Kinetics and equilibrium

1. An aqueous solution containing 18.9g {\rm g}of an unknown molecular (nonelectrolyte) compound in 103.0g {\rm g}of water was found to have a freezing point of -1.7 ∘ C^\circ {\rm C}.Calculate the molar mass of the unknown compound.Express your answer using two significant figures and g/mol
2. What is the osmotic pressure of a solution made by dissolving 25.0g gof glucose, C 6 H 12 O 6 \rm C_6H_{12}O_6, in enough water to form 325.0mL mLof solution at 34.0 ∘ C {^\circ}C?.
3. A solution of water (K f =1.86 ∘ C/m K_{\rm f}=1.86~ ^\circ {\rm C}/m) and glucose freezes at − -2.75 ∘ C ^\circ C. What is the molal concentration of glucose in this solution? Assume that the freezing point of pure water is 0.00 ∘ C ^\circ \rm CExpress your answer to three significant figures and include the appropriate units.
4. A solution of water (K b =0.512 ∘ C/m K_{\rm b}=0.512~ ^\circ {\rm C}/m) and glucose boils at 102.06 ∘ C ^\circ C. What is the molal concentration of glucose in this solution? Assume that the boiling point of pure water is 100.00 ∘ C ^\circ \rm C.Express your answer to three significant figures and include the appropriate units.
5. At a certain temperature, the solubility of N 2 \rm N_2gas in water at 3.08atm atmis 72.5mg of N 2 gas/100 g water mg~of~N_2~gas/100~g~water. Calculate the solubility of N 2 \rm N_2gas in water, at the same temperature, if the partial pressure of N 2 \rm N_2gas over the solution is increased from 3.08atm atmto 8.00atm atm.Express your answer numerically to three significant figures.
6. - Consider the following reaction:  
     
    http://latex.codecogs.com/gif.latex?\fn_jvn%203A%20+%202B%20\rightarrow%202C+4D  
     
    If the rate of change of [A] at a given point in time is -1.0 M/s, what is the rate of change of [C] at that same point in time? Choose from:

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| -1.0 M/s |
| +0.67 M/s |
| +1.0 M/s |
| +1.3 M/s |
| -1.3 M/s |

1. Consider the rate law: rate = k [A]2 What will the units of k be for this rate law? Choose from: 1/s, M/s, 1/M2\*s, 1/M\*s, s/M
2. Identify the intermediate(s) in the following reaction mechanism:  
     
   http://latex.codecogs.com/gif.latex?\fn_jvn%201)\hspace%7b5mm%7d%20NO%20+%20Cl_%7b2%7d%20\rightleftharpoons%20NOCl_%7b2%7d%20\par%202)%20\hspace%7b2mm%7d%20NOCl_%7b2%7d%20+%20NO%20\rightarrow%202%20NOCl
3. Consider the following reaction:  
     
   http://latex.codecogs.com/gif.latex?\fn_jvn%20I_2(g)+H_2(g)\rightleftharpoons%202HI(g)  
     
   If the reaction is at equilibrium, and then the I2(g) present at that point in time is removed, what will happen to the concentrations of H2(g) and HI(g)? Choose from:

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| H2(g) will increase; HI(g) will increase |
| H2(g) will decrease; HI(g) will decrease |
| H2(g) will decrease; HI(g) will increase |
| H2(g) will increase; HI(g) will decrease |
| The concentrations of H2(g) and HI(g) will remain unchanged |

1. The rate law for the reaction:  
     
   A + 2 B → C   
     
   is:  
     
   rate = k[A][B]  
     
   If k = 0.318/M\*s , and initial concentrations of reactants are: [A] = 0.50 M and [B] = 0.35 M, what will be the initial rate of this reaction?
2. Consider the following reaction:  
     
   http://latex.codecogs.com/gif.latex?\fn_jvn%20PbBr_2(s)\rightleftharpoons%20Pb%5e2%5e+(aq)+Br%5e-(aq)  
     
   Which of the species in the reaction are included in the equilibrium constant expression for the reaction? Choose from:

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| PbBr2(s) only |
| Pb2+(aq) only |
| Br-(aq) only |
| Pb2+(aq) and Br-(aq) |
| PbBr2(s), Pb2+(aq) and Br-(aq) |

1. The following reaction:  
     
   CH3CHO → CH4 + CO  
     
   Is first order with k = 0.0693 / min  
     
   If the initial CH3CHO concentration is 0.435 M, what will be the CH3CHO concentration after 37.0 minutes?
2. Which of the following statements best describes chemical equilibrium? Choose from:

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| The forward and reverse reactions have stopped/ |
| The concentration of products is greater than the concentration of reactants. |
| The rate of the forward reaction is equal to the rate of the reverse reaction. |
| The forward reaction has stopped, and the reverse reaction has commenced. |
| The concentrations of reactants and products are equal. |

1. Consider the following equilibrium:   
     
   N2O4 (g) ⇋ 2 NO2(g) Kc = 4.63 x 10-3 at 25 °C   
     
   A reaction vessel contains 0.2 M NO2 and 0.25 M N2O4. Which of the following statements is true?

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| Q = 0.16 and [NO2] increases |
| Q = 0.16 and [N2O4] increases |
| The reaction is at equilibrium |
| Q = 0.80 and [NO2] increases |
| Q = 6.25 and [N2O4] increases |

1. The following reaction:  
     
   H2 (g) + I2 (g) ⇋ 2 HI (g)  
     
   Has an equilibrium constant of 30.5 under certain conditions. If initial concentrations of reactants and product are: [H2] = 0.100 M; [I2] = 0.100 M; and [HI] = 0.250 M, what will be the equilibrium concentration of HI? Choose from:

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| 0.100 M |
| 0.040 M |
| 0.330 M |
| 0.450 M |
| 0.244 M |