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Time Economic Innovative Methodology on the Prediction of Hybridization State of Heterocyclic Compounds

Arijit Das[1*], Bijaya Paul[2], R.Sanjeev[3] and V.Jagannadham[4]
[1]*Department of Chemistry, Ramthakur College, Agartala -799003, Tripura, India*
[2]*Department of School Education, Agartala, West Tripura, India*
[3]*Department of Pharmacy, School of Health Science, University of KwaZulu-Natal, Durban, South Africa*
[4]*Department of Chemistry, Osmania University, Hyderabad, India*

Abstract: *Context based learning approaches have been presented in this article as a way to enhance student's interest in, as well as time economic learning outcomes from chemical education. In this article state of s-p hybridization of hetero atoms in heterocyclic compounds is empirically calculate from the number of bonds and delocalized lone pair of electrons associated with it. The article explores the results and gives implications for context-based teaching, learning and assessment.*

Keywords: *General public, High School, Under Graduate, Graduate student, Chemical Education Research, Organic Chemistry, Hybridization, Heterocyclic Compounds and Chemical Bonding*

I. Introduction

Earlier I have introduced some methods[1,2,3] in my original research article and also in review article mode for prediction of hybridization state of different kinds of Organic and Inorganic molecules and ions on conventional method[4,5,6,7,8] by calculating the number of sigma bonds around each center atom for which hybridization state should be determined. But there is some limitation arises during prediction of hybridization state in case of heterocyclic compounds like Pyrrole, Furan, Thiophene etc. For this reason, in this article, I have introduced another innovative time economic method for the Prediction of Hybridization state in case of heterocyclic compounds.

Innovative Methodology on the Prediction of Hybridization state of Hetero atom in Heterocyclic Compounds:

Total power on Hybridization State (X) = TNBS + DLP

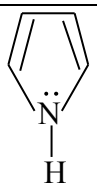
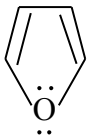
Where, TNBS = Total Number of bonds directly attached with hetero atom excluding H bond if any attached with hetero atom

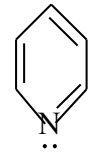
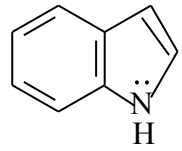
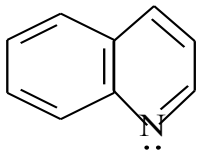
DLP = Delocalized lone pair electrons through resonance

- For sp ; Power on s = 1 and Power on p = 1, Hence Total power = (1+1) = 2
- For sp^2 ; Power on s =1 and Power on p = 2, Hence Total power =3 = (1+2) = 3
- For sp^3 ; Power on s = 1 and Power on p = 3,Hence Total power = (1+3) = 4

Examples have been illustrated in Table-1

Table-1

Heterocyclic Compounds	TNBS (Total number of bonds around hetero atom excluding H Bond)	DLP (Delocalized Lone Pair of e˙s)	Total Power (X) = TNBS + DLP	Hybridization State
 Pyrrole	2	1	3	sp^2
 Furan	2	1 (out of two lone pair of electrons, one can take part in delocalization at a time)	3	sp^2

 Thiophene	2	1 (out of two lone pair of electrons, one can take part in delocalization at a time)	3	sp^2
 Pyridine	3	0 (lone pair on nitrogen does not undergo delocalization)	3	sp^2
 Indole	2	1	3	sp^2
 Quinoline	3	0 (lone pair on nitrogen does not undergo delocalization)	3	sp^2

II. Conclusions

It may be expected that this innovative method would go a long way to help to the students of chemistry at Undergraduate, Senior Undergraduate and Post-Graduate level who would choose the subject as their career. Experiment in vitro on 150 students at Undergraduate, Senior Undergraduate and Post-Graduate level showed that by using this innovative method students can save up to 3-4 mins time in the examination hall. On the basis of this, I can strongly recommend to use this innovative time economic interesting pedagogy.

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