Unit 3 - Combustion and Thermochemistry + Chemical Kinetics + Combustion Chemistry

Assignment-2

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

1) Entropy of combustion (or heat of reaction):

\[ H_{\text{Reactants}} - H_{\text{Products}} \]

\[ H_{\text{Reactants}} = H_{\text{Products}} \]

- 1 point

(Here, \( H_{\text{Reactants}} \) - Net reactant enthalpy, \( H_{\text{Products}} \) - Net product enthalpy)

- Assent is limiting value, but with opposite sign
- Both first and third option.

- No, the answer is incorrect.
- Score: 0

- Accepted Answers: Both first and third option.

2) Adiabatic flame temperature calculation at constant pressure and constant volume is:

\[ H_{\text{Reactants}} = H_{\text{Products}} \]

\[ H_{\text{Reactants}} = H_{\text{Products}} + R_g \cdot (N_{\text{Reactants}} - N_{\text{Products}}) \cdot T_{\text{initial}} \]

\[ T_{\text{Adiabatic}} = \frac{H_{\text{Reactants}}}{H_{\text{Products}}} \]

\[ T_{\text{Adiabatic}} = R_g \cdot (N_{\text{Reactants}} - N_{\text{Products}}) \cdot T_{\text{initial}} \]

\[ U_{\text{Reactants}} = U_{\text{Products}} + R_g \cdot (N_{\text{Reactants}} - N_{\text{Products}}) \cdot T_{\text{initial}} \]

\[ U_{\text{Reactants}} = U_{\text{Products}} + R_g \cdot (N_{\text{Reactants}} - N_{\text{Products}}) \cdot T_{\text{initial}} \]

- 1 point

(Here, \( H_{\text{Reactants}} \) - Net reactant enthalpy, \( H_{\text{Products}} \) - Net product enthalpy, \( R_g \) - Universal gas constant, \( N_{\text{Reactants}} \) - Total moles of reactants, \( N_{\text{Products}} \) - Total moles of product, \( T_{\text{initial}} \) - Initial reaction temperature, \( T_{\text{final}} \) - Final product temperature, \( V \) - Volume of the reacting system, \( P_{\text{final}} \) - Final Pressure of the system, \( P_{\text{reactants}} \) - Initial Pressure of the system, \( U_{\text{Reactants}} \) - Internal energy of the reactants, \( U_{\text{Products}} \) - Internal energy of the products, \( MW_{\text{Reactants}} \) - Molecular weight of the reactants, \( MW_{\text{Products}} \) - Molecular weight of the products)

- No, the answer is incorrect.
- Score: 0

- Accepted Answers: All of the above.

3) Adiabatic flame temperature for a constant pressure, methane-air combustion will:

- 1 point

- Assume constant for different ambient pressures for a thermally perfect gas.
- He also has a lean mixture with fuel-air equivalence ratio less than 1.
- Be different for thermally perfect gas and chemically perfect gas at same ambient pressure, initial temperature.

- No, the answer is incorrect.
- Score: 0

- Accepted Answers: All of the above.

4) Which of the statement is true regarding a second law of thermodynamics/gibbs function:

- 1 point

- Gibbs function describes for a spontaneous, isothermal, isolated change in a single mass system.
- Energy becomes minimum in equilibrium for fixed volume case.
- Equilibrium constant is a function of gibbs function.

- No, the answer is incorrect.
- Score: 0

- Accepted Answers: All of the above.

5) For a reaction to proceed,

- 1 point

- Process needs to be exothermic.
- Energy needs to increase.
- Equilibrium constant less than unity.
- All of the above.

- No, the answer is incorrect.
- Score: 0

- Accepted Answers: All of the above.

6) Detailed Reaction mechanism with intermediate reactions is necessary when:

- 1 point

- Reaction time is very less than flow time scale.
- Reaction time is the order of flow time scale.
- Reaction time is more than the order of flow time scale.
- Damkohler number is greater than 1.

- No, the answer is incorrect.
- Score: 0

- Accepted Answers: Reaction time is more than the order of flow time scale.

7) Which of the statement is false:

- 1 point

- Reaction rate increases with increase in collision of the reactant molecules.
- Reaction rate increases with increase in probability of reaction with each collision.
- Reaction rate increases with increase in activation energy.
- Atomic factor plays important role in determination of reaction rate.

- No, the answer is incorrect.
- Score: 0

- Accepted Answers: Reaction rate increases with increase in activation energy.

8) Which statement is false with regard to the reaction mechanism:

- 1 point

- In general, chain-propagating and chain-breaking reactions are fast.
- Higher initiation rate and lower termination rate, higher is the radical concentration.
- Chain branching reaction, one radical is formed and two radicals are formed.
- Chain initiation reaction is responsible for self-propagating flame.

- No, the answer is incorrect.
- Score: 0

- Accepted Answers: Chain initiation reaction is responsible for self-propagating flame.