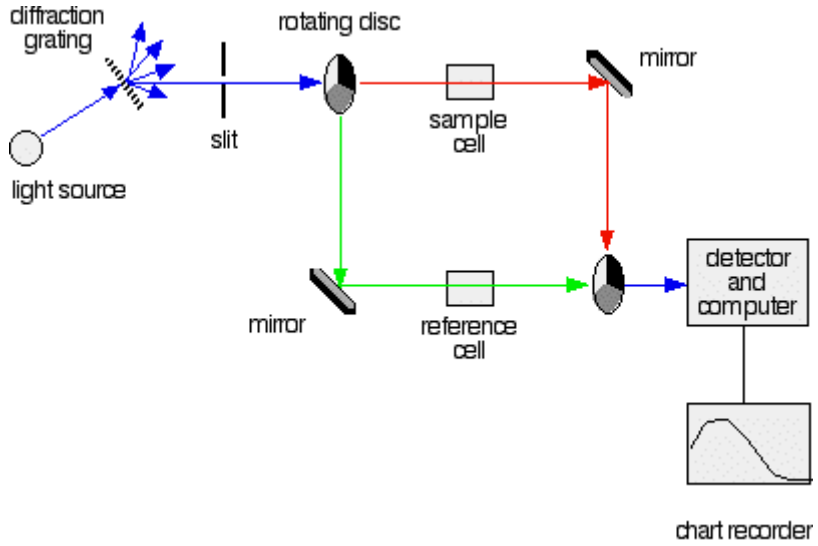
UV-VISIBLE SPECTROSCOPY – THE DOUBLE BEAM ABSORPTION SPECTROMETER

1. These questions relate to the following diagram taken from the Chemguide page.



a) Explain *briefly and in outline only* the purpose of this device.

b) The light source is a combination of two lamps – a deuterium lamp and a tungsten/halogen lamp. Why are two lamps necessary rather than just one?

c) The diffraction grating splits the light from the source into its component wavelengths. The diagram shows only a very narrow band of wavelengths passing through the slit into the rest of the spectrometer. In order to produce an absorption spectrum, all the possible wavelengths of light have to pass through the device. How is that achieved?

d) What is in the sample cell and the reference cell?

e) Explain briefly what is happening with the rotating discs and the mirrors in the central part of the spectrometer.

f) The computer converts the information from the spectrometer into an absorption spectrum which is shown on the chart recorder. Absorbance is recorded on the vertical axis and wavelength on the horizontal one. Absorbance is given by the equation

$$A = \log_{10} \frac{I_o}{I}$$

What are I_0 and I, and how (in outline only) does the computer work them out?