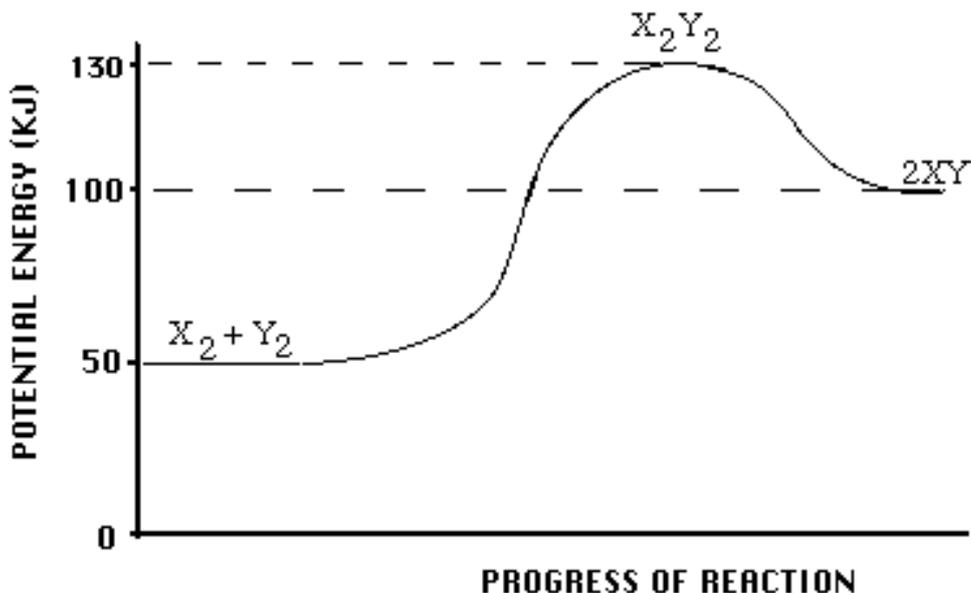


## Chemistry 12 Worksheet 1-2 - Potential Energy Diagrams

USE THE POTENTIAL ENERGY DIAGRAM TO ANSWER THE QUESTIONS BELOW:



1. Is the overall reaction as shown **exothermic** or **endothermic**? \_\_\_\_\_
2. What is the **activation energy** for the forward reaction? \_\_\_\_\_
3. What is the **activation energy** for the reverse reaction? \_\_\_\_\_
4. What is the **enthalpy change of reaction** (  $\Delta H$ ) for the *forward* reaction? \_\_\_\_\_
5. What is the  $\Delta H$  for the *reverse* reaction? \_\_\_\_\_
6. Is the *reverse* reaction **exothermic** or **endothermic**? \_\_\_\_\_
7. Which species forms the **activated complex**? \_\_\_\_\_
8. Which species or set of species has the **highest potential energy**? \_\_\_\_\_

9. Which species or set of species has the *highest kinetic energy*?

\_\_\_\_\_

10. Which species or set of species has the *weakest bonds*?

\_\_\_\_\_

11. Which species or set of species has the *strongest bonds*?

\_\_\_\_\_

12. What is **H** for the reaction:  $X_2Y_2 \rightarrow X_2 + Y_2$  ?

\_\_\_\_\_

13. Which do you think would be *faster*, the **forward** reaction or the **reverse** reaction?

\_\_\_\_\_ Explain. \_\_\_\_\_

\_\_\_\_\_

14. Which species or set of species has the *lowest kinetic energy*?

\_\_\_\_\_

15. Show the  $\Delta H$ , the Activation Energy for the *forward* reaction and the Activation Energy for the *reverse* reaction on the graph above.

16. As reactant particles approach each other before a collision, the **Potential** Energy goes \_\_\_\_\_, while the **Kinetic** Energy goes \_\_\_\_\_.

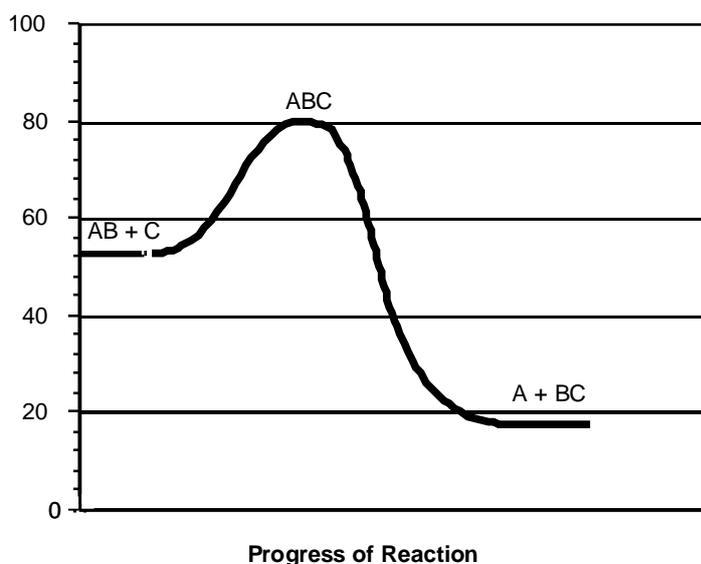
17. As particles of newly formed products move away from one another, the **Potential** Energy goes \_\_\_\_\_, while the **Kinetic** Energy goes \_\_\_\_\_

18. As *reactant* molecules approach each other, they exert \_\_\_\_\_ forces on each other. Thus, as they move together, their speed \_\_\_\_\_ and their *Potential Energy* \_\_\_\_\_

19. State the meaning of **Activated Complex**. \_\_\_\_\_

\_\_\_\_\_

20. Use the following **Potential Energy Diagram** to answer the questions below:



- a) Determine the **Activation Energy** for the *forward* reaction... \_\_\_\_\_ kJ
- b) Determine the **Activation Energy** for the *reverse* reaction.... \_\_\_\_\_ kJ
- c) What is the **Enthalpy Change** ( $\Delta H$ ) for the *forward* reaction?.. \_\_\_\_\_ kJ
- d) What is the **Enthalpy Change** ( $\Delta H$ ) for the *reverse* reaction?.. \_\_\_\_\_ kJ
- e) The *forward* reaction is \_\_\_\_\_ thermic.
- f) The *reverse* reaction is \_\_\_\_\_ thermic.
- g) Which species or set of species forms the **Activated Complex**? \_\_\_\_\_
- h) Which bond is *stronger*, A--B or B--C?\_\_\_\_\_. Give a reason for your answer. \_\_\_\_\_  
\_\_\_\_\_
- i) Particles from which species or set of species is moving the *fastest*? \_\_\_\_\_  
State how you arrived at your answer. \_\_\_\_\_  
\_\_\_\_\_

j) Particles from which species or set of species is moving *most slowly*? \_\_\_\_\_

State how you arrived at your answer. \_\_\_\_\_

\_\_\_\_\_

k) The compound "AB" is a gas and the element "C" is a solid. What effect would grinding "C" into a fine powder have on the graph shown here? \_\_\_\_\_

\_\_\_\_\_

21. State the meaning of **Activation Energy**. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

22. What two requirements must be met before a collision between two reactant particles is *effective*?

1. \_\_\_\_\_

2. \_\_\_\_\_

23. Describe what happens to two reactant particles which collide with *less* energy than the **Activation Energy**.

\_\_\_\_\_

\_\_\_\_\_

24. Burning coal (Carbon) is a highly *exothermic* reaction. However coal, in contact with air at room temperature has such a *slow* reaction that it is not noticeable. Explain these two facts with the help of a Potential Energy Diagram.

