

Name \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 1) The total concentration of ions in a 0.625 M solution of HCl is \_\_\_\_\_. 1) \_\_\_\_\_  
A) 1.50 M      B) 1.25 M      C) 0.625 M      D) 0      E) 0.500 M
- 2) How many grams of NaOH (MW = 40.0) are there in 500.0 mL of a 0.225 M NaOH solution? 2) \_\_\_\_\_  
A) 4.50      B) 14.0      C) 0.00219      D) 0.113      E) 114

**TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.**

- 3) HNO<sub>2</sub> is a strong acid. 3) \_\_\_\_\_

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

- 4) When gold dissolves in aqua regia, into what form is the gold converted? 4) \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 5) What is the molarity of a NaOH solution if 28.2 mL of a 0.355 M H<sub>2</sub>SO<sub>4</sub> solution is required to neutralize a 25.0-mL sample of the NaOH solution? 5) \_\_\_\_\_  
A) 0.400      B) 125      C) 0.315      D) 0.629      E) 0.801

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

- 6) Calculate the concentration (M) of arsenic acid (H<sub>3</sub>AsO<sub>4</sub>) in a solution if 25.00 mL of that solution required 35.21 mL of 0.1894 M KOH for neutralization. 6) \_\_\_\_\_

**TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.**

- 7) Ammonia is a strong base. 7) \_\_\_\_\_

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

- 8) How many moles of BaCl<sub>2</sub> are formed in the neutralization of 393 mL of 0.171 M Ba(OH)<sub>2</sub> with aqueous HCl? 8) \_\_\_\_\_

**TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.**

- 9) Ca(OH)<sub>2</sub> is a strong base. 9) \_\_\_\_\_

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

- 10) The solvent in an aqueous solution is \_\_\_\_\_. 10) \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 11) In which species does sulfur have the highest oxidation number? 11) \_\_\_\_\_  
A) S<sub>8</sub> (elemental form of sulfur)  
B) H<sub>2</sub>S  
C) K<sub>2</sub>SO<sub>4</sub>  
D) H<sub>2</sub>SO<sub>3</sub>  
E) SO<sub>2</sub>
- 12) In which species does nitrogen have the highest oxidation number? 12) \_\_\_\_\_  
A) NO<sub>2</sub><sup>-</sup>                      B) HNO<sub>2</sub>                      C) NH<sub>3</sub>                      D) N<sub>2</sub>                      E) NaNO<sub>3</sub>
- 13) Of the choices below, which would be the best for the lining of a tank intended for use in storage of hydrochloric acid? 13) \_\_\_\_\_  
A) iron                      B) copper                      C) nickel                      D) tin                      E) zinc
- 14) Of the reactions below, only \_\_\_\_\_ is not spontaneous. 14) \_\_\_\_\_  
A) 2Ni (s) + H<sub>2</sub>SO<sub>4</sub> (aq) → Ni<sub>2</sub>SO<sub>4</sub> (aq) + H<sub>2</sub> (g)  
B) 2Ag (s) + 2HNO<sub>3</sub> (aq) → 2AgNO<sub>3</sub> (aq) + H<sub>2</sub> (g)  
C) Zn (s) + 2HI (aq) → ZnI<sub>2</sub> (aq) + H<sub>2</sub> (g)  
D) 2Al (s) + 6HBr (aq) → 2AlBr<sub>3</sub> (aq) + 3H<sub>2</sub> (g)  
E) Mg (s) + 2HCl (aq) → MgCl<sub>2</sub> (aq) + H<sub>2</sub> (g)
- 15) Based on the activity series, which one of the reactions below will occur? 15) \_\_\_\_\_  
A) Fe (s) + ZnCl<sub>2</sub> (aq) → FeCl<sub>2</sub> (aq) + Zn (s)  
B) Pb (s) + NiI<sub>2</sub> (aq) → PbI<sub>2</sub> (aq) + Ni (s)  
C) Mn (s) + NiCl<sub>2</sub> (aq) → MnCl<sub>2</sub> (aq) + Ni (s)  
D) SnBr<sub>2</sub> (aq) + Cu (s) → CuBr<sub>2</sub> (aq) + Sn (s)  
E) None of the reactions will occur.
- 16) Sodium does not occur in nature as Na (s) because \_\_\_\_\_. 16) \_\_\_\_\_  
A) it is easily oxidized to Na<sup>+</sup>  
B) it is easily replaced by silver in its ores  
C) it reacts with water with great difficulty  
D) it is easily reduced to Na<sup>-</sup>  
E) it undergoes a disproportionation reaction to Na<sup>-</sup> and Na<sup>+</sup>

**TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.**

- 17) The compound NH<sub>4</sub>Cl is a weak acid. 17) \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 18) The net ionic equation for the reaction between aqueous solutions of HF and KOH is \_\_\_\_\_. 18) \_\_\_\_\_
- A)  $\text{HF} + \text{K}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O} + \text{KF}$
  - B)  $\text{HF} + \text{KOH} \rightarrow \text{H}_2\text{O} + \text{K}^+ + \text{F}^-$
  - C)  $\text{H}^+ + \text{F}^- + \text{K}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O} + \text{K}^+ + \text{F}^-$
  - D)  $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
  - E)  $\text{HF} + \text{OH}^- \rightarrow \text{H}_2\text{O} + \text{F}^-$

- 19) A neutralization reaction between an acid and a metal hydroxide produces \_\_\_\_\_. 19) \_\_\_\_\_
- A) water and a salt
  - B) ammonia
  - C) hydrogen gas
  - D) oxygen gas
  - E) sodium hydroxide

- 20) Which of the following are strong acids? 20) \_\_\_\_\_
- HI  
HNO<sub>3</sub>  
HF  
HBr
- A) HF, HBr
  - B) HI, HF, HBr
  - C) HNO<sub>3</sub>, HF, HBr
  - D) HI, HNO<sub>3</sub>, HF, HBr
  - E) HI, HNO<sub>3</sub>, HBr

- 21) A strong electrolyte is one that \_\_\_\_\_ completely in solution. 21) \_\_\_\_\_
- A) associates                      B) ionizes                      C) disappears                      D) reacts

- 22) What are the spectator ions in the reaction between KOH (aq) and HNO<sub>3</sub> (aq)? 22) \_\_\_\_\_
- A) K<sup>+</sup> and H<sup>+</sup>
  - B) H<sup>+</sup> and OH<sup>-</sup>
  - C) OH<sup>-</sup> only
  - D) K<sup>+</sup> and NO<sub>3</sub><sup>-</sup>
  - E) H<sup>+</sup> and NO<sub>3</sub><sup>-</sup>

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

- 23) What is aqua regia? 23) \_\_\_\_\_

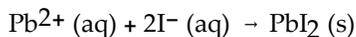
**TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.**

- 24) The compound HClO<sub>4</sub> is a weak acid. 24) \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

25) A weak electrolyte exists predominantly as \_\_\_\_\_ in solution. 25) \_\_\_\_\_  
A) an isotope      B) ions      C) atoms      D) electrons      E) molecules

26) Lead ions can be precipitated from aqueous solutions by the addition of aqueous iodide: 26) \_\_\_\_\_



Lead iodide is virtually insoluble in water so that the reaction appears to go to completion. How many milliliters of 3.550 M HI(aq) must be added to a solution containing 0.700 mol of  $\text{Pb}(\text{NO}_3)_2(\text{aq})$  to completely precipitate the lead?

- A) 0.197
- B)  $2.54 \times 10^{-3}$
- C) 394
- D) 197
- E) 0.394

27) Of the following elements, \_\_\_\_\_ is the least easily oxidized. 27) \_\_\_\_\_

zinc  
iron  
hydrogen  
aluminum  
lead

- A) hydrogen      B) lead      C) aluminum      D) iron      E) zinc

28) The molarity of a solution prepared by diluting 43.72 mL of 5.005 M aqueous  $\text{K}_2\text{Cr}_2\text{O}_7$  to 500. mL is \_\_\_\_\_. 28) \_\_\_\_\_

- A) 0.0879      B) 0.0044      C) 57.2      D) 0.870      E) 0.438

29) The balanced reaction between aqueous nitric acid and aqueous strontium hydroxide is \_\_\_\_\_ 29) \_\_\_\_\_

- A)  $2\text{HNO}_3(\text{aq}) + \text{Sr}(\text{OH})_2(\text{aq}) \rightarrow \text{Sr}(\text{NO}_3)_2(\text{aq}) + 2\text{H}_2(\text{g})$
- B)  $\text{HNO}_3(\text{aq}) + \text{Sr}(\text{OH})_2(\text{aq}) \rightarrow \text{Sr}(\text{NO}_3)_2(\text{aq}) + \text{H}_2(\text{g})$
- C)  $\text{HNO}_3(\text{aq}) + \text{Sr}(\text{OH})_2(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l}) + \text{Sr}(\text{NO}_3)_2(\text{aq})$
- D)  $2\text{HNO}_3(\text{aq}) + \text{Sr}(\text{OH})_2(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + \text{Sr}(\text{NO}_3)_2(\text{aq})$
- E)  $\text{HNO}_3(\text{aq}) + \text{SrOH}(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l}) + \text{SrNO}_3(\text{aq})$

## Answer Key

Testname: UNTITLED1

- 1) B
- 2) A
- 3) FALSE
- 4)  $\text{AuCl}_4^-$  (aq)
- 5) E
- 6) 0.08892
- 7) FALSE
- 8) 0.0672
- 9) TRUE
- 10) water
- 11) C
- 12) E
- 13) B
- 14) B
- 15) C
- 16) A
- 17) TRUE
- 18) E
- 19) A
- 20) E
- 21) B
- 22) D
- 23) a 3:1 mixture of concentrated hydrochloric and nitric acids
- 24) FALSE
- 25) E
- 26) C
- 27) A
- 28) E
- 29) D