Chem12 Enthalpy/Entropy : Quiz 2-40

1) Define : a) Entropy -

b) Spontaneous reaction -

c) Endothermic reaction -

2) Which of the following will produce an increase in the entropy of a system ?

a) increase T

- b) formation of gaseous products from solid reactants.
- c) formation of a precipitate in a liquid solution.
- d) an increase in the volume of the system.
- e) the formation of a solid from a gas.

3) What is the sign of the entropy change for each of the following processes ?

- a) A solute crystallizes from a solution.
- b) Water evaporates.
- c) A new deck of playing cards is shuffled.
- d) Solid AgCl precipitates from a solution of AgNO₃ and NaCl.

4) Predict the sign of the entropy change for the following reactions.

a)
$$2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$$

- b) $H_2(g) + I_2(s) \rightarrow 2HI(g)$
- c) $CaO(s) + 2NH_4CI(s) \rightarrow 2NH_3(g) + CaCl_2(s) + H_2O(l)$
- d) $AgNO_3(aq) + NaCl(aq) -> AgCl(s) + NaNO_3(aq)$

e) $Na_2CO_3(aq) + 2HCI(aq) -> 2NaCI(aq) + H_2O(I) + CO_2(g)$ f) $CO_2(g) + CaO(s) -> CaCO_3(s)$ g) $4NH_3(g) + 3O_2(g) -> 2N_2(g) + 6H_2O(g)$ h) $NH_3(g) + HCI(g) -> NH_4CI(s)$

5) Exothermic or endothermic ?

a)
$$C_2H_5OH(I) + 3O_2(g) -> 2CO_2(g) + 3H_2O(g)$$

b) $H_2O(I) -> H^+(aq) + OH^-(aq) \qquad \Delta H = +56.2 \text{ kJ}$
c) $H_2O(s) + 6.0 \text{ kJ} -> H_2O(I)$
d) $CS_2(I) + 3O_2(g) -> CO_2(g) + 2SO_2(g) \qquad \Delta H = -1105 \text{ kJ}$
e) digestion
f) formation of a molecular bond

6) Spontaneous or non-spontaneous or at equilibrium ?

a)
$$H_2O(I) \rightarrow H_2O(S)$$

b) $2NH_4NO_3(S) \rightarrow 2N_2(g) + 4H_2O(g) + O_2(g)$ $\Delta H = -236 \text{ kJ}$
c) $N_2(g) + 3Cl_2(g) \rightarrow 2NCl_3(g)$ $\Delta H = +230 \text{ kJ}$
d) $4Au(S) + 3O_2(g) + 162 \text{ kJ} \rightarrow 2Au_2O_3(S)$
e) Photosynthesis

Answers : 1)a) It is the degree of disorder in a system., b) It is a reaction that will go to completion without the addition of energy., c) It is a reaction that absorbs energy., 2) a, b, d, 3) -, +, +, -, 4) -, +, +, -, +, -, 5) Ex (burning), En, En, Ex, En, Ex, 6) eq, sp, ns, ns, ns.