Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

Al_2O_3; $(NH_4)_2SO_4$

2.2

Mg^{2+} and O^{2-} have higher charges than Na^+ and Cl^-; and are smaller ions; so the electrostatic attraction / lattice enthalpy is greater and more energy is needed to separate the ions

2.3

electricity needs mobile charged particles; in the solid the ions are held in fixed positions in the lattice; when molten the ions are free to move and carry charge

2.4

$Ca_3(PO_4)_2$; iron(III) sulfate

3.1

(a) each calcium atom loses two electrons and each of two chlorine atoms gains one; Ca^{2+} and Cl^- are both $[Ne]3s^23p^6$ / $1s^22s^22p^63s^23p^6$

(b) $CaCl_2$, calcium chloride

(c) a giant lattice of Ca^{2+} and Cl^- ions in a regular 3-D arrangement; each ion surrounded by ions of opposite charge, held by electrostatic attraction

3.2

(a) X; it conducts when molten but not as a solid (ions fixed, then free to move); high melting point / soluble in water

(b) a force moves layers so that ions of the same charge come side by side; they repel and the lattice breaks

(c) water molecules are polar; their partial charges attract the ions and pull them out of the lattice, surrounding them (hydration)

(d) potassium fluoride; same charges on the ions; F^- is smaller than I^-, so the ions are closer and attract more strongly

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