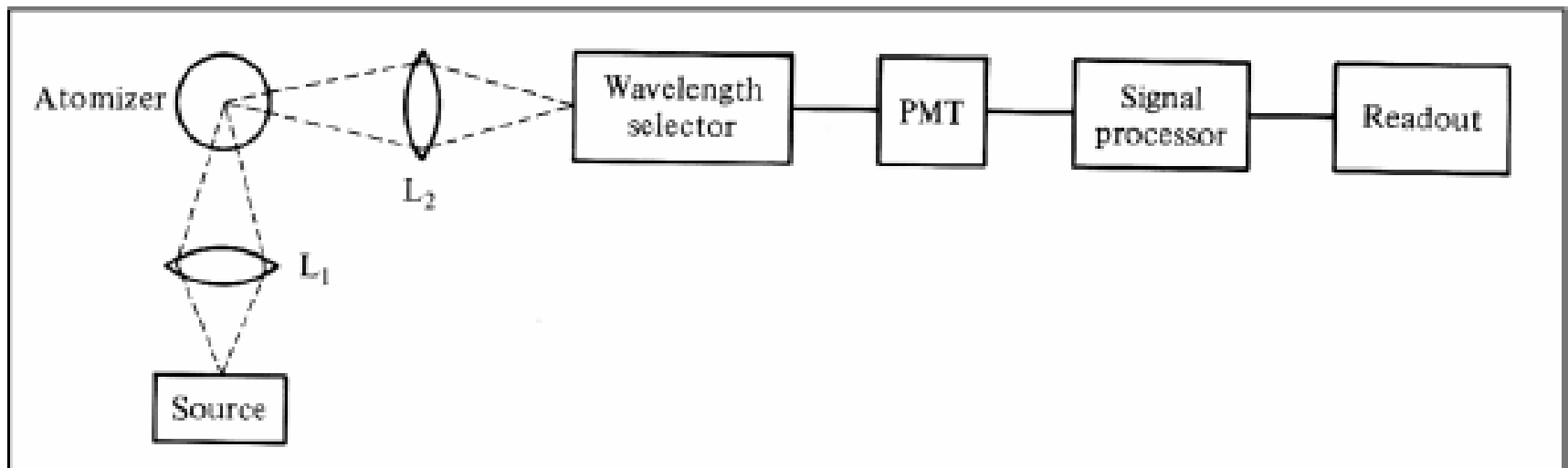
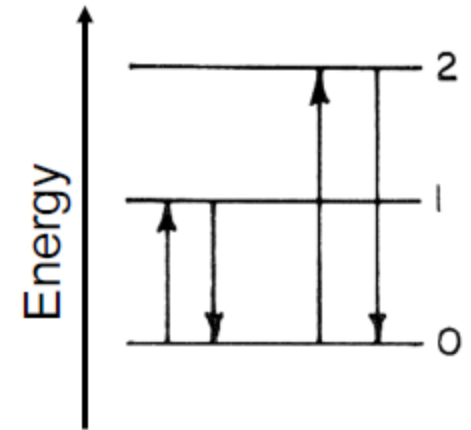


# Atomic Fluorescence Spectroscopy (AFS)

- There are five basic types of fluorescence: resonance fluorescence, direct-line fluorescence, stepwise-line fluorescence, sensitized fluorescence and multi-photon fluorescence.
- The figure shows an energetic diagram level for resonance fluorescence.
- In all cases, the basic instrumentation is the same. EDL are the best excitation sources for AFS.
- The advantage of AFS over AAS is that it provides better limits of detection for several elements.



**TABLE 9-3** Detection Limits (ng/mL)<sup>a</sup>  
for Selected Elements

| Element | AAS<br>Flame | AAS<br>Electro-<br>thermal | AES<br>Flame | AES<br>ICP | AFS<br>Flame |
|---------|--------------|----------------------------|--------------|------------|--------------|
| Al      | 30           | 0.1                        | 5            | 0.2        | 5            |
| As      | 200          | 0.5                        | —            | 2          | 15           |
| Ca      | 1            | 0.25                       | 0.1          | 0.0001     | 0.4          |
| Cd      | 1            | 0.01                       | 2000         | 0.07       | 0.1          |
| Cr      | 4            | 0.03                       | 5            | 0.08       | 0.6          |
| Cu      | 2            | 0.05                       | 10           | 0.04       | 0.2          |
| Fe      | 6            | 0.25                       | 50           | 0.09       | 0.3          |
| Hg      | 500          | 5                          | —            | —          | 5            |
| Mg      | 0.2          | 0.002                      | 5            | 0.003      | 0.3          |
| Mn      | 2            | 0.01                       | —            | 0.01       | 1            |
| Mo      | 5            | 0.5                        | 100          | 0.2        | 8            |
| Na      | 0.2          | 0.02                       | 0.1          | 0.1        | 0.3          |
| Ni      | 3            | 0.5                        | 600          | 0.2        | 0.4          |
| Pb      | 8            | 0.1                        | 200          | 1          | 5            |
| Sn      | 15           | 5                          | 300          | —          | 200          |
| V       | 25           | 1                          | 200          | 0.06       | 25           |
| Zn      | 1            | 0.005                      | 50000        | 0.1        | 0.1          |