100+

Accelerated Chemistry Chapter 10 Exam First and Last Name Jacque D Maxfield

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 exoled during an exothermic reaction

Enthalpy of formation: the change in heat during molecule formation

2. For the following processes, state whether ΔS is positive or negative and explain how you know:

a. $H_2O(l) \rightarrow H_2O(g)$

(l) → (g)

ΔS > 0

b. $2NO(g) + O_2(g) \rightarrow 2NO_2(g)$

3 moles → 2 moles

ΔS < 0

3. Consider the following reaction:

$H_2(g) + Br_2(g) \rightarrow 2HBr(g)$

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

$R = K[H_2][Br_2]$

b. Assume now that experiments show that the rate law is $R = k[H_2][Br_2]^{1/2}$. 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.

X2

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

$2C_2H_6(g) + 7O_2(g) \rightarrow 4CO_2(g) + 6H_2O(g)$

$\Delta S = Sp - Sr$

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

$Sr = 2(229.2) + 7(205.2) = 1844.8$

$\Delta S = 1988 - 1844.8$

$\Delta S = 93.2$

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

$Mg(OH)_2(s) \rightarrow MgO(s) + H_2O(l)$

$Mg + O_2 + H_2 \rightarrow Mg(OH)_2$ −924.5

$Mg + \frac{1}{2}O_2 \rightarrow MgO$ −601.6

$H_2 + \frac{1}{2}O_2 \rightarrow H_2O(l)$ −285.8

$Mg(OH)_2 \rightarrow Mg + O_2 + H_2$ 924.5

$Mg + \frac{1}{2}O_2 \rightarrow MgO$ −601.6

$H_2 + \frac{1}{2}O_2 \rightarrow H_2O(l)$ −285.8

37.1

$Mg(OH)_2 \rightarrow MgO + H_2O(l)$

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

$C_2H_4(g) + H_2(g) \rightarrow C_2H_6(g)$

$\Delta G = G_p - G_r$

$G_p = -32$

$G_r = 68.4$

$\Delta G = -32 - 68.4$

$\Delta G = -100.4$

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 more faster and more likely to collide amount of particles; makes odds of collision higher

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

pH = 12.1
pOH = 1.9
$H^+ = 7.943 \times 10^{-13}$
$OH^- = .012589$