15.2 Entropy & Spontaneity

Question Paper

Course	DP IB Chemistry
Section	15. Energetics/Thermochemistry (HL only)
Topic	15.2 Entropy & Spontaneity
Difficulty	Easy

Time allowed: 10

Score: /5

Percentage: /100

Question 1

Which change will **not** decrease the entropy of a system?

    A. Changing state from gas to liquid

    B. Decreasing the temperature

    C. A reaction where two moles of gaseous reactants changes to four moles of gaseous products

    D. Reducing the volume of the container for a gaseous reaction

[1 mark]

Question 2

When solid ammonium chloride dissolves in distilled water, the temperature of the solution decreases.

What are the signs of $\Delta H^{\ominus}$, $\Delta S^{\ominus}$, and $\Delta G^{\ominus}$ for this spontaneous process?

	$\Delta H^{\ominus}$	$\Delta S^{\ominus}$	$\Delta G^{\ominus}$
A.	–	–	–
B.	+	+	+
C.	+	+	–
D.	+	–	+

[1 mark]

Question 3

A reaction has a standard entropy change, $\Delta S^{\ominus}$ of +10.00 J K^{-1} mol^{-1}. The same reaction has a standard enthalpy change, $\Delta H^{\ominus}$, of +10.00 kJ mol^{-1}.

Which of the following is used to calculate the value of $\Delta G^{\ominus}$ for the reaction in kJ mol^{-1}?

    A. 10 – (298 x 0.001)

    B. 10 – (298 x 0.01)

    C. 10 – (298 x 10)

    D. 0.01 – (298 x 10)

[1 mark]

Question 4

Propane is produced by the hydrogenation of propene.

Formula	$S^{\ominus}$ / $J\,K^{-1}\,mol^{-1}$
$H_2(g)$	+131
$C_3H_6(g)$	+267
$C_3H_8(g)$	+270

Which of the following is the correct calculation to determine the entropy change, $\Delta S^{\ominus}$, for the reaction?

   A. $(267 + 131) - 270$

   B. $270 + (267 + 131)$

   C. $(-270) - (267 + 131)$

   D. $270 - (267 + 131)$

[1 mark]

Question 5

Which species are arranged in order of **decreasing** entropy?

   A. $C_2H_6(g) > C_2H_5OH(l) > Hg(l) > Mg(s)$

   B. $C_2H_5OH(l) > C_2H_6(g) > Hg(l) > Mg(s)$

   C. $Mg(s) > C_2H_5OH(l) > Hg(l) > C_2H_6(g)$

   D. $Mg(s) > Hg(l) > C_2H_6(g) > C_2H_5OH(l)$

[1 mark]