

Reinforcement**Chapter 6****BLM 6-3****Potential Energy Diagrams****Goal**

Practice drawing and interpreting potential energy diagrams.

Procedure

Draw and label potential energy diagrams to answer the following questions.

Questions

1. Assume the following reaction has a one-step mechanism:



Draw a potential energy diagram for the reaction that correctly incorporates each of the following labels:

$$\Delta H = 150 \text{ kJ/mol}$$

$$E_{a(\text{fwd})} = 450 \text{ kJ}$$

Potential energy

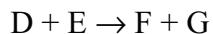
Reaction progress

Transition state

A + B

C

- (a) Is the reaction endothermic or exothermic?
- (b) Determine $E_{a(\text{rev})}$ for the reaction. Add this value to your diagram.
- (c) How would your diagram have been different if the reaction had a two-step mechanism? Explain your answer.
- (d) A catalyst speeds up the reaction by providing an alternative, two-step mechanism. On your diagram, sketch a curve to represent the effect of the catalyst on the reaction.
2. Assume the following reaction has a one-step mechanism:



Draw a potential energy diagram for the reaction that correctly incorporates each of the following labels:

$$\Delta H = -56 \text{ kJ/mol}$$

$$E_{a(\text{rev})} = 120 \text{ kJ}$$

Potential energy

Reaction progress

Transition state

D + E

F + G

- (a)** Is the reaction endothermic or exothermic?
- (b)** Determine $E_{a(\text{fwd})}$ for the reaction. Add this value to your diagram.
- (c)** A catalyst speeds up the reaction by providing an alternative, three-step mechanism. On your diagram, sketch a curve to represent the effect of the catalyst on the reaction.