

Practice Celebration for Kinetics & Equilibrium ANSWER KEY

Use the diagram at right for questions 1-8.

1. What is the correct unit for the Y axis of this graph?

kJ/mole

2. What is the ΔH ? $225 - 75 = 150$ **kJ**

3. What is the activation energy of this reaction?

$300 - 75 = 225$ **kJ**

4. What is the activation energy with a catalyst?

Less than 225 kJ but more than 150 kJ

5. What is the potential energy of the reactants? **75 kJ**

6. Is this an exothermic or endothermic reaction?

endothermic

7. What is the potential energy of the products? **225 kJ**

8. State a reason for your answer in #7 in a complete sentence starting with: This reaction is **endothermic** because...

the products have more potential energy than the reactants started with.

9. Define entropy. **The measure of disorder in a chemical system. In HS there are no units, we just compare and say things like higher or highest entropy, medium entropy, or lower or lowest entropy.**

10. Which has the MOST entropy? circle one $\text{HCl}_{(s)}$ $\text{HCl}_{(aq)}$ **$\text{HCl}_{(g)}$** $\text{H}_2\text{O}_{(l)}$ **(gas)**

11. Which as the LEAST entropy? circle one water vapor liquid water **ice** **(solid)**

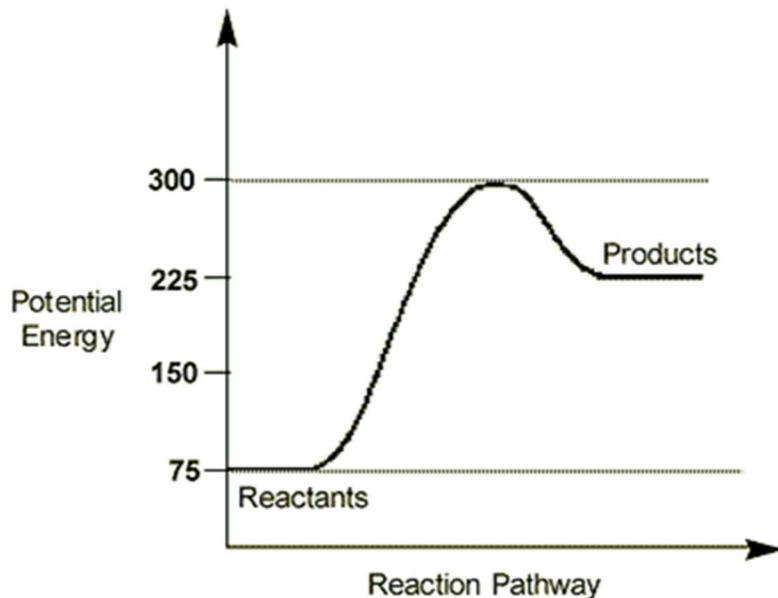
12. Put the three phases of matter in order of highest entropy to lowest entropy. **Gas > Liquid > Solid**

13. Skip **okay!**

In this reaction: $\text{HCl}_{(aq)} + \text{NaOH}_{(aq)} \rightleftharpoons \text{NaCl}_{(aq)} + \text{HOH}_{(l)} + \text{energy}$

14. Is the forward reaction endothermic? **It is exothermic, energy is a product.**

15. Is the reverse reaction endothermic? **Yes the reverse is endothermic, here, the energy is on the reactant "side".**



In this reaction: $2\text{Al}_{(s)} + 6\text{HCl}_{(aq)} \rightleftharpoons 2\text{AlCl}_{3(aq)} + 3\text{H}_{2(g)} + \text{energy}$

16. Does the forward reaction lead to more entropy or less entropy?

More, gases have more entropy, so the product (right) side has gas, the reactant side (left) doesn't. Entropy increases.

17. What is the ΔH of this reaction? Energy is a product, this is NOT on table I, so all we can say is that ΔH is negative.

18. As the pressure decreases on this equilibrium, does the amount of hydrogen increase or decrease?

Lower pressure favors the forward reaction so more hydrogen would form.

19. As the pressure increases, does the amount of hydrogen increase or decrease?

Higher pressure will favor the reverse reaction, so the amount of hydrogen would decrease.

20. As the temperature increases, does the amount of AlCl_3 increase or decrease?

The forward reaction is exothermic, more heat favors the reverse reaction. Less aluminum chloride would be present.

21. A reaction that you did in the lab time took 11.5 seconds exactly to complete. The reaction rate is:

A. 11.5 seconds B. $1/11.5$ seconds C. 11.5/1 seconds D. 11.5^{-2} seconds

22. As concentration of the reactants increases, the rate of reaction will

increase – this leads to more collisions and faster reactions.

23. Explain why the rate of reaction increases as the concentration of reactants increases.

Increased concentration means more collisions will occur, so faster reaction rate.

24. As the temperature decreases, the rate of reaction will decrease.

Because lower temperature = lower kinetic energy = less collisions will occur, making the rate of reaction decrease.