

CBSE Test Paper 01
Chapter 03 Atoms and Molecules

1. A sample of CaCO_3 contains 3.01×10^{23} ions of Ca^{+2} and CO_3^{-2} . The mass of the sample is: **(1)**
- 200 g
 - 50 g
 - 100 g
 - 5 g
2. SO_3 is **(1)**
- acidic
 - amphoteric
 - basic
 - neutral
3. When dilute sulphuric acid is added to zinc granules, we observe that: **(1)**
- the container remains cool
 - the reaction mixture turns yellow
 - bubbles start coming from the surface of the zinc granules
 - a precipitate is formed
4. The number of molecules in $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ bonded by H-bond is **(1)**
- 5
 - 3
 - 2
 - 1
5. The maximum number of electrons in L shell is: **(1)**
- 38

- b. 28
c. 18
d. 8
6. An element X has valency 3 while the element Y has valency 2. Write the formula of the compound formed by X and Y. **(1)**
- a. X_2Y_2
b. X_3Y_3
c. XY
d. X_2Y_3
7. Define atomic mass unit **(1)**
8. How many atoms are present in a: **(1)**
- a. H_2S molecule and
b. PO_4^{3-} ion?
9. Name the Indian philosopher who proposed the theory of matter. **(1)**
10. Find the ratio by mass of the elements present in the molecule of hydrogen sulphide (H_2S). Given that, atomic mass S = 32, H = 1. **(1)**
11. What is the difference between H_2 and $2H$? **(3)**
12. Calculate the number of moles in the following : **(3)**
- i. 28g He
ii. 46g of Na.
iii. 60 g of Ca.
- Given the gram atomic mass of
- i. He = 4 g
ii. Na = 23 g
iii. Ca = 40g.

13. Calculate the molar mass of ethyl alcohol (C_2H_5OH). (3)
14. Write the chemical formulae of the following. (5)
- Magnesium chloride
 - Calcium oxide
 - Copper(II) nitrate
 - Aluminium chloride
 - Calcium carbonate.
15. Write an experiment to show that cathode rays travel in straight line? (5)

PE

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Answers

1. b. 50 g

Explanation: The mass of one mole of CaCO_3 is equal to 100 g. 6.022×10^{23} ions are equivalent to one mole. Therefore, mass of 3.01×10^{23} ions will be equivalent to $(100 / 2)$ g or 50 g.

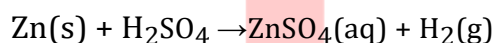
2. a. acidic

Explanation: Molecules whose Lewis structures indicate an atom to have an octet as a result of the formation of one or more multiple bonds will often function as Lewis acids. Examples are CO_2 , SO_3 , SO_2 .

SO_3 is acidic in nature as it is non-metallic oxide.

3. c. bubbles start coming from the surface of the zinc granules

Explanation: Zinc reacts with dil. H_2SO_4 to form H_2 gas and we observe bubbles start coming from the surface of the zinc granules.



This reaction is exothermic and hence heat is evolved in the reaction.

4. d. 1

Explanation: One molecule of water is linked by H-bond because only one molecule of water is present outside the coordination sphere.

5. d. 8

Explanation: L shell can accommodate a maximum of 8 electrons.

6. d. X_2Y_3

Explanation: The formula of an ionic compound is formed by interchanging the valencies of the constituent atoms. The formula of the compound having atoms of X and Y is X_2Y_3 . The valency (2) of Y forms the subscript of X and the valency (3) of X forms the subscript of Y.

7. Atomic mass unit may be defined as:

The mass of one twelfth ($1/12$) of the mass of one atom of carbon taken as 12u. It is represented as 1u.

8. i. 2 atoms of hydrogen + 1 atom of sulphur = 3 atoms. Hence 3 atoms are present in an H_2S molecule.
 ii. 1 atom of phosphorus + 4 atoms of oxygen = 5 atoms. Hence 5 atoms are present in an ion. PO_4^{3-}

9. Kanad proposed the theory of matter around 600 BC.

10. atomic mass of sulphur S = 32 u

atomic mass of hydrogen H = 1u

the ratio by mass of the elements present in the molecule of hydrogen sulphide (H_2S)

= mass of hydrogen atom present in the compound : the mass of the sulphur atom present compound

$$= 2 \times 1 : 32 = 2 : 32 = 1 : 16$$

11. H_2 represents one molecule of H_2 (hydrogen gas) whereas 2H represents two separate atoms of hydrogen.

12. i. 28 g of He

The no. of moles

$$= \frac{\text{Mass of He in grams}}{\text{Gram atomic mass}} = \frac{m}{M} = \frac{(28g)}{(4g)} = 7 \text{ mol}$$

ii. 46 g of Na

The no. of moles

$$= \frac{\text{Mass of Na in grams}}{\text{Gram atomic mass}} = \frac{m}{M} = \frac{(46g)}{(23g)} = 2 \text{ mol}$$

iii. 60 g of Ca

The no. of moles

$$= \frac{\text{Mass of Ca in grams}}{\text{Gram atomic mass}} = \frac{m}{M} = \frac{(60g)}{(40g)} = 1.5 \text{ mol}$$

13. molar mass of C_2H_5OH

$$= (2 \times \text{Atomic mass of C}) + (6 \times \text{Atomic mass of H}) + (1 \times \text{Atomic mass of O})$$

$$= \{(2 \times 12) + (6 \times 1) + (1 \times 16)\} \text{ u}$$

$$= \{24 + 6 + 16\} \text{ u}$$

= 46u

14. chemical formulae of

a. **Magnesium chloride**

Symbols; Mg Cl

Valencies: 2 1

cross-over valencies

Mg_1Cl_2 or $MgCl_2$

Thus, the formula of magnesium chloride is $MgCl_2$.

b. **Calcium oxide**

Symbols; Ca O

Valencies: 2 2

cross-over valencies

Ca_2O_2 or CaO

Thus, the formula of Calcium oxide is CaO .

c. **Copper(II) nitrate**

Symbols; Cu NO_3

Valencies: 2 1

cross-over valencies

$Cu_1(NO_3)_2$ or $Cu(NO_3)_2$

Thus, the formula of copper nitrate is $Cu(NO_3)_2$.

d. **Aluminium chloride**

Symbols; Al Cl

Valencies: 3 1

cross-over valencies

Al_1Cl_3 or $AlCl_3$

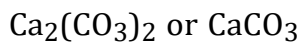
Thus, the formula of Aluminium chloride is $AlCl_3$.

e. **Calcium carbonate.**

Symbols; Ca CO_3

Valencies: 2 2

cross-over valencies



Thus, the formula of Calcium carbonate is CaCO_3 .

15. Experiment to show that cathode rays travel in the straight line:-

- a. Take a discharge tube coated with a fluorescent substance
- b. Place an opaque object in the path of the cathode rays.
- c. When cathode rays were made to pass through the discharge tube then discharge the glowed wherever cathode rays fall except in the region of the shadow of the opaque object.
- d. The above experiment shows that cathode rays travel in the straight line.

