

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 Wed 13-Nov-2024 05:29:59

Problem Type: "Rocket" (Infinite Area Combustor)

prob case=_____2025 ro equilibrium frozen

Pressure (21 values):

p,psia= 14.7, 114.7, 214.7, 314.7, 414.7, 514.7, 614.7, 714.7, 814.7, 914.7, 1014.7, 1114.7, 1214.7, 1314.7, 1414.7, 1514.7, 1614.7,

You selected the following reactants:

name C2H5OH	wt%= 4.1000
name C3H7NO3(L)	wt%= 2.7000
name C4H6,butadiene	wt%= 12.2000
name NH4ClO4(I)	wt%= 70.0000
name Zn	wt%= 11.0000

You selected these options for output:

long version of output

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/CEARUN/prepareInputFile.cgi

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

OPTIONS: TP=F HP=F SP=F TV=F UV=F SV=F DETN=F SHOCK=F REFL=F INCD=F
 RKT=T FROZ=T EQL=T IONS=F SIUNIT=T DEBUGF=F SHKDBG=F DETDBG=F TRNSPT=F

TRACE= 0.00E+00 S/R= 0.000000E+00 H/R= 0.000000E+00 U/R= 0.000000E+00

Pc, BAR =	1.013525	7.908256	14.802986	21.697717	28.592447	35.487178	42.381908
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Pc, BAR =	49.276638	56.171369	63.066099	69.960830	76.855560	83.750291	90.645021
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Pc, BAR =	97.539752	104.434482	111.329213
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Pc/P =

SUBSONIC AREA RATIOS =

SUPERSONIC AREA RATIOS =

NFZ= 1 Mdot/Ac= 0.000000E+00 Ac/At= 0.000000E+00

REACTANT	WT.FRAC	(ENERGY/R),K	TEMP,K	DENSITY
EXPLODED FORMULA				
N: C2H5OH	0.041000	0.000000E+00	0.00	0.0000
C 2.00000	H 6.00000	O 1.00000		

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N: C3H7NO3(L)      0.027000 -0.257983E+05  298.15  0.0000
      C 3.00000 H 7.00000 N 1.00000 O 3.00000
N: C4H6,butadiene  0.122000  0.000000E+00    0.00  0.0000
      C 4.00000 H 6.00000
N: NH4CLO4(I)      0.700000  0.000000E+00    0.00  0.0000
      N 1.00000 H 4.00000 CL 1.00000 O 4.00000
N: Zn              0.110000  0.000000E+00    0.00  0.0000
      ZN 1.00000

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SPECIES BEING CONSIDERED IN THIS SYSTEM
(CONDENSED PHASE MAY HAVE NAME LISTED SEVERAL TIMES)

LAST thermo.inp UPDATE: 9/09/04

g 7/97 *C	g 8/99 CCL	g 8/99 CCL2
n12/93 CCL3	tpis91 CCL4	tpis79 *CH
g 9/99 CHCL	n12/93 CHCL2	g 7/99 CHCL3
g 4/02 CH2	g12/99 CH2CL	tpis91 CH2CL2
g 4/02 CH3	tpis91 CH3CL	g11/00 CH2OH
g 7/00 CH3O	g 8/99 CH4	g 7/00 CH3OH
srd 01 CH3OOH	g 8/99 *CN	g12/99 CNN
tpis79 *CO	tpis91 COCL	tpis91 COCL2
tpis91 COHCL	g 9/99 *CO2	tpis91 COOH
tpis91 *C2	tpis91 C2CL	g 5/02 C2CL2
tpis91 C2CL3	g 5/02 C2CL4	g 5/02 C2CL6
g 6/01 C2H	g 5/02 C2HCL	g 5/02 C2HCL3
g 1/91 C2H2,acetylene	g 5/01 C2H2,vinylidene	tpis91 C2H2CL2
g 4/02 CH2CO,ketene	g 3/02 O(CH)2O	srd 01 HO(CO)2OH
g 7/01 C2H3,vinyl	g 5/02 C2H3CL	srd 01 CH2CL-COOH
g 9/00 CH3CN	g 6/96 CH3CO,acetyl	g 1/00 C2H4
g 8/88 C2H4O,ethylen-o	g 8/88 CH3CHO,ethanal	g 6/00 CH3COOH
srd 01 OHCH2COOH	g 7/00 C2H5	g 7/00 C2H6
g 8/88 CH3N2CH3	g 8/88 C2H5OH	g 7/00 CH3OCH3
srd 01 CH3O2CH3	g 7/00 CCN	tpis91 CNC
srd 01 OCCN	tpis79 C2N2	g 8/00 C2O
tpis79 *C3	n 4/98 C3H3,1-propynl	n 4/98 C3H3,2-propynl
g 2/00 C3H4,allene	g 1/00 C3H4,propyne	g 5/90 C3H4,cyclo-
g 3/01 C3H5,allyl	g 2/00 C3H6,propylene	g 1/00 C3H6,cyclo-
g 6/01 C3H6O,propylox	g 6/97 C3H6O,acetone	g 1/02 C3H6O,propanal
g 7/01 C3H7,n-propyl	g 9/85 C3H7,i-propyl	g 2/00 C3H8
g 2/00 C3H8O,1propanol	g 2/00 C3H8O,2propanol	srd 01 CNCOCN
g 7/88 C3O2	g tpis *C4	g 7/01 C4H2,butadiyne
g 8/00 C4H4,1,3-cyclo-	n10/92 C4H6,butadiene	n10/93 C4H6,1butyne
n10/93 C4H6,2butyne	g 8/00 C4H6,cyclo-	n 4/88 C4H8,1-butene
n 4/88 C4H8,cis2-buten	n 4/88 C4H8,tr2-butene	n 4/88 C4H8,isobutene
g 8/00 C4H8,cyclo-	g10/00 (CH3COOH)2	n10/84 C4H9,n-butyl
n10/84 C4H9,i-butyl	g 1/93 C4H9,s-butyl	g 1/93 C4H9,t-butyl
g12/00 C4H10,n-butane	g 8/00 C4H10,isobutane	g 6/01 C4N2
g 8/00 *C5	g 5/90 C5H6,1,3cyclo-	g 1/93 C5H8,cyclo-
n 4/87 C5H10,1-pentene	g 2/01 C5H10,cyclo-	n10/84 C5H11,pentyl
g 1/93 C5H11,t-pentyl	n10/85 C5H12,n-pentane	n10/85 C5H12,i-pentane
n10/85 CH3C(CH3)2CH3	g 2/93 C6H2	g11/00 C6H5,phenyl
g 8/00 C6H5O,phenoxy	g 8/00 C6H6	g 8/00 C6H5OH,phenol
g 1/93 C6H10,cyclo-	n 4/87 C6H12,1-hexene	g 6/90 C6H12,cyclo-
n10/83 C6H13,n-hexyl	g 6/01 C6H14,n-hexane	g 7/01 C7H7,benzyl
g 1/93 C7H8	g12/00 C7H8O,cresol-mx	n 4/87 C7H14,1-heptene
n10/83 C7H15,n-heptyl	n10/85 C7H16,n-heptane	n10/85 C7H16,2-methylh
n 4/89 C8H8,styrene	n10/86 C8H10,ethylbenz	n 4/87 C8H16,1-octene
n10/83 C8H17,n-octyl	n 4/85 C8H18,n-octane	n 4/85 C8H18,isooctane
n10/83 C9H19,n-nonyl	g 3/01 C10H8,naphthale	n10/83 C10H21,n-decyl
G12/12 C11H21	g 8/00 C12H9,o-bipheny	g 8/00 C12H10,biphenyl
g 7/97 *CL	g 6/95 CLCN	tpis89 CLO
g 7/93 CLO2	tpis89 CL2	tpis89 CL2O
g 6/97 *H	g 6/01 HCN	g 1/01 HCO
tpis89 HCCN	g 6/01 HCCO	tpis89 HCL
g 6/01 HNC	g 7/00 HNCO	g10/01 HNO

tpis89	HN02	g 5/99	HN03	g 1/01	HOCL
g 4/02	H02	tpis78	*H2	g 5/01	HCHO,formaldehy
g 6/01	HCOOH	g 8/89	H2O	g 6/99	H2O2
g 6/01	(HCOOH)2	g 5/97	*N	g 6/01	NC0
g 4/99	*NH	g 3/01	NH2	tpis89	NH3
tpis89	NH2OH	tpis89	*NO	g 4/99	NOCL
g 4/99	NO2	g 4/99	NO2CL	j12/64	NO3
tpis78	*N2	J12/64	N2O	g 6/01	NCN
g 5/99	N2H2	tpis89	NH2NO2	g 4/99	N2H4
g 4/99	N2O3	tpis89	N2O4	g 4/99	N2O5
tpis89	N3	g 4/99	N3H	g 5/97	*O
g 4/02	*OH	tpis89	*O2	g 8/01	O3
g 6/97	*Zn	g 12/0	THDCPD,endo	g 12/0	THDCPD,exo
g11/99	N2H4(L)	n 4/83	C(gr)	n 4/83	C(gr)
n 4/83	C(gr)	n12/84	CH3OH(L)	n12/84	C2H5OH(L)
n 4/85	C6H14(L),n-hexa	n12/88	C6H5NH2(L)	n10/86	C6H6(L)
g11/99	H2O(cr)	g 8/01	H2O(L)	g 8/01	H2O(L)
j 9/65	NH4CL(II)	j 9/65	NH4CL(III)	j 9/65	NH4CL(III)
coda89	Zn(cr)	coda89	Zn(L)		

O/F = 0.000000

ENTHALPY	EFFECTIVE FUEL	EFFECTIVE OXIDANT	MIXTURE
(KG-MOL)(K)/KG	h(2)/R	h(1)/R	h0/R
	-0.66279977E+01	0.00000000E+00	-0.66279977E+01
KG-FORM.WT./KG	bi(2)	bi(1)	b0i
*C	0.11572636E-01	0.00000000E+00	0.11572636E-01
*H	0.44503192E-01	0.00000000E+00	0.44503192E-01
*O	0.25492735E-01	0.00000000E+00	0.25492735E-01
*N	0.62149179E-02	0.00000000E+00	0.62149179E-02
*CL	0.59580015E-02	0.00000000E+00	0.59580015E-02
*Zn	0.16822144E-02	0.00000000E+00	0.16822144E-02

POINT ITN	T	C	H	O	N
	CL	ZN			
Pinf/Pt = 1.734573					
Pinf/Pt = 1.737871					

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 14.7 PSIA
CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.000000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7379
P, BAR	1.0135	0.58320
T, K	2859.50	2703.97
RHO, KG/CU M	9.7907-2	6.0335-2
H, KJ/KG	-55.109	-608.14
U, KJ/KG	-1090.30	-1574.74
G, KJ/KG	-33842.6	-32558.0
S, KJ/(KG)(K)	11.8159	11.8159

M, (1/n)	22.967	23.259
(dLV/dLP)t	-1.02349	-1.01694
(dLV/dLT)p	1.4847	1.3669
Cp, KJ/(KG)(K)	5.4691	4.6696
GAMMAS	1.1395	1.1443
SON VEL,M/SEC	1086.1	1051.7
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1597.3
CF	0.6584
Ivac, M/SEC	1970.8
Isp, M/SEC	1051.7

MASS FRACTIONS

*CO	0.26951	0.26581
*CO2	0.08585	0.09166
*CL	0.02978	0.02346
CLO	0.00002	0.00001
CL2	0.00002	0.00001
*H	0.00182	0.00137
HCL	0.18657	0.19308
HOCL	0.00001	0.00000
*H2	0.01518	0.01517
H2O	0.19526	0.20027
*NO	0.00133	0.00078
*N2	0.08643	0.08669
*O	0.00184	0.00095
*OH	0.01427	0.00961
*O2	0.00211	0.00113
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2,acetylene
C2H2,vinylidene	C2H2CL2	CH2CO, ketene	O(CH)2O	HO(CO)2OH
C2H3,vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl
C2H4	C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH
C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CCN	CNC	OCCN	C2N2
C2O	*C3	C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene
C3H4,propyne	C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-
C3H6O,propylox	C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl
C3H8	C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2
*C4	C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne
C4H6,2butyne	C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,trans2-butene
C4H8,isobutene	C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl
C4H9,s-butyl	C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2
*C5	C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-
C5H11,pentyl	C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3
C6H2	C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol
C6H10,cyclo-	C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane

C7H7,benzyl	C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl
C7H16,n-heptane	C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene
C8H17,n-octyl	C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale
C10H21,n-decyl	C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN
CL02	CL20	HCN	HCO	HCCN
HCCO	HNC	HNCO	HNO	HNO2
HNO3	HO2	HCHO,formaldehy	HCOOH	H2O2
(HCOOH)2	*N	NCO	*NH	NH2
NH3	NH2OH	NOCL	NO2	NO2CL
NO3	N2O	NCN	N2H2	NH2NO2
N2H4	N2O3	N2O4	N2O5	N3
N3H	O3	THDCPD,endo	THDCPD,exo	N2H4(L)
C(gr)	CH3OH(L)	C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)
C6H6(L)	H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)
Zn(cr)	Zn(L)			

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 14.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.8068
P, BAR	1.0135	0.56096
T, K	2859.50	2536.04
RHO, KG/CU M	9.7907-2	6.1101-2
H, KJ/KG	-55.109	-632.23
U, KJ/KG	-1090.30	-1550.32
G, KJ/KG	-33842.6	-30597.8
S, KJ/(KG)(K)	11.8159	11.8159
M, (1/n)	22.967	22.967
Cp, KJ/(KG)(K)	1.7979	1.7695
GAMMAS	1.2521	1.2572
SON VEL,M/SEC	1138.5	1074.4
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1544.0
CF	0.6958
Ivac, M/SEC	1928.9
Isp, M/SEC	1074.4

MASS FRACTIONS

*CO	0.26951	*CO2	0.08585	*CL	0.02978
CLO	0.00002	CL2	0.00002	*H	0.00182
HCL	0.18657	HOCL	0.00001	*H2	0.01518
H2O	0.19526	*NO	0.00133	*N2	0.08643
*O	0.00184	*OH	0.01427	*O2	0.00211
*Zn	0.11000				

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2, acetylene
C2H2, vinylidene	C2H2CL2	CH2CO, ketene	O(CH)2O	HO(CO)2OH
C2H3, vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO, acetyl
C2H4	C2H4O, ethylen-o	CH3CHO, ethanal	CH3COOH	OHCH2COOH
C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CCN	CNC	OCCN	C2N2
C2O	*C3	C3H3, 1-propyn1	C3H3, 2-propyn1	C3H4, allene
C3H4, propyne	C3H4, cyclo-	C3H5, allyl	C3H6, propylene	C3H6, cyclo-
C3H6O, propylox	C3H6O, acetone	C3H6O, propanal	C3H7, n-propyl	C3H7, i-propyl
C3H8	C3H8O, 1propanol	C3H8O, 2propanol	CNCOCN	C3O2
*C4	C4H2, butadiyne	C4H4, 1,3-cyclo-	C4H6, butadiene	C4H6, 1butyne
C4H6, 2butyne	C4H6, cyclo-	C4H8, 1-butene	C4H8, cis2-buten	C4H8, tr2-butene
C4H8, isobutene	C4H8, cyclo-	(CH3COOH)2	C4H9, n-butyl	C4H9, i-butyl
C4H9, s-butyl	C4H9, t-butyl	C4H10, n-butane	C4H10, isobutane	C4N2
*C5	C5H6, 1,3cyclo-	C5H8, cyclo-	C5H10, 1-pentene	C5H10, cyclo-
C5H11, pentyl	C5H11, t-pentyl	C5H12, n-pentane	C5H12, i-pentane	CH3C(CH3)2CH3
C6H2	C6H5, phenyl	C6H5O, phenoxy	C6H6	C6H5OH, phenol
C6H10, cyclo-	C6H12, 1-hexene	C6H12, cyclo-	C6H13, n-hexyl	C6H14, n-hexane
C7H7, benzyl	C7H8	C7H8O, cresol-mx	C7H14, 1-heptene	C7H15, n-heptyl
C7H16, n-heptane	C7H16, 2-methylh	C8H8, styrene	C8H10, ethylbenz	C8H16, 1-octene
C8H17, n-octyl	C8H18, n-octane	C8H18, isooctane	C9H19, n-nonyl	C10H8, naphthale
C10H21, n-decyl	C11H21	C12H9, o-bipheny	C12H10, biphenyl	CLCN
CLO2	CL2O	HCN	HCO	HCCN
HCCO	HNC	HNCO	HNO	HN02
HN03	HO2	HCHO, formaldehy	HCOOH	H2O2
(HCOOH)2	*N	NCO	*NH	NH2
NH3	NH2OH	NOCL	NO2	NO2CL
NO3	N2O	NCN	N2H2	NH2NO2
N2H4	N2O3	N2O4	N2O5	N3
N3H	O3	THDCPD, endo	THDCPD, exo	N2H4(L)
C(gr)	CH3OH(L)	C2H5OH(L)	C6H14(L), n-hexa	C6H5NH2(L)
C6H6(L)	H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)
Zn(cr)	Zn(L)			

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

POINT ITN	T	C	H	O	N
	CL	ZN			
Pinf/Pt = 1.746940					
Pinf/Pt = 1.752575					
Pinf/Pt = 1.752616					

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 114.7 PSIA

CASE = _____

NAME	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150

NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7526
P, BAR	7.9083	4.5123
T, K	3040.62	2839.14
RHO, KG/CU M	7.2982-1	4.5057-1
H, KJ/KG	-55.109	-639.94
U, KJ/KG	-1138.69	-1641.39
G, KJ/KG	-33739.2	-32092.1
S, KJ/(KG)(K)	11.0780	11.0780
M, (1/n)	23.331	23.572
(dLV/dLP)t	-1.01537	-1.01006
(dLV/dLT)p	1.3004	1.2085
Cp, KJ/(KG)(K)	3.9367	3.3482
GAMMAS	1.1597	1.1680
SON VEL,M/SEC	1121.0	1081.5
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1622.9
CF	0.6664
Ivac, M/SEC	2007.5
Isp, M/SEC	1081.5

MASS FRACTIONS

*CO	0.27003	0.26650
*CO2	0.08502	0.09058
*CL	0.01969	0.01419
CLO	0.00002	0.00001
CL2	0.00004	0.00002
*H	0.00115	0.00079
HCL	0.19692	0.20261
HOCL	0.00001	0.00001
*H2	0.01505	0.01508
H2O	0.20174	0.20556
*NO	0.00116	0.00060
*N2	0.08650	0.08677
*O	0.00086	0.00037
*OH	0.01076	0.00647
*O2	0.00102	0.00045
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2,acetylene
C2H2,vinylidene	C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH
C2H3,vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl

C2H4	C2H4O, ethylen-o	CH3CHO, ethanal	CH3COOH	OHCH2COOH
C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CCN	CNC	OCCN	C2N2
C2O	*C3	C3H3, 1-propyn1	C3H3, 2-propyn1	C3H4, allene
C3H4, propyne	C3H4, cyclo-	C3H5, allyl	C3H6, propylene	C3H6, cyclo-
C3H6O, propylox	C3H6O, acetone	C3H6O, propanal	C3H7, n-propyl	C3H7, i-propyl
C3H8	C3H8O, 1propanol	C3H8O, 2propanol	CNCOCN	C3O2
*C4	C4H2, butadiyne	C4H4, 1,3-cyclo-	C4H6, butadiene	C4H6, 1butyne
C4H6, 2butyne	C4H6, cyclo-	C4H8, 1-butene	C4H8, cis2-buten	C4H8, tr2-butene
C4H8, isobutene	C4H8, cyclo-	(CH3COOH)2	C4H9, n-butyl	C4H9, i-butyl
C4H9, s-butyl	C4H9, t-butyl	C4H10, n-butane	C4H10, isobutane	C4N2
*C5	C5H6, 1,3cyclo-	C5H8, cyclo-	C5H10, 1-pentene	C5H10, cyclo-
C5H11, pentyl	C5H11, t-pentyl	C5H12, n-pentane	C5H12, i-pentane	CH3C(CH3)2CH3
C6H2	C6H5, phenyl	C6H5O, phenoxy	C6H6	C6H5OH, phenol
C6H10, cyclo-	C6H12, 1-hexene	C6H12, cyclo-	C6H13, n-hexyl	C6H14, n-hexane
C7H7, benzyl	C7H8	C7H8O, cresol-mx	C7H14, 1-heptene	C7H15, n-heptyl
C7H16, n-heptane	C7H16, 2-methylh	C8H8, styrene	C8H10, ethylbenz	C8H16, 1-octene
C8H17, n-octyl	C8H18, n-octane	C8H18, isooctane	C9H19, n-nonyl	C10H8, naphthale
C10H21, n-decyl	C11H21	C12H9, o-bipheny	C12H10, biphenyl	CLCN
CLO2	CL2O	HCN	HCO	HCCN
HCCO	HNC	HNCO	HNO	HNO2
HNO3	HO2	HCHO, formaldehy	HCOOH	H2O2
(HCOOH)2	*N	NCO	*NH	NH2
NH3	NH2OH	NOCL	NO2	NO2CL
NO3	N2O	NCN	N2H2	NH2NO2
N2H4	N2O3	N2O4	N2O5	N3
N3H	O3	THDCPD, endo	THDCPD, exo	N2H4(L)
C(gr)	CH3OH(L)	C2H5OH(L)	C6H14(L), n-hexa	C6H5NH2(L)
C6H6(L)	H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)
Zn(cr)	Zn(L)			

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 114.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6, butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R, EQ. RATIO= 1.653537 PHI, EQ. RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.8022
P, BAR	7.9083	4.3880
T, K	3040.62	2705.27
RHO, KG/CU M	7.2982-1	4.5515-1
H, KJ/KG	-55.109	-657.58
U, KJ/KG	-1138.69	-1621.66
G, KJ/KG	-33739.2	-30626.7
S, KJ/(KG)(K)	11.0780	11.0780
M, (1/n)	23.331	23.331
Cp, KJ/(KG)(K)	1.8095	1.7828
GAMMAS	1.2452	1.2498
SON VEL, M/SEC	1161.6	1097.7
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1582.9
CF	0.6935
Ivac, M/SEC	1976.0
Isp, M/SEC	1097.7

MASS FRACTIONS

*CO	0.27003	*CO2	0.08502	*CL	0.01969
CLO	0.00002	CL2	0.00004	*H	0.00115
HCL	0.19692	HOCL	0.00001	*H2	0.01505
H2O	0.20174	*NO	0.00116	*N2	0.08650
*O	0.00086	*OH	0.01076	*O2	0.00102
*Zn	0.11000				

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2, acetylene
C2H2, vinylidene	C2H2CL2	CH2CO, ketene	O(CH)2O	HO(CO)2OH
C2H3, vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO, acetyl
C2H4	C2H4O, ethylene-o	CH3CHO, ethanal	CH3COOH	OHCH2COOH
C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CCN	CNC	OCCN	C2N2
C2O	*C3	C3H3, 1-propynyl	C3H3, 2-propynyl	C3H4, allene
C3H4, propyne	C3H4, cyclo-	C3H5, allyl	C3H6, propylene	C3H6, cyclo-
C3H6O, propylox	C3H6O, acetone	C3H6O, propanal	C3H7, n-propyl	C3H7, i-propyl
C3H8	C3H8O, 1propanol	C3H8O, 2propanol	CNCOCN	C3O2
*C4	C4H2, butadiyne	C4H4, 1,3-cyclo-	C4H6, butadiene	C4H6, 1butyne
C4H6, 2butyne	C4H6, cyclo-	C4H8, 1-butene	C4H8, cis2-buten	C4H8, tr2-butene
C4H8, isobutene	C4H8, cyclo-	(CH3COOH)2	C4H9, n-butyl	C4H9, i-butyl
C4H9, s-butyl	C4H9, t-butyl	C4H10, n-butane	C4H10, isobutane	C4N2
*C5	C5H6, 1,3cyclo-	C5H8, cyclo-	C5H10, 1-pentene	C5H10, cyclo-
C5H11, pentyl	C5H11, t-pentyl	C5H12, n-pentane	C5H12, i-pentane	CH3C(CH3)2CH3
C6H2	C6H5, phenyl	C6H5O, phenoxy	C6H6	C6H5OH, phenol
C6H10, cyclo-	C6H12, 1-hexene	C6H12, cyclo-	C6H13, n-hexyl	C6H14, n-hexane
C7H7, benzyl	C7H8	C7H8O, cresol-mx	C7H14, 1-heptene	C7H15, n-heptyl
C7H16, n-heptane	C7H16, 2-methylh	C8H8, styrene	C8H10, ethylbenz	C8H16, 1-octene
C8H17, n-octyl	C8H18, n-octane	C8H18, isooctane	C9H19, n-nonyl	C10H8, naphthale
C10H21, n-decyl	C11H21	C12H9, o-bipheny	C12H10, biphenyl	CLCN
CLO2	CL2O	HCN	HCO	HCCN
HCCO	HNC	HNCO	HNO	HNO2
HN03	HO2	HCHO, formaldehy	HC00H	H2O2
(HCOOH)2	*N	NCO	*NH	NH2
NH3	NH2OH	NOCL	NO2	NO2CL
NO3	N2O	NCN	N2H2	NH2NO2
N2H4	N2O3	N2O4	N2O5	N3
N3H	O3	THDCPD, endo	THDCPD, exo	N2H4(L)
C(gr)	CH3OH(L)	C2H5OH(L)	C6H14(L), n-hexa	C6H5NH2(L)
C6H6(L)	H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)
Zn(cr)	Zn(L)			

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

POINT ITN	T	C	H	O	N
	CL	ZN			

$P_{inf}/P_t = 1.751179$
 $P_{inf}/P_t = 1.757499$
 $P_{inf}/P_t = 1.757550$

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

$P_{in} = 214.7$ PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6, butadiene	0.1220000	0.000	0.000
NAME	NH4ClO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
P_{inf}/P	1.0000	1.7575
P, BAR	14.803	8.4225
T, K	3090.91	2873.40
RHO, KG/CU M	1.3498 0	8.3387-1
H, KJ/KG	-55.109	-648.98
U, KJ/KG	-1151.80	-1659.03
G, KJ/KG	-33607.3	-31840.1
S, KJ/(KG)(K)	10.8551	10.8551

M, (1/n)	23.434	23.653
(dLV/dLP)t	-1.01311	-1.00829
(dLV/dLT)p	1.2525	1.1700
Cp, KJ/(KG)(K)	3.5692	3.0477
GAMMAS	1.1666	1.1759
SON VEL, M/SEC	1131.1	1089.8
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1628.9
CF	0.6691
Ivac, M/SEC	2016.6
Isp, M/SEC	1089.8

MASS FRACTIONS

*CO	0.27007	0.26660
*CO2	0.08495	0.09041
*CL	0.01687	0.01176
ClO	0.00002	0.00001
CL2	0.00005	0.00003
*H	0.00097	0.00065
HCO	0.00001	0.00000
HCL	0.19981	0.20510
HOCL	0.00002	0.00001
*H2	0.01501	0.01505
H2O	0.20365	0.20698
*NO	0.00107	0.00052
*N2	0.08655	0.08680
*O	0.00065	0.00025
*OH	0.00953	0.00550
*O2	0.00077	0.00031

*Zn 0.11000 0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2,acetylene
C2H2,vinylidene	C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH
C2H3,vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl
C2H4	C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH
C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CCN	CNC	OCCN	C2N2
C2O	*C3	C3H3,1-propynl	C3H3,2-propynl	C3H4,allene
C3H4,propyne	C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-
C3H6O,propylox	C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl
C3H8	C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2
*C4	C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne
C4H6,2butyne	C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene
C4H8,isobutene	C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl
C4H9,s-butyl	C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2
*C5	C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-
C5H11,pentyl	C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3
C6H2	C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol
C6H10,cyclo-	C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane
C7H7,benzyl	C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl
C7H16,n-heptane	C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene
C8H17,n-octyl	C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale
C10H21,n-decyl	C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN
CLO2	CL2O	HCN	HCCN	HCCO
HNC	HNCO	HNO	HNO2	HNO3
HO2	HCHO,formaldehy	HC00H	H2O2	(HC00H)2
*N	NCO	*NH	NH2	NH3
NH2OH	NOCL	NO2	NO2CL	NO3
N2O	NCN	N2H2	NH2NO2	N2H4
N2O3	N2O4	N2O5	N3	N3H
O3	THDCPD,endo	THDCPD,exo	N2H4(L)	C(gr)
CH3OH(L)	C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)
H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)
Zn(L)				

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

P_{in} = 214.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

CHAMBER THROAT

Pinf/P	1.0000	1.8010
P, BAR	14.803	8.2192
T, K	3090.91	2752.38
RHO, KG/CU M	1.3498 0	8.4163-1
H, KJ/KG	-55.109	-664.43
U, KJ/KG	-1151.80	-1641.00
G, KJ/KG	-33607.3	-30541.9
S, KJ/(KG)(K)	10.8551	10.8551

M, (1/n)	23.434	23.434
Cp, KJ/(KG)(K)	1.8126	1.7863
GAMMAS	1.2434	1.2479
SON VEL,M/SEC	1167.7	1103.9
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1593.3
CF	0.6929
Ivac, M/SEC	1988.6
Isp, M/SEC	1103.9

MASS FRACTIONS

*CO	0.27007	*CO2	0.08495	*CL	0.01687
CLO	0.00002	CL2	0.00005	*H	0.00097
HCO	0.00001	HCL	0.19981	HOCL	0.00002
*H2	0.01501	H2O	0.20365	*NO	0.00107
*N2	0.08655	*O	0.00065	*OH	0.00953
*O2	0.00077	*Zn	0.11000		

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2,acetylene
C2H2,vinylidene	C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH
C2H3,vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl
C2H4	C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH
C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CNN	CNC	OCCN	C2N2
C2O	*C3	C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene
C3H4,propyne	C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-
C3H6O,propylox	C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl
C3H8	C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2
*C4	C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne
C4H6,2butyne	C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene
C4H8,isobutene	C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl
C4H9,s-butyl	C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2
*C5	C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-
C5H11,pentyl	C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3
C6H2	C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol
C6H10,cyclo-	C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane
C7H7,benzyl	C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl
C7H16,n-heptane	C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene
C8H17,n-octyl	C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale
C10H21,n-decyl	C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN

CL02	CL20	HCN	HCCN	HCCO
HNC	HNCO	HNO	HN02	HN03
H02	HCHO,formaldehy	HCOOH	H202	(HCOOH)2
*N	NCO	*NH	NH2	NH3
NH20H	NOCL	N02	N02CL	N03
N20	NCN	N2H2	NH2N02	N2H4
N203	N204	N205	N3	N3H
O3	THDCPD,endo	THDCPD,exo	N2H4(L)	C(gr)
CH30H(L)	C2H50H(L)	C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)
H20(cr)	H20(L)	NH4CL(II)	NH4CL(III)	Zn(cr)
Zn(L)				

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

POINT ITN	T	C	H	O	N
	CL	ZN			

Pinf/Pt = 1.753839

Pinf/Pt = 1.760523

Pinf/Pt = 1.760578

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 314.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7606
P, BAR	21.698	12.324
T, K	3119.89	2892.33
RHO, KG/CU M	1.9651 0	1.2145 0
H, KJ/KG	-55.109	-654.23
U, KJ/KG	-1159.28	-1668.98
G, KJ/KG	-33499.2	-31658.9
S, KJ/(KG)(K)	10.7196	10.7196

M, (1/n)	23.493	23.699
(dLV/dLP)t	-1.01181	-1.00731
(dLV/dLT)p	1.2255	1.1490
Cp, KJ/(KG)(K)	3.3677	2.8869
GAMMAS	1.1710	1.1808
SON VEL,M/SEC	1137.1	1094.6
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1632.1
CF	0.6707
Ivac, M/SEC	2021.7
Isp, M/SEC	1094.6

MASS FRACTIONS

*CO	0.27007	0.26665
*CO2	0.08495	0.09033
*CL	0.01524	0.01041
ClO	0.00002	0.00001
CL2	0.00005	0.00003
*H	0.00087	0.00057
HCO	0.00001	0.00000
HCL	0.20149	0.20649
HOCL	0.00002	0.00001
*H2	0.01498	0.01503
H2O	0.20477	0.20777
*NO	0.00101	0.00048
*N2	0.08658	0.08683
*O	0.00053	0.00020
*OH	0.00877	0.00494
*O2	0.00064	0.00025
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2, acetylene
C2H2, vinylidene	C2H2CL2	CH2CO, ketene	O(CH)2O	HO(CO)2OH
C2H3, vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO, acetyl
C2H4	C2H4O, ethylen-o	CH3CHO, ethanal	CH3COOH	OHCH2COOH
C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CCN	CNC	OCCN	C2N2
C2O	*C3	C3H3, 1-propynl	C3H3, 2-propynl	C3H4, allene
C3H4, propyne	C3H4, cyclo-	C3H5, allyl	C3H6, propylene	C3H6, cyclo-
C3H6O, propylox	C3H6O, acetone	C3H6O, propanal	C3H7, n-propyl	C3H7, i-propyl
C3H8	C3H8O, 1propanol	C3H8O, 2propanol	CNCOCN	C3O2
*C4	C4H2, butadiyne	C4H4, 1,3-cyclo-	C4H6, butadiene	C4H6, 1butyne
C4H6, 2butyne	C4H6, cyclo-	C4H8, 1-butene	C4H8, cis2-buten	C4H8, tr2-butene
C4H8, isobutene	C4H8, cyclo-	(CH3COOH)2	C4H9, n-butyl	C4H9, i-butyl
C4H9, s-butyl	C4H9, t-butyl	C4H10, n-butane	C4H10, isobutane	C4N2
*C5	C5H6, 1,3cyclo-	C5H8, cyclo-	C5H10, 1-pentene	C5H10, cyclo-
C5H11, pentyl	C5H11, t-pentyl	C5H12, n-pentane	C5H12, i-pentane	CH3C(CH3)2CH3
C6H2	C6H5, phenyl	C6H5O, phenoxy	C6H6	C6H5OH, phenol
C6H10, cyclo-	C6H12, 1-hexene	C6H12, cyclo-	C6H13, n-hexyl	C6H14, n-hexane
C7H7, benzyl	C7H8	C7H8O, cresol-mx	C7H14, 1-heptene	C7H15, n-heptyl
C7H16, n-heptane	C7H16, 2-methylh	C8H8, styrene	C8H10, ethylbenz	C8H16, 1-octene
C8H17, n-octyl	C8H18, n-octane	C8H18, isooctane	C9H19, n-nonyl	C10H8, naphthale
C10H21, n-decyl	C11H21	C12H9, o-bipheny	C12H10, biphenyl	CLCN
CLO2	CL2O	HCN	HCCN	HCCO
HNC	HNCO	HNO	HNO2	HNO3
HO2	HCHO, formaldehy	HCOOH	H2O2	(HCOOH)2
*N	NCO	*NH	NH2	NH3
NH2OH	NOCL	NO2	NO2CL	NO3
N2O	NCN	N2H2	NH2NO2	N2H4
N2O3	N2O4	N2O5	N3	N3H
O3	THDCPD, endo	THDCPD, exo	N2H4(L)	C(gr)
CH3OH(L)	C2H5OH(L)	C6H14(L), n-hexa	C6H5NH2(L)	C6H6(L)
H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)
Zn(L)				

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 314.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.8003
P, BAR	21.698	12.052
T, K	3119.89	2779.55
RHO, KG/CU M	1.9651 0	1.2251 0
H, KJ/KG	-55.109	-668.33
U, KJ/KG	-1159.28	-1652.05
G, KJ/KG	-33499.2	-30464.0
S, KJ/(KG)(K)	10.7196	10.7196
M, (1/n)	23.493	23.493
Cp, KJ/(KG)(K)	1.8144	1.7883
GAMMAS	1.2423	1.2467
SON VEL,M/SEC	1171.2	1107.4
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1599.2
CF	0.6925
Ivac, M/SEC	1995.7
Isp, M/SEC	1107.4

MASS FRACTIONS

*CO	0.27007	*CO2	0.08495	*CL	0.01524
CLO	0.00002	CL2	0.00005	*H	0.00087
HCO	0.00001	HCL	0.20149	HOCL	0.00002
*H2	0.01498	H2O	0.20477	*NO	0.00101
*N2	0.08658	*O	0.00053	*OH	0.00877
*O2	0.00064	*Zn	0.11000		

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2,acetylene
C2H2,vinylidene	C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH
C2H3,vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl
C2H4	C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH
C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CCN	CNC	OCCN	C2N2

C2O	*C3	C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene
C3H4,propyne	C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-
C3H6O,propylox	C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl
C3H8	C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2
*C4	C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne
C4H6,2butyne	C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene
C4H8,isobutene	C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl
C4H9,s-butyl	C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2
*C5	C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-
C5H11,pentyl	C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3
C6H2	C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol
C6H10,cyclo-	C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane
C7H7,benzyl	C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl
C7H16,n-heptane	C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene
C8H17,n-octyl	C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale
C10H21,n-decyl	C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN
CLO2	CL2O	HCN	HCCN	HCCO
HNC	HNCO	HNO	HN02	HNO3
HO2	HCHO,formaldehy	HC00H	H2O2	(HC00H)2
*N	NCO	*NH	NH2	NH3
NH2OH	NOCL	NO2	NO2CL	NO3
N2O	NCN	N2H2	NH2NO2	N2H4
N2O3	N2O4	N2O5	N3	N3H
O3	THDCPD,endo	THDCPD,exo	N2H4(L)	C(gr)
CH3OH(L)	C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)
H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)
Zn(L)				

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

POINT ITN	T	C	H	O	N
	CL	ZN			

Pinf/Pt = 1.755782

Pinf/Pt = 1.762691

Pinf/Pt = 1.762749

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 414.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7627
P, BAR	28.592	16.220
T, K	3139.90	2905.02
RHO, KG/CU M	2.5775 0	1.5935 0
H, KJ/KG	-55.109	-657.87
U, KJ/KG	-1164.42	-1675.76
G, KJ/KG	-33407.3	-31515.1
S, KJ/(KG)(K)	10.6220	10.6220
M, (1/n)	23.534	23.729
(dLV/dLP)t	-1.01091	-1.00665

(dLV/dLT)p	1.2071	1.1350
Cp, KJ/(KG)(K)	3.2328	2.7810
GAMMAS	1.1742	1.1843
SON VEL,M/SEC	1141.3	1098.0
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1634.2
CF	0.6719
Ivac, M/SEC	2025.0
Isp, M/SEC	1098.0

MASS FRACTIONS

*CO	0.27007	0.26668
*CO2	0.08495	0.09029
*CL	0.01411	0.00949
CL0	0.00002	0.00001
CL2	0.00005	0.00003
*H	0.00080	0.00052
HCO	0.00001	0.00000
HCL	0.20265	0.20743
HOCL	0.00002	0.00001
*H2	0.01497	0.01502
H2O	0.20555	0.20831
*NO	0.00096	0.00044
*N2	0.08660	0.08684
*O	0.00046	0.00017
*OH	0.00823	0.00454
*O2	0.00055	0.00021
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2, acetylene
C2H2, vinylidene	C2H2CL2	CH2CO, ketene	O(CH)2O	HO(CO)2OH
C2H3, vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO, acetyl
C2H4	C2H4O, ethylene-o	CH3CHO, ethanal	CH3COOH	OHCH2COOH
C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CCN	CNC	OCCN	C2N2
C2O	*C3	C3H3, 1-propynyl	C3H3, 2-propynyl	C3H4, allene
C3H4, propyne	C3H4, cyclo-	C3H5, allyl	C3H6, propylene	C3H6, cyclo-
C3H6O, propylox	C3H6O, acetone	C3H6O, propanal	C3H7, n-propyl	C3H7, i-propyl
C3H8	C3H8O, 1propanol	C3H8O, 2propanol	CNCOCN	C3O2
*C4	C4H2, butadiyne	C4H4, 1,3-cyclo-	C4H6, butadiene	C4H6, 1butyne
C4H6, 2butyne	C4H6, cyclo-	C4H8, 1-butene	C4H8, cis2-buten	C4H8, tr2-butene
C4H8, isobutene	C4H8, cyclo-	(CH3COOH)2	C4H9, n-butyl	C4H9, i-butyl
C4H9, s-butyl	C4H9, t-butyl	C4H10, n-butane	C4H10, isobutane	C4N2
*C5	C5H6, 1,3cyclo-	C5H8, cyclo-	C5H10, 1-pentene	C5H10, cyclo-
C5H11, pentyl	C5H11, t-pentyl	C5H12, n-pentane	C5H12, i-pentane	CH3C(CH3)2CH3
C6H2	C6H5, phenyl	C6H5O, phenoxy	C6H6	C6H5OH, phenol
C6H10, cyclo-	C6H12, 1-hexene	C6H12, cyclo-	C6H13, n-hexyl	C6H14, n-hexane
C7H7, benzyl	C7H8	C7H8O, cresol-mx	C7H14, 1-heptene	C7H15, n-heptyl
C7H16, n-heptane	C7H16, 2-methylh	C8H8, styrene	C8H10, ethylbenz	C8H16, 1-octene

C8H17,n-octyl	C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale
C10H21,n-decyl	C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN
CL02	CL20	HCN	HCCN	HCCO
HNC	HNCO	HNO	HN02	HN03
HO2	HCHO,formaldehy	HC00H	H202	(HC00H)2
*N	NCO	*NH	NH2	NH3
NH2OH	NOCL	NO2	NO2CL	NO3
N2O	NCN	N2H2	NH2NO2	N2H4
N2O3	N2O4	N2O5	N3	N3H
O3	THDCPD,endo	THDCPD,exo	N2H4(L)	C(gr)
CH3OH(L)	C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)
H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)
Zn(L)				

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 414.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CL04(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7999
P, BAR	28.592	15.886
T, K	3139.90	2798.31
RHO, KG/CU M	2.5775 0	1.6069 0
H, KJ/KG	-55.109	-671.01
U, KJ/KG	-1164.42	-1659.64
G, KJ/KG	-33407.3	-30394.8
S, KJ/(KG)(K)	10.6220	10.6220
M, (1/n)	23.534	23.534
Cp, KJ/(KG)(K)	1.8156	1.7897
GAMMAS	1.2416	1.2460
SON VEL,M/SEC	1173.6	1109.9
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1603.3
CF	0.6923
Ivac, M/SEC	2000.6
Isp, M/SEC	1109.9

MASS FRACTIONS

*CO	0.27007	*CO2	0.08495	*CL	0.01411
CLO	0.00002	CL2	0.00005	*H	0.00080
HCO	0.00001	HCL	0.20265	HOCL	0.00002
*H2	0.01497	H2O	0.20555	*NO	0.00096
*N2	0.08660	*O	0.00046	*OH	0.00823
*O2	0.00055	*Zn	0.11000		

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2, acetylene
C2H2, vinylidene	C2H2CL2	CH2CO, ketene	O(CH)2O	HO(CO)2OH
C2H3, vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO, acetyl
C2H4	C2H4O, ethylene-o	CH3CHO, ethanal	CH3COOH	OHCH2COOH
C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CCN	CNC	OCCN	C2N2
C2O	*C3	C3H3, 1-propynyl	C3H3, 2-propynyl	C3H4, allene
C3H4, propyne	C3H4, cyclo-	C3H5, allyl	C3H6, propylene	C3H6, cyclo-
C3H6O, propylox	C3H6O, acetone	C3H6O, propanal	C3H7, n-propyl	C3H7, i-propyl
C3H8	C3H8O, 1propanol	C3H8O, 2propanol	CNCOCN	C3O2
*C4	C4H2, butadiyne	C4H4, 1,3-cyclo-	C4H6, butadiene	C4H6, 1butyne
C4H6, 2butyne	C4H6, cyclo-	C4H8, 1-butene	C4H8, cis2-buten	C4H8, tr2-butene
C4H8, isobutene	C4H8, cyclo-	(CH3COOH)2	C4H9, n-butyl	C4H9, i-butyl
C4H9, s-butyl	C4H9, t-butyl	C4H10, n-butane	C4H10, isobutane	C4N2
*C5	C5H6, 1,3cyclo-	C5H8, cyclo-	C5H10, 1-pentene	C5H10, cyclo-
C5H11, pentyl	C5H11, t-pentyl	C5H12, n-pentane	C5H12, i-pentane	CH3C(CH3)2CH3
C6H2	C6H5, phenyl	C6H5O, phenoxy	C6H6	C6H5OH, phenol
C6H10, cyclo-	C6H12, 1-hexene	C6H12, cyclo-	C6H13, n-hexyl	C6H14, n-hexane
C7H7, benzyl	C7H8	C7H8O, cresol-mx	C7H14, 1-heptene	C7H15, n-heptyl
C7H16, n-heptane	C7H16, 2-methylh	C8H8, styrene	C8H10, ethylbenz	C8H16, 1-octene
C8H17, n-octyl	C8H18, n-octane	C8H18, isooctane	C9H19, n-nonyl	C10H8, naphthale
C10H21, n-decyl	C11H21	C12H9, o-bipheny	C12H10, biphenyl	CLCN
CLO2	CL2O	HCN	HCCN	HCCO
HNC	HNCO	HNO	HNO2	HNO3
HO2	HCHO, formaldehy	HC00H	H2O2	(HC00H)2
*N	NCO	*NH	NH2	NH3
NH2OH	NOCL	NO2	NO2CL	NO3
N2O	NCN	N2H2	NH2NO2	N2H4
N2O3	N2O4	N2O5	N3	N3H
O3	THDCPD, endo	THDCPD, exo	N2H4(L)	C(gr)
CH3OH(L)	C2H5OH(L)	C6H14(L), n-hexa	C6H5NH2(L)	C6H6(L)
H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)
Zn(L)				

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

POINT ITN	T	C	H	O	N
	CL	ZN			
Pinf/Pt = 1.757311					
Pinf/Pt = 1.764372					
Pinf/Pt = 1.764431					

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 514.7 PSIA

CASE = _____

NAME	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6, butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000

NAME	Zn	0.110000	0.000	0.000
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O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7644
P, BAR	35.487	20.113
T, K	3155.00	2914.39
RHO, KG/CU M	3.1879 0	1.9714 0
H, KJ/KG	-55.109	-660.63
U, KJ/KG	-1168.28	-1680.82
G, KJ/KG	-33327.0	-31395.1
S, KJ/(KG)(K)	10.5458	10.5458
M, (1/n)	23.565	23.752
(dLV/dLP)t	-1.01023	-1.00616
(dLV/dLT)p	1.1934	1.1247
Cp, KJ/(KG)(K)	3.1332	2.7038
GAMMAS	1.1767	1.1871
SON VEL,M/SEC	1144.5	1100.5
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1635.7
CF	0.6728
Ivac, M/SEC	2027.5
Isp, M/SEC	1100.5

MASS FRACTIONS

*CO	0.27006	0.26670
*CO2	0.08496	0.09026
*CL	0.01325	0.00881
CL0	0.00002	0.00001
CL2	0.00005	0.00003
*H	0.00075	0.00048
HCO	0.00001	0.00001
HCL	0.20352	0.20813
HOCL	0.00002	0.00001
*H2	0.01495	0.01502
H2O	0.20615	0.20871
*NO	0.00092	0.00042
*N2	0.08661	0.08685
*O	0.00041	0.00014
*OH	0.00780	0.00425
*O2	0.00049	0.00018
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2, acetylene
C2H2, vinylidene	C2H2CL2	CH2CO, ketene	O(CH)2O	HO(CO)2OH
C2H3, vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO, acetyl
C2H4	C2H4O, ethylen-o	CH3CHO, ethanal	CH3COOH	OHCH2COOH

C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CCN	CNC	OCCN	C2N2
C2O	*C3	C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene
C3H4,propyne	C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-
C3H6O,propylox	C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl
C3H8	C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2
*C4	C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne
C4H6,2butyne	C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene
C4H8,isobutene	C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl
C4H9,s-butyl	C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2
*C5	C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-
C5H11,pentyl	C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3
C6H2	C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol
C6H10,cyclo-	C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane
C7H7,benzyl	C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl
C7H16,n-heptane	C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene
C8H17,n-octyl	C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale
C10H21,n-decyl	C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN
CLO2	CL2O	HCN	HCCN	HCCO
HNC	HNCO	HNO	HNO2	HNO3
HO2	HCHO,formaldehy	HC00H	H2O2	(HC00H)2
*N	NCO	*NH	NH2	NH3
NH2OH	NOCL	NO2	NO2CL	NO3
N2O	NCN	N2H2	NH2NO2	N2H4
N2O3	N2O4	N2O5	N3	N3H
O3	THDCPD,endo	THDCPD,exo	N2H4(L)	C(gr)
CH3OH(L)	C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)
H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)
Zn(L)				

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 514.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7995
P, BAR	35.487	19.720
T, K	3155.00	2812.48
RHO, KG/CU M	3.1879 0	1.9873 0
H, KJ/KG	-55.109	-673.02
U, KJ/KG	-1168.28	-1665.34
G, KJ/KG	-33327.0	-30332.8
S, KJ/(KG)(K)	10.5458	10.5458
M, (1/n)	23.565	23.565
Cp, KJ/(KG)(K)	1.8165	1.7907
GAMMAS	1.2411	1.2454
SON VEL,M/SEC	1175.4	1111.7
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1606.3
CF	0.6921
Ivac, M/SEC	2004.3
Isp, M/SEC	1111.7

MASS FRACTIONS

*CO	0.27006	*CO2	0.08496	*CL	0.01325
ClO	0.00002	CL2	0.00005	*H	0.00075
HCO	0.00001	HCL	0.20352	HOCL	0.00002
*H2	0.01495	H2O	0.20615	*NO	0.00092
*N2	0.08661	*O	0.00041	*OH	0.00780
*O2	0.00049	*Zn	0.11000		

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	COOH
*C2	C2CL	C2CL2	C2CL3	C2CL4
C2CL6	C2H	C2HCL	C2HCL3	C2H2,acetylene
C2H2,vinylidene	C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH
C2H3,vinyl	C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl
C2H4	C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH
C2H5	C2H6	CH3N2CH3	C2H5OH	CH3OCH3
CH3O2CH3	CCN	CNC	OCCN	C2N2
C2O	*C3	C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene
C3H4,propyne	C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-
C3H6O,propylox	C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl
C3H8	C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2
*C4	C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne
C4H6,2butyne	C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,trans2-butene
C4H8,isobutene	C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl
C4H9,s-butyl	C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2
*C5	C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-
C5H11,pentyl	C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3
C6H2	C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol
C6H10,cyclo-	C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane
C7H7,benzyl	C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl
C7H16,n-heptane	C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene
C8H17,n-octyl	C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale
C10H21,n-decyl	C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN
CLO2	CL2O	HCN	HCCN	HCCO
HNC	HNCO	HNO	HNO2	HNO3
HO2	HCHO,formaldehy	HC00H	H2O2	(HC00H)2
*N	NCO	*NH	NH2	NH3
NH2OH	NOCL	NO2	NO2CL	NO3
N2O	NCN	N2H2	NH2NO2	N2H4
N2O3	N2O4	N2O5	N3	N3H
O3	THDCPD,endo	THDCPD,exo	N2H4(L)	C(gr)
CH3OH(L)	C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)
H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)
Zn(L)				

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

POINT ITN	T	C	H	O	N
	CL	ZN			
Pinf/Pt = 1.758569					

Pinf/Pt = 1.765736

Pinf/Pt = 1.765797

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 614.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7658
P, BAR	42.382	24.002
T, K	3167.02	2921.70
RHO, KG/CU M	3.7969 0	2.3485 0
H, KJ/KG	-55.109	-662.83
U, KJ/KG	-1171.35	-1684.81
G, KJ/KG	-33255.5	-31291.5
S, KJ/(KG)(K)	10.4832	10.4832

M, (1/n)	23.590	23.770
(dLV/dLP)t	-1.00969	-1.00578
(dLV/dLT)p	1.1825	1.1166
Cp, KJ/(KG)(K)	3.0552	2.6441
GAMMAS	1.1787	1.1893
SON VEL,M/SEC	1147.1	1102.5
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1636.9
CF	0.6735
Ivac, M/SEC	2029.5
Isp, M/SEC	1102.5

MASS FRACTIONS

*CO	0.27005	0.26671
*CO2	0.08498	0.09024
COOH	0.00001	0.00000
*CL	0.01257	0.00827
CLO	0.00002	0.00001
CL2	0.00006	0.00003
*H	0.00071	0.00045
HCO	0.00001	0.00001
HCL	0.20422	0.20868
HOCL	0.00002	0.00001
*H2	0.01494	0.01501
H2O	0.20662	0.20902
*NO	0.00089	0.00040
*N2	0.08663	0.08686
*O	0.00037	0.00013
*OH	0.00746	0.00401
*O2	0.00045	0.00016

*Zn 0.11000 0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox
C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HNO2	HNO3	HO2
HCHO,formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH3	NH2OH
NOCL	NO2	NO2CL	NO3	N2O
NCN	N2H2	NH2NO2	N2H4	N2O3
N2O4	N2O5	N3	N3H	O3
THDCPD,endo	THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)
C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)
H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 614.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7992

P, BAR	42.382	23.556
T, K	3167.02	2823.76
RHO, KG/CU M	3.7969 0	2.3668 0
H, KJ/KG	-55.109	-674.62
U, KJ/KG	-1171.35	-1669.87
G, KJ/KG	-33255.5	-30276.6
S, KJ/(KG)(K)	10.4832	10.4832

M, (1/n)	23.590	23.590
Cp, KJ/(KG)(K)	1.8172	1.7915
GAMMAS	1.2406	1.2449
SON VEL, M/SEC	1176.8	1113.1
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.00000
CSTAR, M/SEC	1608.7
CF	0.6919
Ivac, M/SEC	2007.2
Isp, M/SEC	1113.1

MASS FRACTIONS

*CO	0.27005	*CO2	0.08498	COOH	0.00001
*CL	0.01257	CL0	0.00002	CL2	0.00006
*H	0.00071	HCO	0.00001	HCL	0.20422
HOCL	0.00002	*H2	0.01494	H2O	0.20662
*NO	0.00089	*N2	0.08663	*O	0.00037
*OH	0.00746	*O2	0.00045	*Zn	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2, acetylene	C2H2, vinylidene
C2H2CL2	CH2CO, ketene	O(CH)2O	HO(CO)2OH	C2H3, vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO, acetyl	C2H4
C2H4O, ethylen-o	CH3CHO, ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3, 1-propynyl	C3H3, 2-propynyl	C3H4, allene	C3H4, propyne
C3H4, cyclo-	C3H5, allyl	C3H6, propylene	C3H6, cyclo-	C3H6O, propylox
C3H6O, acetone	C3H6O, propanal	C3H7, n-propyl	C3H7, i-propyl	C3H8
C3H8O, 1propanol	C3H8O, 2propanol	CNCOCN	C3O2	*C4
C4H2, butadiyne	C4H4, 1,3-cyclo-	C4H6, butadiene	C4H6, 1butyne	C4H6, 2butyne
C4H6, cyclo-	C4H8, 1-butene	C4H8, cis2-buten	C4H8, tr2-butene	C4H8, isobutene
C4H8, cyclo-	(CH3COOH)2	C4H9, n-butyl	C4H9, i-butyl	C4H9, s-butyl
C4H9, t-butyl	C4H10, n-butane	C4H10, isobutane	C4N2	*C5
C5H6, 1,3cyclo-	C5H8, cyclo-	C5H10, 1-pentene	C5H10, cyclo-	C5H11, pentyl
C5H11, t-pentyl	C5H12, n-pentane	C5H12, i-pentane	CH3C(CH3)2CH3	C6H2
C6H5, phenyl	C6H5O, phenoxy	C6H6	C6H5OH, phenol	C6H10, cyclo-
C6H12, 1-hexene	C6H12, cyclo-	C6H13, n-hexyl	C6H14, n-hexane	C7H7, benzyl
C7H8	C7H8O, cresol-mx	C7H14, 1-heptene	C7H15, n-heptyl	C7H16, n-heptane
C7H16, 2-methylh	C8H8, styrene	C8H10, ethylbenz	C8H16, 1-octene	C8H17, n-octyl
C8H18, n-octane	C8H18, isooctane	C9H19, n-nonyl	C10H8, naphthale	C10H21, n-decyl
C11H21	C12H9, o-bipheny	C12H10, biphenyl	CLCN	CL02
CL2O	HCN	HCCN	HCCO	HNC

HNCO	HNO	HN02	HN03	HO2
HCHO,formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH3	NH2OH
NOCL	NO2	NO2CL	NO3	N2O
NCN	N2H2	NH2NO2	N2H4	N2O3
N2O4	N2O5	N3	N3H	O3
THDCPD,endo	THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)
C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)
H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)

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

POINT ITN	T	C	H	O	N
	CL	ZN			
Pinf/Pt = 1.759636					
Pinf/Pt = 1.766879					
Pinf/Pt = 1.766940					

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 714.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7669
P, BAR	49.277	27.888
T, K	3176.94	2927.65
RHO, KG/CU M	4.4046 0	2.7249 0
H, KJ/KG	-55.109	-664.65
U, KJ/KG	-1173.87	-1688.08
G, KJ/KG	-33190.8	-31200.2
S, KJ/(KG)(K)	10.4301	10.4301
M, (1/n)	23.611	23.785
(dLV/dLP)t	-1.00924	-1.00547
(dLV/dLT)p	1.1736	1.1101
Cp, KJ/(KG)(K)	2.9918	2.5960
GAMMAS	1.1805	1.1912
SON VEL,M/SEC	1149.2	1104.1
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1637.8
CF	0.6741
Ivac, M/SEC	2031.0
Isp, M/SEC	1104.1

MASS FRACTIONS

*CO	0.27003	0.26672
*CO2	0.08499	0.09022

COOH	0.00001	0.00000
*CL	0.01200	0.00784
CLO	0.00002	0.00001
CL2	0.00006	0.00003
*H	0.00067	0.00043
HCO	0.00001	0.00001
HCL	0.20480	0.20913
HOCL	0.00002	0.00001
*H2	0.01493	0.01500
H2O	0.20702	0.20928
*NO	0.00086	0.00038
*N2	0.08664	0.08687
*O	0.00034	0.00012
*OH	0.00717	0.00381
*O2	0.00041	0.00014
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propynl	C3H3,2-propynl	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox
C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isoctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HNO2	HNO3	HO2
HCHO,formaldehy	HC00H	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH3	NH2OH
NOCL	NO2	NO2CL	NO3	N2O
NCN	N2H2	NH2NO2	N2H4	N2O3
N2O4	N2O5	N3	N3H	O3
THDCPD,endo	THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)
C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)
H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 714.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7990
P, BAR	49.277	27.391
T, K	3176.94	2833.07
RHO, KG/CU M	4.4046 0	2.7455 0
H, KJ/KG	-55.109	-675.93
U, KJ/KG	-1173.87	-1673.60
G, KJ/KG	-33190.8	-30225.0
S, KJ/(KG)(K)	10.4301	10.4301
M, (1/n)	23.611	23.611
Cp, KJ/(KG)(K)	1.8178	1.7922
GAMMAS	1.2403	1.2445
SON VEL,M/SEC	1177.9	1114.3
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1610.7
CF	0.6918
Ivac, M/SEC	2009.6
Isp, M/SEC	1114.3

MASS FRACTIONS

*CO	0.27003	*CO2	0.08499	COOH	0.00001
*CL	0.01200	CLO	0.00002	CL2	0.00006
*H	0.00067	HCO	0.00001	HCL	0.20480
HOCL	0.00002	*H2	0.01493	H2O	0.20702
*NO	0.00086	*N2	0.08664	*O	0.00034
*OH	0.00717	*O2	0.00041	*Zn	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H40,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox

C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HNO2	HNO3	HO2
HCHO,formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH3	NH2OH
NOCL	NO2	NO2CL	NO3	N2O
NCN	N2H2	NH2NO2	N2H4	N2O3
N2O4	N2O5	N3	N3H	O3
THDCPD,endo	THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)
C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)
H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)

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

POINT ITN	T	C	H	O	N
	CL	ZN			

Pinf/Pt = 1.760561

Pinf/Pt = 1.767859

Pinf/Pt = 1.767921

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 814.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7679
P, BAR	56.171	31.773
T, K	3185.34	2932.62
RHO, KG/CU M	5.0113 0	3.1008 0
H, KJ/KG	-55.109	-666.19
U, KJ/KG	-1176.00	-1690.84
G, KJ/KG	-33131.5	-31118.4
S, KJ/(KG)(K)	10.3840	10.3840

M, (1/n)	23.628	23.797
(dLV/dLP)t	-1.00887	-1.00521
(dLV/dLT)p	1.1661	1.1047
Cp, KJ/(KG)(K)	2.9386	2.5560
GAMMAS	1.1820	1.1928

SON VEL,M/SEC	1151.0	1105.5
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1638.6
CF	0.6747
Ivac, M/SEC	2032.4
Isp, M/SEC	1105.5

MASS FRACTIONS

*CO	0.27002	0.26672
*CO2	0.08500	0.09021
COOH	0.00001	0.00000
*CL	0.01152	0.00747
CLO	0.00002	0.00001
CL2	0.00006	0.00003
*H	0.00064	0.00040
HCO	0.00002	0.00001
HCL	0.20529	0.20950
HOCL	0.00002	0.00001
*H2	0.01492	0.01500
H2O	0.20736	0.20949
*NO	0.00083	0.00036
*N2	0.08665	0.08688
*O	0.00031	0.00010
*OH	0.00692	0.00365
*O2	0.00038	0.00013
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H40,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propynl	C3H3,2-propynl	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H60,propylox
C3H60,acetone	C3H60,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H80,1propanol	C3H80,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2

CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HNO2	HN03	HO2
HCHO, formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH3	NH2OH
NOCL	NO2	NO2CL	NO3	N2O
NCN	N2H2	NH2NO2	N2H4	N2O3
N2O4	N2O5	N3	N3H	O3
THDCPD, endo	THDCPD, exo	N2H4(L)	C(gr)	CH3OH(L)
C2H5OH(L)	C6H14(L), n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)
H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 814.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6, butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7988
P, BAR	56.171	31.227
T, K	3185.34	2840.96
RHO, KG/CU M	5.0113 0	3.1236 0
H, KJ/KG	-55.109	-677.04
U, KJ/KG	-1176.00	-1676.75
G, KJ/KG	-33131.5	-30177.5
S, KJ/(KG)(K)	10.3840	10.3840
M, (1/n)	23.628	23.628
Cp, KJ/(KG)(K)	1.8183	1.7927
GAMMAS	1.2400	1.2442
SON VEL, M/SEC	1178.9	1115.3
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1612.4
CF	0.6917
Ivac, M/SEC	2011.7
Isp, M/SEC	1115.3

MASS FRACTIONS

*CO	0.27002	*CO2	0.08500	COOH	0.00001
*CL	0.01152	CLO	0.00002	CL2	0.00006
*H	0.00064	HCO	0.00002	HCL	0.20529
HOCL	0.00002	*H2	0.01492	H2O	0.20736
*NO	0.00083	*N2	0.08665	*O	0.00031
*OH	0.00692	*O2	0.00038	*Zn	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H4O,ethylen-o	CH3CHO,ethanal	CH3C00H	OHCH2C00H	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propynl	C3H3,2-propynl	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox
C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3C00H)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isoctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HN02	HN03	HO2
HCHO,formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH3	NH2OH
NOCL	N02	N02CL	N03	N2O
NCN	N2H2	NH2N02	N2H4	N2O3
N2O4	N2O5	N3	N3H	O3
THDCPD,endo	THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)
C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)
H2O(L)	NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)

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

POINT ITN T C H O N
 CL ZN

Pinf/Pt = 1.761377

Pinf/Pt = 1.768715

Pinf/Pt = 1.768777

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 914.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7688
P, BAR	63.066	35.655
T, K	3192.59	2936.86
RHO, KG/CU M	5.6172 0	3.4763 0
H, KJ/KG	-55.109	-667.52
U, KJ/KG	-1177.84	-1693.20
G, KJ/KG	-33076.8	-31044.2
S, KJ/(KG)(K)	10.3432	10.3432
M, (1/n)	23.643	23.807
(dLV/dLP)t	-1.00854	-1.00498
(dLV/dLT)p	1.1597	1.1001
Cp, KJ/(KG)(K)	2.8932	2.5220
GAMMAS	1.1833	1.1942
SON VEL, M/SEC	1152.6	1106.7
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1639.3
CF	0.6751
Ivac, M/SEC	2033.5
Isp, M/SEC	1106.7

MASS FRACTIONS

*CO	0.27001	0.26673
*CO2	0.08502	0.09020
COOH	0.00001	0.00000
*CL	0.01111	0.00716
CLO	0.00002	0.00001
CL2	0.00006	0.00003
*H	0.00062	0.00039
HCO	0.00002	0.00001
HCL	0.20571	0.20983
HOCL	0.00002	0.00001
*H2	0.01492	0.01500
H2O	0.20765	0.20968
NH3	0.00001	0.00000
*NO	0.00081	0.00035
*N2	0.08666	0.08688
*O	0.00029	0.00010
*OH	0.00670	0.00350
*O2	0.00035	0.00012
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2, acetylene	C2H2, vinylidene
C2H2CL2	CH2CO, ketene	O(CH)2O	HO(CO)2OH	C2H3, vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO, acetyl	C2H4
C2H40, ethylen-o	CH3CHO, ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O

*C3	C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox
C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isoctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HNO2	HN03	HO2
HCHO,formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH2OH	NOCL
NO2	NO2CL	NO3	N2O	NCN
N2H2	NH2NO2	N2H4	N2O3	N2O4
N2O5	N3	N3H	O3	THDCPD,endo
THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)
C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)
NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)	

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 914.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7986
P, BAR	63.066	35.063
T, K	3192.59	2847.77
RHO, KG/CU M	5.6172 0	3.5012 0
H, KJ/KG	-55.109	-678.00
U, KJ/KG	-1177.84	-1679.46
G, KJ/KG	-33076.8	-30133.2
S, KJ/(KG)(K)	10.3432	10.3432
M, (1/n)	23.643	23.643
Cp, KJ/(KG)(K)	1.8187	1.7932
GAMMAS	1.2397	1.2439
SON VEL,M/SEC	1179.8	1116.1
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1613.8
CF	0.6916

Ivac, M/SEC 2013.4
Isp, M/SEC 1116.1

MASS FRACTIONS

*CO	0.27001	*CO2	0.08502	COOH	0.00001
*CL	0.01111	CLO	0.00002	CL2	0.00006
*H	0.00062	HCO	0.00002	HCL	0.20571
HOCL	0.00002	*H2	0.01492	H2O	0.20765
NH3	0.00001	*NO	0.00081	*N2	0.08666
*O	0.00029	*OH	0.00670	*O2	0.00035
*Zn	0.11000				

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propynyl	C3H3,2-propynyl	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox
C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,trans2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HNO2	HNO3	HO2
HCHO,formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH2OH	NOCL
NO2	NO2CL	NO3	N2O	NCN
N2H2	NH2NO2	N2H4	N2O3	N2O4
N2O5	N3	N3H	O3	THDCPD,endo
THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)
C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)
NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)	

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

POINT	ITN	T	C	H	O	N
		CL	ZN			
Pinf/Pt	=	1.762105				
Pinf/Pt	=	1.769472				
Pinf/Pt	=	1.769534				

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 1014.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4ClO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7695
P, BAR	69.961	39.536
T, K	3198.95	2940.54
RHO, KG/CU M	6.2224 0	3.8513 0
H, KJ/KG	-55.109	-668.69
U, KJ/KG	-1179.45	-1695.26
G, KJ/KG	-33026.0	-30976.1
S, KJ/(KG)(K)	10.3068	10.3068

M, (1/n)	23.656	23.816
(dLV/dLP)t	-1.00826	-1.00479
(dLV/dLT)p	1.1540	1.0961
Cp, KJ/(KG)(K)	2.8537	2.4927
GAMMAS	1.1845	1.1954
SON VEL,M/SEC	1154.0	1107.8
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1639.8
CF	0.6755
Ivac, M/SEC	2034.5
Isp, M/SEC	1107.8

MASS FRACTIONS

*CO	0.27000	0.26673
*CO2	0.08503	0.09019
COOH	0.00001	0.00000
*CL	0.01075	0.00688
CLO	0.00002	0.00001
CL2	0.00006	0.00003
*H	0.00060	0.00037
HCO	0.00002	0.00001
HCL	0.20609	0.21011
HOCL	0.00003	0.00001
*H2	0.01491	0.01499
H2O	0.20790	0.20984
NH3	0.00001	0.00000
*NO	0.00079	0.00034
*N2	0.08667	0.08689
*O	0.00027	0.00009
*OH	0.00650	0.00338
*O2	0.00033	0.00011
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO, ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox
C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isoctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HN02	HN03	HO2
HCHO,formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH2OH	NOCL
NO2	NO2CL	NO3	N2O	NCN
N2H2	NH2NO2	N2H4	N2O3	N2O4
N2O5	N3	N3H	O3	THDCPD,endo
THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)
C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)
NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)	

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

P_{in} = 1014.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
P _{inf} /P	1.0000	1.7985
P, BAR	69.961	38.900
T, K	3198.95	2853.75

RHO, KG/CU M	6.2224 0	3.8783 0
H, KJ/KG	-55.109	-678.83
U, KJ/KG	-1179.45	-1681.84
G, KJ/KG	-33026.0	-30091.7
S, KJ/(KG)(K)	10.3068	10.3068

M, (1/n)	23.656	23.656
Cp, KJ/(KG)(K)	1.8191	1.7937
GAMMAS	1.2395	1.2437
SON VEL,M/SEC	1180.5	1116.9
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1615.1
CF	0.6915
Ivac, M/SEC	2014.9
Isp, M/SEC	1116.9

MASS FRACTIONS

*CO	0.27000	*CO2	0.08503	COOH	0.00001
*CL	0.01075	CLO	0.00002	CL2	0.00006
*H	0.00060	HCO	0.00002	HCL	0.20609
HOCL	0.00003	*H2	0.01491	H2O	0.20790
NH3	0.00001	*NO	0.00079	*N2	0.08667
*O	0.00027	*OH	0.00650	*O2	0.00033
*Zn	0.11000				

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H40,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propynl	C3H3,2-propynl	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H60,propylox
C3H60,acetone	C3H60,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H80,1propanol	C3H80,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H80,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isoctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HNO2	HNO3	HO2

HCHO, formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH2OH	NOCL
NO2	NO2CL	NO3	N2O	NCN
N2H2	NH2NO2	N2H4	N2O3	N2O4
N2O5	N3	N3H	O3	THDCPD, endo
THDCPD, exo	N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)
C6H14(L), n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)
NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)	

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

POINT	ITN	T	C	H	O	N
		CL	ZN			
Pinf/Pt = 1.762762						
Pinf/Pt = 1.770149						
Pinf/Pt = 1.770211						

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 1114.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6, butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R, EQ. RATIO= 1.653537 PHI, EQ. RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7702
P, BAR	76.856	43.416
T, K	3204.60	2943.78
RHO, KG/CU M	6.8270 0	4.2260 0
H, KJ/KG	-55.109	-669.73
U, KJ/KG	-1180.87	-1697.08
G, KJ/KG	-32978.4	-30913.3
S, KJ/(KG)(K)	10.2737	10.2737

M, (1/n)	23.668	23.824
(dLV/dLP)t	-1.00801	-1.00462
(dLV/dLT)p	1.1491	1.0925
Cp, KJ/(KG)(K)	2.8189	2.4669
GAMMAS	1.1856	1.1965
SON VEL, M/SEC	1155.3	1108.7
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.00000
CSTAR, M/SEC	1640.3
CF	0.6759
Ivac, M/SEC	2035.3
Isp, M/SEC	1108.7

MASS FRACTIONS

*CO	0.26999	0.26674
*CO2	0.08504	0.09018
COOH	0.00001	0.00000

*CL	0.01042	0.00664
CLO	0.00002	0.00001
CL2	0.00006	0.00003
*H	0.00058	0.00036
HCO	0.00002	0.00001
HCL	0.20642	0.21035
HOCL	0.00003	0.00001
*H2	0.01490	0.01499
H2O	0.20813	0.20998
NH3	0.00001	0.00000
*NO	0.00077	0.00033
*N2	0.08668	0.08689
*O	0.00026	0.00008
*OH	0.00633	0.00327
*O2	0.00031	0.00010
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propynl	C3H3,2-propynl	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox
C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isoctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HN02	HN03	HO2
HCHO,formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH2OH	NOCL
NO2	NO2CL	NO3	N2O	NCN
N2H2	NH2NO2	N2H4	N2O3	N2O4
N2O5	N3	N3H	O3	THDCPD,endo
THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)
C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)
NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)	

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 1114.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7984
P, BAR	76.856	42.737
T, K	3204.60	2859.06
RHO, KG/CU M	6.8270 0	4.2550 0
H, KJ/KG	-55.109	-679.57
U, KJ/KG	-1180.87	-1683.95
G, KJ/KG	-32978.4	-30052.8
S, KJ/(KG)(K)	10.2737	10.2737
M, (1/n)	23.668	23.668
Cp, KJ/(KG)(K)	1.8195	1.7940
GAMMAS	1.2393	1.2435
SON VEL,M/SEC	1181.2	1117.6
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1616.2
CF	0.6915
Ivac, M/SEC	2016.3
Isp, M/SEC	1117.6

MASS FRACTIONS

*CO	0.26999	*CO2	0.08504	COOH	0.00001
*CL	0.01042	CLO	0.00002	CL2	0.00006
*H	0.00058	HCO	0.00002	HCL	0.20642
HOCL	0.00003	*H2	0.01490	H2O	0.20813
NH3	0.00001	*NO	0.00077	*N2	0.08668
*O	0.00026	*OH	0.00633	*O2	0.00031
*Zn	0.11000				

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H40,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene	C3H4,propyne

C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox
C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HNO2	HN03	HO2
HCHO,formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH2OH	NOCL
NO2	NO2CL	NO3	N2O	NCN
N2H2	NH2NO2	N2H4	N2O3	N2O4
N2O5	N3	N3H	O3	THDCPD,endo
THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)
C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)
NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)	

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

POINT ITN	T	C	H	O	N
	CL	ZN			

Pinf/Pt = 1.763359

Pinf/Pt = 1.770761

Pinf/Pt = 1.770823

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 1214.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7708
P, BAR	83.750	47.295
T, K	3209.67	2946.65
RHO, KG/CU M	7.4310 0	4.6004 0
H, KJ/KG	-55.109	-670.66
U, KJ/KG	-1182.15	-1698.71
G, KJ/KG	-32933.6	-30854.9
S, KJ/(KG)(K)	10.2436	10.2436
M, (1/n)	23.679	23.832
(dLV/dLP)t	-1.00778	-1.00447
(dLV/dLT)p	1.1446	1.0894
Cp, KJ/(KG)(K)	2.7879	2.4442

GAMMAS	1.1866	1.1975
SON VEL,M/SEC	1156.4	1109.5
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.00000
CSTAR, M/SEC	1640.8
CF	0.6762
Ivac, M/SEC	2036.1
Isp, M/SEC	1109.5

MASS FRACTIONS

*CO	0.26998	0.26674
*CO2	0.08505	0.09018
COOH	0.00001	0.00000
*CL	0.01013	0.00643
CLO	0.00002	0.00000
CL2	0.00006	0.00003
*H	0.00056	0.00035
HCO	0.00002	0.00001
HCL	0.20671	0.21057
HOCL	0.00003	0.00001
*H2	0.01490	0.01499
H2O	0.20834	0.21011
NH3	0.00001	0.00000
*NO	0.00076	0.00032
*N2	0.08668	0.08689
*O	0.00024	0.00008
*OH	0.00617	0.00317
*O2	0.00030	0.00010
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H40,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propynl	C3H3,2-propynl	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox
C3H60,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H80,1propanol	C3H80,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl

C8H18,n-octane	C8H18,isoctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CL02
CL20	HCN	HCCN	HCCO	HNC
HNCO	HNO	HNO2	HNO3	HO2
HCHO,formaldehy	HC00H	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH2OH	NOCL
NO2	NO2CL	NO3	N2O	NCN
N2H2	NH2NO2	N2H4	N2O3	N2O4
N2O5	N3	N3H	O3	THDCPD,endo
THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)
C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)
NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)	

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 1214.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7982
P, BAR	83.750	46.574
T, K	3209.67	2863.82
RHO, KG/CU M	7.4310 0	4.6314 0
H, KJ/KG	-55.109	-680.24
U, KJ/KG	-1182.15	-1685.84
G, KJ/KG	-32933.6	-30015.9
S, KJ/(KG)(K)	10.2436	10.2436
M, (1/n)	23.679	23.679
Cp, KJ/(KG)(K)	1.8198	1.7944
GAMMAS	1.2391	1.2433
SON VEL,M/SEC	1181.7	1118.1
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1617.2
CF	0.6914
Ivac, M/SEC	2017.5
Isp, M/SEC	1118.2

MASS FRACTIONS

*CO	0.26998	*CO2	0.08505	COOH	0.00001
*CL	0.01013	CLO	0.00002	CL2	0.00006
*H	0.00056	HCO	0.00002	HCL	0.20671
HOCL	0.00003	*H2	0.01490	H2O	0.20834
NH3	0.00001	*NO	0.00076	*N2	0.08668
*O	0.00024	*OH	0.00617	*O2	0.00030
*Zn	0.11000				

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propynl	C3H3,2-propynl	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox
C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HNO2	HNO3	HO2
HCHO,formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH2OH	NOCL
NO2	NO2CL	NO3	N2O	NCN
N2H2	NH2NO2	N2H4	N2O3	N2O4
N2O5	N3	N3H	O3	THDCPD,endo
THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)
C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)
NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)	

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

POINT ITN	T	C	H	O	N
	CL	ZN			
Pinf/Pt = 1.763907					
Pinf/Pt = 1.771317					
Pinf/Pt = 1.771379					

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

P_{in} = 1314.7 PSIA

CASE = _____

NAME	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7714
P, BAR	90.645	51.172
T, K	3214.26	2949.24
RHO, KG/CU M	8.0345 0	4.9746 0
H, KJ/KG	-55.109	-671.50
U, KJ/KG	-1183.30	-1700.17
G, KJ/KG	-32891.3	-30800.3
S, KJ/(KG)(K)	10.2158	10.2158
M, (1/n)	23.688	23.838
(dLV/dLP)t	-1.00758	-1.00434
(dLV/dLT)p	1.1406	1.0866
Cp, KJ/(KG)(K)	2.7600	2.4238
GAMMAS	1.1875	1.1984
SON VEL,M/SEC	1157.5	1110.3
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.00000
CSTAR, M/SEC	1641.1
CF	0.6765
Ivac, M/SEC	2036.8
Isp, M/SEC	1110.3

MASS FRACTIONS

*CO	0.26998	0.26674
*CO2	0.08506	0.09017
COOH	0.00001	0.00000
*CL	0.00987	0.00624
CLO	0.00002	0.00000
CL2	0.00007	0.00004
*H	0.00055	0.00034
HCO	0.00002	0.00001
HCL	0.20698	0.21077
HOCL	0.00003	0.00001
*H2	0.01489	0.01499
H2O	0.20852	0.21022
NH3	0.00001	0.00001
*NO	0.00074	0.00031
*N2	0.08669	0.08690
*O	0.00023	0.00007
*OH	0.00603	0.00308
*O2	0.00028	0.00009
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4

C2H4O, ethylen-o	CH3CHO, ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3, 1-propyn1	C3H3, 2-propyn1	C3H4, allene	C3H4, propyne
C3H4, cyclo-	C3H5, allyl	C3H6, propylene	C3H6, cyclo-	C3H6O, propylox
C3H6O, acetone	C3H6O, propanal	C3H7, n-propyl	C3H7, i-propyl	C3H8
C3H8O, 1propanol	C3H8O, 2propanol	CNCOCN	C3O2	*C4
C4H2, butadiyne	C4H4, 1,3-cyclo-	C4H6, butadiene	C4H6, 1butyne	C4H6, 2butyne
C4H6, cyclo-	C4H8, 1-butene	C4H8, cis2-buten	C4H8, tr2-butene	C4H8, isobutene
C4H8, cyclo-	(CH3COOH)2	C4H9, n-butyl	C4H9, i-butyl	C4H9, s-butyl
C4H9, t-butyl	C4H10, n-butane	C4H10, isobutane	C4N2	*C5
C5H6, 1,3cyclo-	C5H8, cyclo-	C5H10, 1-pentene	C5H10, cyclo-	C5H11, pentyl
C5H11, t-pentyl	C5H12, n-pentane	C5H12, i-pentane	CH3C(CH3)2CH3	C6H2
C6H5, phenyl	C6H5O, phenoxy	C6H6	C6H5OH, phenol	C6H10, cyclo-
C6H12, 1-hexene	C6H12, cyclo-	C6H13, n-hexyl	C6H14, n-hexane	C7H7, benzyl
C7H8	C7H8O, cresol-mx	C7H14, 1-heptene	C7H15, n-heptyl	C7H16, n-heptane
C7H16, 2-methylh	C8H8, styrene	C8H10, ethylbenz	C8H16, 1-octene	C8H17, n-octyl
C8H18, n-octane	C8H18, isooctane	C9H19, n-nonyl	C10H8, naphthale	C10H21, n-decyl
C11H21	C12H9, o-bipheny	C12H10, biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HNO2	HNO3	HO2
HCHO, formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH2OH	NOCL
NO2	NO2CL	NO3	N2O	NCN
N2H2	NH2NO2	N2H4	N2O3	N2O4
N2O5	N3	N3H	O3	THDCPD, endo
THDCPD, exo	N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)
C6H14(L), n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)
NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)	

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 1314.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6, butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R, EQ. RATIO= 1.653537 PHI, EQ. RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7981
P, BAR	90.645	50.411
T, K	3214.26	2868.13
RHO, KG/CU M	8.0345 0	5.0075 0
H, KJ/KG	-55.109	-680.84
U, KJ/KG	-1183.30	-1687.54
G, KJ/KG	-32891.3	-29981.0
S, KJ/(KG)(K)	10.2158	10.2158
M, (1/n)	23.688	23.688
Cp, KJ/(KG)(K)	1.8200	1.7947
GAMMAS	1.2389	1.2431
SON VEL, M/SEC	1182.3	1118.7
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1618.1
CF	0.6913
Ivac, M/SEC	2018.6
Isp, M/SEC	1118.7

MASS FRACTIONS

*CO	0.26998	*CO2	0.08506	COOH	0.00001
*CL	0.00987	ClO	0.00002	CL2	0.00007
*H	0.00055	HCO	0.00002	HCL	0.20698
HOCL	0.00003	*H2	0.01489	H2O	0.20852
NH3	0.00001	*NO	0.00074	*N2	0.08669
*O	0.00023	*OH	0.00603	*O2	0.00028
*Zn	0.11000				

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL	COCL2	COHCL	*C2
C2CL	C2CL2	C2CL3	C2CL4	C2CL6
C2H	C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene
C2H2CL2	CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl
C2H3CL	CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4
C2H4O,ethylen-o	CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5
C2H6	CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3
CCN	CNC	OCCN	C2N2	C2O
*C3	C3H3,1-propynl	C3H3,2-propynl	C3H4,allene	C3H4,propyne
C3H4,cyclo-	C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox
C3H6O,acetone	C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8
C3H8O,1propanol	C3H8O,2propanol	CNCOCN	C3O2	*C4
C4H2,butadiyne	C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne
C4H6,cyclo-	C4H8,1-butene	C4H8,cis2-buten	C4H8,trans2-butene	C4H8,isobutene
C4H8,cyclo-	(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl
C4H9,t-butyl	C4H10,n-butane	C4H10,isobutane	C4N2	*C5
C5H6,1,3cyclo-	C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl
C5H11,t-pentyl	C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2
C6H5,phenyl	C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-
C6H12,1-hexene	C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl
C7H8	C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane
C7H16,2-methylh	C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl
C8H18,n-octane	C8H18,isoctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl
C11H21	C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2
CL2O	HCN	HCCN	HCCO	HNC
HNCO	HNO	HN02	HN03	HO2
HCHO,formaldehy	HCOOH	H2O2	(HCOOH)2	*N
NCO	*NH	NH2	NH2OH	NOCL
NO2	NO2CL	NO3	N2O	NCN
N2H2	NH2NO2	N2H4	N2O3	N2O4
N2O5	N3	N3H	O3	THDCPD,endo
THDCPD,exo	N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)
C6H14(L),n-hexa	C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)
NH4CL(II)	NH4CL(III)	Zn(cr)	Zn(L)	

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

POINT ITN	T	C	H	O	N
	CL	ZN			
Pinf/Pt = 1.764412					

Pinf/Pt = 1.771827
 Pinf/Pt = 1.771889

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 1414.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7719
P, BAR	97.540	55.048
T, K	3218.44	2951.57
RHO, KG/CU M	8.6376 0	5.3485 0
H, KJ/KG	-55.109	-672.27
U, KJ/KG	-1184.36	-1701.51
G, KJ/KG	-32851.2	-30749.0
S, KJ/(KG)(K)	10.1901	10.1901
M, (1/n)	23.697	23.844
(dLV/dLP)t	-1.00739	-1.00421
(dLV/dLT)p	1.1369	1.0840
Cp, KJ/(KG)(K)	2.7347	2.4054
GAMMAS	1.1883	1.1993
SON VEL,M/SEC	1158.4	1111.0
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.00000
CSTAR, M/SEC	1641.5
CF	0.6768
Ivac, M/SEC	2037.4
Isp, M/SEC	1111.0

MASS FRACTIONS

*CO	0.26997	0.26674
COCL	0.00001	0.00000
*CO2	0.08507	0.09017
COOH	0.00001	0.00000
*CL	0.00963	0.00606
CLO	0.00002	0.00000
CL2	0.00007	0.00004
*H	0.00053	0.00033
HCO	0.00002	0.00001
HCL	0.20723	0.21095
HOCL	0.00003	0.00001
*H2	0.01489	0.01498
H2O	0.20869	0.21032
NH3	0.00001	0.00001
*NO	0.00073	0.00030
*N2	0.08670	0.08690
*O	0.00022	0.00007

*OH 0.00590 0.00300
 *O2 0.00027 0.00009
 *Zn 0.11000 0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
 WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL2	COHCL	*C2	C2CL
C2CL2	C2CL3	C2CL4	C2CL6	C2H
C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene	C2H2CL2
CH2CO, ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl	C2H3CL
CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4	C2H4O,ethylen-o
CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5	C2H6
CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3	CCN
CNC	OCCN	C2N2	C2O	*C3
C3H3,1-propynl	C3H3,2-propynl	C3H4,allene	C3H4,propyne	C3H4,cyclo-
C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox	C3H6O,acetone
C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8	C3H8O,1propanol
C3H8O,2propanol	CNCOCN	C3O2	*C4	C4H2,butadiyne
C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne	C4H6,cyclo-
C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene	C4H8,cyclo-
(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl	C4H9,t-butyl
C4H10,n-butane	C4H10,isobutane	C4N2	*C5	C5H6,1,3cyclo-
C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl	C5H11,t-pentyl
C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2	C6H5,phenyl
C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-	C6H12,1-hexene
C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl	C7H8
C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane	C7H16,2-methylh
C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl	C8H18,n-octane
C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl	C11H21
C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2	CL2O
HCN	HCCN	HCCO	HNC	HNCO
HNO	HNO2	HNO3	HO2	HCHO,formaldehy
HCOOH	H2O2	(HCOOH)2	*N	NCO
*NH	NH2	NH2OH	NOCL	NO2
NO2CL	NO3	N2O	NCN	N2H2
NH2NO2	N2H4	N2O3	N2O4	N2O5
N3	N3H	O3	THDCPD,endo	THDCPD,exo
N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)	C6H14(L),n-hexa
C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)	NH4CL(II)
NH4CL(III)	Zn(cr)	Zn(L)		

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 1414.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7980
P, BAR	97.540	54.248
T, K	3218.44	2872.05
RHO, KG/CU M	8.6376 0	5.3833 0
H, KJ/KG	-55.109	-681.38
U, KJ/KG	-1184.36	-1689.10
G, KJ/KG	-32851.2	-29947.8
S, KJ/(KG)(K)	10.1901	10.1901
M, (1/n)	23.697	23.697
Cp, KJ/(KG)(K)	1.8203	1.7950
GAMMAS	1.2388	1.2430
SON VEL, M/SEC	1182.7	1119.2
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1619.0
CF	0.6913
Ivac, M/SEC	2019.6
Isp, M/SEC	1119.2

MASS FRACTIONS

*CO	0.26997	COCL	0.00001	*CO2	0.08507
COOH	0.00001	*CL	0.00963	CLO	0.00002
CL2	0.00007	*H	0.00053	HCO	0.00002
HCL	0.20723	HOCL	0.00003	*H2	0.01489
H2O	0.20869	NH3	0.00001	*NO	0.00073
*N2	0.08670	*O	0.00022	*OH	0.00590
*O2	0.00027	*Zn	0.11000		

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL2	COHCL	*C2	C2CL
C2CL2	C2CL3	C2CL4	C2CL6	C2H
C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene	C2H2CL2
CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl	C2H3CL
CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4	C2H4O,ethylen-o
CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5	C2H6
CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3	CCN
CNC	OCCN	C2N2	C2O	*C3
C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene	C3H4,propyne	C3H4,cyclo-
C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox	C3H6O,acetone
C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8	C3H8O,1propanol
C3H8O,2propanol	CNCOCN	C3O2	*C4	C4H2,butadiyne
C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne	C4H6,cyclo-
C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene	C4H8,cyclo-
(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl	C4H9,t-butyl
C4H10,n-butane	C4H10,isobutane	C4N2	*C5	C5H6,1,3cyclo-
C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl	C5H11,t-pentyl
C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2	C6H5,phenyl
C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-	C6H12,1-hexene
C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl	C7H8
C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane	C7H16,2-methylh
C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl	C8H18,n-octane

C8H18, isooctane	C9H19, n-nonyl	C10H8, naphthale	C10H21, n-decyl	C11H21
C12H9, o-bipheny	C12H10, biphenyl	CLCN	CL02	CL20
HCN	HCCN	HCCO	HNC	HNC0
HNO	HNO2	HNO3	H02	HCHO, formaldehy
HCOOH	H2O2	(HCOOH)2	*N	NCO
*NH	NH2	NH2OH	NOCL	NO2
NO2CL	NO3	N2O	NCN	N2H2
NH2NO2	N2H4	N2O3	N2O4	N2O5
N3	N3H	O3	THDCPD, endo	THDCPD, exo
N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)	C6H14(L), n-hexa
C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)	NH4CL(II)
NH4CL(III)	Zn(cr)	Zn(L)		

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

POINT ITN	T	C	H	O	N
	CL	ZN			

Pinf/Pt = 1.764881

Pinf/Pt = 1.772297

Pinf/Pt = 1.772358

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 1514.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6, butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.000000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7724
P, BAR	104.43	58.924
T, K	3222.27	2953.70
RHO, KG/CU M	9.2403 0	5.7222 0
H, KJ/KG	-55.109	-672.97
U, KJ/KG	-1185.32	-1702.72
G, KJ/KG	-32813.0	-30700.6
S, KJ/(KG)(K)	10.1661	10.1661
M, (1/n)	23.705	23.849
(dLV/dLP)t	-1.00722	-1.00410
(dLV/dLT)p	1.1336	1.0817
Cp, KJ/(KG)(K)	2.7116	2.3886
GAMMAS	1.1891	1.2000
SON VEL, M/SEC	1159.3	1111.6
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1641.8
CF	0.6771
Ivac, M/SEC	2038.0
Isp, M/SEC	1111.6

MASS FRACTIONS

*CO	0.26996	0.26674
COCL	0.00001	0.00000
*CO2	0.08508	0.09017
COOH	0.00001	0.00000
*CL	0.00941	0.00590
CLO	0.00002	0.00000
CL2	0.00007	0.00004
*H	0.00052	0.00032
HCO	0.00002	0.00001
HCL	0.20745	0.21112
HOCL	0.00003	0.00001
*H2	0.01488	0.01498
H2O	0.20885	0.21042
NH3	0.00001	0.00001
*NO	0.00071	0.00030
*N2	0.08670	0.08690
*O	0.00021	0.00007
*OH	0.00578	0.00292
*O2	0.00026	0.00008
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL2	COHCL	*C2	C2CL
C2CL2	C2CL3	C2CL4	C2CL6	C2H
C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene	C2H2CL2
CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl	C2H3CL
CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4	C2H4O,ethylen-o
CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5	C2H6
CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3	CCN
CNC	OCCN	C2N2	C2O	*C3
C3H3,1-propynl	C3H3,2-propynl	C3H4,allene	C3H4,propyne	C3H4,cyclo-
C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox	C3H6O,acetone
C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8	C3H8O,1propanol
C3H8O,2propanol	CNCOCN	C3O2	*C4	C4H2,butadiyne
C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne	C4H6,cyclo-
C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene	C4H8,cyclo-
(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl	C4H9,t-butyl
C4H10,n-butane	C4H10,isobutane	C4N2	*C5	C5H6,1,3cyclo-
C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl	C5H11,t-pentyl
C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2	C6H5,phenyl
C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-	C6H12,1-hexene
C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl	C7H8
C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane	C7H16,2-methylh
C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl	C8H18,n-octane
C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl	C11H21
C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2	CL2O
HCN	HCCN	HCCO	HNC	HNCO
HNO	HNO2	HNO3	HO2	HCHO,formaldehy
HCOOH	H2O2	(HCOOH)2	*N	NCO
*NH	NH2	NH2OH	NOCL	NO2
NO2CL	NO3	N2O	NCN	N2H2
NH2NO2	N2H4	N2O3	N2O4	N2O5
N3	N3H	O3	THDCPD,endo	THDCPD,exo
N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)	C6H14(L),n-hexa
C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)	NH4CL(II)
NH4CL(III)	Zn(cr)	Zn(L)		

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

Pin = 1514.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7979
P, BAR	104.43	58.086
T, K	3222.27	2875.66
RHO, KG/CU M	9.2403 0	5.7588 0
H, KJ/KG	-55.109	-681.89
U, KJ/KG	-1185.32	-1690.52
G, KJ/KG	-32813.0	-29916.1
S, KJ/(KG)(K)	10.1661	10.1661

M, (1/n)	23.705	23.705
Cp, KJ/(KG)(K)	1.8205	1.7952
GAMMAS	1.2386	1.2428
SON VEL,M/SEC	1183.2	1119.6
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1619.7
CF	0.6912
Ivac, M/SEC	2020.5
Isp, M/SEC	1119.6

MASS FRACTIONS

*CO	0.26996	COCL	0.00001	*CO2	0.08508
COOH	0.00001	*CL	0.00941	CLO	0.00002
CL2	0.00007	*H	0.00052	HCO	0.00002
HCL	0.20745	HOCL	0.00003	*H2	0.01488
H2O	0.20885	NH3	0.00001	*NO	0.00071
*N2	0.08670	*O	0.00021	*OH	0.00578
*O2	0.00026	*Zn	0.11000		

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL2	COHCL	*C2	C2CL
C2CL2	C2CL3	C2CL4	C2CL6	C2H
C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene	C2H2CL2
CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl	C2H3CL

CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4	C2H40,ethylen-o
CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5	C2H6
CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3	CCN
CNC	OCCN	C2N2	C2O	*C3
C3H3,1-propyn1	C3H3,2-propyn1	C3H4,allene	C3H4,propyne	C3H4,cyclo-
C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox	C3H6O,acetone
C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8	C3H8O,1propanol
C3H8O,2propanol	CNCOCN	C3O2	*C4	C4H2,butadiyne
C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne	C4H6,cyclo-
C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene	C4H8,cyclo-
(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl	C4H9,t-butyl
C4H10,n-butane	C4H10,isobutane	C4N2	*C5	C5H6,1,3cyclo-
C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl	C5H11,t-pentyl
C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2	C6H5,phenyl
C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-	C6H12,1-hexene
C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl	C7H8
C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane	C7H16,2-methylh
C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl	C8H18,n-octane
C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl	C11H21
C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2	CL2O
HCN	HCCN	HCCO	HNC	HNCO
HNO	HNO2	HNO3	HO2	HCHO,formaldehy
HCOOH	H2O2	(HCOOH)2	*N	NCO
*NH	NH2	NH2OH	NOCL	NO2
NO2CL	NO3	N2O	NCN	N2H2
NH2NO2	N2H4	N2O3	N2O4	N2O5
N3	N3H	O3	THDCPD,endo	THDCPD,exo
N2H4(L)	C(gr)	CH3OH(L)	C2H5OH(L)	C6H14(L),n-hexa
C6H5NH2(L)	C6H6(L)	H2O(cr)	H2O(L)	NH4CL(II)
NH4CL(III)	Zn(cr)	Zn(L)		

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

POINT ITN	T	C	H	O	N
	CL	ZN			
Pinf/Pt = 1.765317					
Pinf/Pt = 1.772732					
Pinf/Pt = 1.772792					

THEORETICAL ROCKET PERFORMANCE ASSUMING EQUILIBRIUM

COMPOSITION DURING EXPANSION FROM INFINITE AREA COMBUSTOR

Pin = 1614.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
Pinf/P	1.0000	1.7728
P, BAR	111.33	62.799
T, K	3225.80	2955.65
RHO, KG/CU M	9.8426 0	6.0957 0
H, KJ/KG	-55.109	-673.62
U, KJ/KG	-1186.21	-1703.84
G, KJ/KG	-32776.6	-30654.8
S, KJ/(KG)(K)	10.1437	10.1437

M, (1/n)	23.712	23.854
(dLV/dLP)t	-1.00706	-1.00400
(dLV/dLT)p	1.1305	1.0796
Cp, KJ/(KG)(K)	2.6905	2.3733
GAMMAS	1.1898	1.2007
SON VEL,M/SEC	1160.1	1112.2
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1642.1
CF	0.6773
Ivac, M/SEC	2038.5
Isp, M/SEC	1112.2

MASS FRACTIONS

*CO	0.26995	0.26675
COCL	0.00001	0.00000
*CO2	0.08509	0.09016
COOH	0.00001	0.00000
*CL	0.00921	0.00576
CLO	0.00002	0.00000
CL2	0.00007	0.00004
*H	0.00051	0.00031
HCO	0.00002	0.00001
HCL	0.20766	0.21127
HOCL	0.00003	0.00001
*H2	0.01488	0.01498
HCOOH	0.00001	0.00000
H2O	0.20899	0.21050
NH3	0.00001	0.00001
*NO	0.00070	0.00029
*N2	0.08671	0.08691
*O	0.00020	0.00006
*OH	0.00567	0.00285
*O2	0.00025	0.00008
*Zn	0.11000	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL2	COHCL	*C2	C2CL
C2CL2	C2CL3	C2CL4	C2CL6	C2H
C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene	C2H2CL2
CH2CO,ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl	C2H3CL
CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4	C2H4O,ethylen-o
CH3CHO,ethanal	CH3COOH	OHCH2COOH	C2H5	C2H6
CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3	CCN
CNC	OCCN	C2N2	C2O	*C3
C3H3,1-propynyl	C3H3,2-propynyl	C3H4,allene	C3H4,propyne	C3H4,cyclo-
C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox	C3H6O,acetone
C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8	C3H8O,1propanol
C3H8O,2propanol	CNCOCN	C3O2	*C4	C4H2,butadiyne
C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne	C4H6,cyclo-
C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene	C4H8,cyclo-
(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl	C4H9,t-butyl

C4H10,n-butane	C4H10,isobutane	C4N2	*C5	C5H6,1,3cyclo-
C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl	C5H11,t-pentyl
C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2	C6H5,phenyl
C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-	C6H12,1-hexene
C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl	C7H8
C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane	C7H16,2-methylh
C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl	C8H18,n-octane
C8H18,isooctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl	C11H21
C12H9,o-bipheny	C12H10,biphenyl	CLCN	CL02	CL20
HCN	HCCN	HCCO	HNC	HNCO
HNO	HNO2	HNO3	HO2	HCHO,formaldehy
H2O2	(HCOOH)2	*N	NCO	*NH
NH2	NH2OH	NOCL	NO2	NO2CL
NO3	N2O	NCN	N2H2	NH2NO2
N2H4	N2O3	N2O4	N2O5	N3
N3H	O3	THDCPD,endo	THDCPD,exo	N2H4(L)
C(gr)	CH3OH(L)	C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)
C6H6(L)	H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)
Zn(cr)	Zn(L)			

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

THEORETICAL ROCKET PERFORMANCE ASSUMING FROZEN COMPOSITION

P_{in} = 1614.7 PSIA

CASE = _____

	REACTANT	WT FRACTION (SEE NOTE)	ENERGY KJ/KG-MOL	TEMP K
NAME	C2H5OH	0.0410000	0.000	0.000
NAME	C3H7NO3(L)	0.0270000	-214500.000	298.150
NAME	C4H6,butadiene	0.1220000	0.000	0.000
NAME	NH4CLO4(I)	0.7000000	0.000	0.000
NAME	Zn	0.1100000	0.000	0.000

O/F= 0.00000 %FUEL= 0.000000 R,EQ.RATIO= 1.653537 PHI,EQ.RATIO= 0.000000

	CHAMBER	THROAT
P _{inf} /P	1.0000	1.7979
P, BAR	111.33	61.923
T, K	3225.80	2878.98
RHO, KG/CU M	9.8426 0	6.1341 0
H, KJ/KG	-55.109	-682.35
U, KJ/KG	-1186.21	-1691.83
G, KJ/KG	-32776.6	-29885.8
S, KJ/(KG)(K)	10.1437	10.1437
M, (1/n)	23.712	23.712
C _p , KJ/(KG)(K)	1.8207	1.7955
GAMMAS	1.2385	1.2427
SON VEL,M/SEC	1183.6	1120.0
MACH NUMBER	0.000	1.000

PERFORMANCE PARAMETERS

Ae/At	1.0000
CSTAR, M/SEC	1620.4
CF	0.6912
I _{vac} , M/SEC	2021.3
I _{sp} , M/SEC	1120.0

MASS FRACTIONS

*CO	0.26995	COCL	0.00001	*CO2	0.08509
COOH	0.00001	*CL	0.00921	CLO	0.00002

CL2	0.00007	*H	0.00051	HCO	0.00002
HCL	0.20766	HOCL	0.00003	*H2	0.01488
HCOOH	0.00001	H2O	0.20899	NH3	0.00001
*NO	0.00070	*N2	0.08671	*O	0.00020
*OH	0.00567	*O2	0.00025	*Zn	0.11000

* THERMODYNAMIC PROPERTIES FITTED TO 20000.K

PRODUCTS WHICH WERE CONSIDERED BUT WHOSE MASS FRACTIONS
WERE LESS THAN 5.000000E-06 FOR ALL ASSIGNED CONDITIONS

*C	CCL	CCL2	CCL3	CCL4
*CH	CHCL	CHCL2	CHCL3	CH2
CH2CL	CH2CL2	CH3	CH3CL	CH2OH
CH3O	CH4	CH3OH	CH3OOH	*CN
CNN	COCL2	COHCL	*C2	C2CL
C2CL2	C2CL3	C2CL4	C2CL6	C2H
C2HCL	C2HCL3	C2H2,acetylene	C2H2,vinylidene	C2H2CL2
CH2CO, ketene	O(CH)2O	HO(CO)2OH	C2H3,vinyl	C2H3CL
CH2CL-COOH	CH3CN	CH3CO,acetyl	C2H4	C2H4O,ethylen-o
CH3CHO, ethanal	CH3COOH	OHCH2COOH	C2H5	C2H6
CH3N2CH3	C2H5OH	CH3OCH3	CH3O2CH3	CCN
CNC	OCCN	C2N2	C2O	*C3
C3H3,1-propynl	C3H3,2-propynl	C3H4,allene	C3H4,propyne	C3H4,cyclo-
C3H5,allyl	C3H6,propylene	C3H6,cyclo-	C3H6O,propylox	C3H6O,acetone
C3H6O,propanal	C3H7,n-propyl	C3H7,i-propyl	C3H8	C3H8O,1propanol
C3H8O,2propanol	CNCOCN	C3O2	*C4	C4H2,butadiyne
C4H4,1,3-cyclo-	C4H6,butadiene	C4H6,1butyne	C4H6,2butyne	C4H6,cyclo-
C4H8,1-butene	C4H8,cis2-buten	C4H8,tr2-butene	C4H8,isobutene	C4H8,cyclo-
(CH3COOH)2	C4H9,n-butyl	C4H9,i-butyl	C4H9,s-butyl	C4H9,t-butyl
C4H10,n-butane	C4H10,isobutane	C4N2	*C5	C5H6,1,3cyclo-
C5H8,cyclo-	C5H10,1-pentene	C5H10,cyclo-	C5H11,pentyl	C5H11,t-pentyl
C5H12,n-pentane	C5H12,i-pentane	CH3C(CH3)2CH3	C6H2	C6H5,phenyl
C6H5O,phenoxy	C6H6	C6H5OH,phenol	C6H10,cyclo-	C6H12,1-hexene
C6H12,cyclo-	C6H13,n-hexyl	C6H14,n-hexane	C7H7,benzyl	C7H8
C7H8O,cresol-mx	C7H14,1-heptene	C7H15,n-heptyl	C7H16,n-heptane	C7H16,2-methylh
C8H8,styrene	C8H10,ethylbenz	C8H16,1-octene	C8H17,n-octyl	C8H18,n-octane
C8H18,isoctane	C9H19,n-nonyl	C10H8,naphthale	C10H21,n-decyl	C11H21
C12H9,o-bipheny	C12H10,biphenyl	CLCN	CLO2	CL2O
HCN	HCCN	HCCO	HNC	HNCO
HNO	HNO2	HNO3	HO2	HCHO,formaldehy
H2O2	(HCOOH)2	*N	NCO	*NH
NH2	NH2OH	NOCL	NO2	NO2CL
NO3	N2O	NCN	N2H2	NH2NO2
N2H4	N2O3	N2O4	N2O5	N3
N3H	O3	THDCPD,endo	THDCPD,exo	N2H4(L)
C(gr)	CH3OH(L)	C2H5OH(L)	C6H14(L),n-hexa	C6H5NH2(L)
C6H6(L)	H2O(cr)	H2O(L)	NH4CL(II)	NH4CL(III)
Zn(cr)	Zn(L)			

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