Acids Bases And Salts

1 Which compound is an Arrhenius base?
(1) HCl (3) $Ca(OH)_2$
(2) H_3PO_4 (4) CH_3COOH

2 Which formula can represent hydrogen ions in an aqueous solution?
(1) $OH^-(aq)$ (3) $H_3O^+(aq)$
(2) $Hg_2^{2+}(aq)$ (4) $NH_4^+(aq)$

3 Which substance is an Arrhenius base?
(1) HNO_3 (3) $Ca(OH)_2$
(2) H_2SO_3 (4) CH_3COOH

4 Which substance is an Arrhenius acid?
(1) H_2 (3) KCl
(2) HCl (4) NH_3

5 The concentration of which ion is increased when LiOH is dissolved in water?
(1) hydroxide ion (3) hydronium ion
(2) hydrogen ion (4) halide ion

6 Which substance is an Arrhenius acid?
(1) HBr (3) NaOH
(2) NaBr (4) NH_3

7 Which pair of compounds represents one Arrhenius acid and one Arrhenius base?
(1) CH_3OH and NaOH (3) HNO_3 and NaOH
(2) CH_3OH and HCl (4) HNO_3 and HCl

8 Which type of substance yields hydrogen ions, H^+, in an aqueous solution?
(1) an Arrhenius acid
(2) an Arrhenius base
(3) a saturated hydrocarbon
(4) an unsaturated hydrocarbon

9 Based on the Arrhenius theory, when potassium hydroxide dissolves in water, the only negative ion in the aqueous solution is
(1) O^{2-} (aq) (3) H^- (aq)
(2) OH^{2-} (aq) (4) OH^- (aq)

10 Which compound is an Arrhenius base?
(1) CO_2 (3) $Ca(OH)_2$
(2) $CaSO_4$ (4) C_2H_5OH

Base your answers to questions 11 on the information below and on your knowledge of chemistry.

A NaOH(aq) solution with a pH value of 13 is used to determine the molarity of a HCl(aq) solution. A 10.0-mL sample of the HCl(aq) is exactly neutralized by 16.0 mL of 0.100 M NaOH(aq). During this laboratory activity, appropriate safety equipment was used and safety procedures were followed.

11 Compare the hydronium ion concentration to the hydroxide ion concentration when the HCl(aq) solution is exactly neutralized by the NaOH(aq) solution.

Base your answers to questions 12 on the information below and on your knowledge of chemistry.

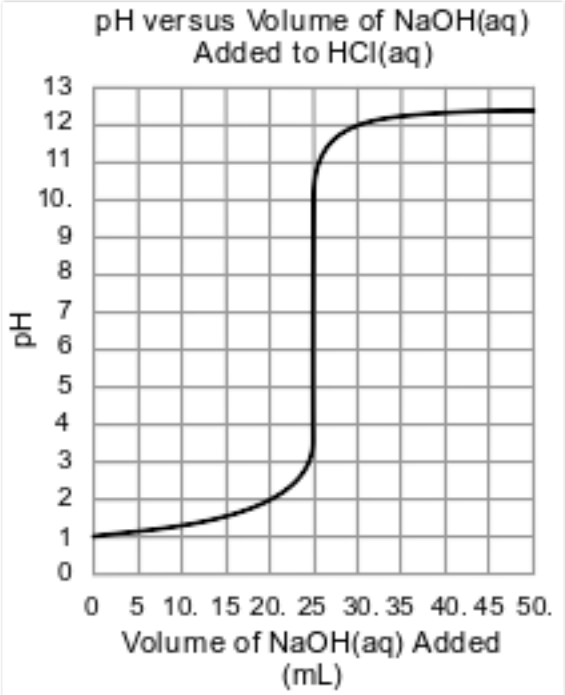
In a laboratory activity, a student titrates a 20.0-milliliter sample of HCl(aq) using 0.025 M NaOH(aq). In one of the titration trials, 17.6 milliliters of the base solution exactly neutralizes the acid sample.

12 Identify the positive ion in the sample of HCl(aq).

Base your answers to questions 13 on the information below and on your knowledge of chemistry.

A student is to determine the concentration of an NaOH(aq) solution by performing two different titrations. In a first titration, the student titrates 25.0 mL of 0.100 M H_2SO_4(aq) with NaOH(aq) of unknown concentration.

In a second titration, the student titrates 25.0 mL of 0.100 M HCl(aq) with a sample of the NaOH(aq). During this second titration, the volume of the NaOH(aq) added and the corresponding pH value of the reaction mixture is measured. The graph below represents the relationship between pH and the volume of the NaOH(aq) added for this second titration.



13 Identify the positive ion present in the H_2SO_4(aq) solution before the titration.

Base your answers to questions 14 on the information below and on your knowledge of chemistry.

During a titration, 10.00 mL of acetic acid, $HC_2H_3O_2$(aq), is completely neutralized by adding 12.50 mL of 0.64 M sodium hydroxide, NaOH(aq).

14 Identify the only positive ion in the $HC_2H_3O_2$(aq).

Base your answers to questions 15 on the information below and on your knowledge of chemistry.

A sample of nitric acid contains both H_3O^+ ions and NO_3^- ions. This sample has a pH value of 1.

15 Write a name of the positive ion present in this sample.

Answer Keys

1 3

2 3

3 3

4 2

5 1

6 1

7 3

8 1

9 4

10 3

11 Allow 1 credit. Acceptable responses include, but are not limited to:
- The hydronium ion concentration is equal to the hydroxide ion concentration.
- The concentrations of H_3O^+ ions and OH^- ions are the same.

12 Allow 1 credit. Acceptable responses include, but are not limited to:
- hydronium ion
- H_3O^+
- hydronium
- H^+
- hydrogen ion
- $H_3O^+(aq)$
- hydrogen
- $H^+(aq)$
- proton

13 Allow 1 credit. Acceptable responses include, but are not limited to:
- hydronium ion
- H_3O^+
- hydronium
- H^+
- hydrogen ion
- $H_3O^+(aq)$
- hydrogen
- H^+ (aq)
- proton

14 Allow 1 credit. Acceptable responses include, but are not limited to:
- $H^+(aq)$
- H_3O^+
- hydrogen ions
- hydronium

15 Allow 1 credit. Acceptable responses include, but are not limited to:

- hydronium ion
- hydronium
- hydrogen ion
- hydrogen