

CHEMISTRY STUDY MATERIALS FOR CLASS 10

(NCERT Based notes of Chapter -03)

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METALS AND NON-METALS

FORMATION OF CALCIUM CHLORIDE: (CaCl₂):

Atomic number of calcium is 20.

Electronic configuration of calcium: 2, 8, 8, 2

Number of electrons in outermost orbit = 2

Valence electron = 2

Valence electrons of chlorine = 7

Calcium loses two electrons in order to achieve stable electronic configuration. Each of the two chlorine atoms on the other hand gains one electron losing from calcium to get stability. By losing of two electrons calcium gets two positive charges over it. Each of the chlorine atoms gets one positive charge over it.

The bonds formed in the calcium chloride are ionic bonds and compound (calcium chloride) is an ionic compound. In similar way; Barium chloride is formed.

Formation of Calcium oxide (CaO):

Valence electron = 2

Atomic number of oxygen is 8

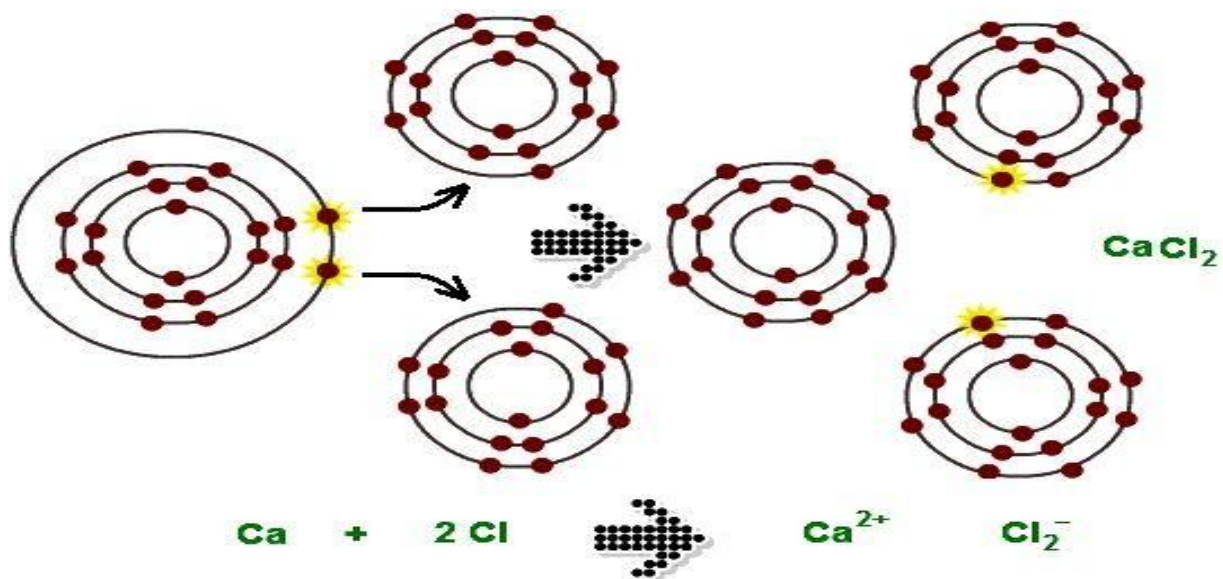
Electronic configuration of oxygen is: 2, 6

Number of electrons in outermost orbit = 6

Valence electron = 6

Calcium loses two electrons and gets two positive charges over it in order to get stability. Oxygen gains two electrons; lost by calcium and thus gets two negative charges over it.

Bond formed between calcium oxide is ionic bond. Calcium oxide is an ionic compound. In similar way; magnesium oxide is formed.



PROPERTIES OF IONIC COMPOUND:

- **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. 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.

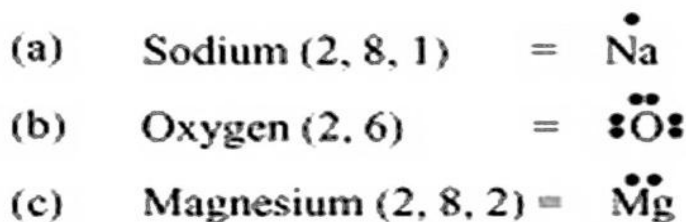
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Question 1: (i) Write the electron-dot structures for sodium, oxygen and magnesium.

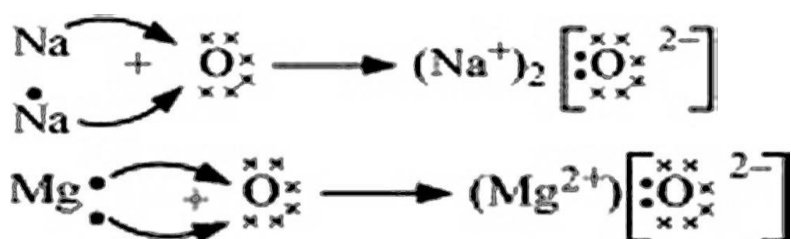
(ii) Show the formation of Na₂O and MgO by the transfer of electrons.

(iii) What are the ions present in these compounds?

Answer: (i) The representation of elements with valence electrons as dots around the elements is referred to as electron-dot structure for elements.



(ii)



(iii) The ions present in Na₂O are Na⁺ and O²⁻ ions and in MgO are Mg²⁺ and O²⁻ ions.

Question 2: Why do ionic compounds have high melting points?

Answer: Ionic compounds have strong electrostatic forces of attraction between the ions. Therefore, it requires a lot of energy to overcome these forces. That is why ionic compounds have high melting points.
