Chemistry 30A
Spring 2015
18 March 2015
SECRET WORD_____

EXAM IIB

Laney College
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NAME_____
MUST SHOW ALL WORK FOR CREDIT

1. The density of a block of metal is 2.56 g cm^{-3}. It weighs 121.5 g. What is its volume?

2. When vinegar (dilute aqueous acetic acid) is added to sodium bicarbonate ($NaHCO_3$), a gas is given off. What is it?

3. What are the ions found in an aqueous solution of K_2SO_4?

4. Double displacement: complete and balance the following reaction. If there is no reaction, simply write NR after the arrow. (See solubility rules).

$$CaCl_2 + AgNO_3 \rightarrow$$

5. Write the net ionic equation for the following balanced reaction:

$$Na_2S\,(aq) + Cd(NO_3)_2(aq) \rightarrow CdS(s) + 2NaNO_3(aq)$$

6. Balance the following reaction involving ions in aqueous solution.

$$Ti^{2+} + Mn^{7+} \rightarrow Ti^{2+} + Mn^{2+}$$

7. A motorist drives 75.0 miles from Bemidji to Alexandria (obviously he is in Minnesota) in an auto that gets 21.3 miles per gallon of gasoline. If the price of gasoline is $3.59 per gallon, how much did the trip cost him?

8. A principal component of gasoline is benzene, C_6H_6. Complete and balance the equation for the combustion of benzene.

9. During the combustion of 20.00 g of benzene, 2100 kcal of heat is released. What is the heat of combustion of benzene in units of kcal/mole?

10. What is the oxidation number of chlorine in $HClO_3$?

11. The equilibrium constant, Ksp, for the following slightly soluble salt, $BaSO_4$, is given as

$Ksp = [Ba^{2+}][SO_4^{2-}] = 2.4 \times 10^{-4}$ (concentrations are given as moles/L)

What is the concentration of Ba^{2+} if the concentration of SO_4^{2-} is 5×10^{-3} moles/L?

12. Consider the following balanced chemical reaction:
$V_2O_5(s) + 5Ca(s) \rightarrow 2V(s) + 5CaO(s)$
How many grams of vanadium can be produced from 455 g of vanadium(V) oxide and an excess of calcium?

13. Write the equilibrium constant expression, K_{eq}, for the following gas phase reaction:

$N_2 + 3H_2 \rightarrow 2NH_3$

14. In the reaction of 7.21 g of chlorine with 14.42 g potassium bromide, which is the limiting reagent and how much bromine can be produced theoretically?

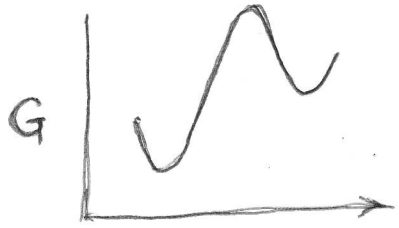
$Cl_2(aq) + 2KBr(aq) \rightarrow 2KCl(aq) + Br_2(aq)$

15. Consider the following balanced redox reaction:
$2PbS(s) + 3O_2(g) \rightarrow 2PbO(s) + 2SO_2(g)$
Which element gets oxidized?

16. Does the entropy, S, increase or decrease when:
a. Gasoline burns: _____
b. Molten candle wax freezes: _____
c. A flat tire is inflated with air: _____
d. $2H_2(g) + O_2(g) \rightarrow 2H_2O(g)$: _____
e. Alcohol and water are mixed: _____

17. Which one of the following statements is consistent with the diagram that follows?

a. ____. $\Delta G > 0$; $K > 1$.
b. ____. $\Delta G > 0$; $K < 1$.
c. ____. $\Delta G < 0$; $K > 1$.
d. ____. $\Delta G < 0$; $K < 1$.



18. Matching: Match the geometry with the molecule:

____. Water (H_2O)	A. Pyramidal
____ Methane (CH_4)	B. Tetrahedral
____ Ammonia (NH_3)	C. Planar trigonal
____ Carbon dioxide	D. Bent
____ Formaldehyde ($H_2C{=}O$)	E. Linear

19. The rate of a chemical reaction depends on (check all that apply):
    a. ____Temperature
    b. ____Gibbs free energy (ΔG)
    c. ____Enthalpy of the reaction (ΔH)
    d. ____Energy of activation
    e. ____Concentration of the reactants

20. Consider a solution of carbon dioxide in water (as in soda pop). The equilibrium can be expressed by means of the equation, $CO_2(g) = CO_2(aq)$. According to LeChatelier's principle, opening a bottle of soda pop under pressure should ____increase/____decrease the solubility of the gas in the aqueous phase.