

## Question Bank

### Language of Chemistry

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1. Fill in the blank spaces with the appropriate words given within the brackets.
- (a) The short hand representation of an \_\_\_\_\_ (element/compound) is called symbol.
- (b) The substance/substances which take part in a chemical reaction are called \_\_\_\_\_ (reactants/products).
- (c) A chemical equation does not tell about \_\_\_\_\_ (rate/kind) of chemical reaction.
- (d) A symbol represents \_\_\_\_\_ (1g-atom/1g-molecule) of an element.
- (e) Chemical \_\_\_\_\_ (symbol/formula) of substance is the symbolic representation of actual number of atoms present in one molecule of a substance.

**Ans** (a) element                      (b) reactants  
(c) rate                                  (d) 1g-atom  
(e) formula.

2. Match the statements in the Column A, with the statements in Column B.

Column A	Column B
(a) $6.023 \times 10^{23}$ atoms of an element	Valency
(b) The substances formed during a chemical reaction.	Chemical formula
(c) A group of negatively or positively charged atoms.	Products
(d) The number of hydrogen atoms which combine with one atom of an element.	1g-atom
(e) Symbolic representation of a chemical compound	Radical

Ans. (a) 1g-atom

(b) Products

(c) Radical

(d) Valency

(e) Chemical formula.

3. Statements given below are incorrect. Write the correct statements.

(a) The valency of ferrous ion is 3 positive.

(b) The formula of ammonium dichromate is  $(\text{NH}_4)_2 \text{CrO}_4$ .

(c) A chemical equation tells by volume the amount of reactants and products.

(d) Valency is the number of hydrogen molecules which combine directly or indirectly with one atom of an element.

(e) A chemical equation does not tell about the chemical state of reactants or products.

Ans. (a) The valency of ferrous ion is **2** positive.

(b) The formula of ammonium dichromate is  $(\text{NH}_4)_2 \text{Cr}_2 \text{O}_7$ .

(c) A chemical equation tells by **weight** the amount of reactants and products.

(d) Valency is the number of hydrogen **atoms** which combine directly or indirectly with one atom of an element.

(e) A chemical equation does not tell about the **physical** state of reactants or products.

4. (a) *What do you understand by the term symbol?*

(b) *What information is conveyed by the symbol Na (At. wt. 23)?*

**Ans. (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.

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

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

**Ans. (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 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 ?*

**Ans. (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).

### Examples

<i>Element</i>	<i>Lower valency</i>	<i>Higher valency</i>
Ferrum (Iron)	Ferrous ( $\text{Fe}^{2+}$ )	Ferric ( $\text{Fe}^{3+}$ ).
Cuprum (Copper)	Cuprous ( $\text{Cu}^{1+}$ )	Cupric ( $\text{Cu}^{2+}$ ).

7. (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.*

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

### (b) Trival Name

1. Rock salt

### Chemical Name

Sodium chloride [ $\text{NaCl}$ ]

- |                     |  |
|---------------------|--|
| 2. Marble           | Calcium carbonate [CaCO <sub>3</sub> ] |
| 3. Chile salt petre | Sodium nitrate [NaNO <sub>3</sub> ]    |
| 4. Caustic soda     | Sodium hydroxide [NaOH]                |

8. (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.*

**Ans. (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 :**

- (a) It does not tell about the physical state of reactants or products.
- (b) It does not tell about the rate of the reaction.
- (c) It does not tell whether the reaction will complete or not.
- (d) It does not tell about the conditions necessary for the reaction.
- (e) It does not tell whether energy is evolved or absorbed.
- (f) It does not tell about the changes in colour, precipitation, etc.

9. (a) State the valencies and formulae of the following radicals/ions :

- (i) Ammonium    (ii) Calcium    (iii) Ferric    (iv) Zincate  
 (v) Oxide    (vi) Hydroxide    (vii) Nitride    (viii) Cupric  
 (ix) Stannic    (x) Barium.

Ans.	Ion or radical	Formula	Valency
	(i) Ammonium	$\text{NH}_4$	+1
	(ii) Calcium	Ca	+2
	(iii) Ferric	Fe	+3
	(iv) Zincate	$\text{ZnO}_2$	-2
	(v) Oxide	O	-2
	(vi) Hydroxide	OH	-1
	(vii) Nitride	N	-3
	(viii) Cupric	Cu	+2
	(ix) Stannic	Sn	+4
	(x) Barium	Ba	+2

10. Write the formulae of the following salts.

- (a) Zinc carbonate    (b) Lead hydroxide    (c) Sodium nitrate  
 (d) Potassium zincate    (e) Magnesium nitride    (f) Ammonium sulphate  
 (g) Barium chloride    (h) Potassium dichromate    (I) Calcium bicarbonate  
 (j) Silver chloride    (k) Copper (II) sulphide    (l) Aluminium oxide.

- Ans.** (a) Zinc Carbonate- $ZnCO_3$  (b) Lead hydroxide- $Pb(OH)_2$   
 (c) Sodium nitrate- $NaNO_3$  (d) Potassium zincate- $K_2ZnO_2$   
 (e) Magnesium nitride- $Mg_3N_2$  (f) Ammonium sulphate- $(NH_4)_2SO_4$   
 (g) Barium chloride-  $BaCl_2$  (h) Potassium dichromate- $K_2Cr_2O_7$   
 (i) Calcium bicarbonate- $Ca(HCO_3)_2$  (j) Silver chloride- $AgCl$   
 (k) Copper (II) sulphide- $CuS$  (l) Aluminium oxide- $Al_2O_3$ .

**11.** Write the names of the following compounds.

- (i)  $Al_2(SO_4)_3$  (ii)  $(NH_4)_2S$  (iii)  $KClO_3$  (iv)  $KClO$   
 (v)  $Pb(NO_3)_2$  (vi)  $Mg(HCO_3)_2$  (vii)  $KMnO_4$  (viii)  $PbCO_3$   
 (ix)  $PbO_2$  (x)  $Fe(OH)_3$ .

<b>Ans. Formula</b>	<b>Compound</b>
(i) $Al_2(SO_4)_3$	Aluminium sulphate
(ii) $(NH_4)_2S$	Ammonium sulphide
(iii) $KClO_3$	Potassium chlorate
(iv) $KClO$	Potassium hypochlorite
(v) $Pb(NO_3)_2$	Lead nitrate or lead (II) nitrate
(vi) $Mg(HCO_3)_2$	Magnesium bicarbonate or Magnesium hydrogen carbonate
(vii) $KMnO_4$	Potassium permanganate

- (viii)  $\text{PbCO}_3$                       Lead carbonate or Lead (II) carbonate  
 (ix)  $\text{PbO}_2$                          Lead dioxide or Lead (IV) oxide  
 (x)  $\text{Fe(OH)}_3$                       Ferric hydroxide or Iron (III) hydroxide.

**12.** Write the formulae of the following acids.

- (i) Carbonic acid                      (ii) Sulphurous acid                      (iii) Nitrous acid  
 (iv) Phosphoric acid                      (v) Hydrochloric acid                      (vi) Nitric acid  
 (vii) Sulphuric acid                      (viii) Hypochlorous acid.

**Ans. Acid**

**Chemical Formula**

- |                          |                         |
|--------------------------|-------------------------|
| (i) Carbonic acid        | $\text{H}_2\text{CO}_3$ |
| (ii) Sulphurous acid     | $\text{H}_2\text{SO}_3$ |
| (iii) Nitrous acid       | $\text{HNO}_2$          |
| (iv) Phosphoric acid     | $\text{H}_3\text{PO}_4$ |
| (v) Hydrochloric acid    | $\text{HCl}$            |
| (vi) Nitric acid         | $\text{HNO}_3$          |
| (vii) Sulphuric acid     | $\text{H}_2\text{SO}_4$ |
| (viii) Hypochlorous acid | $\text{HClO}$ .         |

**13.** Write the formulae of the following alkalies /bases.

- (i) Ammonium hydroxide                      (ii) Sodium hydroxide  
 (iii) Potassium hydroxide                      (iv) Calcium hydroxide  
 (v) Magnesium hydroxide                      (vi) Iron (III) hydroxide.



<b>Ans.</b>	<b>Alkali or base</b>	<b>Formula</b>
(i)	Ammonium hydroxide	$\text{NH}_4\text{OH}$
(ii)	Sodium hydroxide	$\text{NaOH}$
(iii)	Potassium hydroxide	$\text{KOH}$
(iv)	Calcium hydroxide	$\text{Ca(OH)}_2$
(v)	Magnesium hydroxide	$\text{Mg(OH)}_2$
(vi)	Iron (III) hydroxide	$\text{Fe(OH)}_3$

**14.** 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.*

(e) *Iron + conc. Sulphuric acid  $\rightarrow$  Iron (II) sulphate + Sulphur dioxide gas +  
Water.*

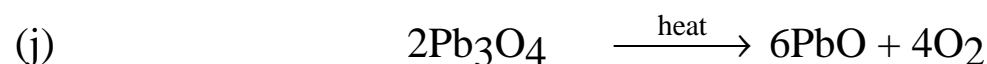
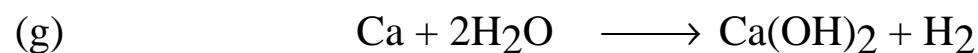
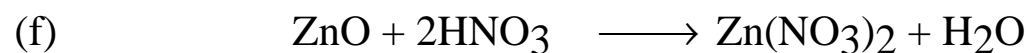
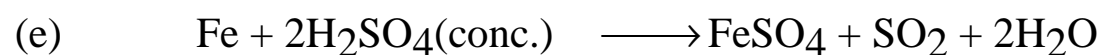
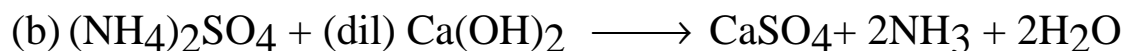
(f) *Zinc oxide + Nitric acid  $\rightarrow$  Zinc nitrate + Water.*

(g) *Calcium + Water  $\rightarrow$  Calcium hydroxide + Hydrogen.*

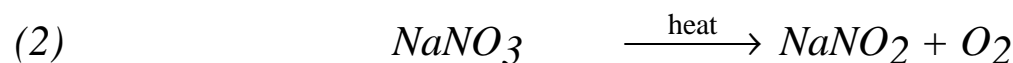
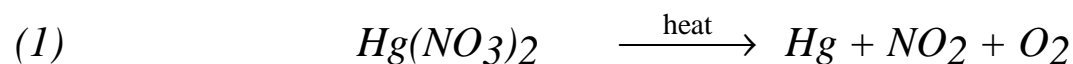
(h) *Ferrous sulphate + Sodium hydroxide  $\rightarrow$  Ferrous hydroxide + Sodium  
sulphate.*

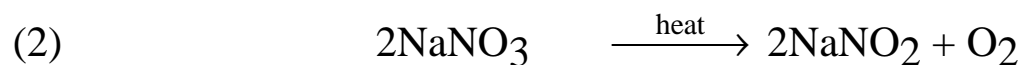
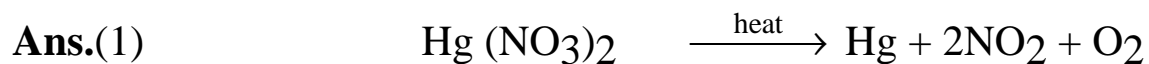
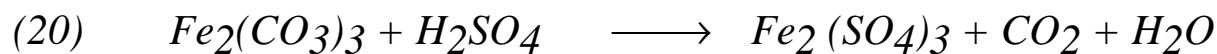
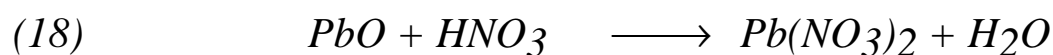
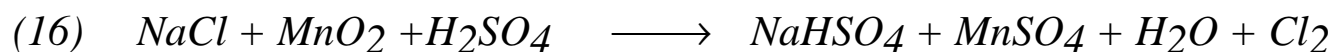
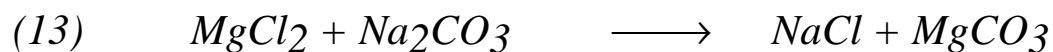
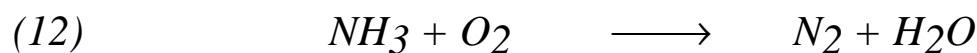
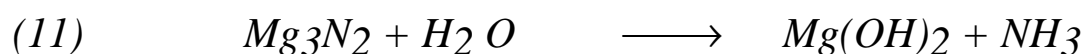
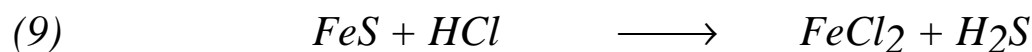
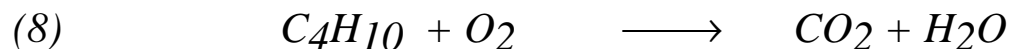
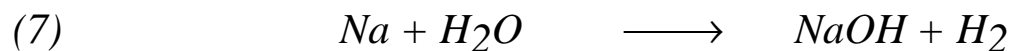
(i) *Calcium carbonate + Hydrochloric acid  $\rightarrow$  Calcium chloride + Water + Carbon  
dioxide.*

(j) *Red lead  $\xrightarrow{\text{heat}}$  Lead monoxide + Oxygen.*

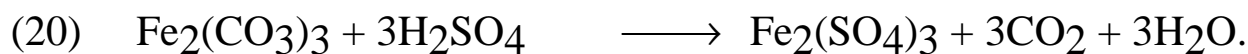


15. Balance the following equations :





- (3)  $\text{Ca} + 2\text{H}_2\text{O} \longrightarrow \text{Ca(OH)}_2 + \text{H}_2$
- (4)  $2\text{NaNO}_3 + \text{H}_2\text{SO}_4 \longrightarrow \text{Na}_2\text{SO}_4 + 2\text{HNO}_3$
- (5)  $\text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2 \longrightarrow 2\text{NaHCO}_3$
- (6)  $\text{Mg} + 2\text{HCl} \longrightarrow \text{MgCl}_2 + \text{H}_2$
- (7)  $2\text{Na} + 2\text{H}_2\text{O} \longrightarrow 2\text{NaOH} + \text{H}_2$
- (8)  $2\text{C}_4\text{H}_{10} + 13\text{O}_2 \longrightarrow 8\text{CO}_2 + 10\text{H}_2\text{O}$
- (9)  $\text{FeS} + 2\text{HCl} \longrightarrow \text{FeCl}_2 + \text{H}_2\text{S}$
- (10)  $\text{MnO}_2 + 4\text{HCl} \longrightarrow \text{MnCl}_2 + 2\text{H}_2\text{O} + \text{Cl}_2$
- (11)  $\text{Mg}_3\text{N}_2 + 6\text{H}_2\text{O} \longrightarrow 3\text{Mg(OH)}_2 + 2\text{NH}_3$
- (12)  $4\text{NH}_3 + 3\text{O}_2 \longrightarrow 2\text{N}_2 + 6\text{H}_2\text{O}$
- (13)  $\text{MgCl}_2 + \text{Na}_2\text{CO}_3 \longrightarrow 2\text{NaCl} + \text{MgCO}_3$
- (14)  $2\text{NaOH} + \text{Cl}_2 \longrightarrow \text{NaCl} + \text{NaClO} + \text{H}_2\text{O}$
- (15)  $\text{FeCl}_3 + 3\text{NaOH} \longrightarrow \text{Fe(OH)}_3 + 3\text{NaCl}$
- (16)  $2\text{NaCl} + \text{MnO}_2 + 3\text{H}_2\text{SO}_4 \longrightarrow 2\text{NaHSO}_4 + \text{MnSO}_4 + 2\text{H}_2\text{O} + \text{Cl}_2$
- (17)  $2\text{KNO}_3 + \text{H}_2\text{SO}_4 \longrightarrow \text{K}_2\text{SO}_4 + 2\text{HNO}_3$
- (18)  $\text{PbO} + 2\text{HNO}_3 \longrightarrow \text{Pb(NO}_3)_2 + \text{H}_2\text{O}$



**16.** *What do the following symbols denote?*

(i)  $2\text{H}$     (ii)  $\text{H}_2$     (iii)  $\text{H}^+$

**Ans.** (i)  $2\text{H}$  stands for two atoms of hydrogen.      (ii)  $\text{H}_2$  stands for one molecule of hydrogen.

(iii)  $\text{H}^+$  stands for one ion of hydrogen.

**17.**  *$\text{MCl}$  is the formula of a chloride of metal  $\text{M}$ . What is the formulae of its sulphate and hydroxide.*

**Ans.** In compound  $\text{MCl}$ , the valency of chlorine is  $-1$ . Therefore, valency of  $\text{M}$  is  $0 + 1$ .

$\therefore$  Formula of the sulphate  $\text{M}$  is  $\text{M}_2\text{SO}_4$ . Formula of the hydroxide of  $\text{M}$  is  $\text{MOH}$ .

**18.**  *$\text{XCl}_2$  is the chloride of metal  $\text{X}$ . Write down the formula of sulphate and hydroxide of  $\text{X}$ .*

**Ans.** In compound  $\text{XCl}_2$ , the valency of chlorine is  $-1$ . Therefore valency of  $\text{X}$  is  $+2$ .

$\therefore$  Formula of the sulphate of  $\text{X}$  is  $\text{XSO}_4$ . Formula of the hydroxide of  $\text{X}$  is  $\text{X}(\text{OH})_2$ .