
Excess Reagent Problems

1. Predict the pH of a solution produced by mixing 100.0 mL of 0.250 mol/L nitric acid with 50.0 mL of 0.400 mol/L $\text{Ca}(\text{OH})_2$ solution. (13.000)

2. Calculate the hydronium concentration after 60.0 mL of 0.100 mol/L HCl is used to "neutralize" 25.0 mL of 0.100 mol/L lithium hydroxide. (0.0412 mol/L)

3. What would be the pH of the solution produced by mixing 100.0 mL of a NaOH solution with a pH of 13.30 with 40.0 mL of a HI solution with a pH = 1.50. (13.125)

4. Calculate the pH of a solution prepared by adding 5.00 mL of 0.100 mol/L $\text{Mg}(\text{OH})_2$ to 10.0 mL of 0.100 mol/L HCl solution. (7.000)

Titration Curve

(using excess reagent stoichiometry)

Complete the table below to determine the pH changes that occur during a titration.

Group	Volume of 0.100 mol/L HCl	Volume of 0.100 mol/L NaOH added	Moles of excess HCl or NaOH	[H ₃ O ⁺]	pH
1	10.0 mL	0.00 mL			
	10.0 mL	1.00 mL			
2	10.0 mL	5.00 mL			
	10.0 mL	9.00 mL			
3	10.0 mL	9.50 mL			
	10.0 mL	10.0 mL	---	---	
	10.0 mL	10.5 mL			
4	10.0 mL	11.0 mL			
	10.0 mL	15.0 mL			
5	10.0 mL	18.0 mL			
	10.0 mL	20.0 mL			

Graph the pH vs the volume of NaOH added on the axis below.



Titration Curve

(using excess reagent stoichiometry)

Complete the table below to determine the pH changes that occur during a titration.

Volume of 0.100 mol/L HCl	Volume of 0.100 mol/L NaOH added	Moles of excess HCl or NaOH	$[H_3O^+] / [OH^-]$	pH
10.0 mL	0.00 mL	0.00100	0.100	1.000
10.0 mL	1.00 mL	0.00090	0.0818	1.09
10.0 mL	5.00 mL	0.00050	0.0333	1.48
10.0 mL	9.00 mL	0.00010	0.00526	2.28
10.0 mL	9.50 mL	0.00005	0.00256	2.59
10.0 mL	10.0 mL	---	---	7.00
10.0 mL	10.5 mL	<i>0.000050 OH⁻</i>	<i>0.00244</i>	11.39
10.0 mL	11.0 mL	<i>0.00010 OH⁻</i>	<i>0.00476</i>	11.68
10.0 mL	15.0 mL	<i>0.00050 OH⁻</i>	<i>0.0200</i>	12.30
10.0 mL	18.0 mL	<i>0.00080 OH⁻</i>	<i>0.0286</i>	12.46
10.0 mL	20.0 mL	<i>0.0010 OH⁻</i>	<i>0.0333</i>	12.52

Graph the pH vs the volume of NaOH added on the axis below.

