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**Assignment – I**

1. Calculate the mass of (i) 0.5 mole of silver (ii) 0.5 mole of sugar (C12H22O11) .(Atomic masses : Ag = 108, C = 12 , H = 1 , O = 16).
2. Calculate (i) number of atoms of gold in 1 g of gold (ii) number of molecules of water in a drop of water weighing 0.05 g.(Atomic mass of gold = 197).
3. Calculate the mass in milligrams of (i) 1021 atoms of U – 238 (ii) 1020 molecules of SO2 gas.
4. Calculate the mass of (i) an atom of copper (ii) a molecule of carbon dioxide (At. mass of Cu = 63.5).
5. Calculate the number of the constituent atom in 53 g of Na2CO3 . (At. masses : Na =23 , C =12 , O = 16)
6. Arrange the following in order of their increasing masses :

(i) 0.1 g of silver (ii) 0.1 mole of H2SO4 (iii) 1023 molecules of CO2 gas

(iv) 1 gram of carbon (v) 1023 atoms of calcium.

(Atomic masses : Ag = 108 , S = 32 , N = 14 , Ca = 40)

1. 1022 atoms of an element ‘X’ are found to have a mass of 930 mg. Calculate the molar mass of the element ‘X’.
2. Calculate the mass of SO2 gas which will contain the same number of molecules as present in 4.4 g of CO2.
3. Which will contain larger number of atoms, 1 g of gold or 1 g of silver? Explain with reason. (Atomic mass : Gold = 197 , Silver = 108)
4. Calculate the number of molecules present in 1 L of water assuming that density of water is 1 g/mL.
5. Which one of the following has larger number of hydrogen atoms ?

(i) One mole of NH3 (ii) Two moles of HCl.

1. Calculate the number of atoms in each of the following :

(i) 16 moles of He (ii) 16 u of He (iii) 16 g of He , (Atomic mass of He = 4 u)

1. Calculate the number of moles for the following :

(i) 52 g of He (ii) 12.044 X 1023 number of He atom

1. Calculate the mass of the following : (i) 0.5 mole of N2 gas (ii) 0.5 mole of N – atoms

(iii) 3.011 X 1023 number of N – atoms (iv) 6.022 X 1023 number of N2 molecules

1. Calculate the number of particles in each of the following :

(i) 46 g of Na atom (ii) 8 g of O2 molecules (iii) 0.1 mole of carbon atom

1. What is the mass of : (i) 0.5 mole of CO2 (ii) 2.5 moles of Cl2 ?
2. Calculate the number of moles in each of the following :

(i) 10 g of CaCO3 (ii) 1023 molecules of CO2 (Atomic mass of Ca = 40 u)

1. How many atoms are present in 9 g of aluminium ? (Atomic mass of Al = 27 u)
2. Calculate the mass of :

(i) one atom of silver (ii) one molecule of oxygen (iii) one molecule of water

1. Calculate the mass of CO2 which will contain the same number of molecules as are contained in 40 g of oxygen.
2. Calculate the mass of Na2CO3 which will have the same number of molecules as contained in 12.3 g of MgSO4 . 7 H2O. (At. masses : Na = 23 , Mg = 24 , C = 12 , O = 16 , S = 32)
3. Find the number of atoms of each type present in 3.42 grams of cane sugar (C12H22O11) .
4. How many atoms and molecules are present in 124 g of phosphorus (P4). (At. mass of P = 31).

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1. Calculate the ratio of molecules present in 4.4 g of CO2 and 1.6 g of SO2 .
2. Which of the following weighs most : (i) 0.1 mole of sodium (ii) 1023 molecules of SO2 gas

(iii) 0.1 g atom of iron (iv) 1023 atoms of silver

(Atomic masses : Na = 23 , Ag = 108 , Fe = 56 , O = 16 , S = 32 )

1. If one gram of SO2 contains x molecules, what will be the number of molecules in 1 g of methane (CH4).
2. The mass of one molecule of a substance is 11.79 x 10 – 26 kg . What is its molar mass ? What could this substance be ?
3. Calculate the number of moles and molecules in the following masses :

(i) 4 g of oxygen (ii) 11 g of CO2

**Answers**

1. (i) 54 g (ii) 171 g 2. (i) 3.06 X 1021 atoms (ii) 1.672 X 1021 molecules

3. (i) 395 mg (ii) 10.6 mg 4. (i) 10.54 X 10 – 23 g (ii) 7.307 X 10 – 23 g

5. 6.022 X 1023 Na – atoms , 3.011 X 1023 C– atoms, 9.033 X 1023  O– atoms

6. (i) 10.8 g (ii) 9.8 g (iii) 7.31 g (iv) 1 g (v) 6.64 g 7. 56 g/mole 8. 6.4 g

9. Silver will contain greater number of atoms 10. 3.345 X 1025 molecules 11. 1 mole of NH3

12. (i) 96.352 X 1023 atoms (ii) 4 atoms (iii) 24.088 X 1023  atoms 13. (i) 13 (ii) 2

14. (i) 7 g (ii) 7 g (iii) 28 g 15. (i) 12.044 X 1023 (ii) 1.5 X 1023 (iii) 6.022 X 1022

16. (i) 22 g (ii) 177.5 g 17. (i) 0.1 mole (ii) 0.166 mole 18. 2 X 1023

19. (i) 1.793 X 10 – 22 g (ii) 5.314 X 10 – 23 g (iii) 2.989 X 10 – 23 g 20. 55 g 21. 5.3 g

22. C = 7.22 X 10 22 , H = 1.32 X 1023  , O = 6.62 X 1022 23. 6.022 X 1023 molecules , 24.088 X 1023 atom

24. 4 : 1 25. 1023 atoms of silver 26. 4x 27. 71 g/mole , it could be Cl2

28. (i) 0.125 mol or 7.527 X 1022 molecules (ii) 0.25 mol or 1.505 X 1023 molecules

**Assignment – II**

1. Which of the following correctly represents 360 g of water ?

|  |  |  |  |
| --- | --- | --- | --- |
| i) 2 mole of H2O | | ii) 20 moles of water | |
| iii) 6.022 X 1023 molecules of water | | iv) 1.2044 X 1025 molecules of water | |
| a) (i) | b) (i) & (iv) | c) (ii) & (iii) | d) (ii) & (iv) |

1. Which of the following statement is not true about an atom ?

a) Atoms are not able to exist independently

b) Atoms are the basic units from which molecules and ions are formed

c) Atoms are always neutral in nature

d) Atoms aggregate in large numbers to form the matter that can we see , feel or touch.

1. The chemical symbol for nitrogen gas is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Ni | b) N2 | c) N+ | d) N |

1. The chemical symbol of sodium is

|  |  |  |  |
| --- | --- | --- | --- |
| a) So | b) Sd | c) NA | d) Na |

1. Which of the following would weigh the highest ?

|  |  |
| --- | --- |
| a) 0.2 mole of sucrose (C12H22O11) | b) 2 moles of CO2 |
| c) 2 moles of CaCO3 | d) 10 moles of H2O |

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1. Which of the following has maximum number of atoms ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 18 g of H2O | b) 18 g of O2 | c) 18 g of CO2 | d) 18 g of CH4 |

1. Which of the following contain maximum number of molecules

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1 g CO2 | b) 1 g N2 | c) 1 g H2 | d) 1 g CH4 |

1. Mass of one atom of oxygen is

|  |  |  |  |
| --- | --- | --- | --- |
| a) g | b) g | c) g | d) 8 u |

1. 3.42 g of sucrose are dissolved in 18 g of water in a beaker. The number of oxygen atoms in the solution are

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6.68 X 1023 | b) 6.09 X 1022 | c) 6.022 X 1023 | d) 6.022 X 1021 |

1. A change in physical state can be brought about

a) only when energy is given to the system

b) only when energy is taken out from the system

c) when energy is neither given to, or taken out from the system

d) without any energy change

**Answers**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. d | 2. a | 3. b | 4. d | 5. c |
| 6. d | 7. c | 8. a | 9. a | 10. c |

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**Assignment – III**

1. Law of conservation of mass was put forward by

|  |  |  |  |
| --- | --- | --- | --- |
| a) J.L. Proust | b) Antoine Lavoisier | c) J.J. Thomson | d) John Dalton |

1. Mass of silver nitrate that will react with 5.85 g of sodium chloride to produce 14.35 g of silver chloride and 8.5 g of sodium nitrate will be (Assuming that law of conservation of mass holds good)

|  |  |  |  |
| --- | --- | --- | --- |
| a) 22.85 g | b) 17.0 g | c) 14.35 g | d) 8.5 g |

1. Mass of carbon present in 2 g of CaCO3 is

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.24 g | b) 0.36 g | c) 0.12 g | d) 0.8 g |

1. Which of the following is not a correct postulate of Dalton’s atomic theory ?

a) Atoms of different elements have different size and masses

b) Atoms of different elements combine together in a simple whole number ratio

c) Atoms of different elements combine to form a single compound

d) Fraction of an atom cannot take part in a reaction

1. Atoms of the same elements having different masses are called

|  |  |  |  |
| --- | --- | --- | --- |
| a) isobars | b) isotones | c) isotopes | d) iso-osmotic |

1. Atoms of different elements having same mass are called

|  |  |  |  |
| --- | --- | --- | --- |
| a) isotopes | b) isobars | c) isotones | d) None of these |

1. The symbol of ‘Ag’ represents

|  |  |  |  |
| --- | --- | --- | --- |
| a) Argon | b) Arsenic | c) Silver | d) Gold |

1. The isotope of chlorine with mass number 35 and 37 exist in the ratio of

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3 : 1 | b) 1 : 3 | c) 1 : 2 | d) 2 : 1 |

1. Atomic mass unit (amu) is

|  |  |
| --- | --- |
| a) th of the mass of carbon-12 isotope | b) th of the mass of oxygen -16 isotope |
| c) th of the mass of carbon-12 isotope | d) th of the mass of oxygen -16 isotope |

1. Sulphur and phosphorus molecules have the symbol, respectively are

|  |  |  |  |
| --- | --- | --- | --- |
| a) S4 , P4 | b) S8 , P8 | c) S8 , P4 | d) S4 , P8 |

1. Buckminster fullerene molecule is

|  |  |  |  |
| --- | --- | --- | --- |
| a) C50 | b) C60 | c) C40 | d) C80 |

1. Molecular mass of a molecule of cane sugar (sucrose) is

|  |  |  |  |
| --- | --- | --- | --- |
| a) 180 | b) 342 | c) 310 | d) 278 |

1. What valency/valencies does the element ‘phosphorus’ show in its molecules ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3 only | b) 5 only | c) both 3 and 5 | d) 1 , 3 and 5 |

1. An element M forms the oxide M2O3. The formula of its phosphate will be

|  |  |  |  |
| --- | --- | --- | --- |
| a) M2PO4 | b) M3PO4 | c) MPO4 | d) M2(PO4)3 |

1. The number of molecules of water (H2O) in 1 g of water will be nearly

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6.02 X 1022 | b) 3.34 X 1022 | c) 6.02 X 1021 | d) 3.34 X 1021 |

1. The mass of one molecule of CO2 will be nearly

|  |  |  |  |
| --- | --- | --- | --- |
| a) 7.31 X 10 – 23 g | b) 6.02 X 10 – 23 g | c) 2.0 X 10 – 23 g | d) 5.32 X 10 – 23 g |

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**Answers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1. b | 2. b | 3. a | 4. c | 5. c | 6. b | 7. c | 8. a |
| 9. c | 10. c | 11. b | 12. b | 13. c | 14. c | 15. b | 16. a |

**Paragraph Based (MCQs)**

**Paragraph :** Atoms and molecules are so small particles that their actual masses cannot be determined. Hence, their masses are expressed on an atomic scale, obtained by comparing with th of the mass of an atom of carbon-12 isotope taken as 1 on the atomic scale. A bigger unit called ‘mole’ was chosen in terms of which masses, number of atoms or molecules or volume in case of gases could be expressed. For example, one mole of a substance contains 6.022 X 1023 atoms or molecules depending upon whether substance is atomic or molecular. This number is called “Avogadro’s number ”.

**Read the paragraph and answer the following questions :-**

1. Total number of atoms present in 10 g of CaCO3 will be

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2 x 6.02 x 1022 | b) 3 x 6.02 x 1022 | c) 4 x 6.02 x 1022 | d) 5 x 6.02 x 1022 |

1. 1022 atoms of an element ‘X’ are found to have a mass of 930 mg. The atomic mass of the element will be

|  |  |  |  |
| --- | --- | --- | --- |
| a) 32 amu | b) 56 amu | c) 28 amu | d) 48 amu |

1. Chlorine is found to exist in nature on the form of two isotopes of masses 35 and 37. On the basis of your knowledge of their ratio of occurrence, the average atomic mass of chlorine is taken as

|  |  |  |  |
| --- | --- | --- | --- |
| a) 36.0 | b) 35.5 | c) 36.5 | d) 35.7 |

1. The mass of SO2 gas which will contain the same number of molecules as present in 4.4 g of CO2 will be

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3.2 g | b) 4.8 g | c) 6.4 g | d) 4.4 g |

**Answers**

|  |  |  |  |
| --- | --- | --- | --- |
| 1. d | 2. b | 3. b | 4. c |

**Fill in the blanks**

1. Law of conservation of mass was put forward by …………….. .
2. 10 g of CaCO3 was heated strongly in a dry test tube. CO2 gas escaped into the atmosphere. The residue left behind will weigh…………………………. .
3. Matter can neither be created nor destroyed. This is called law of …………………. .
4. Law of multiple proportions was put forward by ……………………… .
5. A chemical compound is always made up of the same elements combine together in fixed proportion by mass. This law is called law of ……………………. .
6. % of C in CaCO3 is ………………….. .
7. The amount of O2 that will combine with 1 g of H2 to form H2O will be ………………………. .
8. The Latin name of silver (Ag) is …………………… .
9. One atomic mass unit (amu) stands for …………………….. of the mass of C – 12 isotope.

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1. Chlorine exist in nature in the form of two types of isotopes with mass number ……………………… and ……………… in the ratio of ………………. .
2. Phosphorus molecule has an atomicity of ………………. .
3. Buckminster fullerene molecule has the formula ……………………….. .
4. In terms of atomicity, NH3 is a ……………………. Molecule.
5. The tendency of an atom in a molecule to attract the shared pair of electrons towards itself is called ……………….. .
6. Molecular mass of Glucose (C6H12O6) is ………………………. .
7. Chemical formula of aluminium sulphate is …………………… .
8. The number of units of positive or negative charge present on an ion is called its ………………. .
9. The formula of aluminium phosphate is ………………….. .
10. The number of molecules of CO2 present in 4.4 g of CO2 is ……………………. .
11. The mass of one molecule of NH3 is nearly ……………………… .
12. The number of molecules present in 1 mole of the substance is called ……………………. Number.

**Answers**

|  |  |  |
| --- | --- | --- |
| 1. Antoine Lavoisier | 2. 5.6 g (CaCO3 →CaO + CO2 .100 g CaCO3 → 56 g CaO + 44 g CO2) | |
| 3. Conservation of mass | 4. J.L. Proust | 5. Multiple proportional |
| 6. 12 % | 7. 8 g | 8. Argentum |
| 9. 1/12th | 10. 35 ,37 , 3 : 1 | 11. 4 |
| 12. C60 | 13. Tetratomic | 14. Electronegativity |
| 15. 180 | 16. Al2(SO4)3 | 17. valency |
| 18. AlPO4 | 19. 6.022 X 1022 | 20. 2.8 X 10 – 23 g (17/6.02 X 1023) |
| 21. Avogadro |  |  |

**True/False**

1. Law of conservation is not applicable if the reaction leads to precipitation or evolution of a gas.
2. Law of definite proportions is applicable only if two elements combine to form only one compound.
3. CO2 obtained from heating CaCO3 and that obtained by burning charcoal have the same composition by mass.
4. Atoms of same elements always have the same masses.
5. Atoms of different elements always have the different mass number.
6. Iron and copper show variable valencies.
7. Formula of ammonium carbonate is NH4CO3.
8. One mole of heavier molecules (like SO2) contain the same number of molecules as present in one mole of lighter molecules (like H2).
9. One mole of any gas at STP has the same volume

**Answers**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 1. False | 2. False | 3. True | 4. False | 5. False |
| 6. True | 7. False | 8. True | 9. True |  |

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**Matching Type Questions**

1. Column I Column II

|  |  |
| --- | --- |
| (i) % of C in acetic acid (CH3COOH) | (a) 20 % |
| (ii) % of C in oxalic acid (HOOC – COOH ) | (b) 40 % |
|  | (c) 26.5 % |
|  | (d) 13.25 % |

1. Column I (Element) Column II (Symbol)

|  |  |
| --- | --- |
| (i) Antimony | (a) At |
| (ii) Tin | (b) Sb |
|  | (c) Sn |
|  | (d) Ti |

1. Column I (Molecule) Column II (Atomicity)

|  |  |
| --- | --- |
| (i) Sulphur | (a) 4 |
| (ii) Phosphorus | (b) 6 |
|  | (c) 8 |
|  | (d) 2 |

1. Column I (Ion) Column II (Valencies)

|  |  |
| --- | --- |
| (i) Copper | (a) + 1 , + 3 |
| (ii) Iron | (b) + 1 , + 2 |
|  | (c) + 2 , + 3 |
|  | (d) +2 , + 4 |

1. Column I Column II

|  |  |
| --- | --- |
| (i) 7 g of N2 | (a) 6.022 x 1023 molecules |
| (ii) 1.7 g of NH3 | (b) 1.5 x 1023 molecules |
|  | (c) 6.022 x 1022 molecules |
|  | (d) 3.011 x 1022 molecules |

**Answers**

|  |  |  |
| --- | --- | --- |
| 1. (i) – (b) , (ii) – (c) | 2. (i) – (b) , (ii) – (c) | 3. (i) – (c) , (ii) – (a) |
| 4. (i) – (b) , (ii) – (c) | 5. (i) – (b) , (ii) – (c) |  |

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