

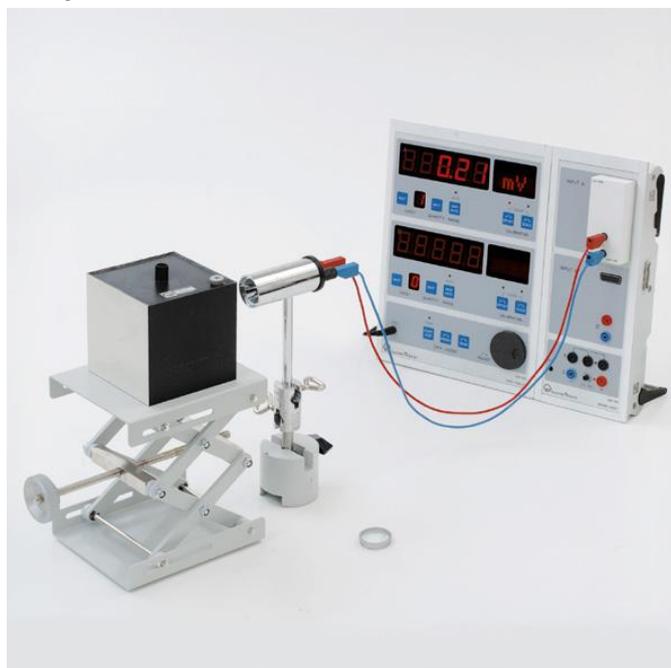
Heat transfer  
Heat radiation

## Emission of heat - Leslie's cube

## Object of the experiment

1. Investigating the emission of heat from bodies with different surface characteristics

## Setup



## Safety note:

When the cube is filled with hot water, only touch it with a piece of cloth or heat protective gloves if you want to shift it.

Remark concerning the intensity measurement:

The thermopile consists of several series-connected thermocouples.

When heat is irradiated from a body, a thermovoltage  $U$  arises at the thermocouples, which is proportional to the intensity of the heat emitted by that body.

Do not touch the thermopile during the measurement and protect it from heat radiation coming, e.g., from the sun or heaters.

Preparation of the intensity measurement:

- Put the CASSY-Display into operation with the Sensor-CASSY being connected.
- Plug the  $\mu\text{V}$  box into Input A.
- Switch the display of Input B off with the key NEXT (CASSY) at the display.
- Connect the thermopile to the  $\mu\text{V}$  box, and set it up at a greater distance from the cube.
- If necessary, make the zero calibration with the key OFFSET (CALIBRATION).

## Apparatus

1 Leslie's cube with stirrer .....	389 261
1 Moll's thermopile .....	557 36
1 $\mu\text{V}$ box .....	524 040
1 Sensor-CASSY 2 .....	524 013
1 CASSY-Display USB .....	524 020USB
1 Connecting leads, 19 A, 100 cm, red/blue, pair .....	501 46
1 Immersion heater .....	303 25
1 Plastic beaker .....	590 06
1 Funnel, Boro 3.3, 60 mm diam. ....	602 670
1 Laboratory stand II .....	300 76
1 Stand rod, 10 cm, 12 mm diam. ....	300 40
1 Universal bosshead .....	666 615
1 Saddle base .....	300 11
Recommended:	
1 Heat protective gloves .....	667 614

## Carrying out the experiment

- Warm 1 l of water with the immersion heater up to approx. 100 °C.
- Put the cube on the laboratory stand, and fill it with the hot water.
- Place the thermopile in front of the black face of the cube at a distance of about 3 cm.
- Remove the protection window of the thermopile.
- When a constant value is reached on the CASSY-Display, read the thermovoltage  $U$ .
- Turn the cube so that the white face is in front of the thermopile (keep the distance of 3 cm).
- Read the thermovoltage  $U$  again.
- Repeat the procedure with all faces of the cube.

## Measuring example

Distance of the thermopile:  $s = 3 \text{ cm}$

Face	$U$ in mV
Black lacquer	2.65
White lacquer	2.58
Metallic-matt	0.24
Metallic-lustrous	0.13

## Evaluation

A hot body emits heat. The intensity of the heat emitted depends on the characteristics of the body's surface.

In the case of black and white bodies, the intensity of the heat emitted is much greater than in the case of metallic-matt or metallic-lustrous bodies.

The intensity of the heat emitted by metallic-lustrous bodies is less than that emitted by metallic-matt bodies.