frac{Volume\ of\ C_3H_8}{1} = \frac{Volume\ of\ O_2}{5}$

or $\frac{1}{1} = \frac{Volume\ of\ O_2}{5}$

So, volume of $O_2 = 5\ L$.

Q.23. Volume occupied by one molecule of water (density $= 1g\ cm^{-3}$) is:

A) $9.0 \times 10^{-23} cm^3$

B) $6.023 \times 10^{-23} cm^3$

C) $3.0 \times 10^{-23} cm^3$

D) $5.5 \times 10^{-23} cm^3$

Answer: $3.0 \times 10^{-23} \mathrm{cm}^3$

Solution: Consider 1 mole of water,

Mass $= 18\ \mathrm{g\ mol^{-1}}$

$d = \frac{1\ \mathrm{g}}{\mathrm{V\ cm^3}}$ (Given)

Now, volume of 1 mol of water $= 18\ \mathrm{cm^3}$

There are 6.02×10^{23} water molecules in 1 mol.

So, volume of each molecule

$$= \frac{18\ \mathrm{cm^3}}{6.02 \times 10^{23}} = 2.99 \times 10^{-23}\ \mathrm{cm^3}$$

$$\approx 3 \times 10^{-23}\ \mathrm{cm^3}$$

Q.24. A mixture of 2.3 g formic acid and 4.5 g oxalic acid is treated with conc. H_2SO_4. The evolved gaseous mixture is passed through KOH pellets. Weight (in g) of the remaining product at STP will be:

A) 1.4

B) 4.4

C) 2.8

D) 3.0

Answer: 2.8

Solution: H_2SO_4 is a strong dehydrating agent.

Formic acid: $HCOOH \xrightarrow{H_2SO_4} CO + H_2O$.......(i)

Oxalic acid: $H_2C_2O_4 \xrightarrow{H_2SO_4} CO + CO_2 + H_2O$.......(ii)

CO_2 will be absorbed by KOH.

Moles of Formic acid: $\left(HCOOH = 46\ \mathrm{g\ mol^{-1}}\right) = \frac{2.3}{46} = 0.05\ \mathrm{mol}$

Moles of Oxalic acid: $\left(H_2C_2O_4 = 90\ \mathrm{g\ mol^{-1}}\right) = \frac{4.5}{90} = 0.05\ \mathrm{mol}$

From above equations:

From reaction (i),

Number of CO formed $= 0.05$ mole.

From reaction (ii),

Number of CO formed $= 0.05$ mole.

Number of CO_2 formed $= 0.05$ mole.

Hence, total CO formed $= 0.05 + 0.05 = 0.1$ mole.

Total CO_2 formed $= 0.05$ mole.

KOH pellets absorbs all CO_2, and H_2O is absorbed by H_2SO_4; thus, CO is remaining product.

So, the mass of gas obtained will be $= 0.1 \times 28 = 2.8$ g.

Q.25. If 0.5 moles of $BaCl_2$ is mixed with 0.2 moles of Na_3PO_4, the maximum number of moles of $Ba_3(PO_4)_2$ that can be formed is:

A) 0.7

B) 0.5

C) 0.03

D) 0.10

Answer: 0.10

Solution: From the balanced chemical equation,

$3\ BaCl_2 + 2\ Na_3PO_4 \rightarrow Ba_3(PO_4)_2\ + 6\ NaCl$

$BaCl_2$ is $0.5\ mol$ and Na_3PO_3 is $0.2\ mol$. So, Na_3PO_4 is the limiting reagent.

$\frac{mol\ of\ Na_3PO_4}{2} =$ mol of $Ba_3(PO_4)_2$

So, moles of $Ba_3\left(PO_4\right)_2 = \frac{0.2}{2} = 0.1\ mol$

Practice more on Some Basic Concepts of Chemistry