

Name _____

Period _____

Chemical Kinetics Homework #2
Calculating Reaction Rates

1) Give the symbol and equation for reaction rate. What units are used to measure it?

2) Suppose you are trying to explain reaction rates to a friend by using an analogy with the speed of an automobile on a highway. What feature about the reaction would be analogous to each of the following?

a) The distance traveled by the automobile

b) The amount of time the automobile travels

c) The speed at which the automobile travels

3) Explain how you can tell from a plot of product concentration versus time, without actually calculating reaction rates, whether the reaction rate is increasing, decreasing, or remaining constant.

4) The concentration of a substance changes from 4.0 M to 2.0 M in 40.0 minutes.

a) Is the substance a reactant or product?

b) Explain how you know.

c) Express the rate of this reaction in M/min.

5) Dinitrogen pentoxide decomposes into nitrogen dioxide and oxygen according to the following equation:



If the change in oxygen concentration was found to be 2.5 M/s, what is the reaction rate in terms of dinitrogen pentoxide?

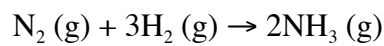
6) Ammonia reacts with oxygen gas to produce nitrogen dioxide and water vapor.

a) Write a balanced equation for the reaction.

b) At the instant when ammonia is reacting at a rate of 0.80 M/min, what is the rate at which oxygen is disappearing?

c) At what rate is each product being formed (in part b above)?

7) Ammonia is formed from its elements according to the equation below:



One mole of nitrogen is mixed with one mole of hydrogen in a one-liter container. After 5.0 s the reaction is stopped, and the gasses are re-measured. There are 0.90 mol of nitrogen, and 0.70 mol of hydrogen. Calculate the reaction rate in terms of each reactant.

N_2

H_2

8) Dinitrogen pentoxide is decomposed to oxygen gas and nitrogen dioxide gas

a) Write a balanced equation for the reaction.

b) Calculate the rate of this reaction, if 0.0021 M oxygen gas is produced from zero to 600 seconds, at a temperature of 50°C.

c) Assuming the rate of this reaction is doubled with every ten degrees (Celsius or Kelvin) increase in temperature, how long would it take to produce 0.0021 M oxygen at a temperature of 100°C?