

nitrate solution, it is observed that the solution turns bluish green.

(a) Explain the observation.

because copper goes into the solution as Cu^{2+} ions and displaces Ag^+ ions from the solution.

(b) $2\text{AgNO}_3(\text{aq}) + \text{Cu}(\text{s}) \longrightarrow 2\text{Ag}(\text{s}) + \text{Cu}(\text{NO}_3)_2(\text{aq})$

Colourless

Blue

solution

solution

Worksheet

Home Assignment

1

- Name any two metals which are soft and can be cut with an ordinary knife.
- What happens if a strip of zinc is immersed in a solution of copper sulphate?
- Name two amphoteric oxides.
- Name one metal and one non-metal which exist in liquid state at room temperature.
- Which is more metallic: sodium or aluminium?
- What will happen if a strip of copper is immersed in a solution of silver nitrate (AgNO_3)?
- Fill in the blanks in the following statements with suitable words:
 - Zinc displaces copper from a solution of Cu^{2+} but does not.
 - Magnesium liberates gas on reacting with boiling water.
 - The white powder formed when magnesium ribbon burns in oxygen is of
- Which of the following reactions will not occur? Explain:
 - $\text{CuSO}_4(\text{aq}) + \text{Fe}(\text{s}) \longrightarrow \text{FeSO}_4(\text{aq}) + \text{Cu}(\text{s})$
 - $\text{MgSO}_4(\text{aq}) + \text{Fe}(\text{s}) \longrightarrow \text{FeSO}_4(\text{aq}) + \text{Mg}(\text{s})$
 - $\text{MgSO}_4(\text{aq}) + \text{Cu}(\text{s}) \longrightarrow \text{CuSO}_4(\text{aq}) + \text{Mg}(\text{s})$
- Give chemical equations to show that
 - hydrogen gas is passed over heated calcium.
 - red hot iron reacts with steam.
 - sodium oxide reacts with water.
- Name two metals which are lighter than water.
- Which metal is mainly used in the current five paise coins?
- Complete the following chemical equations:
 - $\text{Fe}(\text{s}) + \text{H}_2\text{O}(\text{g}) \xrightarrow{\text{Red heat}}$
 - $\text{Na}_2\text{O} + \text{H}_2\text{O} \longrightarrow$
 - $\text{Ag}^+(\text{aq}) + \text{Cu}(\text{s}) \longrightarrow$
 - $\text{MgO} + \text{Cu} \longrightarrow$
- Which of the following metals will displace hydrogen from dilute hydrochloric acid?
- Complete the following sentences by selecting appropriate word from two choices given:
 - Iron occupies position than magnesium in the activity series. (*lower/higher*)
 - An element having electronic configuration 2, 8, 1 is reactive than the one having electronic configuration 2, 8, 3. (*more/less*)
 - Sodium is reactive than copper (*less/more*) because it occupies position in the reactivity series. (*higher/lower*)
 - The most common physical state of metals at room temperature is (*solid/liquid*)
 - A metal occupying higher position in the activity series displace other metals lying below it from their solutions. (*can/cannot*)
- From amongst the metals, name the metal which is
 - best conductor of electricity
 - poorest conductor of electricity: Ag, Hg, Fe, Pb, Cu, Al.
- From the following displacement reactions, predict which is the most reactive metal?
 $\text{Cu}^{2+}(\text{aq}) + \text{Fe}(\text{s}) \longrightarrow \text{Fe}^{2+}(\text{aq}) + \text{Cu}(\text{s})$
 $2\text{Ag}^+(\text{aq}) + \text{Cu}(\text{s}) \longrightarrow \text{Cu}^{2+}(\text{aq}) + 2\text{Ag}(\text{s})$
 $\text{Fe}^{2+}(\text{aq}) + \text{Zn}(\text{s}) \longrightarrow \text{Zn}^{2+}(\text{aq}) + \text{Fe}(\text{s})$
- What is the nature of
 - metal oxides
 - non-metal oxides?
- Name two metals which are both malleable and ductile.
- Name one metal which is more active than hydrogen and one metal which is less active than hydrogen.
- In nature, metal A is found in free state while metal B is found in the form of its compounds. Which of these two metals will be near the top of the reactivity series?
- Which of the following element would yield a basic oxide?
S, P, Ca, Si

22. Name two metals which can form hydrides with hydrogen.
23. Name a non-metal which is a good conductor of electricity.
24. Name one non-metal
 (i) which has metallic lustre,
 (ii) is liquid at room temperature.
25. Classify the following elements into metals and non-metals :
 Potassium, sulphur, diamond and argon.
26. An element X has the electronic configuration 2, 8, 8, 2. On the basis of electronic configuration, answer the following :
 (a) Does this element form acidic or basic oxide ?
 (b) Is it expected to be malleable and ductile or not ?
- (c) Will this element displace hydrogen from dilute acids ?
- (d) Is the element expected to be good conductor of electricity or not ?
27. Write the names of two oxides which are neither acidic nor basic.
28. What type of oxides are formed when non-metals combine with oxygen ?
29. Which of the following elements would give acidic oxide ?
 K, P, Na or H
30. An element M forms an oxide M_2O_3 , which is acidic in nature. State whether the element M is a metal or a non-metal.

Answers and Hints on Page 218

HOW DO METALS AND NON-METALS REACT

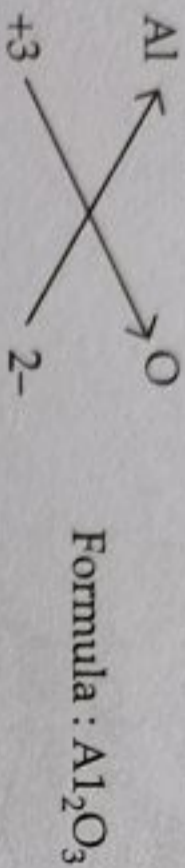
As we have already learnt metals have 1 to 3 electrons in their outermost shells while non-metals have 4 to 8 electrons in their outermost shells. The atoms containing 8 electrons in their outermost shells are noble gases except helium which has only two electrons in its outermost shell. K s electronic

Solved Examples

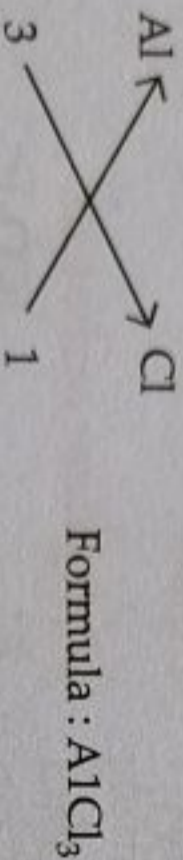
□ **Example 8.** Write the chemical formulae of the following compounds :

- (a) aluminium oxide (b) aluminium chloride
 (c) hydrogen sulphide (d) Calcium hydroxide

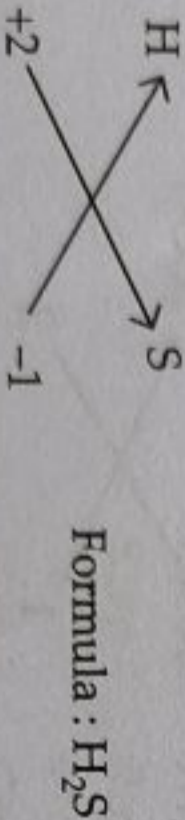
Solution : (a) Aluminium oxide :



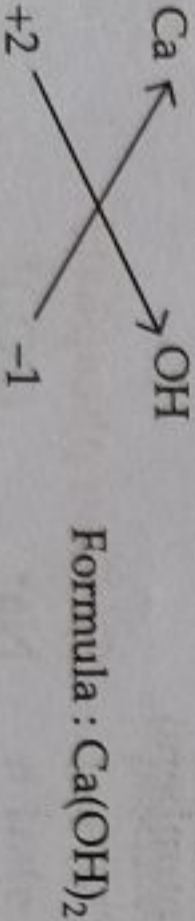
(b) Aluminium chloride



(c) Hydrogen sulphide



(d) Calcium hydroxide



□ **Example 9.** Write the chemical formulae for the following :

- (i) Silver oxide (ii) Copper (II) sulphide
 (iii) Iron (II) bromide (iv) Calcium fluoride

Solution : (i) Silver oxide : $\text{Ag}^+ \text{O}^{2-} = \text{Ag}_2\text{O}$

(ii) Copper (II) sulphide : $\text{Cu}^{2+} \text{S}^{2-} = \text{CuS}$

(iii) Iron (II) bromide : $\text{Fe}^{2+} \text{Br}^- = \text{FeBr}_2$

(iv) Calcium fluoride : $\text{Ca}^{2+} \text{F}^- = \text{CaF}_2$.

□ **Example 10.** Write down the names of compounds represented by the following formulae :

- (i) $\text{Al}_2(\text{SO}_4)_3$ (ii) MgCl_2 (iii) K_2SO_4
 (iv) KNO_3 (v) CaCO_3

Solution :

(i) $\text{Al}_2(\text{SO}_4)_3$: Aluminium sulphate

(ii) MgCl_2 : Magnesium chloride

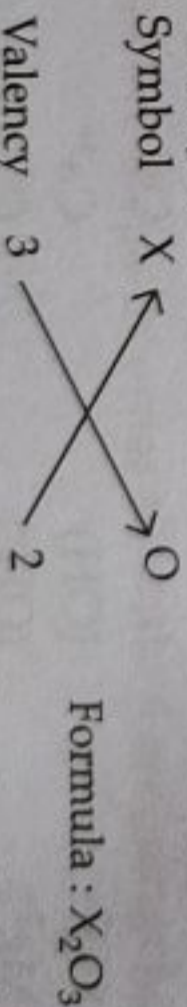
(iii) K_2SO_4 : Potassium sulphate

(iv) KNO_3 : Potassium nitrate

(v) CaCO_3 : Calcium carbonate

□ **Example 11.** An element X shows a variable valency of 3 and 5. Write the formulae of two oxides of this element.

Solution : Formula of oxide of element X when its valency is 3.



Formula of oxide of element X when its valency is 5.



Example 12. An element E forms an oxide with formula E_2O_3 .

- (a) State the valency of E.
 (b) Write the formula of its

(i) chloride (ii) sulphate (iii) phosphate

Solution : (a) In E_2O_3 ,

Valency of one O atom = 2

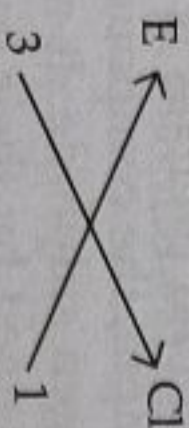
Valency of three O atom = $2 \times 3 = 6$

\therefore In E_2O_3 , the valencies of 2E atoms should be equal to the total valencies of O i.e., 6.

Valency of 2E atoms = 6

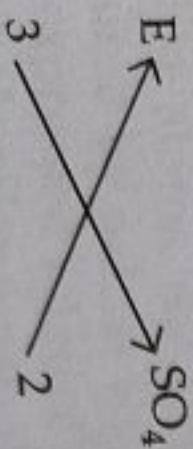
Valency of one E atom = $6/2 = 3$

(b) (i) Formula of chloride



Formula : ECl_3

(ii) Formula of sulphate



Formula : $E_2(SO_4)_3$

(iii) Formula of phosphate



Formula : EPO_4

Example 13. Predict which of the following are correct or wrong. Correct the wrong formula :

- (a) Magnesium nitrate : $Mg(NO_2)_2$
 (b) Barium carbonate : $Ba(CO_3)_2$
 (c) Silver sulphide : AgS
 (d) Potassium sulphate : K_2SO_4

Solution :

(a) Magnesium nitrate



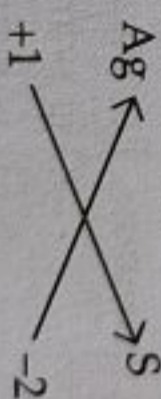
Formula : $Mg(NO_3)_2$
 It is correct.

(b) Barium carbonate



$BaCO_3$
 So the given formula is wrong. It should be $BaCO_3$.

(c) Silver sulphide



Formula Ag_2S
 The given formula is wrong. It should be Ag_2S .

(d) Potassium sulphate



Formula K_2SO_4
 The given formula is correct.

NAMING BINARY MOLECULAR COMPOUNDS

In a binary molecular compound, we first write the name of the

NAMING BINARY MOLECULAR COMPOUNDS

For naming a binary molecular compound, we first write the name of the element, whose symbol appears on the left hand side of the molecular formula of the compound. The name of the other element is changed to end in *-ide* and is written on the right. For example,

HCl is named as hydrogen chloride (chlorine changes to chloride).

When there are more than one elements of an element in a compound, their number is indicated by attaching a Greek numeral prefix (prefix is a word used before a name). For example, the prefix *mono* is used for 1, *di* for 2, *tri* for 3, *tetra* for 4, *penta* for 5, *hexa* for 6, etc. It may be noted that *-o* or *-a* at the end of a prefix is dropped if it is followed by another vowel (i.e. *a, e, i, o, u*). For example, mono-oxide is written as monoxide (*o* is dropped), penta-oxide is written as pentoxide (*a* is dropped) etc. For example,

(i) CO is named as carbon monoxide (here the prefix *mono* means 1 oxygen atom).

(ii) CO₂ is named as carbon dioxide (here the prefix *di* means 2 oxygen atoms).

The use of numeral prefixes is shown below :

Table 9. Use of numeral prefixes

No. of atoms	Prefix	Formula	Name
1	Mono	CO	Carbon monoxide
2	Di	CO ₂	Carbon dioxide
3	Tri	PCl ₃	Phosphorus trichloride
4	Tetra	CCl ₄	Carbon tetrachloride
5	Penta	PCl ₅	Phosphorus pentachloride

Table 10. Some common binary molecular compounds

Formula	Name
H ₂ O	Water
CO	Carbon monoxide
CO ₂	Carbon dioxide
NO	Nitrogen monoxide
NO ₂	Nitrogen dioxide
N ₂ O ₅	Dinitrogen pentoxide
NH ₃	Ammonia
CH ₄	Methane
SO ₂	Sulphur dioxide
SO ₃	Sulphur trioxide
CCl ₄	Carbon tetrachloride
N ₂ O ₄	Dinitrogen tetroxide

It may be noted that the prefixes are needed in naming binary compounds in which the same two non-metallic elements can form many different compounds. For example, the two elements namely nitrogen and oxygen can form six different compounds. These are named as :

NO	:	Nitrogen monoxide
NO ₂	:	Nitrogen dioxide
N ₂ O	:	Dinitrogen monoxide
N ₂ O ₃	:	Dinitrogen trioxide
N ₂ O ₄	:	Dinitrogen tetroxide (<i>a</i> of tetra is not written because it is followed by vowel- <i>o</i>).
N ₂ O ₅	:	Dinitrogen pentoxide (<i>a</i> of penta is not written because it is followed by vowel- <i>o</i>).

Therefore, it is very necessary to use prefixes in naming such compounds.

When hydrogen is the first element in the formula no prefixes is added before hydrogen irrespective of the number. For example, the compound H₂S is named as hydrogen sulphide and not as dihydrogen sulphide. It may be noted that some binary molecular compounds are named by their common names. For example,

H₂O is water though it is hydrogen monoxide

NH₃ is ammonia though it is nitrogen trihydride.

CH₄ is methane though it is carbon tetrahydride.

The names of some common binary molecular compounds are given in Table 10.