Equilibrium IV – worksheet – Review for test Name:_____

1. How would each of the following reactions respond to an increase in pressure?
   a. $C_{(s)} + O_{2(g)} \Leftrightarrow CO_{2(g)} + 360\ kJ$ — no change
   b. $H_{2(g)} + I_{2(g)} \Leftrightarrow 2\ HI_{(g)}$ — no Δ
   c. $Zn_{(s)} + 2\ Ag^{+}_{(aq)} \Leftrightarrow Zn^{+2}_{(aq)} + 2\ Ag_{(s)}$ — no Δ, no gases.

   d- rxn in #2.

   An increase in pressure will always shift a reaction to the side with _____ molecules. (more/less) if in gas phase.

2. How would a decrease in temperature effect this reaction? $N_{2(g)} + 3\ H_{2(g)} \Leftrightarrow 2\ NH_{3(g)} + 88kJ$

   Right

3. How would the other concentration differ after Pb^{2+} ions are added?

   $PbSO_{4(s)} + H^{+}_{(aq)} \Leftrightarrow Pb^{+2}_{(aq)} + HSO^{-}_{4(aq)}$

   H^+: increase ; HSO_4^-: decrease

4. What effect does a catalyst have on an equilibrium?

   none both rates increase equally.

5. Name the following compounds and give the equation that shows how it dissolves in water. (8) (Show subscripts and balance)
   a. $LiCl_{(s)}$: Lithium Chloride — $LiCl(s) \rightarrow Li^+(aq) + Cl^-(aq)$
   b. $C_2H_{6(g)}$: dicarbon hexahydride (ethane) — $C_2H_6(g) \rightarrow C_2H_6(aq)$ covalent!
   c. $Li_2CO_{3(s)}$: Lithium Carbonate — $Li_2CO_3(s) \rightarrow 2\ Li^+(aq) + CO_3^{2-}$
   d. $NO_{2(g)}$: Nitrogen Dioxide — $NO_2(g) \rightarrow NO_2(aq)$ covalent!

6. If one had 500mL of a 0.46*M* solution, how much water would need to be added to produce a 0.10*M* solution?

$$M_1V_1 = M_2V_2$$
$$(0.46)(500) = (0.10)(V_2)$$
$$V_2 = 2300\ mL$$

$$2300 - 500 = 1800\ mL$$

7. The reaction A + B ⇔ 2C + D was started by mixing 10.0 moles of C and 8.0 moles of D in a 2.0 L flask. Later at equilibrium there were 3 moles of A. Find the K_{EQ}. $\frac{10.0}{2.0} = 5.0M$ $\frac{8.0}{2.0} = 4.0M$

	A	B	2C	D
I	0	0	5.0M	4.0M
C	+1.5M	1.5M	-3M	-1.5M
E	1.5M	1.5M	2M	2.5M

$$K_{eq} = \frac{[C]^2[D]}{[A][B]} = \frac{(2^2)(2.5)}{(1.5)(1.5)} = 4.4$$

8. The reaction A + B ⇔ 2C was started by mixing a 2.0M solution of A and a 1.0M solution of B. Find the equilibrium concentrations of all 3 substances if the K_{eq}=12.

	A	B	2C
I	2	1	0
C	-x	-x	+2x
E	2-x	1-x	2x

$$K_{eq} = \frac{[C]^2}{[A][B]}$$
$$12 = \frac{(2x)^2}{(2-x)(1-x)}$$
$$12(2-2x-1x+x^2) = 4x^2$$
$$12(x^2-3x+2) = 4x^2$$
$$12x^2-36x+24 = 4x^2$$
$$8x^2-36x+24 = 0$$
$$x = \cancel{3.7} \text{ or } 0.81$$

$A = 2.0 - 0.81 = 1.2M$
$B = 1.0 - 0.81 = 0.2M$
$C = 2x = 2(0.81) = 1.6M$