

Exam 1  
CHEM1002  
Fall, 2008  
Professor Pojman  
Version A

Your Name \_\_\_\_\_

**1) How many hydrogen atoms are in 1.2 L of water?**

- a)  $4.0 \times 10^{25}$
- b)  $8.0 \times 10^{25}$**
- c)  $4.0 \times 10^{22}$
- d) none of the above
- e)

**2) How do you stop a fish from smelling?**

- a) cut off its nose
- b) add lemon juice to protonate the smelly amines, which are weak bases**
- c) add diluted sodium hydroxide to react with the smelly amines, which are weak acids
- d) add a buffer

**3) If you add acid to water, the**

- a)  $[H^+]$  increases and so to the pH
- b)  $[H^+]$  increases but the pH decreases**
- c)  $[OH^-]$  decrease and the pH increases
- d) none of the above

**4) A scientific theory makes predictions that can be**

- a) proven false.**
- b) proven true.
- c) All of the above

**5) 4.6 moles of  $CaC_2$ , has a mass of ?**

- a) 290 g**
- b)  $7.2 \times 10^{-2}$  g
- c) 180 g
- d) none of the above

**6) When carbon dioxide dissolves in water, it forms what compound?**

- a)  $HCO_2$
- b)  $H_3CO_3$
- c)  $H_2CO_3$**
- d) None of the above

**7) Pure water at 25 °C has**

- a)  $[H^+] = 0$
- b)  $[OH^-] = 0$
- c)  $[H^+] = [OH^-] = 10^{-7} M$**

d) none of the above.

**8) If calcium carbonate is heated to very high temperature, the reaction products are**

- a) carbon dioxide and calcium hydroxide
- b) carbon dioxide and calcium oxide**
- c) carbon dioxide and calcium carbide
- d) all of the above

**9) Calcium carbide plus water produces?**

- a)  $C_2H_2$  and  $Ca(OH)_2$
- b) acetylene and calcium hydroxide
- c) both a and b are correct**
- d) natural gas and calcium hydroxide

**10) If 65 mL of 0.10 M HCl are mixed with 99 mL of 0.2 M NaOH, the pH of the final solution will be:**

- a) 7
- b) > 7**
- c) < 7
- d) none of the above

**11) If 20. g of KOH is added to a 0.65 L solution of 0.34 M HCl, what will be the final pH?**

- a) 0.40
- b) 0.67
- c) 13**
- d) none of the above

**12) At chemical equilibrium, the following is *not* true:**

- a) Concentrations do not change with time.
- b) Temperature does not change with time.
- c) All reactions have stopped.**
- d) Concentrations are the same throughout the reactor.

**13) Which of the following is a weak acid?**

- a)  $H_2SO_4$
- b)  $HNO_3$
- c) HCl
- d)  $H_2SO_3$**

**14) How much solid KOH is needed to neutralize 123 mL of 0.200 M HCl?**

- a)  $2.46 \times 10^{-2}$  g
- b) 1.38 g**
- c) 0.615 g
- d) none of the above

- 15) How much solid KOH will be needed to neutralize 123 mL of 0.200 M  $\text{H}_2\text{SO}_4$ ?
- 2.76 g
  - 1.38 g
  - 0.690 g
  - none of the above
- 16) After neutralization, the concentration of  $\text{H}_3\text{O}^+$  is zero.
- True
  - False
- 17) If we add 650. mL of pure water to 1.24 L of a 0.567 M NaCl solution, what will be the final concentration of NaCl?
- 0.370 M
  - 0.870
  - 2.7 M
  - none of the above
- 18) How much solid  $\text{Ca}(\text{OH})_2$  must be added to a 1.60 L of a 0.020 M  $\text{HNO}_3$  solution to neutralize it?
- 2.37 g
  - 4.73
  - 1.18 g
  - none of the above
- 19) Which of the following is not true?
- pH is a measure of how much acid is in solution.
  - $\text{pH} + \text{pOH} = 14$  is *always* true.
  - pH can be less than 0.
  - pOH is a measure of the amount of hydroxide in solution.
- 20) Before the invention of Portland cement, slaked lime, water and sand were mixed and used as mortar to hold bricks together. What reaction describes how the mortar hardened?
- $\text{Ca}(\text{OH})_2 + \text{H}_2\text{O} \rightarrow \text{Ca}^{2+} + 2 \text{OH}^-$
  - $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$
  - $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$
  - none of the above
- 21) (Answer on the back) Explain the rationale behind the determination of the molecular size of oleic acid, i.e., how does it work, and explain how you do the measurement. Explain all steps and provide relevant mathematical relationships.