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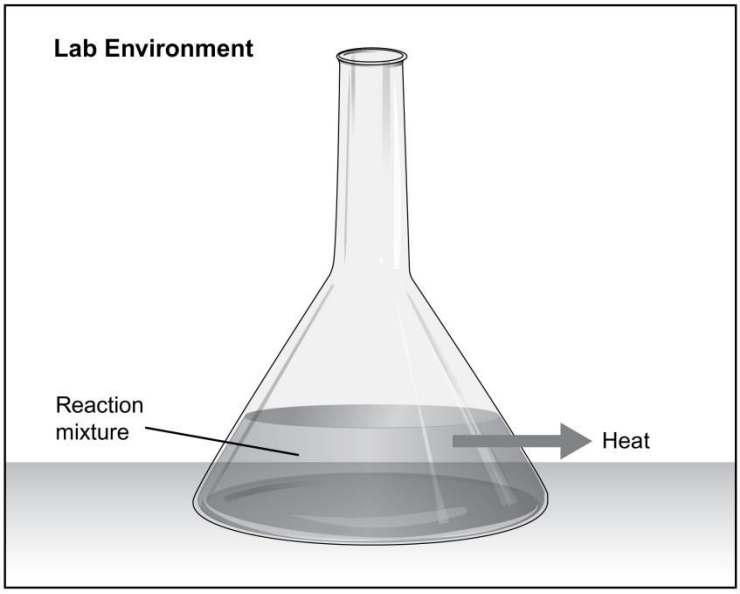
QUIZ

Energy in Chemical Bonds

1. The image shows the direction of heat flow for a reaction mixture in a laboratory environment.



What do the reaction mixture and the laboratory environment represent?

Based on the heat flow, compare the bond enthalpy of the products formed during the reaction and the bond enthalpy of the reactants present at the beginning of the reaction.

The reaction mixture represents the system and the laboratory environment represents the surroundings.
As heat is being released during the reaction, the bond enthalpy of the products formed during the reaction is greater than the bond enthalpy of the reactants present at the beginning of the reaction. Therefore, there is a net release of energy during the reaction.

2. The bond enthalpy of the N-N triple bond is 945 kJ/mol. Which statement about the N_2 molecule is correct?

A. 315 kJ of energy is released when 1 mole of N_2 is formed.

B. 945 kJ of energy is absorbed when 1 mole of N_2 is formed.

C. 1890 kJ of energy is released when 2 moles of N_2 are formed.

D. 1890 kJ of energy is absorbed when 2 moles of N_2 are formed.

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3. The decomposition reaction of ammonia is shown.

$2NH_3 \rightarrow N_2 + 3H_2$

If the bond enthalpy of the N-H bond is 389 kJ/mol, what is the enthalpy of the reactants for 2 moles of reactants during the decomposition reaction?

A. −2334 kJ

B. −778 kJ

C. +778 kJ

D. +2334 kJ

Read the following passage then answer the next two questions.

The chemical equation for the oxidation of ferrous oxide to ferric oxide is given.

$4FeO + O_2 \rightarrow 2Fe_2O_3$

This oxidation is an exothermic reaction with an enthalpy change of 560.66 kJ.

4. Which chemical equations can be used to represent the enthalpy change for the given reaction? Select all that apply.

A. $4FeO + O_2 + 560.66\ kJ \rightarrow 2Fe_2O_3$

B. $4FeO + O_2 \rightarrow 2Fe_2O_3 + 560.66\ kJ$

C. $4FeO + O_2 \rightarrow 2Fe2O_3$; $\Delta H = +560.66\ kJ$

D. $4FeO + O_2 \rightarrow 2Fe_2O_3$; $\Delta H = -560.66\ kJ$

5. The enthalpy change can be calculated based on the enthalpy for the reaction. Calculate the amount of heat released when 3.8 moles of Fe_2O_3 are formed during the reaction. Round the answer to two decimal places.

The amount of heat released when two moles of ferric oxide are formed is 560.66 kJ. The amount of heat released when 3.8 moles of ferric oxide is formed will be (560.66 kJ/2 mol) × 3.8 mol = 1065.25 kJ.