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Water Molecule Thermal Stability

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Abstract: *Respecting the zero water molecule enthalpy of transformation and the double-surface geometry the water molecule thermolysis at about 1850 °C can be expected.*

Keywords: *double-surface geometry, zero enthalpy of transformation, water molecule thermolysis*

1. Preface

Studying the geometry of the water molecule in the temperature interval between 0°C and 100°C the zero enthalpy electron energy exchange between Hydrogen and Oxygen orbitals was proposed.[1] The so called zero enthalpy of transformation was explained by the temperature dependent lengths of the initial bound Hydrogen and initial non-bound Oxygen orbits [1]. Assuming the validity of the temperature dependence for the orbit lengths at the higher temperatures, too, and with the help of the double-surface geometry [1] the upper temperature limit of the concerned electron energy exchange was foreseen.

2. The Temperature Dependent Length of the Initial Orbits

The next temperature dependence expressed in Celsius degrees is expected for the initial non-bound Oxygen electron orbit length[1]:

$$s_0 = s(121) + \frac{s(123) - s(121)}{100°C} \; x \; T = 121.040\,763 + 0.019\,993 \; x \; \frac{T}{°\text{C}}. \tag{1}$$

And for the initial bound Hydrogen electron orbit length we have [1]:

$$s_H = s(103.5) - \frac{s(103.5) - s(98)}{100°C} \; x \; T = 103.547\,646 - 0.054\,973 \; x \; \frac{T}{°\text{C}}. \tag{2}$$

Where n and $s_x(n)$ is the orbit number and orbit length, respectively, related as follows [1]:

$$s_x(n) = n\left(2 - \frac{1}{\sqrt{1 + \frac{\pi^2}{n^2}}}\right) \quad for \; x = O \; or \; H. \tag{3}$$

3. The Upper Temperature Limit for the Electron Energy Exchange

The highest temperature for the electron energy exchange can be achieved at the shortest initial bound Hydrogen electron orbit length (3):

$$s_H(1) = 1.6967 = 103.547\,646 - 0.054\,973 \; x \; \frac{T}{°\text{C}}. \tag{4}$$

Yielding:

$$T = 1852.75°C. \tag{5}$$

The above value can be taken as the temperature of thermolysis of the water molecule.

At this temperature the path of non-bound Oxygen electrons is characterised by the 158th initial orbit since (1):

$$s_0(1852.75°C) = 121.040\,763 + 0.019\,993 \; x \; \frac{1852.75°C}{°\text{C}} = 158.08 \approx s(158) = 158.03. \tag{6}$$

4. Conclusion

By the present theory the zero enthalpy electron energy exchange between the Hydrogen and Oxygen orbitals in the water molecule could not be provided at temperatures above about 1850 °C because of the accompanied chemical decomposition of the molecule.

Dedication

This fragment is dedicated to the zero enthalpy frame of any proper communication

References

[1] Janez Špringer. "Liquid Water Molecule Deposited Energy below 0°C", International Journal of Advanced Research in Physical Science (IJARPS), vol. 6, no. 1, pp. 37-40, 2019.

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