

"Dry Gas Data"

Dry_Co2 = .1174 "Co2 fraction in dry exhaust"
 Dry_Oxygen = 0 "Oxygen fraction in dry exhaust"
 Dry_Nitrogen = .8826 "Nitrogen fraction in dry exhaust"

"Wet Gas Constituents"

Co2 = alpha "moles Co2 in exhaust"
 H2o = beta/2 "moles H2o in exhaust"
 Oxygen = (lambda-1)*(alpha+beta/4) "moles oxygen in exhaust"
 Nitrogen = lambda*(alpha + beta/4)*3.76 "moles nitrogen in exhaust"

"Dry Gas Analysis"

Dry_Total = Co2 + Oxygen + Nitrogen
 Dry_Co2 = Co2/(Dry_Total) "Co2 fraction in dry exhaust"
 Dry_Oxygen = Oxygen/(Dry_Total) "Oxygen fraction in dry exhaust"
 Dry_Nitrogen = Nitrogen/(Dry_Total) "Nitrogen fraction in dry exhaust"

"Actual air/fuel data"

Percent_Theoretical_Air = lambda*100
 air_act_coef = lambda*(alpha + beta/4)
 AF_act = air_act_coef*(32+3.76*28)/(alpha*12+beta*1) "actual air/fuel - gravimetric basis"
 Phi = 1/lambda "actual equivalence ratio"

"Stoichiometric air/fuel data"

air_stoich_coef = alpha+beta/4
 AF_stoich = air_stoich_coef*(32+3.76*28)/(alpha*12+beta*1) "stoichiometric air/fuel - gravimetric basis"

"Fuel Composition"

HtoC_ratio = beta/alpha
 Mass_carbon = alpha*12/(alpha*12+beta*1)
 Mass_hydrogen = beta*1/(alpha*12+beta*1)

SOLUTION**Unit Settings: SI C kPa kJ mass deg**

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|------------------------------|-------------------------|
| AFact = 17.16 | AFstoich = 17.16 |
| airfact,coef = 0.2347 | airstoich,coef = 0.2347 |
| α = 0.1174 | β = 0.4693 |
| Co2 = 0.1174 | DryCo2 = 0.1174 |
| DryNitrogen = 0.8826 | DryOxygen = 0 |
| DryTotal = 1 | H2o = 0.2347 |
| HtoCratio = 3.998 | λ = 1 |
| Masscarbon = 0.7501 | Masshydrogen = 0.2499 |
| Nitrogen = 0.8826 | Oxygen = 0 |
| PercentTheoretical,Air = 100 | ϕ = 1 |

No unit problems were detected.

KEY VARIABLES

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|-----------------------|--|
| AFact = 17.16 | <i>Actual air/fuel on mass basis</i> |
| AFstoich = 17.16 | <i>Stoichiometric air/fuel on mass basis</i> |
| ϕ = 1 | <i>Equivalence Ratio</i> |
| HtoCratio = 3.998 | <i>H/C ratio in fuel</i> |
| Masscarbon = 0.7501 | <i>mass fraction of carbon in fuel</i> |
| Masshydrogen = 0.2499 | <i>mass fraction of hydrogen in fuel</i> |