Section A

Answer **all** questions in the spaces provided.

1 Comparisons of lattice enthalpies from Born–Haber cycles with lattice enthalpies from calculations based on a perfect ionic model are used to provide information about bonding in crystals.

1 (a) Define the terms *enthalpy of atomisation* and *lattice dissociation enthalpy.*

Enthalpy of atomisation .....

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Lattice dissociation enthalpy .....

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(4 marks)

1 (b) Use the following data to calculate a value for the lattice dissociation enthalpy of sodium chloride.

	$\Delta H^{\ominus}$/ kJ mol^{-1}
$Na(s) \longrightarrow Na(g)$	+109
$Na(g) \longrightarrow Na^+(g) + e^-$	+494
$Cl_2(g) \longrightarrow 2Cl(g)$	+242
$Cl(g) + e^- \longrightarrow Cl^-(g)$	–364
$Na(s) + \frac{1}{2}Cl_2(g) \longrightarrow NaCl(s)$	–411

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(3 marks)

1 (c) Consider the following lattice dissociation enthalpy ($\Delta H_L^{\ominus}$) data.

	NaBr	AgBr
$\Delta H_L^{\ominus}$(experimental) / kJ mol^{-1}	+733	+890
$\Delta H_L^{\ominus}$(theoretical) / kJ mol^{-1}	+732	+758

The values of $\Delta H_L^{\ominus}$ (experimental) have been determined from Born–Haber cycles.

The values of $\Delta H_L^{\ominus}$ (theoretical) have been determined by calculation using a perfect ionic model.

1 (c) (i) Explain the meaning of the term *perfect ionic model.*

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(2 marks)

1 (c) (ii) State what you can deduce about the bonding in NaBr from the data in the table.

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(1 mark)

1 (c) (iii) State what you can deduce about the bonding in AgBr from the data in the table.

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(1 mark)

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