Answer on Question #74819-Physics-Optics

Newton's rings are formed with reflected light of wavelength 589 nm using a plano-convex lens and a plane glass plate with a liquid between them. The diameter of the 15th ring is 5.1 mm and radius of curvature of the curved surface of the lens is 1 m. Calculate the refractive index of the liquid if the ring is dark.

Solution

For the dark ring system:

$$\frac{\mu d_n^2}{4R} = n\lambda$$

$$\mu = \frac{4R}{d_n^2} n\lambda$$

The refractive index of the liquid is

$$\mu = \frac{4(1)}{(0.0051)^2}(15)589 \cdot 10^{-9} = 1.36.$$

Answer: 1.36.