NAME

1. (5). 10.59 g of KBr is dissolved in enough water to make 250 mL of solution. What is the molarity of the solution?
2. (5). What is the pH of a 0.146 M solution of KOH ?
3. (20). Fill in the blanks by writing one of the following words or phrases in each blank.
a. One way to accomplish desalination of sea water is by reverse $\qquad$ .
b. Acid + base gives water + $\qquad$ -
c. Carbon-containing compounds burn with the release of $\qquad$ ,
$\qquad$ , and water.
d. The conjugate base of $\mathrm{HSO}_{4}^{-}$is $\qquad$ -
e. Basic solutions have pH values $\qquad$ -
f. A buffer solution includes a weak acid and its $\qquad$ .
Sodium chloride has extremely high melting and boiling points because of strong
$\qquad$
h. The volume of a sample of an ideal gas at constant pressure is directly proportional to its absolute
$\qquad$ -
i. The boiling point of any liquid is the temperature at which its partial pressure equals the
$\qquad$ _.
4. (6). Copper(II) chloride reacts with aluminum metal to give aluminum(III) chloride and metallic copper. Write the complete and the net ionic equation for the reaction.

## NAME

5. (3). True of false. (Circle your choice). The boiling point of water is decreased by the addition of common table salt $(\mathrm{NaCl})$.
6. (3). Consider a mixture of blood and an aqueous salt $(\mathrm{NaCl})$ solution. If the concentration of the salt solution is less than the isotonic concentration $(0.15 \mathrm{M})$, the blood cells will
$\qquad$ burst; $\qquad$ shrink due to osmosis.
7. (5). What happens when a strong acid like HBr , a covalently bonded gas, is dissolved in water? (A simple equation will do).
8. (5). What is the hydrogen ion concentration in a solution whose pH is 3.50 ?
9. (5). What is the pH of a buffer system that contains 0.200 M hydrocyanic acid $(\mathrm{HCN})$ and 0.150 M sodium cyanide $(\mathrm{NaCN})$ ? The pKa of hydrocyanic acid is 9.31 .
10. (5). How many milliliters of 0.50 M NaOH solution are required to titrate (exactly neutralize) 40.0 mL of a 0.10 M solution of hydrochloric acid ( HCl )?

NAME
11. (5). If a 2.760 g sample of a gas maintains a pressure of 450 mm Hg when contained in a 2.0 L flask at 20 deg C , what is the molecular weight of the gas?
12. (5). A sample of gas has a volume of 250 mL at 0.500 atm pressure and 50 deg C . What would the volume be if the pressure is increased to 1.25 atm at 100 deg C ?
13. (5). How many grams of NaOH are contained in 50 mL of a 1.50 M solution?
14. (5). Hydrogen and oxygen react according to the equation, $2 \mathrm{H}_{2}(\mathrm{~g})+\mathrm{O}_{2}(\mathrm{~g}) \rightarrow 2 \mathrm{H}_{2} \mathrm{O}(\mathrm{g})$. How many liters of oxygen are required to react with 5.20 L hydrogen at STP?

NAME $\qquad$
15. (5). Write the equation for the reaction of formate ion ( $\mathrm{HCOO}^{\circ}$ ), a weak Brønsted base, with water. Is the resulting solution acidic or basic?
16. (5). If 15.0 g of CO 2 gas has a volume of 0.30 L at 310 K , what is its pressure in mm Hg ?
17. (6). Write the equation for the reaction between hydrocyanic acid $(\mathrm{HCN})$ and fluoride ion (F'). The pKa's are 3.46 (HF) and $9.31(\mathrm{HCN})$. Does the reaction as written favor the lefthand side (LHS) $\qquad$ or the right-hand side (RHS) ?

NAME
18. (6). Answer these questions based on the general heating curve - shown below -- for a molecular compound such as water.
a. The solid and liquid phases are in equilibrium between points $\qquad$ and $\qquad$ .
b. The pure liquid phase exists between points $\qquad$ and $\qquad$ .
c. The heat of vaporization is given by the difference in heat $(\Delta H)$ between points $\qquad$ and $\qquad$ .


Heat added (Kcal/mol)

## NAME

## USEFUL INFORMATION

$\mathrm{Kw}=10^{-14} ; \quad \mathrm{pKa}+\mathrm{pKb}=14 ; \mathrm{pH}+\mathrm{pOH}=14$

Henderson-Hasselbalch equation: $\mathrm{pH}=\mathrm{pKa}+\log \{[$ base $] /[$ acid $]\}$

Gas constant $\mathrm{R}=0.0821 \mathrm{~L}-\mathrm{atm}$ per mol-K or $62.4 \mathrm{~L}-\mathrm{mmHg}$ per mol-K

Ideal gas law: $\mathrm{PV}=\mathrm{nRT}$
$\mathrm{K}=273+{ }^{0} \mathrm{C}$
$760 \mathrm{mmHg}=760$ torr $=1.000 \mathrm{~atm}=14.7 \mathrm{psi}$

## Scoring


11. (5) $\qquad$ Class Median: Raw $\qquad$ or $\qquad$ Percent
2. (5)
12. (5) $\qquad$ Your adjusted score: $\qquad$ Percent
3. $(20)$ $\qquad$ 13. (5) Your letter grade equivalent on this exam $\qquad$
4. (6) $\qquad$ 14. (5) $\qquad$
5. (3) $\qquad$ 15. (5)
6. (3) $\qquad$ 16. (5)
7. (5) $\qquad$ 17. (6) $\qquad$
8. (5) $\qquad$ 18. (6) $\qquad$
9. (5) $\qquad$ Total no of points:104
10. (5) $\qquad$ Your Raw Total $\qquad$

