# Chapter 19 Cumulative Practice

## Acids & Bases

1) List the equations that are used for pH calculations.

2) Use those equations to find the missing information in the following chart.

| | [Solution] | $[H^+]$ | pH | pOH | $[OH^-]$ | Acidic/Basic? |
|---|---|---|---|---|---|---|
| **a** | 0.5 M HCl | | | | | |
| **b** | _____M HCl | | 4.5 | | | |
| **c** | ____M NaOH | | | 6.5 | | |
| **d** | 0.0015*M* NaOH | | | | | |

3) What is the **Arrhenius** definition?
   a) Acid -
   b) Base -

4) What is the **Brönsted-Lowry** definition?
   a) Acid -
   b) Base -

5) Identify the Acid, Base, Conjugate Acid, and Conjugate Base.

$CH_3NH_{2(l)} + H_2O_{(l)} \rightarrow CH_3NH_3^+{}_{(aq)} + OH^-{}_{(aq)}$

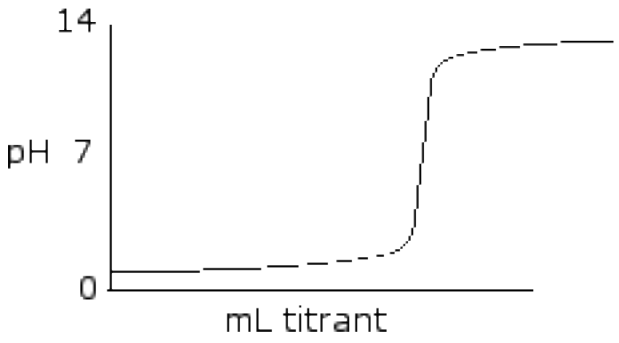
$HSO_3^-{}_{(aq)} + H_2O_{(l)} \rightarrow H_2SO_{3(aq)} + OH^-{}_{(aq)}$

$H_2PO_4^-{}_{(aq)} + H_2O_{(l)} \rightarrow HPO_4^{2-}{}_{(aq)} + H_3O^+{}_{(aq)}$

6) Explain which will have a lower pH, a 1.0 M solution of HCl or a 1.0 M solution of $HC_2H_3O_2$.

7) Why is HCl considered to be a stronger acid than $HC_2H_3O_2$?

8) **Shown to the right is a titration curve:**
A) Was the starting solution (Titrand) a strong/weak acid or a strong/weak base?




B) Was the solution added to it during the titration a strong/weak acid or a strong/weak base?

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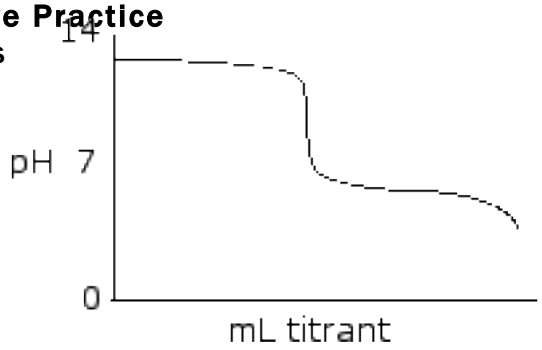
9) **Shown to the right is a titration curve:**

A) Was the starting solution (Titrand) a strong/weak acid or a strong/weak base?

B) Was the solution added to it during the titration a strong/weak acid or a strong/weak base?




10) Mark the equivalence point of each of the titration curves in questions #8 and #9. Explain why the equivalence point should be above seven, below seven, or equal to seven?

11) Identify each of the following compounds.

| | | | | | |
|---|---|---|---|---|---|
| a) $HNO_2$ | strong acid | weak acid | strong base | weak base | neutral |
| b) NaCl | strong acid | weak acid | strong base | weak base | neutral |
| c) $Ca(OH)_2$ | strong acid | weak acid | strong base | weak base | neutral |
| d) HI | strong acid | weak acid | strong base | weak base | neutral |

12) What is the definition of the equivalence point of a titration?

13) What are you trying to find in a titration?

14) 50 mL of a solution of HBr is added to a flask along with a few drops of phenolpthalein indicator. When 30 mL of 0.50 M NaOH are added, the solution turns pink.

a) How many moles of $OH^-$ were added?

b) How many moles of $H^+$ must have been present originally?

c) What was the concentration of the original HBr solution?

d) Should the pH at the equivalence point be above, below, or equal to seven?

15) 20 mL of a $Ba(OH)_2$ solution are added to a flask along with a few drops of bromothymol blue indicator. When 43 mL of a 0.10 M $HC_2H_3O_2$ solution are added, solution changes from blue to yellow.

a) How many moles of $H^+$ were added?

b) How many moles of $OH^-$ must have been present originally?

c) **CHALLENGE:** What was the concentration of the original $Ba(OH)_2$ solution?

d) Was the pH at the equivalence point above, below, or equal to seven?