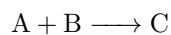Worksheet 9: Equilibrium

1. What does equilibrium mean in terms of the rates of the forward and reverse reactions?

2. For the reaction below, state how each change will affect the equilibrium constant K_c.

$$A + B \longrightarrow C$$

   (a) Reversing the reaction $(C \longrightarrow B + A)$

   (b) Doubling the coefficients of the products and reactants $(2\,A + 2\,B \longrightarrow 2\,C)$

   (c) Halving the coefficients of the products and reactants $(\frac{1}{2}\,A + \frac{1}{2}\,B \longrightarrow \frac{1}{2}\,C)$

3. For the reaction in the previous problem, what would be the effects on the equilibrium constant of doubling the starting concentrations of A and B and halving the initial concentration of C.

4. Using the equations and associated equilibrium constants below, determine the equilibrium constant for the reaction $2\,NO + Br_2 \rightleftharpoons 2\,NOBr$.

   - $2\,NO \rightleftharpoons N_2 + O_2$, $K_c = 1\times10^{30}$
   - $N_2 + Br_2 + O_2 \rightleftharpoons 2\,NOBr$, $K_c = 2\times10^{-27}$

5. Use the reaction below and the equilibrium constant $K_c = 0.040$ to fill in the table below.
   $Zn(C_2H_5)_2 + 5\,O_2 \rightleftharpoons ZnO + 4\,CO_2 + 5\,H_2O$

Reaction	$(Zn(C_2H_5)_2)$ [M]	(O_2) [M]	(ZnO) [M]	(CO_2) [M]	(H_2O) [M]	Q	Direction?
1	2.00	3.00	2.00	3.00	1.00		
2	1.00	1.00	1.00	1.00	0.50		
3	1.00	1.00	1.00	1.06	0.50		