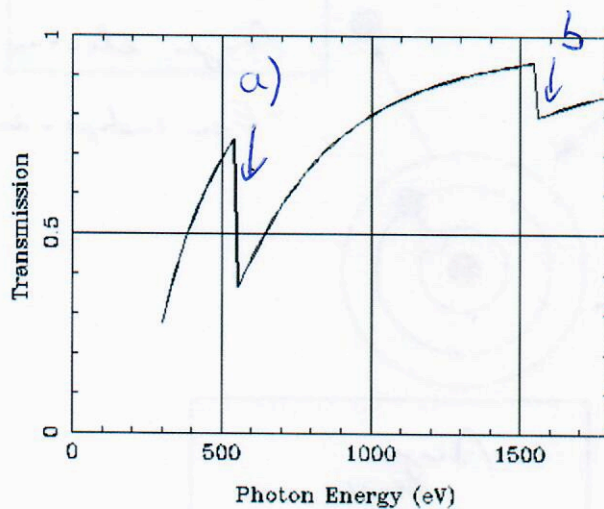


CH314 – Structural Analysis

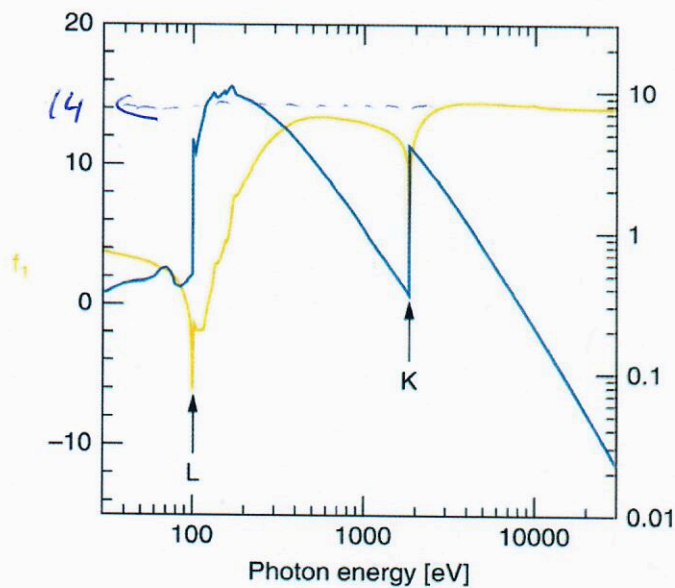
Part III : X-ray Tools

The Phoenix beamline at the Swiss Light Source can record absorption scans in the soft X-ray regime. Figure out the elements in the following sample. Use the electron binding energy tables from the x-ray data booklet on moodle or table on slide 18. Can you guess the material?



a) Oxygen k-edge 543 eV
 b) Aluminium k-edge at 156 eV
 $\Rightarrow \text{Al}_2\text{O}_3$

In the next figure the atomic scattering factors f_1 and f_2 of a single and simple element are plotted. How many electrons does each atom contain? What is the material?



f_2 above resonance = 14
 $\rightarrow$ 14 electrons

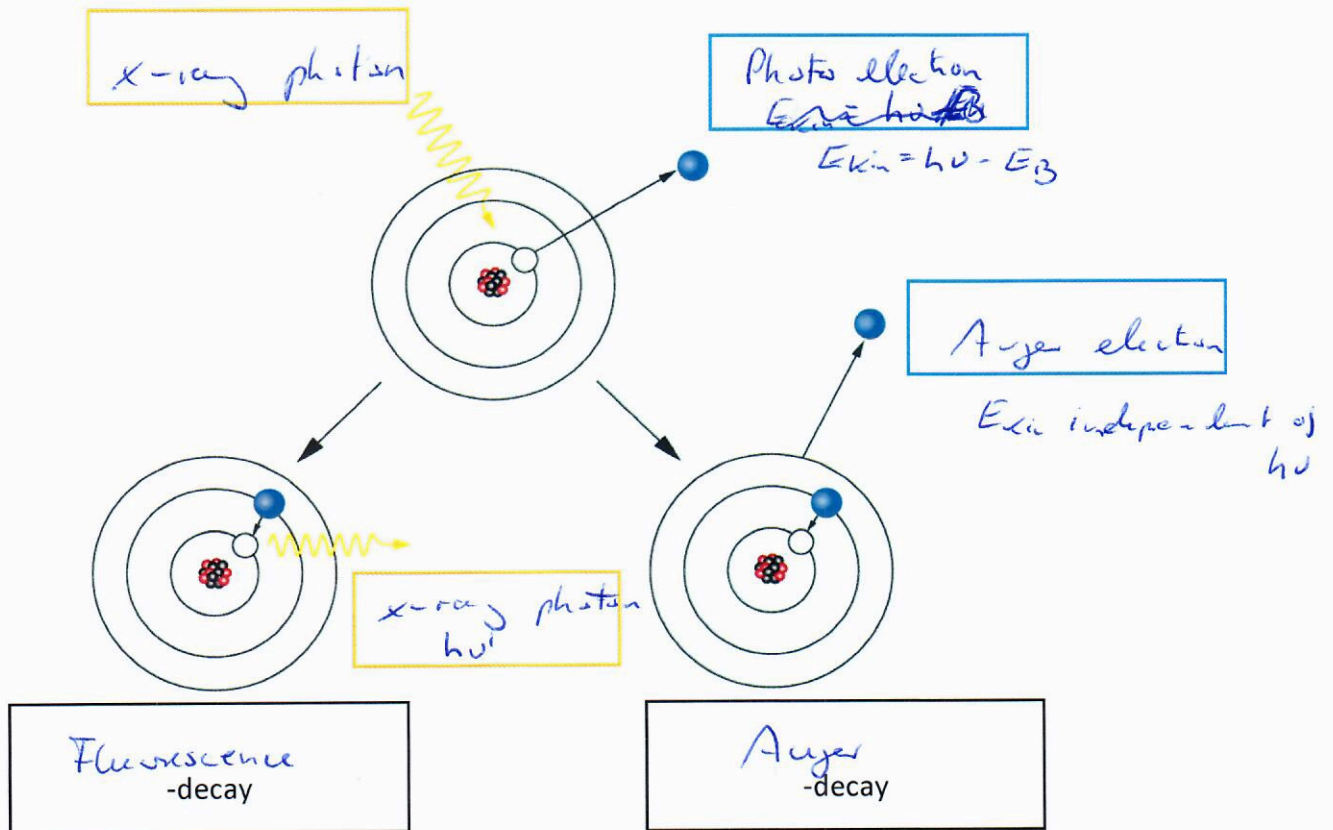
k-edge 1835 eV

L_1 -edge 150 eV

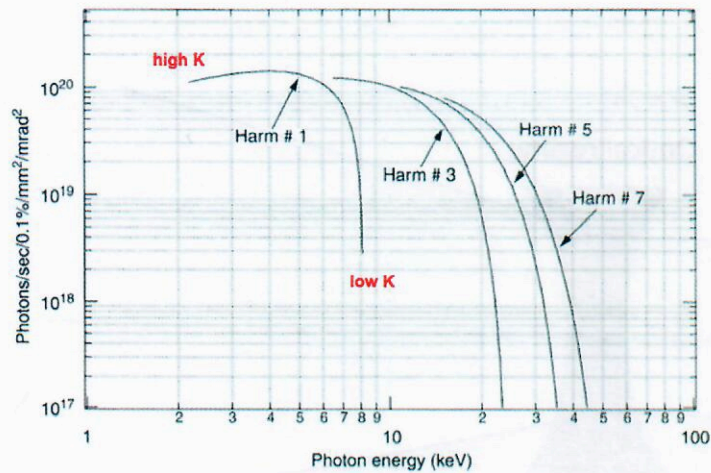
L_2 -edge 100 eV

$\Rightarrow$ Silicon

Label the following figure

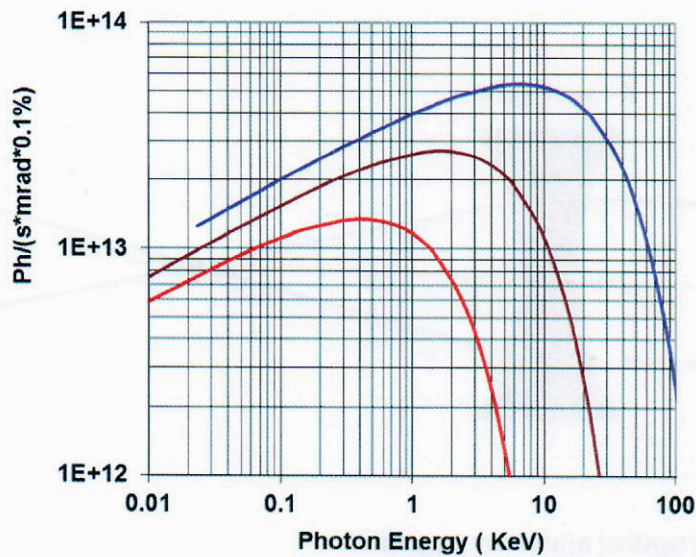


To which X-ray source do the following characteristic output spectra belong?

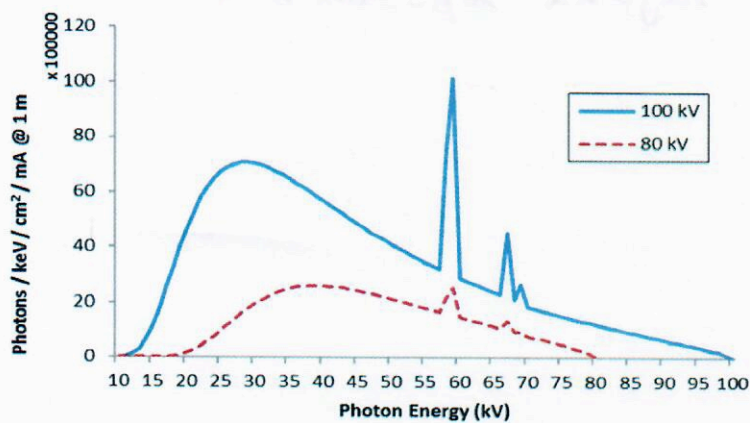


Undulator

→ harmonics



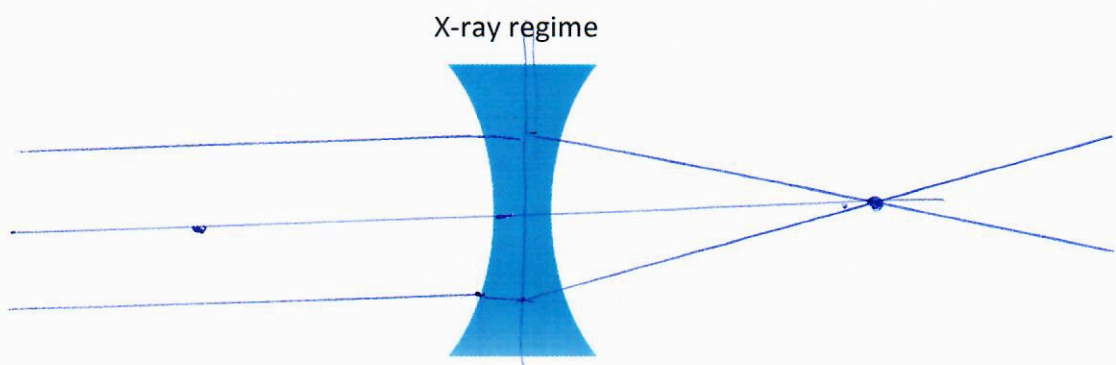
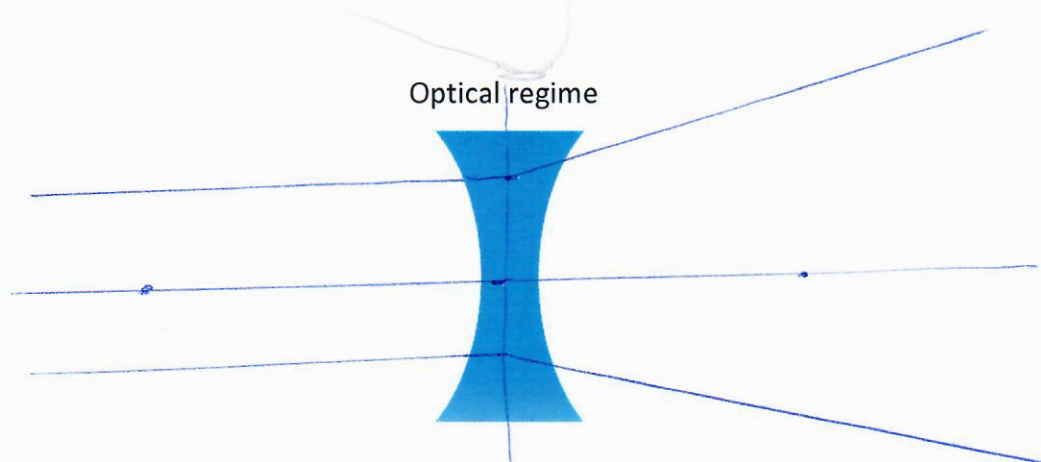
Bend magnet



X-ray tube

- characteristic emission lines
- Bremsstrahlung spectrum

Draw the light rays for the following lenses in the optical and x-ray regime. Assume an ideal refractive material for both cases.



What is the difference between the optical and x-ray regime?

x-ray: negative refractive index