$$^{1}_{1}p \longrightarrow {}^{1}_{0}n + {}^{0}_{+1}\beta$$

An example of positron emission is the decay of $^{38}_{19}K$ into $^{38}_{18}Ar$. Notice that the atomic number decreases by one but the mass number stays the same.

$$^{38}_{19}K \longrightarrow {}^{38}_{18}Ar + {}^{0}_{+1}\beta$$

Electron Capture

Another type of decay for nuclides that have a neutron/proton ratio that is too small is electron capture. *In* **electron capture,** *an inner orbital electron is captured by the nucleus of its own atom.* The inner orbital electron combines with a proton, and a neutron is formed.

$$^{0}_{-1}e + {}^{1}_{1}p \longrightarrow {}^{1}_{0}n$$

An example of electron capture is the radioactive decay of $^{106}_{47}Ag$ into $^{106}_{46}Pd$. Just as in positron emission, the atomic number decreases by one but the mass number stays the same.

$$^{106}_{47}Ag + {}^{0}_{-1}e \longrightarrow {}^{106}_{46}Pd$$

Gamma Emission

Gamma rays (γ) *are high-energy electromagnetic waves emitted from a nucleus as it changes from an excited state to a ground energy state.* The position of gamma rays in the electromagnetic spectrum is shown in **Figure 6.** The emission of gamma rays is another piece of evidence supporting the nuclear shell model. According to the nuclear shell model, gamma rays are produced when nuclear particles undergo transitions in nuclear-energy levels. This is similar to the emission of photons (light or X rays) when an electron drops to a lower energy level, which was covered in Chapter 4. Gamma emission usually occurs immediately following other types of decay, when other types of decay leave the nucleus in an excited state.

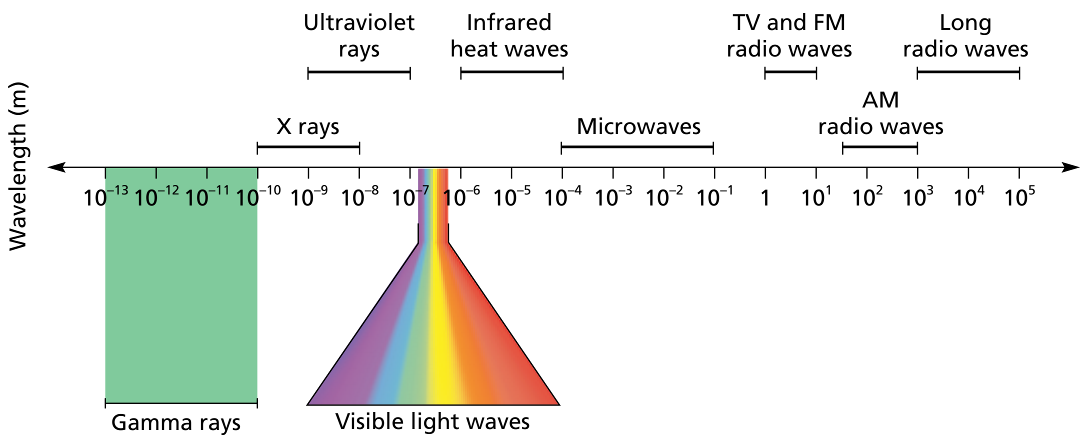

FIGURE 6 Gamma rays, like visible light, are a form of electromagnetic radiation, but they have a much shorter wavelength and are much higher in energy than visible light.