Aqueous Ionic Equilibrium 2

1. Which of the following processes will result in an **increase** of entropy of the system? Choose from:

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| http://latex.codecogs.com/gif.latex?H_2O%28l%29%5Crightarrow%20H_2O%28s%29 |
| http://latex.codecogs.com/gif.latex?2%20SO_2%28g%29%20+%20O_2%28g%29%5Crightarrow%202SO_3%28g%29 |
| http://latex.codecogs.com/gif.latex?2%20NH_3%28g%29%5Crightarrow%20N_2%28g%29%20+%203H_2%28g%29 |
| http://latex.codecogs.com/gif.latex?H_2O%28g%29%5Crightarrow%20H_2O%28l%29 |
| http://latex.codecogs.com/gif.latex?CO%28g%29%20+%202H_2%28g%29%5Crightarrow%20CH_3OH%28g%29 |

1. What does the standard change in Gibbs free energy ( http://latex.codecogs.com/gif.latex?%5CDelta%20G%5Eo) of a reaction tell us about the equilibrium constant (K) for that reaction under standard conditions? Choose from:

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| There is no significant relationship between http://latex.codecogs.com/gif.latex?%5CDelta%20G%5Eoand K. |
| A negative http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20G%5Eoindicates that product formation is favored, and K will be greater than 1. |
| A negative http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20G%5Eoindicates that reactant formation is favored, and K will be less than 1. |

1. Which of the following combinations of http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20Hand http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20Sdescribe a process that is **only** spontaneous at low temperatures? Choose from:

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| http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20H: positive , http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20S: positive |
| http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20H: negative , http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20S: positive |
| http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20H: positive , http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20S: negative |
| http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20H: negative , http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20S: negative |
| Spontaneity is not related to the sign of http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20Hand http://latex.codecogs.com/gif.latex?%5Csmall%20%5CDelta%20S. |

1. AB 2 \rm AB_2has a molar solubility of 3.72×10 −4 M 3.72\times 10^{-4} ~M. What is the value of the solubility product constant for AB2 ?
2. C 2 D 3 \rm C_2D_3has a solubility product constant of 9.14×10 −9 9.14\times 10^{-9}. What is the molar solubility of C 2 D 3 \rm C_2D_3?
3. A buffer contains significant amounts of ammonia and ammonium chloride.

Part A:Write an equation showing how this buffer neutralizes added acid (HI)

Part B: Write an equation showing how this buffer neutralizes added base (CsOH). Express your answer as a chemical equation.

1. Solve an equilibrium problem (using an ICE \rm ICEtable) to calculate the pH \rm pHof each solution:

Part A: a solution that is 0.165M Min HC 2 H 3 O 2 {\rm{HC}}_2 {\rm{H}}_3 {\rm{O}}_2and 0.120M Min KC 2 H 3 O 2 {\rm{KC}}_2 {\rm{H}}_3 {\rm{O}}_2

Part B: a solution that is 0.185M Min CH 3 NH 2 {\rm{CH}}_3 {\rm{NH}}_2and 0.110M Min CH 3 NH 3 Br

1. A 1.0-L {\rm L}buffer solution is 0.105M Min HNO 2 {\rm{HNO}}_2and 0.145M Min NaNO 2 {\rm{NaNO}}_2. Express your answers using three significant figures separated by a comma.

Part A: Determine the concentrations of HNO 2 {\rm{HNO}}_2and NaNO 2 {\rm{NaNO}}_2after addition of 1.4g gHCl

Part B: Determine the concentrations of HNO 2 {\rm{HNO}}_2and NaNO 2 {\rm{NaNO}}_2after addition of 1.4g gNaOH {\rm HCl}.

Part C: Determine the concentrations of HNO 2 {\rm{HNO}}_2and NaNO 2 {\rm{NaNO}}_2after addition of 1.4g gHI{\rm HI}.{\rm{CH}}_3 {\rm{NH}}_3 {\rm{Br}}