```
        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 22-Nov-2022 20:29:13

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

prob case=_____5663 ro equilibrium

# Pressure (1 value):
p,psia= 250
# Chamber/Exit Pressure Ratio (1 value):
pi/p= 18.532

# Oxidizer/Fuel Wt. ratio (1 value):
o/f= 1.5

# You selected the following fuels and oxidizers:
reac
fuel C2H5OH(L)         wt%= 95.0000
fuel H2O(L)            wt%=  5.0000
oxid O2(L)             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 = 250.0 PSIA
CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
FUEL	C2H5OH(L)	0.9500000	0.000	0.000
FUEL	H2O(L)	0.0500000	0.000	0.000
OXIDANT	O2(L)	1.0000000	-12979.000	90.170

O/F= 1.50000 %FUEL= 40.000000 R,EQ.RATIO= 1.255871 PHI,EQ.RATIO= 1.319726

	CHAMBER	THROAT	EXIT
Pinf/P	1.0000	1.7251	18.532
P, BAR	17.237	9.9920	0.93011
T, K	3515.66	3358.19	2773.25
RHO, KG/CU M	1.2324 0	7.5947-1	9.0900-2
H, KJ/KG	-243.37	-983.04	-3740.90
U, KJ/KG	-1642.05	-2298.70	-4764.12
G, KJ/KG	-45273.8	-43996.5	-39262.2
S, KJ/(KG)(K)	12.8085	12.8085	12.8085
M, (1/n)	20.899	21.223	22.535
(dLV/dLP)t	-1.05651	-1.05137	-1.02664
(dLV/dLT)p	1.9992	1.9534	1.6045
Cp, KJ/(KG)(K)	9.3321	9.2267	7.3047
GAMMAs	1.1285	1.1244	1.1153
SON VEL,M/SEC	1256.3	1216.3	1068.3
MACH NUMBER	0.000	1.000	2.476

PERFORMANCE PARAMETERS

Ae/At	1.0000	3.8422	
CSTAR, M/SEC	1866.0	1866.0	
CF	0.6518	1.4174	
Ivac, M/SEC	2298.0	3031.7	
Isp, M/SEC	1216.3	2644.8	

MASS FRACTIONS

*CO	0.32387	0.31304	0.26501
*CO2	0.21714	0.23417	0.30965
COOH	0.00001	0.00001	0.00000
*H	0.00230	0.00202	0.00104
HCO	0.00001	0.00001	0.00000
HO2	0.00013	0.00009	0.00001
*H2	0.01007	0.00963	0.00807
H2O	0.31897	0.33004	0.37014
H2O2	0.00001	0.00001	0.00000
*O	0.01588	0.01291	0.00375

```
  *OH             0.06835  0.05970  0.02690
  *O2             0.04325  0.03838  0.01543

   * THERMODYNAMIC PROPERTIES FITTED TO 20000.K

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