Basic Titrations

How to Calculate Solution Concentration by Simple Acid/Base Titration

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What are Titrations?

Known Concentration

+

Unknown Concentration

=

Complete Reaction

Back-Calculate Unknown Concentration

Uses for Titrations

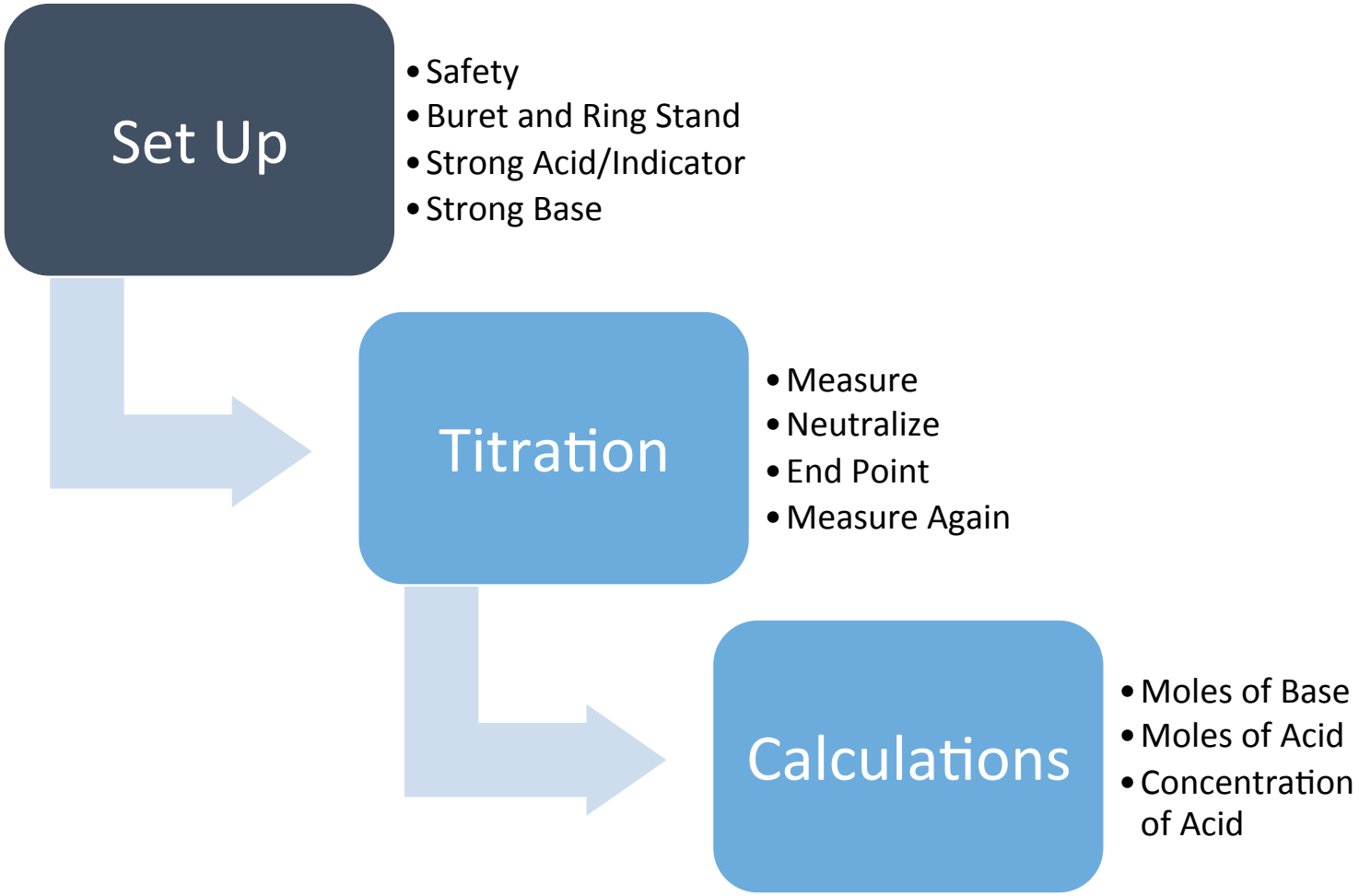
Medicine

Food Industry

Environmental Testing

Teaching

Steps to Acid/Base Titration



Set Up

- Safety
- Buret and Ring Stand
- Strong Acid/ Indicator
- Strong Base

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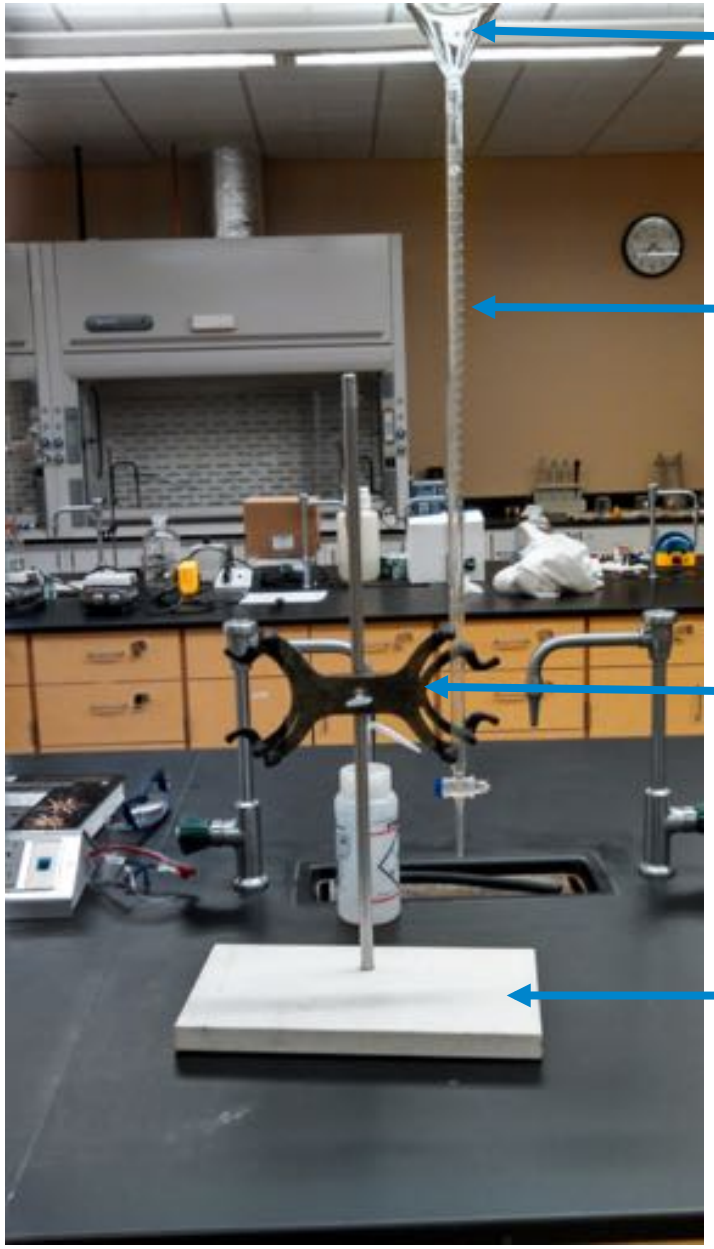
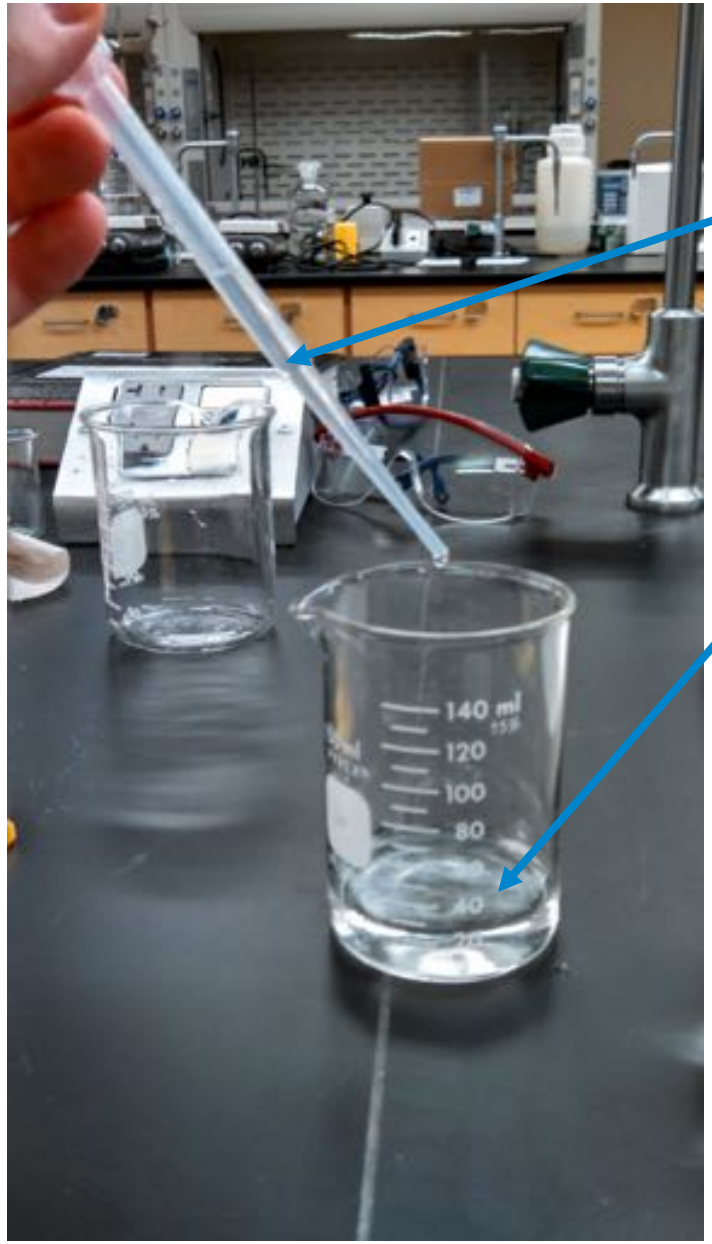


Set Up

- Safety
- Buret and Ring Stand
- Strong Acid/ Indicator
- Strong Base



Phenolphthalein Indicator

Strong Acid

- Only 4 drops of indicator are needed
- The acid should remain clear after indicator addition

Set Up

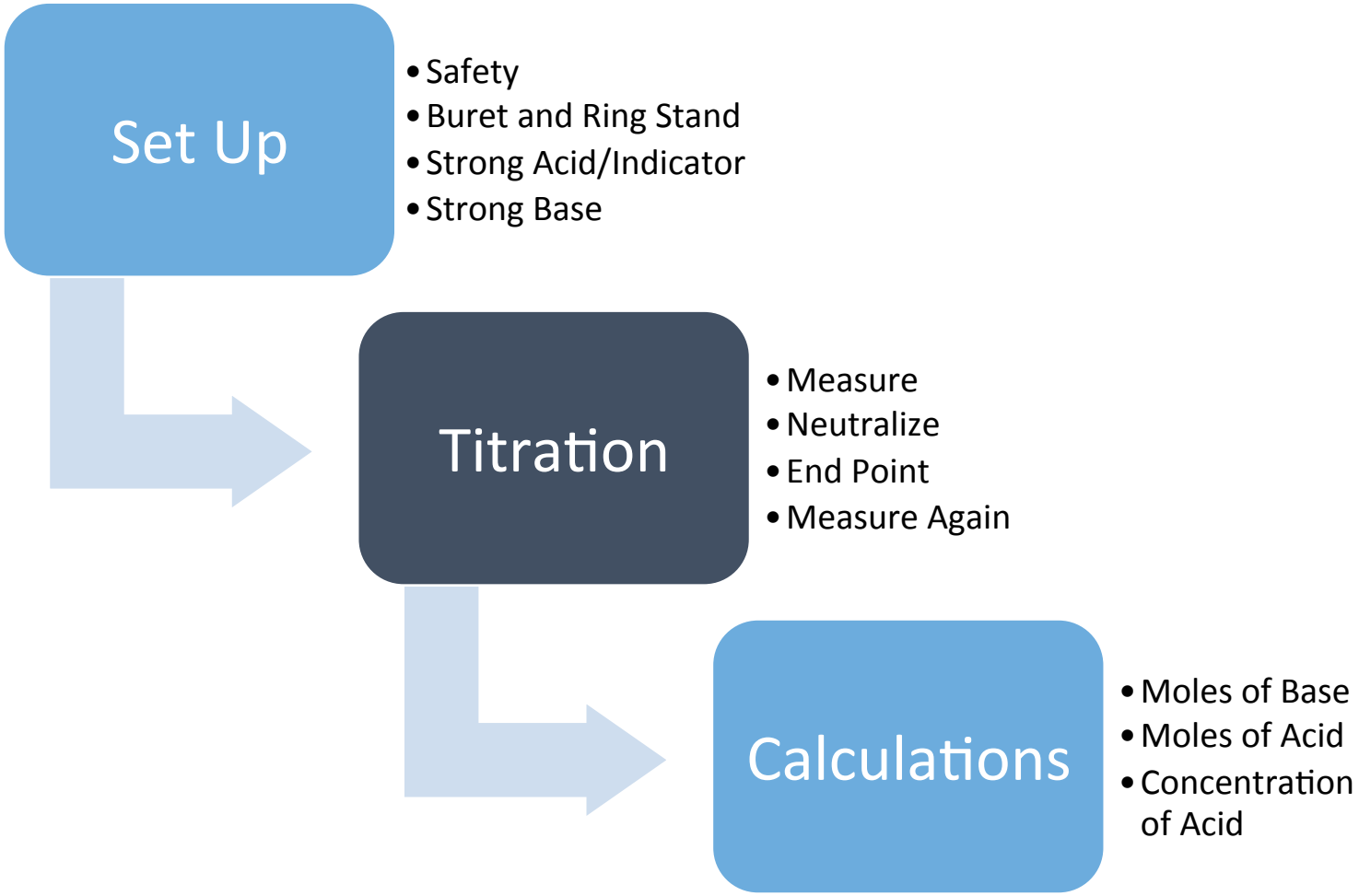
- Safety
- Buret and Ring Stand
- Strong Acid/ Indicator
- Strong Base

Valve Closed

Valve Open

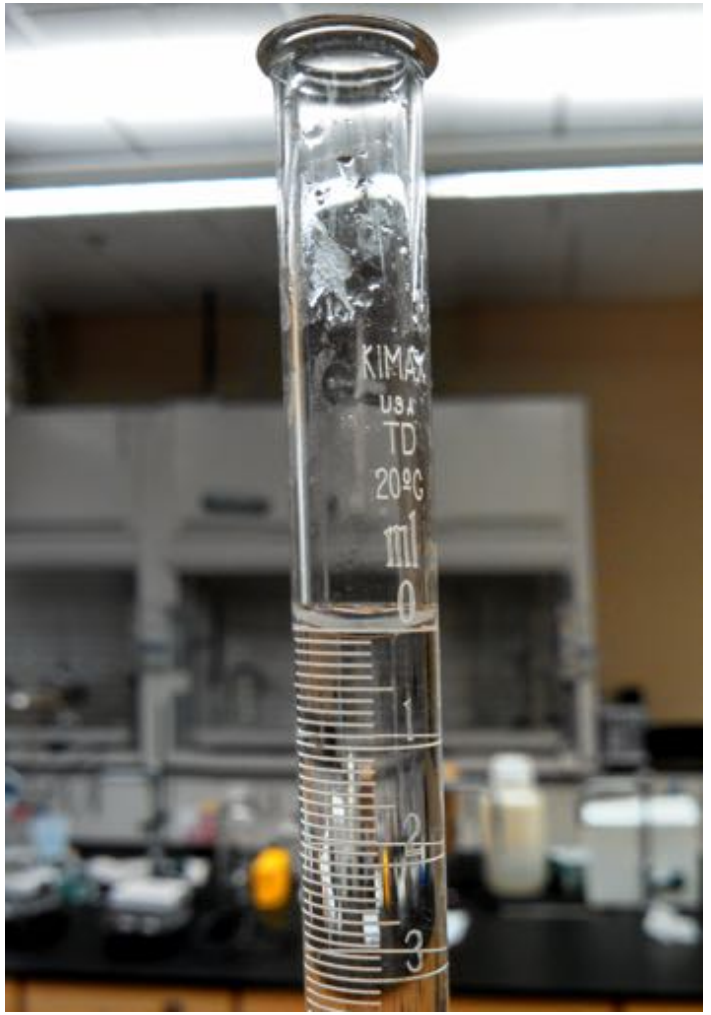
- Make sure the buret valve is closed
- Pour the base through the funnel into the buret

Steps to Acid/Base Titration



Titration

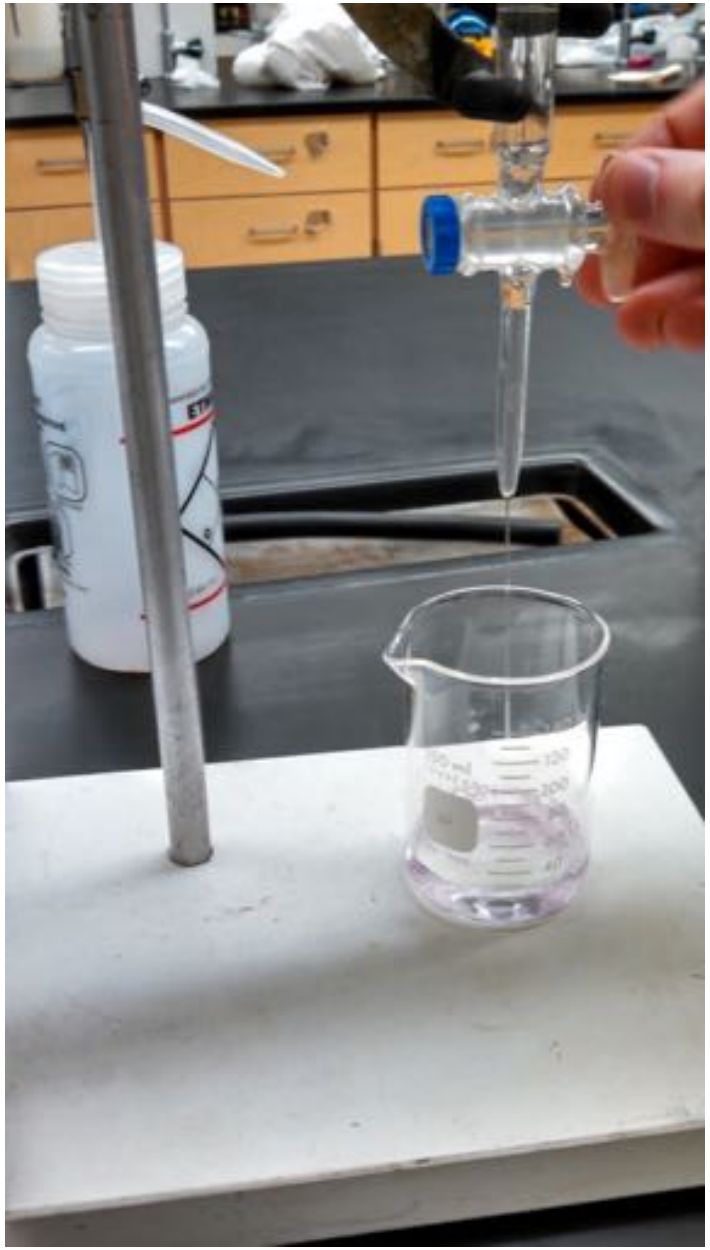
- Measure
- Neutralize
- End Point
- Measure Again

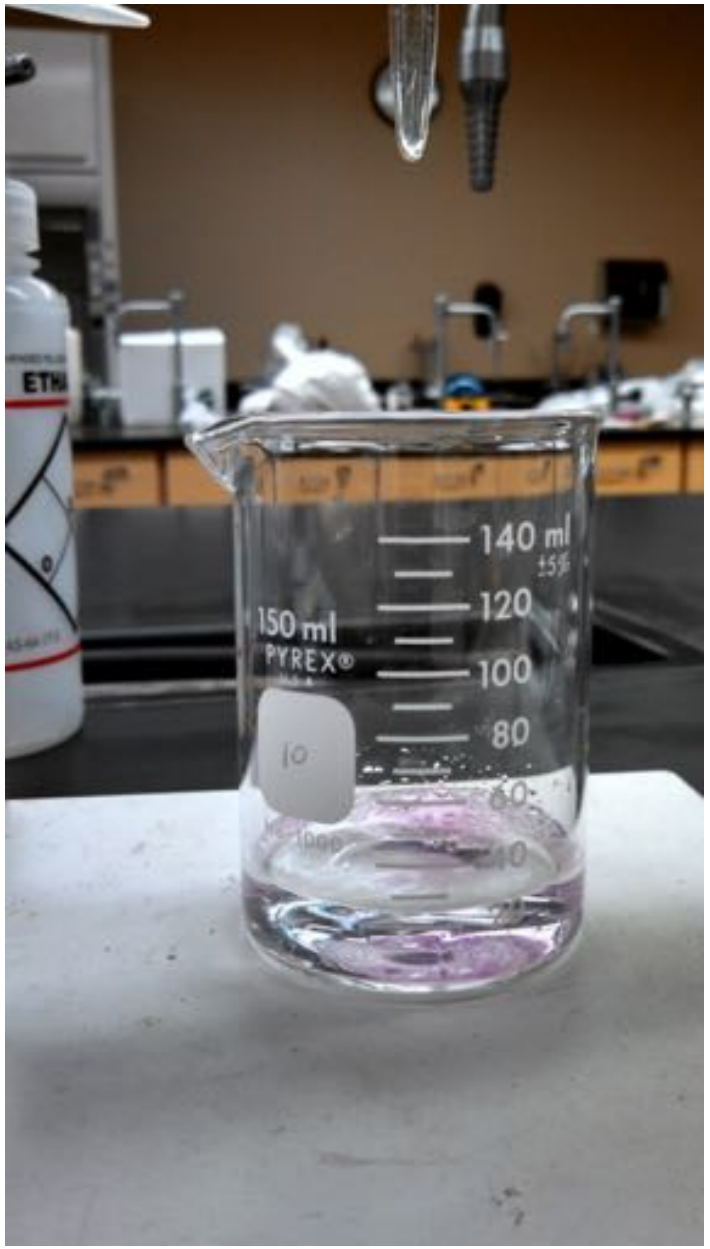


Record initial volume at the bottom of the meniscus

Titration

- Measure
- Neutralize
- End Point
- Measure Again





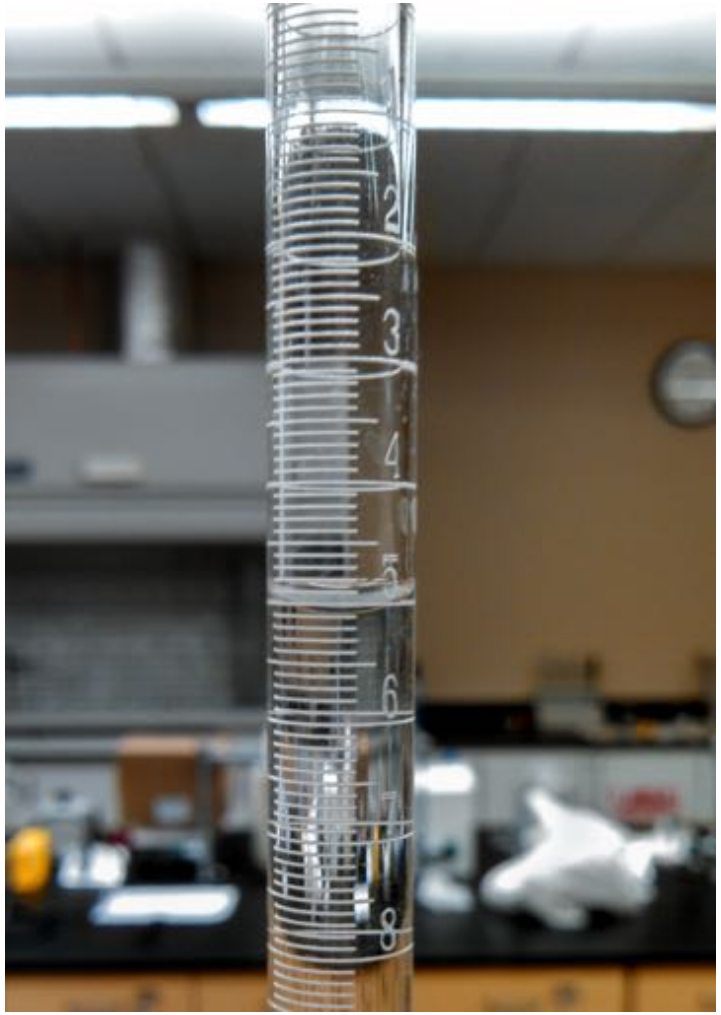
Titration

- Measure
- Neutralize
- End Point
- Measure Again

- Quick 180° turns near the end point
- The indicator will change the color when the reaction is done
- Swirl the solution to make sure the color does not disappear

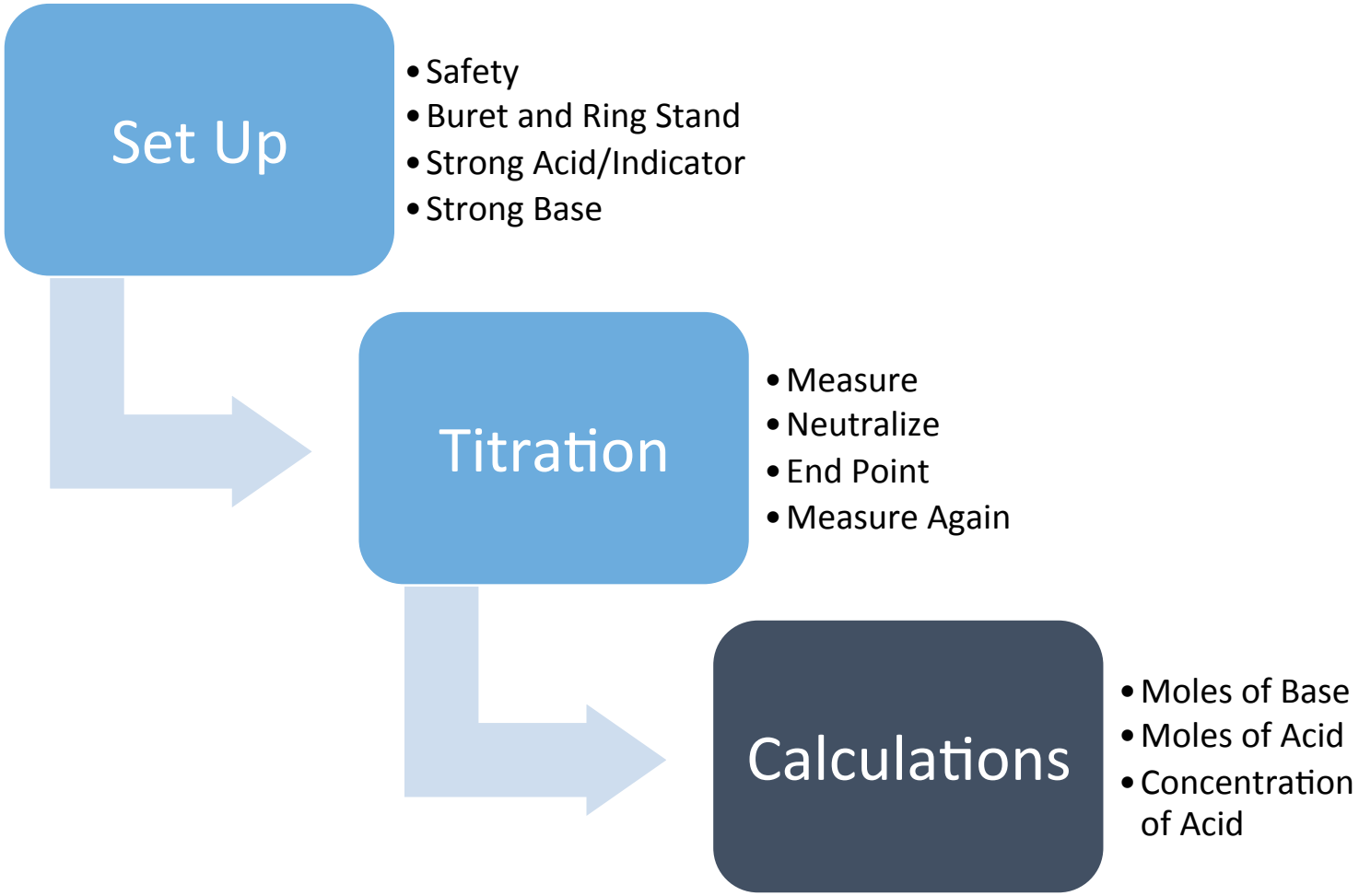
Titration

- Measure
- Neutralize
- End Point
- Measure Again



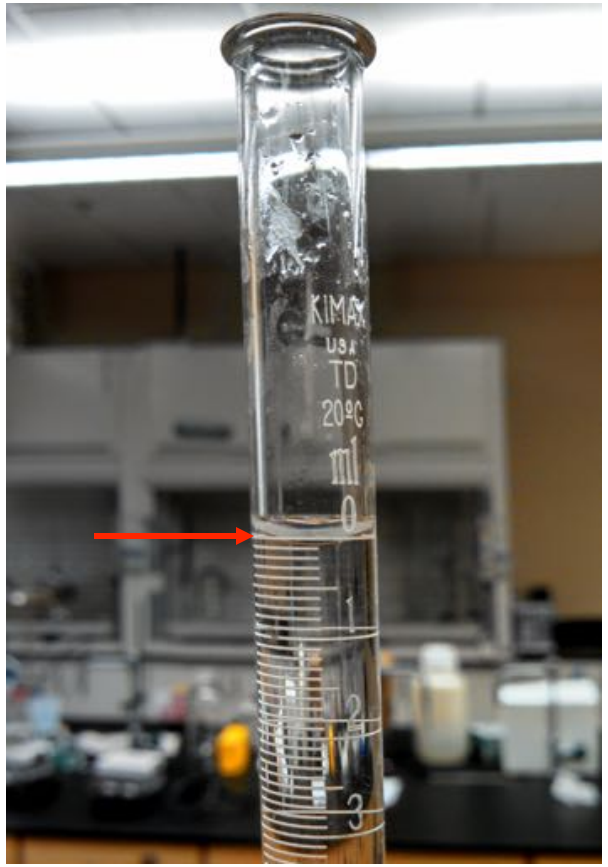
Record new volume at the bottom of the meniscus

Steps to Acid/Base Titration

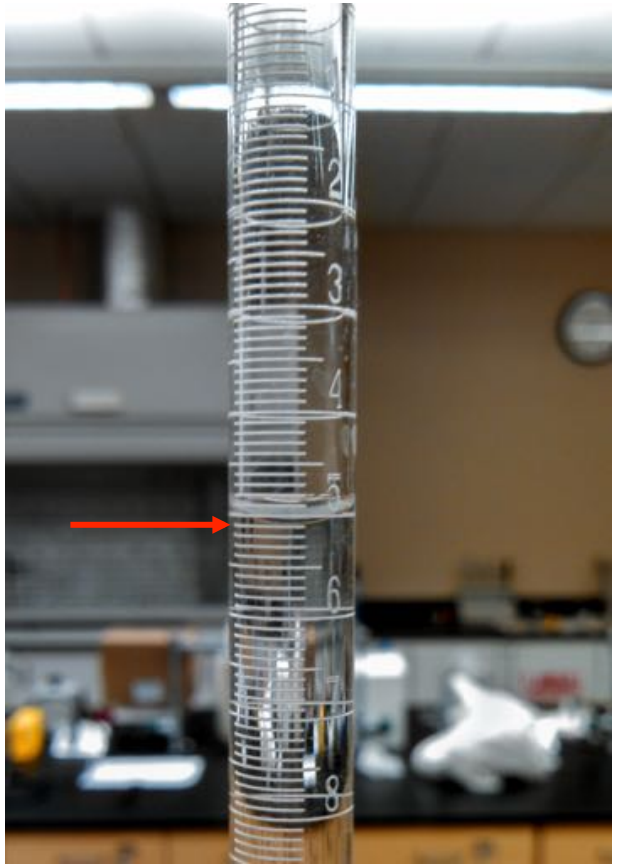


Calculations

- Moles of Base
- Moles of Acid
- Concentration of Acid



Before = 0.0mL



After = 5.1mL

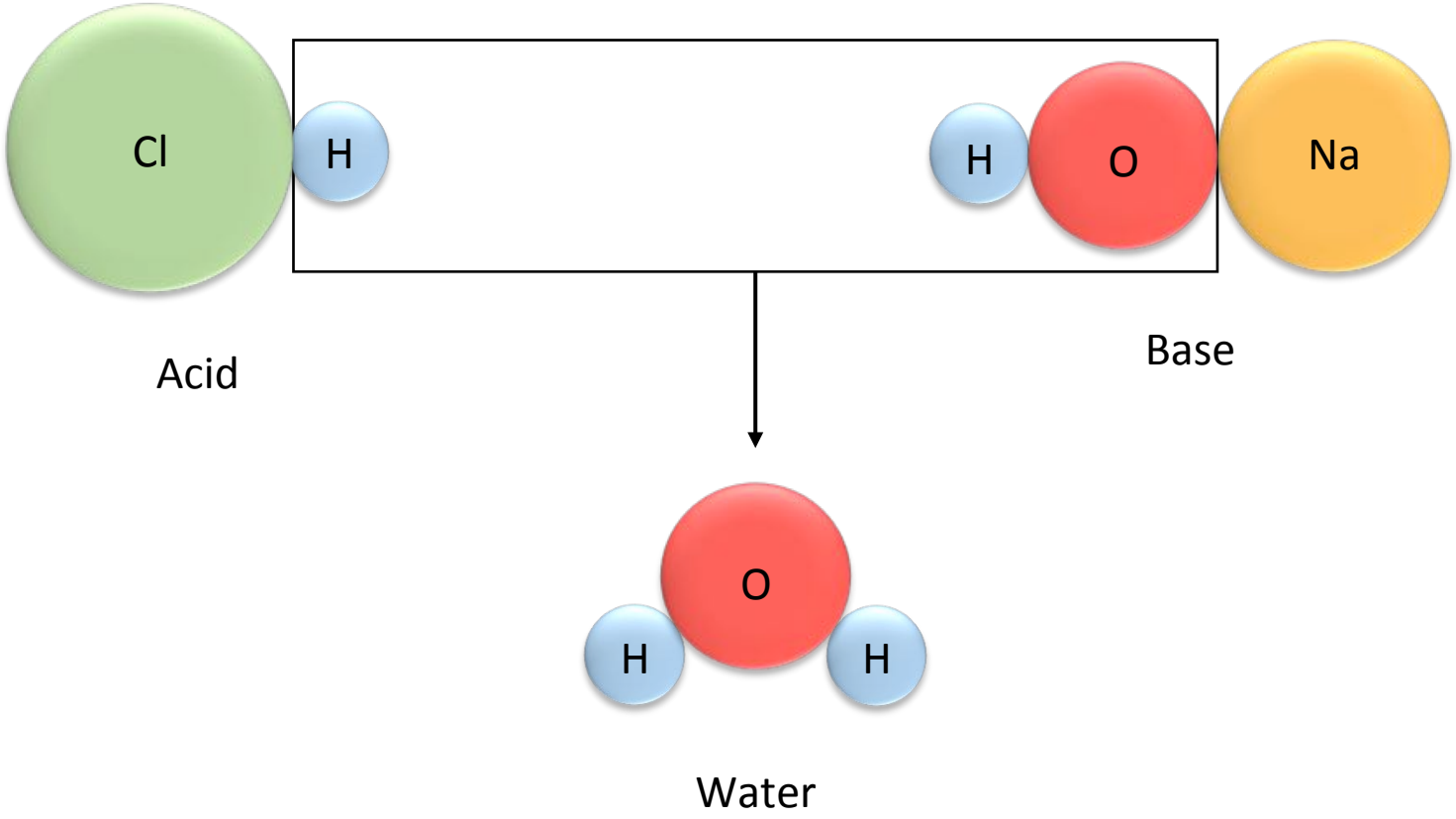
5.1mL of base used in the titration

[Base] = 0.05M = 0.05mol/L

$$5.1 mL/1 * 1 L/1000 mL * 0.05 mol/1 L = 0.000255 mol\ of\ base$$

Calculations

- Moles of Base
- Moles of Acid
- Concentration of Acid



- 1 to 1 ratio in the reaction
- Moles of base = moles of acid
- Moles of acid = 0.000255mol

Calculations

- Moles of Base
- Moles of Acid
- Concentration of Acid

Moles of Acid = 0.000255mol

25mL of Acid Used

$$[Acid]=0.000255 mol/25 mL * 1000 mL/1 L = 0.0102 M$$

Actual concentration of acid used = 0.0100M

Steps to Acid/Base Titration