Chemistry

Name: _____

Section _____ RATE PE DIAG. COLLISIONS Date: _____

Directions (1-20): For *each* statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Some questions may require the use of the *2011 Edition Reference Tables for Physical Setting/Chemistry*.

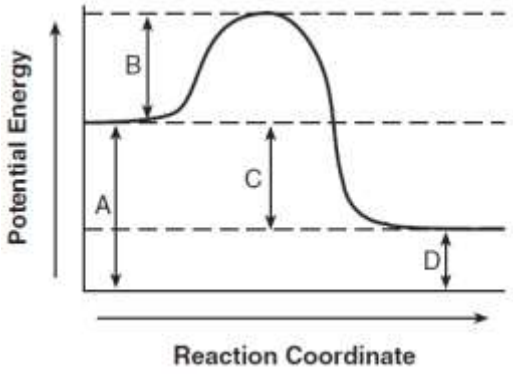
1 Which expression represents the heat of reaction for a chemical change in terms of potential energy, PE?

(1) $(PE_{products}) + (PE_{reactants})$
(2) $(PE_{products}) - (PE_{reactants})$
(3) $(PE_{products}) \times (PE_{reactants})$
(4) $(PE_{products}) \div (PE_{reactants})$

2 The addition of a catalyst to a chemical reaction provides an alternate pathway that

(1) increases the potential energy of reactants
(2) decreases the potential energy of reactants
(3) increases the activation energy
(4) decreases the activation energy

Base your answers to questions 3 and 4 on the potential energy diagram of a chemical reaction shown below.



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

(1) A
(2) B
(3) C
(4) D

4 Which of the following represents the activation energy for the *reverse* reaction?

(1) A + B
(2) B + C
(3) C + D
(4) B

5 In order for a chemical reaction to occur, there must always be

(1) effective collisions between reactant particles
(2) a bond that breaks in a reactant particle
(3) highly charged reactant particles
(4) reactant particles with high kinetic energy

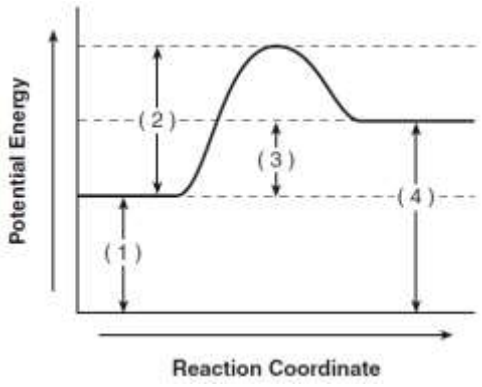
6 As the number of effective collisions between reacting particles increases, the rate of reaction

(1) decreases
(2) increases
(3) remains the same
(4) changes the orientation of the particles

7 In a chemical reaction, as the concentrations of the reacting particles increase, the rate of reactions generally

(1) decreases
(2) increases
(3) remains the same
(4) reaches equilibrium

8 The graph below represents the potential energy diagram of a compound that is formed from its elements. Which interval represents the heat of reaction?



(1) (2) (3) (4)

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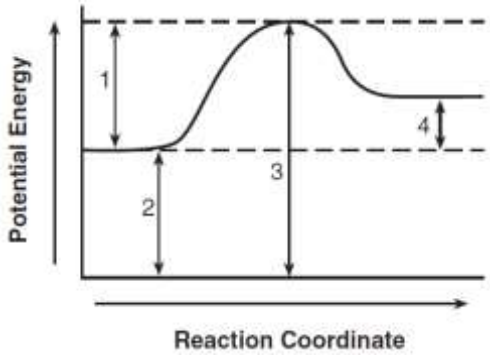
9 The addition of a catalyst will change the

(1) activation energy
(2) heat of reaction
(3) PE of the reactants
(4) PE of the products

10 Given the potential energy diagram below, which interval represents the potential energy of the activated complex?



(1) (2) (3) (4)

11 A student adds two 50-milligram pieces of $Ca_{(s)}$ to water. A reaction takes place according to the following equation.

$$Ca_{(s)} + 2\ H_2O_{(l)} \rightarrow Ca(OH)_{2\ (aq)} + H_{2\ (g)}$$

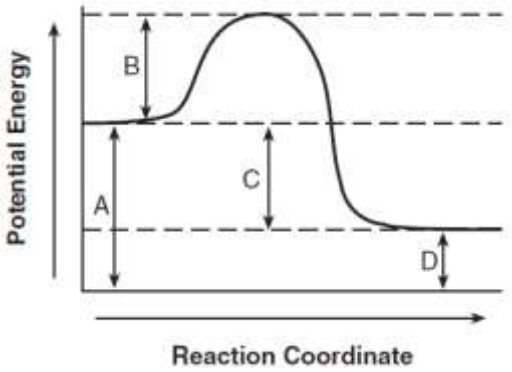
Which change could the student have made that would most likely have increased the rate of reaction?

(1) used ten 10-milligram pieces of $Ca_{(s)}$
(2) used one 10-milligram pieces of $Ca_{(s)}$
(3) decreased the amount of water
(4) decreased the temperature of the water

12 Under which conditions with the forward rate of a chemical reaction most often decrease?

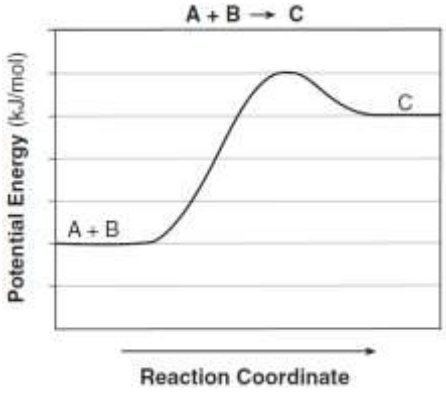
(1) the concentration of the reactants decreases and the temperature decreases
(2) the concentration of the reactants decreases and the temperature increases
(3) the concentration of the reactants increases and the temperature decreases
(4) the concentration of the reactants increases and the temperature increases

13 Given the potential energy diagram below, what does interval B represent?



(1) potential energy of the reactants
(2) potential energy of the products
(3) activation energy
(4) activated complex

14 The potential energy diagram below represents the reaction A + B → C



Which statement correctly describes the reaction?

(1) it is endothermic and energy is absorbed
(2) it is endothermic and energy is released
(3) it is exothermic and energy is absorbed
(4) it is exothermic and energy is released

15 As the temperature of a system increases, the entropy of the system

(1) increases
(2) decreases
(3) remains the same
(4) depends on ΔH

16 A 1-cm^3 cube of sodium reacts more rapidly in water than a 1-cm^3 cube of calcium at 25°C. This difference in rate of reaction is most closely associated with the different

(1) surface area of the metal cubes
(2) nature of the metals
(3) density of the metals
(4) concentration of the metals

17 At room temperature, which reaction would be expected to have the fastest reaction rate?

(1) $Pb^{2+}_{(aq)} + S^{2-}_{(aq)} \rightarrow PbS_{(s)}$
(2) $2\ H_{2\,(g)} + O_{2\,(g)} \rightarrow 2\ H_2O_{(\ell)}$
(3) $N_{2\,(g)} + 2\ O_{2\,(g)} \rightarrow 2\ NO_{2\,(g)}$
(4) $2\ KClO_{3\,(s)} \rightarrow 2\ KCl_{(s)} + 3O_{2\,(g)}$

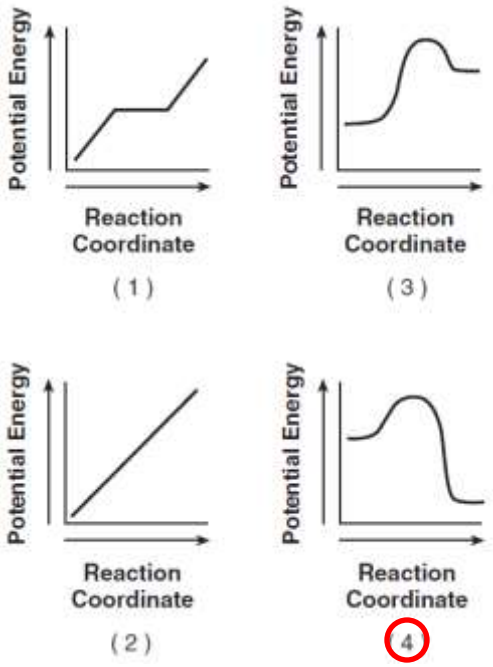
18 Consider the following equation:

$$A_{(s)} + B_{(aq)} \rightarrow C_{(aq)} + D_{(s)}$$

Which change would most likely increase the rate of this reaction?

(1) a decrease in pressure
(2) an increase in pressure
(3) a decrease in temperature
(4) an increase in temperature

19 Which potential energy diagram represents the reaction A + B → C + energy?



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