Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Physical 1_Thermodynamics

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Name of the Student:_____
Max. Marks : 16 Marks **Time : 16 Minutes**

Mark Schemes

Q1.

A

[1]

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Q2.

D

[1]

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Q3.

(a) Enthalpy change or heat energy change when 1 mol of solid ionic compound/substance or 1 mol of ionic lattice

1

is formed from its gaseous ions.

1

Allow: enthalpy change for:

$M^+ (g) + X^- (g) \longrightarrow MX (s)$ or $Ag^+ (g) + I^- (g) \longrightarrow AgI (s)$

CE=0/2 if describing wrong process (e.g. ΔH of lattice dissociation or ΔH of formation / or heat energy required)

Ignore heat energy released

(b) lattice dissociation energy= (112 + 464 + 293) = + 869 (kJmol$^-$1)

1

lattice formation energy = − 869 (kJ mol $^-$1)

(+)869 = 1 mark

1

(c) AgI contains covalent character

CE=0/2 if atoms/molecules

For M1, allow the following:

not completely ionic / ions not spherical / ions distorted / some covalent bonding

1

Forces / bonds (holding the lattice together) are stronger

Ignore covalent bonds stronger (than ionic bonds)

Ignore electronegativity

Ignore references to energy

1

(d) $AgNO_3$
yellow ppt

Ignore ammonia/acidified/nitric acid/sulfuric acid

1

or

Cl_2 or Br_2
brown solution/black ppt

M2 dependent on correct M1 but mark on from Ag^+ or Tollens

1

[8]

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Q4.

$\Delta S = \Sigma_S$ products – ΣS reactants or
253 + (2 × 198) – (2 × 223 + 2 × 5.7 + 50.2) (= 649 – 507.6)

This expression could also score M1

1

ΔS = 141(.4) (J $K^{-1}mol^{-1}$)

This scores M1 and M2

Allow ecf for M3, M4 and M5 from incorrect M2

1

$\Delta G = \Delta H - T\Delta S$

1

ΔG = -60 - (1262 × 141(.4) × 10^{-3})

This expression also scores M3.

For M4, allow ΔG = -60 - (1262 × their M2 × 10^{-3})

1

= –238 (kJ mol^{-1}) to 3 sig figs

If calculated in joules

M4: Allow $\Delta G = -60 \times 10^3$ - (1262 × 141(.4))

M5: Allow -238 000 J mol^{-1} providing units shown

1

feasible since ΔG is negative/less than zero

Allow consequential M6 from their ΔG

1

[6]

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