Name: _____ Date: _____ Period: ____ #: ____

ACID-BASE TITRATIONS

To determine the concentration of an acid (or base), we can react it with a base (or acid) of known concentration until it is completely neutralized. This point of exact neutralization, known as the endpoint, is noted by the change in color of the indicator.

$$\mathbf{V_a \bullet M_a \bullet \#H/formula = V_b \bullet M_b \bullet \#OH/formula}$$

Solve the following problems.

1. A 25.0 mL sample of HCl was titrated to the endpoint with 15.0 mL of 2.0 M NaOH. What was its molarity?

2. A 10.0 mL sample of H_2SO_4 was exactly neutralized by 13.5 mL of 1.0 M KOH. What is the molarity of the H_2SO_4?

3. How much 1.5 M NaOH is necessary to exactly neutralize 20.0 mL of 2.5 M H_3PO_4?

4. How much of 0.5 M HNO_3 is necessary to titrate 25.0 mL of 0.05 M $Ca(OH)_2$ solution to the endpoint?

5. What is the molarity of NaOH solution if 15.0 mL is exactly neutralized by 7.5 mL of a 0.02 M $HC_2H_3O_2$ solution?

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6. Define titration:

7. Define endpoint:

8. What specialized piece of equipment is used in titrations?
9. What is the purpose of adding an indicator?
10. What is the formula for titration calculations?

SHOW ALL WORK BELOW THE TABLE. USE A SEPARATE SHEET OF PAPER IF NECESSARY. FILL IN THE BLANKS WHEN COMPLETE.

	[ACID]	ACID VOLUME (mL)	[BASE]	BASE VOLUME (mL)
11.	2.00 M HCl	50.0	3.00 M NaOH	
12.	4.00 M HCl	25.0	NaOH	50.0
13.	3.00 M HNO_3		2.00 M KOH	30.0
14.	HNO_3	60.0	4.20 M KOH	40.0
15.	3.00 M HBr	45.0	6.50 M LiOH	
16.	1.25 M HBr	30.0	LiOH	45.0
17.	2.25 M H_2SO_4	24.0	1.20 M KOH	
18.	3.50 M H_2SO_4		1.75 M KOH	35.0
19.	HI	15.0	1.30 M $Ca(OH)_2$	30.0
20.	1.60 M HI	20.0	$Ca(OH)_2$	40.0