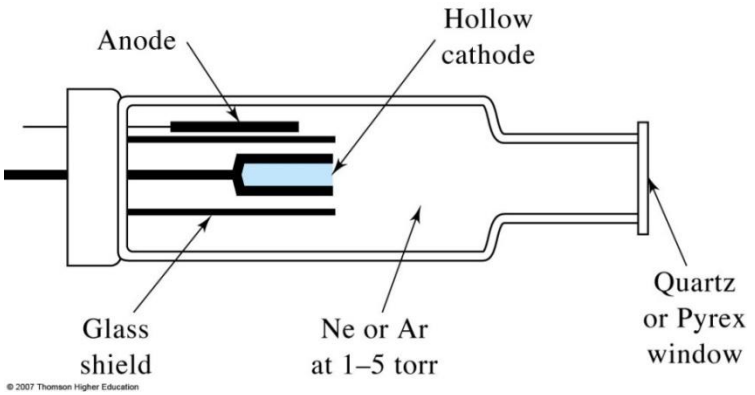
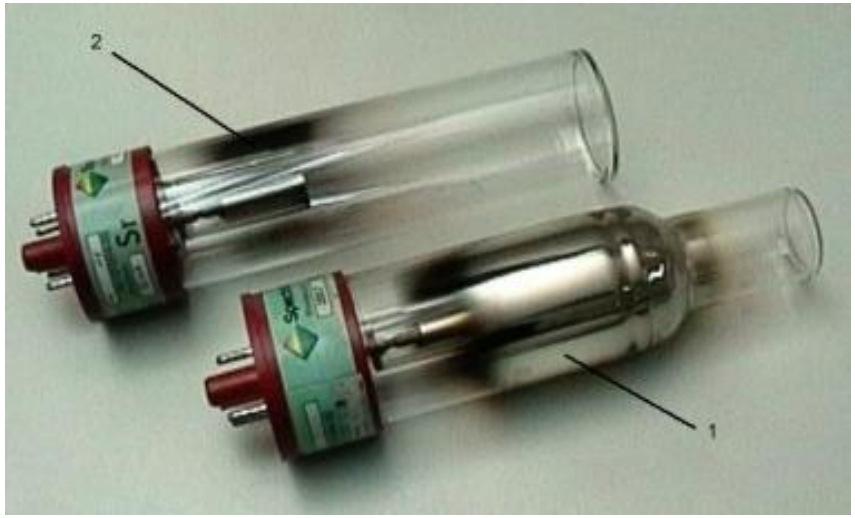
Hollow Cathode Lamps:

- The most common source for AAS.
- Consists of a tungsten anode and a cylindrical cathode sealed in a glass tube that is filled with *neon or argon at a pressure of 1 to 5 torr.*
- The cathode is constructed of the metal whose spectrum is desired.



- Ionization of the inert **g**as occurs when a potential on the order of 300 V is applied across the electrodes, which generates a current of about 5 to 15 mA.
- If the potential is sufficiently large, the gaseous cation acquire enough kinetic energy to dislodge some of the metal atoms from the cathode surface and produce an atomic cloud in a process called *sputtering*.

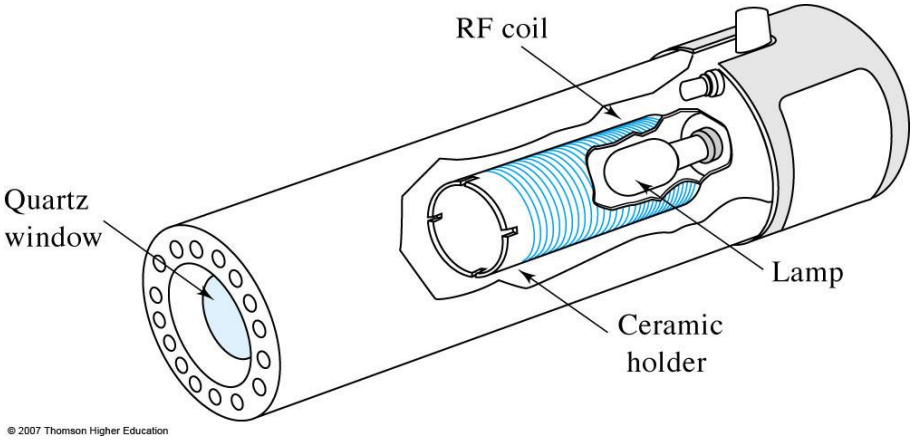
- A portion of the sputtered metal atom are in excited states and thus emit their characteristic radiation as they return to the ground state.
- Eventually, the metal atoms diffuse back to the cathode surface or to the glass walls of the tube and are redeposited.



- The efficiency of the hollow-cathode lamp depends on its geometry and the operating voltage.
- High voltages, and thus high currents, lead to greater intensities. This advantage is offset somewhat by an increase in Doppler broadening of the emission lines from the lamp.
- Furthermore, the greater currents produce an increased number of unexcited atoms in the cloud. The unexcited atoms, in turn, are capable of absorbing the radiation emitted by the excited ones. This *selfabsorption* leads to lowered intensities, particularly at the center of the emission band.

Electrodeless Discharge Lamps (EDLs):

- These provide radiant intensities that are usually one to two orders of magnitude greater than hollow cathode lamps.
- A typical lamp is constructed from a sealed quartz tube containing a few torr of an inert gas such as argon and a small quantity of the metal (or its salt) whose spectrum is of interest.
- The lamp is energized by an intense field of radio-frequency or microwave radiation. Ionization of the argon occurs to give ions that are accelerated by the high-frequency component of the field until they gain sufficient energy to excite the atoms of the metal whose spectrum is sought. Electrodeless discharge lamps are available commercially for 15 or more elements.



- EDLs exhibit better detection limits than do hollow-cathode lamps." This occurs because EDLs for these elements are more intense than the corresponding hollow-cathode lamps, and thus, EDLs are quite useful in determining these elements.

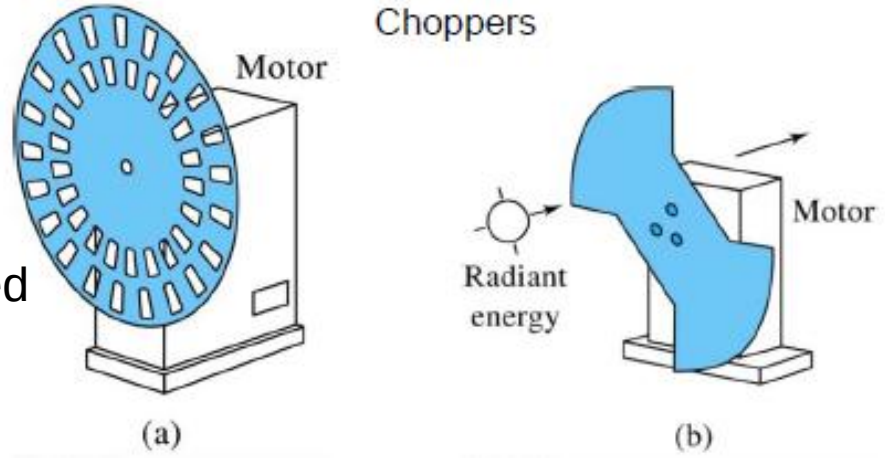
Source Modulation:

➢to eliminate interferences caused by *emission of radiation by the flame*,

➢the emission from the source is modulated with a chopper interposed between the source and the flame.

➢ As another alternative, the power supply for the source can be designed for intermittent or AC operation so that the source is switched on and off at the desired constant frequency.

➢ The detector then receives two types of signal, an alternating one from the source and a continuous one from the flame. These signals are converted to the corresponding types of electrical response. A simple high-pass *RC filter can then be* used to remove the unmodulated DC signal and pass the AC signal for amplification.



Emission from the sample + emission from the flame

Monochromator is able to eliminate flame interference based on wavelength separation. However, when the wavelength of interference is the same as the analyte wavelength the monochromator is unable to eliminate interference.