

Name: _____

Period: _____

Seat#: _____

Directions:

- Show your work!
- Some answers are provided at the end of the problem. They are underlined.

- 1) How many mL of a 0.10 M Ca(OH)_2 solution are required to neutralize 25.0 mL of 0.50 M HNO_3 ?
- 2) 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 acid solution? Assume we are only removing one H^+ from H_2SO_4 0.2 M
- 3) It takes 26.23 mL of a 1.008 M NaOH solution to neutralize a solution of 5g of an unknown monoprotic acid in 150.2 mL of solution. What is the molecular weight of the unknown? 192.3 g/mol
- 4) What volume of 1.015 mol/L magnesium hydroxide is needed to neutralize 40.0 mL of 1.60 mol/L HCl? 31.5 mL
- 5) In a titration experiment, 25.0 mL of an aqueous solution of sodium hydroxide was required to neutralize 50.0 mL of a 0.010 M hydrochloric acid. What is the concentration of the sodium hydroxide solution? 0.020 M
- 6) What volume of 0.150 M HCl is needed to neutralize each solution listed below?
 - a. 25.0 mL of 0.135 M NaOH 22.5 mL
 - b. 20.0 mL of 0.185 M NH_4OH 24.7 mL
 - c. 80.0 mL of 0.0045 M Ca(OH)_2 4.8 mL

Dougherty Valley HS Chemistry
Acids & Bases – More Titration Practice

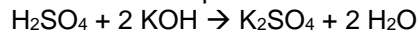
- 7) What concentration of sodium hydroxide is required for each neutralization reaction?
- d. 37.82 mL of NaOH neutralizes 15.00 mL of 0.250 M HF 0.0991 M

 - e. 21.56 mL of NaOH neutralizes 20.00 mL of 0.145 M H₂SO₄. Assume we are only removing one H⁺ from H₂SO₄ 0.135 M

 - f. 14.27 mL of NaOH neutralizes 25.00 mL of 0.105 M H₃PO₄. Assume we are only removing one H⁺ from H₃PO₄ 0.184 M
- 8) A 25.0 mL sample of sulfuric acid is completely neutralized by adding 32.8 mL of 0.116 M ammonia solution. Ammonium sulphate is formed. What is the concentration of the sulfuric acid? 7.6 x 10⁻² M
**HINT* - use the balanced equation. You are removing both H⁺ this time according to the equation!*
- 9) Lactic acid, a chemical responsible for muscle fatigue, is a monoprotic acid. When 0.578 g of lactic acid is titrated with 0.206 M NaOH, a volume of 31.11 mL of NaOH is used. What is the molar mass of lactic acid?
HA + NaOH → NaA + H₂O
- 10) A volume of 25.0 mL of nitric acid, HNO₃ is titrated with 0.12 M NaOH. To completely neutralize the acid 10 mL of NaOH must be added. Find the concentration (mol/L) of the nitric acid. HNO₃ + NaOH → NaNO₃ + H₂O
- 11) Malonic acid is a diprotic acid used in the production of pharmaceuticals. A 0.965 g sample of malonic acid requires 45.91 mL of 0.404 M LiOH to be neutralized. Determine the molar mass (g/mol) for malonic acid.
H₂A + 2 LiOH → Li₂A + 2 H₂O

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- 12) To find the molarity of sulfuric acid, H_2SO_4 it is titrated with 0.75 M KOH. It requires 328.4 mL of KOH to neutralize a 40.00 mL sample of sulfuric acid. Calculate the concentration (mol/L) of the sulfuric acid.



- 13) Boric acid is a triprotic acid that is used as an ant and roach killer. A 1.42-g sample of boric acid is neutralized by 157 mL of 0.4388 M NaOH. Determine the molar mass (g/mol) for boric acid. $\text{H}_3\text{A} + 3 \text{NaOH} \rightarrow \text{Na}_3\text{A} + 3 \text{H}_2\text{O}$

- 14) Tartaric acid, $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$ is neutralized with NaOH. A sample of 3.0 g of tartaric acid reacts with 45 mL of base. How concentrated is the base? $\text{H}_2\text{C}_4\text{H}_4\text{O}_6 + 2 \text{NaOH} \rightarrow \text{Na}_2\text{C}_4\text{H}_4\text{O}_6 + 2 \text{H}_2\text{O}$

- 15) Using the following graph, determine the concentration of the unknown titrand.

Titration of 25 mL HCl of Unknown Concentration
with 0.10 M Sodium Hydroxide as Titrant

