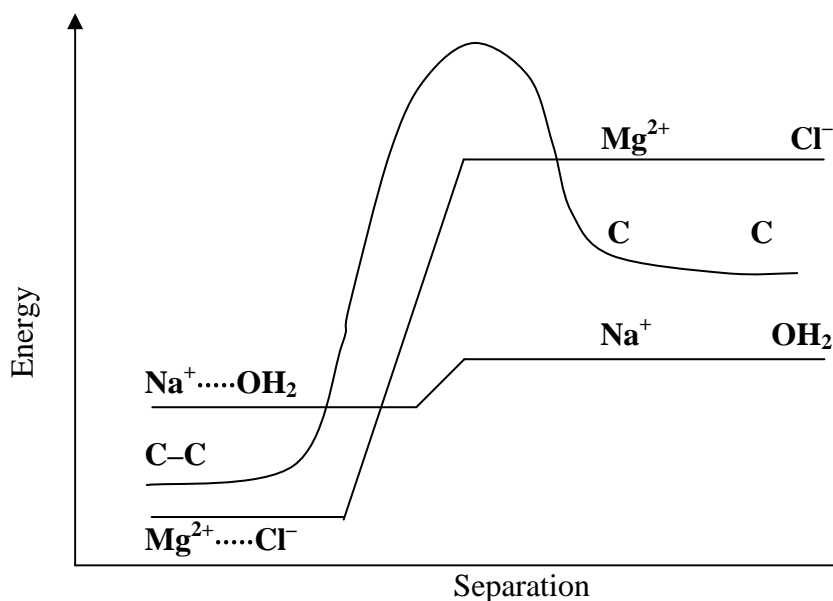


- Shown below is the energy profile for the separation of Na^+ from H_2O . Draw energy profiles for the separation of Mg^{2+} from Cl^- and for the breaking of the C–C bond in ethane to the same scales (approximately).

Marks
6



There is an activation energy (barrier) for the breaking of a covalent bond. For an ionic bond and an ion-dipole interaction, the energy just increases with separation. Due to the charges, the ion-ion interaction is harder to break than the ion-dipole interaction.

Name the inter- or intra-molecular forces involved in each of these three interactions.

Na^+ OH_2

ion - dipole

Mg^{2+} Cl^-

ion – ion (ionic bond)

C C

covalent bond

Explain why bonds such as C–C are generally considered to be stronger than interactions such as that between Mg^{2+} and Cl^- .

The covalent bond has a large energy barrier (activation energy) that must be overcome to break the bond. Ionic bonds do not have this barrier, but have a larger overall ΔH .