Homework #6, part a

for Stoichiometry, SR=1.0

Take a basis of 1 mole of C3H8

	moles
C3H8	1
O2	5
N2	18.81

C3H8 + 5O2 ==> 3 CO2 + 4 H2O

For SR=	**0.9**	y_i	MW_i	y_i*MW_i
C3H8	1	0.044586	44	1.961783
O2	4.5	0.200637	32	6.420382
N2	16.92857	0.754777	28	21.13376
Tot	22.42857	1	MW_avg=	29.5

Initial pressure =	5	psig, but =	1.340136	atm
Initial temperature =	298	K		
Initial density =	1.62	g/lit		
Initial volume=	5	lit		
Initial mass =	8.088732	g		

Final MW (from Nasa-Lewis code)=		2261	K
Final MW (from Nasa-Lewis code)=		27.727	g/gmol
Final density =	0.20	0.20028	(from printout)
Volume expansion =	**8.08**	8.077423	(from printout)
Final volume =	**40.40**	**liters**	

		MW	
*Ar	0.00837	39.95	0.334382
*CO	0.03345	28	0.9366
*CO2	0.09167	44	4.03348
*H	0.00069	1	0.00069
*H2	0.01032	2	0.02064
H2O	0.1549	18	2.7882
*NO	0.00063	30	0.0189
*N2	0.69768	28	19.53504
*O	0.00007	16	0.00112
*OH	0.00176	17	0.02992
*O2	0.00046	32	0.01472
			27.71369

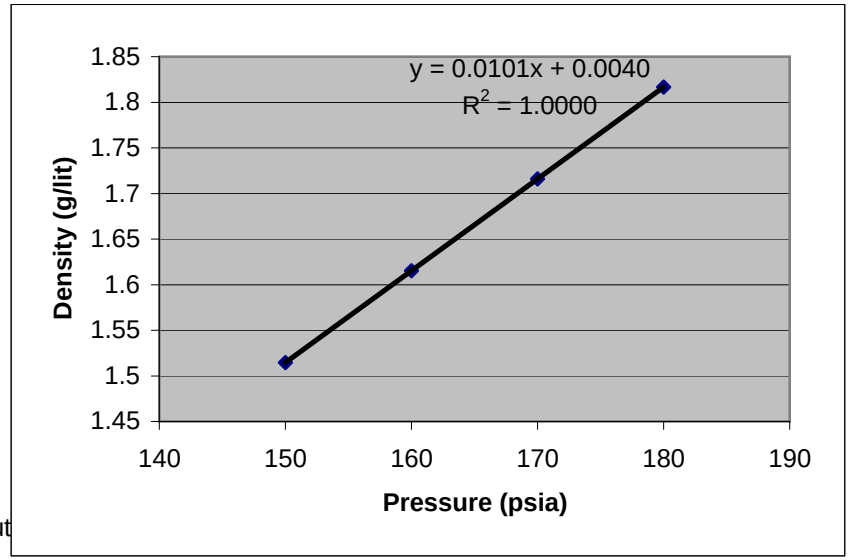
Combustion Homework #7, part b

Initial density = 1.62 g/lit (from part a)

Results of NASA-lewis predictions at different pressures

P (psia)	150	160	170	180	
P (atm)	10.2	10.9	11.6	12.2	
T (K)	2279.9	2280.2	2280.54	2281.09	(unchanging!)
MW	27.764	27.764	27.765	27.766	(unchanging!)
Dens (g/lit)	1.514473	1.615225	1.715983	1.816551	

27.764 27.764 27.765 27.766 27.766



density = m/V = P1*MW1/(R*T1) = P2*MW2/(R*T2)

So P2/P1 = (MW1/MW2)*(T2/T1)

P2/P1= 8.13 P2= 10.90134 atm

T2/T1= 7.65 T2= 2280.2 K

Equation for density=

dens = 0.0101*P(psia) + 0.004

So, when density = 1.62 g/lit

P= 159.78 psia

10.869 atm

From multiple iterations, P= 160.4 psia (using density from printout

11.059 bar

10.91 atm