Chemistry
Review

Name: Key

1. Identify each description as an acidic solution (A), a basic solution (B) or a neutral solution (N).

B 1. tastes bitter	A 2. turns cabbage juice pink	A 3. neutralizes NaOH
B 4. has a pH > 7.0	A 5. tastes sour	A 6. $[H+] = 1.0 \times 10^{-4}$ M
B 7. neutralizes HCl	B 8. Ammonia water	N 9. Has a pOH = 7.0
B 10. turns cabbage juice blue/green	B 11. $[OH-] = 1.0 \times 10^{-1}$ M	A 12. Has $[H+] > [OH-]$

2. What does pH measure? how acidic/basic amount of H^+ & OH^- ions

3. What is the difference between how Bronsted-Lowry define acids and bases versus Lewis?

acid → accept electron pair (2), donate H^+ (B2)

base → accept H^+ (B2), donate electron pair (2)

4. Identify the acid(s) and base(s) in the following reaction:

H_2SO_4 + H_2O → HSO_4^- + H_3O^+

acid base C. base C. acid

5. Complete the following charts:

pH	pOH	$[H^+]$	$[OH^-]$	Acid/Base
2	12	1×10^{-2}	1×10^{-12}	acid
3	11	1×10^{-3}	1×10^{-11}	acid
10	4	1×10^{-10}	1×10^{-4}	base
1	13	1×10^{-1}	1×10^{-13}	acid
13	1	1×10^{-13}		base
9	5	1×10^{-9}	1×10^{-1} / 1×10^{-5}	base
8	6	1×10^{-8}	1×10^{-6}	base

pH	pOH	$[H^+]$	$[OH^-]$	Acid/Base
11.4	2.6	3.98×10^{-12}	2.51×10^{-3}	base
5.8	8.2	1.58×10^{-6}	6.31×10^{-9}	acid
9.9	4.1	1.26×10^{-10}	7.94×10^{-5}	base
1.30	12.7	5.0×10^{-2}	2×10^{-13}	acid
4.82	9.18	1.50×10^{-5}	6.67×10^{-10}	acid
10.10	3.9	8.00×10^{-11}	1.26×10^{-4}	base

6. How many liters of 3.4 M HI will be required to reach the equivalence point with 2.1 L of 2.0 M KOH?

$V_A = ?$ $V_B = 2.1\ L$

$M_{H+} = 3.4\ M$ $M_{OH} = 2.0\ M$

$3.4M \cdot V_A = 2.0M \cdot 2.1\ L$

$V_A = 1.24\ L$

7. It takes 83 mL of a 0.45 M NaOH solution to neutralize 235 mL of an HCl solution.
   a. Write the neutralization reaction.

$HCl + NaOH \rightarrow NaCl + HOH$ (H_2O)

   b. What is the concentration of the HCl solution?

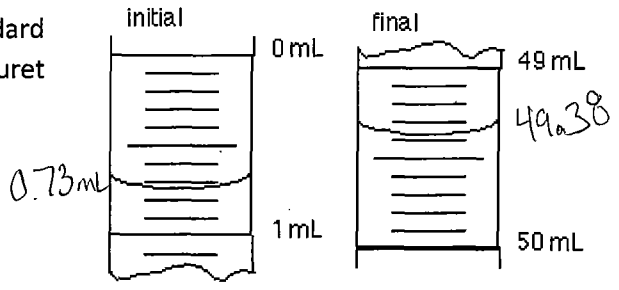
$V_A = 235mL$ $V_b = 83mL$

$M_{H+} =$ $M_{OH} = 0.45M$

$235mL \cdot M_{H+} = 83mL \cdot 0.45M$

$M_{H+} = 0.16M$

8. A student is given a 15 mL sample of acetic acid and asked to determine the concentration of the acid by titration. The student uses a standard 0.20 M NaOH and phenolphthalein. The image below shows the buret before the titration begins and at the equivalence point.



   a. Use the following picture to identify the volume of NaOH delivered in the titration. $49.38 - 0.73 = 48.65mL$

   b. Calculate the concentration of the acetic acid.

$(15mL) \cdot M_{H+} = (48.65\ mL)(0.20M)$

$M_{H+} = 0.65M$

   c. What is the purpose of phenolphthalein in a titration?

Indicator for end point

equivalence pt: $[OH^-] = [H^+]$