

Scattering of sunlight in the atmosphere

Task and equipment

Information for teachers

Additional Information

This experiment must be carried out in a completely blacked out room. Only in this way can all the desired effects be observed.

The method for this experiment is uncritical. Only if the milk mixture is too turbid can nothing be seen in transmission - in this case one can simply dilute with water. Experience has shown that 2 drops of concentrated milk or 4 drops of ordinary milk are sufficient for the volume of the macro-cuvette.

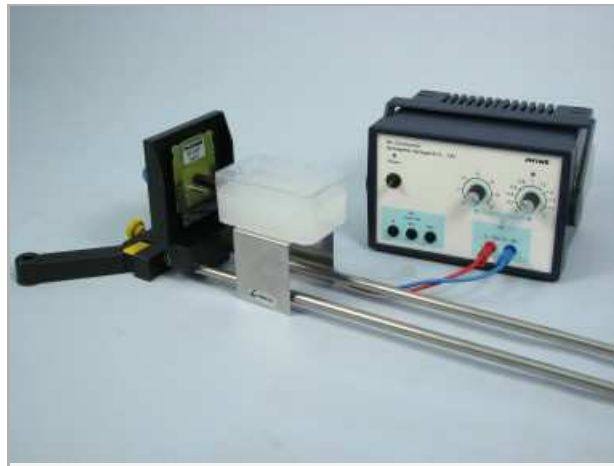
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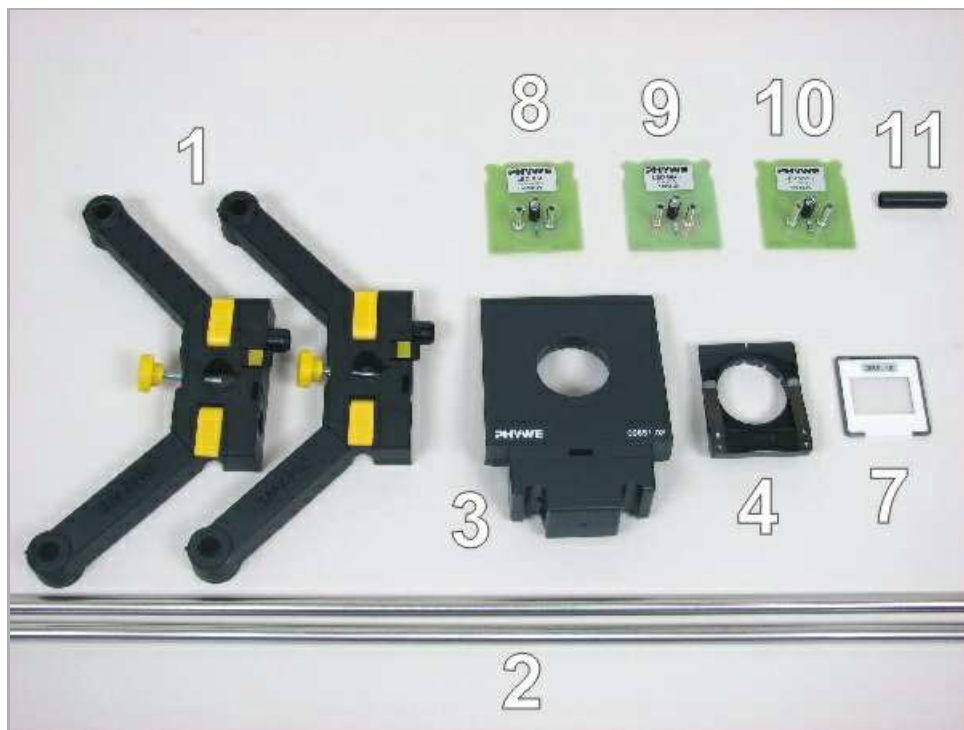
Task

Why is the sky blue?

Why is the sky blue and why is it red in the evening when the sun is setting? This is a question one hears time and again (not only from children). In this experiment you will develop the principles for answering these questions.

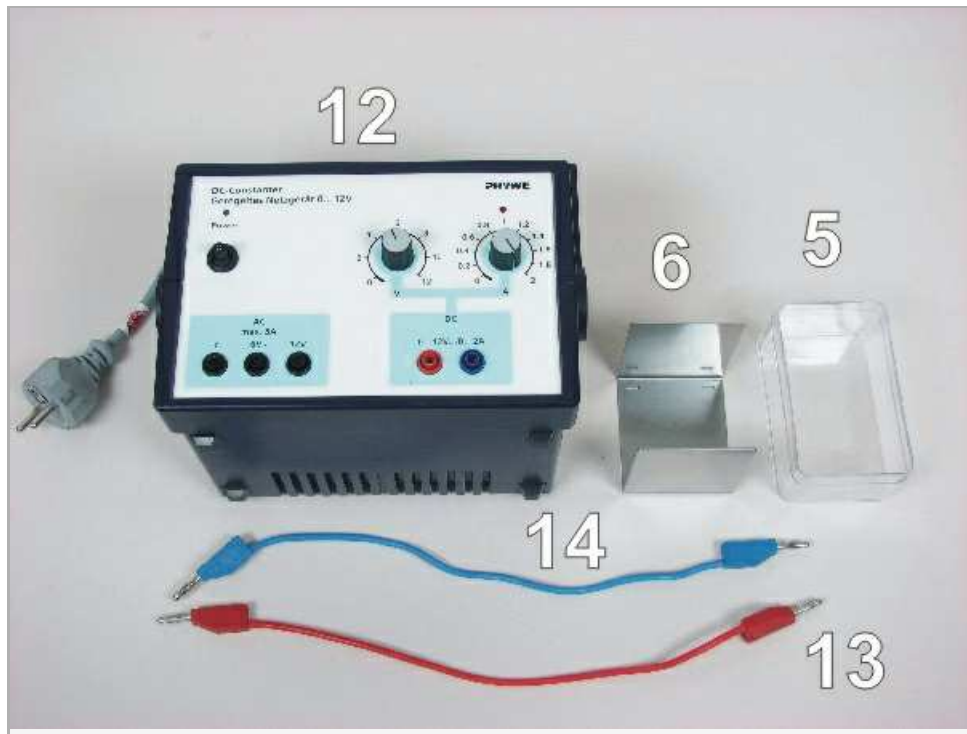


Equipment



Student's Sheet

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Position No.	Material	Order No.	Quantity
1	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1
2	Support base, variable	02001-00	1
3	LED - blue, with series resistor and 4 mm plugs	09852-40	
4	LED - red, with series resistor and 4 mm plugs	09852-20	1
5	LED - white, with series resistor and 4 mm plugs	09852-60	1
6	Universal bench	09840-00	1
7	Stray light tube for LED, $D_i = 8$ mm, $l = 40$ mm	09852-01	1
8	Support rod, stainless steel, $l = 600$ mm, $d = 10$ mm	02037-00	2
9	Slide mount without angle scale	09851-02	1
10	Grating, 500 lines/mm, in slide frame, glassless	09851-16	1
11	Diaphragm holder, attachable	11604-09	1
12	Connecting cord, 32 A, 750 mm, red	07362-01	1
13	Connecting cord, 32 A, 750 mm, blue	07362-04	1
14	Cuvette, plastic, W x D x H: 99 x 59 x 42 mm	09851-05	1
Additional equipment:			
	Milk		

Set-up and procedure

Set-up

Procedure

- Look initially into the cuvette from the side then from the front without directly looking into the light cone. Record the colour impressions



Fig. 11

- For a more precise description of the colour impression, the light is viewed through the grating which is held directly in front of the eye. The spectral distribution is noted down.

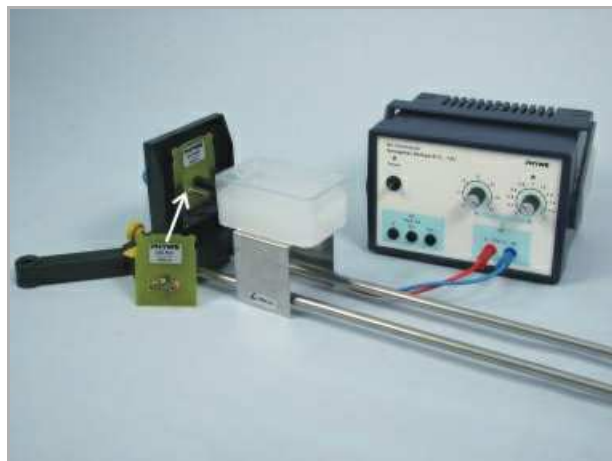


Fig. 12

- Then the LED colour is changed and the experiment is repeated.
- In this experiment you should also modify the concentration of the milk solution.



Fig. 13

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Report: Scattering of sunlight in the atmosphere

Result - Observation 1

Describe the colour impression without the grating.

1. Red LED from a) the side and b) the front.
2. White LED from a) the side and b) the front.

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Evaluation - Question 1

Describe the impressions you gain when viewing through the grating.

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Evaluation - Question 2

Compare the results with the red and the white LED.

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Evaluation - Question 3

Try to find parallels between this experiment and the situation in the sky (blue sky, evening red). What is the role of the milk in this experiment? Consider what kind of molecules are found in the solution.

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