

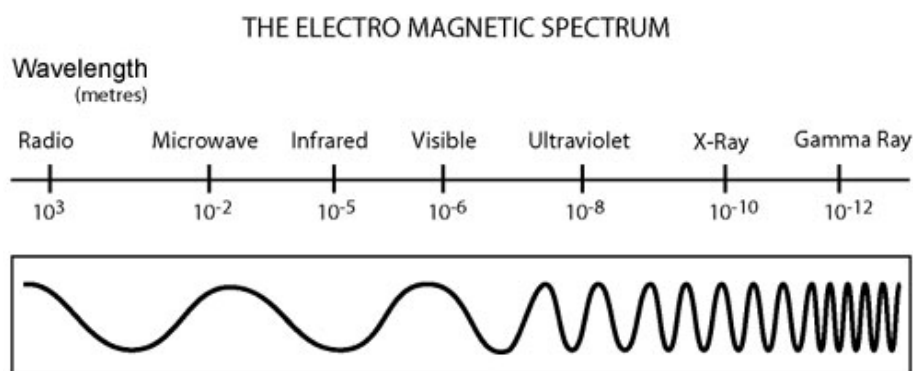
ATOMIC THEORY AND ISOTOPES

X-Rays

- Discovered in 1895 by German physicist Wilhelm Roentgen
 - Observed that certain materials emitted an unknown kind of energy when he bombarded them with electrons → rays darkened photographic plates just like visible light did
- French physicist Henry Becquerel found that a rock containing uranium salts emitted these X-rays naturally (did not have to bombard them with electrons)
- Chemists Marie and Pierre Curie were able to isolate the minerals emitting the X-rays → found it to be from the uranium atoms in the rock sample
 - Called this process radioactivity

Radioactivity

- The release of high-energy particles and rays of energy from a substance as a result of changes in the nuclei of atoms
- Radiation → the high-energy particles and rays of energy
- Occurs all around us as Natural Background Radiation
- The electromagnetic spectrum covers all of the different types of energy rays (pg. 287 in text)
- Note that, regardless of the type of radiation (microwave, gamma rays, etc), the amount of energy contained in one wavelength is constant → because gamma rays hit an object more frequently, it imparts more energy to that object



Isotopes

- Have students look at bottom left corner of Periodic Table → the statement indicates that some elements have different atomic masses
- Where does the change in masses come from?
 - All of the mass in an atom is located in the nucleus
 - Atomic number has to stay the same or you change the element
 - The only thing that can change is the number of neutrons
- Isotope → atoms of the same element with different atomic masses (different number of neutrons) → this can make some nuclei unstable

- Example: Carbon
 - Occurs naturally in 3 forms: ${}^{12}_6\text{C}$, ${}^{13}_6\text{C}$, ${}^{14}_6\text{C}$ ← called standard **atomic notation** or **the nuclear symbol**

Isotope	# Protons	# Electrons	# Neutrons
${}^{12}_6\text{C}$	6	6	6
${}^{13}_6\text{C}$	6	6	7
${}^{14}_6\text{C}$	6	6	8

- Carbon 12 (${}^{12}_6\text{C}$) and Carbon 13 (${}^{13}_6\text{C}$) are the **stable** isotopes → Carbon 14 (${}^{14}_6\text{C}$) is the **unstable** form
- Radiation is the result of **unstable** nuclei of some atoms giving off **energy** as they become a more **stable** nuclei

Homework Isotopes Worksheet (BC Science 10 SWB pg. 123)
 Isotopes Worksheet (BC Science BLM 2-43)