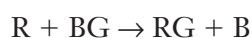


# REACTION MECHANISMS

NAME \_\_\_\_\_

SECTION \_\_\_\_\_

1. Given the chemical equation



Describe the interaction between reactant particles that must occur to convert them to products. You may draw one or more pictures as part of your description.

2. Write the general differential form of the rate law for the reaction above.

3. The following table summarizes several experiments where the concentrations of R and BG were varied to determine the effect on the initial rate of the reaction.

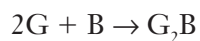
Experiment Number	R (M)	BG (M)	Initial Rate ( $\frac{M}{s}$ )
1	0.240	0.125	$1.85 \times 10^1$
2	0.480	0.124	$3.68 \times 10^1$
3	0.479	0.249	$7.37 \times 10^1$

Determine the rate law for the reaction.

4. How do the exponents in the rate law that was obtained in Question 3 compare to the coefficients in the balanced chemical equation in Question 1?

5. Define the term *reaction mechanism*.

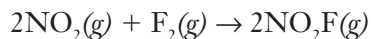
6. a. Optional: Look at the simulation (<http://introchem.chem.okstate.edu/DCICLA/K2GBM.htm>) for the reaction:



The rate law is known to be  $\text{rate} = k[\text{G}]^2$ . Suggest a possible mechanism for this reaction.

- b. Why is B not part of the rate law? (Hint: do all of the steps in a mechanism contribute to the overall rate? Why or why not?)

7. The rate law for the following reaction



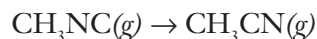
was experimentally determined to be

$$\text{rate} = k[\text{NO}_2]^1[\text{F}_2]^1$$

Which of the following mechanisms is the most reasonable? Explain your reasoning for making the choice you did.

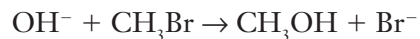
- a.  $2\text{NO}_2(g) + \text{F}_2(g) \rightarrow 2\text{NO}_2\text{F}(g)$
- b.  $\text{NO}_2(g) + \text{F}_2(g) \rightarrow \text{NO}_2\text{F}(g) + \text{F}(g)$  (fast)  
 $\text{NO}_2(g) + \text{F}(g) \rightarrow \text{NO}_2\text{F}(g)$  (slow)
- c.  $\text{NO}_2(g) + \text{F}_2(g) \rightarrow \text{NO}_2\text{F}(g) + \text{F}(g)$  (slow)  
 $\text{NO}_2(g) + \text{F}(g) \rightarrow \text{NO}_2\text{F}(g)$  (fast)

8. Suggest a mechanism for the reaction



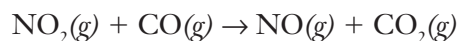
if the experimental rate law is  $\text{rate} = k[\text{CH}_3\text{NC}]^1$ .

9. Suggest a possible mechanism for the reaction



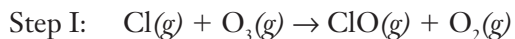
if the experimental rate law is  $\text{rate} = k[\text{CH}_3\text{Br}]^1[\text{OH}^-]^1$ .

10. Suggest a possible mechanism for the reaction



if the experimental rate law is  $\text{rate} = k[\text{NO}_2]^2$ .

11. Consider the following set of equations



Describe the process illustrated by the above set of equations and the role each of the species plays in the process. Use words like mechanism, elementary steps, overall reaction, reactants, products, intermediate, and catalyst in your description.