Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Blk

# Acid/Base

1) List at least three characteristic properties of acids and three of bases.

ACIDS BASES

a) a)

b) b)

c) c)

2) According to the Arrhenius theory,

a) what is an acid?

b) what is a base?

3) According to the Bronsted-Lowry theory,

a) what is an acid?

b) what is a base?

4) According to the Lewis theory, (SLO??)

a) what is an acid?

b) what is a base?

5) In each of the reactions below, identify the acid, base, conjugate acid and conjugate base.

a) NH4+ + CN- ⇔ HCN + NH3

b) HS- + HSO4- ⇔ H2S + SO42-

c) NH3 + HBr ⇔ NH4+ + Br-

d) NH4+ + OH- ⇔ NH3 + H2O

**pH and pOH**

The pH of a solution indicates how acidic or basic that solution is.

pH range of 0-7 acidic

7 neutral

7-14 basic

Since [H+]·[OH-] = 10-14 at 25°C, if [H+] is known, the [OH-] can be calculated and vice versa.

pH = -log [H+] So if [H+] = 10-6 M, pH = 6

pOH = -log [OH-] So if [OH-] = 10-8,pOH = 8

Together, pH + pOH = 14.

Complete the following chart:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | [H+] | pH | [OH-] | pOH | Acidic or Basic |
| 1. | 10-5 M | 5 | 10-9 M | 9 | Acidic |
| 2. |  | 7 |  |  |  |
| 3. |  |  | 10-4 M |  |  |
| 4. | 10-2 M |  |  |  |  |
| 5. |  |  |  | 11 |  |
| 6. |  | 12 |  |  |  |
| 7. |  |  | 10-5 M |  |  |
| 8. | 10-11 M |  |  |  |  |
| 9. |  |  |  | 13 |  |
| 10. |  | 6 |  |  |  |

**pH and pOH CONTINUED**

Calculate the pH of the solutions below.

1. 0.01 M HCl
2. 0.0010 M NaOH

**Neutralization**:

1. What is the general reaction of a neutralization reaction?
2. Give the neutralization reaction of Sulfuric acid with Potassium hydroxide. (Balance and name)

**Strong vs Concentrated**:

1. Give 4 examples of strong acids and 4 strong bases.
2. What does ‘strong’ mean?
3. What does ‘concentrated’ mean?
4. How would you classify this: 0.00001 M H2CO3?

**Titration:**

1. Describe this process.
2. Explain the term ‘endpoint’. Include what it means in terms of [H+] and [OH-].

**More review:**

1) Identify the acid, base, conjugate acid, and conjugate base in the following reactions:

a) HNO3 + H2O 🡸 🡺 H3O+ + NO3-

b) H2C2O4 + CH3NH2 🡸 🡺 HC2O4- + CH3NH3+

c) NH4+ + H2O 🡸 🡺 NH3 + H3O+

2) Complete and balance the following neutralization / acid-base reactions:

a) NaOH + H2CO3 🡺

b) H2SO4 + Ba(OH) 2 🡺

c) H2S + KOH 🡺

d) Al(OH) 3 + HBr 🡺

3) Write a balanced: (1) formula unit, (2) total ionic, and (3) net ionic equation for each of the following acid-base reactions:

a) KOH + H2SO4 🡺

b) HNO3 + Ba(OH)2 🡺

c) H2CO3 + Al(OH)3 🡺

d) Ca(OH)2 + HCl 🡺

4) Given a salt, predict an acid-base pair which would produce the salt:

a) Al2(SO4)3 c) CaCl2

b) NH4F d) KBr