12. In the context of the Hall - Heroult process for the extraction of Al, which of the following statements is false?

(1) CO and CO2 are produced in this process

(2) Al2O3 is mixed with CaF2 which lowers the melting point of the mixture and brings conductivity

(3) Al^{3+} is reduced at the cathode to form Al

(4) Na3AlF6 serves as the electrolyte

Answer:

Hall-Heroult Process:The process of extracting a metal from its oxide is, in general, referred to as smelting. The Hall-Heroult process is used industrially for Aluminium production. Aluminium cannot be produced by an aqueous electrolytic process because Hydrogen is electrochemically much nobler than Aluminium. The liquid Aluminium is produced by the electrolytic reduction of Alumina (Al2O3) dissolved in an electrolyte (bath) mainly containing Cryolite (Na3AlF6).

The overall chemical reaction can be written as **2 Al2O3 (dissolved) +3C (s) =4 Al (l) +3 CO2 (g)**

So the correct option is (4) Na3AlF6 serves as the electrolyte