

Answers to exam style questions, ages 14–16

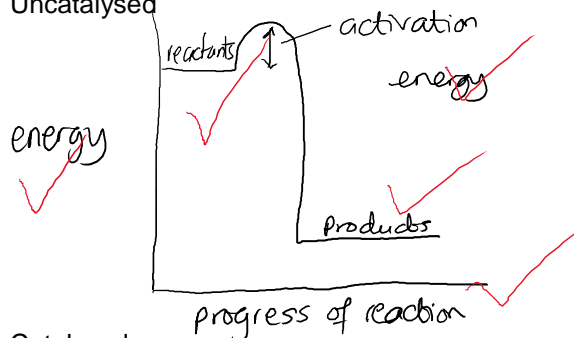
Education in Chemistry

November 2017

rsc.li/EiC617-catalysts-get-helping-hands

1. Define the term catalyst.
 - ✓ A substance which speeds up a chemical reaction
 - ✓ Without being used up
2. Explain how a catalyst works
 - ✓ Provides an alternative route for a reaction
3. Draw fully labelled energy level diagrams for an exothermic reaction

a. Uncatalysed



b. Catalysed

As above but activation energy smaller, reactants and products at the same level (relative to each other). (2 marks)

4. Give one example of a reaction that is commonly carried out in the presence of a catalyst. Include a balanced symbol equation for the reaction.
 - ✓ Any suitable example from their specification
 - ✓ A balanced symbol equation
 - ✓ Correct catalyst identified
5. State 3 other factors that affect the rate of a reaction.
 - ✓ Concentration
 - ✓ Surface area
 - ✓ Temperature
6. The reaction between peroxodisulfate ions and iodide ions is very slow. The reaction may be catalysed by Fe^{2+} ions. The reaction produces iodine. Iodine is a brown colour in water and can be further visualised with starch which produces a blue/black colour when a certain amount of iodine is produced.
$$\text{S}_2\text{O}_8^{2-} + 2\text{I}^- \rightarrow 2\text{SO}_4^{2-} + \text{I}_2$$
 - a. Suggest why the reaction is very slow
 - ✓ Two negative ions are reacting together

- b. Outline an experiment which could be used to prove that Fe^{2+} ions catalyse the reaction.

	Indicative content
Level 3 (5-6 marks): Recording of results and comparison	<ul style="list-style-type: none">✓ <i>Mentions that results must be compared eg, check if the addition of catalyst makes the time shorter</i>✓ <i>Calculation of rate (required to achieve the full 6 marks)</i>
Level 2 (3-4 marks): Experimental detail	<ul style="list-style-type: none">✓ <i>Sensible scale for experiment</i>✓ <i>Control variables (volume and concentration of solutions, way of measuring colour change eg, disappearing cross)</i>
Level 1 (1-2 marks): Carries out catalysed and uncatalysed reaction	<ul style="list-style-type: none">✓ <i>Describes a simple, feasible experiment</i>✓ <i>2 experiments undertaken (one with catalyst, one without)</i>✓ <i>Specific event to measure time (colour change)</i>