Practice Test for Kinetics - 2017

1. With endothermic reactions, energy is written with the (reactants or products)?
2. With exothermic reactions, energy is written with the (reactants or products)?
3. All endothermic reactions have a (positive or negative) $\Delta H$?
4. All exothermic reactions have a (positive or negative) $\Delta H$?
5. What sort of energy is stored in chemical bonds? (kinetic, potential, activation, etc.?)
6. State the Law of Conservation of Energy
7. What is heat of solution?
8. Draw a potential energy diagram for the combustion of propane, $C_3H_8$.
9. Draw the potential energy diagram for the solvation of ammonium nitrate.
10. Define entropy
11. Using the three phases of matter, order them from highest to lowest entropy
12. If you have some $CaCl_2$, some $C_6H_{12}O_6$, and some $GaBr_3$, all at room temperature and normal pressure. Which of these solids has the highest and lowest entropy?
13. Skip
14. Table I shows the heat of solution for $Na^{+1}{}_{(AQ)} + OH^{-1}{}_{(AQ)} \rightarrow NaOH_{(S)}$ to be –44.51 kJ/mole. What would the $\Delta H$ be?
15. Name four ways to increase the rate of reactions.
16. Explain how catalysts work (two reasons)
17. What does the collision theory say or mean?
18. When lithium bromide is dissolved into water this way, what is the heat of solution? $LiBr_{(S)} \rightarrow Li^{+1}{}_{(AQ)} + Br_2{}^{-1}{}_{(AQ)}$
19. State LeChatleier's Principle, and explain it.
20. Does the decomposition of aluminum oxide have a positive or negative $\Delta H$?
21. What is equal in a dynamic equilibrium?

Assume this reaction is in dynamic equilibrium, stresses are applied, which way does the shift occur, F or R? (use arrows)

$$C_3H_{8(G)} + 5O_{2(G)} \leftrightarrow 3CO_{2(G)} + 4H_2O_{(G)} + 2219.2\text{ kJ}$$

Add propane
Add carbon dioxide
Add heat

Remove water
Remove heat
Decrease pressure
Add water
Remove propane
Remove water

Remove oxygen
Increase pressure
Remove carbon dioxide

Add a catalyst
Add oxygen

Practice Test for Kinetics Answers

1. With endothermic reactions, energy is written with the reactants.

2. With exothermic reactions, energy is written with the products.

3. All endothermic reactions have a + $\Delta$H.

4. All exothermic reactions have a – $\Delta$H.

5. What sort of energy is stored in chemical bonds? Potential energy.

6. Energy cannot be created or destroyed in a chemical reaction but it can be transferred.

7. When Ionic Compounds dissolve into water, that makes a solution, (a mixture) it's not a chemical reaction. The $\Delta$H for these are called heat of solution rather than heat of reaction.

8. Draw a potential energy diagram for the combustion of propane, $C_3H_8$. (on back)

9. Draw the potential energy diagram for the solvation of ammonium nitrate. (on back)

10. Entropy is the measure of disorder in a chemical system.

11. Highest entropy to lowest entropy would be gases with most, liquids medium, and solids with lowest entropy.

12. Comparing $CaCl_2$, $C_6H_{12}O_6$, and $GaBr_3$ Least entropy has most bonding, $C_6H_{12}O_6$. Most entropy is the smallest particles, $CaCl_2$

13. Skip

14. The H for this reaction is –44.51 kJ/mole. For solutions the heat of solution is the heat of reaction.

15. To increase the rate of reactions are: increase temp, increase concentration of reactants, and increase the surface area of the reactants. You could also add a catalyst.

16. Catalysts work by lowering activation energy, or providing an alternate pathway forward for the reaction.

17. Reactions are caused by effective collisions of reactant particles, at the proper orientation. Anything that can increase the rate of these collisions increases the rate of reaction.

18. The heat of solution for this: $LiBr_{(S)} \rightarrow Li^{+1}_{(AQ)} + Br_2{}^{-1}_{(AQ)}$ is –48.83 kJ/mole

19. LeChatleier's Principle is: Chemical systems at dynamic equilibrium tend to stay at equilibrium. If a stress is applied to an equilibrium, the system shifts to accommodate this stress, and a new equilibrium forms.

20. The decomposition of aluminum oxide is the reverse of the reaction on table I, so here the $\Delta$H = +3351 kJ/mole

21. Dynamic equilibrium is when the rate of the forward reaction is equal to the rate of the reverse. It applies to chemical reactions and to solvation/precipitation of solutions as well.

$$C_3H_{8(G)} + 5O_{2(G)} \leftrightarrow 3CO_{2(G)} + 4H_2O_{(G)} + 2219.2\text{ kJ}$$

Add propane →
← Add carbon dioxide
← Add heat

Remove water →
Remove heat →
Decrease pressure →
← Add water
← Remove propane
Remove water →

← Remove oxygen
← Increase pressure
Remove carbon dioxide →

X Add a catalyst X
Add oxygen →