Chemical Reactions

Reversible Reactions

- In a reversible reaction, the products can react to form the original products again

Heating hydrated salts

- When salt crystals have water as part of their structure we say that they are hydrated
- We call the water in the salt, the water of crystallisation
- When the crystals are heated the water of the crystallisation is lost
- We are left with an anhydrous substance
- Anhydrous means without water

Equilibrium

Equilibrium reactions have particular features:

- The reactants or products must not escape from the reaction mixture, we call this is a closed system
- At equilibrium the reactants are constantly being changed to products and the products are being changed back to reactants. We say that this is dynamic equilibrium
- In dynamic equilibrium the concentration of reactants and products are fixed
- At equilibrium the concentration of the reactants and products do not change
- This is because the rate of the forward reaction is the same as the rate of the reverse reaction
- The equilibrium can be approached from either direction
- We can start with only the reactants or products
- Whichever we start with, we end up with fixed concentrations of reactants and products in the equilibrium mixture
- The position of equilibrium tells us how far the reaction goes in favour if the reactants or products
- If the concentration of the products is greater than the concentration of the reactants we say that equilibrium is towards the right- it favours the products
- If the concentration of reactants is greater than the concentration of products, we say that the position of equilibrium is to the left- it favours the reactants

Shifting equilibrium

- Catalyst do not have an effect on the position of equilibrium they speed up both the forward and backward reactions equally

Changing the concentration

- When the concentration of the reactant is increased, the equilibrium moves to the right
- Adding more reactants unbalances the equilibrium
- So the equilibrium moves to the right to form more products until the equilibrium is restored
- In this way the relative concentrations of products and reactants are the same as before
- When the concentration of a product is increases, the equilibrium moves to the left
- Products are changed into reactants until the equilibrium is rstored

Changing the pressure

- Pressure can only affect reactions where the is a gas in the equation
- If there are more moles of gas on the left than the right
- An increase in pressure moves the reaction to the right
- This happens because increasing the pressure squashes the molecules closer together, increasing their concentration
- The reaction mixture tries to overcome this by moving the equilibrium to the right so that the overall number of molecules is reduced
- Decreasing the pressure has the opposite effect
- It pushes the reaction to the left
- If there are equal volumes of gas on both sides of the equation, increasing the pressure has no effect

Changing the temperature

- If the reaction is exothermic in the forward reaction, it will be endothermic in the reverse reaction
- So for an exothermic reaction when temperature increases, the equilibrium shifts in favour of the reverse reaction
- It favours the endothermic change when heat is taken in
- In an endothermic reaction, the opposite happens
- Increasing the temperature moves the reaction to the right to favour the products
- It favours the exothermic change where heat is given out