

Student Exploration: Titration

Activity A: Acids and bases

Get the Gizmo ready:

- Click **Reset**. Select **1.0 M HNO₃** for the **Burette** and **Mystery NaOH** for the **Flask**.
- Select **Phenolphthalein** for the **Indicator**.
- You will need a scientific calculator for this activity.



Question: How do acids and bases interact in solution?

1. **Describe:** The equation for the reaction of nitric acid (HNO₃) and sodium hydroxide (NaOH) is shown on the bottom right of the Gizmo.
 - A. What are the reactants in this reaction? HNO₃, NaOH
 - B. What are the products of this reaction? NaNO₃, H₂O
2. **Measure:** A **titration** can be used to determine the concentration of an acid or base by measuring the amount of a solution with a known concentration, called the **titrant**, which reacts completely with a solution of unknown concentration, called the **analyte**. The point at which this occurs is called the **equivalence point**.

Carefully add HNO₃ into the flask until the phenolphthalein begins to lose its color. Stop adding HNO₃ when the color change is permanent.

- A. How much (HNO₃) was required to cause the indicator to change color? 8.9mL
 - B. What can you say about the pH before and after the last drop of HNO₃ was added?
The pH was above 8.2 when it was pink before the last drop, after the last drop it is less than 8.2
3. **Explore:** Click **Reset** and change the indicator to **Bromthymol blue**. Add exactly 8.8 mL of HNO₃ to the flask.
 - A. What does the color of the indicator tell you about the current pH of the flask?
Since it is blue, it tells me that the pH is above 7.6
 - B. Add one more drop of HNO₃. What does the color tell you about the pH now?
Since it is yellow, I know that the pH is below 6.0

Activity B:

Get the Gizmo ready:



Titration Gizmo Answer Key Teacher Guide

Terry C. Jones

A red circular graphic with a gradient, appearing as a semi-circle or a partial circle, located to the right of the author's name.

Titration Gizmo Answer Key Teacher Guide:

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