SECTION B

Answer all the questions.

16	This	s 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'.				
		Exp	lain what is meant by the term weighted mean mass.			
				[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 1.74g of magnesium bromide, MgBr ₂ .			
			Give your answer to 3 significant figures.			
			number of ions =	[3]		

(c)* Table 16.1 shows some physical properties of magnesium, bromine and magnesium bromide.

Substance	Melting point/°C	Electrical conductivity	
Substance	Meiting point/ C	Solid	Liquid
Magnesium	711	Good	Good
Bromine	-7	Poor	Poor
Magnesium bromide	650	Poor	Good

Table 16.1

Explain the physical properties shown in Table 16.1 using your knowledge of structure and bonding. [6]
Additional answer space if required

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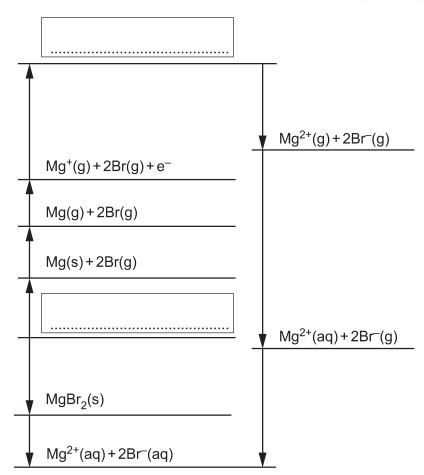
(d) The enthalpy change of hydration of bromide ions can be determined using the enthalpy changes in **Table 16.2**.

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.



(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 =kJmol ⁻¹ [3]

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