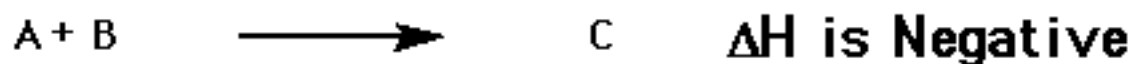


Exothermic reactions give off energy and are favorable



Endothermic reactions take up energy and are unfavorable



The heat of combustion is the amount of energy given off when 1 mole of a substance is burned and is often expressed in

keal/mol

Substance

Heat of Combustion

Methane

210.8 keal/mol

Octane

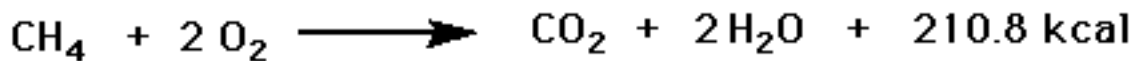
1302.7 keal/mol

Ethyl alcohol

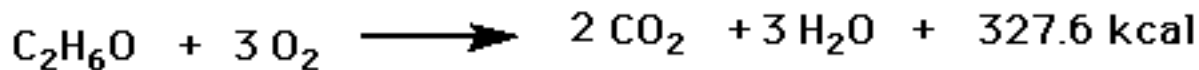
327.6 keal/mol

When we burn hexane, energy is released. The heat of combustion of hexane (C₆H₁₄) is 989.8 kcal/mol.

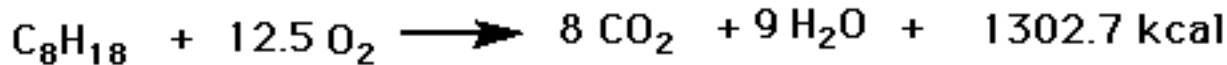
- a. Write the balanced equation for the combustion of hexane**
- b. Calculate the amount of energy released (in kcal) when 213 g of hexane is burned.**
- c. Convert the above answer to kjoules given that 1 kcal = 4.184 kjoules (kj).**
- d. Calculate the amount of CO₂ released when the above 213 g of hexane is burned.**



210.8 kcal/mol CO_2

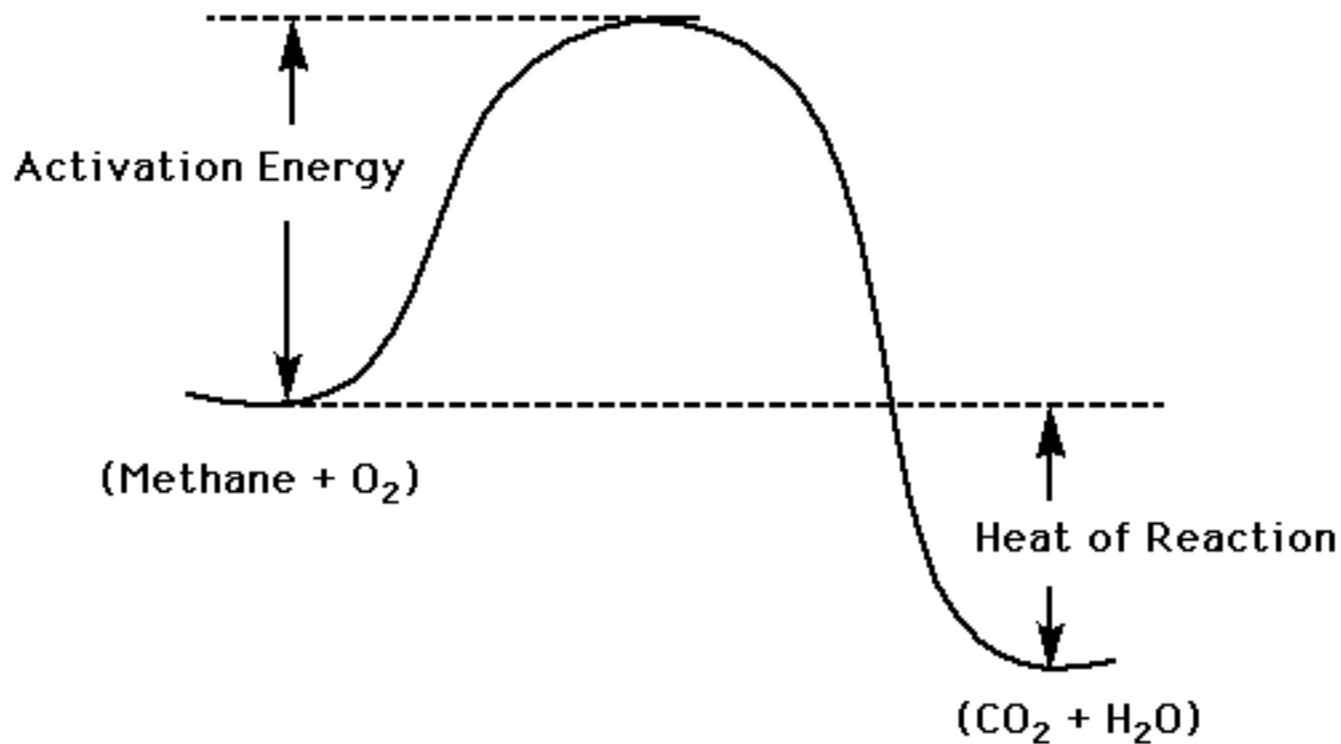


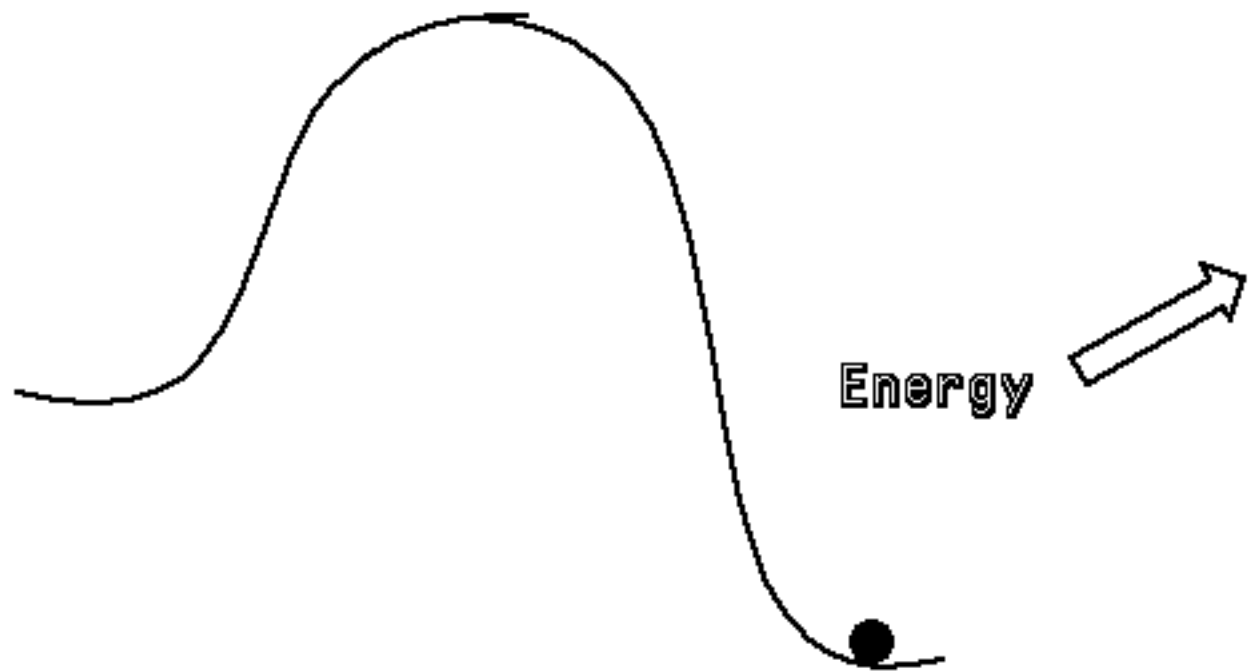
163.8 kcal/mol CO_2



162.8 kcal/mol CO_2

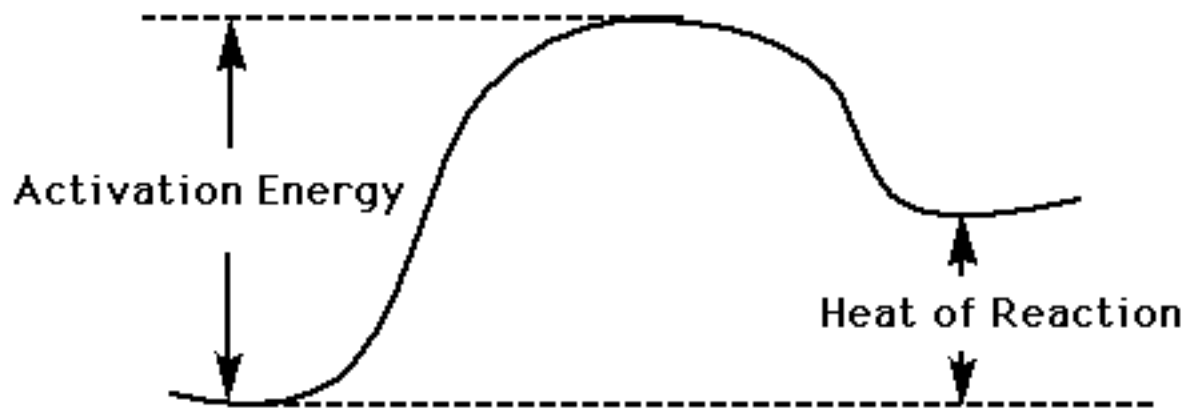
An Energy Diagram for an Exothermic Reaction



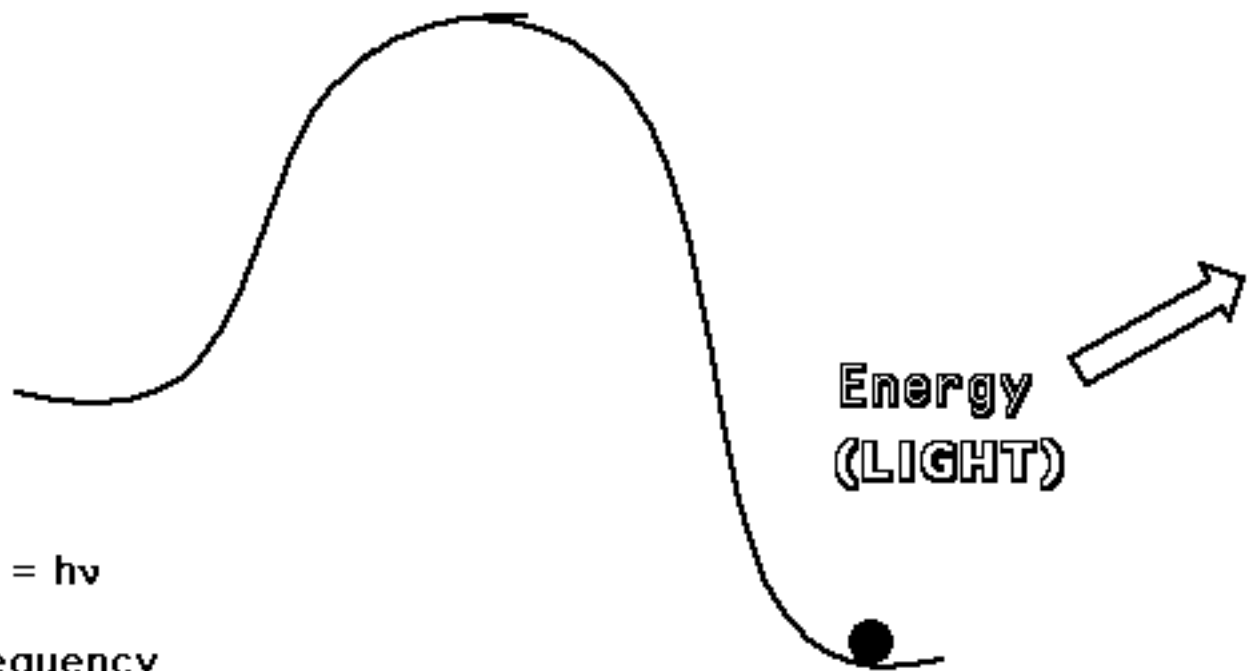


Energy

An Energy Diagram for an Endothermic Reaction



The Energy given off is often in the form of Heat but it can take other forms such as light



For light $E = h\nu$

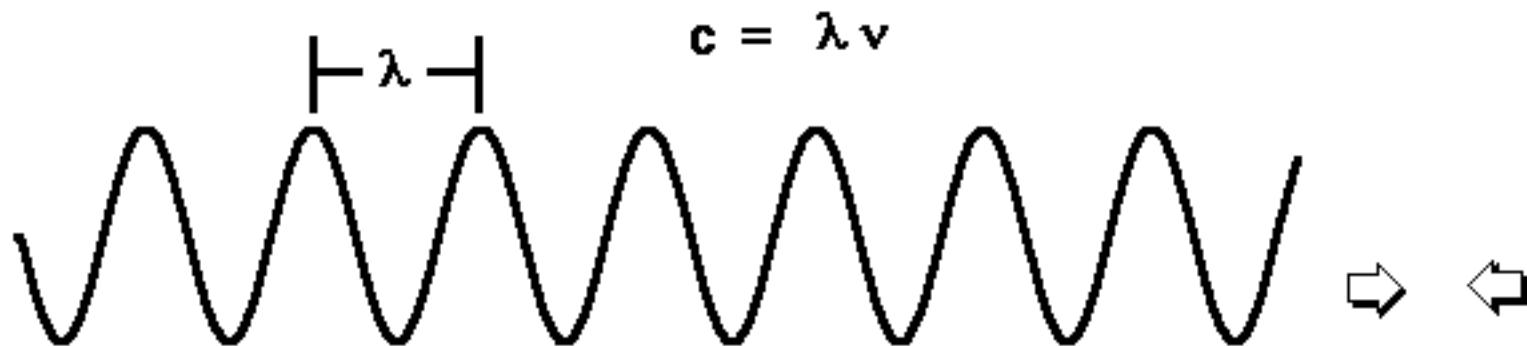
ν is the frequency

All electromagnetic waves travel at the same speed, $c = 3 \times 10^8$ m/s. Each wave has a characteristic length and a characteristic frequency.

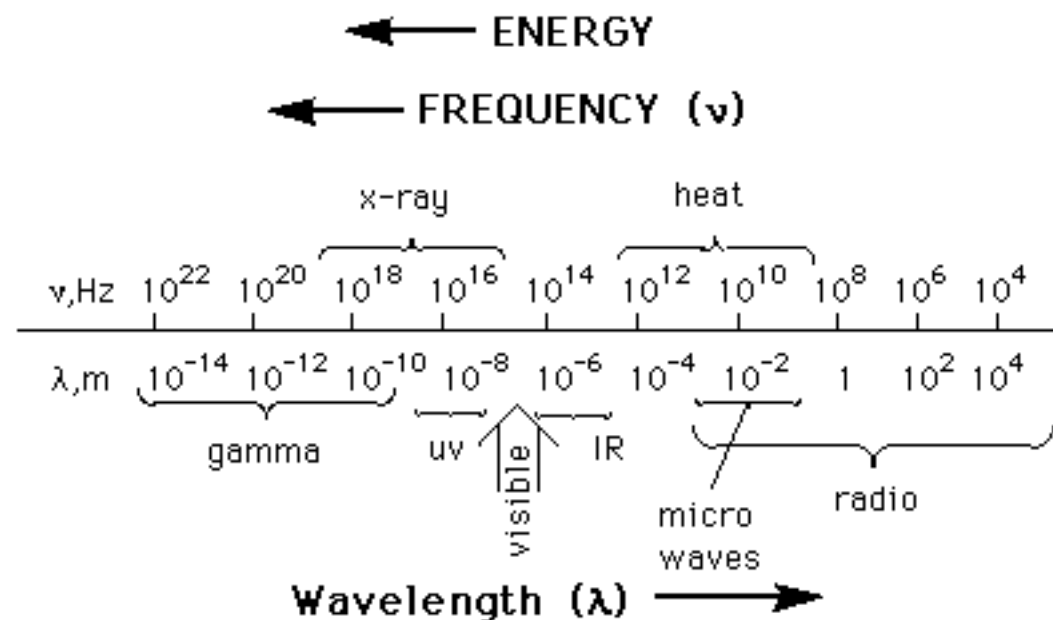
Frequency, number of vibrations or waves per second is represented by the Greek letter nu ν , is measured in waves per second (also called "hertz").

Wavelength is measured in meters and represented by the Greek letter lambda λ

The velocity of light is the product of the wavelength and the frequency of any particular kind of radiation:



LIGHT Energy increases with Frequency



LIGHT Energy decreases with Wavelength

electromagnetic spectrum

Frequency (ν) in Hz

10^{20}

10^{18}

10^{16}

10^{14}

10^{12}

10^{10}

γ rays

X rays

Ultra-violet

Infrared

Micro-waves

Radio waves

10^{-10}

10^{-8}

10^{-6}

10^{-4}

10^{-2}

1

Wavelength (λ) in cm

Wavelength (λ) in cm

Visible

380 nm

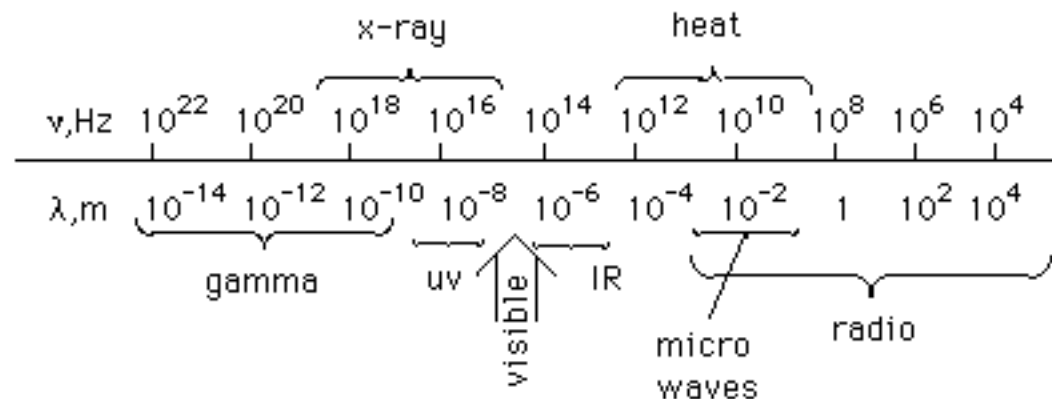
500 nm

600 nm

700 nm

780 nm

The electromagnetic Spectrum:



Important parts:

1. X-rays and gamma rays – high energy
2. Ultraviolet radiation (uv) – Energetic gives you sunburn
3. Visible light red ---> Violet
4. Infra red (IR) associated with heat (molecular vibrations)
5. Microwaves (molecular rotations)
6. Radio waves