Day-7

→ Continuing last day's problem:

Ok, that's wrong! 2nd iteration!

$T_{ad.} = 2300\ K$

let $T = \frac{300 + 2300}{2} = 1300\ K$

$H_R(T_R) = -74831\ kJ$

$H_p(T) = -393546 - 483690 + (T - 298)(56.984 + 45.027 \times 2 + 34.113 + 7.52)$

Now, $H_R = H_p$

$\Rightarrow T = 2286.278\ K$

→ $H_2 + \frac{1}{2}O_2 \longrightarrow H_2O$ (STP)

$T_{ad,\,guess} = 3700\ K$

$H_R(298\ K) = 0 + 0 = 0$

C_p at $\frac{300 + 3700}{2}\ K = 2000\ K$

$H_p(T_{ad}) = -241845 + 51.143\,(T_{ad} - 298)$

$\Rightarrow T_{ad} = \frac{241845}{51.143} + 298$

$= 5026.8\ K$

2nd iteration:

$$T_{ad\ (guess)} = \frac{3700 + 5000}{2} = 4350\ K$$

Take C_p at $\frac{3700 + 4300}{2}\ K$

$$= 4000\ K$$

so $$T_{ad} = 298 + \frac{241845}{58.026}$$

$$= 4465.873\ K$$

Why such a 'bad guess'?

☆ Dissociation of products at high temp. at ambient pressure.

so $$H_2 + \frac{1}{2}O_2 \longrightarrow x H_2 + 0.5x O_2 + (1-x) H_2O$$

→

Species	Reactants	Products
H_2	0.667	0.295
O_2	0.333	0.1457
H_2O	0	0.5628