

### Properties of air

Air is a mixture of several gases. Its composition is given below.

#### **Composition of Standard Air**

| Constituent  | Percentage by volume |
|--|----------------------|
| Nitrogen   | 78.084000            |
| Oxygen   | 20.947600            |
| Argon  | 0.934000             |
| Carbon dioxide   | 0.031400             |
| Neon   | 0.001818             |
| Helium   | 0.000524             |
| Other gases(traces of methane, sulfur dioxide, hydrogen, krypton, and xenon) | 0.000658             |
|  | 100.00000            |

**Apparent molecular weight** of standard dry air is 28.9645 g/gmole

**Specific volume of dry air:**

$$V' = \frac{1}{\text{Density}_{air}} = \frac{\text{Volume}_{air}}{(\text{Number of moles}_{air})(MW_{air})}$$

From ideal gas law on a mole basis

$$P V = n R T$$

where; P, pressure, V, volume, n, number of moles, R, gas constant, and T, absolute temperature.

**Average specific heat of dry air:** At 1atm pressure in a temperature range of -40 to 60°C

$$C_{p \text{ air}} = 1.005 \text{ kJ/kg K.}$$

**Enthalpy of dry air:** The heat content of dry air based on the selected reference temperature. Often 0°C is selected.

$$H_a = 1.005 (T_{\text{air}} - T_{\text{ref}})$$