Name _____

Section _____

Date _____

Lab Instructor _____

EXPERIMENT 25   Rates of Chemical Reactions

PRE-LABORATORY QUESTIONS

1. Given the following data, determine the *orders* with respect to the concentrations of substances A and B in the reaction

$$A + B \rightarrow \text{products}$$

$[A]_{initial}$	$[B]_{initial}$	Time for reaction
0.10 M	0.10 M	262 s
0.20 M	0.10 M	131 s
0.30 M	0.10 M	87 s
0.20 M	0.20 M	66 s
0.10 M	0.20 M	131 s

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2. What must be the *units* of the specific rate constant in Pre-Laboratory Question 1, given that the rate of reaction would be measured in *M/s*?

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3.   What is the *mechanism* of a chemical reaction? How can a study of reaction rates be used to elucidate the mechanism of a chemical reaction?

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4.   How is the rate of reaction affected by the *temperature* at which the reaction is performed? Do reactions proceed *more slowly* or *more rapidly* when the temperature is raised? Why?

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EXPERIMENT 25   Rates of Chemical Reactions

RESULTS/OBSERVATIONS

Kinetic Runs

Time required for I_2 color to appear	First trial	Second trial
Run A (10 mL Solution 1)	_____	_____
Run B (20 mL Solution 1)	_____	_____
Run C (30 mL Solution 1)	_____	_____
Run D (40 mL Solution 1)	_____	_____
Run E (50 mL Solution 1)	_____	_____

Judging on the basis of your results, what is the *order* of the reaction with respect to potassium iodate concentration? Explain your reasoning.

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Temperature Dependence

What higher temperature did you use? _____

What times were required for reaction?   First trial _____   Second Trial _____

What lower temperature did you use? _____

What times were required for reaction?   First trial _____   Second Trial _____

Do these times confirm the rule of thumb? Explain. _____

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QUESTIONS

1.   In this experiment you determined the dependence of the reaction rate on the concentration of potassium iodate. Devise an experiment for determining the dependence of the rate on the concentration of sodium sulfite.

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2.   Why was it necessary in all the kinetic runs to keep constant the total volume of the reagents after mixing, (that is, why was it necessary to add distilled water in inverse proportion to the quantity of Solution 1 that was required?)

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3.   Why was it necessary that the two solutions to be mixed be at the *same temperature* before mixing? What error would have been introduced if the solutions had not been at the same temperature?

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4.   In this experiment, you used the *time required* for the reaction to occur as an index of the *rate* of the reaction. Are rate and time related directly, or is the relationship an inverse proportionality? Explain.

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