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Chemistry Home Work
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1. Prepare a table identifying several energy transitions thake place during the typical operation of a automobile

Operation	Transformation of energy
Igortion	Chemical to heat
Stroke	Heat to mechanical
Exhaust	Mechanical to chemical
Accelerate	Mechanical to kinetic
Horn blowing	Electrical to sound
Turning on lights	Electrical to luminance
Braking	Kinatic to heat (Due rubbing of brakepads)
Alternator Working	Mechanic to chemical (charges battery)
Using Ac	Mechanical to thermal
Using audio Player	Electrical To sound
Using any Switch	Kinatic to electrical
Speedometer working analog	Electrical to mechanical

8. Which is the least expensive source of energy in kilojoules per dollar: a box of breakfast cereal that weighs 32 ounces and costs $4.23, or a liter of isooctane (density, 0.6919 g/mL) that costs $0.45? Compare the nutritional value of the cereal with the heat produced by combustion of the isooctane under standard conditions. A 1.0-ounce serving of the cereal provides 130 Calories.

A nutritional Calorie is the energy unit which is used to measure the amount of energy derived from the metabolism of foods

Mass is calculated as the product of density and volume. Mathematically, it is calculated as:

$$m = p \times V$$

Here, p is the density, m is the mass and V is the volume.

1-ounce cereals gives 130 Calories. Therefore, Calculate the nutritional value 32-Ounces of cereal (n_c) as follows:

$$n_c = 32 \times 130 \text{ Calories}$$
$$= 4160 \text{ Calories}$$

Convert the calories to KJ by the conversion factor as follows:

$$1 \text{ Cal} = 4.184 \times 10^{-3} \text{ KJ}$$

Therefore,

$$4160 \text{ Cal} = 4160 \text{ Cal} \times \frac{4.184 \times 10^{-3} \text{ KJ}}{1 \text{ Cal}}$$

= 17.405 KJ

Therefore, the nutritional value of 32-ounces cereal is 17.405 KJ. Cost of 32-ounces cereal is $4.23

Calculate the nutritional value 32-ounces of cereal is $4.23.

Calculate the cost of heat of cereals (C_c) in KJ dollar^{-1} as follows:

$$C_c = \frac{17.405\ KJ}{4.23\ dollar}$$

$$= 4.11\ KJ\ dollar^{-1}$$

The mass of iso-octane is calculated by the relation as follows:

$$m_1 = p \times V$$

Here, V is the volume, m is the mass and P is the density. Substitute, 1000 mL for V and 0.6919 g mL^{-1} for P in the equation (1) as follows:

Calculate mass of isooctane (m_1) in grams as follows:

$$m_1 = 1000\ mL \times 0.6919\ mL^{-1}$$

$$= 691.9\ g$$

Heat of combustion of iso-octane is 5462 KJ/mol.

Molar mass of isooctane (C_8H_{18}) is 114.2 g/mol

Therefore, mass of 1 mol of isooctane is 114.2 g

calculate the heat combustion (ΔH_{comb}) of 691.9 g isooctane by the Unitary method as follows:

$$\Delta H_{comb} = \frac{5462\ KJ}{114.2\ g} \times 691.9\ g$$

$$= 33.078 \times 10^3\ KJ$$

The heat of combustion of $1L\ C_8H_{18}$ is 33.078×10^3 KJ
Therefore, energy provided by $1L\ C_8H_{18}$ is 33.078×10^3 KJ
Cost of $1L\ C_8H_{18}$ is produced by \$0.45 Calculate the cost of \$1.0 by the Unitary method as follows:

$$\$1.0 = \frac{33.078 \times 10^3\ KJ \times \$1.0}{\$0.45}$$

$$= 73.51 \times 10^3\ KJ$$

Therefore, $1L\ C_8H_{18}$ provides 73.51×10^3 KJ/dollar energy.
Therefore, the value of heat of Combustion of Iso-octane is 33.078×10^3 KJ and Nutritional value of cereal is 17.405 Kg. Iso-Octane is the least expensive source