Kinetics Practice Quiz

1. Which event must *always* occur for a chemical reaction to take place?

   A) formation of a precipitate
   B) formation of a gas
   C) effective collisions between reacting particles
   D) addition of a catalyst to the reaction system

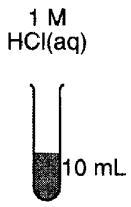
2. The energy needed to start a chemical reaction is called

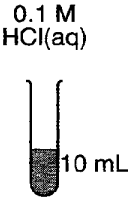
   A) potential energy B) kinetic energy
   C) activation energy D) ionization energy

3. Which statement explains why increasing the temperature increases the rate of a chemical reaction, while other conditions remain the same?

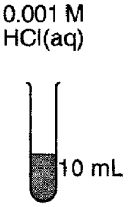
   A) The reacting particles have less energy and collide less frequently.
   B) The reacting particles have less energy and collide more frequently.
   C) The reacting particles have more energy and collide less frequently.
   D) The reacting particles have more energy and collide more frequently.

4. Each of four test tubes contains a different concentration of HCI(aq) at 25°C. A 1-gram cube of Zn is added to each test tube. In which test tube is the reaction occurring at the fastest rate?

   A) 

   B) 

   C) 

   D) 

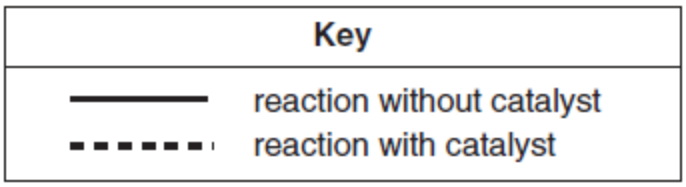
5. As the surface area of the Zn(s) used in the reaction

   $$Zn(s) + 2\ HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$$

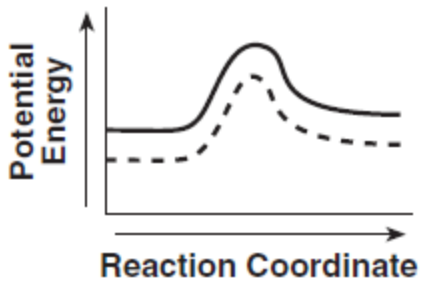
   is increased, the rate of the reaction will

   A) decrease B) increase
   C) remain the same

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



A)



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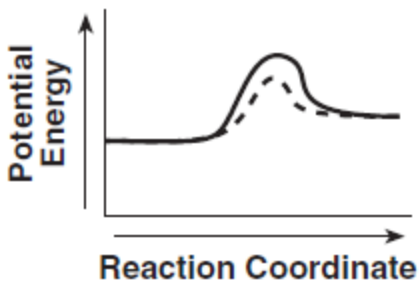

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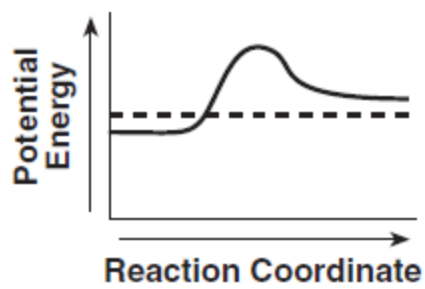
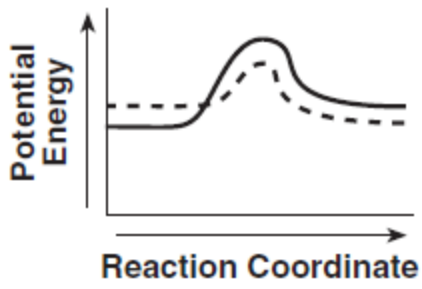


D)



7. For a given chemical reaction, the addition of a catalyst provides a different reaction pathway that

A) decreases the reaction rate and has a higher activation energy
B) decreases the reaction rate and has a lower activation energy
C) increases the reaction rate and has a higher activation energy
D) increases the reaction rate and has a lower activation energy

8. Which balanced equation represents an endothermic reaction?

A) $C(s) + O_2(g) \rightarrow CO_2(g)$
B) $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(\ell)$
C) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$
D) $N_2(g) + O_2(g) \rightarrow 2NO(g)$

9. Given the equation:

$$I + I \rightarrow I_2 + 35 \text{ kcal}$$

This equation shows that the formation of an iodine molecule is an

A) exothermic process in which energy is absorbed
B) exothermic process in which energy is released
C) endothermic process in which energy is absorbed
D) endothermic process in which energy is released

10. Which expression represents the heat of reaction for a chemical change in terms of potential energy, *PE*?

A) $(PE_{products}) + (PE_{reactants})$
B) $(PE_{products}) - (PE_{reactants})$
C) $(PE_{products}) \times (PE_{reactants})$
D) $(PE_{products}) \div (PE_{reactants})$

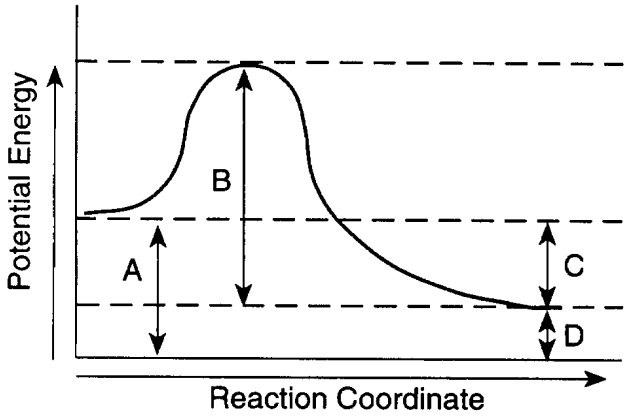
11. Given the balanced equation:

$4Fe(s) + 3O_2(g) \rightarrow 2Fe2O_3(s) + 1640$ kJ

Which phrase best describes this reaction?

A) endothermic with $\Delta H = +1640$ kJ
B) endothermic with $\Delta H = -1640$ kJ
C) exothermic with $\Delta H = +1640$ kJ
D) exothermic with $\Delta H = -1640$ kJ

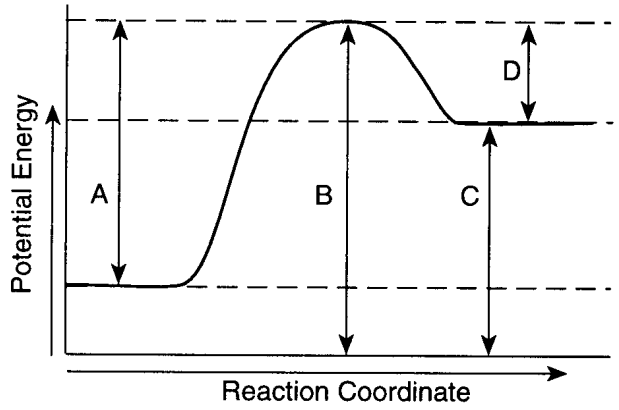
12. The potential energy diagram of a chemical reaction is shown below.



Which arrow represents the part of the reaction most likely to be affected by the addition of a catalyst?

A) *A* B) *B* C) *C* D) *D*

Base your answers to questions **13** and **14** on the potential energy diagram of a chemical reaction shown below.



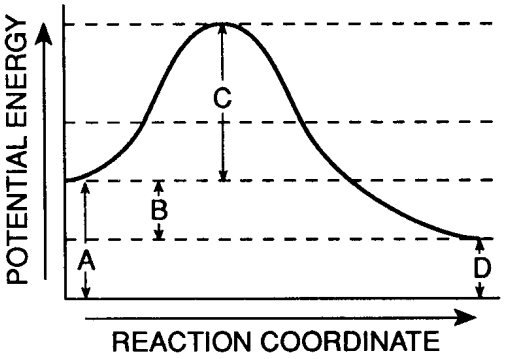
13. The forward reaction is best described as an

A) exothermic reaction in which energy is released
B) exothermic reaction in which energy is absorbed
C) endothermic reaction in which energy is released
D) endothermic reaction in which energy is absorbed

14. Which arrow represents the activation energy for the forward reaction?

A) *A* B) *B* C) *C* D) *D*

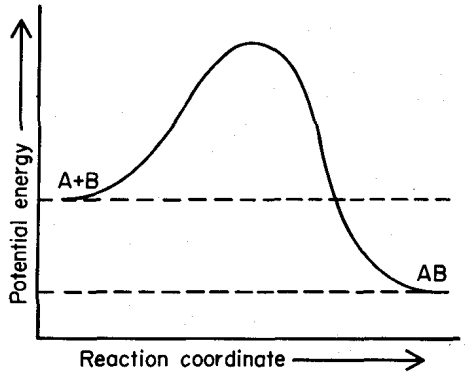
15. The potential energy diagram of a chemical reaction is shown below.



Which letter in the diagram represents the heat of reaction (ΔH)?

A) *A* B) *B* C) *C* D) *D*

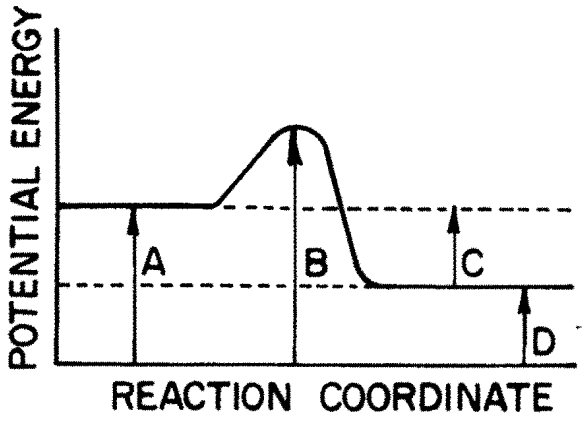
16. Given the potential energy diagram:



With reference to energy, the reaction $A + B \rightarrow AB$ can best be described as

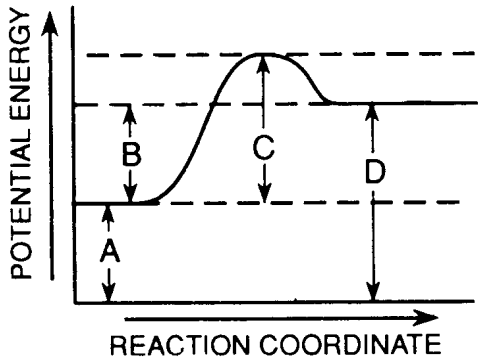
A) endothermic, having a $+\Delta H$
B) endothermic, having a $-\Delta H$
C) exothermic, having a $+\Delta H$
D) exothermic, having a $-\Delta H$

17. In the potential energy diagram below, which letter represents the potential energy of the activated complex?



A) *A* B) *B* C) *C* D) *D*

Base your answers to questions **18** and **19** on the reaction coordinate shown below:



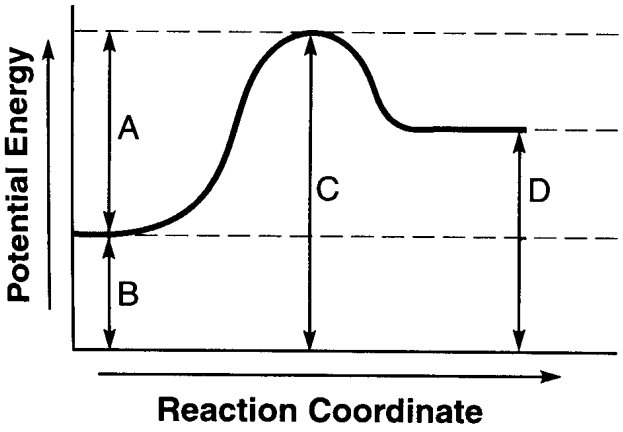
18. Which interval represents the heat of reaction?

A) *A* B) *B* C) *C* D) *D*

19. Which interval represents the activation energy of the forward reaction?

A) *A* B) *B* C) *C* D) *D*

20. Given the potential energy diagram of a chemical reaction:



Which arrow represents the potential energy of the reactants?

A) *A* B) *B* C) *C* D) *D*