CHM152 Quiz 1a 25 Pts Spring 2014 Name: _ Show all work to receive credit

- 1. (4 Pts) The reaction $A + 2B \rightarrow \text{products}$ has been found to have the rate law, rate = k[A] [B]². If the concentration of A is tripled and the concentration of B is doubled. Predict by what factor the rate of reaction increases.
 - rate = & [3] [272 /12 Fold
- 2. (5 Pts) Given the rate law for a reaction, rate = $k[A][B]^2$, where rate is measured in units of M 's⁻¹, what are the units for the rate constant k?

$$\frac{M}{S} = \frac{1}{2} M \cdot M^2$$

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3. (5 Pts) What is the rate law that corresponds to the data shown for the reaction $2A + B \rightarrow C$?

Exp.	Initial [A] 0.015	Initial [B] 0.022	Initial rate 0.125	rate=k[A] [B]
2	0.030	0.044	0.500	rate = A [B]
3	0.060	0.044	0.500	rau = x cox
4	0.060	0.066	1.125	

General rate law : rate = & [A] [B)* for [A] experiments 2 = 3 show no change in rate, so Zero order

For [B] = 1.125 = 4 (A) [0.066]8 2.25 = [1.5] &

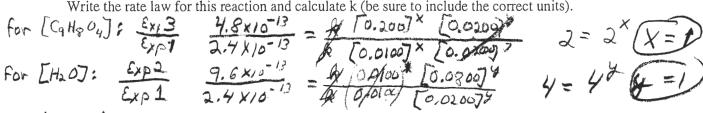
For [B] = 1.125 = 1.125 = 1.00 [0.04438]

4. (6 Pts) Aspirin, C₉H₈O₄, slowly decomposes at room temperature by reacting with water in the atmosphere to produce acetic acid, HC₂H₃O₂, and 2-hydroxybenzoic acid, C₇H₆O₃ (this is why old bottles of aspirin often smell like vinegar):

$$\mathrm{C_9H_8O_4} + \mathrm{H_2O} \rightarrow \mathrm{HC_2H_3O_2} + \mathrm{C_7H_6O_3}$$

_	Concentration a	ind rate data for th	ven below.		
EXP	$[C_9H_8O_4](M)$	$[H_2O](M)$	$\frac{\text{Rate (M/s)}}{2.4 \times 10^{-13}}$	rate & [C9 H802] X [H20]	70
1	0.0100	0.0200		Late - M [- 41.8-27]	J
2	0.0100	0.0800	9.6×10^{-13}		
3	0.0200	0.0200	4.8×10^{-13}		

Write the rate law for this reaction and calculate k (be sure to include the correct units).



$$2 = 2.4 \times 10^{-13} \text{ M} = 0.0100 \text{ M} \cdot 0.0200 \text{ M} = 1.2 \times 10^{-9} \text{ M}^{-1} \cdot \text{S}^{-1}$$

5. (5 Pts) Chlorine dioxide reacts in basic water to form chlorite and chlorate according to the following chemical equation:

 $2ClO_2(aq) + 2OH^-(aq) \rightarrow ClO_2^-(aq) + ClO_3^-(aq) + H_2O(l)$

Under a certain set of conditions, the initial rate of disappearance of chlorine dioxide was determined to be 2.30×10^{-1} M/s. What is the initial rate of appearance of chlorite ion under those same conditions?

Since there is a 2:1 ratio, the CLO2 is appearing at 1/2 the rate of disappearance of CLO2

2.30 ×10-1