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Class: IX
Subject: Chemistry
Topic: Atoms and molecules
No. of Questions: 20

1. Hydrogen and oxygen combine in the ratio of 1:8 by mass to form water. What mass of oxygen gas would be required to react completely with 3 g of hydrogen gas?

   Ans: It is given that the ratio of hydrogen and oxygen by mass to form water is 1 :8 Then, the mass of oxygen gas required to react completely with 1 g of hydrogen gas is 8 g. Therefore, the mass of oxygen gas required to react completely with 3 g of hydrogen gas is 8 × 3 g = 24 g.

2. Half life of a radioactive material is 2 days. If the original material is 1 kg, then how much of it will left after 6 days?
   A. 125 gms
   B. 250 gms
   C. 500 gms
   D. 750 gms

   Ans: 125 gms

3. 1 u or 1 amu means
   A. $1/12^{th}$ mass of C-12 atoms
   B. Mass of C-12 atom
   C. Mass of O-16 atom
   D. Mass of Hydrogen molecule

   Ans: (a) $1/12^{th}$ mass of C-12 atoms

4. How many atoms are present in a
   (i) H_2S molecule and
   (ii) PO_4^{3-} ion?

   Ans: (i) in an H_2S molecule, three atoms are present; two of hydrogen and one of sulphur.

   (ii) in a PO_4^{3-} ion, five atoms are present; one of phosphorus and four of oxygen.

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5. Two electrons move around a nucleus in circular orbits of radii r and 4r. Ratio of their frequencies is
   A. 1 : 4
   B. 4 : 1
   C. 8 : 1
   D. 1 : 8

   Ans: 8 : 1

6. The percentage of hydrogen in H_2O molecule is
   A. 5.55
   B. 11.11
   C. 44.45
   D. 88.89

   Ans: (b) 11.11

7. What are polyatomic ions? Give examples?

   Ans: A polyatomic ion is a group of atoms carrying a charge (positive or negative). For example, ammonium ion (NH_4^+), hydroxide ion (OH^-), carbonate ion (CO_3^{-2}), sulphate ion (CO_4^{-2}).

8. If an hydrogen atom is excited to a state corresponding to n = 4, then according to Bohr's theory, no. of lines emitted will be
   A. 3
   B. 4
   C. 5
   D. 6

   Ans: 6

9. A sample of ammonia molecule irrespective of source, contains 82.35% of nitrogen and 17.65% of hydrogen by mass. This data supports:
   A. Law of conservation of mass
   B. Law of definite proportions
   C. Las of multiple proportions
   D. Avagadro's Law

   Ans: (b) Law of Definite proportions

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10. What is the mass of ---
    A. 1 mole of nitrogen atoms?
    B. 4 moles of aluminium atoms (atomic mass of aluminium = 27)?
    C. 10 moles of sodium sulphite (Na_2SO_3)?

    Ans:

    (a) The mass of 1 mole of nitrogen atoms is 14 g.
    (b) The mass of 4 moles of aluminium atoms is (4 x 27) g = 108 g
    (c) The mass of 10 moles of sodium sulphite (Na_2SO_3)is

    $10 \times [2 \times 23 + 32 + 3 \times 16]$ g = 10×126 g = 1260 g

11. Ratio of energy of the hydrogen atom in its first and third excited state will be
    A. 4 : 1
    B. 1 : 4
    C. 16 : 1
    D. 1 : 16

    Ans: 4 : 1

12. Which of the following will have maximum mass?
    A. 0.1 mole of NH_3
    B. 1022 atoms of carbon
    C. 1022 molecules of CO_2
    D. 1 gm of Fe

    Ans: (a) 0.1 mole of NH_3

13. Calculate the number of molecules of sulphur (S_8) present in 16 g of solid sulphur.

    Ans: 1 mole of solid shulphur (S_8)= 8×32 g = 256 g

    i.e., 256 g of solid sulphur contains = 6.022×10^{23} molecules

    Then, 16 g of solid sulphur contains = $\frac{6.022 \times 10^{23}}{256} \times 16$ molecules

    = 3.76×10^{22} molecules (approx)

14. If a proton is completely converted into energy, then energy released will be about
    A. 13. 6 MeV
    B. 931 MeV
    C. 931 Joules
    D. 931 Calories

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Ans: b

15. An element X is tetravalent and another element Y is divalent. The compound formed by these two elements will be:
    A. XY
    B. XY_2
    C. X_2Y
    D. XY_4

    Ans : (b)

16. Binding energy of deuterium is 2.23 MeV. Mass defect in amu is
    A. 0.0012
    B. 0.0024
    C. 0.0036
    D. -0.0012

    Ans: b

17. Write the chemical formulae of the following compounds:
    a. Magnesium sulphide
    b. Ferric chloride

    Sol:

    a. The chemical formulae of magnesium sulphide is MgS
    b. The chemical formulae of Ferric chloride is FeCl3.

18. What is valency of an element? How do you derive valency of Aluminium?

    Ans: Valency of an element is defined as its combining capacity and it is measured the number of hydrogen atoms with which, one atom of the element combines.

    One atom of aluminium combines with three atoms of chlorine.

    ∴ One atom of Al = 3 atoms of chlorine

    $Since\ \ the\ valence\ of\ chlorine\ is\ one,$

    $Valence\ of\ Al = 1 \times 3 = 3.$

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19. Define the atomic mass unit.

    Ans: The atomic mass unit (abbreviated as amu) is unit that is used to express that atomic masses of atoms and molecule. One atomic mass unit is a mass unit equal to exactly one twelfth ($1/12^{th}$) the mass of one atom of carbon – 12. The atomic masses of all elements have been found relative to an atom of carbon -12.

    $1/12^{th}$ of carbon atom is basically the one twelfth the mass of one atom of carbon-12 isotope.

20. Write down the formulae of
    (i) Sodium oxide
    (ii) Aluminium chloride
    (iii) Sodium sulphite
    (iv) Magnesium hydroxide

    Ans: The formulae are:

    (i) Sodium oxide-Na_2O
    (ii) Aluminium chloride – $AlCl_3$
    (iii) Sodium suphite-Na_2SO_3
    (iv) Magnesium hydroxide – $Mg(OH)_2$