

Multiple Choice

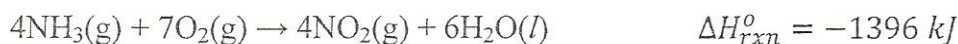
- 1) The temperature of a piece of silver metal is increased from 22.20°C to 84.30°C by absorbing 365 J of heat. Knowing that the specific heat of silver is 0.235 J/g °C. The mass (in g) of this piece of silver is:

A) 23 B) 25 C) 27 D) 29

- 2) Inside a bomb calorimeter with a total heat capacity of 11.30 kJ/°C. 1.50 g sample of methane gas "CH₄" was burned with excess oxygen. The temperature increased inside the calorimeter by 7.3°C. The molar heat of combustion " ΔH_c " (in kJ/mol) of methane gas is:

A) -882.2 B) -775.6 C) -742.5 D) -695.4

- 3) Ammonia burns in oxygen according to:



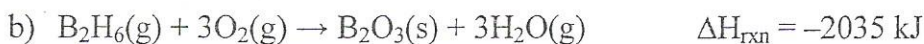
given $\Delta H_f^\circ(\text{NH}_3)_\text{g} = -46 \text{ kJ/mol}$

and $\Delta H_f^\circ(\text{H}_2\text{O})_\text{l} = -286 \text{ kJ/mol}$

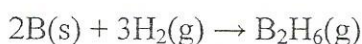
the heat of formation of NO₂(g) $\Delta H_f^\circ(\text{NO}_2)_\text{g}$ (in kJ/mol) is:

A) +48 B) -48 C) +34 D) -29

- 4) Given the following thermochemical equations:



Calculate ΔH_{rxn} (in kJ) for:

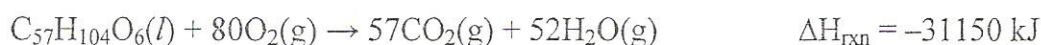


A) -76 B) -54 C) +54 D) +36

- 5) A balloon is inflated to its full extent by heating the air inside it. In the final stages of this process, the volume of the balloon changes from $3.5 \times 10^6 \text{ L}$ to $4.5 \times 10^6 \text{ L}$ by the addition of $1.1 \times 10^5 \text{ kJ}$ of heat energy. Assuming the balloon expands against a constant pressure of 1.0 atm. Calculate the change in the internal energy ΔE " ΔU " (in kJ) for this process:

A) 6775 B) 8675 C) -4884 D) 4884

- 6) Olive oil is completely burned in oxygen at 100.3°C according to:



Calculate the change in the internal energy ΔE " ΔU " (in kJ) for this combustion process.

A) -31025 B) -31060 C) -31078 D) -31240

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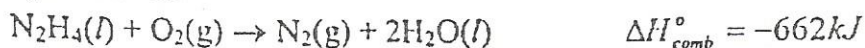
- 7 A piece of 155.0 g aluminum metal at 120°C was placed in a constant pressure calorimeter of negligible heat capacity containing 300.0 g of water at 20°C. Calculate the final temperature of the system (the aluminum metal and the water) in °C; given the specific heat of aluminum metal = 0.90 J/g °C, and that of water = 4.184 J/g °C.

A) 24 B) 26 C) 28 D) 30

- 8 A 2.2 g sample of quinone $C_6H_4O_2$ was burned in a bomb calorimeter for which the total heat capacity is 7850 J/°C. The temperature of the calorimeter increased from 23.44°C to 30.57°C. What is the molar heat of combustion of quinone (in kJ/mole)?

A) -2750 B) -2760 C) -2785 D) -2790

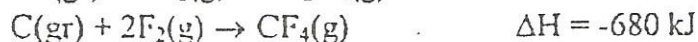
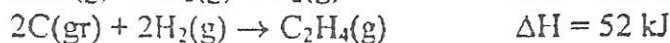
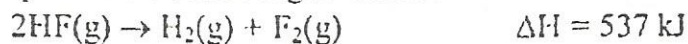
- 9 Hydrazine, $N_2H_4(l)$ is used as a rocket fuel. The thermochemical equation for the combustion of hydrazine is:



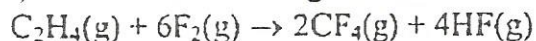
How many grams of hydrazine are required to obtain 20654 kJ of heat energy?

A) 800 B) 900 C) 1000 D) 1100

- 10 From the enthalpies of the following reactions:

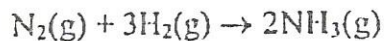


Calculate (in kJ) ΔH for the following reaction:



A) +2174 B) -2174 C) -2298 D) -2486

- 11 Given $\Delta H_f^\circ(NH_3(g)) = -46 \text{ kJ/mol}$. Calculate (in kJ) the change in internal energy, ΔE° , for the following reaction:



A) -51 B) -41 C) -87 D) -97