

## Chapter 9: Electrons in Atoms

**Why** is hydrogen explosive?

**Why** are noble gases unreactive?

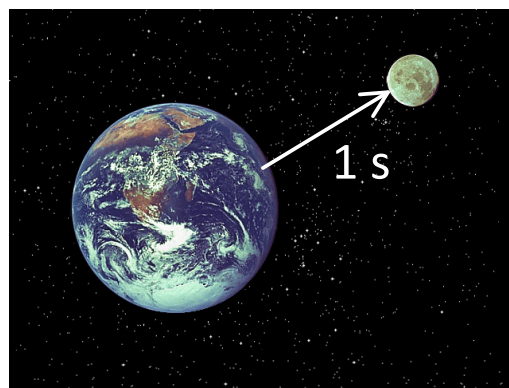
**Why** do F, Cl, Br, and I all form 1- ions?

The answers are all due to the behavior of the **electrons** in those atoms.

... but if electrons are nearly massless and much smaller than an atom, how do we know anything about them? How can we figure out how they behave, or learn about their locations in an atom?

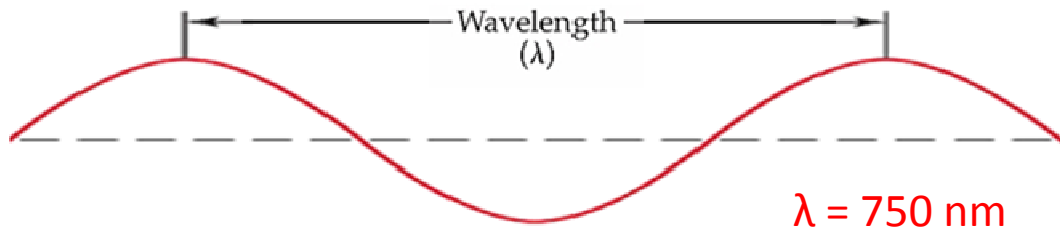
It all started by studying light.

**Light** (electromagnetic radiation), the form of energy that travels in waves at a speed of  $3.00 \times 10^8$  m/s.



# Wavelength and color

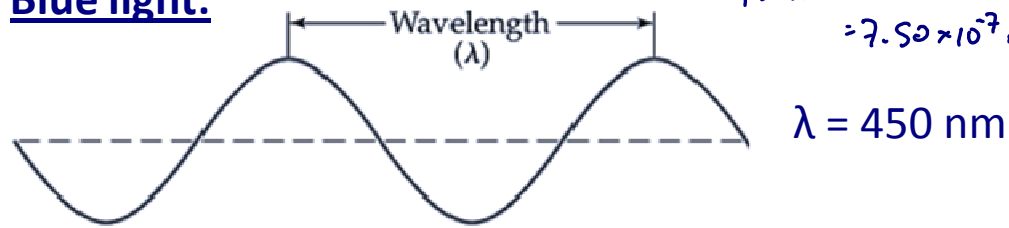
## Red light:



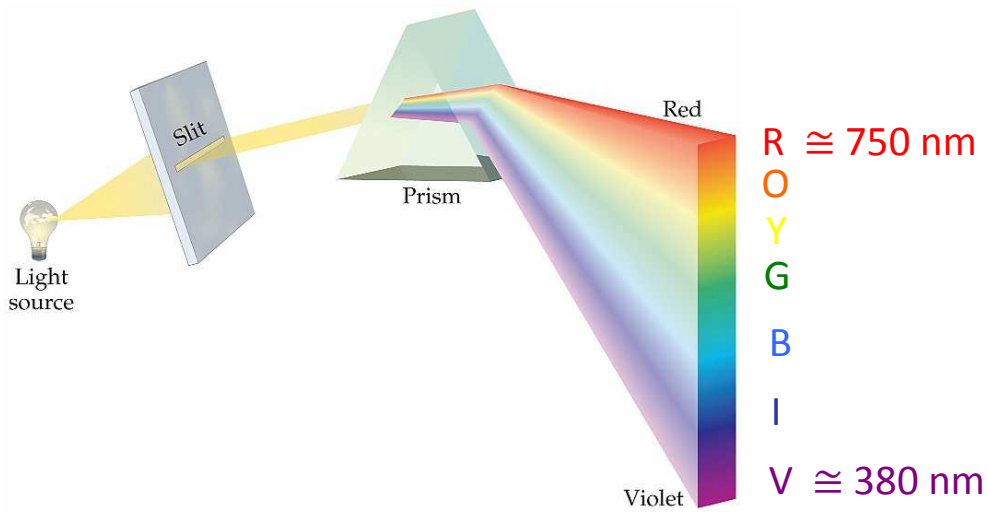
$$n = 10^{-9}$$

$$750 \text{ nm} = 750 \times 10^{-9} \\ = 7.50 \times 10^{-7} \text{ m}$$

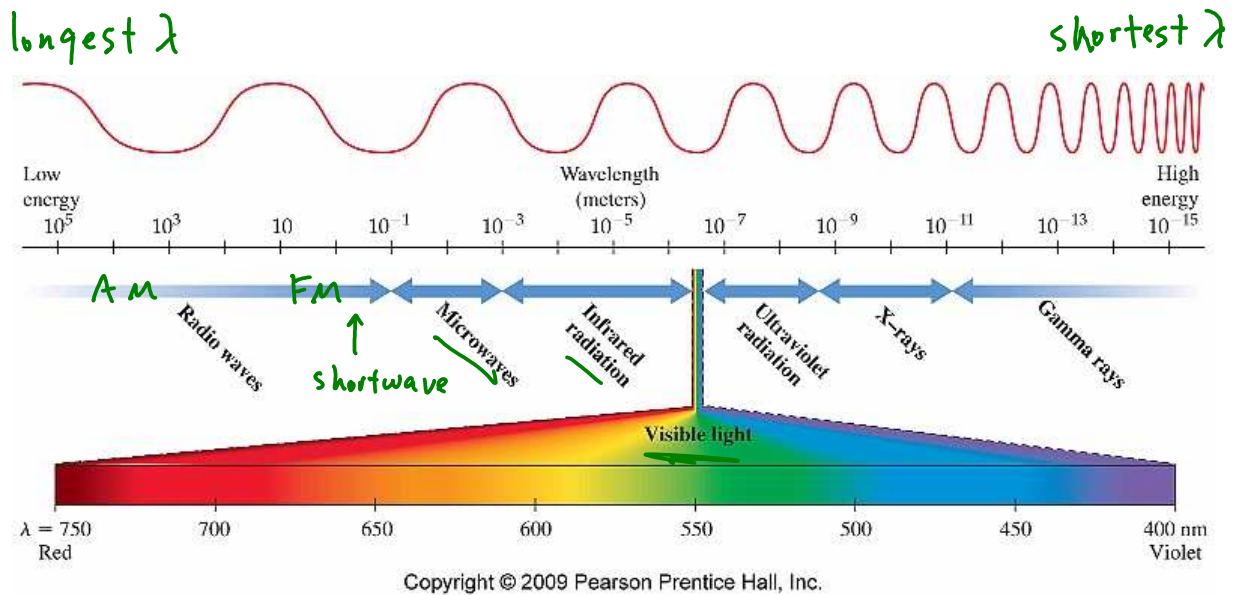
## Blue light:



## The visible spectrum



# The electromagnetic spectrum



Energy and wavelength ( $\lambda$ ) have what relationship?

inversely proportional

Radio: 10 cm - 10,000 m

Microwaves:

Infrared:

Visible:

UV:

X-ray:

Gamma: most harmful