CONSIDER 1 MOLE OF GAS AT NTP

$$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$$

$\Delta H_f^\circ\ CO_2 \longrightarrow -393\ KJ/mol$

$\Delta H_f^\circ\ H_2O(g) \longrightarrow -241.8\ KJ/mol$

$\Delta H_f^\circ\ CH_4(g) \longrightarrow -74.8\ KJ/mol$

$$\Delta H_R = \underset{PROD}{\Sigma}(n_i \times \Delta H_{fi}) - \underset{REAC}{\Sigma}(n_j)(\Delta H_j)$$

$$\Delta H_{R_{CH_4}}^\circ = 802\times10^3\ KJ/Kgmol = 802\times10^3\ KJ/Kmol$$

$$= 191.93\times10^3 Kcal.$$

AFT CALCULATION

$$\Delta H_{298}^{Com} = 191\times10^3\ Kcal \quad FOR\ 1\ Kmol.$$

SPECIFIC HEAT CAPACITY OF POC

$$= n_{CO_2}\left[10.55 + 2.16\times10^{-3}T - \frac{2.04\times10^5}{T^2}\right] + n_{H_2O}\times\left[7.17 + 2.56\times10^{-3} + \frac{0.08\times10^5}{T^2}\right]$$

$$n_{N_2}\left[6.66 + 1.02\times10^{-3}T\right]$$

HEAT INPUT = HEAT OUTPUT

$$191.93\times10^3 = \int_{298}^{T_f} 74.3072\,dT + \int_{298}^{T_f} 14.84\times10^{-3}T\,dT + \int_{298}^{T_f} -1.88\times10^5\,\frac{}{T^2}$$

AFTER INTEGRATING AND ITERATION

AFT = 2065°C = 2338K