

Subtle Touch of Electron Orbits in Planar Molecules

Janez Špringer

Cankarjeva cesta 2, 9250 Gornja Radgona, Slovenia, EU

***Corresponding Author:** Janez Špringer, Cankarjeva cesta 2, 9250 Gornja Radgona, Slovenia, EU

Abstract: On the double-surface geometry conceptualized bond length of carbon disulfide yielding 155.24 pm is very close to the experimental value 155.26 pm known from Chemistry and Physics references.

Keywords: Subtle electron orbit, planar molecule, double-surface length, conceptual electron orbit and conceptual bond length

1. PREFACE

Previously one proposed a subtle touch of electron orbits spread around nitrogen atoms in the protonated guanidine[1]. In the present paper the concept is extended to the other planar molecules possessing delocalized electrons, too.

2. THE SUBTLE ORBIT

A subtle touch is the point contact of orbits belonging to the electrons of zero kinetic energy [1]. Such a touch is meaningful according to Heraclitean dynamics [2] where the zero kinetic energy mirrors the non-zero speed of a physical body. The orbit with zero kinetic energy of the circulating electron (subtle orbit) is the longest distributive orbit being twice as long as the original one [1]:

$$s_{\text{subtle}} = 2 \times s_{\text{original}} \quad (1)$$

The later otherwise possesses the kinetic and total energy of the opposite values [3].

3. THE DOUBLE-SURFACE

Double-surface length is the average elliptic-hyperbolic length s related to the elliptic length n as follows [4]:

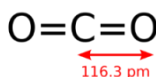
$$s(n) = n \left(2 - \frac{1}{\sqrt{1 + \frac{\pi^2}{n^2}}} \right). \quad (2)$$

The integer value of elliptic length expressed in Compton wavelengths of the electron $n \in \mathbb{N}$ enables the stable circulating of the electron on the orbit [2], in our case on the same or neighboring orbit being engaged in the subtle touch.

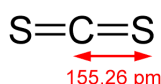
4. THE SUBTLE ORBITS TOUCH IN PLANAR MOLECULES

For instance, the next molecules are planar:

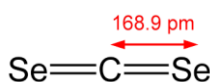
Carbon dioxide [5]



Carbon disulfide [6]



And carbon diselenide[7]



The subtle touch of oxygen, sulfur and selen orbits should take place at the middle of both to the carbon atom bounded atoms, i.e. at the center of carbon atom. The oxygen, sulfur and selen subtle orbit length s_o , s_s and s_{Se} , respectively, is related to the carbon dioxide, carbon disulfide and carbon diselenide bond length $l_{C=O} = 116.3 \text{ pm}$, $l_{C=S} = 155.26 \text{ pm}$ and $l_{C=Se} = 168.9 \text{ pm}$, respectively, as follows:

$$s_X = 2\pi \times l_{C=X} \text{ for } X = O, S \text{ and } Se. \quad (3)$$

The concerned values are calculated using the above equation (3) and collected in *Table*. The nearest conceptual values of subtle orbit length s_X and bond length $l_{C=X}$ satisfying the double-surface concept (2) are also included in the mentioned table. The experimental-conceptual bond length difference is added.

Table1. The experimental and conceptual values of planar molecules CX_2 bond length $l_{C=X}$ as well as subtle orbit length s_X . For $X = O, S$ and Se

Planar molecule CX_2	Experimental bond length $l_{C=X}^{experimental}$	Experimental subtle orbit length $s_X^{experimental}$	Conceptual subtle orbit length $s_X^{conceptual}$	Conceptual bond length $l_{C=X}^{conceptual}$	Experimental-conceptual bond length difference Δ
CO_2	116.3 pm	$301.1711 \lambda_e$	$s_o(301) = 301.0164 \dots \lambda_e$	116.24 pm	0.06 pm
CS_2	155.26 pm	$402.0621 \lambda_e$	$s_s(402) = 402.0123 \dots \lambda_e$	155.24 pm	0.02 pm
CSe_2	168.9 pm	$437.3843 \lambda_e$	$s_{Se}(437) = 437.0113 \dots \lambda_e$	168.76 pm	0.14 pm

5. CONCLUSIONS

The difference between the experimental and conceptual values tells us about the strength of concept describing subtle orbits touch on double surface. The conceptual bond length of carbon disulfide is in a good agreement with the experimental value ($\Delta = 0.02 \text{ pm}$) while the experimental-conceptual bond length difference of carbon dioxide ($\Delta = 0.06 \text{ pm}$) and carbon diselenide ($\Delta = 0.14 \text{ pm}$) only coincidentally confirms the mentioned concept unless the second decimal place of experimental bond length of CO_2 and CSe_2 remains unknown.

DEDICATION

This fragment is dedicated to the Slovene basketball team – European champions 2017

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