



CD Spectroscope Workshop

Difficulty Level: 1 (very simple)

Parts and Tools

- Strong cardboard box
- Old CD
- Sticky tape
- Protractor
- Craft knife
- Light sources

Instructions

This guide demonstrates how to construct a very simple spectroscope.

Spectroscopes are simple devices often using a diffraction grating or prism to split visible light into a spectrum. Often used to look at stars or gemstones, the resultant spectrum enables the viewer to determine the makeup of the star or gem in question. Different wavelengths (colours) are absorbed and reflected by different minerals and gases and so because each star or type of gemstone has different physical properties, the spectrum created by each is unique, reflecting which types of gas or mineral it contains. In science we use spectroscopes to view different light sources such as filament lamps and candle flames. Each source gives a different spectral configuration.

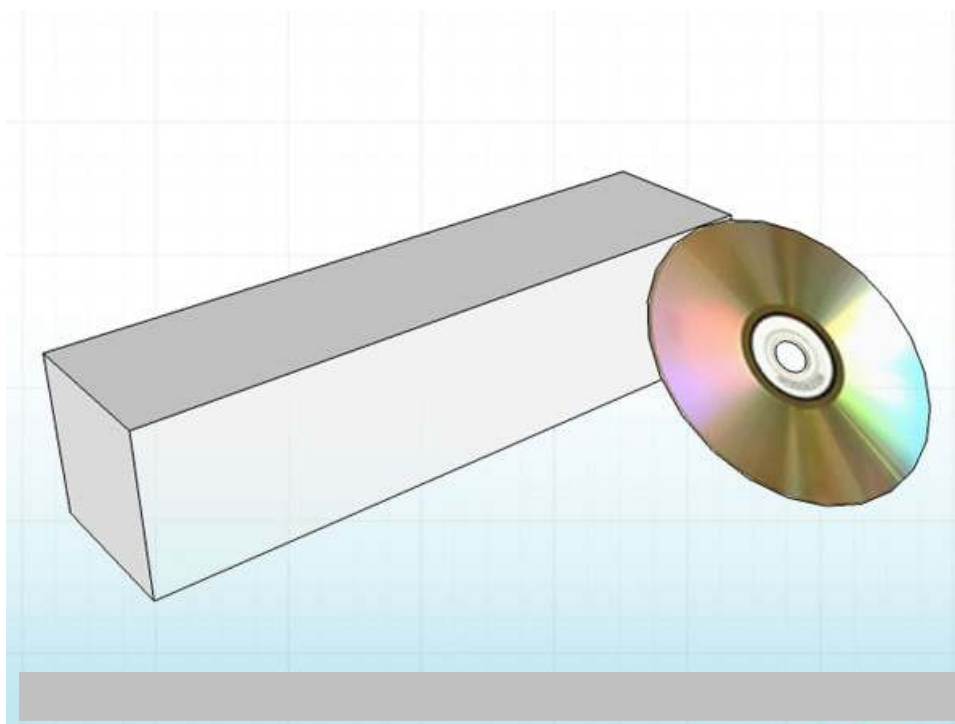


Fig 1: Rectangular box and an old CD

Fig 1 shows a rectangular box and an old CD which are the main components that make up this model. The type of box which houses aluminium foil is perfect for this. The CD must be free of scratches to ensure a clean spectral image.

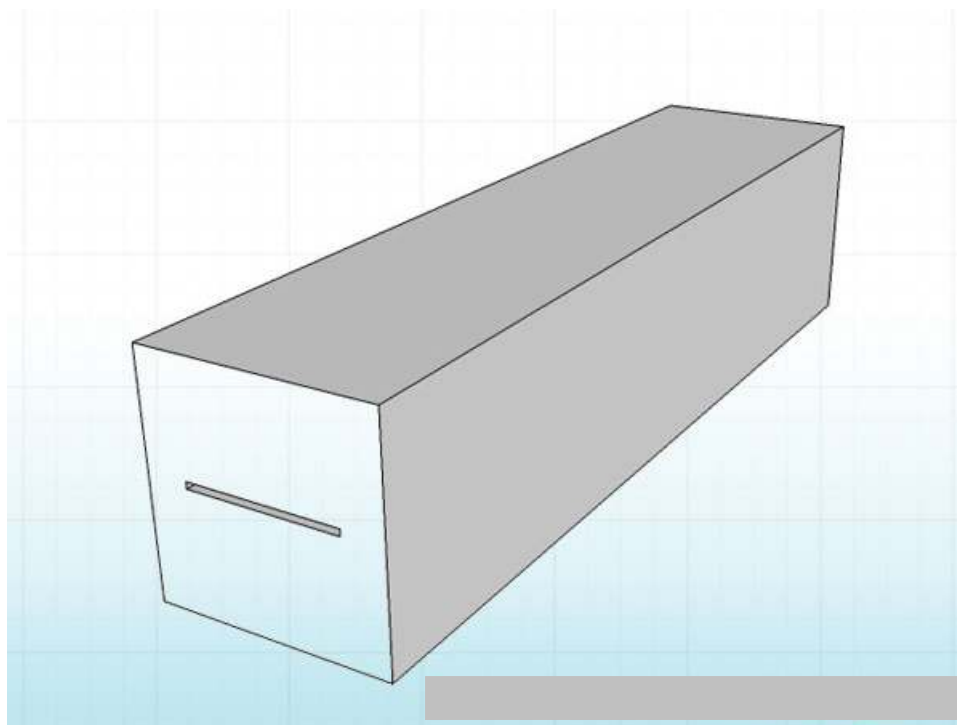


Fig 2: Slit cut into one end section of the box

Fig 2 shows the slit which has been cut into one end section of the box. Use a craft knife to cut a small slit no more than 3mm wide. This aperture will allow light to pass through and towards the CD face. Make sure the sides of the slit are straight and clean of debris.

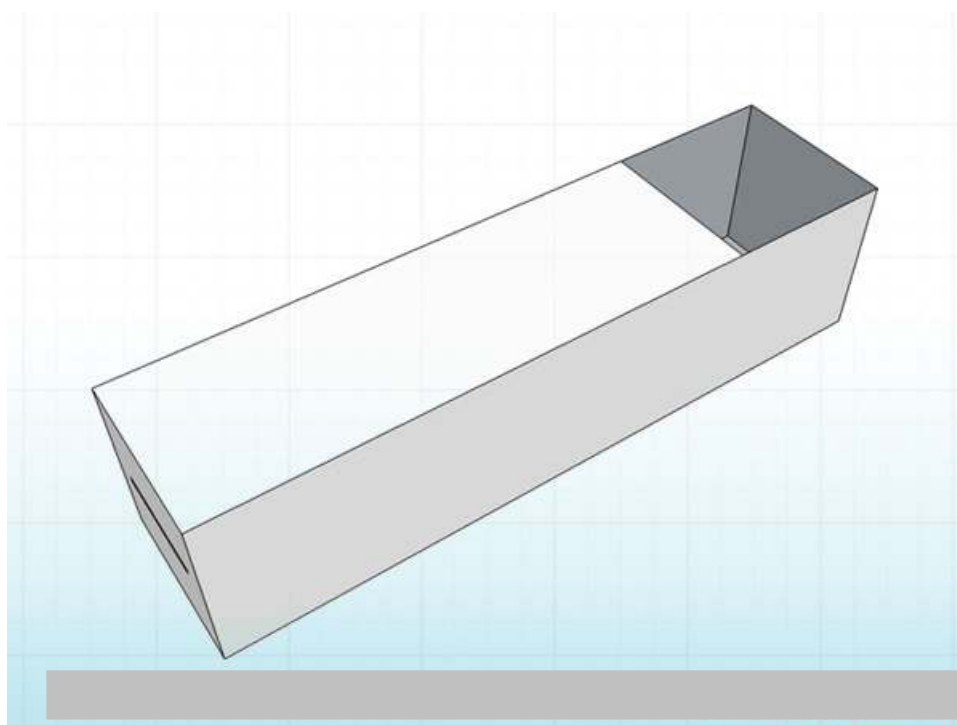


Fig 3: Cut out section on the top of the box

Fig 3 shows a cut out section on the top of the box. This will allow the CD to be positioned and will allow the viewer to look into the box to view the spectra. If cutting the hole in the top compromises the strength of the box, Add some sticky tape to secure the sides. The size of the hole needs to be approximately $\frac{3}{4}$ the width of the CD.

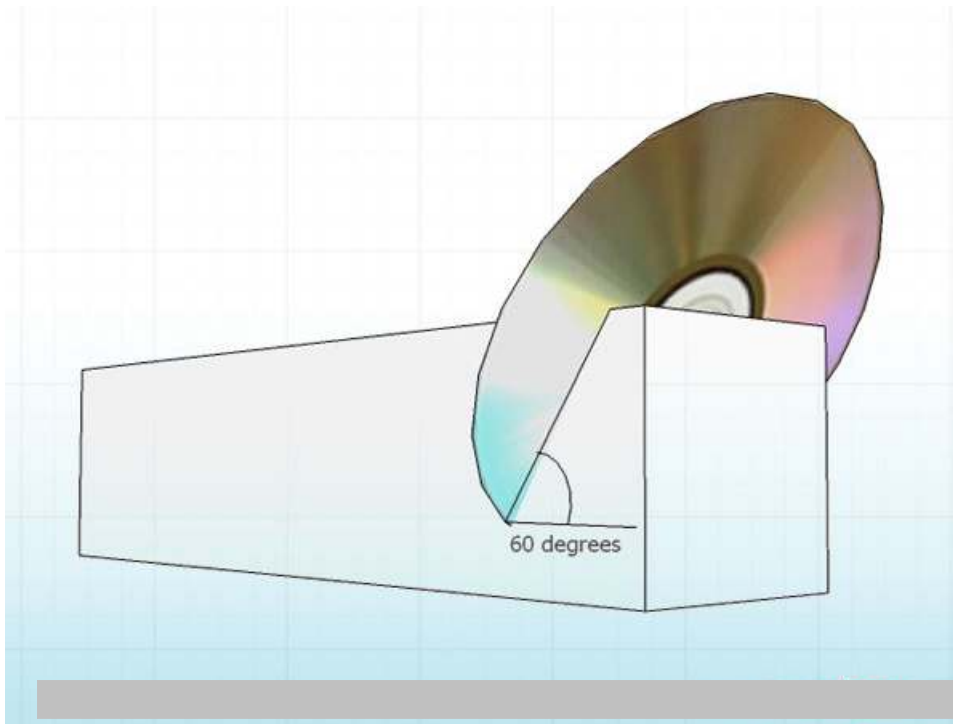


Fig 4: CD in place

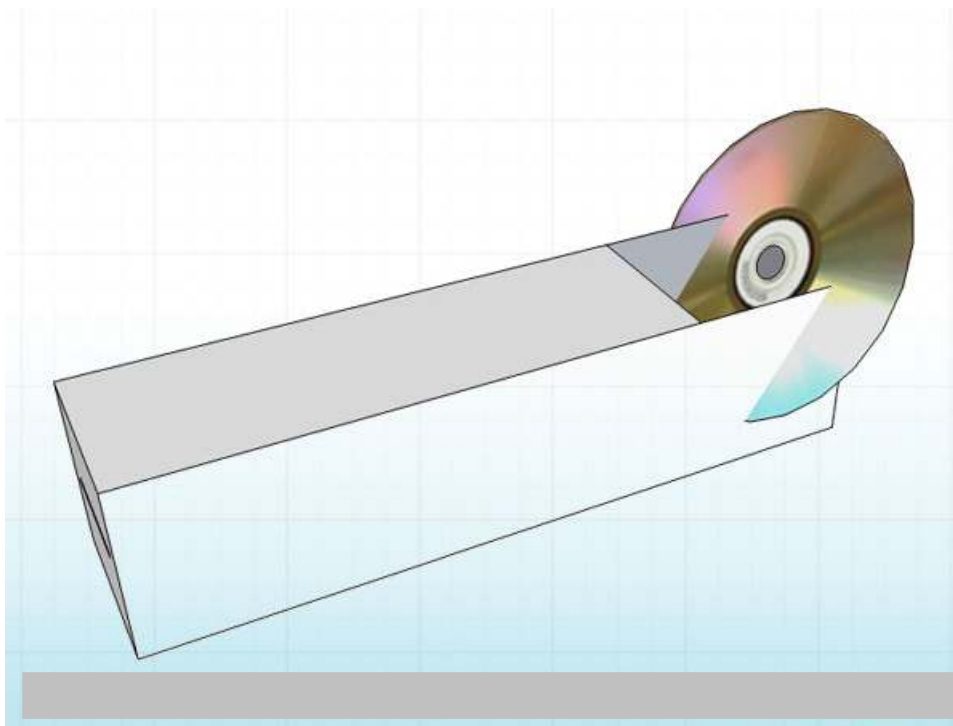


Fig 5: CD in place

Fig 4 and fig 5 show the CD in place. Two slits first need to be cut into the sides of the box at 60° to the horizontal. The CD then needs to be slotted in so that the centre of the CD is in line with the top of the box. Secure the CD with sticky tape. Look into the box at the CD face and ensure you can see the end slit reflected in the surface of the CD.

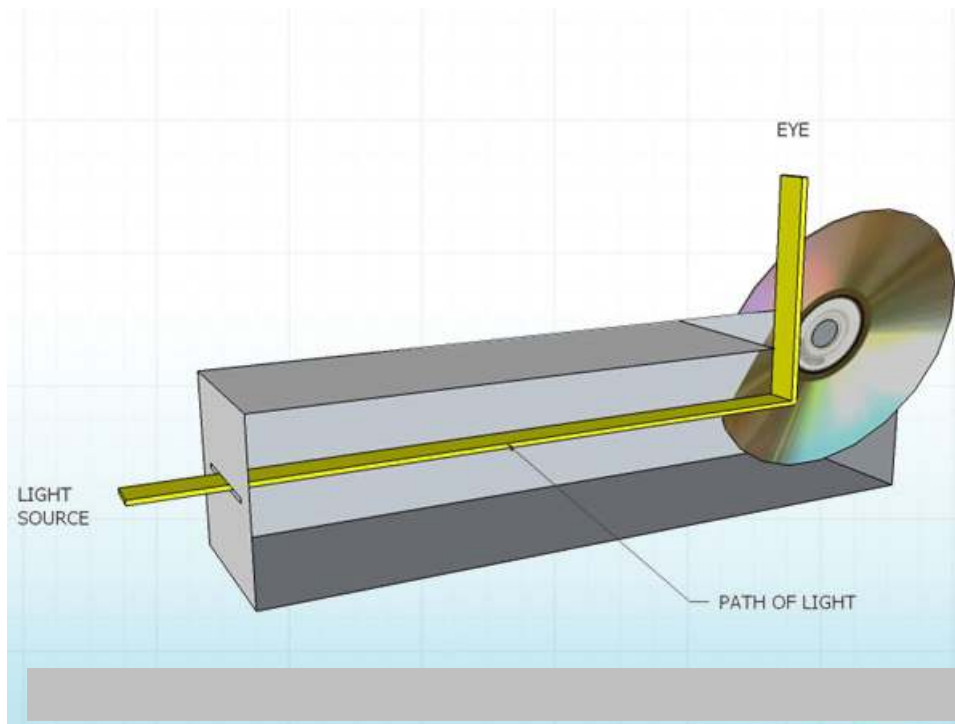


Fig 6: Path of the light

Fig 6 shows the path of the light which enters the slit and where the viewer should look to see the spectra.

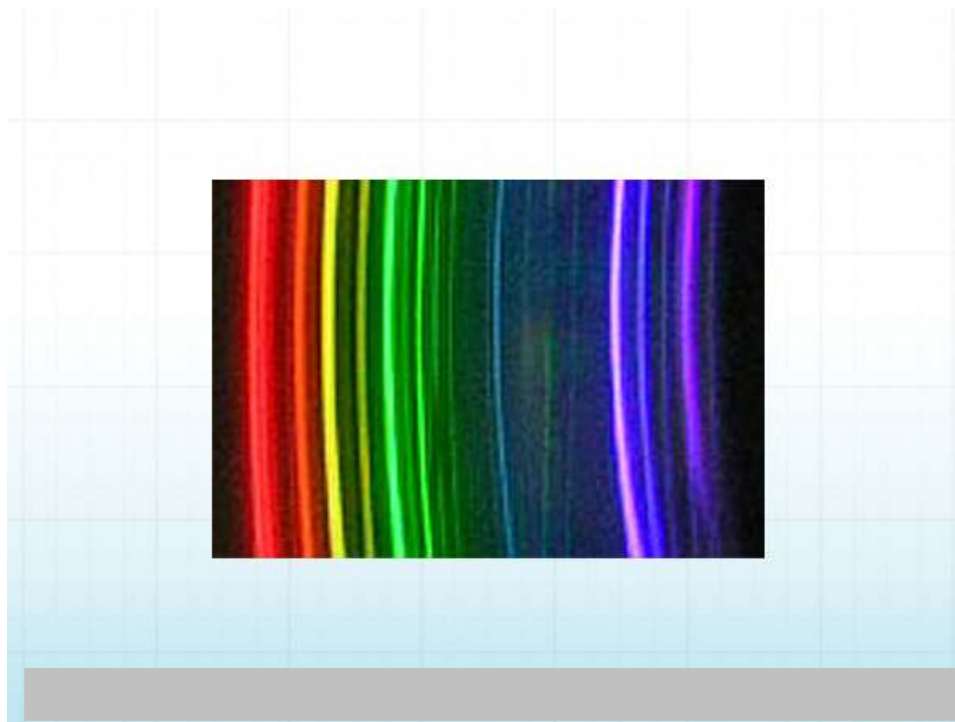


Fig 7: Spectra

Fig 7 shows the kind of spectra you should be able to view using this model. Point the slit end at a filament lamp in a darkened room to get a good effect. Viewing different types of lighting eg; fluorescent tubes, candle flames, coloured bulbs etc give dramatically different spectral bands of different colours. These bands can help identify the source gas or type of filament being viewed.

Disclaimer

Before attempting any of the construction projects featured, ensure you have, and know how to use, the appropriate tools, components and safety equipment and are competent to undertake the project. These guides are for information only and we hold no responsibility for any accidents, injuries or damage caused by the use or misuse of any equipment, project or information contained within this website. In short - use common sense and stay safe!