

Section A

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

- 1** This question is about bond dissociation enthalpies and their use in the calculation of enthalpy changes.

- 1 (a)** Define *bond dissociation enthalpy* as applied to chlorine.

.....

.....

.....

.....

.....

(2 marks)

- 1 (b)** Explain why the enthalpy of atomisation of chlorine is exactly half the bond dissociation enthalpy of chlorine.

.....

.....

.....

(1 mark)

- 1 (c)** The bond dissociation enthalpy for chlorine is $+242 \text{ kJ mol}^{-1}$ and that for fluorine is $+158 \text{ kJ mol}^{-1}$.
The standard enthalpy of formation of ClF(g) is -56 kJ mol^{-1} .

- 1 (c) (i)** Write an equation, including state symbols, for the reaction that has an enthalpy change equal to the standard enthalpy of formation of gaseous ClF

.....

(1 mark)



1 (c) (ii) Calculate a value for the bond enthalpy of the Cl—F bond.

.....

.....

.....

.....

.....

(2 marks)

1 (c) (iii) Calculate the enthalpy of formation of gaseous chlorine trifluoride, ClF₃(g).
Use the bond enthalpy value that you obtained in part (c) (ii).

(If you have been unable to obtain an answer to part (c) (ii), you may assume that the Cl—F bond enthalpy is +223 kJ mol⁻¹. This is **not** the correct value.)

.....

.....

.....

.....

.....

(3 marks)

1 (c) (iv) Explain why the enthalpy of formation of ClF₃(g) that you calculated in part (c) (iii) is likely to be different from a data book value.

.....

.....

(1 mark)

1 (d) Suggest why a value for the Na—Cl bond enthalpy is **not** found in any data book.

.....

.....

(1 mark)

