

Ch20 • Entropy & Free Energy

NChO 1999

25. Under which set of conditions is a chemical reaction most likely to be spontaneous?

	ΔH	ΔS	T (temperature)
(A)	-	-	low
(B)	-	-	high
(C)	+	+	low
(D)	+	-	high

26. For which reaction do you expect ΔS to be negative?

- (A) $2C(s) + O_2(g) \rightarrow 2CO(g)$
 (B) $Br_2(s) \rightarrow Br_2(l)$
 (C) $H_2O(l, 25^\circ C) \rightarrow H_2O(l, 50^\circ C)$
 (D) $Cl_2(g) + 2HI(g) \rightarrow I_2(s) + 2HCl(g)$

NChO 1998

23. Which has the greatest absolute entropy?

- (A) one mol of C(s) at $25^\circ C$
 (B) one mol of $CH_3Cl(l)$ at $25^\circ C$
 (C) one mol of $C_2H_6(g)$ at $25^\circ C$
 (D) one mol of $C_6H_6(l)$ at $25^\circ C$

NChO 1997

26. For which of these processes would ΔS° be expected to be the most positive?

- (A) $O_2(g) + 2H_2(g) \rightarrow 2H_2O(g)$
 (B) $H_2O(l) \rightarrow H_2O(s)$
 (C) $N_2O_4(g) \rightarrow 2NO_2(g)$
 (D) $NH_4NO_2(s) \rightarrow N_2(g) + 2H_2O(g)$

NChO 1996

24. For which of these processes is the value of ΔS expected to be negative?

- I. Sugar is dissolved in water
 II. Steam is condensed
 III. $CaCO_3$ is decomposed into CaO and CO_2 .
 (A) I only (C) II only
 (B) I and III only (D) II and III only

25. Which set of conditions is most likely to result in a reaction that is spontaneous as written?

	ΔH	ΔS	T
(A)	< 0	< 0	$500^\circ C$
(B)	< 0	< 0	$0^\circ C$
(C)	> 0	< 0	$0^\circ C$
(D)	> 0	< 0	$500^\circ C$

NChO 1995

21. For which of these processes is the sign of the enthalpy change different from the others?

- (A) $Al_2O_3(s) \rightarrow 2Al(s) + 3/2O_2(g)$
 (B) $H_2O(s) \rightarrow H_2O(l)$
 (C) $Cl_2(g) \rightarrow 2Cl(g)$
 (D) $Cl(g) + e^- \rightarrow Cl^-(g)$

24. For the process $O_2(g) \rightarrow 2O(g)$, $\Delta H^\circ = +498 \text{ kJ}$. What would be predicted for the sign of ΔS_{rxn} and the conditions under which this reaction would be spontaneous?

	ΔS_{rxn}	Spontaneous
(A)	positive	at low temperatures only
(B)	positive	at high temperatures only
(C)	negative	at high temperatures only
(D)	negative	at low temperatures only

25. For the reaction



$$\Delta H^\circ = +176 \text{ kJ and } \Delta G^\circ = +91.2 \text{ kJ at } 298 \text{ K.}$$

What is the value of ΔG at 1000 K ?

- (A) -109 kJ (C) +64 kJ
 (B) -64 kJ (D) +109 kJ

NChO 1994

23. When ammonium nitrate, $NH_4NO_3(s)$ is added to water at $25^\circ C$, it dissolves spontaneously and the temperature of the solution decreases. This indicates that the factor causing the substance to dissolve is a change in
 (A) energy (C) entropy
 (B) enthalpy (D) temperature