

EXERCISE 6(C)

Solution:

When white light from the sun enters the earth's atmosphere, it gets scattered or the light spreads in all directions by the dust particles and air molecules present in the atmosphere. This phenomenon is called scattering of light.

Solution:

The intensity of scattered light is found to be inversely proportional to the fourth power of the wavelength. This relation holds when the air molecules is smaller in size than the wavelength of incident light.

Solution:

As the intensity of scattered light is inversely proportional to the fourth power of wavelength of light. Hence violet colour is scattered the most while red the least.

Solution:

(a) Out of three radiations, yellow light has the highest wavelength. Hence, it gets scattered the least.

(b) Out of three radiations, blue light has the lowest wavelength. Hence, it gets scattered the most.

Solution:

The light having the longest wavelength is scattered the least. Hence, red coloured light is scattered the least.

Question: 6

The danger signal is red. Why?

Solution:

The wavelength of red light is longest in the visible light. So the light of red colour is scattered least by the air molecules of the atmosphere. Hence when compared to other colours the light of red colour can penetrate to a longer distance. Thus red light can be seen from the farthest distance in comparison to the light of other colours having the same intensity. Hence red light is used for danger signal so that the signal may be visible from the far distance even in fog, etc.

Question: 7

Solution:

Since there is no atmosphere on moon, therefore there is no scattering of light on moon surface. Hence to an observer on the surface of moon, except the light reaching directly from the sun, no light reaches the eyes of the observer. Thus the sun will appear black to an observer on the moon's surface.

Question: 8

What characteristic property of light is responsible for the blue colour of the sky?

Solution:

As the blue colour is scattered the most due to its short wavelength. Scattering property of light is responsible for the blue colour of the sky.

Question: 9

The colour of the sky, in direction of the sun is blue. Explain.

Solution:

As light travels through the atmosphere, it gets scattered in different directions by the air molecules present in its path. The blue light due to its short wavelength is scattered more than the red light of long wavelength. Thus the light directly from sun reaching our eye is rich in red colour while the light from all the other directions reaching our eye is the scattered blue light. Therefore the sky in direction of the sun is blue.

Question: 10

Why does the sun appear red at sunrise and sunset?

Solution:

The light from sun has to travel the longest distance of atmosphere to reach observer at the time of sunrise and sunset. Since blue light of short wavelength is lost due to scattering while the red light of long wavelength is scattered a little and is not lost much. Thus blue light is almost absent in sunlight reaching the observer and only the red light

reaches us.

Question: 11

The sky at noon appears white. Give reason.

Solution:

At noon the sun is overhead and the light travels a relatively shorter distance through the atmosphere to reach the earth. Due to short distance of light only blue light is scattered and most of the light is not scattered. Hence the sun appears white.

Question: 12

The clouds are seen white. Explain.

Solution:

The clouds are nearer the earth surface and contain dust particles. The water droplets present in clouds are bigger than wavelength of all seven colours of light. Hence the water droplets scatter the entire spectrum. Therefore the clouds appear white.

Question: 13

Give reason why the smoke from a fire looks white.

Solution:

Smoke appears white in colour because the size of the smoke particles are bigger than the wavelength of the light. White light is a mixture of large number of wavelength but they scatter at same extent since the condition of scattering is that size of particles should be smaller than the wavelength of light. Hence the scattered light appears white.

MULTIPLE CHOICE TYPE

Question: 1

In the white light of sun, maximum scattering by the air molecules present in the earth's atmosphere is for:

- (a) red colour
- (b) yellow colour
- (c) green colour
- (d) blue colour

Solution:

In the white light of sun, maximum scattering by the air molecules present in the earth's atmosphere is for blue colour.

Question: 2

To an astronaut in a space-ship, the earth appears:

- (a) white

- (b) red
- (c) blue
- (d) black

Solution:

To an astronaut in a space-ship, the earth appears blue



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