

Fold this side out by 90 degrees and paste to the Spectroscope Base

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To make the Spectroscope cut along the dotted lines and fold and paste as shown

Spectroscope Base

Do not fold

Spectroscope made by: _____

Name: _____

Do not fold

Sides **A** and **B** are aligned to line **A'** and **B'** and glued

Fold here - inside

Fold this side in by 90 degrees

A'

Towards light

B'

Fold this side in by 90 degrees

Colour	Element	wl	wl = wavelength in nm
Faint purple	Mercury	405	
Bright blue	Mercury	436	
Faint green	Mercury (triphosphor)	542	
Green	Mercury	546	
Green yellow	Mercury	577	
Orange red	Mercury (triphosphor)	611	

Eye

Fold round CD

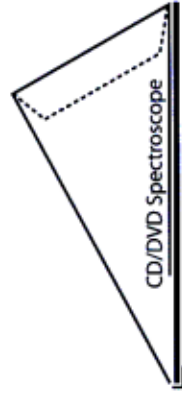
Institute of Astronomy

CD/DVD Spectroscope

Adapted from an original design by Arvind Paranjpye for the Public Outreach Programme at the Inter-University Centre for Astronomy and Astrophysics, Pune, India
<http://www.lucaa.ernet.in/~scipop>

Fold out

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Insert and stick used CD or DVD like this

YOUR SPECTROSCOPE

The spectroscope allows light in at one end through a narrow slit, to be dispersed into a **spectrum** by the CD acting as a diffraction grating near your eye.



HOW TO USE YOUR SPECTROSCOPE:

Look through the 'Eye' slit while pointing the 'Towards Light' slit at a source of light. Adjust the angle so you can see a rainbow, or **spectrum**.

SUGGESTIONS OF SOURCES OF LIGHT TO INVESTIGATE WITH YOUR SPECTROSCOPE

A *continuum* source of light – such an **old-style (incandescent) lightbulb** will show a simple rainbow with no bright lines in either absorption or emission. This is because the light comes from hot material (such as the tungsten filament in the light bulb). It is known as *black body* radiation.

- The **Sun** will look like a continuous rainbow – you may see thin dark bands superposed on this spectrum, caused by absorption by chemical elements in the Solar atmosphere and by molecules in Earth's atmosphere (make the slit narrower with something like a 'post-it' note to see these lines more clearly);
- a **white LED light** (such as a white bike light) or a white screen on an **old-style computer display** (cathode-ray tube) each show a continuum spectrum;
- **coloured LED lights** produce a continuous band of a single colour;
- **candlelight** has a continuous spectrum.

Light sources involving hot gasses will produce *emission lines* at only a few colours; the spectroscope spreads these colours out, so that they can be seen individually. Examples of light sources that yield an emission-line spectrum are:

- a **fluorescent light** which has mercury gas emitting (mostly) ultraviolet light, which activates phosphor to produce a broad-band of visible light. We therefore see bright mercury emission lines (most obviously bright violet and green lines) superposed on a continuum spectrum;
- similarly, **low-energy lightbulbs** and **neon lamps** show a range of emission lines, due to various mixtures of argon, neon, mercury and phosphors;
- a **sodium streetlamp** shows several bright emission lines including in particular a distinctive bright yellow line of sodium;
- a flat-screen monitor – such as a **laptop screen** – produce emission lines;
- when **table salt** is burnt in a candle flame, the yellow sodium line is briefly prominent overlying the candle flame's continuous spectrum.