

CHAPTER 9	Potential Energy Diagrams	BLM 9.1.4
ASSESSMENT		

Draw and label potential energy diagrams to answer the following 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:

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

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

Potential energy

Reaction progress

Transition state

A + B

C

(a) Is the reaction endothermic or exothermic?

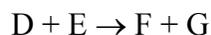
(b) Determine  $E_{a(\text{rev})}$  for the reaction. Add this value to your diagram.

(c) How would your diagram have been different if the reaction had a two-step mechanism? Explain your answer.

(d) A catalyst speeds up this reaction by providing an alternative, two-step mechanism. On your diagram, sketch a curve to represent the effect of the catalyst on the reaction.

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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:

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

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

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 this reaction by providing an alternative, three-step mechanism. On your diagram, sketch a curve to represent the effect of the catalyst on the reaction.