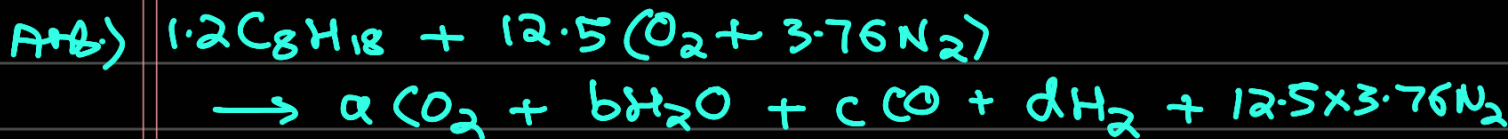
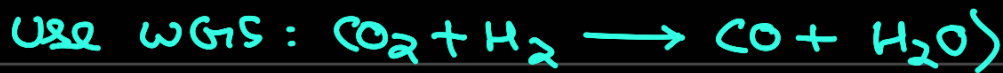
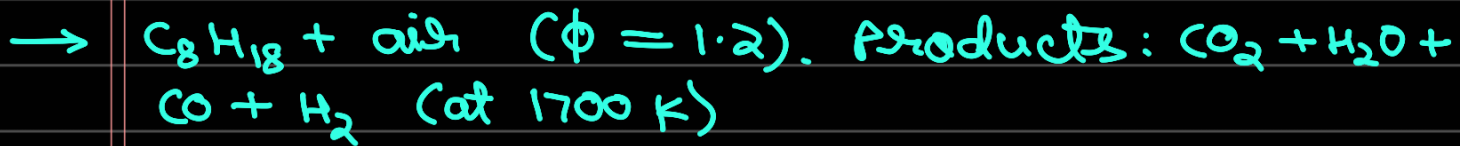


## Day-10



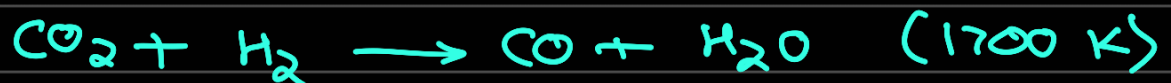
$$a + c = 1.2 \times 8 = 9.6$$

$$2(b + d) = 1.2 \times 18 = 21.6$$

$$\Rightarrow b + d = 10.8$$

$$2a + b + c = 12.5 \times 2 = 25$$

$$\Rightarrow a + b = 25 - 9.6 = 15.4$$



$$K_p = \exp\left(\frac{-396414 + 0 - (-260711 - 152963)}{8.314 \times 1700}\right)$$

$$\approx 3.391$$

$$\text{Now, } 3.391 = \frac{bc}{ad}$$

$$= \frac{(15.4 - a)(9.6 - a)}{a(10.8 - b)}$$

$$= \frac{(15.4 - a)(9.6 - a)}{a(a - 4.6)}$$

$$\Rightarrow 3.391a^2 - 15.6a = 147.84 - 25a + a^2$$

$$\Rightarrow 2.391a^2 + 9.4a - 147.84 = 0$$

$$\Rightarrow a = \frac{-9.4 \pm \sqrt{(9.4)^2 + 4 \times 2.391 \times (47.84)}}{2 \times 2.391}$$

$$\approx 6.14$$

$$b = 9.26$$

$$C = 3.46$$

$$d = 1.54$$

For per mole fuel,

$$a' = \frac{a}{1.2} = 5.1167$$

$$b' = \frac{b}{1.2} = 7.7167$$

$$c' = \frac{c}{\gamma} = 2.843$$

$$d' = \frac{d}{1.2} = 1.283$$

→ Softwares :

- 1.) CEA (Chemical Equilibrium with Applications)
- 2.) STANJAN (Stanford Janaf)
- 3.) GASEQ (Gas Equilibrium)

→  $T_{ad}$  at constant  $v$  —

$$\cancel{dQ}^0 = dU + \cancel{PdV}$$
$$\Rightarrow dU = 0$$

$$\Rightarrow v_R(T_R) = v_P(T_{Ad})$$

$$\Rightarrow H_R(T_R) - P_R V = H_P(T_P) - P_P V$$

$\downarrow \qquad \qquad \qquad \downarrow$

$n_R R_u T_R \qquad \qquad n_P R_u T_{ad}$

$$\Rightarrow H_R - \sum N_R R_v T_R = H_P - \sum N_P R_v T_{Ad}$$

rest of the process is same.