Name_____

Secret word/phrase_____

1. What is the pH of 0.00010 M KOH?

2. Adding glucose ($C_6H_{12}O_6$) to water lowers the vapor pressure and increases the boiling point. True_____? Or False_____? Check one.

3. Complete the following ionic equation for the reaction of acetate ion with water:

    OAc^- (aq) + H_2O(l) →

4. What is the formula of the conjugate base of hydrogen phosphate ion, HPO_4^{2-} ?

5. One liter of steam, H_2O(g), at 150 deg C and 1.00 atm pressure is heated to 300 deg C at constant volume. What is the final pressure of the steam?

6. What is the pH of a nitrite buffer which is 0.100 M in sodium nitrite and 0.250 M in nitrous acid? The pK_a of nitrous acid is 3.37.

Name_____

7. When a solid melts, heat is given off and the entropy increases. True____ or False____ (check one).

8. What is the molar concentration of hydroxide ion in a 0.015 M solution of barium hydroxide, $Ba(OH)_2$?

9. What is the molar concentration of glucose in an aqueous solution containing 6.00 g of glucose ($C_6H_{12}O_6$) dissolved in 250 mL of water? (The molecular weight of glucose is 180 g/mol).

10. Give an example of a molecular compound (not a salt) which, when dissolved in water, becomes a strong electrolyte.

11. Consider the following reaction:

    $C(s)$ + $2H_2(g)$ → $CH_4(g)$

How many liters of methane can be made when 2 moles of hydrogen gas are reacted with an excess of solid carbon at STP?

12. How many grams of methane (CH_4) are contained in a 0.50 L sample at 2.4 atm and 27 deg C?

Name_____

13. What is the hydrogen ion concentration in an aqueous solution whose pH is 9.00?

14. Nitrous acid, HNO_2, is a weak acid. Write (a) the equation for its dissociation in water and (b) the mathematical expression for K_a, its acid dissociation constant.

15. (10 pts). What is the molar concentration of NaCl in a solution made up by mixing 50 mL of 0.20 M NaOH and 200 mL of 0.25 M HCl? (Hint: First, write the balanced the chemical equation).

16. The boiling point of any liquid is the temperature at which the _____ of the liquid is equal to the external pressure. Fill in the blank.

Name_____

Useful information:

Henderson-Hasselbalch equation:

$$pH = pKa + \log\frac{[A-]}{[HA]} \quad \text{or} \quad pH = pKa - \log\frac{[HA]}{[A-]}$$

Abbreviated table of acids in order of decreasing acid strength:

ACID	CONJUGATE BASE
HCl	Cl$^-$
H$_3$O$^+$	H$_2$O
H$_3$PO$_4$	H$_2$PO$_4$$^-$
HNO$_2$	NO$_2$$^-$
HF	F$^-$
CH$_3$COOH (HOAc)	OAc$^-$
H$_2$CO$_3$	
NH$_4$$^+$	
HCN	
H$_2$O	OH$^-$
NH$_3$	NH$_2$$^-$

$K_w = 10^{-14}; \qquad pH + pOH = 14$

$K_a K_b = K_w; \quad pK_a + pK_b = 14$

Ideal gas law, $PV = nRT$

R = 0.0821 L-atm per mol-K or 62.4 L-mmHg per mol-K

K = deg C + 273

760 mmHg = 760 torr = 1.000 atm = 14.7 psi