Catalysts and Activation Energy

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

On a potential energy diagram, the forward activation energy is the difference between the peak and reactants. The net energy change is products minus reactants.

1 Which change explains why a catalyst can increase reaction rate?

(1) It provides a pathway with a lower activation energy.

(2) It increases the number of atoms in the reactants.

(3) It always increases the net energy released per mole.

(4) It removes the need for reactant particles to interact.

2 Two pathways connect the same reactants and products, but one has a lower peak. Explain why they have the same net energy change. [1]

Answer and work

3 Reactants have a potential energy of 25 kJ/mol and a pathway peaks at 85 kJ/mol. Calculate the forward activation energy. [1]

Answer and work

4 Which statement describes the effect of a catalyst at a fixed temperature?

(1) It raises the average kinetic energy of all reactants.

(2) It raises the minimum energy needed for reaction.

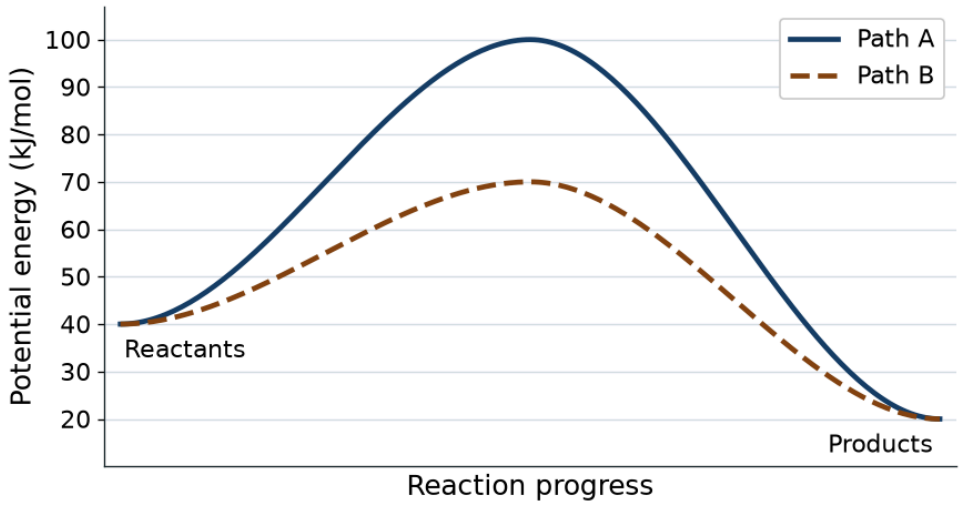
(3) It lets more particles reach the energy threshold for reaction.

(4) It makes every collision produce a reaction.

Two Paths to the Same Products

Use the information below to answer the questions.

A simulation shows two pathways for the same reaction. Both begin at the reactant energy level and end at the product energy level.



Model potential energy pathways.

5 Which pathway represents the catalyzed reaction?

(1) Path A, because it has a higher peak.

(2) Path B, because it has a lower peak.

(3) Path A, because it has a lower product energy.

(4) Both, because they have identical barriers.

6 Use the graph to calculate the forward activation energy of each path. [1]

Answer and work

7 What is the net energy change for the reaction in the graph?

(1) −80 kJ/mol

(2) −20 kJ/mol

(3) +20 kJ/mol

(4) +60 kJ/mol

8 Which path also has a smaller activation energy for the reverse reaction? Use the graph to justify your answer. [1]

Answer and work