Brønsted Lowry Acid/Base Reactions Using Stop-Motion Video

Teacher's Guide

1. Provide each group the following model parts.

Atom Centers					Bonds
Qty	Element	Color/Holes		Qty	Type
2	Oxygen	Red/4		5	single
1	Fluorine	Green/4			
5	Hydrogen	White/1			
1	Nitrogen	Blue/4			

2. Each student should prepare his/her own paper to be turned in after completing the lab.

3. Each student should write the balanced equations for three reactions:

   a. Water and ammonia form an ammonium ion and a hydroxide ion:

   $$H_2O + NH_3 \rightleftharpoons OH^- + NH_4^+$$

   d. Water and hydrogen fluoride form a hydronium ion and a fluoride ion:

   $$H_2O + HF \rightleftharpoons H_3O^+ + F^-$$

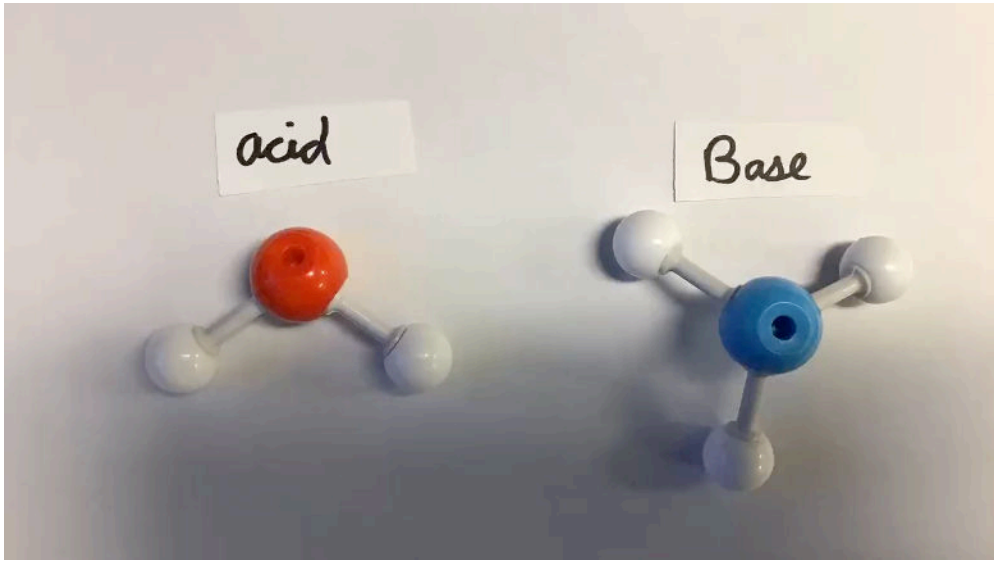
   e. Ammonia and hydrogen fluoride form a fluoride ion and an ammonium ion:

   $$NH_3 + HF \rightleftharpoons F^- + NH_4^+$$

6. Have one student in each group download the free app “Stop Motion Studio,” into an iPhone or iPad. An app is also available for android phones.

7. The group then attaches the iPhone, android phone, or iPad with a test tube clamp or ring clamp(s) to a ring stand about 10-15 cm above the top of the table.

Example Stop Motion Video:



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Student Procedure

Objective: To model the process of Brønsted Lowry Acid/Base reactions.

Materials: Ryler Enterprises model kit parts, Stop Motion Studio app (free), ring stand, test tube clamp or ring clamp(s), rubber bands, sticky notes, Sharpie pen, paper.

1. Write the equations for the reversible reactions between water and ammonia, water and hydrogen fluoride, and ammonia and hydrogen fluoride.
2. Balance the equations. Show the balanced equations to the teacher.
3. Assemble models of water, ammonia, and hydrogen fluoride.
4. Make three stop motion videos of the reactions you wrote in step 2 (both forward and reverse reactions) using the Stop Motion Studio app. Write the word "acid" on one sticky note and the word "base" on another sticky note with a Sharpie and include them in your video.
5. The video should show the transfer of the hydrogen ion (proton). Adjust the speed of the movie so that the reaction process is clearly legible. Share the videos with your instructor.

Questions:

1. What is the definition of a Brønsted Lowry Acid?

2. What is the definition of a Brønsted Lowry Base?

3. Define the term amphoteric.

4. What are the conjugate acids of H_2O, NH_3, and F^-?

5. What are the conjugate bases of H_2O, NH_3, and HF?