

15: Spectroscopy Instruments

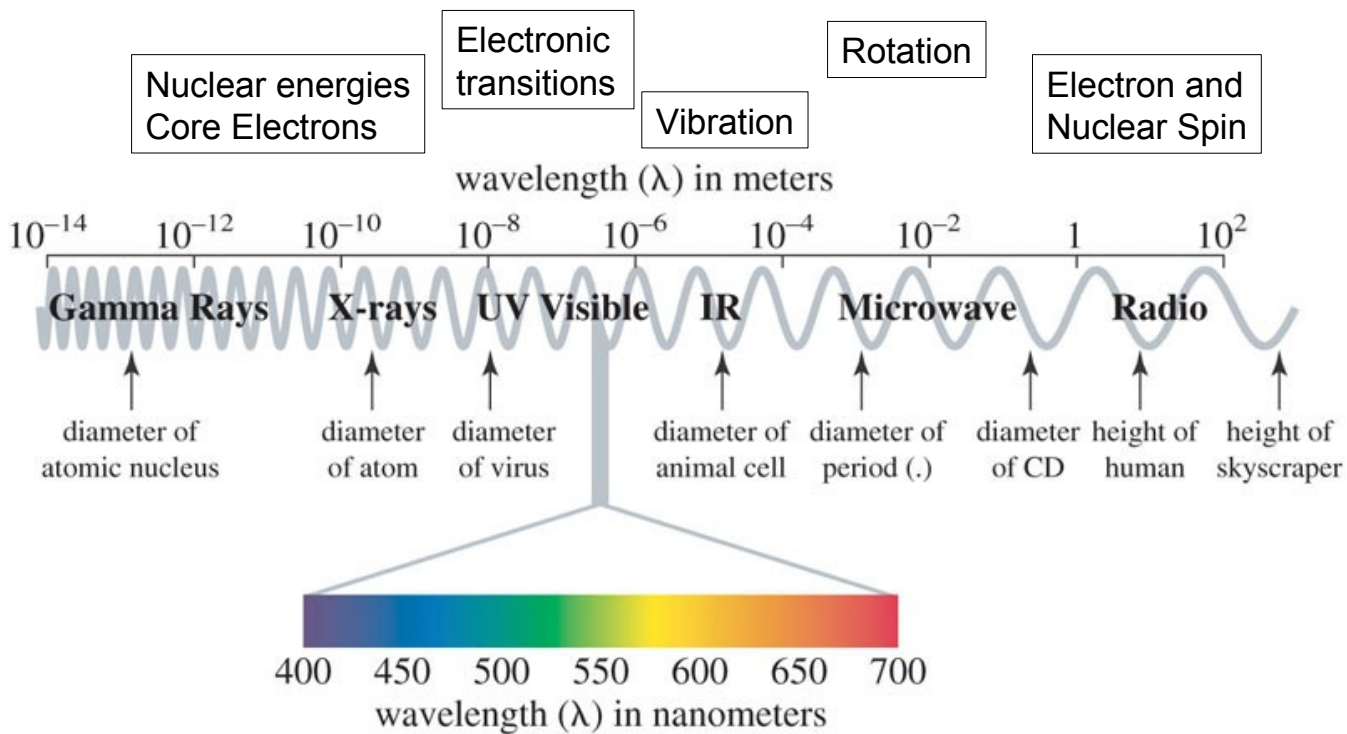
- I General Instrumentation
 - A Wavelength Selector
 - B Detectors
- II Background and Errors
 - A Instrumental sources of error

Reading:
Harris Ch 17.6-7:404-413
19.1-3: 445-461
Banwell, Ch 1

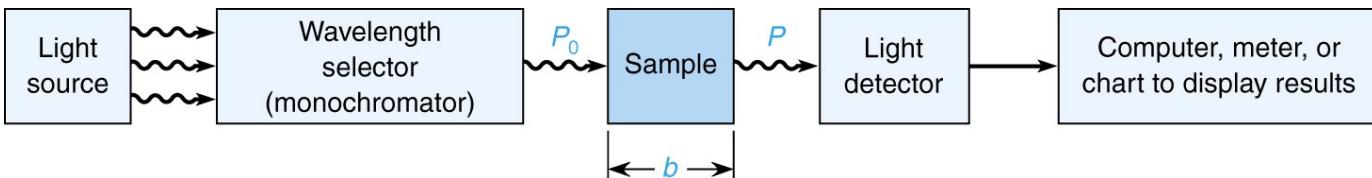
Announcements and Reminders

- I Problem Set 4 on Sapling
 - A due Sunday night / Monday morning 4am
- II Lab 4: UV-Vis
 - A Pre-lab takes some time. Don't procrastinate!

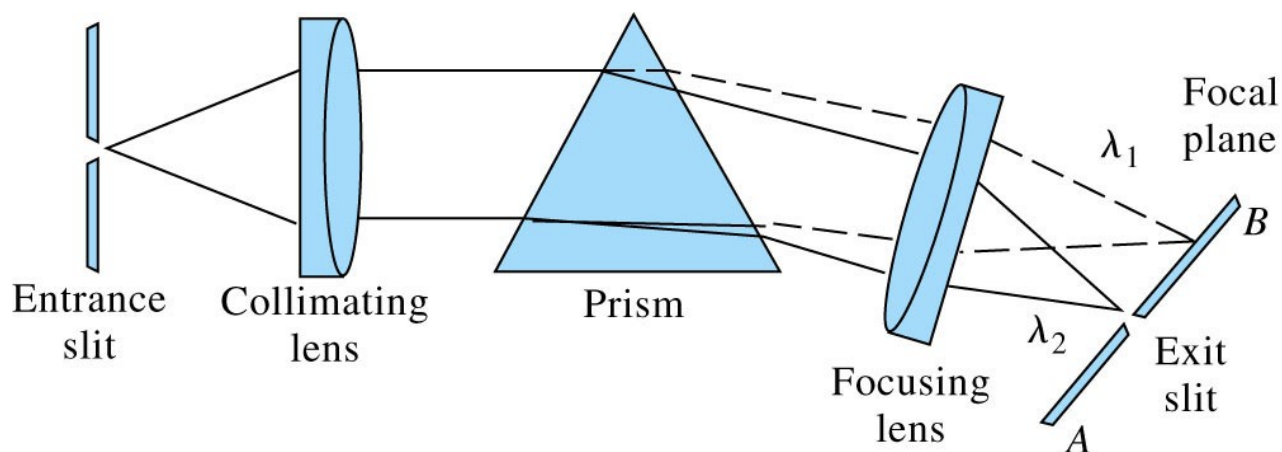
Electromagnetic Spectrum



General Spectroscopic Instrumentation



Prism Wavelength Disperser



(b)

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Figure from *Principles of Instrumental Analysis*, 6e, Skoog et al.

Grating Wavelength Disperser

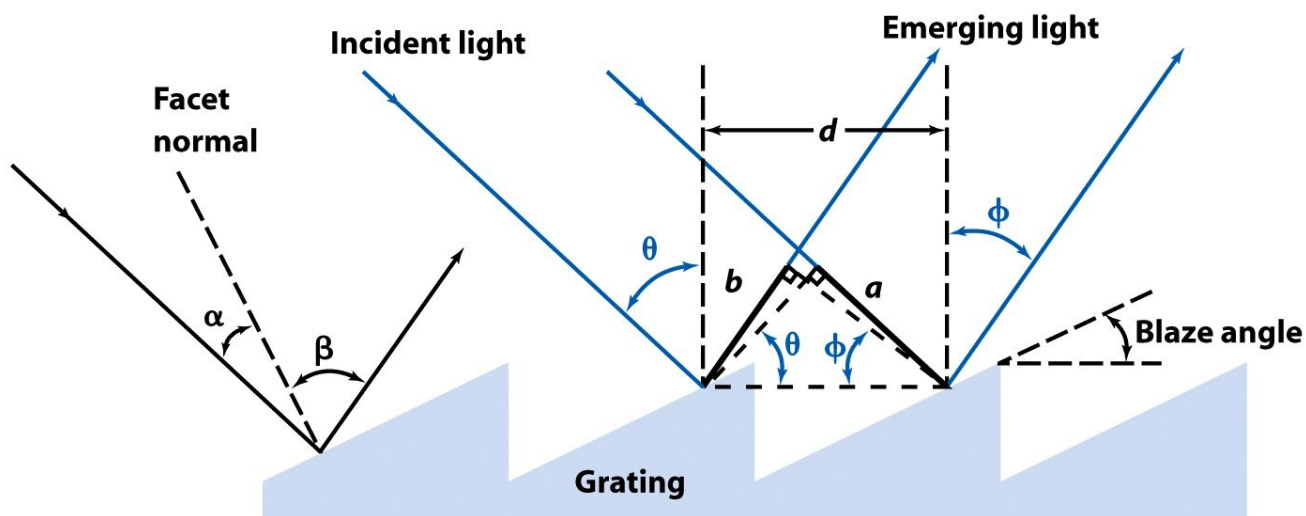


Figure 20-6
Quantitative Chemical Analysis, Seventh Edition
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Grating-based Selector

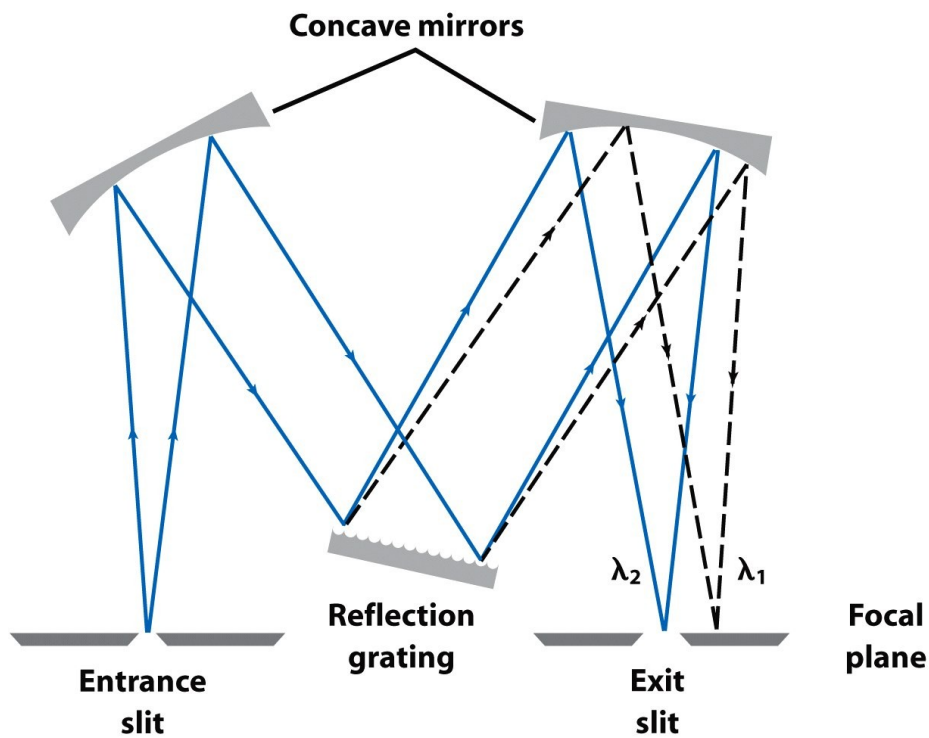


Figure 20-5
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Wavelength Selector Materials

| Wavelength, nm | 100 | 200 | 400 | 700 | 1000 | 2000 | 4000 | 7000 | 10,000 | 20,000 | 40,000 |
|--------------------------|--|-----|---------|---------|------|------|------|------|--------|--------|--------|
| Spectral region | VAC | UV | Visible | Near IR | | | IR | | | | Far IR |
| (b) Wavelength selectors | Fluorite prism | | | | | | | | | | |
| | Fused silica or quartz prism | | | | | | | | | | |
| | Glass prism | | | | | | | | | | |
| | NaCl prism | | | | | | | | | | |
| | KBr prism | | | | | | | | | | |
| Continuum | 3000 lines/mm Gratings 50 lines/mm | | | | | | | | | | |
| Discontinuous | Interference wedge | | | | | | | | | | |
| | Interference filters | | | | | | | | | | |
| | Glass filters | | | | | | | | | | |

Photomultiplier Tube

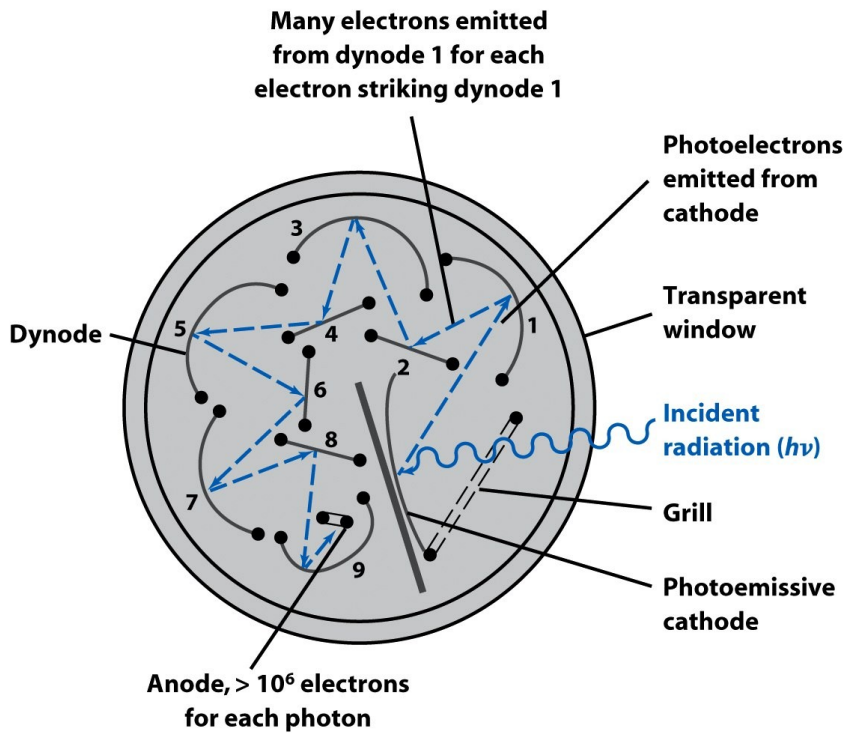


Figure 20-12
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Photodiodes: p-n Junctions

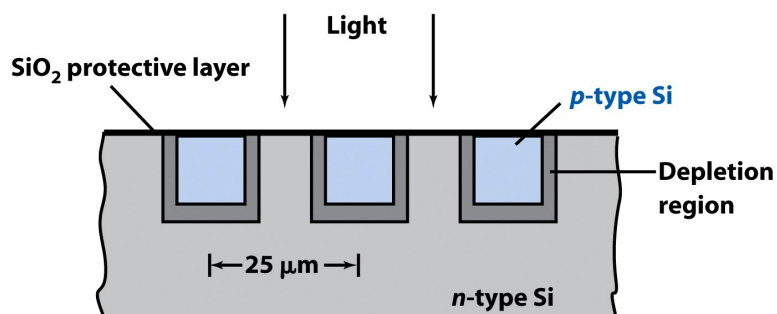
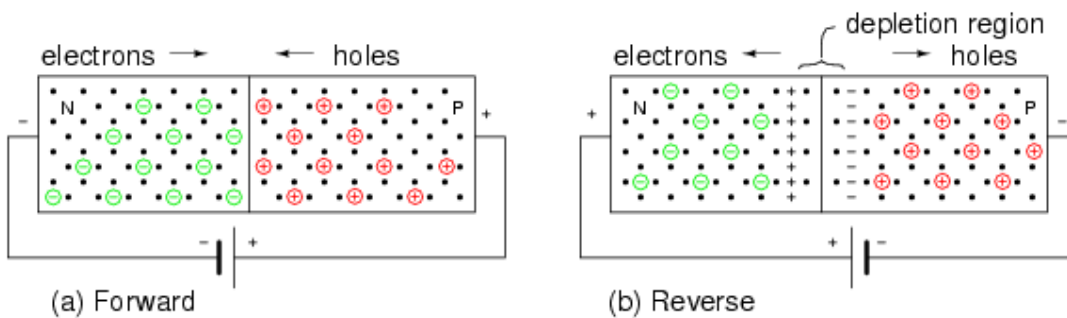


Figure 20-13a
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Detector Types and Materials

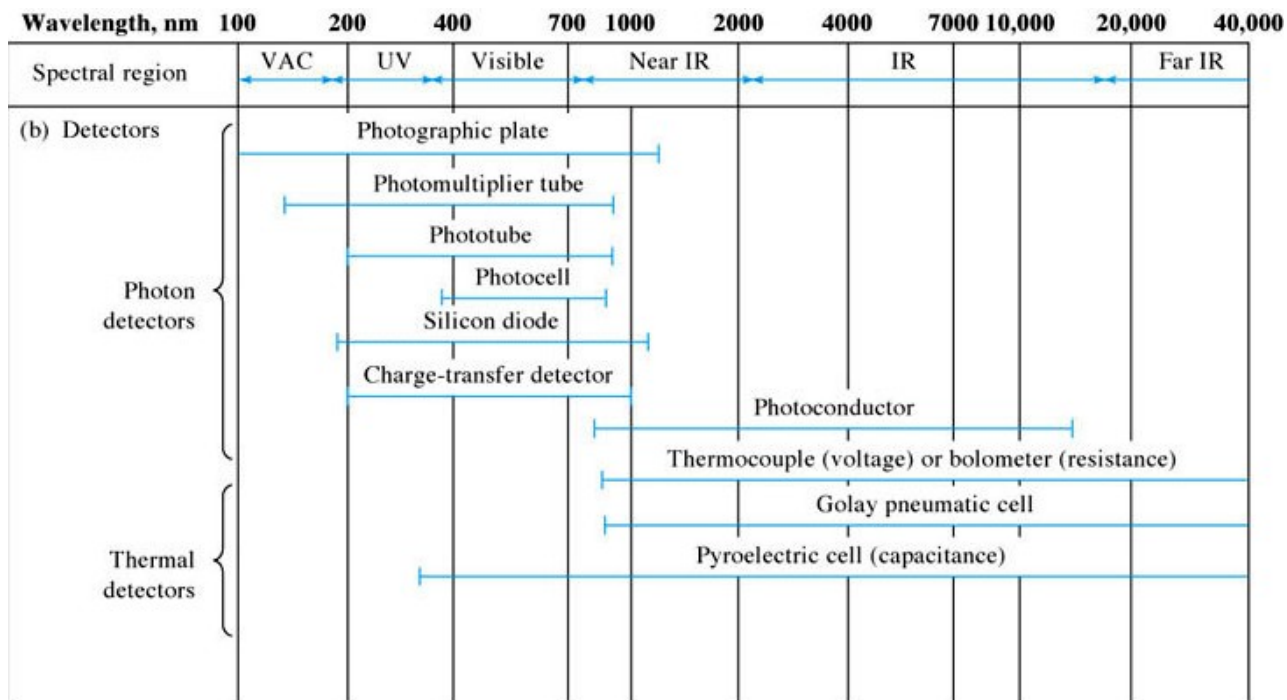


Figure from Principles of Instrumental Analysis, 6e, Skoog et al.

Response of Different Materials

