

Quiz #6

Chemistry, 7th ed., Zumdahl & Zumdahl, sections 6.1, 6.2 & 6.4

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revised 06/02/2009

Unless otherwise specified, each question is worth ⁵ 4 points. oops!

Note that there is a Periodic Table of the Elements and some other possibly helpful information on the last page of this quiz.

- During an explosive reaction, a system "loses" 550 kJ of heat and does 280 kJ of expansion work on the surroundings. Calculate the change in internal energy of this system. *HINT: $\Delta E = w + q$*

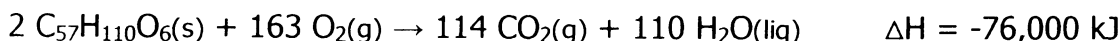
$$\Delta E = w + q$$

$$= -280 - 550 \text{ kJ} = \boxed{-830 \text{ kJ}}$$

NO UNITS = -1 pt

EACH INCORRECT SIGN = -1 pt

- How much heat is evolved when 12g of fat from a Krispy Kreme original glazed donut is metabolized (or combusted) per the following reaction? ($C_{57}H_{110}O_6$, or Tristearin, is a typical fat found in donuts; its molar mass is 891.5 g/mol.) *HINT: think about the ratio of kJ to moles of Tristearin*



$$12 \text{ g} \times \frac{1 \text{ mol } C_{57} \dots}{891.5 \text{ g}} = 0.01346 \text{ mol} \quad (1 \text{ POINT})$$

$$0.01346 \text{ mol} \times \left(\frac{-76,000 \text{ kJ}}{2 \text{ mol}} \right) = 511 \text{ kJ} \quad (2 \text{ POINTS})$$

MISSING UNITS = -1

"EVOLVED" IMPLIES - Q

(+ IS OKAY)

510 kJ

WRONG SIGN FIBS -1

Unless otherwise specified, each question is worth 5 points.

3. A Krispy Kreme original donut contains a total of 840 J (200 Calories) of energy. If this energy was transferred to 15.0 g of water originally at 25.5°C, what would the final temperature be? Note that the Specific Heat Capacity of water is 4.184 [J/g·°C].
*HINTS: heat = specific heat capacity X mass X change in temperature;
change in temperature = final temperature - initial temperature*

$$Q = SHC \times m \times \Delta T$$
$$840 \text{ J} = 4.184 \frac{\text{J}}{\text{g} \cdot ^\circ\text{C}} \times 15.0 \text{ g} \times \Delta T$$
$$\Delta T = 13.384^\circ\text{C} \quad (2 \text{ sig figs})$$

↳ 13°C

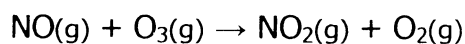
$$\Delta T = T_f - T_i$$
$$13^\circ\text{C} = T_f - 25.5$$

$$T_f = 39^\circ\text{C}$$

Unless otherwise specified, each question is worth ⁵ 4 points.

4. Use the standard heats of formation (see below) to calculate the standard change in enthalpy (ΔH_f°) for the following reaction:

HINT: $\Delta H_{\text{reaction}} = H_{\text{products}} - H_{\text{reactants}}$



Standard Heats of Formation, ΔH_f° [kJ/mol]

NO(g).....	89
O ₃ (g).....	143
O ₂ (g).....	0
NO ₂ (g).....	34

$$\Delta H_{\text{REACTION}} = (34 + 0) - (\del{89} + 143)$$

$$= 34 - 232$$

"REVERSED"
= -2

$$\Delta H_{\text{rxn}} = \boxed{-198 \text{ kJ}}$$

MISSING
UNITS = -1