Columbia Foundation Sr. Sec. School

D – Block, Vikaspuri, New Delhi

Class – IX - (Question Bank)
Atoms and Molecules

Multiple Choice questions:

Q1. What is the symbol of Sodium metal?
a) S b) Na c) So d) Sd

Q2. Which is a Cation?
a) Ca^{+} b) O^{2-} c) Cl d) None of these

Q3. Choose the diatomic species.
a) H_2O b) NO_2 c) HCl d) CO_2

Q4. Atom of Oxygen is?
a)O_2 b)O_3 c)O d) All of these

Q5. What is the symbol of Magnesium metal?
a) M b) Ma c) Mn d) Mg

Q6.Molecule of Nitrogen is:
a)N b)N_2 c) NO_2 d)N^{3-}

Q7. What is the symbol of Iron metal?
a) I b) Ir c) Fe d) F

Q8. Which is not a Polyatomic species.
a) H_2O_2 b) NO_3^{-} c) NH_4^{+} d) Li

Q9. Which is an anion?
a) Zn^{2+} b)Na c)F^{-} d) All of these

Q10. What is the symbol of Chlorine?
a) S b) Na c) So d) Sd

Q11. $MgCl_2$ is the chemical formula of?
a) Magnesium b) Chlorine c) Magnesium Chloride d) None of these

Q12. Avogadro's number is:
a) $6.022 * 10^{-23}$ b) $6.022* 10^{23}$ c) $3.011* 10^{-23}$ d) $3.011* 10^{23}$

Q13. 1 mole of H_2 corresponds to:
a) 2 g of H_2 b) $6.022* 10^{23}$ molecules of H_2 c) Both of these d) None of these

Q14. Atomic mass of oxygen atom is?
a) 8 u b) 16u c) 32 u d)64 u

Q15. Mass of 2 moles of HCl is?
a) 32 g b) 73 g c) 36.5 g d) 35.5 g

Q16. How many moles contain 16 g of Helium atoms?
a) 1 b) 2 c) 3 d) 4

Q17. 1 mole of Ca corresponds to:
a) 40 g of Ca b) $6.022* 10^{23}$ atoms of Ca c) Both of these d) None of these

Q18. Molecular mass of NH_3 is?
a) 18 u b) 15u c) 17 u d)21 u

Q19. Molecular mass of Carbon dioxide is?

a) 22 u b) 16u c) 44 u d)85 u

Q20. 1 mole of H_2O corresponds to:

a) 18 g of H_2O b) 6.022* 10^{23} molecules of H_2O c) Both of these d) None of these

Very short answer type questions:

Q1. State the postulate of Dalton's Atomic Theory which can explain the law of definite proportions.

Q2. Name the element whose Latin name is Stibium.

Q3. What is the valency of a sulphide ion?

Q4. What is the unit of measurement of atomic radius?

Q5. Why is potassium denoted by the symbol K?

Q6. Define relative atomic mass of an element.

Q7. State the Law of Conservation of Mass.

Q8. Define the term atom.

Q9. Name the body which approves the nomenclature of elements and compounds.

Q10. Name one element which form diatomic and one which form tetra atomic molecules.

Q11. Show that water illustrates the law of constant proportions.

Q12. State the law of constant proportions.

Q13 Classify the following on the basis of their atomicity:

(i) Chlorine (ii) Phosphorus

Q14. Give one word for the following:

(i) Positively charged atom

(ii) A group of atoms carrying a charge

Q15. Define polyatomic ions and give an example.

Q16. Find the ratio by mass of the combining elements in the compound – C2H5OH.

Q17. Give the formula of the compound formed by the elements calcium and fluorine.

Q18. How many atoms of oxygen are present in 50g of CaCO3?

Q19. What is the ratio by number of atoms in mercurous chloride?

Q20. What is the formula of ferric nitrate?

Q21. Name the compound represented by the formula $Ca_3(PO_4)_2$.

Q22. 5 g of calcium combine with 2 g of oxygen to form a compound. Find the molecular formula of the compound. (Atomic mass of Ca = 40 u; O =16 u).

Q23. Write chemical formula of potassium Sulphate.

Q24. Write a chemical formula of a compound using zinc ion and phosphate ion.

Q25. Calculate the number of molecules in 8 g of O_2.

Q26. Calculate the molar mass of:

(i) Ethyne (C_2H_2) (ii) Phosphorus molecule (P_4)

(Atomic mass of C =12u, H =1u and P = 31u).

Q27. Calculate the number of moles in 52 grams of He (Helium). (At. mass : O = 16 u He = 4 u)

Q28. Calculate the number of moles in 17g of H_2O_2. (Atomic weight of H=1, O=16u)

Q29. Write the names of compounds represented by the following formulae:

a) KNO_3 b) $Al_2(SO_4)_3$

Q30. Compute the number of ions present in 5.85 g of sodium chloride.

Short answer type questions:

Q1. 2.8 g of nitrogen gas was allowed to react with 0.6 g of hydrogen gas to produce 3.4 g of ammonia. Show that these observations are in agreement with the law of Conservation of mass. State the law of conservation of mass.

Q2. Potassium chlorate decomposes, on heating, to form potassium chloride and oxygen. When 24.5 g of potassium chlorate is decomposed completely, then 14.9 g of potassium chloride is formed. Calculate the mass of oxygen formed. State the law of chemical combination which you have used in solving this problem.

Q3. State the law of constant proportion. Magnesium and oxygen combine in the ratio of 3: 2 by mass to form magnesium oxide. How much oxygen is required to react completely with 12 g of magnesium?

Q4. State the number of atoms present in each of the following chemical species.

(a) CO_3^{2-} (b) PO_4^{3-} (c) P_2O_5 (d) CO

Q5. (i) Define the term 'atomic mass unit'. How is it linked with relative atomic mass?

(ii) How do we know the presence of atoms if they do not exist independently for most of the elements?

Q6. Hydrogen and oxygen combine in the ratio of 1: 8 by mass to form water. Calculate the mass of oxygen gas that would be required to react with 3 g of hydrogen gas.

Q7. Which postulate of Dalton's Atomic Theory is the basis of law of conservation of mass?

Q8. Give the limitations of Dalton's Atomic Theory.

Q9. Write any four postulates of Dalton's Atomic Theory. Why are Dalton's symbol not used in chemistry?

Q10. What mass of silver nitrate will react with 5.85g of sodium chloride to produce 14.35 g of silver chloride and 8.5 g of sodium nitrate if the law of conservation of mass is true?

Q11. An element 'Z' forms the following compound when it reacts with hydrogen, chlorine, oxygen and phosphorus.

ZH_3, ZCl_3, Z_2O_3 and ZP

(a) What is the valency of element Z?

(b) Element 'Z' is metal or non-metal?

Q12. (a) Calculate the molar mass of nitric acid (HNO3) (atomic masses of H=1u, O=16u and N=14u)

(b) Calculate the no. of moles in 22 grams of carbon dioxide (CO_2) (atomic masses of C=12u, O=16u)

Q13. Calculate the following quantities in 5.6 g of nitrogen [Atomic mass of N = 14 u]

(a) Number of moles of N_2

(b) Number of molecules of N_2

(c) Number of atoms of nitrogen.

Q14. Calculate the number of molecules of glucose present in its 90 grams (molecular mass of glucose is 180u) .

Q15. Calculate number of atoms in 120 g of calcium and 120 g of iron. Which one has more number of atoms and how much is the difference? (Given atomic mass of calcium = 40 u and iron = 56 u)

Q16. An element "M" forms the compound MH_3 when it reacts with hydrogen.

(i) Find the valency of element M.

(ii) Is element "M" is metal or a nonmetal?

Q17. Fill the missing data in the table:

Species atom Property	H2O	Na
No. of moles	2	-
No. of particles	-	-
Mass	36 g	115 g

Q18. a) Define one mole of an element.
b) What is the relation between mole and gram atomic mass of an element.
c) Gram atomic mass of an element X is 27 g. How many moles of X are in 54 g?

Q19. A sample of vitamin C is known to contain 2.58×10^{24} oxygen atoms. How many moles of oxygen atoms are present in the sample?

Q20. Sample A contains one gram molecule of oxygen molecule and sample B contains one mole of oxygen molecule. What is the ratio of the number of molecules in both the samples?
Sample A contains one gram molecule of oxygen molecule and sample B contains one mole of oxygen molecule. What is the ratio of the number of molecules in both the samples?

Long answer type questions:

Q1 Define the following terms with example.
(a) Atomicity
(b) Anion
(c) Molecular Mass
(d) Relative Formula Mass
(e) Cation

Q2 When 3.0 g of carbon is burnt in 8.0 g of oxygen; 11.0 g of carbon dioxide is produced. What mass of carbon dioxide will be formed when 3.0 g of carbon is burnt in 50.00 g of oxygen? Which law of chemical combination will govern your answer? State the law.

Q3. Name all the elements present in the following compounds.
(i) Lead nitrate
(ii) Ammonium phosphate
(iii) Magnesium hydrogen carbonate

Q4. (a) Write the formula of the compounds formed by the following ions
(i) Cr^{3+} and SO_4^{2-} (ii) Pb^{2+} and NO_3^{-1}
(b) State the significance of one mole.
(c) Which has more number of atoms 100g of sodium or 100g of iron? (At mass Na=23u, Fe=56u)

Q5. A sample of ethane (C_2H_6) gas has the same mass as 1.5×10^{20} molecules of methane (CH_4). How many C_2H_6 molecules does the sample of the gas contain?

Q6. Write the formulae for the following and calculate the molecular mass for each one of them.
(a) Caustic potash (b) Baking powder (c) Limestone (d) Caustic soda (e) Ethanol
[K=39, O=16, H=1, Na=23, Ca=40, C=12]Q4.

Q7. (i) Calculate the molecular mass of $CaCO_3$. (At. mass Ca=40 u, C=12 u, O=16 u)
(ii) Verify by calculating that
(a) 5 moles of CO_2 and 5 moles of H_2O do not have the same mass
(b) 240g of calcium and 240 g of magnesium elements have a mole ratio of 5: 3
(At mass H=1u, Ca= 40u, Mg=24 u)