

Name: Key
Blk: _____ Date: 9

Chemistry 12
EQUILIBRIUM Lesson #7
LE CHATELIER'S PRINCIPLE AND K_{eq}

When the concentration, pressure or surface area is changed, the reaction tends to counteract these changes, and equilibrium is re-established.
The re-established equilibrium has the SAME K_{eq} value.

The only change imposed on a system at equilibrium that will result in a change in the K_{eq} value is a TEMPERATURE change!!!!

THE MEANING OF THE NUMERICAL VALUE FOR K_{eq} :

Recall that $K_{eq} = \frac{[\text{Products}]}{[\text{Reactants}]}$

This is simply a fraction. For any fraction if the number is LARGE it means that the value in the NUMERATOR is greater, or in this case the PRODUCTS is larger. If the number is SMALL it means that the value in the DENOMINATOR is greater, or in this case the REACTANTS is larger.

IN OTHER WORDS

(large)
(small)
 $K_{eq} = 1$ both reactants and products are equally favoured at equilibrium
 $K_{eq} > 1$ the PRODUCTS are favoured at equilibrium.
 $K_{eq} < 1$ the REACTANTS are favoured at equilibrium.

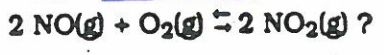
SEAT WORK/ HOMEWORK: EXERCISES 36 - 46 pgs 62 - 63
PLO's: F3 + F4

Name: Key
 Blk: _____ Date:

Chemistry 12
 EQUILIBRIUM Lesson #8
 EQUILIBRIUM CALCULATIONS

EXAMPLE A

A 2.0 L bulb contains 6.00 mol of NO₂(g), 3.0 mol of NO(g) and 0.20 mol of O₂(g) at equilibrium. What is K_{eq} for:



1. Write out K_{eq} expression

$$K_{eq} = \frac{[\text{NO}_2]^2}{[\text{NO}]^2 [\text{O}_2]}$$

2. Notice values given in moles @ equilibrium

Calculate [] (mol/L)

$$[\text{NO}_2] = \frac{6.00 \text{ mol}}{2.0 \text{ L}} = 3.0 \text{ M}, \quad [\text{NO}] = \frac{3.0 \text{ mol}}{2.0 \text{ L}} = 1.5 \text{ M}; \quad [\text{O}_2] = \frac{0.20 \text{ mol}}{2.0 \text{ L}} = 0.10 \text{ M}$$

3. Plc values @ equilibrium plug into K_{eq} and solve

$$K_{eq} = \frac{[3.0]^2}{[1.5]^2 [0.10]} = \boxed{4.0 \times 10^1}$$

(sig figs)

EXAMPLE B

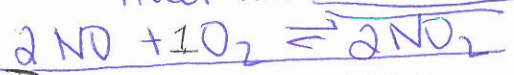
Into a 2.00 L bulb was introduced 4.00 mol of NO₂(g). After a while equilibrium was attained according to the equation:



At equilibrium, 0.500 mol of NO(g) was found. What is the value of K_{eq}?

1. Write K_{eq} expression → $K_{eq} = \frac{[\text{NO}_2]^2}{[\text{NO}]^2 [\text{O}_2]}$

2. Plc there is a sense of TIME PASSING you need an ICE TABLE. where I = initial []



I	∅	∅	2.00
C	+0.250	+0.125	-0.250
E	0.250	0.125	1.75

C = change []
 E = equilibrium []

↓ Represents the SHIFTS
 follows the RULES of STOICHIOMETRY

$$\begin{matrix} 2 & \rightleftharpoons & 2 \\ 0.250 & & 0.125 & & 0.250 \end{matrix}$$