Language of Chemistry

EXERCISE

Question 1.
Explain the term 'symbol'. State a reason why – the symbol of calcium is 'Ca' & of copper is 'Cu'

Answer:
Symbol is a short form or abreviated name – of the element.
OR
"Symbol of an element is the 'first letter' or the 'first letter and another letter' of the English name or Latin name of the element".
As the name calcium and copper start with same letter of English alphabet 'C' so another letter from the name of the element is added to 'C'.
Hence symbol of calcium is 'Ca' and symbol of copper or cuprum (Latin name of copper) is 'Cu'.

Question 2.
Define the term 'valency'. With reference to water & ammonia as compounds respectively, state the valency of oxygen & nitrogen. Magnesium [2, 8, 2] has valency 2+. Give reasons.

Answer:
Valency is the number of hydrogen atoms which combine with (or displace) one atom of the element forming a Compound. Compound water H_20, two atoms of hydrogen combine with one atom of oxygen to form water. Hence valency of oxygen atom is 2.
Compound ammonia NH_3.
Valency of atom nitrogen is 3, as it combines with 3 atoms of hydrogen.
Valency of magnesium is 2^+, Mg [2, 8, 2]
Electronic configuration of Mg is 2, 8, 2 i.e. there are 2 valence electrons which Mg can lose and achieve stable configuration of nearest noble gas Neon.
Hence is cation Mg^{2+} has valency 2^+.

Question 3.
Explain the term 'variable valency'. Copper having electronic configuration 2,8,18,1 exhibits variable valency. Give a reason for the same & name the compound CuCI & $CuCl_2$.

Answer:
Variable valency : "When an element has more than one valency, its valency is called variable valency."
Copper exhibit valency '1' and '2' i.e. has variable valency reason for variable valency :
Valency is – the number of electrons lost or gained from the outer shell of an atom of an element – during chemical reaction. Variation in this gain or loss results in 'variable valency'.
Lower valency ends with – ous
Higher valency ends with – ic
CuCI is named as cuprous chloride (lower valency)
OR

Cu [I] Cl i.e. Copper [I] chloride and $CuCl_2$ – Cupric chloride (higher valency) i.e. Copper [II] chloride $Cu[II]Cl_2$

Question 4.
State the valencies of the following metallic elements –

(a) Potassium
(b) Sodium
(c) Calcium
(d) Magnesium
(e) Zinc
(f) Aluminium
(g) Chromium [write each symbol with the valency]

Answer:
Metals have positive valency 1, 2 or 3 ,
Valency of

(a) Potassium is K^+
(b) Sodium 1^+
Na^+
(c) Calcium 2^+
Ca^{2+}
(d) Magnesium 2+
Mg^{2+}
(e) Zinc 2^+
Zn^{2+}
(f) Aluminium 3^+
Al^{3+}
(g) Chromium 3+
Cr^{3+}

Question 5.
Certain metals exhibit variable valencies which include valencies: 1+, 2+, 3+ & 4+.
State the variable valency of the following metals –

(a) Copper
(b) Silver
(c) Mercury
(d) Iron
(e) tin
(f) Lead

[write each symbol with the variable valency]

Answer:

(a) Copper : exhibits valency 1 and 2

Cu^{1+}	Cu^{2+}
Cuprous	Cupric

(b) Silver : exhibits valency 1 and 2

Ag^{1+}	Ag^{2+}
Argentous	Argentic

(c) Mercury exhibits valency 1 and 2

Hg^{1+}	Hg^{2+}
Mercurous	Mercuric

(d) Iron has variable valency 2 and 3

Fe^{2+}	Fe^{3+}
Ferrous	Ferric
or Fe[II]	Fe[III]

(e) Tin has variable valency 2 and 4

Sn^{2+}	Sn^{4+}
Stanous	Stanic
or Sn[II]	Sn[IV]

(f) Lead has variable valency 2 and 4

Pb^{2+}	Pb^{4+}
Plumbous	Plumbic
or Pb[II]	Pb[IV]

Question 6.
State which of the following ions or radicals given below of non-metallic elements exhibit-valency: 1^-, 2^- & 3^-
(a) Chloride **(b)** Bromide **(c)** Iodide **(d)** Nitrate **(e)** Hydroxide **(f)** Bicarbonate **(g)** Bisulphite **(h)** Bisulphate **(i)**Aluminate **(j)** Permanganate **(k)** Oxide **(l)** Sulphide **(m)** Sulphite **(n)** Sulphate **(o)** Carbonate **(p)** Dichromate **(q)** Zincate **(r)** Plumbite **(s)** Phosphate **(t)** Nitride
[write each ion or radical with the correct valency]

Answer:

		Ion	Valency
(a) Chloride	Cl	Cl^{1-}	–1
(b) Bromide	Br	Br^{1-}	–1
(c) Iodide	I	I^{1-}	–1
(d) Nitrate	NO_3	$[NO_3]^{1-}$	–1
(e) Hydroxide	[OH]	$[OH]^{1-}$	–1
(f) Bicarbonate	$[HCO_3]$	$[HCO_3]^{1-}$	–1
(g) Bisulphite	$[HSO_3]$	$[HSO_3]^{1-}$	–1
(h) Bisulphate	$[HSO_4]$	$[HSO_4]^{1-}$	–1
(i) Aluminate	AlO_2	$[AlO_2]^{1-}$	–1
(j) Permanganate	MnO_4	$[MnO_4]^{1-}$	–1
(k) Oxide	O	O^{2-}	–2
(l) Sulphide	S	S^{2-}	–2
(m) Sulphite	SO_3	$[SO_3]^{2-}$	–2
(n) Sulphate	SO_4	$[SO_4]^{2-}$	–2
(o) Carbonate	CO_3	$[CO_3]^{2-}$	–2
(p) Dichromate	Cr_2O_7	$[Cr_2O_7]^{2-}$	–2
(q) Zincate	ZnO_2	$[ZnO_2]^{2-}$	–2
(r) Plumbite	PbO_2	$[PbO_2]^{2-}$	–2
(s) Phosphate	PO_4	$[PO_4]^{3-}$	–3
(t) Nitride N	N	N^{3-}	–3

Question 7.
Differentiate between the terms – 'Ion' & 'radical' with suitable examples.

Answer:
Ion "is an atom or a group of atoms carrying a positive or negative charge due to loss or gain of electrons." e.g. cation Na^+ and Cl^{1-} is anion.
Radical "is group of atoms of elements that behaves like a single unit & show valency."
Positive radical [$NH\ H_4^{1+}$] Ammonium
Negative radical [HCO_3^{1-}], [NO_3^{1-}] Bicarbonate Nitrate

Question 8.
Write the chemical formula of the following compounds in a step-by-step manner – **(a)** Potassium chloride **(b)** Sodium bromide **(c)** Potassium nitrate **(d)** Calcium hydroxide **(e)** Calcium bicarbonate **(f)** Sodium bisulphate **(g)** Potassium sulphate **(h)** Zinc hydroxide **(i)** Potassium

permanganate **(j)** Potassium dichromate **(k)** Aluminium hydroxide **(l)** Magnesium nitride **(m)** Sodium zincate **(n)** Copper [II] oxide **(o)**Copper [I] sulphide **(p)** Iron [III] chloride **(q)** Iron [II] hydroxide **(r)** Iron [III] sulphide **(s)** Iron [III] oxide.

Answer:

Write the formula of

(a) Potassium chloride :

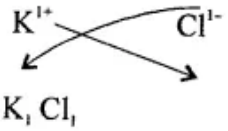
	Symbol	Valency
Potassium	K	1^+
Chloride	Cl	1^-

Step 1 – Write each symbol with its valency.

K^{1+} Cl^{1-}

Positive ion is written first

Step II – Inter change the valencies



(+ and –ve) signs ignored

and Ignore 1 in KCl

Therefore Formula is KCl

(a) Sodium Bromide :

	Symbol	Valency
Sodium	Na	1^+
Bromide	Br	1^-

Step 1 – Write each symbol with valency.

Na^{1+} Br^{1-}

Positive ion is written first

Step II – Inter change the valencies and ignore the signs

Ignore 1

The Formula is NaBr

(c) Potassium Nitrate :

	Symbol	Valency
Potassium	K	1^+
Nitrate	NO_3	1^-

Step 1 – Write each symbol with valency

Positive ion is written first

K^{1+} $[NO_3]^{1-}$

Step II – Inter change the valencies and ignoring the +ve and –ve signs

Ignore 1

The Formula is KNO_3

(d) Calcium Hydroxide :

	Symbol	Valency
Calcium	Ca	2^+
Hydroxide	OH	1^-

Step 1 – Write each symbol with valency

Positive ion first

Ca^{2+} $[OH]^{1-}$

Step II – Inter change the valencies and ignoring positive and negative signs.

$Ca_1[OH]_2$ Ignore 1

The Formula is $Ca[OH]_2$

(e) Calcium Bicarbonate :

	Symbol	Valency
Calcium	Ca	2^+
Bicarbonate	HCO_3	1^-

Step 1 – Write each symbol with valency

Positive ion is written first

Ca^{2+} $[HCO_3]^{1-}$

Step II – Inter change the valencies and ignoring (+) and (–) signs

$Ca_1[HCO_3]_2$ Ignore 1

The Formula is $Ca[HCO_3]_2$

(f) Sodium bisulphate :

	Symbol	Valency
Sodium	Na	1^+
Bisulphate	HSO_4	1^-

Step 1 – Write each symbol with valency

Positive ion is written first

Na^{1+} $[HSO_3]^{1-}$

Step II – Interchange the valencies ignoring the signs.

$Na_1\ [HSO_4]_2$ Ignore 1

The Formula is $NaHSO_4$

(g) Potassium sulphate :

	Symbol	Valency
Potassium	K	1^+
Sulphate	SO_4	2^-

Step 1 – Write each symbol with valency

Positive ion is written first

K^{1+} $[SO_3]^{2-}$

Step II – Inter change the valencies ignoring the signs.

$K_2\ [SO_4]_1$ Ignore 1

The Formula is K_2SO_4

(h) Zinc hydroxide :

	Symbol	Valency
Zinc	Zn	2^+
Hydroxide	OH	1^-

Step 1 – Write each symbol with valency

Positive ion is written first

Zn^{2+} $[OH]^{1-}$

Step II – Inter change the valencies ignoring the signs.

$Zn_1\ [OH]_2$ Ignore 1

The Formula is $Zn[OH]_2$

(i) Potassium permanganate :

	Symbol	Valency
Potassium	K	1^+
Permanganate	MnO_4	1^-

Step 1 – Write each symbol with valency

Positive ion is written first

K^{1+} $[MnO_4]^{1-}$

Step II – Inter change the valencies ignoring the (+) and (–) signs.

$K_1\ [MnO_4]_1$ Ignore 1

The Formula is $KMnO_4$

(J) Potassium dichromate :

	Symbol	Valency
Potassium	K	1^+
Dichromate	Cr_2O_7	2^-

Step 1 – Write each symbol with valency

Positive ion is written first

K^{1+} $[Cr_2O_7]^{2-}$

Step II – Inter change the valencies ignoring the (+) and (–) signs.

$K_2\ [Cr_2O_7]_1$ Ignore 1

The Formula is $K_2Cr_2O_7$

(k) Aluminium hydroxide :

	Symbol	Valency
Aluminium	Al	3^+
Hydroxide	OH	1^-

Step 1 – Write each symbol with valency

Positive ion is written first

Al^{3+} $[OH]^{1-}$

Step II – Inter change the valencies positive ion is write first.

$Al_1\ [OH]_3$ Ignore 1

The Formula is $Al[OH]_3$

(l) Magnesium nitride :

	Symbol	Valency
Magnesium	Mg	2^+
Nitride	N	3^-

Step 1 – Write each symbol with valency

Positive ion is written first. Mg^{2+} $N3^-$

Step II – Inter change the valencies positive ion is write first.

The Formula is Mg_3N_2

(m) Sodium zincate :

	Symbol	Valency
Sodium	Na	1^+
Zincate	ZnO_2	2^-

Step 1 – Write each symbol with valency

Positive ion is written first

Na^{1+} $[ZnO_2]^{2-}$

Step II – Inter change the valencies ignoring (+) and (–) signs

$Na_2 [ZnO_2]_1$ Ignore 1

The Formula is Na_2ZnO_2

(n) Copper [II] oxide :

	Symbol	Valency
Copper	Cu	2^+
Oxide	O	2^-

Step 1 – Write each symbol with valency

Positive ion is written first

Cu^{2+} O^{2-}

Step II – Inter change the valencies ignoring (+) and (–) signs

$Cu_2\ O_2$ Cancelling 2

The Formula is CuO

(o) Copper [I] sulphide :	Symbol	Valency
Copper	Cu	1^+
Oxide	S	2^-

Step 1 – Write each symbol with valency

Positive ion is written first

Cu^{1+} S^{2-}

Step II – Inter change the valencies ignoring the signs

Cu_2S_1 Ignore 1

The Formula is Cu_2S

(p) Iron [III] chloride :	Symbol	Valency
Iron	Fe	3^+
Chloride	Cl	1^-

Step 1 – Write each symbol with valency

Positive ion is written first

Fe^{3+} Cl^{1-}

Step II – Inter change the valencies ignoring (+) and (–) signs

Fe_1Cl_3 Ignore 1

The Formula is $FeCl_3$

(q) Iron [II] hydroxide :	Symbol	Valency
Iron	Fe	2^+
Hydroxide	OH	1^-

Step 1 – Write each symbol with valency

Positive ion is written first

Fe^{2+} $[OH]^{1-}$

Step II – Inter change the valencies ignoring signs

$Fe_1[OH]_2$ Ignore 1

The Formula is $Fe[OH]_2$

(r) Iron [III] sulphur :

	Symbol	Valency
Iron	Fe	3^+
Sulphur	S	2^-

Step 1 – Write each symbol with valency

Positive ion is written first

Fe^{3+} S^{2-}

Step II – Inter change the valencies ignoring (+) and (–) signs

The Formula is Fe_2S_2

(s) Iron [III] oxide :

	Symbol	Valency
Iron	Fe	3^+
Oxide	O	2^-

Step 1 – Write each symbol with valency

Positive ion is written first

Fe^{3+} O^{2-}

Step II – Inter change the valencies ignoring (+) and (–) signs

The Formula is Fe_2O_3

Question 9.

What' is a chemical equation. How is it represented. Differentiate between a 'word equation' and a 'molecular equation' with a suitable example.

Answer:
"Chemical equation is a short form – representing the result of a chemical change."
OR
"Is the representation of a chemical change."
Word equation tells which substances react (take part) in chemical reaction and which substances are produced where as molecular equation symbols and molecular formulas are used for both reactants and products.
Example : When zinc reacts with dilute sulphuric acid, both being reactants, products produced are zinc sulphate and hydrogen gas, which are shown as below:

Word equation :
Zinc + Sulphuric acid → Zinc sulphate + Hydrogen
Molecular equation :

$$\underset{\text{Zinc}}{Zn} + \underset{\text{[Sulphuric acid]}}{H_2SO_4(dil.)} \longrightarrow \underset{\text{[Zinc sulphate]}}{ZnSO_4} + \underset{\text{[Hydrogen]}}{H_2[g]}$$

Question 10.
State the information provided by a chemical equation. Chemical equations suffer from a number of limitations. State the main limitations of a chemical equation.

Answer:
Information provided by a chemical equation :

(a) It tells us the formulas and symbols of the reactants and products.
(b) It tells us the ratio in which substances reacts or are produced. If limitations are covered.
(c) It tells the physical state of substances i.e. solid, liquid, gas.
(d) Whether the reaction is endothermic or exothermic.
(e) Conditions for starting the reaction i.e. if catalyst is needed or not.
(f) If reaction is reversible or not.

Limitations :

(a) Physical states of the reactants or products. But now we write along with substances (1) for liquids, (s) for solid and (g) for gas.
(b) Conditions that effect the reaction, i.e. temp, pressure or catalyst.
(c) Concentration of reactants and products we use dil. for dilute and cone, for concentrated.
(d) Nature of the chemical reaction.
(e) Speed – reaction is fast or slow.
(f) Exothermic or endothermic we write + heat or – heat towards products for exothermic and endothermic.
(g) The completion of the reaction.

Question 11.
State what is a balanced equation with a relevant example. Give a reason why an equation is balanced with reference to the law of conservation of matter.

Answer:
A balanced equation : "An equation is said to be balanced if the number of atoms of each element of the reactant is equal to the number of atoms of each element of the product."
Example :
$2Mg + O_2 \rightarrow 2MgO$
[Reactants] [Product]
Reactans have 2 atoms of Mg and 2 atoms of oxygen.
Products have 2 atoms of magnesium and 2 atoms of oxygen.
∴ Number of atoms of each element of reactants = Number of atoms of each element of product.

- **Reason for balancing equation :** Law of conservation of matter says that "Matter is neither created nor destroyed during a chemical reaction." This is possible only if number of atoms of each element on both sides of → are equal i.e. in reactants and also in products. Hence a reaction is balanced.

Question 12.
Write balanced molecular equations for the following word equations :

(a)	Calcium	+ oxygen	→ Calcium oxide	
(b)	Calcium	+ water	→ Calcium hydroxide	+ hydrogen
(c)	Zinc	+ sulphuric acid	→ Zinc sulphate	+ hydrogen
(d)	Lead sulphate	+ ammonium hydroxide	→ Ammonium sulphate	+ lead hydroxide
(e)	Copper hydroxide	+ nitric acid	→ Copper nitrate	+ water
(f)	Lead nitrate	+ sodium chloride	→ Sodium nitrate	+ lead chloride

Answer:

(a) $2Ca + O_2 \longrightarrow 2CaO$
(b) $Ca + 2H_2O \longrightarrow Ca(OH)_2 + H_2$
(c) $Zn + H_2SO_4 \longrightarrow ZnSO_4 + H_2$
(d) $PbSO_4 + 2NH_4OH \longrightarrow Pb[OH]_2 + [NH_4]_2SO_4$
(e) $Cu[OH]_2 + 2HNO_3 \longrightarrow Cu[NO_3]_2 + 2H_2O$
(f) $Pb[NO_3]_2 + 2NaCl \longrightarrow 2NaNO_3 + PbCl_2$

Question 13.
Balance the following equations :

(a) $P + O_2 \rightarrow P_2O_5$

(b) $Na_2O + H_2O \rightarrow NaOH$

(c) $K + H_2O \rightarrow KOH + H_2$

(d) $Fe + H_2O \rightleftharpoons Fe_3O_4 + H_2$

(e) $CaO + HCl \rightarrow CaCl_2 + H_2O$

(f) $Fe + Cl_2 \rightarrow FeCl_3$

(g) $Al + H_2O \rightarrow Al_2O_3 + H_2$

(h) $Al + H_2SO_4 \rightarrow Al_2(SO_4)_3 + H_2$

(i) $Fe_2O_3 + H_2 \rightarrow Fe + H_2O$

(j) $C + H_2SO_4 \rightarrow CO_2 + H_2O + SO_2$

(k) $Pb_3O_4 \rightarrow PbO + O_2$

(l) $Al + O_2 \rightarrow Al_2O_3$

(m) $NO + O_2 \rightarrow NO_2$

(n) $ZnS + O_2 \rightarrow ZnO + SO_2$

(o) $Pb_3O_4 + HCl \rightarrow PbCl_2 + H_2O + Cl_2$

(p) $ZnO + NaOH \rightarrow Na_2ZnO_2 + H_2O$

(q) $H_2S + Cl_2 \rightarrow S + HCl$

(r) $FeCl_3 + NaOH \rightarrow NaCl + Fe(OH)_3$

(s) $Fe_2O_3 + CO \rightarrow Fe + CO_2$

(t) $KHCO_3 \rightarrow K_2CO_3 + H_2O + CO_2$

(u) $CuO + NH_3 \rightarrow Cu + H_2O + N_2$

Answer:

(a) $P + O_2 \rightarrow P_2O_5$

To balance O atoms on both sides

$P + 5O_2 \rightarrow 2P_2O_5$

There are 4 P atoms on RHS

$\therefore$ Make P atoms 4 on LHS

$4P + 5O_2 \rightarrow 2P_2O_5$

Atoms of P and O are equal on both sides.

(b) $Na_2O + H_2O \rightarrow NaOH$

To make Na atoms equal to 2 on RHS

$Na_2O + H_2O \rightarrow 2NaOH$

Atoms of Na, O and H are balance on both sides.

(c) $K + H_2O \rightarrow KOH + H_2$

Multiply H_2O by 2 on left side and KOH by 2 on right to make H and O equal.

$K + 2H_2O \rightarrow 2KOH + H_2$

To make K equal make 2K on left.

$2K + 2H_2O \rightarrow 2KOH + H_2$

There are 2K atoms, 2(O) atoms and 4H atoms on both side.

(d) $Fe + H_2O \rightleftharpoons Fe_3O_4 + H_2$

To make Fe_3 mutliply Fe by 3 on left and to make O_4 multiply H_2O by 4

$\therefore$ $3Fe + 4H_2O \rightleftharpoons Fe_3O_4 + 4H_2$

(e) $CaO + HCl \rightarrow CaCl_2 + H_2O$

There 2 Cl atoms on right : Use 2HCl on left side.

$CaO + 2HCl \rightarrow CaCl_2 + H_2O$

(f) $Fe + Cl_2 \rightarrow FeCl_3$

To make Cl atoms equal *i.e.* 6

$Fe + 3Cl_2 \rightarrow 2FeCl_3$

Make 2 Fe on left side.

$2Fe + 3Cl_2 \rightarrow 2FeCl_3$

(g) $Al + H_2O \rightarrow Al_2O_3 + H_2$

To balance Al and O atoms equal

$2Al + 3H_2O \rightarrow Al_2O_3 + H_2$

But there are 6 atoms of H on left and 2 atoms of H on right.

$\therefore$ $2Al + 3H_2O \rightarrow Al_2O_3 + 3H_2$

(h) $Al + H_2SO_4 \rightarrow Al_2(SO_4)_3 + H_2$

To make atoms of Al and (SO_4) equal

$2Al + 3H_2SO_4$ $Al_2(SO_4) + H_2$

To H atoms 6 multiply H_2 on right by 3

$2Al + 3H_2SO_4 \rightarrow Al_2(SO_4)_3 + 3H_2$

Atoms of each element on left are equal on right side.

(i) $Fe_2O_3 + H_2 \rightarrow Fe + H_2O$

There are 2 atoms of Fe on left.

$Fe_2O_3 + H_2 \rightarrow 2Fe + H_2O$

Now equate O atoms and use $3H_2O$ on right.

$Fe_2O_3 + H_2 \rightarrow 2Fe + 3H_2O$

But H atoms on right are 6 make $3H_2$ on left.

$\therefore$ $Fe_2O_3 + 3H_2 \rightarrow 2Fe + 3H_2O$

It is balanced.

(j) $C + H_2SO_4 \rightarrow CO_2 + H_2O + SO_2$

Atoms of oxygen are not equal on both sides.

To make atoms equal, we multiply H_2SO_4 on left by 2 and equate.

$C + 2H_2SO_4 \rightarrow CO_2 + 2H_2O + 2SO_2$

Atoms of each element are equal on both sides.

(k) $Pb_3O_4 \rightarrow PbO + O_2$

Multiply PbO by 3 to make Pb equal.

$Pb_3O_4 \rightarrow 3PbO + O_2$

Multiply Pb_3O_4 by 2 and 3PbO by 2

$2Pb_3O_4 \rightarrow 6PbO + O_2$

Iit is balanced equation.

(l) $Al + O_2 \rightarrow Al_2O_3$

Multiply Al by 4 and Al_2O_3 by 2 to make atoms of Al equal.

$4Al + O_2 \rightarrow 2Al_2O_3$

To make oxygen atoms equal

$4Al + 3O_2 \rightarrow 2Al_2O_3$

(m) $NO + O_2 \rightarrow NO_2$

Multiply NO and NO_2 by 2

$2NO + O_2 \rightarrow 2NO_2$

(n) $ZnS + O_2 \rightarrow ZnO + SO_2$

Multiply O_2 by 3 and to make atoms of oxygen equal on both sides multiply right side by 2.

$ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$

Multiply ZnS by 2 to make balanced euqation.

$2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$

Atoms of every element are equal on both sides.

(o) $Pb_3O_4 + HCl \rightarrow PbCl_2 + H_2O + Cl_2$

There are 4 atoms of oxygen in Pb_3O_4 so make H atoms 8 in HCl.

$Pb_3O_4 + 8HCl \rightarrow PbCl_2 + H_2O + Cl_2$

Multiply $PbCl_2$ by 3 to make Pb atoms equal and H_2O by 4.

$Pb_3O_4 + 8HCl \rightarrow 3PbCl_2 + 4H_2O + Cl_2$

(p) $ZnO + NaOH \rightarrow Na_2ZnO_2 + H_2O$

Multiply NaOH on left side by 2 to make Na and O equal.

$ZnO + 2NaOH \rightarrow Na_2ZnO_2 + H_2O$

(q) $H_2S + Cl_2 \rightarrow S + HCl$

Multiply HCl on right side by 2 and atoms of H and Cl are balanced.

$H_2S + Cl_2 \rightarrow S + 2HCl$

(r) $FeCl_3 + NaOH \rightarrow NaCl + Fe(OH)_3$

Multiply NaOH by 3 and NaCl by 3

$FeCl_3 + 3NaOH \rightarrow 3NaCl + Fe(OH)_3$

(s) $Fe_2O_3 + CO \rightarrow Fe + CO_2$

Multiply Fe by 2 to make atoms of Fe equal and to make CO_2 atoms equal by using 3 atoms of oxygen in Fe_2O_3

$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

(t) $KHCO_3 \rightarrow K_2CO_3 + H_2O + CO_2$

Multiply $KHCO_3$ by 2 on left side

$2KHCO_3 \rightarrow K_2CO_3 + H_2O + CO_2$

(u) $CuO + NH_3 \rightarrow Cu + H_2O + N_2$

Multiply CuO by 3, NH_3 by 2, Cu by 3 and H_2O by 3

$3CuO + 2NH_3 \rightarrow 3Cu + 3H_2O + N_2$

OBJECTIVE TYPE QUESTIONS

Q.1. Complete the statements given below by filling in the blank with the correct words.

Question 1.
The formula of silver [I] chloride is ___ [AgCl/$AgCl_2$].
Answer:
The formula of silver [I] chloride is **AgCl.**

Question 2.
The basic unit of an element is a/an ___ [molecule/atom/ion]
Answer:
The basic unit of an element is a/an **atom.**

Question 3.
Atoms contains ___ [netron/nucleus/, with positively charged __ [electrons/protons].
Answer:
Atoms contains **nucleus** with positively charged **protons.**

Question 4.
Element ___ [calcium/lead/carbon] has the symbol derived from its Laltin name 'plumbum'.

Answer:
Element **lead** has the symbol derived from its Laltin name 'plumbum'.

Question 5.
From the elements – He, Br, Pt & O; the element which forms a polyatomic molecule is ___ & which is liquid at room temperature is ___
Answer:
From the elements – He, Br, Pt & O; the element which forms a polyatomic molecule is **O** & which is liquid at room temperature is **Br.**

Question 6.
The valency of iron in FeO is ___ [$2^+/1^+$] of chlorine [chloride] in $CaCl_2$ is ___ [$1^-/2^-$] and of dichromate in $K_2Cr_2O_7$ is [$2^+/2^-$].
Answer:
The valency of iron in FeO is **2^+** of chlorine [chloride] in $CaCl_2$ is **1^-** and of dichromate in $K_2Cr_2O_7$ is 2^-.

Q.2. Match the statements – 1 to 10 below with their correct answers from – A to J.

1. Elements having valency of two.	A: Br^{1-}
2. An anion	B: Divalent
3. A gaseous non-metal	C: Reactants
4. A cation.	D: Ammonium
5. The term used for the substances which take part in the chemical reaction	E: Nitric oxide
6. The meaning of the symbol 'Δ' over the arrow in a chemical equation.	F: Nitrogen
7. The chemical name for nitrogen monoxide.	G: Zero
8. A radical containing nitrogen & hydrogen only	H: Nitrous oxide
9. The chemical name for dinitrogen oxide	I: Heat required
10. The valency of noble gases	J: K^{1+}

Answer:

1.	Elements having valency of two.	B: Divalent
2.	An anion	A: Br^{1-}
3.	A gaseous non-metal	F: Nitrogen
4.	A cation.	J: K^{1+}
5.	The term used for the substances which take part in the chemical reaction	C: reactants
6.	The meaning of the symbol 'Δ' over the arrow in a chemical equation.	I: Heat required
7.	The chemical name for nitrogen monoxide.	E: Nitric oxide
8.	A radical containing nitrogen & hydrogen only	D: Ammonium
9.	The chemical name for dinitrogen oxide	H: Nitrous oxide
10.	The valency of noble gases	G: Zero

Q.3. Match the compounds in List I – 1 to 20 with their correct formulas in List II – A to T.

1. Copper [I] sulphide	2. Potassium permanganate
3. Phosphoric acid	4. Copper [I] oxide
5. Carbonic acid	6. Aluminium sulphide
7. Iron [II] oxide	8. Iron [III] sulphide
9. Iron [II] sulphate	10. Sodium zincate
11. Nitrous oxide	12. Aluminium sulphate
13. Magnesium nitride	14. Iron [III] sulphate
15. Copper [II] oxide	16. Iron [III] oxide
17. Nitric oxide	18. Copper [II] sulphide
19. Iron [II] sulphide	20. Magnesium nitrate

A. $KMnO_4$	B. Mg_3N_2
C. $Mg(NO_3)_2$	D. $Al_2(SO_4)_3$
E. Na_2ZnO_2	F. N_2O
G. H_2CO_3	H. Al_2S_3
I. NO	J. FeS
K. Fe_2S_3	L. H_3PO_4
M. Cu_2S	N. CuS
O. Fe_2O_3	P. FeO
Q. $FeSO_4$	R. $Fe_2(SO_4)_3$
S. CuO	T. Cu_2O

Answer:

1.	Copper [I] sulphide	M.	Cu_2S
2.	Potassium permanganate	A.	$KMnO_4$
3.	Phosphoric acid	L.	H_3PO_4
4.	Copper [I] oxide	T.	Cu_2O
5.	Carbonic acid	G.	H_2CO_3
6.	Aluminium sulphide	H.	Al_2S_3
7.	Iron [II] oxide	P.	FeO
8.	Iron [III] sulphide	K.	Fe_2S_3
9.	Iron [II] sulphate	Q.	$FeSO_4$
10.	Sodium zincate	E.	Na_2ZnO_2
11.	Nitrous oxide	F.	N_2O
12.	Aluminium sulphate	D.	$Al_2(SO_4)_3$
13.	Magnesium nitride	B.	Mg_3N_2
14.	Iron [III] sulphate	R.	$Fe_2(SO_4)_3$
15.	Copper [II] oxide	S.	CuO
16.	Iron [III] oxide	O.	Fe_2O_3
17.	Nitric oxide	I.	NO
18.	Copper [II] sulphide	N.	CuS
19.	Iron [II] sulphide	J.	FeS
20.	Magnesium nitrate	C.	$Mg(NO_3)_2$

Q.4. Underline the incorrectly balanced compound in each equation & rewrite the correct equation.

Question 1.
$2Na + 3H_20 \rightarrow 2NaOH + H_2$
Answer:
Correct equation is :
$2Na + 2H_20 \rightarrow 2NaOH + H_2$

Question 2.
$4P + 4O_2 \rightarrow 2P_2O_5$
Answer:
Correct equation is :
$4P + 5O_2 \rightarrow 2P_2O_5$

Question 3.
$FE_2O_3 + 2H_2 \rightarrow 2Fe + 3H_20$

Answer:
Correct equation is :
$FE_2O_3 + 3H_2 \rightarrow 2Fe + 3H_20$

Question 4.
$2A1 + 2H_2SO_4 \rightarrow A1_2(SO_4)3 + 3H_2$
Answer:
Correct equation is :
$2A1 + 3H_2SO_4 \rightarrow A1_2(SO_4)3 + 3H_2$

Question 5.

$$N_2 + 3H_2 \rightleftharpoons NH_3$$

Answer:
Correct equation is :

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

Question 6.
$ZnO + 3NaOH \rightarrow NA_2ZnO_2 + H_20$
Answer:
Correct equation is :
$ZnO + 2NaOH \rightarrow NA_2ZnO_2 + H_20$

Question 7.
$FeCl_3 + 3NH_4OH \rightarrow 2NH_4C1 + Fe(OH)_3$
Answer:
Correct equation is :

$$FeCl_3 + 3NH_4OH \rightarrow 3NH_4Cl + Fe(OH)_3$$

Question 8.
$FeS + 2HCl \rightarrow 2FeCl_2 + H_2S$
Answer:
Correct equation is :
$FeS + 2HCl \rightarrow FeCl_2 + H_2S$

Question 9.
$3NH_3 + H_2So_4 \rightarrow (NH_4)_2So_4$
Answer:
Correct equation is :
$2NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$

Question 10.

$PbO_2 + 4HCl \rightarrow PbCl_2 + H_20 + Cl_2$

Answer:

Correct equation is :

$PbO_2 + 4HCl \rightarrow PbCl_2 + 2H_20 + Cl_2$