Answer on Question #51845-Physics-Other

20 For a metallic conductor, Ohm's law holds provided (a) potential difference varies (b) current remains constant (c) temperature remains constant (d) potential difference remains constant

Solution

Ohm's law states that the current through a conductor at a constant temperature and in a zero magnetic field between two points is directly proportional to the potential difference across the two points. So, Ohm's law assumes that temperature remains constant.

Answer: (c) temperature remains constant.

8 Which of the following precautions is NOT applicable to experiment involving planoconvex lens?

a) planoconvex lens should have small focal length b) parallax error should be avoided c) the surface of the lens should be cleaned properly d) the tip of the optical pin should be at the same level with the principal axis of the lens

Solution

Sources of error and precaution in experiment involving planoconvex lens:

1. Glass plates and lens should be cleaned thoroughly.

2. The lens used should be of large radius of curvature.

3. The sources of light used should be an extended one.

4. Tip of the optical pin should be focused on a lens tangentially, thus it should be at the same level with the principal axis of the lens to avoid parallax error (Parallax error occurs when the measurement of an object's length is more or less than the true length because of your eye being positioned at an angle to the measurement markings Hence, «planoconvex lens should have small focal length» is not applicable to experiment involving planoconvex lens.

Answer: a) planoconvex lens should have small focal length.

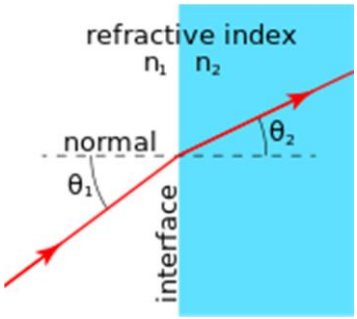
9 A glass prism of refracting angle 60 degrees gives a minimum deviation of 47degrees. What is the refractive index of the glass? a) 1.61 (b) 1.20 (c) 1.52 (d) 1.41

Solution

In optics the refractive index or index of refraction n of a substance (optical medium) is a dimensionless number that describes how light, or any other radiation, propagates through that medium.

The light is traveling through air with refracting index n_1, crosses the edge air-glass and continues to traveling in glass. Due to the different refraction indexes of air and glass, light beam changes its trajectory. The refractive index can be calculated using Snell's law:

$$n_1 \sin\theta_1 = n_2 \sin\theta_2.$$



In our case $\theta_1 = 60°, n_1 = 1\ (for\ air), \theta_2 = 47°$. The refraction index of glass n_2 is unknown.

From Snell's law:

$$n_2 = \frac{n_1 \sin\theta_1}{\sin\theta_2} = \frac{1 \cdot \sin 60°}{\sin 47°} = 1.20.$$

Answer: (b) 1.20.

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