

Unit 10 - Week 8 : Energy Balances on Reactive Systems

Course outline

How does an NPTEL online course work?

Week 0 : Prerequisite

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Week 2: Process Variables and Rate

Week 3: Fundamentals of Material Balance

Week 4: Basic Principles of Compressible System

Week 5 : Basic principles of multiphase system

Week 6 : Energy and Its Forms

Week 7 : Energy Balances on Nonreactive Processes

Week 8 : Energy Balances on Reactive Systems

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Lecture 8.2: Energy balance with heat of reaction

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Feedback form

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Assignment 8

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

Due on 2020-03-25, 23:59 IST.

1) The equation for the standard heat of reaction is

1 point

- $\Delta H^{\circ} = \sum_{\text{product}} n_i \Delta H_f^{\circ} + \sum_{\text{reactants}} \Delta H_f^{\circ}$
 $\Delta H^{\circ} = \sum_{\text{product}} n_i \Delta H_f^{\circ} - \sum_{\text{reactants}} n_i \Delta H_f^{\circ}$
 $\Delta H^{\circ} = \sum n_i - \sum_{\text{product}} n_i$
 $\Delta H^{\circ} = \sum_{\text{reactants}} n_i \Delta H_f^{\circ} + \sum_i n_i$

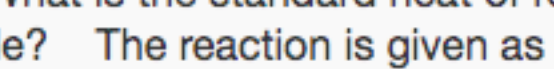
No, the answer is incorrect.
Score: 0

Accepted Answers:

$$\Delta H^{\circ} = \sum_{\text{product}} n_i \Delta H_f^{\circ} - \sum_{\text{reactants}} n_i \Delta H_f^{\circ}$$

2) What is the standard heat of reaction ΔH° for nitrogen monoxide gas if it is reacting with oxygen to form nitrogen dioxide? The reaction is given as

1 point



Given: ΔH_f° for NO (g) = 90.4 kJ/mol; ΔH_f° for O₂ (g) = 0; ΔH_f° for NO₂ (g) = 33.85 kJ/mol

- 113 kJ
 -113 kJ
 115 kJ
 -115 kJ

No, the answer is incorrect.
Score: 0

Accepted Answers:

-113 kJ

3) The standard heat of reaction ΔH° for the reaction A with B to form C is (Stoichiometric coefficients are 1)

1 point

- $\Delta H^{\circ} = C - A - B$
 $\Delta H^{\circ} = C + A - B$
 $\Delta H^{\circ} = C - A + B$
 $\Delta H^{\circ} = C + A + B$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$\Delta H^{\circ} = C - A - B$

4) For endothermic reaction, what is the standard heat of reaction

1 point

- negative
 positive
 zero
 both a and b

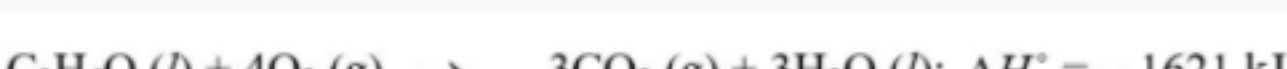
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Accepted Answers:

positive

5) What is the standard heat of formation of acetone by the complete combustion of 1 mole of acetone, which releases 1345 kJ of heat? The following reaction is given as follow:

1 point



Given:

Compound	Standard heat of formation
O ₂ (g)	0
CO ₂ (g)	-285.4
H ₂ O (l)	-135.62

All the above values has a unit of kJ/mole.

- 256.45 kJ/mol
 452.63 kJ/mol
 -356.94 kJ/mol
 563.98 kJ/mol

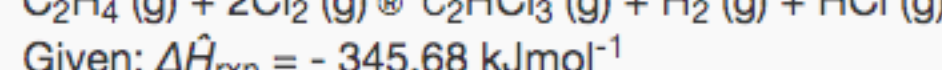
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Accepted Answers:

-356.94 kJ/mol

6) What is the change in the internal energy of the reaction as given as follows at the standard condition (25 °C, 1 atm)?

1 point



Given: $\Delta \hat{H}_{\text{rxn}} = -345.68 \text{ kJmol}^{-1}$

- 420.85 kJmol⁻¹
 -343.20 kJmol⁻¹
 -543.20 kJmol⁻¹
 -243.20 kJmol⁻¹

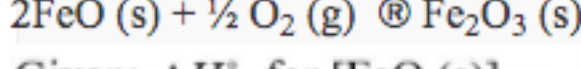
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Score: 0

Accepted Answers:

-343.20 kJmol⁻¹

7) Select the expression which gives the enthalpy change (kJ mol⁻¹) for heat of reaction for the following reaction

1 point



Given: ΔH_f° for [FeO (s)] = -270 kJ mol⁻¹; ΔH_f° for [Fe₂O₃ (s)] = -820 kJ mol⁻¹

- (-820 × 1/2) + 270 = -140
 (-820 × 1/2) - 270 = +150
 -820 + (270 × 2) = -280
 -820 - (270 × 2) = +280

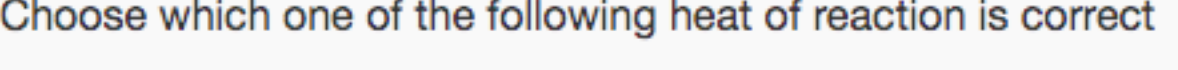
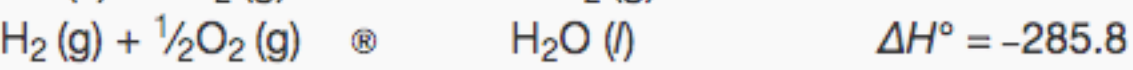
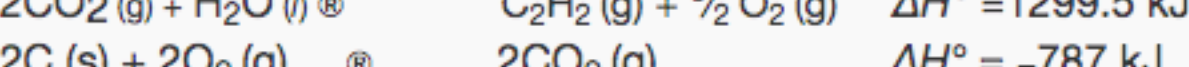
No, the answer is incorrect.
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Accepted Answers:

-820 + (270 × 2) = -280

8) Given the following thermochemical equations:

1 point



Choose which one of the following heat of reaction is correct

- $2\text{C}(\text{s}) + \text{H}_2(\text{g}) \rightleftharpoons \text{C}_2\text{H}_2(\text{g}) \quad \Delta H^{\circ} = +352.4 \text{ kJ}$
 $\text{C}(\text{s}) + \text{H}_2(\text{g}) \rightleftharpoons \text{C}_2\text{H}_2(\text{g}) \quad \Delta H^{\circ} = -352.4 \text{ kJ}$
 $2\text{C}(\text{s}) + \text{H}_2(\text{g}) \rightleftharpoons \text{C}_2\text{H}_2(\text{g}) \quad \Delta H^{\circ} = +226.7 \text{ kJ}$
 $\text{C}(\text{s}) + \text{H}_2(\text{g}) \rightleftharpoons \text{C}_2\text{H}_2(\text{g}) \quad \Delta H^{\circ} = -226.7 \text{ kJ}$

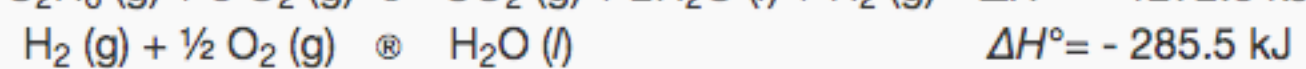
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Accepted Answers:

$2\text{C}(\text{s}) + \text{H}_2(\text{g}) \rightleftharpoons \text{C}_2\text{H}_2(\text{g}) \quad \Delta H^{\circ} = +226.7 \text{ kJ}$

9) Answer the correct option from the following reactions

1 point



- $\text{C}_2\text{H}_6(\text{g}) + 3\text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l}) \quad \Delta H^{\circ} = +1458.3 \text{ kJ}$
 $\text{C}_2\text{H}_6(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}) \quad \Delta H^{\circ} = -1558.3 \text{ kJ}$
 $2\text{C}_2\text{H}_6(\text{g}) + 3\text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}) \quad \Delta H^{\circ} = -1558.3 \text{ kJ}$
 $\text{C}_2\text{H}_6(\text{g}) + 3.5\text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + 3\text{H}_2\text{O}(\text{l}) \quad \Delta H^{\circ} = -1558.3 \text{ kJ}$

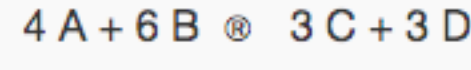
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Score: 0

Accepted Answers:

$\text{C}_2\text{H}_6(\text{g}) + 3.5\text{O}_2(\text{g}) \rightleftharpoons \text{CO}_2(\text{g}) + 3\text{H}_2\text{O}(\text{l}) \quad \Delta H^{\circ} = -1558.3 \text{ kJ}$

10) The heat of formation of A, B, C and D are 4 kJ, 6 kJ, 8 kJ, and 12 kJ respectively. What is the heat of reaction for

1 point



- 6 kJ
 4 kJ
 8 kJ
 9 kJ

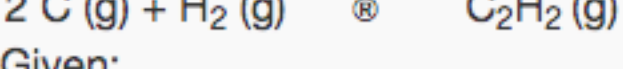
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Accepted Answers:

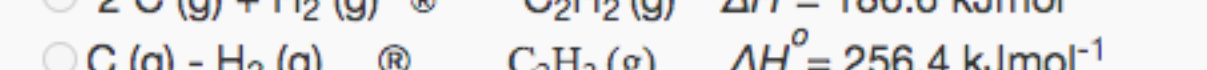
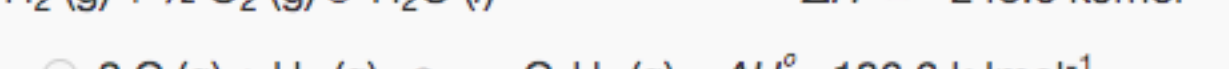
8 kJ

11) Calculate the enthalpy for C₂H₂ from the given reaction

1 point



Given:



- $2\text{C}(\text{g}) + \text{H}_2(\text{g}) \rightleftharpoons \text{C}_2\text{H}_2(\text{g}) \quad \Delta H^{\circ} = 186.6 \text{ kJmol}^{-1}$
 $\text{C}(\text{g}) - \text{H}_2(\text{g}) \rightleftharpoons \text{C}_2\text{H}_2(\text{g}) \quad \Delta H^{\circ} = 256.4 \text{ kJmol}^{-1}$
 $2\text{C}(\text{g}) + \text{H}_2(\text{g}) \rightleftharpoons \text{C}_2\text{H}_2(\text{g}) \quad \Delta H^{\circ} = 365.2 \text{ kJmol}^{-1}$
 $2\text{C}(\text{g}) + \text{H}_2(\text{g}) \rightleftharpoons \text{C}_2\text{H}_2(\text{g}) \quad \Delta H^{\circ} = 143.6 \text{ kJmol}^{-1}$

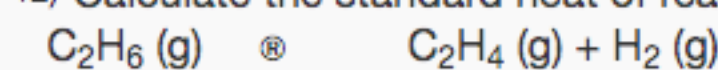
No, the answer is incorrect.
Score: 0

Accepted Answers:

$2\text{C}(\text{g}) + \text{H}_2(\text{g}) \rightleftharpoons \text{C}_2\text{H}_2(\text{g}) \quad \Delta H^{\circ} = 143.6 \text{ kJmol}^{-1}$

12) Calculate the standard heat of reaction of combustion as follows

1 point



Given: Standard heat of combustion for C₂H₆, C₂H₄, and H₂ are -1559.9 kJmol⁻¹, -1410.99 kJmol⁻¹, and -285.84 kJmol⁻¹, respectively.

- 136.93 kJmol⁻¹
 -146.58 kJmol⁻¹
 -231.56 kJmol⁻¹
 -152.26 kJmol⁻¹

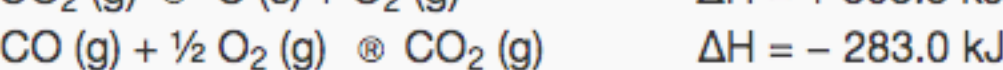
No, the answer is incorrect.
Score: 0

Accepted Answers:

-136.93 kJmol⁻¹

13) What is the standard enthalpy of formation for CO₂, as per given in the following equations:

0 points



- +110.5 kJ mol⁻¹
 -110.5 kJ mol⁻¹
 -110.5 kJ
 +110.5 kJ

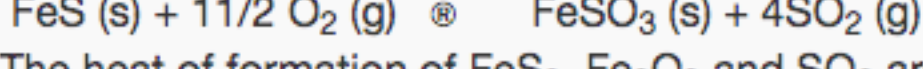
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Accepted Answers:

-110.5 kJ

14) What is the standard heat of reaction for the following reaction

1 point



The heat of formation of FeS₂, Fe₂O₃ and SO₂ are

-42.52 kcalmol⁻¹, -196.50 kcal mol⁻¹ and -70.96 kcal mol⁻¹ respectively.

- 459.6 kcal mol⁻¹
 +395.3 kcal mol⁻¹
 +459.6 kcal mol⁻¹
 -395.3 kcal mol⁻¹

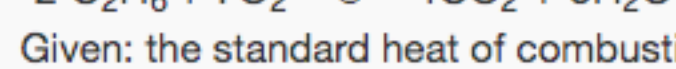
No, the answer is incorrect.
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Accepted Answers:

-395.3 kcal mol⁻¹

15) From the standard heat of formation, what is the heat of combustion per mole of gaseous water formed during the complete combustion of ethane gas? The reaction is given as follows

1 point



Given: the standard heat of combustion C₂H₆ (g) = -84.68 kJmol⁻¹;

O₂ (g) = 0; CO₂ = -393.5 kJmol⁻¹; H₂O = -241.5 kJmol⁻¹

- 2853.64 kJmol⁻¹
 -3454.62 kJmol⁻¹
 -14164.8 kJmol⁻¹
 -44121.8 kJmol⁻¹

No, the answer is incorrect.
Score: 0

Accepted Answers:

-2853.64 kJmol⁻¹