```
        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 Tue 03-Dec-2024 15:17:42

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

prob case=_____3157 ro equilibrium

# Pressure (1 value):
p,atm= 19.02
# Supersonic Area Ratio (1 value):
supar= 70

# Oxidizer/Fuel Wt. ratio (1 value):
o/f= 2.3

# You selected the following fuels and oxidizers:
reac
fuel paraffin          wt%=100.0000 rho,g/cc=   0.924
oxid O2                wt%=100.0000

# You selected these options for output:
# short version of output
output short
# Proportions of any products will be expressed as Mass Fractions.
output massf
# Heat will be expressed as siunits
output siunits

# Input prepared by this script:/var/www/sites/cearun.grc.nasa.gov/cgi-bin/CEARU
N/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 =   279.5 PSIA
CASE = _____

            REACTANT                    WT FRACTION      ENERGY      TEMP
                                         (SEE NOTE)     KJ/KG-MOL      K
FUEL        paraffin                     1.0000000  -1860600.000    298.150
OXIDANT     O2                           1.0000000         0.000      0.000

O/F=    2.30000  %FUEL= 30.303030  R,EQ.RATIO= 1.444352  PHI,EQ.RATIO= 1.444352

                CHAMBER   THROAT     EXIT
Pinf/P            1.0000   1.7310   891.42
P, BAR            19.272   11.134  0.02162
T, K             3485.98  3312.76  1394.92
RHO, KG/CU M    1.5101 0 9.3124-1 4.5646-3
H, KJ/KG         -562.82 -1240.63 -6320.15
U, KJ/KG        -1839.02 -2436.21 -6793.78
```

G, KJ/KG	-41511.7	-40154.8	-22705.9
S, KJ/(KG)(K)	11.7467	11.7467	11.7467
M, (1/n)	22.711	23.038	24.487
(dLV/dLP)t	-1.04036	-1.03380	-1.00000
(dLV/dLT)p	1.7204	1.6363	1.0001
Cp, KJ/(KG)(K)	6.7576	6.3636	1.9050
GAMMAs	1.1364	1.1338	1.2170
SON VEL,M/SEC	1204.2	1164.3	759.2
MACH NUMBER	0.000	1.000	4.470

PERFORMANCE PARAMETERS

Ae/At	1.0000	70.000
CSTAR, M/SEC	1777.5	1777.5
CF	0.6550	1.9091
Ivac, M/SEC	2191.2	3532.9
Isp, M/SEC	1164.3	3393.3

MASS FRACTIONS

*CO	0.46785	0.45717	0.34666
*CO2	0.23670	0.25349	0.42716
COOH	0.00001	0.00001	0.00000
*H	0.00186	0.00159	0.00000
HCO	0.00002	0.00001	0.00000
HO2	0.00006	0.00003	0.00000
*H2	0.00916	0.00897	0.01407
H2O	0.21771	0.22582	0.21211
H2O2	0.00001	0.00000	0.00000
*O	0.00846	0.00611	0.00000
*OH	0.04085	0.03345	0.00000
*O2	0.01731	0.01336	0.00000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

NOTE. WEIGHT FRACTION OF FUEL IN TOTAL FUELS AND OF OXIDANT IN TOTAL OXIDANTS