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# Magadh University



## PROVISIONAL CERTIFICATE

Certified that.....**Eena Bahan**.....

Passed the.....**Ph. &**.....Examination

of this University held in the month of.....**July**.....2009  
Sub: **MRINDO/S-c1 calculations on the electronic spectra of the isomers of**  
**Tetraazatetrahedrane (N<sub>4</sub>), Hexazine (N<sub>6</sub>) and octazacycubane (N<sub>8</sub>)**  
BODH-GAYA

Dated the **04/08/09**.....200

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\* Controller of Examinations

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*Eena Bahan*  
*10/3/2009*

M. U. Press, Bodh-Gaya.

# Charge Distribution and Ionization Potential of $N_8$ Isomers

Eena Bahan<sup>1\*</sup>, R. S. Prasad<sup>2</sup>

<sup>1</sup>Department of Physics S. C. E. Sasaram, India

\*Email: 14200shprateek[at]gmail.com

<sup>2</sup>Former Head Department of Physics, Magadh University, Bodh Gaya, India

**Abstract:** By use of an approximate self-consistent field (SCF) method MRINDO/S, the potential nitrogen molecules, octaazacubane  $N_8$  isomers were studied. The  $N_8$  isomers considered in the present study belong to the molecular point groups  $O_h$ ,  $D_{2h}$  and  $C_{2v}$ , respectively. We report their charge distribution and ionization potential of the  $N_8$  isomers. The charge distribution was accounted for by making use of Mulliken population analysis.

**Keywords:** -  $N_8$  isomers. Charge distribution and ionization potential

## 1. Introduction

Although cubane and cyclooctatetrane are known experimentally, unsubstituted pentalene has never been synthesized; nevertheless, the vibrational analysis of Leininger et al. [1] indicates that the three nitrogen analogues namely octaazacubane of  $O_h$  symmetry, an all-nitrogen analogue of cyclooctatetrane of  $D_{2d}$  symmetry and a planar bicyclic structure analogous to pentalene (octaazapentalene) of  $D_{2h}$  symmetry represent potential energy minima. The  $N_8$  isomers are metastable and the metastability of octaazapentalene is attributed to two  $\pi$  electrons present in it but not in pentalene; according to the rule of topological charge stabilization, further, they concluded that since all three minima are very high-lying with respect to  $4N_2$ , their potential application is as high energy density materials (HEDMs).

Synthesis of the metastable molecules  $N_4$ ,  $N_6$  and  $N_8$  would offer a potential route toward the storage of large amounts of energy. The evolving quest for more efficient explosives and rocket propellants has led to the examination of new and novel ways of storing energy [2]. A great deal of effort has been focused on increasing energy density by producing highly strained molecular systems. Strained hydrocarbons such as tetrahedrane and cubane have occupied the interest of researchers for many years [3]. One way of further increasing the energy of these systems is to replace CH fragment with an  $N_2$  atom. In the limit of full replacement, nitrogen analogues of tetrahedrane and cubane are obtained. While one would expect these molecules to be metastable thermodynamically, pathways for decomposition to ground state N are forbidden by orbital symmetry. Therefore, it is possible that  $N_4$  and  $N_8$  can be observed experimentally.

The intense scientific and popular interest in the  $C_{60}$  molecule has naturally raised the question whether other important cluster species have been systematically overlooked. N clusters are reasonable candidates for the following two reasons. First, a number of  $(CH)_n$  clusters have been synthesized, which are isoelectronic with  $N_n$ . It is possible that these nitrogen structures will show analogous stability. Second,  $N_n$  clusters would be high energy density materials (HEDMs). The dissociation

energy of  $N_2$  ( $N \equiv N$  triple - bond energy) is 225 kcal/mol, while the standard  $N = N$  double - bond energy is 100 kcal/mol and that of  $N - N$  single bond is 40 kcal/mol [4]. Since the  $N \equiv N$  triple - bond energy (225 kcal/mol) is much more than three times the single - bond energy ( $3 \times 40 = 120$  kcal/mol), this suggests that the  $N_n$  clusters with  $N - N$  single bonds may release sufficient amounts of energy when they dissociate into  $N_2$  molecules. For instance, the cluster  $N_{2n}$ , which has  $3n$  single  $N - N$  bonds (each nitrogen atom connecting to three other nitrogen atoms with single bonds), will release as much as  $225n - 40 \times 3n = 105n$  kcal/mol energy when it decomposes into  $nN_2$  molecules. Also since the  $N = N$  double - bond energy (100 kcal/mol) is still larger than that of two single bonds ( $2 \times 40 = 80$  kcal/mol), the ideal HEDM candidates are those clusters containing  $N - N$  single bonds. This rough estimation of the decomposition energy may be compared with the results of recent high-level theoretical studies. For tetraazatetrahedrane  $N_4$  ( $105 \times 2 = 210$  kcal/mol), the relative energy to  $N_2$  was reported as 191 kcal/mol at the TZ2P CCSD level of theory [5] or 183 kcal/mol at the 6-311 + G(3df) Becke 3 LYP level [6]. For octaazacubane  $N_8$  ( $105 \times 4 = 420$  kcal/mol), the analogous relative energy was reported as 450 (TZ2P CCSD)[5], 442 [6 - 311 + G(3df) Becke LYP] [6], or 423 kcal/mol [DZP CCSD (T)] [7], respectively.

As mentioned earlier, in 1995, Leininger et al. [1] investigated two new isomers of cubane namely an all-nitrogen analogue of cyclooctatetrane of  $D_{2d}$  symmetry and octaazapentalene of  $D_{2h}$  symmetry. By use of DZP basis set accompanied by the SCF, MP2, CISD, and CCSD methods they reported optimized geometries and harmonic vibrational frequencies of the two newly investigated isomers and also of the previously investigated structure octaazacubane of  $O_h$  symmetry. High-quality estimates of the energy differences between these  $N_8$  isomers and  $4N_2$  were determined using the CCSD (T) method. In 1996, Gimarc and Zhao studied the strain energies and resonance energies of these three  $N_8$  clusters using *ab initio* methods [7]. The nitrogen cluster strain energies are generally of the same order of magnitude as those of isostructural hydrocarbon clusters, and resonance energies of nitrogen clusters are much smaller than those of the comparable aromatic hydrocarbons. Recently, Glukhovtsev et al. [6]

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investigated  $N_8$  clusters more systematically. The number of the structures (including two saddle points) for  $N_8$  clusters in their paper has reached as many as eight.

All the previously investigated  $N_8$  clusters, except the cubic structure, contain N = N double bonds. For the purpose of searching for HEDM candidates, Tian et al. [8] wanted to limit their attention to isomers with only N - N single bonds. With the help of graph theory, they found two new previously uninvestigated isomers, which have only N - N single bonds. One has  $D_{2h}$  symmetry, and the other, analogous to cuneane designated octaazacuneane, has  $C_{2v}$  symmetry.

The above studies stimulated us to consider the  $N_8$  clusters to account for their spectroscopic characteristics. In the present study we have considered three  $N_8$  clusters; two of these octaazacubane and octaazacuneane contain only N - N single bonds while the third octaazapentalene contains N = N double bonds too.

## 2. Charge Distribution

The net charge distributions in the isomers are shown in Fig.1. We know according to the chemical intuition that higher the electron density on N, the higher is its donor character. Due to increase in negative charge density on N, its size is slightly increased. If positive charge is developed on N, its donor character is diminished and hence its basic character is decreased. on this basis, all the nitrogen atoms in octaazacubane, except those numbered 4, 5 and 7, exhibit donor character. On the other hand, fifty percent of the nitrogen atoms in octaazapentalene and octaazacuneane exhibit donor character while the others behave like acceptors. Here we would like to mention about the magnitude of the charges developed on in the isomers. This is the little in octaazacubane while in the other two isomers this is too large; the charges developed on different nitrogen atoms in octaazapentalene are more than ten times that in octaazacuneane.

## 3. Ionization Potentials

The first ionization potential of octaazacubane is interpreted as the removal of a  $\sigma$  electron while the second as the removal of a  $\pi$  one, looking at the values of these two ionization potentials we infer that both the  $\pi$  and  $\sigma$  electrons have the same probability to leave the molecule first. Prasad and Kumar [10] found approximately a similar situation in octaazacubane - aside the reversal in the appearance of  $\sigma$  and  $\pi$  electrons. Besides, near constancy in the ionization potentials of octaazacubane makes it easy to infer that some of the excited states would show degeneracy. This is in consistent with the earlier study [10]. On the other hand, the first removed electron in octaazapentalene and octaazacuneane is a  $\pi$  electron while the second removed electron is a  $\sigma$  one. In contrast to octaazacubane, the first two ionization potentials of octaazapentalene and octaazacuneane are not exactly the same but differ in magnitude and hence their spectra would be more structured than octaazacubane. This aspect of the spectra will be discussed in the succeeding section.

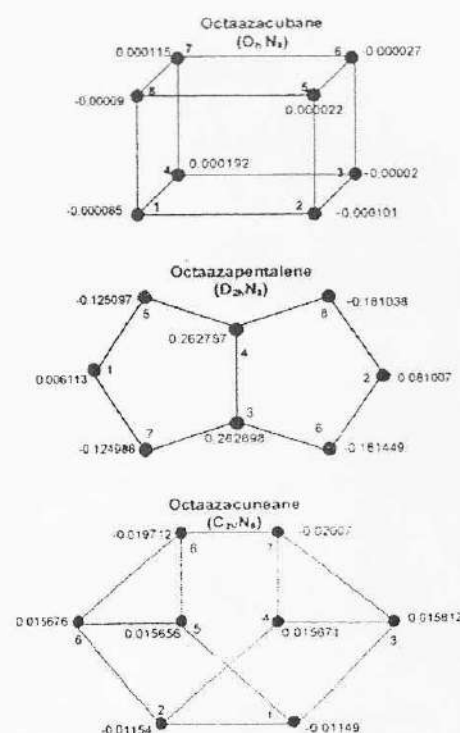
## 4. Results

Table 1 contains ionization potentials deduced from Koopmans theorem [9] and the corresponding orbital symmetries. The first columns of Table 1 contain ionization potentials and symmetries of the orbitals reported by Prasad and Kumar for octaazacubane only [10]. The Charge distribution is cited on page. No. 5.

Table 1: The lowest ionization potential of  $N_8$  isomers

Molecule (Symmetry)	Previous Work		This Work		
	I.P.	Type of orbital	I.P.	Sym. Of Orbital	Type of orbital
Octaazacubane ( $O_h$ )	11.197	$t_{1g} \pi$	10.819	$a_{1g} \sigma$	$\sigma$
	11.199	$a_{2g} \sigma$	10.819	$t_{1g} \pi$	$\pi$
	13.027	$t_{1u} \pi$	10.823	$a_{2g} \sigma$	$\sigma$
	13.040	$a_{2u} \sigma$	12.934	$t_{2g} \sigma$	$\sigma$
	14.385	$T_{2u} \pi$	12.953	$a_{2g} \sigma$	$\sigma$
Octaazapentalene ( $D_{2h}$ )			50.781	$a_{1g} \sigma$	$\sigma$
			10.635	$a_u \pi$	$\pi$
			11.452	$b_{1u} \sigma$	$\sigma$
			11.918	$b_{2u} \pi$	$\pi$
			12.157	$b_{2g} \sigma$	$\sigma$
Octaazacuneane ( $C_{2v}$ )			41.319	$b_{1u} \sigma$	$\sigma$
			46.831	$a_u \sigma$	$\sigma$
			11.031	$a_2$	
			11.211	$a_1$	$\sigma$
			11.268	$b_2$	$\sigma$

Fig. 1 The net charge distribution in  $N_8$  isomers. The spheres represent nitrogen atoms with their respective numbers



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				4.643	0.703	A <sub>1</sub>	n→σ*	0
				4.717	0.204	A <sub>1</sub>	n→π*	0
				4.849	0.949	B <sub>2</sub>	n→π*	2

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दूरभाष : 0612-2641451 ( कॉलेज )  
ई-मेल : info@rpmcollegepatna.ac.in  
वेबसाइट : www.rpmcollegepatna.ac.in

# रामेश्वरदास पन्नालाल महिला महाविद्यालय

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( पाटलिपुत्र विश्वविद्यालय की अंगीभूत इकाई )

पत्रांक 644/RPM/2022

प्राचार्या कार्यालय

दिनांक 30/09/22

## OFFICE ORDER

As per Sankalp of Govt. of Bihar No 1594 dated 20-08-2014, through Education Department accordingly in pursuance of Patliputra University, Patna Memo No R/PPU/2047/22 dated 05-09-2022 from ID no. 731 Dr. Ena Bahan has joined as Guest / Part-Time Teacher in Physics subject on 08-09-2022 forenoon.

*Alamlati*

30/9/22

*Ena Bahan*  
30/09/22  
Prof. In-Charge



## MRINDO/S-CI Calculation on the Electronic Spectra of $N_8$ Isomers

EENA BAHAN<sup>1\*</sup>, RAJ SHEKHAR PRASAD<sup>2</sup> AND R. S. PRASAD<sup>3</sup>

1. Department of Physics S. C. E. Sasaram, India

2. Department of Mathematics, Government Engineering College, Buxar, India

3. Former Head Department of Physics, Magadh University, Bodh Gaya.

**Abstract:** MRINDO/S-CI Calculation Completed by singly excited configuration interaction was performed on the octaazacubane, octaazapentalene and octaazacuneane. The importance of outer (Rydberg) atomic orbitals is stressed and it is found that a few singlet-singlet transitions of the higher azines lead to an excited state with considerable Rydberg character.

**Keywords:** - MRINDO/S, octaazacubane, octaazapentalene and octaazacuneane.

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### I. Introduction

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The above studies stimulated us to consider the  $N_8$  clusters to account for their spectroscopic characteristics. In the present study we have considered three  $N_8$  clusters; two of these octaazacubane and octaazacuneane contain only N - N single bonds while the third octaazapentalene contains N = N double bonds too.

## II. Geometry of the $N_8$ Isomers

The geometries of octaazacubane and octaazapentalene were taken from Leininger et al. [1] while the geometry of octaazacuneane was taken from Tian et al. [8]. Since the geometries of molecules play invaluable role in spectral calculations, we have used the above said geometries because these were optimized at the correlated level of theory.

## III. Singlet excitations

### 3.1 Octaazacubane

The lowest singlet excitation in octaazacubane is predicted at 6.296 eV. This does indicate that the octaazacubane spectrum cannot be expected in the visible or in the near-ultraviolet, for it appears in the medium ultraviolet under the approximation used in this work. This agrees with the previous prediction [10] but, in contrast, the lowest excitation ( $n \rightarrow \sigma^*$ ) is allowed ( $f = 0.0374$ ) while this was forbidden in Ref. [10]. The first absorption which concerns essentially the  $n \rightarrow \pi^*$  transition takes place at 6.321 eV and this transition is more intense ( $f = 0.0439$ ) than the lowest one. Several intense transitions are reported in the spectrum of octaazacubane but the most intense of all appears at 7.474 eV. This is an  $n \rightarrow \sigma^*$  transition with an oscillator strength amounting to 0.0782. This region of energy therefore corresponds to the maximum absorption region in octaazacubane. Of interest is the presence of an  $n \rightarrow \pi^*$  transition below the maximum absorption region. This  $n \rightarrow \pi^*$  transition exhibits an oscillator strength amounting to 0.0551, Thus these two transitions are of comparable intensity but they can be easily observed experimentally because the former is z-polarized while the latter is y-polarized, Comparing our results with the previous calculation [10] we notice that the present maximum absorption region in octaazacubane is shifted by about 1eV towards the shorter wavelength side of the spectrum.

The spectrum of octaazacubane consists of three closely spaced Rydberg excitations. All these transitions are  $n \rightarrow \sigma_R^*$  in character and appear at 6.953, 6.958 and 6.959 eV, respectively. The corresponding quantum defects of these Rydberg excitations are the same of magnitude 1.12. Obviously they form the members of ns Rydberg series. None of these transitions exhibits intensity and hence they cannot be observed experimentally without stable experimental conditions. According to the previous calculation [10] the spectrum of octaazacubane was devoid of Rydberg excitations.

### 3.2 Octaazapentalene

We note that reduction in symmetry reduces surprisingly the transition energy. This is obvious because the lowest transition in octaazapentalene predicted at 3.369 eV lies about 3eV below the lowest transition in octaazacubane. This transition is  $n \rightarrow \pi^*$  transition with an oscillator strength of 0.0450. Comparing the spectra of the three isomers we notice that the lowest transition in octaazacubane is  $n \rightarrow \sigma^*$  while this is  $n \rightarrow \pi^*$  in Octaazapentalene and octaazacuneane. Among  $n \rightarrow \pi^*$  transitions the most absorbing one is predicted at 5.179 eV with an oscillator strength of 0.0816. This  $n \rightarrow \pi^*$  transition is x-polarized. The most intense of all the transitions



in octaazapentalene is an  $n \rightarrow \sigma^*$  transition at 7.76 eV. This maximum absorbing band having oscillator strength of 0.5699 is x-polarized. Thus the maximum absorption region in octaazapentalene occurs around 8 eV.

The spectrum of Octaazapentalene consists of two Rydberg excitations, the former at 5.416 eV has a quantum defect of 1.3 while the latter at 6.823 eV has a quantum defect of 1.1. Thus they form the members of ns Rydberg series. These Rydberg excitations exhibit zero oscillator strength. We would like to mention here that both of the Rydberg members are overlapped by intense transitions on both of their ends. So it would be difficult to observe them experimentally.

### 3.3 Octaazacuneane

The lowest excitation in octaazacuneane is an  $n \rightarrow \pi^*$  at 4.921 eV. This transition shows oscillator strength of 0.0012. We would like to mention here the polarization of the lowest excitation in the  $N_8$  isomers. This is z-polarized in octaazacubane and octaazapentalene while in octaazacuneane this is y-polarized, The lowest symmetry of octaazacuneane (as compared with the symmetry of octaazacubane or octaazapentalene) makes  $n \rightarrow \pi^*$  transitions more dominant than  $n \rightarrow \sigma^*$  transitions. This is because the most intense of all the transitions in octaazacuneane is an  $n \rightarrow \pi^*$  at 7.883 eV. This transition having an oscillator strength of 0.1942 is y-polarized. Thus the maximum absorption in octaazacuneane occurs around 8 eV ; this is the same absorption region as mentioned in octaazacubane and octaazapentalene. Tian et al. [8] opine that for the  $N_8$  isomers with the same bonding characteristics, it appears that the ones with higher symmetry have the higher energy. Here if we consider the lowest excitation energy then their ordering is

$$O_h N_8 < C_{2v} N_8 < D_{2h} N_8$$

Comparing the spectra of the isomers we note that the spectrum of octaazapentalene or octaazacuneane is more structured than that of octaazacubane.

The spectrum of octaazacuneane comprises three Rydberg excitations. The first at 7.145 eV exhibits intensity ( $f=0.004$ ) and its quantum defect of 1.13 does indicate that this forms the member of ns Rydberg series. This transition on account of its intensity can be observed experimentally. The other two transitions at 7.409 and 7.425 eV again form the members of ns Rydberg series because their respective quantum defects are 1.06 and 1.05. These transitions are forbidden and hence they can produce difficulties in their experimental observation.

### IV. Triplet excitations

The lowest triplet excitation in octaazacubane is an  $n \rightarrow \sigma^*$  transition while in octaazapentalene and octaazacuneane this is an  $n \rightarrow \pi^*$  one. All the singlet — triplet splittings in octaazacubane do not exceed 1 eV. In octaazapentalene and octaazacuneane some of the S — T splittings exceed 1 eV. An important point is that only the S-T splittings of  $n \rightarrow \pi^*$  transitions in octaazapentalene and octaazacuneane exceed 1 eV while those of  $n \rightarrow \sigma^*$  transitions remain less than 1 eV, The  $n \rightarrow \pi^*$  transitions in all the three isomers exhibit intensity. The separations between the lowest singlet and triplet  $n-\pi$  states are as follows. This is about 0.612 eV in octaazacubane, 1.124 eV in octaazapentalene and 0.534 eV in octaazacuneane.

### V. Conclusion

The electronic spectra of octaazacubane, octaazapentalene and octaazacuneane have not yet been observed or theoretically calculated, except Ref. [10], in the literature. Our calculations reveal that the spectra of the  $N_8$  isomers are compact. Nevertheless, the structural features of the spectra are well pronounced. We note the ordering of different spectroscopic data of the isomers as follows.

The first ionization potential:

$$D_{2h} N_8 < O_h N_8 < C_{2v} N_8$$

The maximum absorption region:

$$O_h N_8 < D_{2h} N_8 < C_{2v} N_8$$

The lowest S-T splitting

$$C_{2v} N_8 < O_h N_8 < D_{2h} N_8$$

We hope that the present results would be helpful in further studies.

**Table 1.** The singlet excitations in  $N_8$  isomers (All the energies are in eV)

Molecule (Symmetry)	Previous Work			This Work					% Rydberg cha. N
	Transitio n Energy	f	Type of transition	Transitio n energy	F	Pol.	Sym. Of exc. state	Type of transition	
Octaaz- Acubana ( $O_h$ )	5.842	0	$T_{2u}(n \rightarrow \sigma^*)$	6.296	0.0374	z	$T_{1u}$	$n \rightarrow \sigma^*$	0

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	5.847	0	A <sub>1g</sub> (n→σ*)	6.312	0.000	-	A <sub>2g</sub>	n→σ*	0
	5.850	0	A <sub>1g</sub> (n→π*)	6.316	0.000	-	T <sub>2g</sub>	n→π*	0
	5.857	0	A <sub>2g</sub> (n→σ*)	6.321	0.0439	y	T <sub>2g</sub>	n→π*	0
	5.867	0	T <sub>2g</sub> (n→π*)	6.332	0.000	-	A <sub>2g</sub>	n→π*	0
Octa azapentalene( D <sub>2h</sub> )				3.369	0.0450	z	B <sub>1u</sub>	n→π*	0
				3.505	0.0000	-	B <sub>2u</sub>	n→π*	0
				3.511	0.0000	-	A <sub>u</sub>	n→π*	0
				3.778	0.0000	-	B <sub>3u</sub>	n→σ*	0
				3.824	0.0000	-	B <sub>3u</sub>	n→σ*	0
Octaazacunean e (C <sub>2v</sub> )				4.921	0.0012	y	A <sub>1</sub>	n→π*	0
				4.988	0.0050	x	B <sub>1</sub>	n→π*	0
				5.175	0.0115	z	A <sub>2</sub>	n→π*	0
				5.346	0.0000	-	A <sub>1</sub>	n→σ*	0
				5.528	0.0094	x	B <sub>1</sub>	n→σ*	0

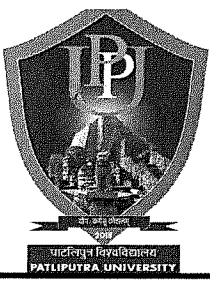
Table 2. The Triplet excitations in N<sub>8</sub> isomers (All the energies are in eV\*)

Molecule (Symmetry)	Previous Work			This Work				% Rydberg cha.  N
	Transition energy	S-T split	Type of transition	Transitio n energy	S-T split	Sym. Of exc. State	Type of transition	
Octaaz- Acubana (O <sub>h</sub> )	5.375	0.609	T <sub>2g</sub> (n→π*)	5.708	0.580	T <sub>1u</sub>	n→σ*	0
	5.377	0.736	T <sub>1g</sub> (n→π*)	5.709	0.612	T <sub>2g</sub>	n→π*	0
	5.510	0.332	T <sub>2u</sub> (n→σ*)	5.713	0.643	A <sub>1g</sub>	n→σ*	0
	5.546	0.556	T <sub>1g</sub> (n→π*)	5.983	0.355	T <sub>1u</sub>	n→σ*	0
	5.555	0.302	A <sub>2g</sub> (n→σ*)	6.031	0.285	T <sub>2g</sub>	n→π*	0
Octa Azapentalene (D <sub>2h</sub> )				2.245	1.124	B <sub>1u</sub>	n→π*	0
				2.662	1.106	B <sub>3u</sub>	n→π*	0
				2.688	2.309	B <sub>2g</sub>	n→π*	0
				2.761	0.744	B <sub>2u</sub>	n→π*	0
				3.213	0.655	B <sub>3u</sub>	n→π*	0
Octaazacuneane (C <sub>2v</sub> )				4.464	0.534	A <sub>1</sub>	n→π*	0
				4.608	0.567	A <sub>2</sub>	n→π*	0

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Esa Bahan  
12/11/2020

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# PATLIPUTRA UNIVERSITY

## PATNA-800020

E-mail:- [patliputrauniversity2018@gmail.com](mailto:patliputrauniversity2018@gmail.com)  
[registrar@ppup.ac.in](mailto:registrar@ppup.ac.in)

Ref.no:-.....

Date:-.....

### NOTIFICATION

In pursuance of the Department Sankalp No. 1594 dated 20.08.2014, and No. 15/ए-2-2014-925 dated 13.04.2021 issued by the Education Department, Government of Bihar, Patna. Advertisement for engagement of Guest/Part-Time Teachers was issued by the University in different national daily newspaper and on the University Website, vide Advt. No.: G/06, followed by the meeting of Selection Committee held on 26.08.2022. On the recommendation of Selection Committee, the following persons are hereby engaged as Guest/Part-Time Teacher in the subject of **PHYSICS** purely on temporary basis on a fixed honorarium of Rs. 1500/- (One Thousand Five Hundred only) per class, with a maximum of Rs. 50000/- (Fifty thousand only) in a month. However, the benefit of provident fund, Pension, etc. Normally given to regular teachers of the University, shall not be admissible to Guest/Part-Time Teachers.

The tenure of engagement of the Guest/Part-Time Teachers will not be of more than one academic session (equivalent to eleven months) or till appointment of regular faculty whichever is earlier and his/her engagement will automatically be terminated on the 31<sup>st</sup> May of every year and will remain so till the University re-opens after summer vacation, for which no payment or claim for payment shall be admissible. Their services shall be renewal for the next academic year on the recommendation of the Selection Committee, constituted as per provision of the Departmental Sankalp No. 15/ए-2-2014-925 dated 13.04.2021, to be made on the basis of Performance Evaluation Report and recommendation of the concerned Head of the University Department or Principal of the College.

Their service can be terminated at any point of time by the University with ten days notice. In future, they will have no claim for permanent job/absorption on the basis of this contractual engagement.

Sl. No.	Form ID	Name	Address	Place of Posting
1.	439	Dr. Abhishek Kumar	Quater No 9 Professor Colony Near Dayawati Public School Hapur Road Modinagr Dist.- Ghaziabad Pincode - 201204 State- Uttar Pradesh	A.N.S.College, Barh, Patna



2.	496	Dr. Priyanka Kumari	C/O Virendra Prasad Sinha No-405 A,OM Palace, New Jaganpura Near Patna Central School, Khemichak, Kankarbagh Patna Dist.-Gaya Pincode- 800027 State- Bihar	Sri Arvind Mahila College, Patna
3.	528	Dr. Sumeet Kumar	Ramdiri-3 Ward-6 Nakti, Chaudhary Patti Dist.-Begusarai Pincode- 851129 State -Bihar	S.P.M.College, Udantpuri, Nalanda
4.	328	Dr. Mini Agarwal	H.N.-26, Gali no.-14, Inderpuri, Patliputra Colony near durgapuri chock, Kesri- nagar, P.O.- Patna, Dist.- Patna Pincode- 800024 State -Bihar	Nalanda Mahila College, Biharsharif, Nalanda
5.	6173	Dr.Dharmendra Yadav	Village- Sardaha, Post – Madhasiya, Tehsil- Nizamabad Dist.-Azamgarh Pincode-276208 State- Uttar Pradesh	Kisan College, Sohsarai, Nalanda
6.	5614	Dr. Abhishek Kumar	C/o Shri Umashankar Yadav Village-Thepha Bazar Purvanchal Tola Thepha Dist.- Siwan Pincode-841245 State -Bihar	S.G.G.S.College, Patna City, Patna
7.	6202	Dr. Shailesh Kumar Suman	Shailesh Kumar Suman C/O Ram Kumar Prasad Annour Aguwan Block Road Dist.- Saran Pincode-841401 State -Bihar	R.R.S.College, Mokama, Patna
8.	731	Dr. Eena Bahan	8E/13 B.H. Colony Near New Augamkuan Thana	R.P.M.College, Patna City, Patna



			Kankarbagh Dist.- Patna Pincode-800026 State-Bihar	
9.	4582	Dr. Shreemant Raman	A/2, Ashokpuri C/O- Operative Colony Khajpura, Post- B.V College Patna Dist.- Patna Pincode-800014 State-Bihar	S.M.D.College, Punpun, Patna
10.	1079	Mr. Narad Prasad	Vill. – Shrirampur, Po. - Noniyadih PS- Raxaul Dist. – East Champaran Pincode – 845305 State- Bihar	S.U.College, Hilsa, Nalanda
11.	5977	Dr. Suman Kumari	Digha Ghat Patna-11, Near Bank of Baroda, P.O - Digha, P.S- Digha Gath Dist. – Patna Pincode – 800011 State -Bihar	Mahila College, Khagaul, Patna
12.	6205	Dr. Gautam Kumar Sinha	AT- Bakarpur, P.O- Bishanpur said, P.S- Rajapakar Dist. – Vaishali Pincode- 844115 State -Bihar	J.N.L.College, Khagaul, Patna

By the order of Hon'ble Vice Chancellor  
Sd/-

(Dr. Jitendra Kumar)

Registrar

Patliputra University, Patna.

Memo...R/PPU/2017/22

Date.....05-09-2022.....

Copy to:-

1. Persons Concerned.
2. Director, Higher Education, Govt. of Bihar.
3. Principal, Concerned Colleges.
4. F.O., PPU, Patna.
5. P.S. to VC, PPU, Patna.
6. P.S. to F.A./Registrar, PPU, Patna.
7. Guard File.

Registrar

Patliputra University, Patna.

05/09/2022