

CHEMISTRY 12 – UNIT II – EQUILIBRIUM

D: Dynamic Equilibrium (Introduction)

It is expected that students will be able to...

D1: Defining a reversible reaction

1. What does it mean for a reaction to be reversible?
Use the reaction: $2\text{H}_2 + \text{O}_2 \rightleftharpoons 2\text{H}_2\text{O}$ in your answer's explanation.
Make sure to use the reactants and products in your answer.
2. What is the reason that some reactions are spontaneous while other reactions are reversible?

D2 & D4: Defining Equilibrium

1. Comparing a reversible reaction and a reaction at equilibrium...
 - a. What is the similarity between the 2 reactions?
 - b. What is the difference between the 2 reactions?
2. An equilibrium system is said to be dynamic because at equilibrium the...
3. Define macroscopic properties and give three examples of macroscopic properties of a chemical reaction.

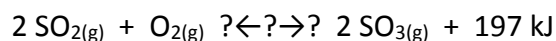
D3: Relate changes in rates of the forward and reverse reaction to changing concentrations of the reactants and products as equilibrium is established

4. For the following reversible reaction: $X \leftrightarrow Z + 10 \text{ kJ}$
relate the changes in [reactant] and [product] if only particle Z was added to a reaction vessel and the reaction was allowed to proceed to equilibrium.
- Sketch a [concentration] vs. reaction proceeding graph to help you explain your answer!
 - On the graph, show where equilibrium is reached.
 - Indicate on your graph when the forward and reverse rates are equal

D7 - D9: Enthalpy and entropy changes and predicting the spontaneity of a reaction

1. Define ENTROPY and explain if chemical reactions prefer minimum or maximum entropy. In terms of ENTHALPY, do reactions prefer minimum or maximum enthalpy?

2. Consider the following reaction:



Describe how the enthalpy and entropy change in the forward direction and state the result (will there be a reaction? If so, will it react completely or reach equilibrium?).

3. For the following reaction: $\text{CO}_{(g)} + 2 \text{H}_{2(g)} \rightleftharpoons \text{CH}_2\text{OH}_{(g)}$; $\Delta H = 45 \text{ kJ}$
It was found that when carbon monoxide and hydrogen gas are mixed at room temperature the reaction did not occur. Give an explanation of why this is possible.