Heat Produced by Burning Hydrocarbons
Two Butane Lighters

http://staff.fcps.net/JSWANGO/unit5/gases/Determining%20the%20Molar%20Mass%20of%20Butane.pdf

Employ the aluminum can calorimeter to compare the heat generated by an ordinary butane lighter with that produced by a small butane "torch". Describe the variables that were controlled, and address limitations whose variables are difficult to control. Record your data, observations, and conclusions below

The chemistry of burning hydrocarbons involves most of the same limitations involved in burning a cheese puff. Heat lost to the surroundings, incomplete combustion, and non-uniform heating are all possible limiting factors.

Assuming 100% combustion of pure butane, the following balanced chemical equation provides both chemical data and enthalpy data. Recall that "enthalpy" is fairly complex, but the value can be used as a decent approximation of "heat" released. The values are expressed in "kJ per mole" of butane, where a "mole" is defined as 22.4 liters of gas at standard temperature (0 degrees C) and pressure (1013.25 mbars or 29.92 inches of Hg).

Combustion of Butane

$$2C_4H_{10}(g) + 13O_2 \rightarrow 8CO_2 + 10H_2O$$

Enthalpy = 2877 kJ/mol

Other hydrocarbon gases are also frequently used for heating, including "natural gas" (a mixture containing primarily "methane") and "LP" (liquefied propane). Chemical equations and energy values are provided here as well:

Combustion of Methane

$$CH_4(g) + 2O_2 \rightarrow CO_2 + 2H_2O$$

Enthalpy = 889 kJ/mol

Combustion of Propane

$$C_3H_8(g) + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

Enthalpy = 2220 kJ/mol

Fuel cells produce energy from the "burning" of hydrogen gas. The equation for this reaction along with energy details are provided for comparison with hydrocarbon combustions. Advantages of using fuel cells for energy includes the obvious absence of carbon dioxide (CO_2) as a product:

Combustion of Hydrogen

$$2H_2(g) + O_2 \rightarrow 2H_2O$$

Enthalpy = 286 kJ/mol

Here is the table of values I used above… other fuels are listed also, including liquid fuels (such as ethanol and gasoline) and solids (such as paraffin and coal)

http://en.wikipedia.org/wiki/Heat_of_combustion