4. MOLARITY & TITRATION

UNIT 1 REACTIONS IN AQUEOUS SOLUTIONS
CH40S
MR. WIEBE

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REVIEW - MOLARITY

- Two solutions can contain the same solute and solvent but be quite different because the proportions of those compounds are different.
- Molarity is one way to measure the concentration of a solution.

$$\text{Molarity } (M) = \frac{\text{moles of solute}}{\text{volume of solution in liters}}$$

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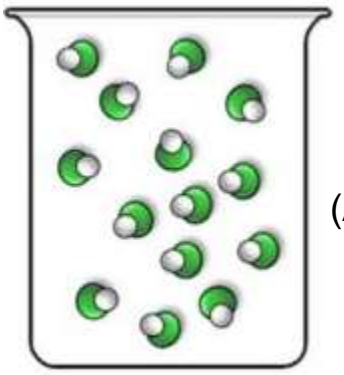
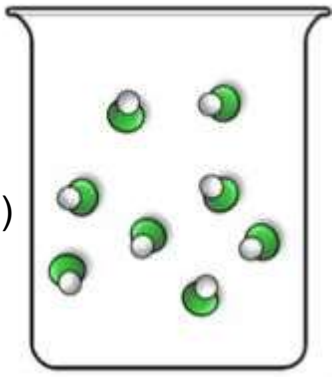
REVIEW - CONCENTRATED VS. DILUTE ACIDS



CONCENTRATED ACIDS CONTAIN MORE SOLUTE (ACID MOLECULES) THAN DILUTE ACIDS)



CONCENTRATED

(i.e. 5.0 mol/L)

DILUTE

(i.e. 3.0 mol/L)

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REVIEW - CALCULATING MOLARITY

What is the molarity of a solution made by dissolving 23.4 g of sodium hydroxide in enough water to form 125 mL of solution? What is the molarity of each of the ions present in the solution?

Slide 4

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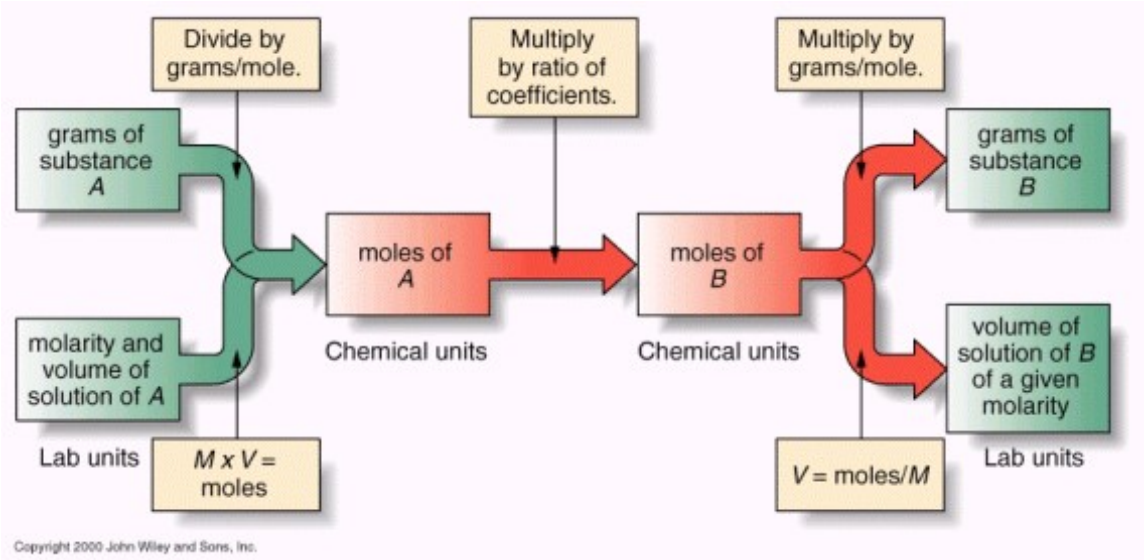
REVIEW - USING MOLARITY IN STOICHIOMETRY



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STOICHIOMETRY OF NEUTRALIZATION REACTIONS

Calculate the volume of 0.250 M strontium hydroxide solution (base) required to react fully neutralize 125.0 mL of 0.150 M hydrochloric acid (HCl).

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STOICHIOMETRY OF NEUTRALIZATION REACTIONS

125 mL of sodium hydroxide base is mixed with 175 ml of 0.200 M sulfuric acid (H_2SO_4). The resulting solution is completely neutral. What is the concentration of the sodium hydroxide?

Slide 7

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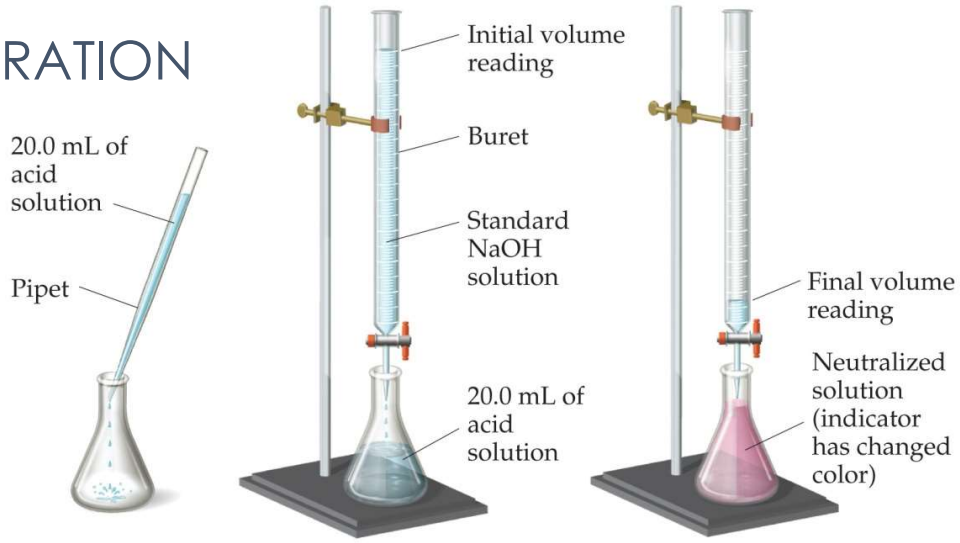
TITRATION



Titration is a technique in which one can calculate the unknown concentration of a solution from the known concentration of another solution.

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TITRATION – DEEP DIVE

$$H^+(aq) + OH^-(aq) \rightarrow H_2O_{(l)}$$

- In every neutralization reaction, the H^+ from the acid reacts in a 1:1 ratio with the OH^- from the base.
- If you add 5 moles of H^+ from an acid, it will react with 5 moles of OH^- from a base.
- If you can determine the moles of H^+/OH^- in your known, you can calculate the moles of H^+/OH^- present in the unknown.

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TITRATION DATA ANALYSIS

Table 1: The Titration of 10.0 mL of HCl(aq) with 0.100 M NaOH			
Titration Trial #	**Final Volume NaOH (mL)**	**Initial Volume NaOH (mL)**	**Volume NaOH Used (mL)**
1	12.2	0.0	
2	23.7	12.2	
3	35.1	23.7	
Average Volume of NaOH Used to Neutralize the HCl (mL):			

AT LEAST TWO TRIALS WITHIN 0.20 mL OF EACH OTHER

IGNORE OTHERS

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SUMMARY PROBLEM

One commercial method of peeling potatoes is to soak them in sodium hydroxide solution for a short time, then spray off the loosened peel. The [NaOH] is normally in the range of 3M to 6M. To ensure the range is consistant, periodic titrations are done on the lye. In one titration, it was found that 45.7 mL of 0.500M H_2SO_4 was needed to neutralize a 20.0 mL sample of NaOH. What was the [NaOH]?

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