

UNIT III - THERMOCHEMISTRY

1. Calculate the H-F bond energy given the following data.



$$\Delta H_{\text{rxn}} = -544 \text{ kJ}$$

- A. 1130 kJ/mol B. 565 kJ/mol **C. 283 J/mol** D. 300 kJ/mol E. 134 kJ/mol
2. 1.0 g of the rocket fuel hydrazine (N_2H_4) is burned in a bomb calorimeter. The temperature of the bomb calorimeter changes from 24.63 °C to 28.16 °C. The heat capacity of the bomb calorimeter is 837 J/K. Calculate the heat of combustion per mol of hydrazine in the bomb calorimeter.

- A. 95.0 kJ/mol** B. 2.96 kJ/mol C. 3.55×10^3
D. 92.4 J/mol E. 1.13×10^5 kJ/mol

3. Calculate the enthalpy change for the following reaction of nitric oxide NO with ozone
- O_3
- .



Given the following data:



- A. -1083.7 kJ B. -693.8 kJ C. -198.8 kJ **D. -93.7 kJ** E. -93.7 kJ
4. An endothermic reaction does no work on the surroundings. What values do you predict for the heat and energy change of this reaction?

- A. $q < 0$, $\Delta E > 0$ **B. $q < 0$, $\Delta E < 0$** C. $q > 0$, $\Delta E > 0$
D. $q > 0$, $\Delta E < 0$ E. $q > 0$, $\Delta E = 0$

5. M&M candies contain 209.0 Calories per 1.5 oz serving. The fat content accounts for 38.3% of these Calories. What is the energy of the fat content in kJ?

- A. 19.1 kJ B. 874 kJ **C. 1.91×10^{-2} kJ**
D. 3.35×10^5 kJ E. 335 kJ

6. Calculate the heat released when 2.00 g of butane from a cigarette lighter is burned.



- A. -90.7 kJ **B. -98.3 kJ** C. -49.2 kJ D. -108.4 kJ E. -196.6 kJ
7. When Karl Kaverman adds chilled grog to a granite mug, 10.9 kJ of energy is transferred from the mug to the grog. If the mug has a mass of 625 g and an initial temperature of 25 °C, what is the final temperature of the mug? The specific heat of granite is 0.79 J/g·K.

- A. 2.9 °C B. 14 °C **C. 22 °C** D. 25 °C E. 47 °C

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