

Composition of the Atmosphere

The atmosphere surrounds the earth and rotates with the earth as it orbits the sun. As Table 1-1 shows, dry air consists of about 78 percent nitrogen, 21 percent oxygen and one percent argon. Trace gases such as carbon dioxide, neon and helium also exist as does water vapor. Although the water vapor content of the air is fairly small, it absorbs six times more radiation than any other atmospheric constituent and is therefore a very important component of the atmosphere.

Table 1-1. Chemical composition of dry atmospheric air	
Substance	Concentration (ppm)¹
Nitrogen	780,900
Oxygen	209,400
Argon	9,300
Carbon dioxide	315
Neon	18
Helium	5.2
Methane	2.3
Krypton	0.5
Hydrogen	0.5
Xenon	0.08
Nitrogen dioxide	0.02
Ozone	0.01-0.04

1. ppm is an abbreviation for parts per million. To convert from a concentration expressed as ppm to a concentration expressed as a percent of a total, divide the ppm concentration by 10,000.

Source: *Handbook of Air Pollution* 1968.

Layers of the Atmosphere

The atmosphere is divided into four distinct layers: the troposphere, stratosphere, mesosphere, and thermosphere (Figure 1-1). The lowest layer is called the troposphere which accounts for about three quarters of the mass of the atmosphere and contains nearly all of the water associated with the atmosphere (vapor, clouds and precipitation). The troposphere, where air masses, fronts, and storms reside, is the most unsettled layer and provides earth its weather. The depth of the troposphere varies with latitude and season. The top of the troposphere (tropopause) is about 16.5 km (54,000 ft) on average over the equator and about 8.5 km (28,000 ft) over the poles. Seasonal changes affect the thickness of the troposphere causing it to be thicker in summer (when the air is warmer) than in winter. The depth of the troposphere changes constantly due to changes in atmospheric temperature.