

AQA – Energetics – A2 Chemistry P1

1. No.8

0 8

This question is about enthalpy changes.

0 8 . 1

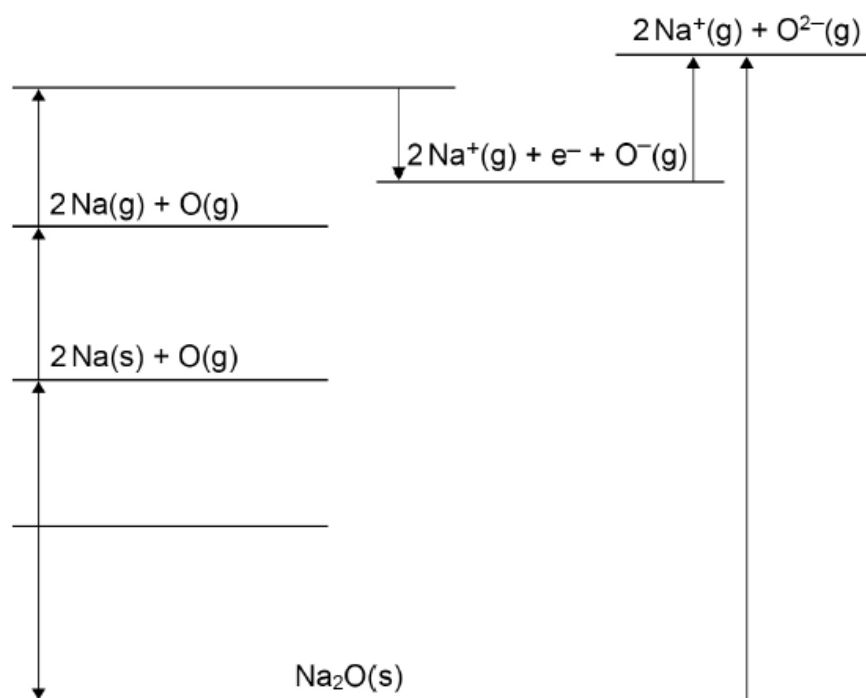
Theoretical values for enthalpies of lattice dissociation can be calculated using a perfect ionic model.

State the meaning of the term perfect ionic model.

[1 mark]

0 8 . 2

Enthalpies of lattice dissociation can also be obtained from Born–Haber cycles.

Figure 3 shows an incomplete Born–Haber cycle for the formation of sodium oxide.**Figure 3**Complete **Figure 3** by writing formulas, including state symbols, of the appropriate species on each of the two blank lines.**[2 marks]**

0 8 . 3 Table 4 shows some enthalpy changes.

Table 4

Enthalpy change	$\Delta H / \text{kJ mol}^{-1}$
Enthalpy of atomisation of oxygen	+248
Enthalpy of atomisation of sodium	+109
Enthalpy of formation of sodium oxide	-416
First ionisation energy of sodium	+494
First electron affinity of oxygen	-142
Second electron affinity of oxygen	+844

Use the data in Table 4 to calculate the enthalpy of lattice dissociation of sodium oxide.

[2 marks]

Enthalpy of lattice dissociation _____ kJ mol^{-1}

0 8 . 4 Explain why the second electron affinity of oxygen has a positive value.

[1 mark]

0 8 . 5

Explain why the enthalpy of lattice dissociation for sodium oxide is greater than the enthalpy of lattice dissociation for sodium chloride.

[2 marks]

0 8 . 6

Sodium chloride dissolves in water.

Table 5 shows some more enthalpy changes.

Table 5

Enthalpy change	$\Delta H / \text{kJ mol}^{-1}$
Enthalpy of hydration for Cl^- ions	-364
Enthalpy of hydration for Na^+ ions	-406
Enthalpy of lattice dissociation for NaCl	+771

Use the data in **Table 5** to calculate the enthalpy of solution for sodium chloride.

[2 marks]

Enthalpy of solution _____ kJ mol^{-1}

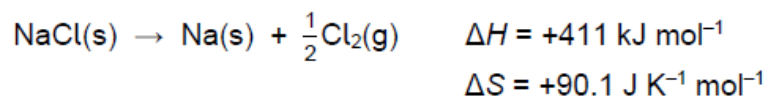
08.7

Give a reason why data books do not contain a value for the enthalpy of solution of sodium oxide.

[1 mark]

08.8

Calculate the temperature, in °C, at which this reaction becomes feasible.



[3 marks]

Temperature _____ °C