During Class Invention #

Name(s) with Lab section in Group

Extent of a Reaction

_____

_____

This DCI consists of a series of experiments that involve interaction between you (the student), your instructor and a molecular level simulation. Log on to the Internet. Type the following address into the location-input line of your browser:

http://cheminfo.chem.ou.edu/~mra/CCLI2004/EQERGBN.htm

1. Open the Graphic Simulation program for the R + BG reaction. Using the Control Bar region, adjust the initial conditions of the reaction being studied to those listed in the following table. Use the Resume and Enable Reaction buttons to begin the reaction. When the reaction is completed, pause to stop the action. Record the values of the ending concentrations in the following table. Then determine the entries for the Concentration Change – C row.

EXPERIMENT #1:   R + BG → RG + B

Initial Concentration – I   2.0   2.0   0   0

Concentration Change – C   ___   ___   ___   ___

Ending Concentration – E   ___   ___   ___   ___

Comments:

2. Using the Control Bar region, adjust the initial conditions of the reaction being studied to those listed in the following table. Use the Resume and Enable Reaction buttons to begin the reaction. When the reaction is completed, pause to stop the action. Record the values of the ending concentrations in the following table. Then determine the entries for the Concentration Change – C row.

EXPERIMENT #2:	R	+	BG	→	RG	+	B
Initial Concentration – I	1.0		1.0		0		0
Concentration Change – C	___		___		___		___
Ending Concentration – E	___		___		___		___

Comments:

3. Predict the ending amount for these initial conditions;

	R	+	BG	→	RG	+	B
Initial Concentration – I	1.5		1.5		0		0
Predicted Concentration Change – C	___		___		___		___
Predicted Ending Concentration – E	___		___		___		___

Using the Control Bar region, adjust the initial conditions of the reaction being studied to those listed in the following table. Use the Resume and Enable Reaction buttons to begin the reaction. When the reaction is completed, pause to stop the action. Record the values of the ending concentrations in the following table. Then determine the entries for the Concentration Change – C row.

Comments:

4. Predict the ending amount for these initial conditions;

$$R + BG \rightarrow RG + B$$

Initial Concentration – I   0   0   1.0   1.0

Predicted
  Concentration Change – C   ___   ___   ___   ___

Predicted
  Ending Concentration – E   ___   ___   ___   ___

Using the Control Bar region, adjust the initial conditions of the reaction being studied to those listed in the following table. Use the Resume and Enable Reaction buttons to begin the reaction. When the reaction is completed, pause to stop the action. Record the values of the ending concentrations in the following table. Then determine the entries for the Concentration Change – C row.

Comments:

5. Predict the ending amount for these initial conditions;

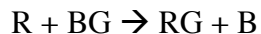**EXPERIMENT #5:** $R + BG \rightarrow RG + B$

Initial Concentration – I   1.0   2.0   0   0

Predicted
Concentration Change – C   ___   ___   ___   ___

Predicted
Ending Concentration – E   ___   ___   ___   ___

Using the Control Bar region, adjust the initial conditions of the reaction being studied to those listed in the following table. Use the Resume and Enable Reaction buttons to begin the reaction. When the reaction is completed, pause to stop the action. Record the values of the ending concentrations in the following table. Then determine the entries for the Concentration Change – C row.

Comments:

6. Predict the ending amount for these initial conditions;

    EXPERIMENT #6:   R + BG → RG + B

         Initial Concentration – I   _1.0_ _0.6_ _1.2_ _0.8_

        Predicted
        Concentration Change – C   ___ ___   ___ ___

        Predicted
        Ending Concentration – E   ___ ___   ___ ___

Using the Control Bar region, adjust the initial conditions of the reaction being studied to those listed in the following table. Use the Resume and Enable Reaction buttons to begin the reaction. When the reaction is completed, pause to stop the action. Record the values of the ending concentrations in the following table. Then determine the entries for the Concentration Change – C row.

Comments:

7.   Complete the following Table

                   R + BG → RG + B

Exp #1-Ending Conc –E___ ___   ___ ___   _____ _____ _____

Exp #2-Ending Conc –E___ ___   ___ ___   _____ _____ _____

Exp #3-Ending Conc –E___ ___   ___ ___   _____ _____ _____

Exp #4-Ending Conc –E___ ___   ___ ___   _____ _____ _____

Exp #5-Ending Conc –E___ ___   ___ ___   _____ _____ _____

Exp #6-Ending Conc –E___ ___   ___ ___   _____ _____ _____

8.   What conclusions can be drawn from these data? Find an algebraic equation that relates the ending concentrations of the reactants and products of the reactions being studied. (Hint: Try all possible combinations of the four concentrations by multiplication and/or division. For example, multiply all four concentrations together, multiply two and divide by the other two, etc., looking for the combination that gives the most constant result.) Summarize your results for three possibilities in the table above. Label each column with how you combined the four concentrations in the box provided. Discuss your results below.

9.   Define the term *chemical equilibrium*.

10.   Write the equilibrium expression, given the following general equation.

$$aA_{(g)} + bB_{(g)} \rightleftharpoons cC_{(g)} + dD_{(g)}$$