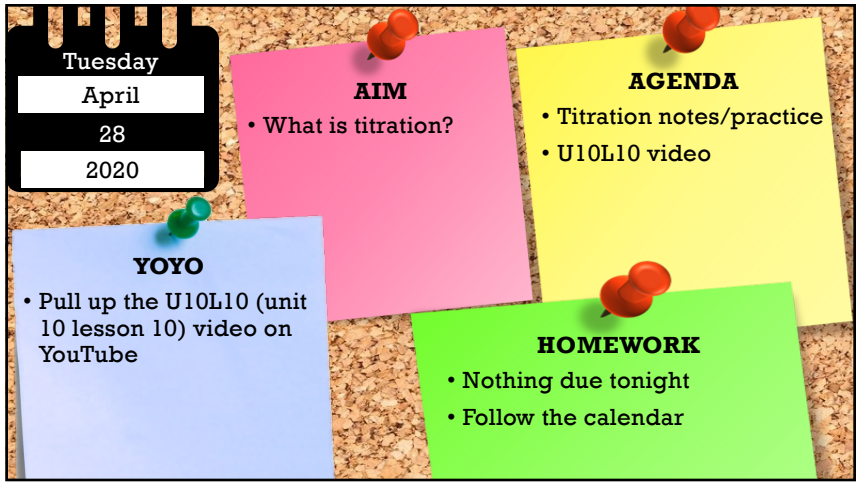


1

YOYO

Using Table K +L, write the complete **balanced** neutralization reaction to the following reactants.

Carbonic acid and potassium hydroxide

2

YOYO

Using Table K +L, write the complete **balanced** neutralization reaction to the following reactants.

Phosphoric acid and sodium hydroxide

3

Types of Acids and Bases

- HCl produces 1 hydrogen and is called a monoprotic acid
- H_2SO_4 produces 2 hydrogens and is called a diprotic acid
- H_3PO_4 produces 3 hydrogens and is called a triprotic acid
- NaOH produces 1 hydroxide group and is called a monohydroxy base

4

Concentration: Molarity (Table T)

- 1 M of HCl gives off 1 mole H^+/liter
- 2 M of HCl gives off 2 mole H^+/liter
- 1 M H_2SO_4 gives off 2 mole H^+/liter
- 2 M H_2SO_4 gives off 4 mole H^+/liter

5

Concentration: Molarity (Table T) YOU TRY

- 1 M NaOH gives off ____ mole OH^-/liter
- 2 M NaOH gives off ____mole OH^-/liter
- 2 M $Ca(OH)_2$ gives off ____ mole OH^-/liter

6

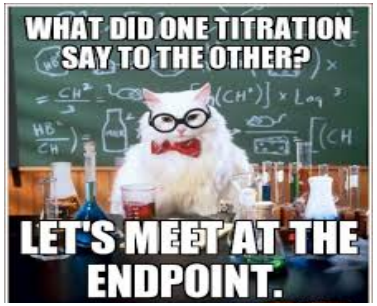
Titration

- Titration is used to find the molarity of an acid or a base
- $M_aV_a = M_bV_b$ (Table T)
- This is done by adding measured volumes of an acid or base of known molarity to a base or acid of unknown molarity until neutralization occurs
- Neutralization is when the number of H^+ and OH^- are equal and the pH is 7, this is also known as the equivalence point.

7

Titration

- An acid-base indicator can be used to show when neutralization has occurred.
- The point of neutralization is the endpoint of the titration.



8

The Titration Formula – Table T

- Titration formula (Table T):

$$M_A V_A = M_B V_B$$

- M_A = molarity of acid (H+)
- V_A = volume of acid
- M_B = molarity of base (OH-)
- V_B = volume of base

9

Sample #1

- What is the concentration of a 30 ml sample of HCl if it can be neutralized by 50 ml of 1.2 M of NaOH?

10

Sample #2

- How many milliliters of 3.0 M of H_2SO_4 are needed to neutralize 50 ml of 1.2 M $Al(OH)_3$?

11

Practice #1

- Determine the concentration of H_3PO_4 if a 90. ml sample is neutralized by 30. ml of 0.9 M $Ca(OH)_2$.

12

Practice #2

- How much 6.0 M HNO_3 is needed to neutralize 39 ml of 2.0 M KOH?

13

Practice #3

- How much 3.0 M NaOH is needed to neutralize 30 ml of .75 M H_2SO_4?

14

Practice #4

- What is the concentration of 20 ml of LiOH if it is neutralized by 60 ml of 4 M HCl?

15

Practice #5

- What is the concentration of 60 ml of H_3PO_4 if it is neutralized by 225 ml of 2 M $Ba(OH)_2$?

16

Practice #6

- How much 2 M HBr is needed to neutralize 380 ml of 0.1 M NH_4OH?

17

Practice #7

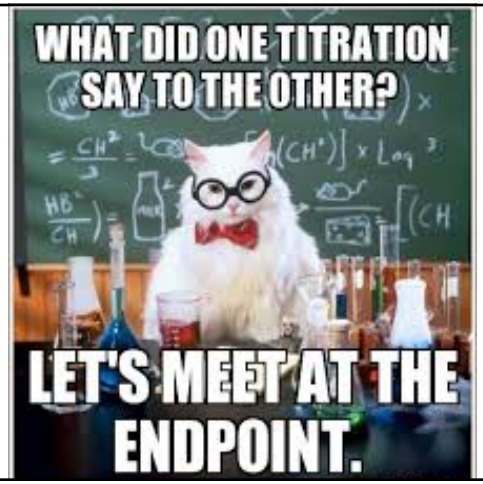
- You have 50 mL of 1.0 M H_2SO_4(aq). What volume of 0.5 M NaOH would be required to neutralize the acid?

18

Practice #8

- A acid has an H+ concentration of 0.1 M and a volume of 100 mL. What volume of a base with a 0.5 M [OH-] will be required to neutralize the reaction?

19



20