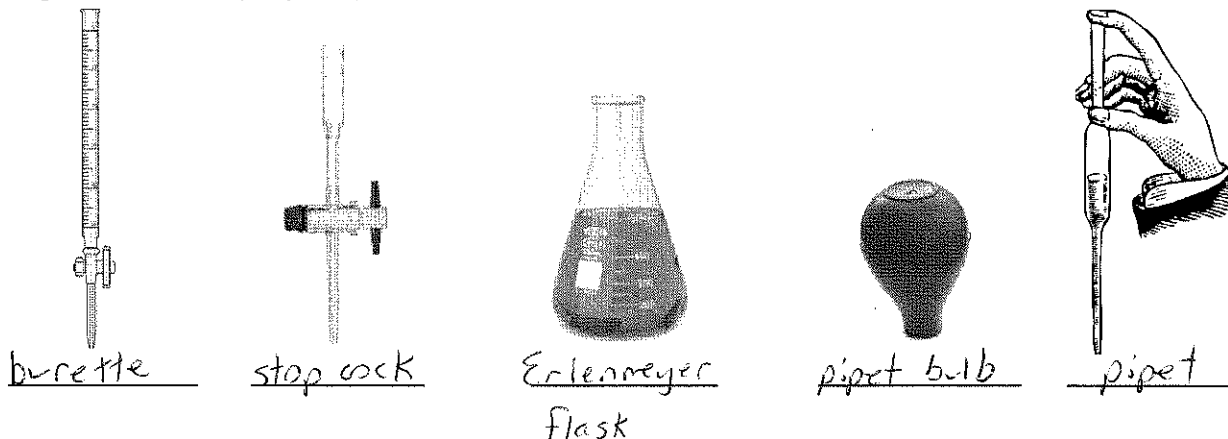


# S30 Unit B: Chemistry: Titration Analysis WS

Name: Key!

Date: Feb 12<sup>th</sup> 2014

1. Label the equipment used for a titration below with the proper names. (*pipet bulb, pipet, stopcock, Erlenmeyer flask.*)



burette

stopcock

Erlenmeyer  
flask

pipet bulb

pipet

2. Define the following: *conc.*

a) titrant: the known<sup>v</sup> chemical, placed in the burette.

b) sample: the unknown conc. chemical, placed in Erlenmeyer.

c) endpoint: the point when the indicator changes colour = end of titration.

d) indicator: changes colour when equal moles of acid & base are present.

Titration of 25.0 mL of NaHCO <sub>3(aq)</sub> with 0.352 mol/L HCl <sub>(aq)</sub>				
Trial	1	2	3	4
Final volume (mL)	16.5	31.8	47.0	16.4
Initial volume (mL)	0.6	16.5	31.8	1.2
Volume of HCl <sub>(aq)</sub> used (mL)	15.9	15.3	15.2	15.2
Color at endpoint (bromothymol blue)	Yellow	Green	Green	Green

3. Baking soda (NaHCO<sub>3(aq)</sub>) is titrated with hydrochloric acid HCl<sub>(aq)</sub>.

a) What is average volume used in the titration?

$$(15.3\text{ mL} + 15.2\text{ mL} + 15.2\text{ mL}) \div 3 = 15.26\text{ mL}$$

b) Calculate the concentration of baking soda.

Acid (HCl)  $C = \frac{n}{V}$

$$C = 0.352\text{ mol/L}$$

$$V = 0.01527\text{ L}$$

$$n = ?$$

$$0.352\text{ mol/L} = \frac{n}{0.01527\text{ L}}$$

$$n = 0.005374\text{ mol}$$

Base (NaHCO<sub>3</sub>)

$$C = ? \quad V = 0.025\text{ L}$$

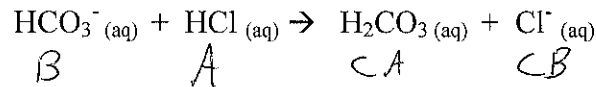
$$n = 0.005374\text{ mol}$$

$$C = \frac{n}{V} = \frac{0.005374\text{ mol}}{0.025\text{ L}}$$

$$= 0.215\text{ mol/L}$$

12/02/2014

c) Identify the Acid/Base pairs for the titration above.



Titration of 10.0 mL of KOH <sub>(aq)</sub> with 0.150 mol/L HNO <sub>3(aq)</sub>				
Trial	1	2	3	4
Final volume (mL)	12.8	25.3	37.9	--
Initial volume (mL)	0.2	12.8	25.3	--
Volume of HNO <sub>3(aq)</sub> used (mL)	12.6	12.5	12.6	--

4. Nitric acid is titrated with potassium hydroxide.

a) What is average volume used in the titration?

12.56 mL

b) Calculate the concentration of potassium hydroxide..

Acid (HNO<sub>3</sub>)

$$c = 0.150 \text{ mol/L}$$

$$v = 0.01257 \text{ L}$$

$$n = ?$$

$$c = \frac{n}{v}$$

$$0.150 \frac{\text{mol}}{\text{L}} = \frac{n}{0.01257 \text{ L}}$$

$$n = 0.001885 \text{ mol}$$

Base (KOH)

$$c = ?$$

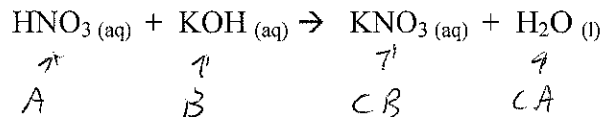
$$v = 0.010 \text{ L}$$

$$n = 0.001885 \text{ mol}$$

$$c = \frac{0.001885 \text{ mol}}{0.010 \text{ L}}$$

$$= 0.1885 \text{ mol/L}$$

c) Identify the Acid/Base pairs for the titration above.



5. What volume of 0.100 mol/L NaOH<sub>(aq)</sub> is required to neutralize 25.0 mL of 0.0875 mol/L HCl<sub>(aq)</sub>?

Acid (HCl)

$$v = 0.025 \text{ L}$$

$$c = 0.0875 \frac{\text{mol}}{\text{L}}$$

$$n = ?$$

$$c = \frac{n}{v}$$

$$0.0875 \frac{\text{mol}}{\text{L}} = \frac{n}{0.025 \text{ L}}$$

$$n = 0.0021875 \text{ mol}$$

Base (NaOH)

$$v = ?$$

$$c = 0.100 \text{ mol/L}$$

$$n = 0.0021875 \text{ mol}$$

$$c = \frac{n}{v}$$

$$0.100 \frac{\text{mol}}{\text{L}} = \frac{0.0021875}{v}$$

$$v = 0.021875 \text{ L} = 21.875 \text{ mL}$$

6. What is the concentration of HNO<sub>3(aq)</sub> if 18.3 mL is used to neutralize 24.0 mL of 1.00 mol/L baking soda, NaHCO<sub>3(aq)</sub>?

Base (NaHCO<sub>3</sub>)

$$c = 1 \text{ mol/L}$$

$$v = 0.024 \text{ L}$$

$$n = ?$$

$$c = \frac{n}{v}$$

$$1 \frac{\text{mol}}{\text{L}} = \frac{n}{0.024 \text{ L}}$$

$$n = 0.024 \text{ mol}$$

Acid (HNO<sub>3</sub>)

$$c = ?$$

$$v = 0.0183 \text{ L}$$

$$n = 0.024 \text{ mol}$$

$$c = \frac{n}{v}$$

$$= \frac{0.024 \text{ mol}}{0.0183 \text{ L}}$$

$$= 1.31 \text{ mol/L}$$