

**Instructor's guide** This activity follows Temperature of the Earth.

Estimate the optical depth for infrared light with wavelength  $15\ \mu\text{m}$  when it travels through our atmosphere at standard temperature and pressure  $STP$ . The number density of air molecules at STP can be found from  $pV = Nk_B T$ .

Our air is 0.041%  $\text{CO}_2$  (410 ppm).

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Figure 1: Absorption cross sections  $\sigma_a$ . The graph is from *Fundamentals of Atmospheric Radiation* by Craig Bohren, a highly recommended book.