

During Class Invention #

Name(s) with Lab section in Group

Shifting Reactions B DCI

\_\_\_\_\_

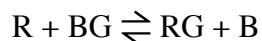
\_\_\_\_\_

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://introchem.chem.okstate.edu/DCICLA/EQRGBN.htm>

1. Open the Graphics Simulation program. Using the data from the Control Bar Region, enter the initial concentration of each substance in the equation below;

**EXPERIMENT #1:**



Initial Concentration – I

\_\_\_ \_\_\_ \_\_\_ \_\_\_

Concentration Change – C

\_\_\_ \_\_\_ \_\_\_ \_\_\_

Ending Concentration – E

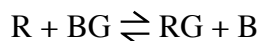
\_\_\_ \_\_\_ \_\_\_ \_\_\_

Click on the Resume and then the Enable Reactions button to begin the reaction. When the reaction appears to be complete, click Pause to stop the action. Record the values of the ending concentrations in the table in Section 1A. Calculate the change in concentration of each of the substances in the reaction.

Comments:

2. If necessary click Pause to stop the action. Use the ending concentrations of BG, RG and B from Experiment #1 (Section 1A.) as the initial concentrations in this experiment. Enter those values in the table below. In the Control Bar Region add R until its concentration is 2.0 M. Record this initial concentration of R in the table below. Click the Resume button. Observe how the concentrations of the substances change over time. When the reaction appears to be complete click the Pause button. Record the values of the ending concentrations in this table

**EXPERIMENT #2: Increase reactant R to 2.0 M**

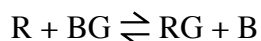


|                           |     |     |     |     |
|---------------------------|-----|-----|-----|-----|
| Initial Concentration – I | ___ | ___ | ___ | ___ |
| Concentration Change – C  | ___ | ___ | ___ | ___ |
| Ending Concentration – E  | ___ | ___ | ___ | ___ |

Comments:

3. If you moved the strip chart scrollbar in the previous section, shift it back to as far to the right as it will go. Use the ending concentrations of R, RG and B from Experiment #2 as the initial concentrations in this experiment. Enter those values in the table below. In the Control Bar Region add BG until its concentration is 1.0 M. Record this initial concentration of BG in the table below. Click the Resume button. Observe how the concentrations of the substances change over time. When the reaction is appears to be complete click the Pause button. Record the values of the ending concentrations in this table;

**EXPERIMENT #3: Increase reactant BG to 1.0 M**

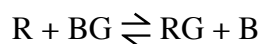


|                           |     |     |     |     |
|---------------------------|-----|-----|-----|-----|
| Initial Concentration – I | ___ | ___ | ___ | ___ |
| Concentration Change – C  | ___ | ___ | ___ | ___ |
| Ending Concentration – E  | ___ | ___ | ___ | ___ |

Comments:

4. In a manner similar to the previous experiments remove R until its concentration equal 0.75 M. Record the new initial conditions of all substances in the table below. Click the Resume button. Observe how the concentrations of the particles in the sample change over time. When the reaction is appears to be complete click the Pause button. Record the values of the ending concentrations in the table and calculate the change in concentration of each of the substances in the reaction.

**EXPERIMENT #4: Decrease reactant R to 0.75 M**

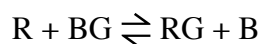


|                           |     |     |     |     |
|---------------------------|-----|-----|-----|-----|
| Initial Concentration – I | ___ | ___ | ___ | ___ |
| Concentration Change – C  | ___ | ___ | ___ | ___ |
| Ending Concentration – E  | ___ | ___ | ___ | ___ |

Comments:

5. In a manner similar to the previous experiments add RG until its concentration is 2.0 M. Record the new initial conditions of all substances in the table below.

**EXPERIMENT #5: Increase product RG to 2.0 M**

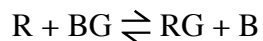


|                           |     |     |     |     |
|---------------------------|-----|-----|-----|-----|
| Initial Concentration – I | ___ | ___ | ___ | ___ |
| Concentration Change – C  | ___ | ___ | ___ | ___ |
| Ending Concentration – E  | ___ | ___ | ___ | ___ |

Comments:

6. In a manner similar to the previous experiments remove RG until its concentration is 1.0 M. Record the new initial conditions of all substances in the table below.

**EXPERIMENT #6: Decrease product RG to 1.0 M**



|                           |     |     |     |     |
|---------------------------|-----|-----|-----|-----|
| Initial Concentration – I | ___ | ___ | ___ | ___ |
| Concentration Change – C  | ___ | ___ | ___ | ___ |
| Ending Concentration – E  | ___ | ___ | ___ | ___ |

Comments:

7. Summarize your observations of Experiments #3 - #6 by completing the table below. As an example, the entries for Experiment #2 have been done for you.

| Experiment | Stress           | Change in [Reactants]    | Change in [Products]     | Reaction shift |
|------------|------------------|--------------------------|--------------------------|----------------|
| #2         | Add reactant [R] | Concentrations decreased | Concentrations increased | Left to Right  |
| #3         |                  |                          |                          |                |
| #4         |                  |                          |                          |                |
| #5         |                  |                          |                          |                |
| #6         |                  |                          |                          |                |

8. Review the summary of your experimental observations that you prepared in Section IVA. Write a statement(s) that generalizes how stressing a reaction by adding or removing a reactant or product shifts the chemical reaction.