

SECTION B

Answer **all** the questions.

16 This question is about magnesium, bromine and magnesium bromide.

- (a) Relative atomic mass is defined as ‘the weighted mean mass compared with 1/12th mass of carbon-12’.

Explain what is meant by the term **weighted mean mass**.

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..... [1]

- (b) (i) Draw a ‘dot-and-cross’ diagram for MgBr_2 .

Show outer electron shells only.

[2]

- (ii) Calculate the total number of **ions** in 1.74 g of magnesium bromide, MgBr_2 .

Give your answer to **3** significant figures.

number of ions = [3]

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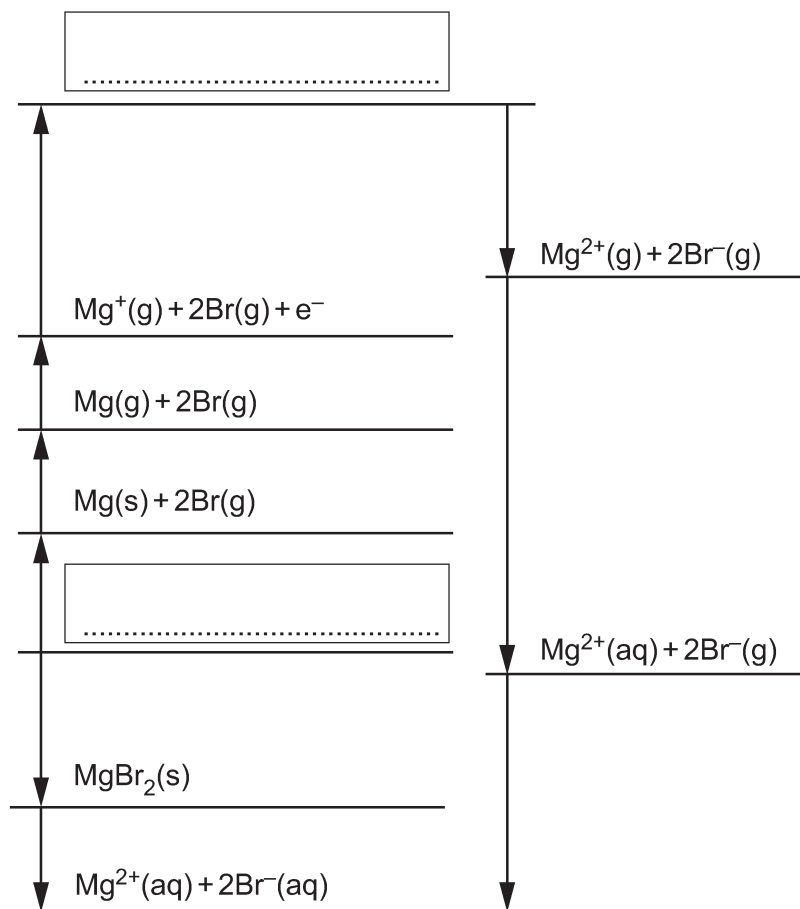
- (d) The enthalpy change of hydration of bromide ions can be determined using the enthalpy changes in **Table 16.2**.

Enthalpy change	Energy / kJ mol^{-1}
1st ionisation energy of magnesium	+736
2nd ionisation energy of magnesium	+1450
atomisation of bromine	+112
atomisation of magnesium	+148
electron affinity of bromine	-325
formation of magnesium bromide	-525
hydration of bromide ion	to be calculated
hydration of magnesium ion	-1926
solution of magnesium bromide	-186

Table 16.2

- (i) An incomplete energy cycle based on **Table 16.2** is shown below.

On the dotted lines, add the species present, including state symbols.



[2]

- (ii) Using your completed energy cycle in **16(d)(i)**, calculate the enthalpy change of hydration of bromide ions.

enthalpy change of hydration = kJ mol^{-1} [2]

- (iii) Write the equation for the lattice enthalpy of magnesium bromide and calculate the lattice enthalpy of magnesium bromide.

Equation

Calculation

lattice enthalpy = kJ mol^{-1} [3]