

ICSE-7<sup>th</sup>

WORKSHEET

TOPIC – THE LANGUAGE OF CHEMISTRY

1.  $XCl_2$  is the chloride of metal X. Write down the formula of sulphate and hydroxide of X.

**Answer:** In compound  $XCl_2$ , the valency of chlorine is  $-1$ . Therefore valency of X is  $+2$ .

$\therefore$  Formula of the sulphate of X is  $XSO_4$ . Formula of the hydroxide of X is  $X(OH)_2$ .

2.  $MCl$  is the formula of a chloride of metal M. What is the formula of its sulphate and hydroxide?

**Answer:** In compound  $MCl$ , the valency of chlorine is  $-1$ . Therefore, valency of M is  $0 + 1$ .

$\therefore$  Formula of the sulphate M is  $M_2SO_4$ . Formula of the hydroxide of M is  $MOH$ .

3. What do the following symbols denote?

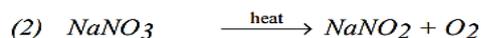
(i)  $2H$ (ii)  $H_2$ (iii)  $H^+$ 

**Answer:** (i)  $2H$  stands for two atoms of hydrogen.

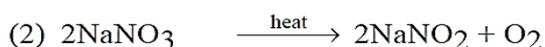
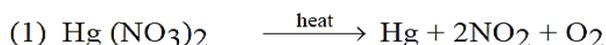
(ii)  $H_2$  stands for one molecule of hydrogen.

(iii)  $H^+$  stands for one ion of hydrogen.

4. Balance the following equations :



**Answer:**



5. (a) What do you understand by the term “chemical formula”?

(b) What information is conveyed by the formula  $H_2O$ ?

**Answer:** (a) Chemical formula: - The formula of a substance is the symbolic representation of the actual number of atoms present in one molecule of a substance.

(b) (i) It represents, 1 molecule of water contains 2 atoms of hydrogen and one atom of oxygen.

(ii) It represents, 2 g of hydrogen combine with 16 g of oxygen to form 18 g of water.

(iii) It represents, 18 g of water contain  $6.023 \times 10^{23}$  molecules of water.

6. (a) What do you understand by the term symbol?  
 (b) What information is conveyed by the symbol Na (At. wt. 23)?

**Answer:** (a) Symbol: The short hand representation of an element is called symbol.

- (b) (i) It represents one atom of sodium.  
 (ii) It represents, it is 23 times the atomic mass unit.  
 (iii) It represents, 1 g-atom of sodium weighs 23 g.  
 (iv) It represents, 1 g-atom of sodium has  $6.023 \times 10^{23}$  atoms.

7. Write the formulae and balance the following equations.

- (a) Zinc + dil. Sulphuric acid  $\rightarrow$  Zinc sulphate + Hydrogen.  
 (b) Ammonium sulphate + Calcium hydroxide  $\rightarrow$  Calcium sulphate + Ammonia + Water.  
 (c) Lead dioxide + Hydrochloric acid  $\rightarrow$  Lead chloride + Water + Chlorine.  
 (d) Aluminium oxide + Sulphuric acid  $\rightarrow$  Aluminium sulphate + Water.

**Answer:**

- (a)  $\text{Zn} + \text{H}_2\text{SO}_4 (\text{dil}) \longrightarrow \text{ZnSO}_4 + \text{H}_2$   
 (b)  $(\text{NH}_4)_2\text{SO}_4 + (\text{dil}) \text{Ca}(\text{OH})_2 \longrightarrow \text{CaSO}_4 + 2\text{NH}_3 + 2\text{H}_2\text{O}$   
 (c)  $\text{PbO}_2 + 4\text{HCl} \longrightarrow \text{PbCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$   
 (d)  $\text{Al}_2\text{O}_3 + 3\text{H}_2\text{SO}_4 \longrightarrow \text{Al}_2(\text{SO}_4)_3 + 3\text{H}_2\text{O}$

8. Write the formulae and balance the following equations.

- (a) Iron + conc. Sulphuric acid  $\rightarrow$  Iron (II) sulphate + Sulphur dioxide gas + Water.  
 (b) Zinc oxide + Nitric acid  $\rightarrow$  Zinc nitrate + Water.  
 (c) Calcium + Water  $\rightarrow$  Calcium hydroxide + Hydrogen.  
 (d) Ferrous sulphate + Sodium hydroxide  $\rightarrow$  Ferrous hydroxide + Sodium sulphate.

**Answer:**

- (a)  $\text{Fe} + 2\text{H}_2\text{SO}_4 (\text{conc.}) \longrightarrow \text{FeSO}_4 + \text{SO}_2 + 2\text{H}_2\text{O}$   
 (b)  $\text{ZnO} + 2\text{HNO}_3 \longrightarrow \text{Zn}(\text{NO}_3)_2 + \text{H}_2\text{O}$   
 (c)  $\text{Ca} + 2\text{H}_2\text{O} \longrightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$   
 (d)  $\text{FeSO}_4 + 2\text{NaOH} \longrightarrow \text{Fe}(\text{OH})_2 + \text{Na}_2\text{SO}_4$

9. Write the formulae of the following alkalis /bases.

- (i) Ammonium hydroxide                      (ii) Sodium hydroxide

**Answer:** (i)  $\text{NH}_4\text{OH}$                                       (ii)  $\text{NaOH}$

10. Write the formulae of the following alkalis /bases.

(i) Potassium hydroxide (ii) Calcium hydroxide

Answer: (i) KOH (ii) Ca(OH)<sub>2</sub>

11. Write the formulae of the following alkalis /bases.

(i) Magnesium hydroxide (ii) Iron (III) hydroxide

Answer: (i) Mg(OH)<sub>2</sub> (ii) Fe(OH)<sub>3</sub>

12. Write the formulae of the following acids.

(i) Carbonic acid (ii) Sulphurous acid (iii) Nitrous acid

Answer: (i) H<sub>2</sub>CO<sub>3</sub> (ii) H<sub>2</sub>SO<sub>3</sub> (iii) HNO<sub>2</sub>

13. Write the formulae of the following acids.

(i) Phosphoric acid (ii) Hydrochloric acid (iii) Nitric acid

Answer: (i) H<sub>3</sub>PO<sub>4</sub> (ii) HCl (iii) HNO<sub>3</sub>

14. Write the names of the following compounds.

i) Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> ii) (NH<sub>4</sub>)<sub>2</sub>S iii) KClO<sub>3</sub> iv) KClO

Answer: i) Aluminium sulphate ii) Ammonium sulphide iii) Potassium chlorate iv) Potassium hypochlorite

15. Write the names of the following compounds.

i) Pb(NO<sub>3</sub>)<sub>2</sub> ii) Mg(HCO<sub>3</sub>)<sub>2</sub> iii) KMnO<sub>4</sub> iv) PbCO<sub>3</sub>

Answer: i) Lead nitrate or lead (ii) nitrate ii) Magnesium bicarbonate or Magnesium hydrogen carbonate

iii) Potassium permanganate iv) Lead carbonate or Lead (II) carbonate

16. Write the formulae of the following salts.

i) Zinc carbonate ii) Lead hydroxide iii) Sodium nitrate  
iv) Potassium nitrate v) Magnesium nitride

Answer: i) ZnCO<sub>3</sub> ii) Pb(OH)<sub>2</sub> iii) NaNO<sub>3</sub> iv) K<sub>2</sub>ZnO<sub>2</sub> v) Mg<sub>3</sub>N<sub>2</sub>

17. State the valencies and formulae of the following radicals/ions :

i) Ammonia ii) Calcium iii) Ferric iv) Zincate v) Oxide

Answer: i) NH<sub>4</sub><sup>+</sup> ii) Ca<sup>2+</sup> iii) Fe<sup>3+</sup> iv) ZnO<sub>2</sub><sup>2+</sup> v) O<sup>2-</sup>

18. State the valencies and formulae of the following radicals/ions :

i) Hydroxide ii) Nitride iii) Cupric iv) Stannic v) Barium

Answer: i) OH<sup>-</sup> ii) N<sup>3-</sup> iii) Cu<sup>2+</sup> iv) Sn<sup>4+</sup> v) Ba<sup>2+</sup>

19. (a) What do you understand by the term "chemical equation"?

(b) Why should a chemical equation be always balanced?

(c) State the limitations of a chemical equation.

**Answer:** (a) Chemical equation: A chemical equation is a statement that describes a chemical change in terms of symbols and formulae.

(b) According to the law of mass conservation "matter can neither be created, nor can it be destroyed". This is possible only, if the total number of atoms on the reactants side is equal to the total number of atoms on the products side. Thus, a chemical equation should be always balanced.

(c) Limitations of a chemical equation:

- ✓ It does not tell about the physical state of reactants or products.
- ✓ It does not tell about the rate of the reaction.
- ✓ It does not tell whether the reaction will complete or not.
- ✓ It does not tell about the conditions necessary for the reaction.

## 20. Potassium atom is larger than sodium atom. Why?

**Answer:** Potassium is placed below sodium in group 1. It therefore has one more electron shell. Na atom has three electron shells (2, 8, 1); K atom has four (2, 8, 8, 1). So, potassium atom is bigger than sodium atom.

## 21. (a) What do you understand by the trivial name (common name) of a compound?

(b) Give chemical names and trivial names of any four compounds.

**Answer:** (a) The name by which a chemical compound is known to common man is called trival name.

(b) Trival Name	Chemical Name
1. Rock salt	Sodium chloride [NaCl]
2. Marble	Calcium carbonate [CaCO <sub>3</sub> ]
3. Chile salt petre	Sodium nitrate [NaNO <sub>3</sub> ]
4. Caustic soda	Sodium hydroxide [NaOH]

## 22. (a) What do you understand by the term valency?

(b) Why do certain elements exhibit variable valency?

(c) Giving at least two examples explain how the ions of the elements having variable valency are named?

**Answer:** (a) Valency: The number of hydrogen atoms which combine directly or indirectly with one atom of an element so as to form a compound is called valency.

(b) When an atom donates electrons from a shell next to the valence shell, in addition to electrons of the valence shell, it exhibits variable valency.

(c) The lower valency is named by adding the prefix (–ous) and higher valency by adding the prefix (–ic).

Element	Lower valency	Higher valency
Ferrum (Iron)	Ferrous (Fe <sup>2+</sup> )	Ferric (Fe <sup>3+</sup> ).
Cuprum (Copper)	Cuprous (Cu <sup>1+</sup> )	Cupric (Cu <sup>2+</sup> ).