Oxford Cambridge and RSA

GCSE Chemistry B (Twenty First Century Science)

J258/04 Depth in chemistry (Higher Tier)

Question Set 28

1 Calcium nitrate, $Ca(NO_3)_2$, and ammonium nitrate, NH_4NO_3, are ionic compounds which are used to make fertilisers.

(a) **Fig. 7.1** shows how the ions are arranged in a solid, ionic compound.

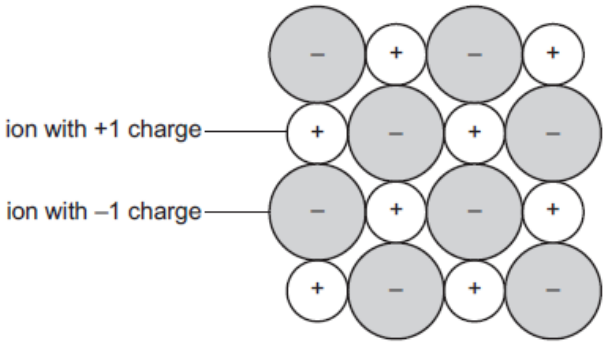

Fig. 7.1

(i) Give **two** reasons why **Fig. 7.1** is a better representation for the ions in solid ammonium nitrate, NH_4NO_3, than the ions in solid calcium nitrate, $Ca(NO_3)_2$. **[2]**

(ii) In **Fig. 7.1** the ions are shown far larger than they actually are.

Suggest **two other** reasons why **Fig. 7.1** does not accurately represent a solid ionic compound. **[2]**

(b)* The energy changes that happen when solid fertilisers dissolve in water are related to bond-breaking and bond-making.

Fig. 7.2 shows the process of a solid ionic compound dissolving in water, in terms of bond-breaking and bond-making.

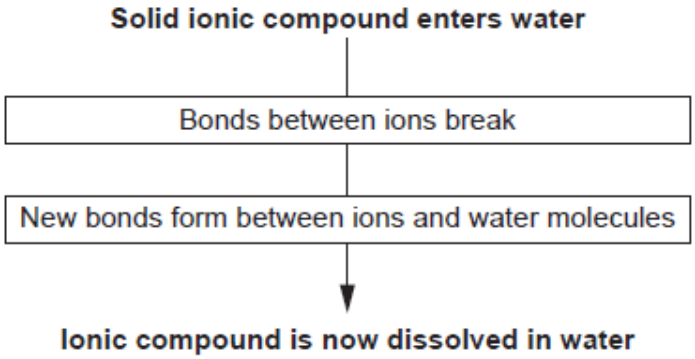

Fig. 7.2

Fig. 7.3 shows the energy changes when calcium nitrate and ammonium nitrate dissolve in water.

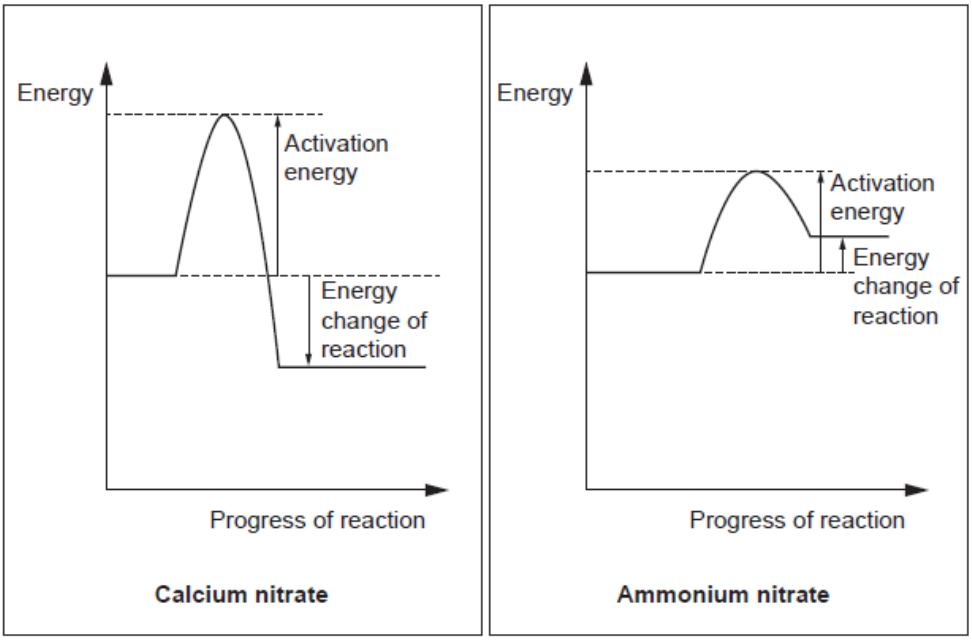

Fig. 7.3

Using **Fig. 7.2** and **Fig. 7.3**, describe and explain the differences in the energy changes when calcium nitrate and ammonium nitrate dissolve in water.

Use ideas about bond-breaking and bond-making in your answer.

[6]

(c) Some fertilisers contain more than one compound mixed together.

Which **two** compounds, when mixed together, contain the three elements nitrogen, phosphorus and potassium?

Put a ring around the **two** correct answers.

$Ca(NO_3)_2$ **$Ca_3(PO_4)_2$** **NH_4NO_3** **KNO_3** **K_2SO_4** **[1]**

Total Marks for Question Set 28: 11