

Optics

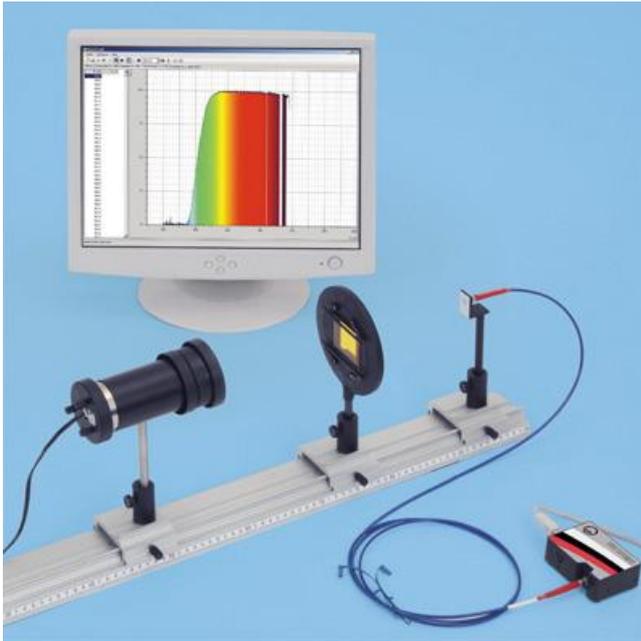
Dispersion and chromatics
Absorption spectra

Absorption spectra of tinted glass samples - Recording and evaluating with a spectrophotometer

Description from SpectraLab (467 250)

For loading examples, please use the SpectraLab help.

Transmission spectra of coloured glasses



Experiment description

This experiment will record the light of an incandescent lamp passed through coloured glasses with a spectrometer and compare this light to the continuous spectrum of the lamp's light. The transmission coefficient and optical density (extinction) of the coloured glasses will be calculated.

Required equipment

1	Compact spectrometer, physics	467 251
1	Fibre holder	460 251
1	Lamp housing with cable	450 60
1	Bulb, 6 V/30 W, E14, set of 2	450 511
1	Condenser with diaphragm holder	460 20
1	Transformer, 6/12 V	521 210
1	Holder with spring clamps	460 22
	Various filters, e.g.:	
1	Light filter, dark red	468 01
1	Light filter, blue-green	468 09
1	Light filter, blue with violet	468 11
1	Optical bench, S1 profile, 1 m	460 310
3	Clamp rider with clamp	460 311
1	PC with Windows 2000/XP/Vista/7/8	

Experiment setup (see picture)

Place the lamp in the housing but do not yet make a connection to the 6 V transformer output. Initially leave the filter holder empty, i.e. without any filter in the spring clamps.

Performing the experiment

- Activate  to begin a new measurement.
- Select the **Intensity I1** display.
- Start the measurement with .
- Connect the lamp to the 6 V transformer output.
- Align the fibre optic waveguide to maximise intensity. Adapt the integration time, either directly or with  or , such that maximum intensity lies between 75 % and 100 %. Do not change the integration time again after this.
- Switch off the light again to record the background spectrum.

- Open the **Offset I0** display.
- The displayed spectrum will be removed from subsequent measurements as the background spectrum.
- Change to the **Reference I2** display.
- Connect the lamp again to the 6 V transformer output.
- The displayed spectrum serves as a reference spectrum for the following measurement. Suspend reference measurement with **II**.
- Place a filter in the spring clamps of the filter holder.
- The light spectrum passing through the filter can now be seen in the **Intensity I1** display. The reference spectrum is also displayed in grey.
- The filtered spectrum's relationship to the reference curve is calculated and presented in the **Transmission T** display.
- Extinction (optical density) will be calculated and presented in the **Extinction E** display.
- The **●** control can be used to save the transmission spectrum for all displays simultaneously.
- Repeat the experiment with other filters.

Evaluation

After inserting a filter into the holder's spring clamps, the broad spectrum with various spectral colours disappears. When light filters are inserted, only the band of the filter's colour components remains in the visible spectral range. The other components of the visible spectrum are absorbed. The transmission of long wavelengths increase with all filters, especially those in the infrared spectral range. Therefore the filter's colour does not permit conclusions to be drawn about transmission characteristics outside the visible spectral range.

Notes

In the **Transmission** and **Extinction** displays, only those ranges are evaluated whose intensities in the reference curve amount to at least 2 %.

The **Σ** control can be used to reduce noise by averaging multiple individual spectra (also Offset and Reference). Alternatively, [Smoothing to 1 nm resolution](#) can be set in the settings options.