Dalton's Law

In 1803 John Dalton summarized his findings on how mixtures of gasses behave with a statement now know as Dalton's law of partial pressures:

For a mixture of gases in a container; the total pressure exerted is the sum of the pressures that each gas would exert if it were alone.

$$P_{\text{total}} = P_1 + P_2 + P_3 + \cdots$$

Using the ideal gas law we can relate the partial pressure to the moles.

$$P_{\text{total}} = P_1 + P_2 + P_3 + \cdots = (n_1 + n_2 + n_3 + \cdots)(\frac{RT}{V})$$

We can now define the mole fraction. The ratio of the number of moles of a given component to the total number of moles.

$$\chi_1 = \frac{n_1}{n_{\text{total}}} = \frac{P_1}{P_{\text{total}}}$$

Taking water vapor in to account

5.25atm CO_2 + 0.12atm H_2O= 5.37atm Total

Water Vapor Pressure Table

Temperature (°C)	Pressure (mmHg)	Temperature (°C)	Pressure (mmHg)	Temperature (°C)	Pressure (mmHg)
0.0	4.6	19.5	17.0	27.0	26.7
5.0	6.5	20.0	17.5	28.0	28.3
10.0	9.2	20.5	18.1	29.0	30.0
12.5	10.9	21.0	18.6	30.0	31.8
15.0	12.8	21.5	19.2	35.0	42.2
15.5	13.2	22.0	19.8	40.0	55.3
16.0	13.6	22.5	20.4	50.0	92.5
16.5	14.1	23.0	21.1	60.0	149.4
17.0	14.5	23.5	21.7	70.0	233.7
17.5	15.0	24.0	22.4	80.0	355.1
18.0	15.5	24.5	23.1	90.0	525.8
18.5	16.0	25.0	23.8	95.0	633.9
19.9	16.5	26.0	25.2	100.0	760.0

Ex: