Key

Titrations Practice Worksheet

Find the requested quantities in the following problems:

1) If it takes 54 mL of 0.1 M NaOH to neutralize 125 mL of an HCl solution, what is the concentration of the HCl?

Given:

NaOH: $M_1 = .1\,M$, $V_1 = 54\,ml = .054\,L$

HCl: $M_2 = ?$, $V_2 = 125\,ml = .125\,L$

Soln: $M_1V_1 = M_2V_2$

$$M_2 = \frac{M_1V_1}{V_2} = \frac{(.1M)(.054L)}{(.125L)}$$

$$\boxed{M_2 = .04\,M}$$

2) If it takes 25 mL of 0.05 M HCl to neutralize 345 mL of NaOH solution, what is the concentration of the NaOH solution?

Given:

HCl: $M_1 = .05\,M$, $V_1 = 25ml = .025L$

NaOH: $M_2 = ?$, $V_2 = 345ml = .345L$

Soln: $M_1V_1 = M_2V_2$

$$M_2 = \frac{M_1V_1}{V_2} = \frac{(.05M)(.025L)}{(.345L)}$$

$$\boxed{M_2 = .004\,M}$$

3) If it takes 50 mL of 0.5 M KOH solution to completely neutralize 125 mL of sulfuric acid solution (H_2SO_4), what is the concentration of the H_2SO_4 solution?

Given:

KOH: $M_1 = .5\,M$, $V_1 = 50ml = .05\,L$

H_2SO_4: $M_2 = ?$, $V_2 = 125ml = .125L$

Soln: $M_1V_1 = (M_2V_2)2$

$$M_2 = \frac{M_1V_1}{2V_2} = \frac{(.5M)(.05L)}{2(.125L)}$$

$$\boxed{M_2 = .1\,M}$$

$2M_2$ because H_2SO_4 is Diprotic Acid $\therefore$ $2H^+$ need to Neutralized

4) Can I titrate a solution of unknown concentration with another solution of unknown concentration and still get a meaningful answer? Explain your answer in a few sentences.

You Cannot do a titration without knowing the molarity of at Least one of the substances, because you'd then be solving one equation with 2 unknowns (M_1 & M_2)

5) Explain the difference between an endpoint and equivalence point in a titration.

Endpoint: When you actually stop doing the titration (usually, this is determined by a color change in an indicator or an indication of pH=7.0 on an electronic pH probe)

Equivalence point: When the solution is exactly neutralized. It's important to keep in mind that the equivalence point and the endpoint are not exactly the same because indicators don't change color at exactly 7.0000 pH and pH probes aren't infinitely accurate. Generally, you can measure the effectiveness of a titration by the closeness of the endpoint to the equivalence point.