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## Accelerated Chemistry Chapter 10 Exam

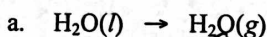
Answer questions in complete sentences using correct spelling and grammar. Show your work on all computations. State all results with the correct number of significant digits. Point values are shown in parentheses.

1. Distinguish between the terms enthalpy of reaction, enthalpy of combustion, and enthalpy of formation.

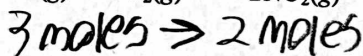
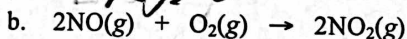
Enthalpy of reaction: the change in heat during a reaction  
 Enthalpy of combustion: the amount of heat expelled during an oxidation

Enthalpy of formation: the change in heat during molecule formation

2. For the following processes, state whether  $\Delta S$  is positive or negative and explain how you know:

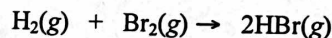


$\Delta S > 0$



$\Delta S < 0$

3. Consider the following reaction:



- a. If this reaction occurs in a single step, predict the rate law.

$$R = k[\text{H}_2][\text{Br}_2]$$

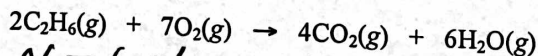
- b. Assume now that experiments show that the rate law is  $R = k[\text{H}_2][\text{Br}_2]^{1/2}$ . What does this rate law tell you about the reaction mechanism?

it is multistep

- c. From the experimentally determined rate law in part (b), determine what the effect on the reaction rate will be if the bromine gas concentration is increased by a factor of 4.

X 2

4. Determine  $\Delta S^\circ$  for the following reaction:



$$\Delta S = S_p - S_r$$

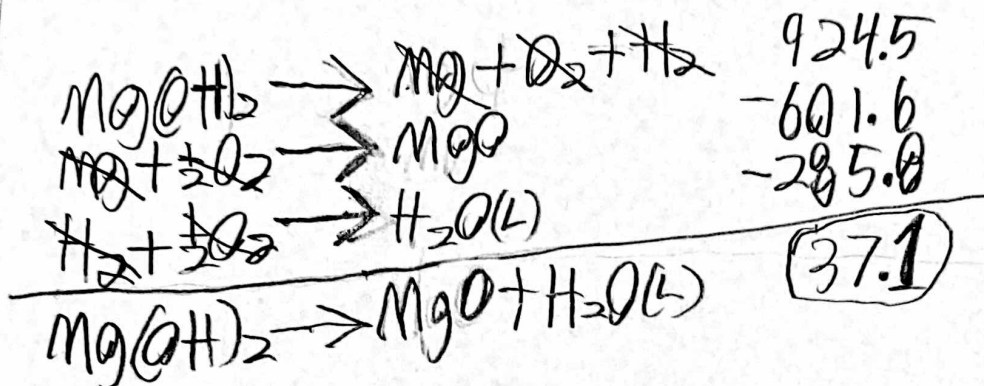
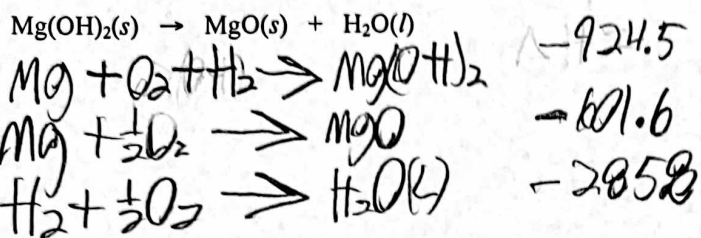
$$S_p = 4(213.8) + 6(188.8) = 1988$$

$$S_r = 2(229.2) + 7(205.2) = 1894.8$$

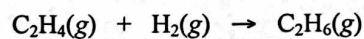
$$\Delta S = 1988 - 1894.8$$

$$\Delta S = 93.2$$

5. Using tables of thermochemical data, determine the enthalpy of reaction for the following reaction:



6. Using tables of thermochemical data, determine the change in the Gibbs free energy for the following reaction:



$$\Delta G = G_P + G_R$$

$$G_P = -32$$

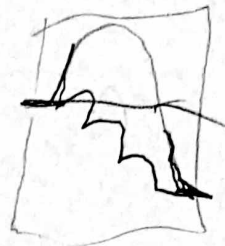
$$G_R = 68.4$$

$$\Delta G = -32 - 68.4$$

$$\boxed{\Delta G = -100.4}$$

7. Use the concept of the reaction energy pathway to describe, in general, how a catalyst is able to expedite a chemical reaction.

With a catalyst present it lowers the amount of energy needed for a reaction so the reaction can happen faster



8. Briefly describe the factors that influence reaction rates, according to collision theory.

Surface Area: amount of substance where collisions can happen  
Catalyst: if present reduces energy needed for reaction  
Temp: makes particles move faster and more likely to collide  
Amount of particles: makes prob of collision higher

9. The pH of a certain solution is 12.1. Determine pOH,  $[H_3O^+]$ , and  $[OH^-]$ .

$$\begin{aligned} \text{pH} &= 12.1 \\ \text{pOH} &= 1.9 \\ [H^+] &= 7.943 \times 10^{-13} \\ [OH^-] &= 0.012589 \end{aligned}$$