Answers to exam style questions, ages 14–16

***Education in Chemistry***November 2017[rsc.li/EiC617-catalysts-get-helping-hands](http://rsc.li/EiC617-catalysts-get-helping-hands)

1. Define the term catalyst.

* *A substance which speeds up a chemical reaction*
* *Without being used up*

1. Explain how a catalyst works

* *Provides an alternative route for a reaction*

1. Draw fully labelled energy level diagrams for an exothermic reaction
   1. Uncatalysed



* 1. Catalysed

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



1. 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*

1. State 3 other factors that affect the rate of a reaction.

* *Concentration*
* *Surface area*
* *Temperature*

1. The reaction between peroxodisulfate ions and iodide ions is very slow. The reaction may be catalysed by Fe2+ 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.

S2O82– + 2I– 🡪 2SO42– + I2

1. Suggest why the reaction is very slow

* *Two negative ions are reacting together*

1. Outline an experiment which could be used to prove that Fe2+ ions catalyse the reaction.

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|  | **Indicative content** |
| Level 3 (5-6 marks): Recording of results and comparison | * *Mentions that results must be compared eg, check if the addition of catalyst makes the time shorter* * *Calculation of rate (required to achieve the full 6 marks)* |
| Level 2 (3-4 marks): Experimental detail | * *Sensible scale for experiment* * *Control variables (volume and concentration of solutions, way of measuring colour change eg, disappearing cross)* |
| Level 1 (1-2 marks): Carries out catalysed and uncatalysed reaction | * *Describes a simple, feasible experiment* * *2 experiments undertaken (one with catalyst, one without)* * *Specific event to measure time (colour change)* |