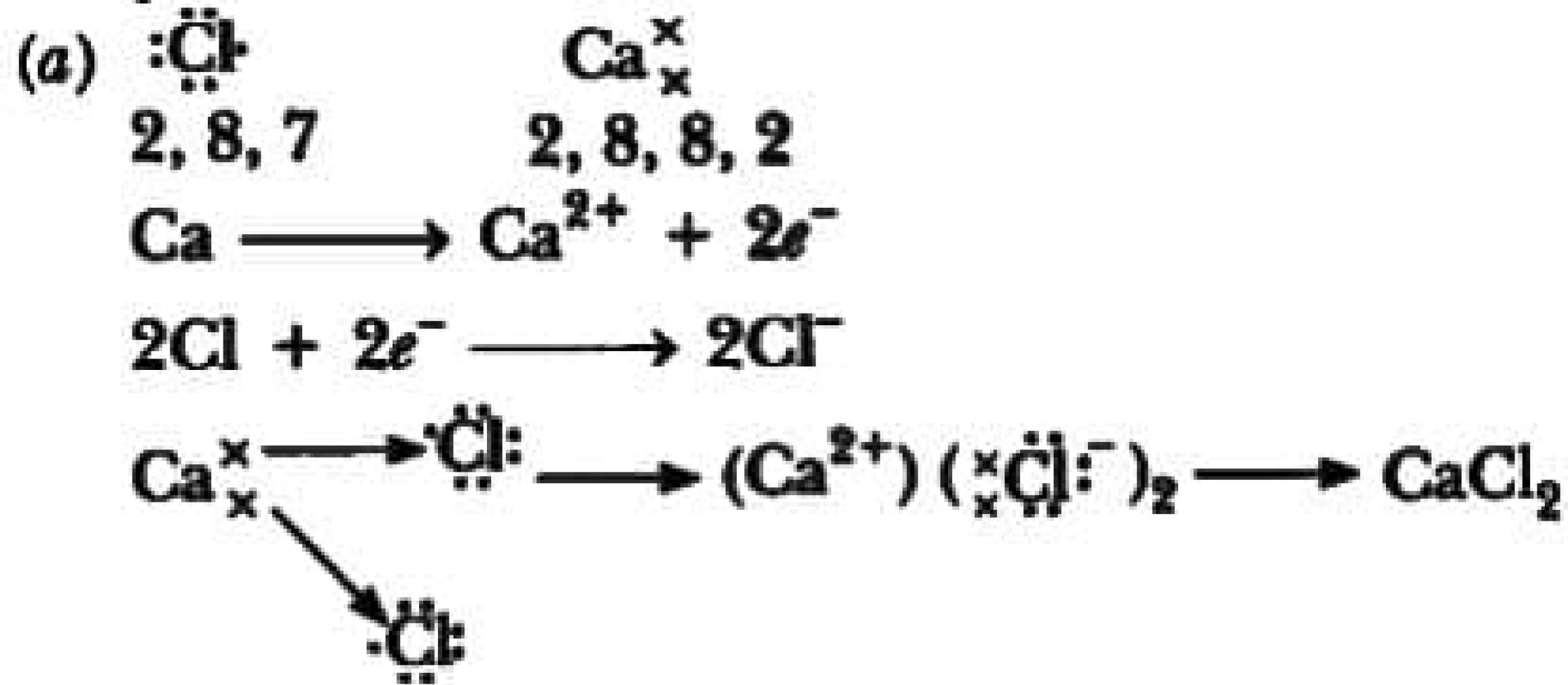


PROPERTIES OF IONIC COMPOUNDS

- **Physical nature:** Ionic compounds are solids and are somewhat hard because of the strong force of attraction between the positive and negative ions. These compounds are generally brittle and break into pieces when pressure is applied.
- **Melting and Boiling points:** Ionic compounds have high melting and boiling points (see Table 3.4). This is because a considerable amount of energy is required to break the strong inter-ionic attraction.
- **Solubility:** Electrovalent compounds are generally soluble in water and insoluble in solvents such as kerosene, petrol, etc.
- **Conduction of Electricity:** The conduction of electricity through a solution involves the movement of charged particles. A solution of an ionic compound in water contains ions, which move to the opposite electrodes when electricity is passed through the solution. Ionic compounds in the solid state do not conduct electricity because movement of ions in the solid is not possible due to their rigid structure. But ionic compounds conduct electricity in the molten state. This is possible in the molten state since the electrostatic forces of attraction between the oppositely charged ions are overcome due to the heat. Thus, the ions move freely and conduct electricity



5B. Compare in tabular form the reactivities of the following metals with cold and hot water:

(A) Sodium

(B) Calcium

(C) Magnesium

[CBSE 2020]

Ans. Reactivities of the metals:

Sodium	Calcium	Magnesium
<p>Sodium reacts with cold water and forms sodium hydroxide and hydrogen gas</p> $2\text{Na}_{(s)} + 2\text{H}_2\text{O}_{(l)} \longrightarrow 2\text{NaOH}_{(aq)} + \text{H}_2(g) + \text{Heat}$ <p>Reaction with water is highly exothermic. Hydrogen gas produced during the reaction catches fire and causes explosion.</p> <p>Sodium is a very reactive metal.</p>	<p>Calcium reacts with cold water and forms calcium hydroxide and hydrogen gas.</p> $\text{Ca}_{(s)} + 2\text{H}_2\text{O}_{(l)} \longrightarrow \text{Ca(OH)}_2(aq) + \text{H}_2(g)$ <p>The heat produced during reaction is not sufficient to burn hydrogen gas. The bubbles of gas formed stick to the piece of calcium metal and it starts floating in water.</p> <p>Calcium is less reactive than sodium $\text{Na} > \text{Ca} > \text{Mg}$.</p>	<p>Magnesium reacts with hot water and forms magnesium hydroxide and hydrogen gas</p> $\text{Mg} + 2\text{H}_2\text{O}_{(l)} \longrightarrow \text{Mg(OH)}_2(aq) + \text{H}_2(g)$ <p>When Mg reacts with steam it forms magnesium oxide and hydrogen.</p> $\text{Mg}_{(s)} + \text{H}_2\text{O}_{(g)} \longrightarrow \text{MgO}_{(s)} + \text{H}_2(g)$ <p>Piece of Magnesium starts floating in water due to bubbles of Hydrogen gas which stick to its surface.</p> <p>Magnesium is less reactive than calcium.</p>

72. What are ionic compounds? Why do ionic compounds not conduct electricity in the solid state? [CBSE 2019]

Ans. Ionic compounds are the compounds formed by the combination of oppositely charged ions formed by transfer of electrons from one atom to another.

Ionic compounds do not conduct electricity in solid state as they have a rigid structure as ions are not free to move due to strong electrostatic forces of attraction between them.

Q3. List in tabular form three chemical properties on the basis of which we can differentiate between a metal and a non-metal.

[CBSE 2019]

Ans. Chemical properties used to differentiate between metal and non-metals:

	Metals	Non-Metals
(1)	<p>Metals are electro-positive in nature as they lose electrons and form positive ions.</p> $K \longrightarrow K^+ + e^-$	<p>Non-Metals are electronegative in nature as they accept electrons and form negative ions.</p> $S + 2e^- \longrightarrow S^{2-}$
(2)	<p>Metals combine with oxygen to form basic or amphoteric oxides.</p> $2Cu + O_2 \longrightarrow 2CuO$	<p>Non-metals combine with oxygen to form acidic or neutral oxides which are covalent compounds.</p> $C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$
(3)	<p>Metal reacts with dil acids such as dil HCl and dil H_2SO_4 to form salt and H_2 gas.</p> $Mg_{(s)} + 2HCl \longrightarrow$ $MgCl_{2(aq)} + H_{2(g)}$	<p>Non-metals do not displace hydrogen from dilute acids as it cannot supply electrons to H^+ ions.</p>
(4)	<p>Metals react with water and produce a metal hydroxide or oxide and H_2.</p> $2K_{(s)} + 2H_2O_{(l)} \longrightarrow$ $2KOH_{(aq)} + H_{2(g)} + \text{Heat}$	<p>Non-metals do not react with water.</p>

79. Name the following:

- (A) Metal that can be cut by knife
- (B) Lustrous non-metal
- (C) Metal that exists in liquid state at room temperature
- (D) Most malleable and ductile metal
- (E) Metal that is best conductor of electricity
- (F) Non-metal that can exist in different forms

[CBSE 2020]

- Ans.** (A) Metal which can be cut by knife—Sodium
- (B) Lustrous non—metal—Iodine
- (C) Metal that exists in liquid state at room temperature—mercury
- (D) Most malleable and ductile metal—Gold
- (E) Metal that is best conductor of electricity—Silver
- (F) Non-metal that can exist in different forms—Carbon