

Name:

## le Chatelier's principle

If an equilibrium mixture is perturbed by changing the pressure or temperature the position of the equilibrium moves to counteract the change'

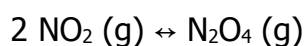
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If the temperature of a reaction mixture is increased, more of the exothermic / endothermic product is produced.

If the pressure on a reaction mixture is increased, the yield of the side of the reaction with more / fewer gaseous particles is increased.

Dinitrogen tetroxide ( $\text{N}_2\text{O}_4$ ) is a colourless gas. Nitrogen dioxide is a dark brown gas. In a sealed system (like a glass bulb) the two gases will both be present.

Endothermic



Exothermic

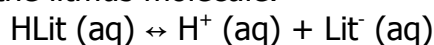
How can you alter the temperature to increase the amount of  $\text{N}_2\text{O}_4$  present?

How can you alter the pressure to increase the amount of  $\text{N}_2\text{O}_4$  present?

What would you see if you cooled the mixture?

What would you see if you compressed the mixture?

The indicator litmus is a weak acid. It is a complicated molecule containing a hydrogen atom which break free to form an ion ( $\text{H}^+$ ). In the equation 'Lit' represents the rest of the litmus molecule.



In litmus solution there is a dynamic equilibrium involving the HLit molecules and the two ions. Because litmus is a weak acid, the position of equilibrium lies well to the left.

Use this example to explain what is meant by the terms dynamic equilibrium and position of equilibrium.

HLit molecules are red and  $\text{Lit}^-$  ions are blue. Use le Chatelier's principle to explain why litmus turns red when you add an acid (a source of  $\text{H}^+$  (aq)) to it.

Use le Chatelier's principle to explain why litmus turns blue when you add an alkali (a source of  $\text{OH}^-$ (aq)) to it.