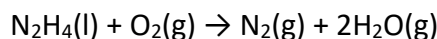


COLLATED QUESTIONS

Enthalpy and entropy changes associated with spontaneity in chemical reactions (entropy calculations are not required).

2017: 2

- (d) The reaction for the complete combustion of hydrazine is shown in the equation below.



This is an exothermic reaction.

Explain the entropy changes associated with this reaction.

2017: 3

- (b) (iii) Explain why the sublimation of iodine is spontaneous, even though the enthalpy of sublimation is a positive value.

2016: 2

- (c) (iii) Why does NaCl readily dissolve in water, even though the process is slightly endothermic?
 $\text{NaCl}(\text{s}) \rightarrow \text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \Delta_r H^\circ = +3.90 \text{ kJ mol}^{-1}$.

2016:3

- (b) (iii) The equation for the evaporation of liquid methanol is: $\text{CH}_3\text{OH}(\text{l}) \rightarrow \text{CH}_3\text{OH}(\text{g})$

Explain the entropy changes of the system and surroundings for the evaporation of methanol.

2015:

No question asked

2014:3

- (b) Ammonium nitrate is used in 'cold packs' to relieve symptoms of a sports injury. The dissolving of the solid crystals of ammonium nitrate (shown in the equation below) is spontaneous, despite being endothermic. $\text{NH}_4\text{NO}_3(\text{s}) \rightarrow \text{NH}_4^+(\text{aq}) + \text{NO}_3^-(\text{aq})$

Explain why this is so, in terms of the entropy change for the reaction system

AS91390 Demonstrate understanding of thermochemical principles and the properties of particles and substances

- (c) Ammonium nitrate dissociates in an endothermic reaction, as shown in the equation below.



Below is a table outlining four statements about changes in entropy that may occur during any reaction.

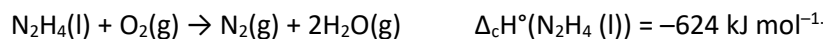
Tick (✓) to the left of any statement that is correct for the above reaction.

Tick (✓)	Entropy statement
	The entropy of the system increases.
	The entropy of the surroundings increases.
	The entropy of the system decreases.
	The entropy of the surroundings decreases,

Justify your choice(s).

2013:3

- (c) Hydrazine is often used as a rocket fuel. When liquid hydrazine undergoes combustion, it forms nitrogen and water:



Explain why liquid hydrazine readily burns in oxygen.

Your answer should consider both enthalpy and entropy changes.

Answers: See NZQA site.