

Year 11 C8: Rates and equilibrium. Chemistry – Science Faculty

Rationale and Context of Unit:	Core curriculum content:	Tier 2 & Tier 3 vocabulary explicitly taught:
<p>In this chapter, students have learnt about the factors that affect the rate of a reaction, including temperature, surface area, concentration, and pressure. Students should be able to explain the effect of each factor on the rate of reaction using collision theory – understanding that each factor increases the <i>frequency</i> of effective collisions. They should also be able to explain the effect of catalysts on the rate of a reaction in terms of providing an alternative reaction pathway with a lower activation energy.</p> <p>Students will also learn about reversible reactions and dynamic equilibrium. Students should apply their knowledge on endothermic and exothermic reactions (C7) to equilibrium reactions to be able to predict the effect of temperature changes on the reversible reactions and the position of the equilibrium. Higher-tier students should also be able to use Le Châtelier's principle to explain the effect of temperature and pressure on the position of equilibrium.</p>	<ul style="list-style-type: none"> <li>• Rate of reaction</li> <li>• Collision theory and surface area</li> <li>• The effect of temperature on reaction rate</li> <li>• The effect of concentration and pressure on reaction rate</li> <li>• The effect of catalysts on reaction rate</li> <li>• Reversible reactions</li> <li>• Energy and reversible reactions</li> <li>• Dynamic equilibrium</li> <li>• Altering conditions</li> </ul>	<p>Equilibrium Collision Frequency Concentration Catalyst Surface area Activation energy</p>
Challenge and Support:	World wide learning/ links to 21 <sup>st</sup> century:	Cultural capital/ Industry/ Enrichment:
<ul style="list-style-type: none"> <li>• <i>Models used to help understand difficult concepts like equilibrium, activation energy and catalysts.</i></li> <li>• <i>Practical activities help support understanding of ideas associated with rates of reactions.</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Ammonia which is produced by manipulating an equilibrium, is used to fertilise crops and is responsible for feeding approximately 40% of the world's population.</i></li> </ul>	<ul style="list-style-type: none"> <li>• Increasing the rates of reactions allows chemicals to be produced faster and cheaper. Understanding rates of reactions and balancing yield with cost is important for many chemical industries.</li> <li>• Ammonia production.</li> <li>• Methanol (used in antifreeze, glue production and many other applications) production is via equilibrium.</li> </ul>

Historical, Social, Moral, Spiritual, Cultural context:	Cross curricular links/ literacy/numeracy:	<ul style="list-style-type: none"> <li>Sulphuric acid is produced from an equilibrium.</li> </ul> <b>Common misconceptions:</b>
<ul style="list-style-type: none"> <li>Providing heat to speed up reacting has high energy demands, what impact does this have on the environment?</li> <li>The Haber process was developed in the early 20<sup>th</sup> century to make ammonia for the Germans in World War 1 so that they could make explosives. It's now used to make fertiliser and feed people.</li> </ul>	<ul style="list-style-type: none"> <li>Links with GCSE biology units B8 and B9 which look at photosynthesis and respirations, these are the reverse of one another and exothermic and endothermic.</li> <li>Links with maths: drawing a tangent on a curved line graph.</li> </ul>	<ul style="list-style-type: none"> <li>Catalysts affect the position of equilibrium.</li> <li>Changing the position of equilibrium makes one reaction faster than another.</li> </ul>
<b>Assessment timeline:</b>		
<ul style="list-style-type: none"> <li>regular EPPQs</li> <li>end of unit test</li> <li>EPPQ homework task</li> <li>in lesson questioning and other progress checks</li> </ul>		
<b>Home learning</b>		
<ul style="list-style-type: none"> <li>EPPQ homework booklet</li> </ul>		
<b>Feedback</b>		
<ul style="list-style-type: none"> <li>Students self/peer mark homework booklets and set revision goals based on understanding.</li> <li>Feedback based on the end of the unit test.</li> </ul>		

**Length of unit (duration indicated in lessons)**

C8.1	C8.2	C8.3	C8.4	C8.5	C8.6	C8.7	C8.8	C8.9	C8 test
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**Unit: C8: rates and equilibrium, Chemistry**