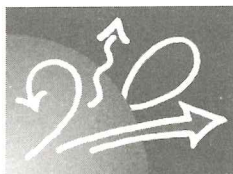




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IAU Symposium No. 210

Modelling of Stellar Atmospheres

17 - 21 June 2002
Uppsala, Sweden

At 5000 K: Compare w/ JANAF

$$K(H_2^+) = \frac{K(H) K(H)}{K(H_2^+)} = \frac{6.442 \times 7.45 \times 10^{-11}}{2.477 \times 10^{-12}} = 193.6$$

since 1 more product than reactant, we change to SI units

$$\rightarrow 193.6 \times P_{\text{standard}} = 1.94 \times 10^7 \text{ N/m}^2 (\text{Pa})$$

$$= 1.94 \times 10^8 \text{ dyne/cm}^2$$

compare with Stancil, 1994, JQRST 51,655 $\rightarrow 1.98 \times 10^8 \text{ dyne/cm}^2$

$$K(H_2) = \frac{K(H) K(H)}{K(H_2^*)} = \frac{6.442^2}{1} = 41.49$$

$$\rightarrow 4.15 \times 10^6 \text{ N/m}^2 (\text{Pa})$$

$$\rightarrow 4.15 \times 10^7 \text{ dyne/cm}^2$$

Compare with my calculated value $\rightarrow \sim 3.95 \times 10^6 \text{ Pa}$

Sauval & Tatum value: $\theta = 1.008$, $(\log \theta = 3.46 \times 10^{-3})$

$$\log K = 11.1759 - 0.8735 \times 3.46 \times 10^{-3} - 0.7470 \times 0(-6) - \theta$$

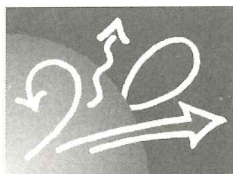
$$\sim 11.1759 - 1.008 \times 4.4781$$

$$\sim 6.66$$

$$K \sim 4.57 \times 10^6$$



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At 5000K

$$K(\text{No}^+) = \frac{K(\text{N})^{+1.48} K(\text{O}^+)^{-10.153}}{K(\text{No}^+)} = \frac{3.31 \times 10^{-2} \times 7.03 \times 10^{-4}}{4.94 \times 10^{-8}}$$

$$= \frac{2.327 \times 10^{-12}}{4.94 \times 10^{-8}}$$

$$= 4.71 \times 10^{-5}$$

$$\rightarrow = 4.71 \text{ Pa}$$

$$= 47.1 \text{ dyne/cm}^2$$

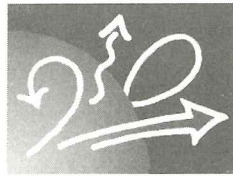
Data from Tarafdar 1977 $\rightarrow \log K = 1.6682$

$$\rightarrow K = 46.58 \text{ dyne/cm}^2$$

My value $K = 23.00 \text{ Pa}$



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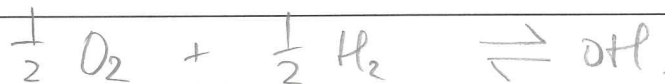
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we want $K^d(H_2^+) = \frac{P_H P_{H^+}}{P_{H_2^+}}$

they give (JANAF) $K^J(H_2^+) = \frac{K^f(H_2^+)}{\text{reference state}} =$

ocean example

eg. say we want OH, $O + H \rightleftharpoons OH$
in terms of reference elements would be



we want $K_d = \frac{P_O P_H}{P_{OH}}$

we have $K_f(O) = \frac{P_O}{\sqrt{P_{O_2}}}$ $\frac{1}{2} O_2 \rightleftharpoons O$
at ref state

$K_f(H) = \frac{P_H}{\sqrt{P_{H_2}}}$ $\frac{1}{2} H_2 \rightleftharpoons H$

$K_f(OH) = \frac{P_{OH}}{\sqrt{P_{H_2}} \sqrt{P_{O_2}}}$

so $K_d = \frac{K(O) K(H)}{K(OH)} = \frac{P_O}{\sqrt{P_{O_2}}} \cdot \frac{P_H}{\sqrt{P_{H_2}}} \cdot \frac{\sqrt{P_{H_2}} \sqrt{P_{O_2}}}{P_{OH}}$!