

8.23 A glass semicylinder with $n = 1.4$ is positioned such that its flat face is horizontal, as shown in Fig. P8.23, and its horizontal surface supports a drop of oil, as also shown. When light is directed radially toward the oil, total internal reflection occurs if θ exceeds 53° . What is the index of refraction of the oil?

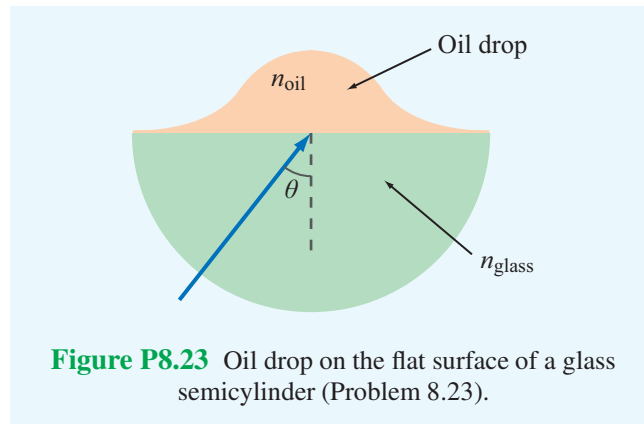


Figure P8.23 Oil drop on the flat surface of a glass semicylinder (Problem 8.23).

Solution:

$$\sin \theta_c = \frac{n_2}{n_1} = \frac{n_{oil}}{1.4},$$

$$n_{oil} = 1.4 \sin 53^\circ = 1.12.$$
