



Activity type	classroom <input type="checkbox"/> homework <input checked="" type="checkbox"/> independent learning <input checked="" type="checkbox"/> other <input type="checkbox"/>		
Activity objectives(s)	<p>At the end of this topic, students should be able to:</p> <ul style="list-style-type: none"> • Interpret rate graphs. • State that a potential energy diagram can be used to show the energy pathway for a reaction. • State that enthalpy change is the energy difference between products and reactants. It can be calculated from a potential energy diagram. • State that the enthalpy change has a negative value for exothermic reactions and a positive value for endothermic reactions. • State that the activated complex is an unstable arrangement of atoms formed during a reaction, at the maximum of the potential energy barrier. • State that the activation energy is the energy required by colliding particles to form an activated complex. • State that the activation energy can be calculated from potential energy diagrams. • State that temperature is a measure of the average kinetic energy of the particles of a substance. (revision; Higher, Unit 1, Topic 1) • State that the activation energy is the minimum kinetic energy required by colliding particles before reaction may occur. (revision; Higher, Unit 1, Topic 3) • use energy distribution diagrams to explain the effect of changing temperature on the kinetic energy of particles. • State that the effect of temperature on reaction rate can be explained in terms of an increase in the number of particles with energy greater than the activation energy. 		
Activity resources(s)	Students will need access to the internet and their SCHOLAR login details. Students may wish to use calculator for the calculation based questions.		
Delivery mode	teacher led <input checked="" type="checkbox"/> student led <input checked="" type="checkbox"/>	Collaboration type	individual <input checked="" type="checkbox"/> pairs <input type="checkbox"/> groups <input checked="" type="checkbox"/>



SCHOLAR Lesson Outline

Task description

Computer task

Get pupils to navigate to the correct topic - Higher (CfE) Chemistry Unit 1 Topic 1.2 - reaction rates - Reaction Profiles. Navigate through the topic and complete the end of topic test for homework.

Pupils may benefit from carrying out the reactions described in section 2.2 "Interpreting Graphs" themselves and plotting graphs of the reactions before working through the SCHOLAR section. The first experiment is a simple mass loss between zinc and hydrochloric acid on a 3 decimal place balance. The second experiment (again between zinc but now with different concentrations of hydrochloric acid) is a good opportunity to introduce students to a gas syringe through a demo.

Focus on definitions of "Activation Energy", "Potential Energy Diagram", "Enthalpy Change" and "Activated Complex".

Whole class

You may wish to give feedback to students on their progress.
Display a report of the exercise.

Move onto some text book practice of interpreting reaction profiles and rate graphs.

Practical Work that will enhance this topic

A number of animations showing reaction profiles are available. Entering the search terms 'Activation energy animation' into an internet search engine will produce a large number of hits.

Students could look at potential energy diagrams for different reactions and calculate the enthalpy change. (Calculating the difference between products and reactants on the potential energy diagrams.)

The pHET initiative from the University of Colorado also has an interactive simulation that shows reaction profiles well.

Learners can investigate the effect of temperature by using the reaction between sodium thiosulfate and acid in which a sulfur precipitate forms (Old Higher PPA), or the reaction of potassium iodate and bisulfite/starch solution. Descriptions of both these activities are found in Classic Chemistry Experiments, Kevin Hutchings (2000), available free online from the Royal Society of Chemistry.

Learners can produce rate versus temperature graphs illustrating the exponential increase in rate with temperature.

Card sorts can be a good way of checking students understanding of the concepts covered in this topic.

Students could be set questions to calculate the rates of chemical reactions from rate graphs.



SCHOLAR Lesson Outline

Differentiation (Alternative use)	<p>With an able group of students, you may wish to set this as a homework task to review the topic when you have completed it. In particular, the end of unit test has a variety of questions to ensure that students can interpret reaction profiles.</p> <p>With weaker students, you may wish to carry this out as an in class activity so you can answer any questions they may have as they attempt the exercise.</p>
Hints & Tips	<p>This task is best done in pairs or individually.</p> <p>Students are often reluctant to write down any working when given a computer-based task. It is a good idea to get students to copy the example calculations in the materials into their notes so that they can refer to them while attempting the exercise. Emphasize the need for working.</p> <p>Go round the class and get students to explain their answers.</p> <p>It is a good idea to get students to show you their score when they finish the exercise. If they do not get full marks you can send them back to have another try while the rest of the class finish off.</p> <p>Some teachers like to generate a report while students are logged in so that they can be shown what the teacher can see. This will highlight progress and any pupils who are just clicking reveal, as full marks can only be achieved by entering correct answers.</p> <p>There is online training available to help you learn how to do this. When you are logged in you will see a course called Succeed with SCHOLAR. Unit 1 Topic 7 introduces you to the reporting system.</p> <p>Choose some questions for students to try from the textbook in advance so faster pupils can move onto these.</p> <p>Questions in the end of topic test give extra practice.</p>
Notes	<p>Pupils will need a calculator for this topic.</p> <p>The SCHOLAR section of this material should take approx 20 minutes.</p>