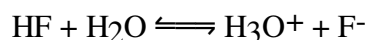


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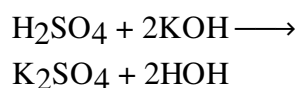
- ___ 1) Pure water at 25 °C has a pH of
- 1) 14
 - 2) 1×10^{-7}
 - 3) 1×10^{-14}
 - 4) 7
- ___ 2) How many milliliters of 5.0 M NaOH are needed to exactly neutralize 40. milliliters of 2.0 M HCl?
- 1) 16 mL
 - 2) 40. mL
 - 3) 8.0 mL
 - 4) 10. mL
- ___ 3) As HF dissolves in water, the following ionization reaction occurs:



In this reaction, a proton is donated to

- 1) H_2O by HF
 - 2) HF by F^-
 - 3) H_3O^+ by F^-
 - 4) H_3O^+ by H_2O
- ___ 4) What is the concentration of H_3O^+ ions, in moles per liter, of a 0.0001 M HCl solution?
- 1) 1×10^{-3}
 - 2) 1×10^{-1}
 - 3) 1×10^{-4}
 - 4) 1×10^{-2}

- ___ 5) Given the neutralization reaction:



Which compound is a salt?

- 1) H_2SO_4
- 2) K_2SO_4
- 3) KOH
- 4) HOH

- ___ 6) If 50. milliliters of a 1.0 M NaOH solution is needed to exactly neutralize 10. milliliters of an HCl solution, the molarity of the HCl solution is
- 1) 0.20 M
 - 2) 10. M
 - 3) 5.0 M
 - 4) 1.0 M
- ___ 7) Household vinegar has a pH of approximately 3.0. Which would appear yellow when added to a vinegar solution?
- 1) bromocresol green
 - 2) methyl orange
 - 3) litmus
 - 4) phenolphthalein
- ___ 8) Which formula represents a conjugate acid-base pair?
- 1) H_3PO_4 and PO_4^{3-}
 - 2) H_2SO_4 and SO_4^{2-}
 - 3) CH_3COOH and CH_3COO^-
 - 4) H_3O^+ and OH^-
- ___ 9) The results of testing a colorless solution with three indicators are shown in the table below.

Indicator	Result
red litmus	blue
blue litmus	blue
phenolphthalein	pink

- Which formula could represent the solution tested?
- 1) $\text{C}_6\text{H}_{12}\text{O}_6(\text{aq})$
 - 2) $\text{NaOH}(\text{aq})$
 - 3) $\text{HCl}(\text{aq})$
 - 4) $\text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{aq})$
- ___ 10) An aqueous solution of an ionic compound turns red litmus blue, conducts electricity, and reacts with an acid to form a salt and water. This compound could be
- 1) HCl
 - 2) NaI
 - 3) LiOH
 - 4) KNO_3

- ___ 11) What type of reaction is represented by the following equation?
- $$\text{Al}_2\text{S}_3 + 6\text{H}_2\text{O} \longrightarrow 2\text{Al}(\text{OH})_3 + 3\text{H}_2\text{S}$$
- 1) electrolysis
 - 2) neutralization
 - 3) hydrolysis
 - 4) dehydration
- ___ 12) Which compound reacts with an acid to form a salt and water?
- 1) KCl
 - 2) CH_3Cl
 - 3) KOH
 - 4) CH_3COOH
- ___ 13) According to the Arrhenius theory, the acidic property of an aqueous solution is due to an excess of
- 1) H^+
 - 2) H_2
 - 3) H_2O
 - 4) OH^-
- ___ 14) According to the Arrhenius theory, which list of compounds includes only bases?
- 1) LiOH, $\text{Ca}(\text{OH})_2$, and $\text{C}_2\text{H}_4(\text{OH})_2$
 - 2) KOH, $\text{Ca}(\text{OH})_2$, and CH_3OH
 - 3) NaOH, $\text{Ca}(\text{OH})_2$, and CH_3COOH
 - 4) KOH, NaOH, and LiOH
- ___ 15) Which substance can act as an Arrhenius acid in aqueous solution?
- 1) NH_3
 - 2) LiH
 - 3) HI
 - 4) NaI
- ___ 16) If a solution has a hydronium ion concentration of 1×10^{-9} M, the solution is
- 1) basic and has a pH of 5
 - 2) acidic and has a pH of 9
 - 3) basic and has a pH of 9
 - 4) acidic and has a pH of 5
- ___ 17) What is the conjugate base of NH_3 ?
- 1) NO_3^-
 - 2) NO_2^-
 - 3) NH_2^-
 - 4) NH_4^+
- ___ 18) Which pH value indicates the *most* basic solution?
- 1) 3
 - 2) 7
 - 3) 8
 - 4) 11
- ___ 19) Which concentration indicates a basic solution at 298 K?
- 1) $[\text{OH}^-] = 1.0 \times 10^{-7}$
 - 2) $[\text{H}_3\text{O}^+] > 1.0 \times 10^{-7}$
 - 3) $[\text{H}_3\text{O}^+] = 1.0 \times 10^{-7}$
 - 4) $[\text{OH}^-] > 1.0 \times 10^{-7}$
- ___ 20) A 0.1 M solution of HCl contains
- 1) an equal number of H_3O^+ ions and OH^- ions
 - 2) fewer H_3O^+ ions than OH^- ions
 - 3) more H_3O^+ ions than OH^- ions
 - 4) neither H_3O^+ ions nor OH^- ions
- ___ 21) An indicator was used to test a water solution with a pH of 12. Which indicator color would be observed?
- 1) pink with phenolphthalein
 - 2) colorless with litmus
 - 3) red with litmus
 - 4) colorless with phenolphthalein
- ___ 22) As a solution of NaOH is diluted from 0.1 M to 0.001 M, the pH of the solution
- 1) decreases
 - 2) increases
 - 3) remains the same
- ___ 23) When an acid solution exactly neutralizes a base solution, what acid-base combination *always* produces a mixture with a pH less than 7?
- 1) a weak acid and a weak base
 - 2) a strong acid and a strong base
 - 3) a strong acid and a weak base
 - 4) a weak acid and a strong base

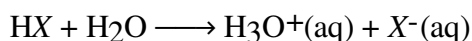
___ 24) According to the Bronsted-Lowry theory, H_2O is considered to be a base when it

- 1) donates a proton
- 2) accepts a proton
- 3) donates an electron
- 4) accepts an electron

___ 25) When the salt Na_2CO_3 undergoes hydrolysis, the resulting solution will be

- 1) basic with a pH less than 7
- 2) basic with a pH greater than 7
- 3) acidic with a pH greater than 7
- 4) acidic with a pH less than 7

___ 26) Given the reaction:



Based on the equation, HX would be classified as

- 1) an acid, because it accepts a proton
- 2) a base, because it accepts a proton
- 3) an acid, because it donates a proton
- 4) a base, because it donates a proton

___ 27) Which of the following statements *best* describes a solution with a pH of 3?

- 1) It has an H_3O^+ ion concentration of 1×10^{-3} mol/L and is acidic.
- 2) It has an H_3O^+ ion concentration of 1×10^3 mol/L and is basic.
- 3) It has an H_3O^+ ion concentration of 1×10^{-3} mol/L and is basic.
- 4) It has an H_3O^+ ion concentration of 1×10^3 mol/L and is acidic.

___ 28) Which 0.1 M solution has a pH *greater* than 7?

- 1) KCl
- 2) KOH
- 3) CH_3COOH
- 4) $\text{C}_6\text{H}_{12}\text{O}_6$

___ 29) As the H_3O^+ ion concentration of a solution increases, the pH of the solution

- 1) decreases
- 2) increases
- 3) remains the same

___ 30) Which salt hydrolyzes in water to form a solution that is acidic?

- | | |
|---------|---------------------------|
| 1) NaCl | 3) KCl |
| 2) LiCl | 4) NH_4Cl |