**Quiz 5**

# Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work. Where appropriate answers should be boxed for clarity, written to the correct number of significant figures, and, include the proper units.

1. Define what is meant by unimolecular and bimolecular steps. Why are termolecular steps infrequently seen in chemical reactions (5 points)?

In a unimolecular reaction, a single reactant molecule decomposes to products. In a bimolecular reaction, two molecules collide to give products. The probability of the simultaneous collision of three molecules with enough energy and orientation is very small, making termolecular steps very unlikely.

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| [NO]i (M) | [O2]i (M) | Initial Rate (M-1 s-1) |
| 0.030 | 0.0055 | 8.55 × 10-3 |
| 0.030 | 0.0110 | 1.71 × 10-2 |
| 0.060 | 0.0055 | 3.42 × 10-2 |

1. Determine the rate law and the value of k for the following reaction using the data provided (15 points).

2 NO (g) + O2 (g) → 2 NO2 (g)

Answer: Rate = (1.7 × 103 1/M2 s)[O2] [NO]2

Rate = (1.7 × 103 1/M2 s)[O2] [NO]2