

# Rainbows for analysis

## How does it work?

Light is made up of a spectrum of colours. We see this in rainbows. Light is changed when it passes through liquids or solids, and by measuring this change we can work out what molecules the liquid or solid contains. This is called spectral analysis.

## Steps for analysis

- Set up your spectrometer. If you're working on a Mac you can use Photo Booth to take photos with a USB camera. On recent Windows systems you can use the Camera App.
- Take spectrum with CFL lamp to calibrate the instrument and upload to [spectralworkbench.org](http://spectralworkbench.org)
- Calibrate spectrum by aligning the green and blue markers (instructions online)
- Replace the CFL lamp with a halogen light source. Be careful not to disturb the spectrometer.
- Fill a cuvette with your filtrate
- Take spectrum with the halogen light source
- Fill a cuvette with your pure solvent (diethyl ether or ethanol)
- Take spectrum with the halogen light source
- Upload spectra to [spectralworkbench.org](http://spectralworkbench.org)
- Calibrate spectra with calibration taken from the CFL lamp
- Subtract solvent spectrum from filtrate spectrum to gain the spectrum of the extracted chemicals
- Compare spectra with published spectra to identify chemicals present

A **CFL lamp** is commonly known as a low-energy light bulb. The light it produces has a characteristic spectrum with two distinct lines in the green area of the spectrum and 3 distinct blue lines. You use these lines to calibrate your spectrometer.



Your CFL Lamp spectrum should look something like this, with distinctive lines



This spectrum will be hard to calibrate as the light is too strong, so the lines aren't clear