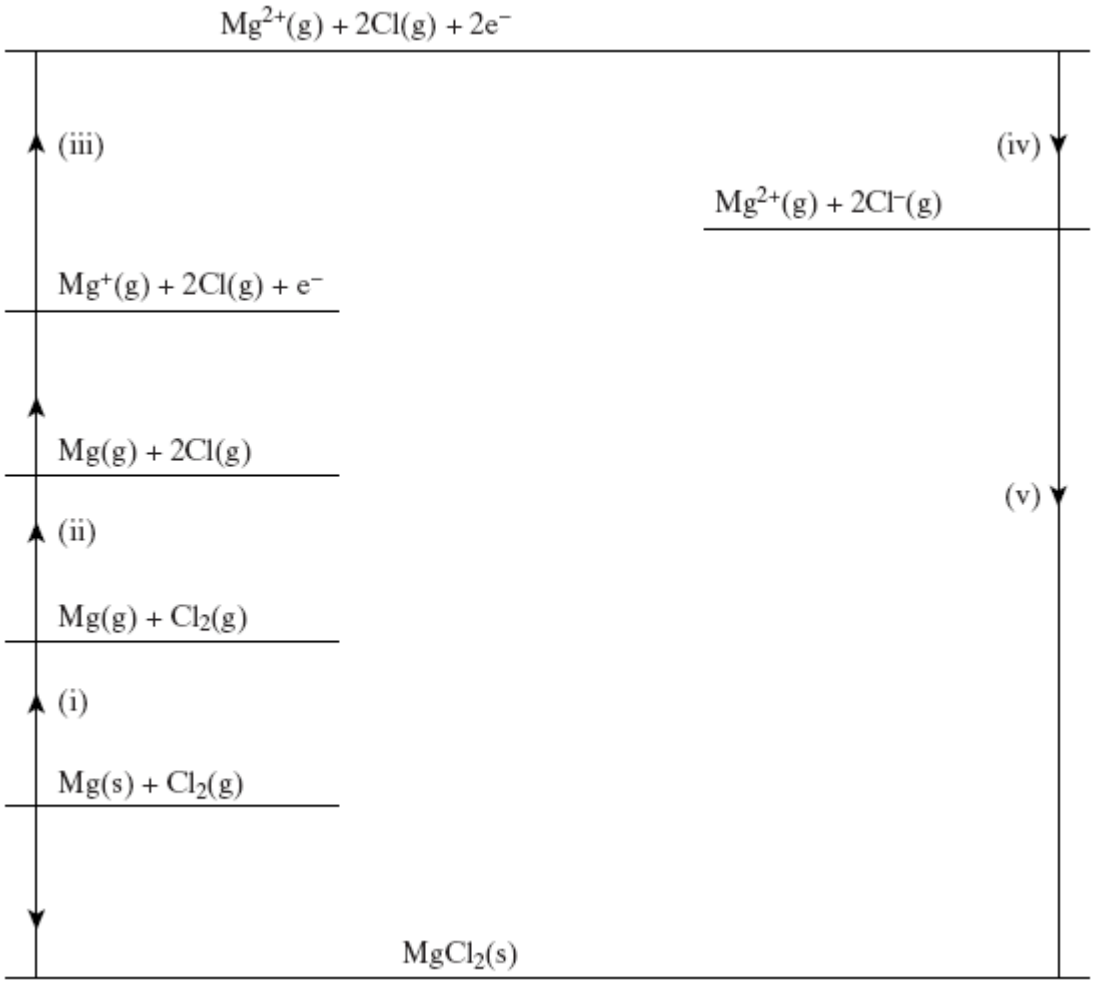
Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Physical 1

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Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Q1.

(a) A Born–Haber cycle for the formation of magnesium(II) chloride is shown below.



Taking care to note the direction of the indicated enthalpy change and the number of moles of species involved, give each of the enthalpy changes (i) to (v) above.

Enthalpy change (i) _____

Enthalpy change (ii) _____

Enthalpy change (iii) _____

Enthalpy change (iv) _____

Enthalpy change (v) _____

(5)

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(b) Write an equation for the decomposition of MgCl(s) into $MgCl_2(s)$ and Mg(s) and use the following data to calculate a value for the enthalpy change of this reaction.

$\Delta H_f^{\ominus}$MgCl(s) = –113 kJ mol^{-1}

$\Delta H_f^{\ominus}MgCl_2(s)$ = –653 kJ mol^{-1}

Equation _____

Calculation _____

_____

_____

_____

(4)

(c) Use the data below to calculate a value for the molar enthalpy of a solution of $MgCl_2(s)$.

Lattice formation enthalpy of $MgCl_2(s)$ = –2502 kJ mol^{-1}

$\Delta H_{hydration}^{\ominus}$ of $Mg^{2+}(g)$ = –1920 kJ mol^{-1}

$\Delta H_{hydration}^{\ominus}$ of $Cl^-(g)$ = –364 kJ mol^{-1}

_____

_____

_____

_____

_____

_____

(3)

(Total 12 marks)

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Q2.

Chlorine is formed in a reversible reaction as shown by the equation

$$4HCl(g) + O_2(g) \rightleftharpoons 2Cl_2(g) + 2H_2O(g)$$

(a) Use the data below to calculate the standard enthalpy change, $\Delta H^{\ominus}$, and the standard entropy change, $\Delta S^{\ominus}$, for this reaction.

Substance	HCl(g)	$O_2(g)$	$Cl_2(g)$	$H_2O(g)$
$\Delta H_f^{\ominus}$/kJ mol^{-1}	–92	0	0	–242
$S^{\ominus}$/ J K^{-1} mol^{-1}	187	205	223	189

Standard enthalpy change, $\Delta H^{\ominus}$ _____

_____

_____

_____

_____

Standard entropy change, $\Delta S^{\ominus}$ _____

_____

_____

_____

_____

(6)

(b) The data below apply to a different gas phase reversible reaction.

Standard enthalpy change, $\Delta H^{\ominus}$ = +208 kJ mol^{-1}
Standard entropy change, $\Delta S^{\ominus}$ = +253 J K^{-1} mol^{-1}

(i) Deduce the effect of an increase in temperature on the position of the equilibrium in this reaction. Use Le Chatelier's principle to explain your answer.

Effect _____

Explanation _____

(ii) Calculate the minimum temperature at which this reaction is feasible.

_____

_____

_____

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(7)

(Total 13 marks)

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