“Caught off base” Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Choices for questions 1 to 4

A) acids only B) bases only C) salts only D) acids, bases, and salts.

\_\_\_\_\_1. Form H+ as their only positive ion in aqueous solutions.

\_\_\_\_\_2. Electrolytes.

\_\_\_\_\_3. Compounds that are always polar covalent.

\_\_\_\_\_4. Form both + and – ions when dissolved in water.

\_\_\_\_\_5. Bases are generally defined as substances that form A) H+ ion B) H3O+ ion

C) OH– ion D) NH4+ ion in solution.

\_\_\_\_\_6. Based on table L on the reference table, we can conclude that bases are

A) always ionic B) always polar covalent

C) sometimes polar, and sometimes ionic D) sometimes nonpolar, and sometimes polar covalent

\_\_\_\_\_7. Sabrina tests the pH of an acid by dissolving it in water, and then testing it with

some indicators. She finds that her solution turns litmus paper red, and that it turns

methyl orange yellow. A possible pH of her solution is A)5.0 B) 3.2 C) 8.2 D)12

\_\_\_\_\_8. When sulfuric acid is reacted with potassium hydroxide, one of the products is

A) K2S B) KSO4 C) K2SO4 D) K2SO3

\_\_\_\_\_9. Neutralization reactions can also be described as

A) single replacement B) double replacement C) synthesis D) decomposition.

\_\_\_\_\_10. When solutions of HCl and HC2H3O2 are prepared with the same concentration, the HCl solutions have an approximately 100 times greater concentration of H+ ion than do the HC2H3O2 solutions. If the hydrochloric acid solution has a pH of 4, then the HC2H3O2 would have a pH of A) 6 B) 2 C) 3 D) 5

\_\_\_\_\_11. Which must be true in an aqueous solution of pH = 11?

A) the solution is a nonelectrolyte. B) the H+ concentration = the OH– concentration

C) the H+ concentration < the OH– concentration

D) the H+ concentration > the OH– concentration

\_\_\_\_\_12. The device used to add measured volumes of acids and bases during a titration is

called a A) beaker B) graduated cylinder C) burette D) Grazi flask.

\_\_\_\_\_13. Which 0.10 molar solution contains the highest concentration of OH– ions?

A) CH3COOH B) KOH C) CO2 (aq) D) CH3OH

\_\_\_\_\_14. Which is a **non**electrolyte? A) KBr B) HBr C) C6H12O6 D) KOH

\_\_\_\_\_15. A 12.00 mL sample of HNO3 solution is exactly neutralized by 24.00 mL of

0.25 molar KOH. The concentration of the acid is A) 0.125 molar B) 0.25 molar

C) 0.50 molar D) 7.2 molar

\_\_\_\_\_16. According to the Brønsted-Lowry theory, NH3 is a base in water because NH3

A) gains a proton to form NH4+ B) loses a proton to form NH2–  C) gains OH– ions to form NH3OH D) Forms H3O+ ions

Tables below are for questions 17 to 22.

|  |  |
| --- | --- |
| Reaction | ΔH° (kJ) |
| A. 2 CO(g) + O2(g) ➞ 2 CO2(g) | –566.0 |
| B. N2(g) + O2(g) ➞ 2 NO(g) | 182.7 |
| C. C6H12O6(s) + 6 O2(g) ➞ 6 CO2 (g) + 6 H2O(g) | –2540 |
| D. C(s) + O2(g) ➞ CO2(g) | –393.5 |
| E. 2 HI(g) ➞ H2(g) + I2(g) | ?? |

\_\_\_\_\_\_\_\_\_\_\_\_(fill in) 17. What is ΔH̊ for reaction “E” ? ( refer to your reference table)

\_\_\_\_\_\_\_18. Which of the reactions will produce MORE PRODUCT at equilibrium when

the temperature is increased? A)A B)B C) C D) D

\_\_\_\_\_\_\_19. Which of the reactions will produce MORE PRODUCT at equilibrium

when the volume of the system is INCREASED ? A)A B)B C)C D)D

\_\_\_\_\_\_\_20. In reaction B, as the volume of the container increases, the amount of NO at equilibrium A) increases B) decreases C) remains the same

\_\_\_\_\_\_\_21. In reaction A, if more CO is added to the equilibrium system, the amount of

CO2 would A) increase B) decrease C) stay the same

\_\_\_\_\_\_\_22. In reaction A, to **maximize** the amount of CO and O2 equilibrium, (and minimize the amount of CO2) the best set of conditions are A) high temperature and high pressure B) high temperature and low pressure C) low temperature and high pressure

D) low temperature and low pressure.

\_\_\_\_\_\_23. The conditions that most favor a spontaneous change are 1) increasing potential

energy and increasing entropy 2) decreasing potential energy and decreasing entropy

3) increasing potential energy and decreasing entropy

4) decreasing potential energy and increasing entropy

\_\_\_\_24. As ice melts, its entropy 1) decreases 2) increases 3) stays the same

\_\_\_\_25. Which statement correctly describes a chemical reaction at equilibrium?

1) The concentrations of products and reactants are constant.

2) The concentrations of products and reactants are equal.

3) The rate of the forward reaction is less than the rate of the reverse reaction

4) The rate of the forward reaction is greater than the rate of the reverse reaction.

I. Data from Sam’s titration experiment: Complete the experiment by filling in the shaded boxes with the correct values. HCl was titrated with KOH.

Molarity of acid 0.100 molar

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | | | | |
| Initial acid | 1.50 | Initial base | 4.50 | |
| Final acid | 21.50 | Final  Base | 9.50 | |
| Volume of acid |  | Volume of base |  | |
|  | | M of base | |  |

II. How many MOLES of H2O were formed during this titration? \_\_\_\_\_\_\_\_\_\_\_\_\_.

III. Write a balanced equation for the reaction that takes place when KOH is neutralized by HCl.

IV. Jack prepared two solutions, solution “A” and solution “B” . He tested solution A with phenolphthalein, and the solution turned pink. He tested solution B with bromcresol green, and the solution turned yellow. When he mixed the two solutions, the products were H2O and Ca(NO3)2.

A. Identify solution A.

B. Identify solution B.

C. Briefly explain your answers to parts A and B.

IV. Extra Credit: How many mL of 0.100 molar barium hydroxide will exactly neutralize 24.0 mL of 0.100 molar phosphoric acid, to produce barium phosphate and water?