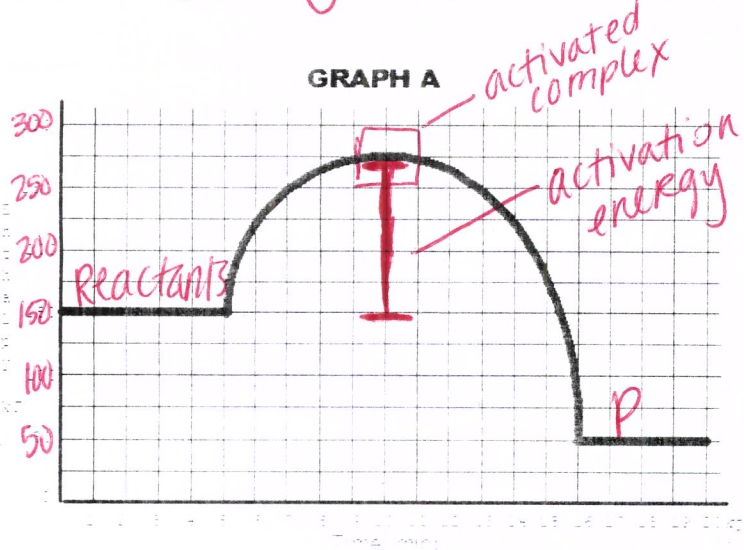
Name: Key
Period: _____ Date: _____

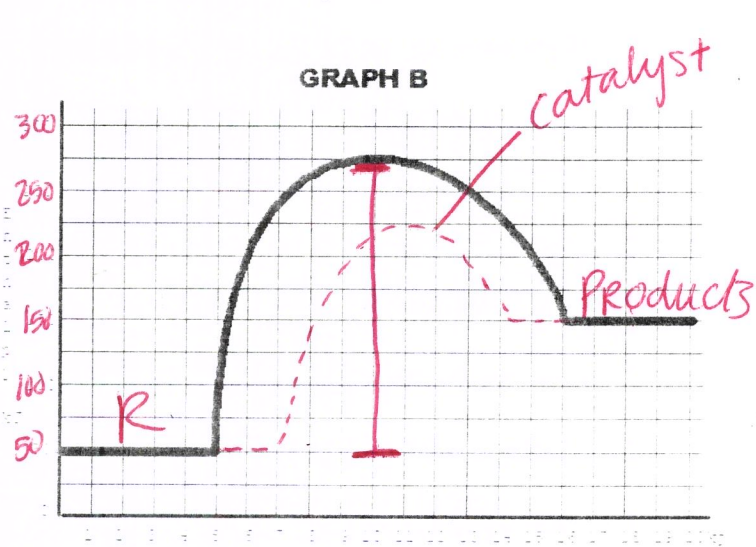
Unit 11A: Reactions and Energy Study Guide_K

1. The heat content of a substance is called its enthalpy and the symbol for this is H / ΔH
2. If the heat of reaction value is a negative number, it indicates the reaction is exothermic.
3. In an endothermic reaction, the enthalpy of the products is higher than the enthalpy of the reactants
4. In the reaction $2H_2 + O_2 \rightarrow 2H_2O \quad \Delta = -136.64$ kcal
   a. The reaction is exothermic (**exothermic, endothermic**)
   b. As this reaction proceeds, the temperature of the surroundings will (**increase, decrease**)
5. Energy which must be put into the reactants to get a reaction started is called activation energy.
6. Enthalpy is stored heat energy or (**potential, kinetic**) energy. - motion
7. ~~Where is enthalpy, heat energy, stored in a chemical substance?~~
8. Endothermic reactions have a (+ -) sign. ΔH

USE THE GRAPHS BELOW TO ANSWER THE NEXT 6 QUESTIONS.

9. Graph (**A , B**) represents an endothermic reaction.
10. What is the enthalpy of the reactants for graph A? 150
    What is the activation energy for graph A? 275-150 = 125
11. What is the enthalpy of the products for graph B? 150
    What is the activation energy for graph B? 225
12. In graph (**A, B**) temperature of the surrounding will increase as the reaction proceeds.
13. In graph (**A, B**) potential energy is decreasing.
14. In graph (**A, B**) the temperature of the system will increase as the reaction proceeds.





PROBLEMS: Calculate the ΔH for each of the following reactions. Show all of your work.

	$C_3H_{8(g)}$	$CO_{2(g)}$	$C_2H_{2(g)}$	$H_2O_{(l)}$	$C_6H_{12}O_{6(s)}$	$C_2H_{6(g)}$	$NO_{(g)}$	$N_2O_{3(g)}$	$H_2O_{(g)}$
kJ/mole	-104	-393.5	227	-285.8	-1,268	-84.7	90.4	84	-241.8

15. $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(l)}$ (**endothermic, exothermic**)

0 0

-285.8(2)

-571.6

$\Delta H = \Sigma H(\text{Products}) - \Sigma H(\text{Reactants})$

$= -571.6 - 0$

-571.6 kJ/mole

16. $2C_6H_{12}O_{6(s)} + 5O_{2(g)} \rightarrow 6H_2O_{(g)} + 2C_2H_{6(g)} + 8CO_{2(g)}$ (**endothermic, exothermic**)

-1,268(2) 0 -241.8(6) -84.7(2) -393.5(8)

$\Delta H = (-241.8(6) + -84.7(2) + -393.5(8)) - (-1268(2))$

$(-1450.8 + -169.4 + -3148) - (-2536)$

$-4768.2 - 2536 =$ **-2232.2 kJ/mole**

17. Find the standard enthalpy change ($\Delta H°$) for the reaction $2H_2(g) + 2C(s) + O_2(g) \rightarrow C_2H_5OH(l)$, using the following thermochemical data.

$C_2H_5OH(l) + 2O_2(g) \rightarrow 2CO_2(g) + 2H_2O(l)$ $\Delta H = +875.$ kJ

$2CO_2 + 2H_2O \rightarrow C_2H_5OH + 2O_2$

$2C(s) + 2O_2(g) \rightarrow 2CO_2(g)$ $\Delta H = -394.51$ kJ $\times 2 = -789.02$

$2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$ $\Delta H = -285.8$ kJ $\times 2 = -571.6$

$2C + 2H_2 + O_2 \rightarrow C_2H_5OH$

$875 + (-394.51 \times 2) + (-285.8 \times 2) = -485.62$ kJ

Write a rate law for the next two questions:

18. $2NaCl(s) + F_2(g) \rightarrow 2NaF(s) + Cl_2(g)$ Rate $= k[F_2]$

If the [ ] of chlorine is doubled, how does the rate of reaction change? it doesn't

19. $2Al(s) + 3Cl_2(g) \rightarrow 2AlCl_3$ Rate $= k[Cl_2]^3$

20. If quadrupling the [ ] of a reactant increases the rate by 16, the order (exponent) of the reactant is ____

Collision Theory describes what must happen in order for a reaction to take place; particles must collide in the proper orientation with enough energy.

21. If temperature is increased, which part(s) of the collision theory is(are) being affected? energy

22. If surface area is increased, which part(s) of the collision theory is(are) being affected? collision

23. If pressure on a gas is increased, which part(s) of the collision theory is(are) being affected? all

24. Reaction rate is shown by [ ] of reactants (**increasing, decreasing**) or [ ] of products (**increasing, decreasing**) over time.

25. A catalyst (**increases, decreases**) activation energy by increasing Rxn Rate.

26. An inhibitor (**speeds up, slows down**) a chemical reaction.

27. Glow sticks are (**endothermic, exothermic**) reactions because they (**release, absorb**) light energy.

28. Making a 10 karat gold ring, mixing silver and gold, is a (**physical, chemical**) change.

29. Burning methane (CH_4) is an (**endothermic, exothermic**) (**physical, chemical**) change.