Name _____

Class time _____

Quiz 1. Take Home – Due February 2 by 5:00 p.m. (No Late Quizzes Accepted!)
Must Show Work or NO credit given! Attach Work and Circle Answers!

1. Given the following reaction: $8MnO_4^- + 14H^+ + 5S_2O_3^{2-} \rightarrow 8Mn^{2+} + 7H_2O + 10SO_4^{2-}$

   a) Express the general rate of reaction in terms of each of the reactants and products. (2 pt)

   b) If the rate of appearance of H_2O is 0.022 M/s, what is the rate of disappearance of $S_2O_3^{2-}$? (2 pt)

2. Consider rate data obtained for the following reaction:

   $2I^- + 4H^+ + 2VO_2^+ \rightarrow I_2 + 2VO^{2+} + 2H_2O$
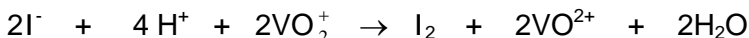
Trial	$[I^-]$ M	$[H^+]$ M	$[VO_2^+]$ M	Rate $\dfrac{M}{s}$
1	0.00200	0.0333	0.0100	2.89×10^{-9}
2	0.00200	0.100	0.0100	2.60×10^{-8}
3	0.00200	0.100	0.0025	6.50×10^{-9}
4	0.00600	0.100	0.0100	7.80×10^{-8}

   a) What is the rate law for this reaction? (4 pts)

   b) What is the value of the rate constant, k? (Include the appropriate units for k!) (2 pts)

   c) What is the rate of reaction if $[I^-]$ is 0.00825 M, $[H^+]$ is 0.0750 M and $[VO_2^+]$ is 0.00425 M? (2 pt)

3. The first order reaction, A $\rightarrow$ Products, has a rate constant of 2.81×10^{-4} min^{-1} at 25 °C.
   a) What is the half life for this process? (1 pts)

   b) How much of a 375 g sample of A will remain after 5 days? (3 pts)

   c) How many minutes will it take for 18.0 % of a sample of A to decompose? (3 pts)

4. Kinetic data was obtained for the reaction: $SO_2Cl_2 \rightarrow SO_2 + Cl_2$

time (s)	$[SO_2Cl_2]$ M
0	0.1000
100.0	0.0876
200.0	0.0768
300.0	0.0673
400.0	0.0590
500.0	0.0517
700.0	0.0397
900.0	0.0305
1100.0	0.0234

   a) Make appropriate plots to determine if the reaction is zero, first or second order with respect to SO_2Cl_2 and include original copies **of all 3 plots** (computer-generated preferred or use graph paper). Do **NOT** show all 3 plots on one set of axes – if you do this, it makes it impossible to tell which graph is linear. Use a regression line (straight line) for the linear graph and a "connect-the-points" curve for any non-linear graphs. Make sure the axes are appropriately labeled. (9 pts)

   b) Based on your graphs, what is the order of the reaction with respect to SO_2Cl_2? (1 pt)

   c) What is the value of k based on the graph showing the correct order of SO_2Cl_2? (Include units for k!) (1 pt)