CHEMISTRY

NCERT - NCERT CHEMISTRY(HINGLISH)

ATOMS AND MOLECULES

Solved Examples

1. (a) Calculate the relative molecular mass of water (H_2O). (b) Calculate the molecular mass of HNO_3 .

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2. Calculate the formula unit mass of $CaCl_2$.

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3. Calculate the number of moles for the following:

(i) 52 g of He (finding mole from mass)

(ii) $12.044 \times 10_{23}$ number of He atoms (finding mole from number of particles).

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4. Calculate the mass of the following:

(i) 0.5 mole of N_2 gas (mass from mole of molecule)

(ii) 0.5 mole of N atoms (mass from mole of atom)

(iii) $3.011 \times 10_{23}$ number of N atoms (mass from number)

(iv) $6.022 \times 10_{23}$ number of N_2 molecules (mass from number)

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

(i) 46 g of Na atoms (number from mass)

(ii) $8gO_2$ molecules (number of molecules from mass)

(iii) 0.1 mole of carbon atoms (number from given moles)

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Exercise

1. In a reaction, 5.3 g of sodium carbonate reacted with 6 g of acetic acid. The products were 2.2 g of carbon dioxide, 0.9 g water and 8.2 g of sodium

acetate. Show that these observations are in agreement with the law of conservation of mass.

sodium carbonate + acetic acid $\rightarrow$ sodium acetate + carbon dioxide + water

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2. 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?

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3. Which postulate of Dalton's atomic theory is the result of the law of conservation of mass?

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4. Which postulate of Dalton's atomic theory can explain the law of definite proportions?

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5. Define the atomic mass unit.

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6. Why is it not possible to see an atom with naked eyes?

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7. Write down the formulae of

(i) sodium oxide

(ii) aluminium chloride

(iii) sodium sulphide

(iv) magnesium hydroxide

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8. Write down the names of compounds represented by the following formulae:

(i) $Al_2(SO_4)_3$

(ii) $CaCl_2$

(iii) K_2SO_4

(iv) KNO_3

(v) $CaCO_3$

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9. What is meant by the term chemical formula?

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10. How many atoms are present in a

(i) H_2S molecule and

(ii) PO_4^{3-} ion?

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11. Calculate the molecular masses of

$H_2, O_2, Cl_2, CO_2, CH_4, C_2H_6, C_2H_4, NH_3, CH_3OH$

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12. Calculate the formula unit masses of ZnO, Na_2O, K_2CO_3, given atomic masses of Zn = 65 u, Na = 23 u, K = 39 u, C = 12 u, and O = 16 u.

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13. If one mole of carbon atoms weighs 12 grams, what is the mass (in grams) of 1 atom of carbon?

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14. Which has more number of atoms, 100 grams of sodium or 100 grams of iron (given, atomic mass of Na = 23 u, Fe = 56 u)?

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15. A 0.24 g sample of compound of oxygen and boron was found by analysis to contain 0.096 g of boron and 0.144 g of oxygen. Calculate the percentage composition of the compound by weight.

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16. When 3.0 g of carbon is burnt in 8.00 g oxygen, 11.00 g of carbon dioxide is produced. What mass of carbon dioxide will be formed when 3.00 g of carbon is burnt in 50.00 g of oxygen? Which law of chemical combination will govern your answer?

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17. What are polyatomic ions? Give examples.

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18. Write the chemical formulae of the following.

(a) Magnesium chloride

(b) Calcium oxide

(c) Copper nitrate

(d) Aluminium chloride

(e) Calcium carbonate.

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19. Give the names of the elements present in the following compounds.

(a) Quick lime

(b) Hydrogen bromide

(c) Baking powder

(d) Potassium sulphate.

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20. Calculate the molar mass of the following substances.

(a) Ethyne, C_2H_2

(b) Sulphur molecule, S_8

(c) Phosphorus molecule, P_4 (Atomic mass of phosphorus = 31)

(d) Hydrochloric acid, HCl

(e) Nitric acid, HNO_3

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21. 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)?

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22. Convert into mole.

(a) 12 g of oxygen gas

(b) 20 g of water

(c) 22 g of carbon dioxide.

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23. What is the mass of:

(a) 0.2 mole of oxygen atoms?

(b) 0.5 mole of water molecules?

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

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25. Calculate the number of aluminium ions present in 0.051 g of aluminium oxide.

(Hint: The mass of an ion is the same as that of an atom of the same element. Atomic mass of Al = 27 u)

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Example

1. Make placards with symbols and valencies of the elements separately. Each student should hold two placards, one with the symbol in the right hand and the other with the valency in the left hand. Keeping the symbols in place, students should criss-cross their valencies to form the formula of a compound.

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2. A low cost model for writing formulae: Take empty blister packs of medicines. Cut them in groups, according to the valency of the element, as

shown in the figure. Now, you can make formulae by fixing one type of ion into other.

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