Chemistry Instructions

Unit 10 exam Friday!!

1) Get out your notebook

2) Add LT 10.3 to table of contents

3) title it Titrations

May 21-11:21 AM

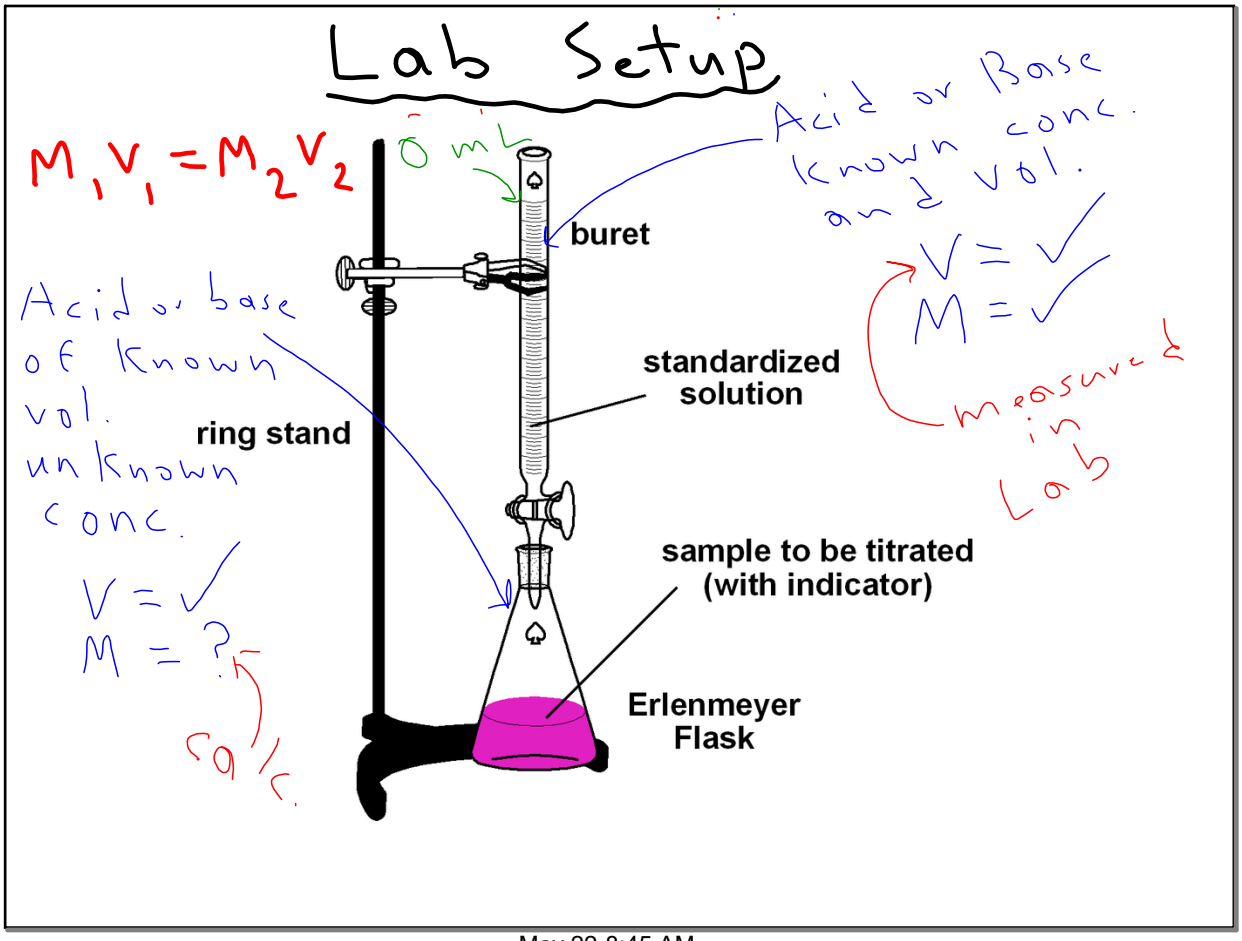
Learning Target 10.3

10.3 I can calculate the pH of an unknown acid using data from a titration

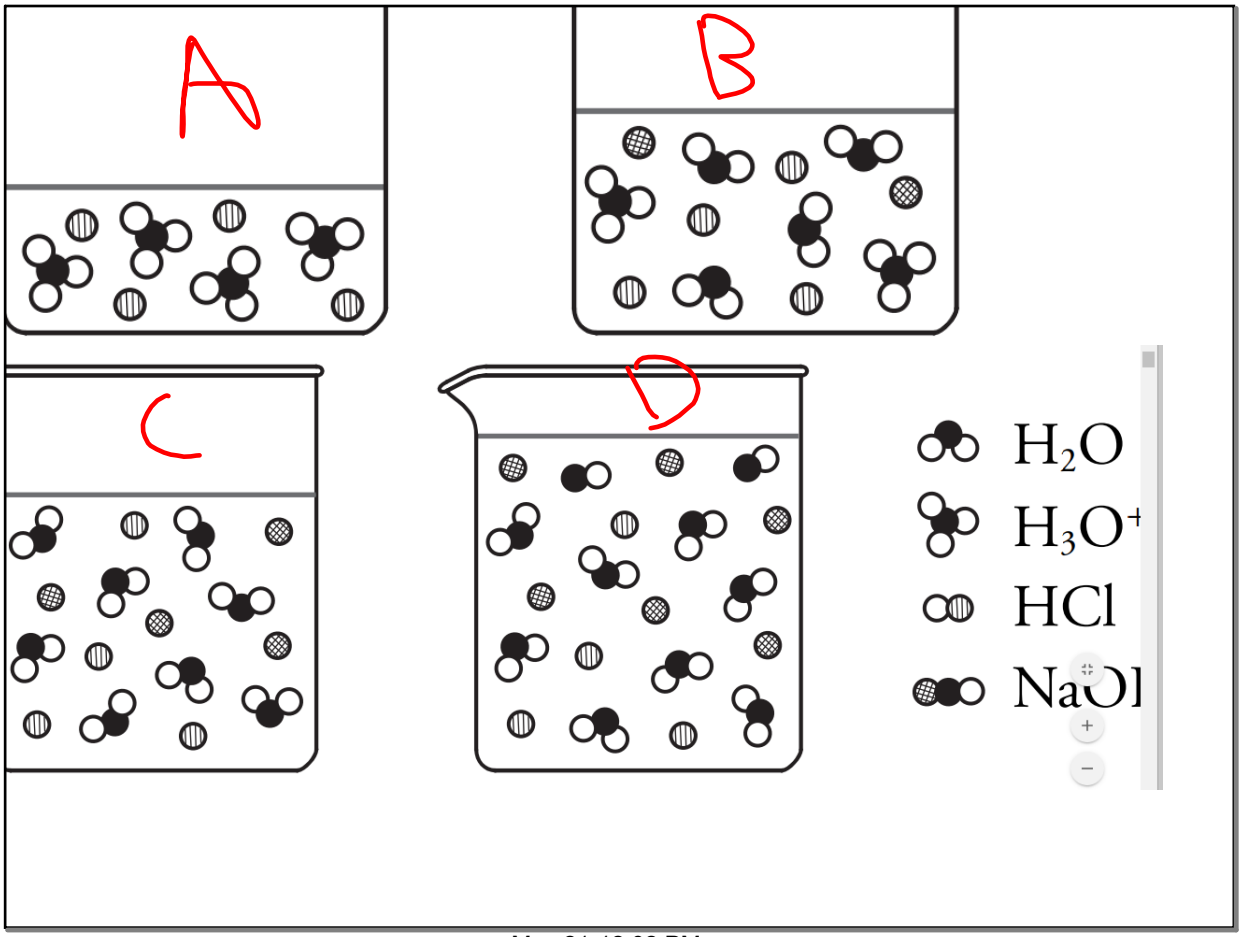
Titration: lab technique used to determine the concentration of an unknown base or acid by recording the volume required to neutralize the reaction.

pH=7
- neutralize Acid add base
- neutralize Base add Acid

May 22-8:40 AM



May 22-8:45 AM



May 21-12:02 PM

Chemistry Instructions

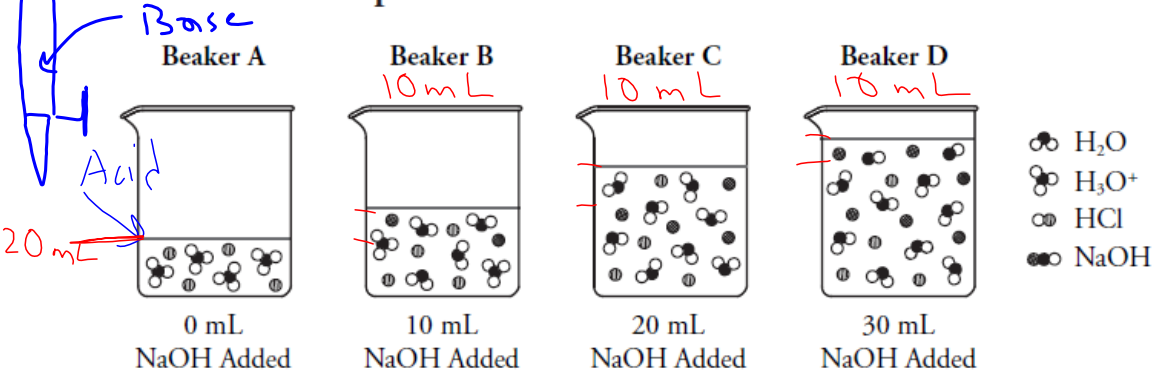
1) Get out the Titrations Worksheet from yesterday.

2) Make sure learning target 10.3 on the top.

Reminder Unit 10 exam is Friday

May 21-1:00 PM

Model 1 – HCl Sample Titrated with NaOH



Beaker	A	B	C	D
H_2O molecules	0	4	8	8
H_3O^{1+} ions (H^+)	4	2	0	0
Cl^{1-} ions	4	4	4	4
Na^{1+} ions	0	2	4	6
OH^{1-} ions	0	0	0	2

Acid

Base

May 22-8:41 AM

1. Consider the diagrams in Model 1.

   a. Which beaker illustrates the solution before the titration begins?

   Beaker A

   b. Why does the volume increase from Beaker A to Beaker D?

   NaOH was added

2. Explain why there are no HCl molecules in any of the beakers.

   $HCl \rightarrow H^+ + Cl^-$

3. Write a balanced net ionic equation for the reaction between HCl and NaOH during the titration.

   $HCl + NaOH \rightarrow NaCl + H_2O$

   $H^+ + Cl^- + Na^+ + OH^- \rightarrow Na^+ + Cl^- + H_2O$

   $H^+ + OH^- \rightarrow H_2O$

   pH A B

May 22-8:41 AM

4. Which species in the illustrations in Model 1 are simply spectator ions?

   Na^+ Cl^-

5. Complete the table in Model 1 by counting the number of each species in each of the four beakers. Record the numbers in the appropriate box in the table. The first column has been done for you as an example. # 5-9

6. For each beaker in Model 1 determine if the solution would be acidic, basic or neutral when checked with a pH meter. Justify your reasoning.

   Beaker A – Acidic, $H^+ > OH^-$ 4/0

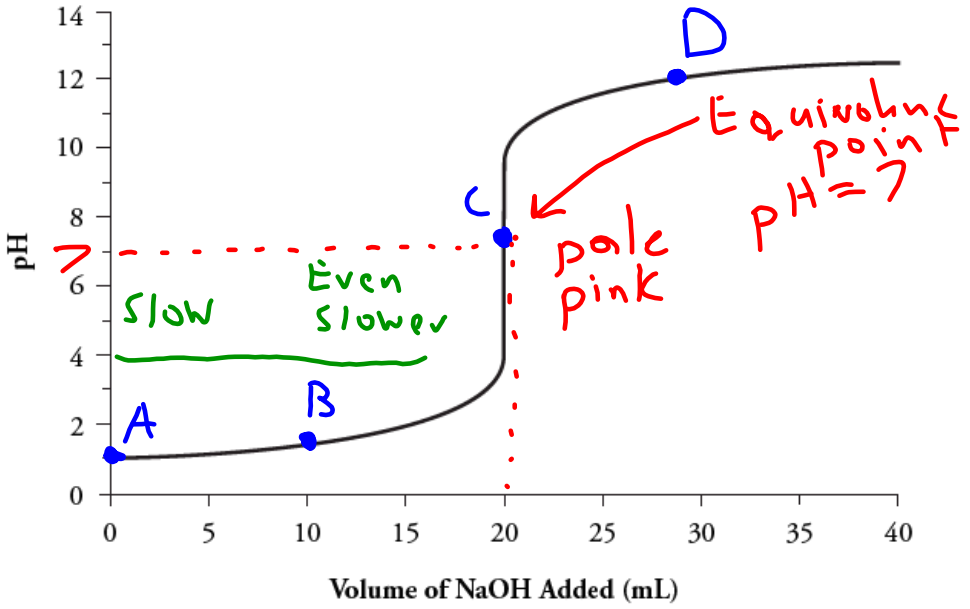
   Beaker B – Acidic, $H^+ > OH^-$ 2/0

   * Beaker C – Neutral 0 H^+ and 0 OH^-

   Beaker D – Basic $H^+ < OH^-$ 0/2

May 22-8:42 AM

Model 2 – A Titration Curve



May 22-8:43 AM

May 24-8:39 AM

8. The sample for the titration shown in Models 1 and 2 was 20.00 mL of 0.100 M hydrochloric acid. Verify that the initial pH of this sample is correctly plotted in the graph in Model 2. Show a calculation to support your answer. pH = 1

$pH = -\log(.1)$

9. The solution in Beaker B of Model 1 was the result of 10.00 mL of 0.100 M sodium hydroxide solution being added to Beaker A.

a. How many moles of HCl were initially in Beaker A?

$0.1 = \frac{mol}{.02L}$ $mol = 0.1(.02) =$ 0.002 mol HCl

b. How many moles of NaOH were added to Beaker A to get Beaker B?

$0.1 = \frac{mol}{.01}$ $mol = 0.1(.01) =$ 0.001 mol NaOH

c. After the reaction, which species is in excess –HCl or NaOH?

HCl

d. How many moles of excess reactant are left in Beaker B?

.002 mol − 0.001 = 0.001 M HCl

e. Calculate the concentration of the excess HCl or excess NaOH. Make sure to consider the new volume of the solution (assume the volumes are additive).

$M = \frac{mol}{L} = \frac{0.001 mol}{0.03} =$ 0.033 mol HCl

May 22-8:46 AM

Standard solution/ Titrant:

- Placed in Buret
- known vol. and conc.

$M_1 = \checkmark$

$V_1 =$ measured (data)

Titrand:

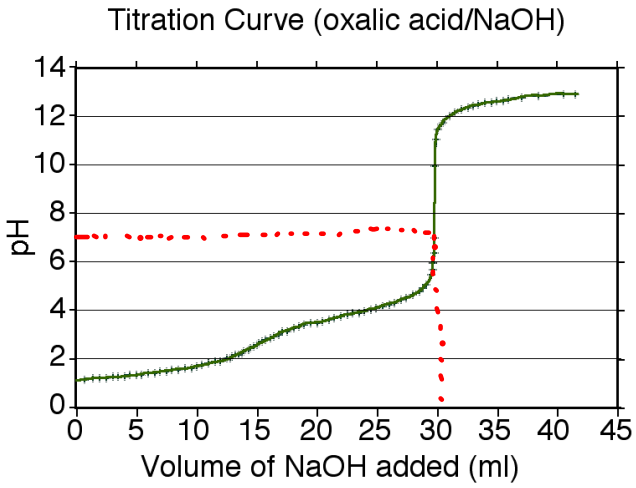
- Placed in beaker/flask
- Known vol
- unknown conc.

$M_2 = ?$ (calc.)

$V_2 = \checkmark$

May 22-10:25 AM

Titration Curves



- Starting pH = 1 (Acidic)
- In lab 30 mL NaOH is add to acid to bring pH to 7.

May 22-8:44 AM

10.3 Test No challenge ?!!!

* you will be given a data set from a titration.

1) Graph to get titration curve.

2) find vol to neutrize the reaction (Equivalene Point)

3) use $M_1V_1 = M_2V_2$ and solve for unknown concentration.

May 22-10:22 AM

Chemistry Instructions

1) Pick up the worksheet on your way in

2) Get out your:

- titration worksheet from yesterday

- Notebook

- pH calc. worksheet

Unit 10 Exam will be on Tuesday

May 25-8:52 AM

May 23-8:33 AM