

Name: _____

CHEMISTRY HW 09 - ACIDS & BASES

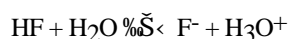
- 1) A water solution that has an H^+ ion concentration of 1×10^{-8} mole per liter is classified as
- basic, with a pH greater than 7
 - acidic, with a pH less than 7
 - acidic, with a pH greater than 7
 - basic, with a pH less than 7
- 2) In the reaction $H_2SO_4 + H_2O \rightleftharpoons H_3O^+ + HSO_4^-$, which two are proton donors?
- H_2SO_4 and H_3O^+
 - H_2SO_4 and HSO_4^-
 - H_2O and H_3O^+
 - H_2O and HSO_4^-
- 3) Which is a net ionic equation for a neutralization reaction?
- $NH_4^+ + OH^- \rightleftharpoons NH_4OH$
 - $H^+ + HCO_3^- \rightleftharpoons H_2CO_3$
 - $Ag^+ + Cl^- \rightleftharpoons AgCl$
 - $H^+ + OH^- \rightleftharpoons H_2O$
- 4) What color is phenolphthalein in a solution that has a pH of 9?
- colorless
 - white
 - pink
 - blue
- 5) Which equation represents a neutralization reaction?
- $NaCl(aq) + AgNO_3(aq) \rightleftharpoons NaNO_3(aq) + AgCl(s)$
 - $Ag^+(aq) + I^-(aq) \rightleftharpoons AgI(s)$
 - $H^+(aq) + OH^-(aq) \rightleftharpoons H_2O(l)$
 - $Zn(s) + 2HCl(aq) \rightleftharpoons ZnCl_2(aq) + H_2(g)$
- 6) Given the reaction at equilibrium:
- $$NH_4^+ + OH^- \rightleftharpoons H_2O + NH_3$$
- Which species is the Bronsted-Lowry acid in the forward reaction?
- OH^-
 - NH_4^+
 - H_2O
 - NH_3
- 7) Given the reactions:
- $NH_3(g) + H_2O(l) \rightleftharpoons NH_4^+(aq) + OH^-(aq)$
 - $HCl(aq) + H_2O(l) \rightleftharpoons H_3O^+(aq) + Cl^-(aq)$
- As shown in equations (A) and (B) and based on the Bronsted theory, water is an amphoteric substance because it can
- neither donate nor accept protons
 - either donate or accept protons
 - donate protons, only
 - accept protons, only
- 8) Which substance, when dissolved in water, is a Bronsted-Lowry acid?
- $NaOH$
 - C_2H_5COOH
 - CH_3OH
 - CH_3COO^-
- 9) Which type of reaction is represented by the following equation?
- $$Al_2S_3 + 6H_2O \rightleftharpoons 2Al(OH)_3 + 3H_2S$$
- electrolysis
 - dehydration
 - hydrolysis
 - neutralization
- 10) Which compounds are *both* classified as electrolytes?
- NH_4Cl and KCl
 - $C_6H_{12}O_6$ and CH_3OH
 - NH_4Cl and $C_6H_{12}O_6$
 - KCl and CH_3OH
- 11) According to the Arrhenius theory, a substance that is classified as an acid will *always* yield
- $H^+(aq)$
 - $OH^-(aq)$
 - $CO_3^{2-}(aq)$
 - $NH_4^+(aq)$
- 12) According to the Bronsted-Lowry theory, an acid is
- an electron acceptor
 - an electron donor
 - a proton donor
 - a proton acceptor
- 13) Given the reaction at equilibrium:
- $$HSO_4^- + H_2O \rightleftharpoons H_3O^+ + SO_4^{2-}$$
- The two Bronsted bases are
- H_2O and SO_4^{2-}
 - H_3O^+ and SO_4^{2-}
 - H_2O and H_3O^+
 - H_3O^+ and HSO_4^-
- 14) Which solution will change red litmus to blue?
- $HCl(aq)$
 - $CH_3OH(aq)$
 - $NaCl(aq)$
 - $NaOH(aq)$
- 15) According to the Arrhenius theory, the acidic property of an aqueous solution is due to an excess of
- OH^-
 - H^+
 - H_2O
 - H_2

- 16) Given the equation:



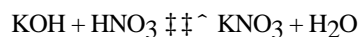
Which pair represents Bronsted-Lowry acids?

- A) HF and H_3O^+ C) H_2O and H_3O^+
 B) H_2O and F^- D) HF and F^-
- 17) Which solution will change litmus paper red?
 A) $\text{NaOH}(\text{aq})$ C) $\text{CH}_3\text{COOH}(\text{aq})$
 B) $\text{NH}_4\text{OH}(\text{aq})$ D) $\text{CH}_3\text{OO}^-(\text{aq})$
- 18) In the solution, litmus is blue. The pH of the solution could be
 A) 4 C) 10
 B) 2 D) 3
- 19) Which concentration indicates a basic solution at 298 K?
 A) $[\text{H}_3\text{O}^+] = 1.0 \times 10^{-7}$
 B) $[\text{H}_3\text{O}^+] > 1.0 \times 10^{-7}$
 C) $[\text{OH}^-] > 1.0 \times 10^{-7}$
 D) $[\text{OH}^-] = 1.0 \times 10^{-7}$
- 20) Water containing dissolved electrolyte conducts electricity because the solution contains mobile
 A) ions C) atoms
 B) electrons D) molecules
- 21) Which type of reaction will occur when volumes of 0.1 M HCl and 0.1 M NaOH are mixed?
 A) hydrolysis C) neutralization
 B) electrolysis D) ionization
- 22) Given the reaction:



Which species is the Bronsted acid in the reverse reaction?

- A) HF C) H_2O
 B) F^- D) H_3O^+
- 23) According to the Arrhenius theory, when an acid substance is dissolved in water it will produce a solution containing only one kind of positive ion. To which ion does the theory refer?
 A) sodium C) hydrogen
 B) chloride D) acetate
- 24) Given the reaction:



Which process is taking place?

- A) neutralization C) esterification
 B) substitution D) addition

- 25) What is the molarity of a KOH solution if it requires 20. milliliters of 2.0 M HCl to exactly neutralize 20. milliliters of the KOH solution?

A) 2.0 M C) 20. M
 B) 10. M D) 1.0 M

- 26) Which formulas represent a conjugate acid-base pair?

A) H_2SO_4 and SO_4^{2-}
 B) H_3O^+ and OH^-
 C) CH_3COOH and CH_3COO^-
 D) H_3PO_4 and PO_4^{3-}

- 27) In the reaction $\text{H}_2\text{O} + \text{CO}_3^{2-} \rightleftharpoons \text{OH}^- + \text{HCO}_3^-$, the two Bronsted-Lowry acids are

A) CO_3^{2-} and OH^- C) CO_3^{2-} and HCO_3^-
 B) H_2O and OH^- D) H_2O and HCO_3^-

- 28) In the reaction $\text{H}_2\text{O} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OH}^-$, the water is acting as

A) neither a proton acceptor nor donor
 B) a proton donor, only
 C) a proton acceptor, only
 D) both a proton acceptor and donor

- 29) An aqueous solution that has a hydrogen ion concentration of 1.0×10^{-8} mole per liter has a pH of

A) 6, which is acidic C) 8, which is basic
 B) 8, which is acidic D) 6, which is basic

- 30) Which is a characteristic of a solution of HNO_3 ?

A) It turns litmus blue.
 B) It conducts electricity.
 C) It turns phenolphthalein pink
 D) It forms OH^- ions.

- 31) Which compound reacts with an acid to form a salt and water?

A) KOH C) CH_3COOH
 B) CH_3Cl D) KCl

- 32) One sample of a solution with a pH of 10 is tested with phenolphthalein and another sample of this solution is tested with litmus. In this solution the color of the litmus is

A) blue and the phenolphthalein is colorless
 B) red and the phenolphthalein is pink
 C) red and the phenolphthalein is colorless
 D) blue and the phenolphthalein is pink

- 33) The reaction of NH_4NO_3 with water to form an acidic solution is called

A) reduction C) oxidation
 B) hydrolysis D) electrolysis

