Appendix
UNIT CONVERSION

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It is common practice to express the concentration of gaseous pollutants present in the air as parts per million, parts per billion and parts per trillion in **volumetric basis**. The concentration of pollutants as a **mass basis** is commonly expressed as milligrams, micrograms or nanograms per cubic meter of air.

$$ppm = \frac{1\ vol\ gaseous\ compound}{10^6\ vol\ air} \qquad \frac{mg}{m^3}$$

$$ppb = \frac{1\ vol\ gaseous\ compound}{10^9\ vol\ air} \qquad \frac{\mu g}{m^3}$$

$$ppt = \frac{1\ vol\ gaseous\ compound}{10^{12}\ vol\ air} \qquad \frac{ng}{m^3}$$

Assuming that the pollutant gas behaves as an ideal gas, at given pressure and temperature, the relationship between ppm and milligrams per cubic meter is found from:

$$P\,V = n\,R\,T$$

Where: *P*= pressure (atm)
T= temperature (K)
V= volume (L)
n= moles
MW= molecular weight ($g \cdot mol^{-1}$)
R= 0.082 $atm \cdot L \cdot mol^{-1} \cdot K^{-1}$

If P is taken as 101.3 kPa (**1 atm**) and T as 25ºC (**298.15 K**), reducing the equation, *V* is **24.5 L**; then, the basic relation between the concentration (*C*) in $mg \cdot m^{-3}$ and a ppm is:

$$C\,(\frac{mg}{m^3}) = \frac{ppm \cdot MW_{poll}}{24.5}$$

The concentration in other conditions can be determined by multiplying the constant by the appropriate ratio of temperatures and pressures according to the Ideal Gas Law.