\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

NASA-GLENN CHEMICAL EQUILIBRIUM PROGRAM CEA2, FEBRUARY 5, 2004

BY BONNIE MCBRIDE AND SANFORD GORDON

REFS: NASA RP-1311, PART I, 1994 AND NASA RP-1311, PART II, 1996

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

### CEA analysis performed on Sun 09-Feb-2020 17:49:04

# Problem Type: "Rocket" (Infinite Area Combustor)

prob case=1111\_\_\_\_\_\_\_\_\_\_\_7282 ro equilibrium

# Pressure (1 value):

p,atm= 1

# Equivalence based on Fuel/Oxid. wt ratio (Eq 9.19\*) (1 value):

phi= 0.8

# You selected the following fuels and oxidizers:

reac

fuel C3H8 mole=100.0000 t,k= 298.000

oxid Air mole=100.0000 t,k= 298.000

# You selected these options for output:

# short version of output

output short

# Proportions of any products will be expressed as Mole Fractions.

# Heat will be expressed as siunits

output siunits

# Input prepared by this script:prepareInputFile.cgi

### IMPORTANT: The following line is the end of your CEA input file!

end

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 14.7 PSIA

CASE = 1111\_\_\_\_\_\_\_\_\_\_\_

REACTANT MOLES ENERGY TEMP

KJ/KG-MOL K

FUEL C3H8 100.0000000 -104691.036 298.000

OXIDANT Air 100.0000000 -129.895 298.000

O/F= 19.59862 %FUEL= 4.854693 R,EQ.RATIO= 0.800304 PHI,EQ.RATIO= 0.800000

CHAMBER THROAT

Pinf/P 1.0000 1.8045

P, BAR 1.0132 0.56152

T, K 2040.47 1819.87

RHO, KG/CU M 1.7019-1 1.0584-1

H, KJ/KG -119.53 -451.65

U, KJ/KG -714.87 -982.18

G, KJ/KG -19273.5 -17534.9

S, KJ/(KG)(K) 9.3871 9.3871

M, (1/n) 28.497 28.521

(dLV/dLP)t -1.00047 -1.00011

(dLV/dLT)p 1.0156 1.0043

Cp, KJ/(KG)(K) 1.5938 1.4598

GAMMAs 1.2321 1.2521

SON VEL,M/SEC 856.4 815.0

MACH NUMBER 0.000 1.000

PERFORMANCE PARAMETERS

Ae/At 1.0000

CSTAR, M/SEC 1174.6

CF 0.6939

Ivac, M/SEC 1466.0

Isp, M/SEC 815.0

MOLE FRACTIONS

\*Ar 0.00877 0.00877

\*CO 0.00088 0.00016

\*CO2 0.09354 0.09434

\*H 0.00003 0.00000

\*H2 0.00025 0.00006

H2O 0.12422 0.12517

\*NO 0.00347 0.00183

\*N2 0.72918 0.73064

\*O 0.00017 0.00004

\*OH 0.00203 0.00075

\*O2 0.03746 0.03824

\* THERMODYNAMIC PROPERTIES FITTED TO 20000.K