Introduction

Theory

Spectrometer

We shall first, in short, explain how a spectrometer works and what it is used. A spectrometer is a device that can measure the spectral composition of light. Fig. 1 shows the spectrum of hydrogen. The most common form of spectrometer, which is also what we have used, is a grating spectrometer. A grating spectrometer, separates the light by wavelength with a periodic grate, as illustrated in fig 2. Let us a consider a monochromatic component of light. As it is reflected off the grate it will only create construcive interference at specific angles. This angle is related to the wavelength by the follwing formula called the 'grating equation'

$$d\left(\sin\theta_i - \sin\theta_m\right) = \lambda m \quad m = \pm 0, \pm 1, \pm 2 \ldots .$$

Absorbtion

When electromagnetic waves travel in a media some of the electromagnetic energy in the wave is transformed to internal energy in the media. E.g the intensity of light decreases when it passes through a media. The relationship between the ingoing intensity and outgoing intensity is called absorbance and given by:

$$A = log_{10}(\frac{I_{In}}{I_{Out}})$$

Where A is the absorbance, I_{In} is the ingoing intensity and I_{Out} is the outgoing intensity. The amount of light that gets absorbed depends on what media the light is travelling through and how far it needs to travel in the media. This relation is described by the Lambert-Beer law:

$$A = \epsilon c l$$

Where ϵ it the absorptivity of the material, c is the concentration of the media and l is the length the light has to travel in the media.
Different materials absorbs differently in the visible spectrum e.g the sea is blue because it absorbs least light in the blue part of the spectrum. Sending light through a material can then be used to determine what the material is.

Emission

Results

Discussion

Conclusion