

molar mass kg/kmol

CH₄=16, O₂=32, CO₂=44, H₂O=18, N₂=28, Air=28.84

CH₄+2O₂=CO₂+2H₂O

16 + 64 = 44+36

V_{molecula} is the ratio of in Nm³ molecula to Nm³ of CH₄

CO	H2S	H2	O2	N2	CO2	CH4	C2H6	C3H8	C4H10
0.0000	0.0000	0.0000	0.0000	0.2000	0.0900	99.4856	0.1932	0.0210	0.0081

CO := 0 H2S := 0 H2 := 0 O2 := 0 N2 := 0.2 CO2 := 0.09

CH4 := 99.4856 C2H6 := 0.1932 C3H8 := 0.021 C4H10 := 0.0081 C5H12 := 0.0021

C2H4 := 0 C3H6 := 0 C4H8 := 0 C6H6 := 0 C2H2 := 0 H2O := 0

SUM := CO + H2S + H2 + O2 + N2 + CO2 + CH4 + C2H6 + C3H8 + C4H10 + C5H12 ... = 100 + C2H4 + C3H6 + C4H8 + C6H6 + C2H2 + H2

C_mH_n = Σ(m+n/4)·C_mH_n

$$\begin{aligned} C_m H_n := & \left(1 + \frac{4}{4}\right) \cdot CH_4 + \left(2 + \frac{6}{4}\right) \cdot C_2H_6 + \left(3 + \frac{8}{4}\right) \cdot C_3H_8 + \left(4 + \frac{10}{4}\right) \cdot C_4H_{10} \dots = 199.822 \\ & + \left(5 + \frac{12}{4}\right) C_5H_{12} + \left(2 + \frac{4}{4}\right) \cdot C_2H_4 + \left(3 + \frac{6}{4}\right) \cdot C_3H_6 + \left(4 + \frac{8}{4}\right) \cdot C_4H_8 \dots \\ & + \left(6 + \frac{6}{4}\right) \cdot C_6H_6 \end{aligned}$$

V⁰[m³ air/m³NG]

$$V_0 := 0.0476 \cdot (0.05CO + 0.5 \cdot H_2 + 1.5 \cdot H_2S + C_m H_n - O_2) = 9.512 \cdot \frac{m^3}{m^3} (4-13)$$

V⁰_{N₂}[m³ (N₂)/m³(NG)]

$$V_{0N_2} := 0.79 \cdot V_0 + \frac{N_2}{100} = 7.516 \quad (4-14)$$

VRO₂[m³ (CO₂+CO+H₂S)/m³(NG)]

$$V_{\text{co2}} := \frac{1}{1} = 1 \quad V_{\text{o2}} := \frac{2}{1} = 2 \quad V_{\text{n2}} := V_{\text{o2}} \cdot \frac{.791}{.209} = 7.569 \quad V_{\text{air}} := V_{\text{o2}} \cdot \frac{1}{.209} = 9.569$$

$$V_{\text{h2o}} := \frac{2}{1} = 2$$

$$\alpha := 1.79$$

$$V_{\text{g}} := V_{\text{co2}} + V_{\text{h2o}} + V_{\text{n2}} + V_{\text{air}} \cdot (\alpha - 1) = 18.129$$

$$O_2 := 12.393 \quad \alpha_{\text{w}} := \frac{V_{\text{h2o}}}{V_{\text{g}}}$$

$$O_{2\text{dry}} := O_2 \cdot \frac{1}{1 - \alpha} = 13.93$$

$$\alpha_{\text{w}} := \left(\frac{O_{2\text{dry}}}{20.9 - O_{2\text{dry}}} \right) \cdot \frac{(V_{\text{n2}} + V_{\text{co2}})}{V_{\text{air}}} = 1.79$$

Exhaust gas analysis:	Vol.%
N2	73.538
O2	12.393
CO2	3.746
SO2	0.000
H2O	9.461
Ar	0.862

C2H2	H2O	SUM
0.0000	0.0000	100.0000