Chem!stry

Chemical Energetics

- Use the average bond energies given below to calculate the overall enthalpy change when 1 mole of each organic compound, **a** to **e**, is completely burned in oxygen to produce carbon dioxide and water as the reaction products.

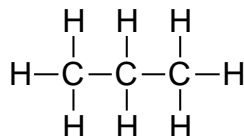$$C-C = 348 \text{ kJ/mol} \qquad C=C = 612 \text{ kJ/mol} \qquad C-O = 360 \text{ kJ/mol}$$

$$C=O = 743 \text{ kJ/mol} \qquad C-H = 412 \text{ kJ/mol} \qquad O-H = 463 \text{ kJ/mol} \qquad O=O = 496 \text{ kJ/mol}$$

a) Calculate the enthalpy change of combustion for propane, C_3H_8.

$$
\begin{array}{ccc}
\text{H} & \text{H} & \text{H} \\
| & | & | \\
\text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\
| & | & | \\
\text{H} & \text{H} & \text{H}
\end{array}
$$

Balanced chemical equation: …………………………………………………………………………………….

- Calculation:

b) Calculate the enthalpy change of combustion for cyclohexane, C_6H_{12}.
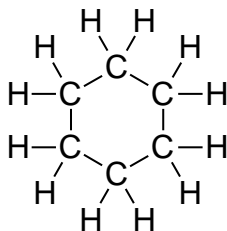
Balanced chemical equation: ……………………………………………………………………………….
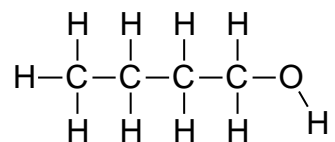
• Calculation:

c) Calculate the enthalpy change of combustion for but-2-ene, C_4H_8.
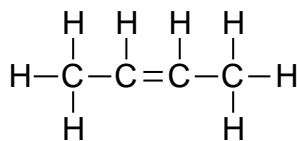
Balanced chemical equation: ……………………………………………………………………………….

• Calculation:

d) Calculate the enthalpy change of combustion for butan-1-ol, C_4H_9OH.

$$\begin{array}{cccc}
H & H & H & H \\
| & | & | & | \\
H-C-C-C-C-O \\
| & | & | & | \quad \backslash \\
H & H & H & H \quad H
\end{array}$$

Balanced chemical equation: ....

Calculation:

e) Calculate the enthalpy change of combustion for ethanoic acid, CH_3COOH.

$$\begin{array}{cc}
H & O \\
| & \parallel \\
H-C-C \\
| & \quad \backslash \\
H & O-H
\end{array}$$
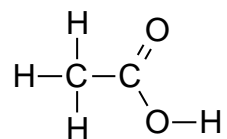
Balanced chemical equation: ....

Calculation:

• Scan the QR Code below for the answers to this assignment.

http://www.chemist.sg/energy_changes/enthalpy_change_combustion_ans.pdf