



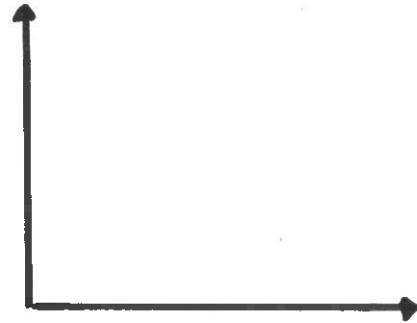
Dynamic Equilibrium

Dynamic Equilibria

- 1
- 2
- 3
- 4
- 5



-
-
-
-
-



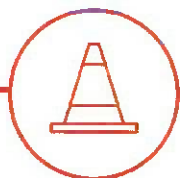
Equilibrium Reached when :



Le chatelier's Principle

1 2 3 4 5

- Helps to predict



N.B. A catalyst has NO EFFECT on the position of the equilibrium. However, a system will reach equilibrium more quickly.

You need to...

-
-
-



Le Chatelier's - Concentration

[]

1

2

3

4

5



Equilibrium Shifts Right if:

a)

b)

Equilibrium Shifts Left if:

a)

b)

e.g. If [] is increased -

If [] is decreased -



Le Chatelier's - Pressure

1 2 3 4 5



↑ Pressure favours the side with

↓ Pressure favours the side with



^{NB.} Pressure changes can also affect rate.



Le Chatelier's - Temperature

1 2 3 4 5



$\Delta H =$



•

↑ Temperature favours the

↓ Temperature favours the

★

NB, Temp changes can also affect rate!

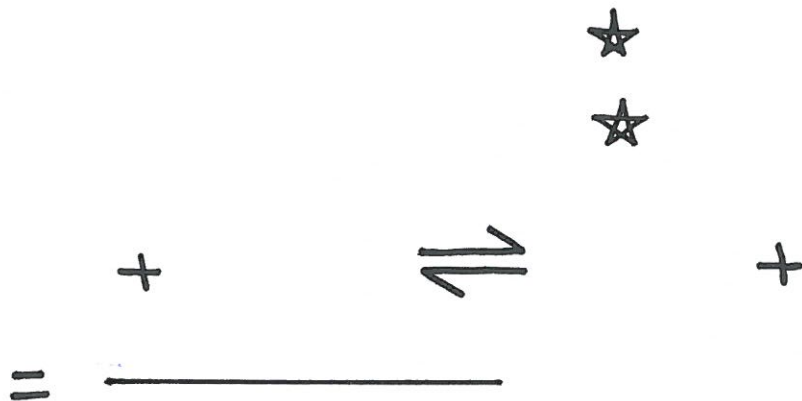


Homogenous

K_c - The Equilibrium Constant

- 1
- 2
- 3
- 4
- 5

The Expression



Heterogenous

+



= _____

+



= _____

+



= _____



+

"

+



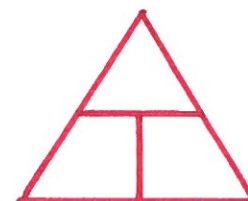
+

= _____



Deducing Amounts at Equilibrium

1 2 3 4 5





K_c Calculations - Numbers & Units



$$K_c = \frac{\quad}{\quad} = \frac{\quad}{\quad} =$$

$$\text{UNITS} = \frac{\quad}{\quad} = \frac{\quad}{\quad} =$$



$$K_c = \frac{\quad}{\quad} = \frac{\quad}{\quad} =$$

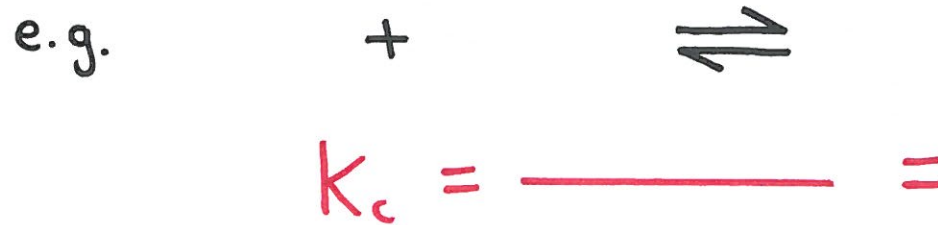
If $K_c = 1$

If $K_c < 1$

If $K_c > 1$



Factors Affecting K_c



Predicting Change in K_c

Increasing Temperature

-
-
-
-

Decreasing Temperature

-
-
-
-



EXAMPLE K_c CALCULATIONS - HOMOGENOUS

1. Methanol can be manufactured using the following process.



0.242 moles of CO were mixed with 0.360 moles of H₂ in sealed container with a volume of 400cm³ at a temperature of 550K and left to reach equilibrium.

a) It was found that 0.100 moles of CH₃OH was present at equilibrium.

Calculate K_c, including its units.

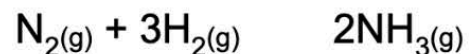
K_c = Units

What would happen to value of K_c, if the temperature was decreased?



EXAMPLE K_c CALCULATIONS - HOMOGENOUS

2. A dynamic equilibrium is set up when Nitrogen reacts with Hydrogen to form Ammonia.



A 2.0dm³ vessel was found to contain 0.05 moles of Nitrogen and 0.08 moles of Ammonia once equilibrium was reached at 300K. The value of K_c for this equilibrium at this temperature is 9.6.

a) Calculate the number of moles of Hydrogen present at equilibrium.

b) Deduce the units for K_c for this equilibrium