

Light and colour

Dispersion of light into colours

Infrared radiation in the continuous spectrum -
Setup with a zinc sulphide screen

Object of the experiment

1. Detecting infrared radiation in the continuous spectrum of an incandescent lamp

Setup



- Align the filament of the incandescent lamp vertically by turning the lamp insert, and pull the lamp insert out by approx. 3 cm.
- Position the condenser lens ($f = + 50$ mm) behind the lamp at a distance of approx. 2cm.
- Adjust a slit width of approx. 1.75 mm.
- Stick a sheet of white paper to the translucent screen by means of adhesive tape.
- To adjust the experiment setup, keep the prism out of the ray path, and place the translucent screen on the back third of the optical bench.
- Displace the imaging lens ($f = + 100$ mm) until a sharp image of the slit appears on the translucent screen. Then remove the translucent screen from the optical bench, and set it up at a distance of approx. 30 cm and at an angle of approx. 60° with respect to the optical bench.
- Before starting the experiment, expose the zinc sulphide screen to the daylight.
- Darken the room completely.

Remark:

The result from D 5.6.1.3 (detection of infrared radiation by means of a zinc sulphide screen) should be known to the students before the experiment is carried out.

When using the zinc sulphide screen in the spectrum, keep in mind that the phosphorescence starts to die off already when the screen is illuminated with red light.

Apparatus

1 Optical bench, S1 profile, 1 m	460 310
5 Clamp riders with fixing column	460 313
2 Clamp riders with clamp	460 311
1 Lamp housing with cable	450 60
1 Bulbs, 6 V/30 W, E14, set of 2	450 511
1 Plate holder on rod	459 30
1 Lens on rod, $f = + 50$ mm	459 60
1 Lens on rod, $f = + 100$ mm	459 62
1 Adjustable slit on rod	471 71
1 Prism, flint glass	465 32
1 Candle holders, set of 2	459 31ET2
1 Extension pins, set of 2	686 60ET2
1 Screen, translucent	441 53
1 Zinc sulphide screen	468 72
1 Transformer 6/12 V	521 210

Carrying out the experiment

- Set up the flint glass prism in the ray path, and turn the candle holder on the clamp rider until a wide spectrum of high light intensity appears on the translucent screen.
- If necessary, correct the sharpness of the spectrum by displacing the imaging lens.
- Set up the zinc sulphide screen directly at the visible end of the red spectral region.
- Switch the optics lamp off after approx. 2 minutes, and observe the luminous effect on the zinc sulphide screen.

Observation

On the phosphorescing zinc sulphide screen a dark stripe is seen.

Evaluation

In the continuous spectrum of an incandescent lamp, there is a transition from the long-wavelength visible red spectral region to the invisible infrared region.