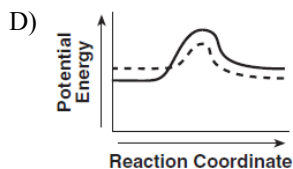
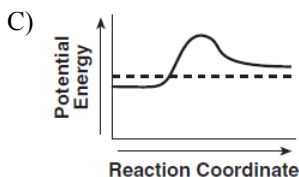
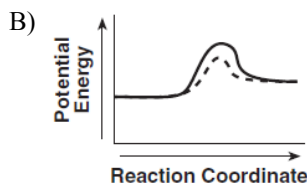
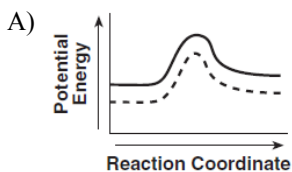
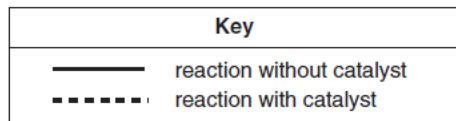
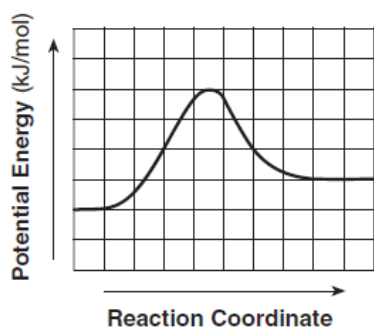


1. Which potential energy diagram represents the change in potential energy that occurs when a catalyst is added to a chemical reaction?

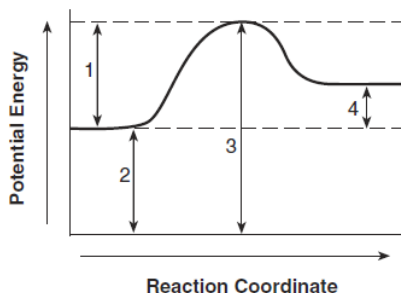


2. Given the potential energy diagram for a reversible chemical reaction:



Each interval on the axis labeled "Potential Energy (kJ/mol)" represents 10. kilojoules per mole. What is the activation energy of the forward reaction?

- A) 10. kJ/mol      B) 30. kJ/mol  
C) 40. kJ/mol      D) 60. kJ/mol
3. After being ignited in a Bunsen burner flame, a piece of magnesium ribbon burns brightly, giving off heat and light. In this situation, the Bunsen burner flame provides
- A) ionization energy      B) activation energy  
C) heat of reaction      D) heat of vaporization
4. Given the potential energy diagram for a reaction:

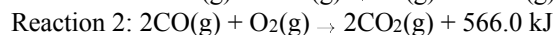
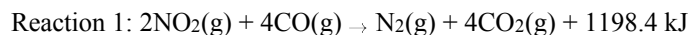


Which intervals are affected by the addition of a catalyst?

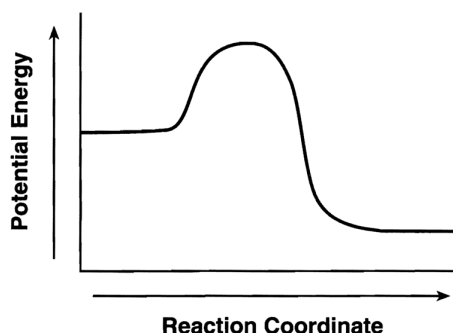
- A) 1 and 2    B) 1 and 3    C) 2 and 4    D) 3 and 4
5. The activation energy of a chemical reaction can be *decreased* by the addition of
- A) a catalyst      B) an indicator  
C) electrical energy      D) thermal energy

6. Base your answer to the following question on the information below.

The catalytic converter in an automobile changes harmful gases produced during fuel combustion to less harmful exhaust gases. In the catalytic converter, nitrogen dioxide reacts with carbon monoxide to produce nitrogen and carbon dioxide. In addition, some carbon monoxide reacts with oxygen, producing carbon dioxide in the converter. These reactions are represented by the balanced equations below.

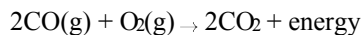


The potential energy diagram below represents reaction 1 without a catalyst. On the same diagram, draw a dashed line to indicate how potential energy changes when the reaction is catalyzed in the converter.

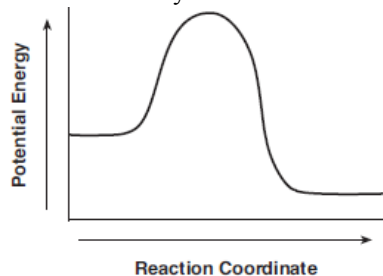


Base your answers to questions 7 and 8 on the information below and on your knowledge of chemistry.

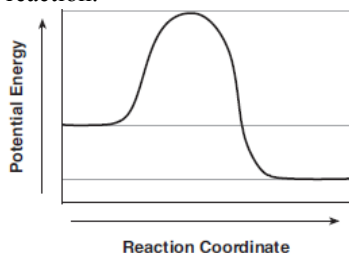
The balanced equation below represents the reaction between carbon monoxide and oxygen to produce carbon dioxide.



7. On the potential energy diagram below, draw a dashed line to show how the potential energy diagram changes when the reaction is catalyzed.

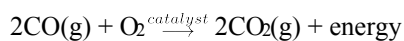


8. On the potential energy diagram below, draw a double-headed arrow to indicate the interval that represents the heat of reaction.

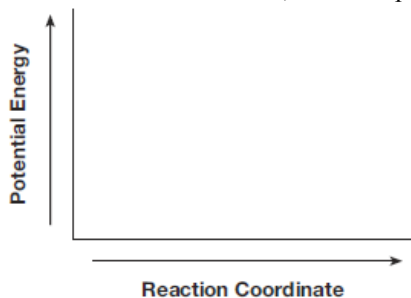


9. Base your answer to the following question on the information below and on your knowledge of chemistry.

Carbon monoxide,  $\text{CO}(\text{g})$ , is a toxic gas found in automobile exhaust. The concentration of  $\text{CO}(\text{g})$  can be decreased by using a catalyst in the reaction between  $\text{CO}(\text{g})$  and  $\text{O}_2(\text{g})$ . This reaction is represented by the balanced equation below.

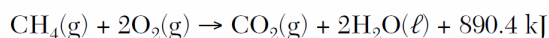
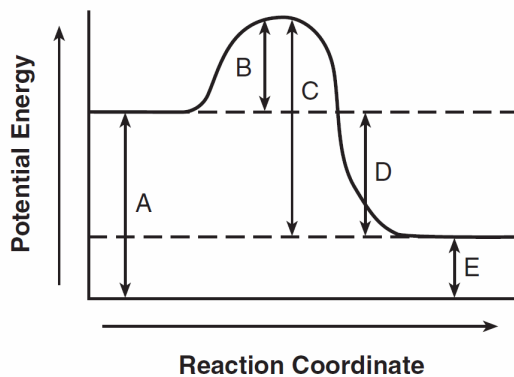


On the labeled axes below, draw the potential energy curve for the reaction represented by this equation.



10. Base your answer to the following question on the information below.

The chemical reaction between methane and oxygen is represented by the potential energy diagram and balanced equation below.



Which potential energy interval in the diagram represents the activation energy of the forward reaction?