Diagram 1

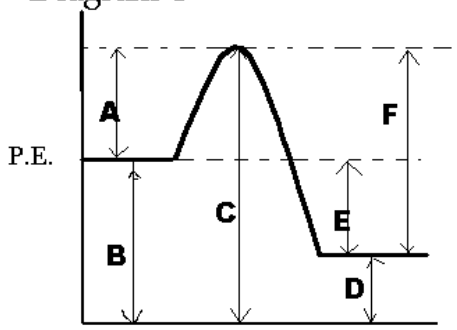
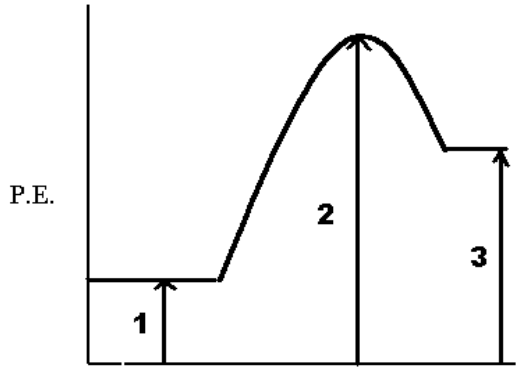


Diagram 2



Reaction	$\Delta\mathring{H}$ (kJ)
A. $2\ CO(g) + O_2(g) \rightarrow 2\ CO_2(g)$	–566.0
B. $N_2(g) + O_2(g) \rightarrow 2\ NO(g)$	182.7
C. $C_6H_{12}O_6(s) + 6\ O_2(g) \rightarrow 6\ CO_2(g) + 6\ H_2O(g)$	-2540
D. $C(s) + O_2(g) \rightarrow CO_2(g)$	-393.5
E. $2\ HI(g) \rightarrow H_2(g) + I_2(g)$	??

"Better Rate Than Never"

Name_____

Questions 1-7 are based on diagram 1.

_____1. Which represents the activation energy of an exothermic reaction?

_____2. Which arrow represents ΔH for the **reverse** reaction?

_____3. Which arrow represents ΔH for the reaction?

_____4. Which arrow represents the potential energy of the activated complex ?

_____5. A catalyst would change lines A) A and E B) B and D
C) C and F D) A and B

_____6. Which arrow represents the difference in potential energy between the product and the reactant? A) arrow E B) arrow B C) arrow F D) arrow D

_____7. Which of the reactions shown at the bottom of the accompanying page could **NOT** be represented by diagram 1 ? A) Reaction A
B) Reaction B C) Reaction C D) Reaction D

_____8. In diagram 2, ΔH for the reaction is represented by A) arrow 1
B) arrow 3 minus arrow 1 C) arrow 3 D) arrow 2.

_____9. In diagram 2 it is evident that the activation energy of the reverse reaction is A) greater than the activation energy of the forward reaction
B) equal to the activation energy of the forward reaction
C) less than the activation energy of the forward reaction.

_____10. In diagram 2, the potential energy of the reactant is
A) greater than the potential energy of the product, and the reaction is endothermic
B) less than the potential energy of the product, and the reaction is exothermic
C) less than the potential energy of the product, and the reaction is endothermic
D) greater than the potential energy of the product, and the reaction is exothermic

_____11. If the activation energy of the forward reaction in diagram two is 40.0 kJ /mol, and the activation energy of the reverse reaction is 25 kJ/mol, what is the value of ΔH for the reaction?,

_____(fill in) 12. What is $\Delta\mathring{H}$ for reaction "E" ? (refer to your reference table)

_____13. Based on table I on your reference table, write the formula of one substance that based on its heat of solution, ΔH, should become MORE soluble with an

increase in temperature.

Questions 14 - 20 are based on the five reactions at the bottom of the accompanying page.

_____14. Which of the reactions will produce LESS PRODUCT at equilibrium when the volume of the system is INCREASED ? A)A B)B C)C D)D

_____15. Which of the reactions will produce MORE PRODUCT at equilibrium when the temperature is increased? A)A B)B C) C D) D

_____16. In reaction B, as the pressure increases, the amount of NO at equilibrium
A) increases B) decreases C) remains the same

_____17. In reaction B, as the volume of the vessel increases, the RATE of the forward reaction A) increases B) decreases C) remains the same

_____18. In reaction A, if CO_2 is added to the equilibrium system, the amount of O_2 would A) increase B) decrease C) stay the same

_____19. In reaction A, to **maximize** the amount of CO_2 at equilibrium, the best set of conditions are A) high temperature and high pressure
B) high temperature and low pressure C) low temperature and high pressure
D) low temperature and low pressure.

_____20. Based on reaction A, which of the following equations is correct?

A. $2\ CO(g) + O_2(g) \rightarrow 2\ CO_2(g) + 566.0\ kJ$

B. $2\ CO(g) + O_2(g) + 566.0\ kJ \rightarrow 2\ CO_2(g)$

C. $2\ CO(g) + O_2(g) \rightarrow 2\ CO_2(g) - 566.0\ kJ$

D. $2\ CO(g) + O_2(g) \rightarrow 2\ CO_2(g) + 283.0\ kJ$

_____21. The *efficiency* or *effectiveness* of molecular collisions can best be increased by increasing the A) pressure B)temperature C) volume of the container
D) concentration

_____22. Catalysts increase the rate of a chemical reaction by
A) increasing collision frequency B) decreasing collision frequency
C) decreasing the activation energy D) increasing the activation energy.

Extended Response: You wish to produce hydrogen gas by reacting solid zinc with hydrochloric acid, HCl. You must make the following choices:

a. concentrated HCl or dilute HCl.
b. powdered zinc or zinc strips
c. warm HCl or cold HCl.

Which choices would you make in order to make the reaction as rapid as possible?

Briefly explain your choices on the basis of molecular collisions. (12 pts)

Name_____

E.C. How much heat is released when 10.00 grams of NaOH dissolves in excess water?

E.C. II. Compare reaction C on the accompanying page with the combustion of glucose shown on your reference table. Based on the two reactions, find the heat of vaporization of water in kJ/mol, which can be defined as $\Delta\mathring{H}$ for the change $H_2O(\ell) \rightarrow H_2O(g)$.

Super extra credit. (5 points added to test grade)

The heat of formation of CH_4 is defined as $\Delta\mathring{H}$ for the reaction $C(s) + 2\ H_2(g) \rightarrow CH_4(g)$

Use the information on table I to find the heat of formation of $CH_4(g)$.

(Hint: you will need to use **three** of the listed reactions!)