

**Setup** - Search "PhET Reversible Reactions" simulation. Open and run the simulation.

- Reaction Conditions:** Set the Temperature to 300K. Do not click on any other boxes.
- Design!** You will run three trials. Each one should have 100 total molecules.
  - The first trial you will start off with 100 Reactant A molecules and 0 product B molecules.
  - The next two trial you can alter the start quantities of A and B, just make sure the total amount is 100 molecules.
- Place the starting amounts in the table at time 0. Record the amount of A and B in the chamber every 20 seconds for 5 minutes.

| Trial 1         |     |   | Trial 2         |   |   | Trial 3         |   |   |
|-----------------|-----|---|-----------------|---|---|-----------------|---|---|
| Time            | A   | B | Time            | A | B | Time            | A | B |
| 0<br>(initial)  | 100 | 0 | 0<br>(initial)  |   |   | 0<br>(initial)  |   |   |
| 20              |     |   | 20              |   |   | 20              |   |   |
| 40              |     |   | 40              |   |   | 40              |   |   |
| 60              |     |   | 60              |   |   | 60              |   |   |
| 80              |     |   | 80              |   |   | 80              |   |   |
| 100             |     |   | 100             |   |   | 100             |   |   |
| 120             |     |   | 120             |   |   | 120             |   |   |
| 140             |     |   | 140             |   |   | 140             |   |   |
| 160             |     |   | 160             |   |   | 160             |   |   |
| 180             |     |   | 180             |   |   | 180             |   |   |
| 200             |     |   | 200             |   |   | 200             |   |   |
| 220             |     |   | 220             |   |   | 220             |   |   |
| 240             |     |   | 240             |   |   | 240             |   |   |
| 260             |     |   | 260             |   |   | 260             |   |   |
| 280             |     |   | 280             |   |   | 280             |   |   |
| 300             |     |   | 300             |   |   | 300             |   |   |
| Final A:B Ratio |     |   | Final A:B Ratio |   |   | Final A:B Ratio |   |   |

3. Graph the concentration (number of molecules) of both molecules A and B vs time for trial 1.. You should have two separate curves (A and B). This is a scatter plot graph where time is your independent variable.
4. Create another two graphs for the other 2 trials.
5. What is happening to the concentrations at the beginning of the experiment? How does that differ from what is happening at the end of the experiment? Mark a vertical line on the graph at the point where equilibrium is established on each graph (point where both lines plateau at the same time).
6. All three trials started at different amounts. How did the final ratios of A to B compare (ie. were they all the same, different)?
7. Did the reaction ever stop?