

Name of the Student: _____

Max. Marks : 25 Marks

Time : 25 Minutes

Mark Schemes

Q1.

(a) 242

Units not essential

1

(b) Bond is shorter or bonding pair closer to nucleus

*Allow Cl is a smaller atom**Allow fewer electron shells**do not allow smaller molecules*

1

So attraction (between nucleus and) (to) bond pair is stronger

*Allow shared pair (or bonding electrons) held more tightly**Mention of Cl⁻ loses M2*

1

(c) Net attraction between the chlorine nucleus and the extra electron

Allow Cl⁻ ion more stable than Cl

1

(d) (i) step 1 $\text{Ag(s)} \rightarrow \text{Ag(g)}$ only change

1

step 2 $\text{Ag(s)} \rightarrow \text{Ag}^+(\text{g}) + \text{e}^-$ only change

1

step 3 $\frac{1}{2}\text{Cl}_2(\text{g}) \rightarrow \text{Cl(g)}$ only change*This step can be first, second or third*

1

(ii) $127 + 289 + 732 + 121 - 364$

1

 $= 905 \text{ kJ mol}^{-1}$ *-905 scores 1 mark only*

1

(e) (i) Ions can be regarded as point charges (or perfect spheres)

*Allow no polarisation***OR** *only bonding is ionic***OR** *no covalent character*

1

(ii) Greater

Electronegativity argument or mention of intermolecular,

$CE = 0$

1

Chloride ions are smaller than bromide
Mark independently but see above

1

They are attracted more strongly to the silver ions
Mark independently

1

(iii) AgCl has covalent character
Ignore reference to molecules

1

Forces in the lattice are stronger than pure ionic attractions
Allow stronger bonding OR additional/extra bonding

1

[15]

Q2.

- (a) Particles are in maximum state of order
(or perfect order or completely ordered or perfect crystal or minimum disorder or no disorder)
(entropy is zero at 0 K by definition)

1

- (b) (Ice) melts
(or freezes or changes from solid to liquid or from liquid to solid)

1

- (c) Increase in disorder

1

Bigger (at T_2)

1

Second mark only given if first mark has been awarded

- (d) (i) Moles of water = $1.53/18$ (= 0.085)

1

Heat change per mole = $3.49/0.085 = 41.1$ (kJ mol⁻¹)
(allow 41 to 41.1, two sig. figs.)
(penalise -41 (negative value), also penalise wrong units but allow kJ only)

1

- (ii) $\Delta G = \Delta H - T\Delta S$

1

- (iii) $\Delta H = T\Delta S$ or $\Delta S = \Delta H/T$
(penalise if contradiction)

1

$\Delta S = 41.1/373 = 0.110$ kJ K⁻¹ (mol⁻¹) (or 110 (J K⁻¹ (mol⁻¹))
(allow 2 sig. figs.)
(if use value given of 45, answer is 0.12 (or 120 to 121)
(if ΔH is negative in (d) (i), allow negative answer)
(if ΔH is negative in (d) (i), allow positive answer)
(if ΔH is positive in (d) (i), penalise negative answer)

1

Correct units as above (mol⁻¹ not essential)

1

[10]