

CURRICULUM VITAE

DR. POONAM RAJESH PRASAD

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Personal Details

Born	08 th Sep 1984, India
Gender	Female
Citizenship	Indian
Marital Status	Married
Family members:	Husband and two children

Areas of Research Interest

Design and Synthesis of Organochalcogens compounds, Organochalcogenaaza macrocycles and their Metal Complexes with Transition metals as well as inner transition metals and study their structural properties and applications.

Education Details

Post-Doctoral Fellow (Advisor: Prof. Dmitri Gelman) The Hebrew university of Jerusalem, Israel	March 2017–October 2017
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Doctor of Philosophy <i>Thesis title: Studies of Alicyclic Organochalcogens and Related Derivatives</i> (Supervisor: Prof. Harkesh B. Singh) Department of Chemistry Indian Institute of Technology Bombay Mumbai, India	July 2007-December 2014
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Master of Science (Inorganic Chemistry) Department of Chemistry Banaras Hindu University Varanasi, India (First class, 75%)	July 2004-June 2006
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Bachelor of Science (Chemistry Hons.)

July 2001-June 2004

Department of Chemistry
Banaras Hindu University
Varanasi, India
(Second class, 54.88 %)

Teaching Experience

Teachers do not only teach and impart knowledge but inspire and motivate students to initiate important step in life. Teacher provides an opportunity to nurture and encourage their students to appropriate and develop their natural abilities and interest. While teaching, I feel satisfied when my students understand evidently and satisfied.

My first teaching commenced in year 2008 when I was pursuing my Ph.D. from Indian Institute of Technology, Bombay. I was teaching assistant and lab instructor of B.Tech.1st-year students. I was directed for a tutorial course (CH-103), laboratory course (CH-117L) as well as preparative course for M. Sc.

After completion of my Ph.D., I got the opportunity to work as an assistant professor in R.D. National College Mumbai. From August 2015 to December 2016, I imparted lectures on Inorganic Chemistry to the students of B.Sc. and M.Sc.

Later, I got another teaching opportunity at Veermata Jijabai Technological Institute Wadala, (VJTI) Mumbai from December 2016-March 2017

I discontinued the teaching, owing to get the opportunities of Postdoctoral fellowship from The Hebrew University Jerusalem, Israel in March 2017.

From October 4th, 2017 till date teaching in the Department of Chemistry, Institute of Science, Banaras Hindu University, Varanasi. Conducting courses for B.Sc. (CHB-102), (CHB-502), M.Sc. (CHM-404), and Ph.D. course work (CHPR-11). Moreover, I am conducting practical classes for B.Sc. (CHB-202), (CHB-402) and M.Sc. Courses. Total classes in each semester; **Even Semester:** 6 Theories (6 hours)+6 Practical (12 hours);+4 hours M.Sc. Project; Total 22 hours per week. **Odd Semester:** 2 Theories (2 hours) + 6 Practical (12 hours); total 14 hours per week.

Seven M.Sc. project students awarded their dissertation and two JRF scholars are pursuing their Ph.D. under my supervision.

Achievement

Council of Scientific and Industrial Research-National Eligibility Test for Junior Research Fellowship (CSIR-NET) in Chemical Sciences (2006-2007), CSIR-SRF (2009-2012)

Graduate Aptitude Test in Engineering (GATE) 2007

Laboratory and Technical Skills

Synthetic Techniques:

Advanced organic, organometallic and inorganic synthesis techniques. Considerable experience in the manipulation of air and moisture sensitive compounds under vacuum (Schlenk techniques) with special expertise in handling of organochalcogen compounds.

Synthesis of alicyclic, polycyclic aromatic hydrocarbons organoselenium and organotellurium derivatives, their halides, oxidation, reduction, Schiff-base macrocycles and metallation towards the transition metals.

Studies the glutathione peroxidase (GPx) like activity.

Use of standard Schlenk line and glove box techniques.

Separation of the mixture by silica gel column chromatography, MPLC, vacuum distillation under nitrogen and GC analysis.

Autoclave reaction by passing H₂ and CO gases during hydroformylation reaction

Spectroscopy and other Techniques:

Considerable experience in NMR, FTIR, MS, GC, UV-Vis, NIR, Fluorescence spectroscopy

Computational Chemistry:

Computational Chemistry: Gaussian 03, GENNBO, ChemCraft, AIM2000.

Crystallographic software's: Shelxtl, WinGx, Mercury 2.3, Diamond, Ortep, Platon, Conquest

Computer: Windows, MS-Office (Word, Excel, Power Point), ChemOffice, Scopus, SciFinder Scholar, OriginLab, MestreNova

Instrumentation

NMR (Varian, Bruker-400), UV-VIS (JASCO), IR (Perkin Elmer), GC-Mass (Shimadzu),

Cyclic Voltammetry and Fluorescence, MPLC

Research Experience

Post-Doctoral Research Supervisor: Prof. Dmitri Gelman

Postdoctoral research involved, synthesis and characterization of 3d transition metal complexes of a 3-dimensional chiral PC(sp³)P pincer based dibenzobarrelene scaffold. These transition

metal complexes have been applied as catalysts in a variety of chemical transformations, such as transfer dehydrogenation of alkanes and alcohols, acceptorless dehydrogenation, dehydrogenative coupling, hydroformylation.

Rh catalyzed hydroformylation reaction; Pd-catalyzed cross coupling reaction of aryl halide with diethyl malonate ester

Doctoral Research:

Thesis Title: Studies of Alicyclic Organochalcogens and Related Derivatives

Research Supervisor: Prof. Harkesh. B. Singh

Contrasting Reactivity of 2-chloro-1-formyl-3-hydroxymethylenecyclohexene and its Schiff Bases towards Disodium Diselenide: Isolation of Selenospirocycles versus Azapentalenes

In case of disodium diselenide reaction, along with 1-oxa-6,6a λ^4 -diselenapentalene, along with 1,6-dioxa-6a-selenapentalen isolation of first chiral alicyclic fused selenospirocyclic” (*Asian J. Org. Chem.*, 2019, 8, 128-137).

Synthesis, Structure, and Bonding of 1-Oxa-6,6a λ^4 -chalcogenopentalenes and Related Derivatives; The Role of Intramolecular Coordination:

Synthesis and characterization of a series of unexpected alicyclic organochalcogen compounds such as 1-oxa-6,6a λ^4 -dichalcapentalene and 1,6-dioxa-6a-selena/tellurapentalene derived from 2-chloro-1-formyl-3-hydroxymethylenecyclohexene are described. The reaction of disodium disulfide afforded an unexpected 1-oxa-6,6a λ^4 -dithiapentalene, whereas the reaction of disodium diselenide afforded 1-oxa-6,6a λ^4 -diselenapentalene, along with 1,6-dioxa-6a-selenapentalen. In contrast, when it was treated with Na₂Te₂, it resulted in the formation of 1-oxa-6,6a λ^4 -ditellurapentalene along with 1,6-dioxa-6a-tellurapentalene and cyclic monotelluride. The oxidation of 1-oxa-6,6a λ^4 -diselenapentalene with m-CPBA provided the corresponding 1-oxa-6,6a λ^4 -diselenapentalene-6,6a λ^4 -dioxide in which both of the selenium atoms were found to be oxidized. The 1-oxa-6,6a λ^4 -dichalcogenopentalenes are stabilized by 3c-4e bond resulting from intramolecular E $\cdots$ O interaction. The donor oxygen donates a lone pair of electrons to the σ^* orbital of acceptor E–E bond (E = S, Se, and Te) whose σ bond already has its bond pair electrons. The single crystal Xray structures of compounds 1-oxa-6,6a λ^4 -dichalcogenopentalenes reveal that the molecules are almost planar. Nucleus-independent chemical shifts were calculated to compare the aromaticity in both the five-membered rings of 1-

oxa-6,6a λ^4 -dichalcogenopentalenes and 1,6-dioxa-6a-chalcopentalenes. The isotropic shift values of the covalently fused five-membered heterocyclic rings are more negative than the five membered heterocyclic rings formed by intramolecular coordination. (**J. Org. Chem.** **2016**, **81**, **3214–3226**).

Synthesis, structure and reactivity of β -chalcocyclohexenals: Dichalcogenides and chalcogenides:

Synthesis and characterization of a series of organochalcogen compounds derived from β -chlorocyclohexenal/ β -bromocyclohexenal which are stabilized by E/O (E $\cdots$ S, Se, Te) intramolecular secondary bonding interaction (IM-SBI). Di-(2-formylcyclohex-1-ene)sulfide and Di-(2-formylcyclohex-1-ene)diselenide was obtained by reacting β - β -chlorocyclohexenal with disodium sulfide/diselenide respectively. In case of diselenide, the reaction always produced a mixture of di-(2-formylcyclohex-1-ene)diselenide and di-(2-formylcyclohex-1-ene)selenide. Attempts to synthesize di-(2-formylcyclohex-1-ene)ditelluride by disodium ditelluride afforded a mixture of monotellurides; 3,4,5,6,7,8-hexahydro-2H-9-telluraanthracene-1-carbaldehyde, di-(2-formylcyclohex-1-ene)telluride and 9-hydroxy 2,3,5,6,7,8,9,9a-octahydro-1H-telluroxanthene-4-carbaldehyde. 3,4,5,6,7,8-hexahydro-2H-9-telluraanthracene-1-carbaldehyde, di-(2-formylcyclohex-1-ene)telluride were used as ligands for metal complexation reactions such as Pd and Pt which afforded without cleavage or transmetallation occurring during metallation. The structural comparison of monochalcogenides indicates that, (anti, anti) configuration dominates over (syn, anti) configuration with the intramolecular E/O (E $\cdots$ S, Se) interactions (**J. Organomet. Chem.** **2016**, **814**, **42-56**). Studied of GPx-like antioxidant activity of new cyclohexene-fused spiroseleuranes and a spirotellurane. di-(2-formylcyclohex-1-ene)diselenide showed better GPx like activity than the aromatic analogue bis(o-formylphenyl)diselenide (**Molecules** **2015**, **20**, **12670-12685**).

Isolation and structures of some selenium and tellurium derivatives of 1, 4, 5, 8, 9, 12-hexabromododecahydrotriphenylene as co-crystals of triphenylene:

Multi-steps synthesis and characterization of new organoselenium and –tellurium containing polyaromatic hydrocarbon derivatives has been attempted. Due to the larger size of selenium and tellurium, it is difficult to introduce them at the peripheral positions of triphenylene. Elemental analysis and single crystal X-ray structure analysis of organoselenium/-tellurium compounds indicate that

these always synthesize as a mixture of three components triphenylene and mono selenium/tellurium substituted triphenylene and it is too difficult to separate them. (*J. Chem. Sci.*, **126**, **2014**, 1311–1321).

Isolation and structural characterization of some aryltellurium halides and their hydrolyzed products stabilized by an intramolecular Te...N interaction” Organometallics **2011**, 30, 534.

Synthesis, structure, and glutathione

Synthesis and structural characterization of a series of tellurium-(IV) derivatives, including the rare iodobis[2-(phenylazo)-phenyl-C,N0]telluronium triiodide . The hydrolysis of [2 (phenylazo)phenyl-C,N0]tellurenenyl(IV) trichloride afforded tellurinic acid and its sodium salt as a cocrystal, which represents the first significant example of monomeric tellurinic acid.

Synthesis, structure, and glutathione peroxidase-like activity of amino acid containing ebselen analogues and diaryl diselenides” Chem. Eur. J. **2011**, 17, 12741.

The sterically bulky amino acid substituents present at the 2,6-positions of arylbromides do not facilitate the S_NAr displacement of Br with Li₂Se₂/Na₂Se₂. The diselenides with amino acid functionalities as intramolecularly coordinating groups displayed much better catalytic efficiencies.

Research Area: *Synthesis and characterization of Pincer based chalcogenaza Schiff-base macrocyclics with various ring sizes and and related derivatives. Study their Structural properties, reactivity, stability, and their coordination properties towards the heavy transition metals ions as well as Inner transition metals.*

Supervision Experience

Supervisor: Seven M.Sc. project students awarded their dissertation and
Two JRF scholars are pursuing their Ph.D. under my supervision.

Sponsored Research grant

Currently, I am working on three projects sponsored by

- i) UGC start-up research grant, from June 2019-May 2021
- ii) BHU IOE Seed grant from October 2020- October 2023 and
- iii) SERB Grant from January 2021-Deember 2023

Poster Presentation

In-House symposium (2010)

3rd Indo-German symposium (2011)

Contemporary trends and future prospects of functional material (CTFM-2019)

List of Publications

1. Srivastava, K.; **Shah, P.**; Singh, H. B.; Butcher, R. J. "Isolation and structural characterization of some aryltellurium halides and their hydrolyzed products stabilized by an intramolecular Te...N interaction" *Organometallics* **2011**, 30, 534.
2. Selvakumar, K. **Shah, P.**; Singh, H. B.; Butcher, R. J. "Synthesis, structure, and glutathione peroxidase-like activity of amino acid containing ebselen analogues and diaryl diselenides" *Chem. Eur. J.* **2011**, 17, 12741.
3. Selvakumar, K., Singh, V. P.; **Shah, P.**; Singh, H. B. "Synthesis of novel heterocycles containing Se-O/Se-N linkages: Role of intramolecular coordination" *Main Group Chemistry* **2011**, 10, 141.
4. Prasad, Poonam R.; Singh, H. B.; Butcher, R. J. "Isolation and structures of some selenium and tellurium derivatives of 1, 4, 5, 8, 9, 12- hexabromododecahydrotriphenylene as co-crystals of triphenylene" *J. Chem. Sci.* **2014**, 126, 1311.
5. Prasad, Poonam R.; Das, S.; Singh, H. B.; Butcher, R. J. "2-Bromo-5-tert-butyl-N-methyl-N-[2- (methylamino)phenyl]-3-(1-methyl- 1Hbenzimidazol-2-yl)benzamide" *Acta Cryst. Sect. E* **2014**, 70, o822.
6. Prasad, Poonam R.; Singh, H. B.; Butcher, R. J. "Synthesis, Structure and Antioxidant Activity of Cyclohexene-Fused Selenuranes and Related Derivatives" *Molecules* **2015**, 20, 12670-12685.
7. **Prasad, P. R.**; Singh, H. B.; Butcher, R. J. "Synthesis, Structure and Reactivity of β -Chalcocyclohexenals: Dichalcogenides and Chalcogenides" *J. Organomet. Chem.* **2016**, 814, 42-56.
8. **Prasad, P.**; Selvakumar, K.; Singh, H. B.; Butcher, R. J. "Facile Synthesis, Structure and Bonding of 1-Oxa-6,6a λ^4 -Chalcogenopentalenes and Related Derivatives; Role of Intramolecular Coordination" *J. Org. Chem.* **2016**, 81, 3214-3226.
9. Venkateshwaran, K.; **Prasad, P. R.**; Deka, R.; Raju, S.; Singh, H.B.; Butcher, R. J. "Contrasting Behavior of 5-Alkyl-2-chloro-1- formyl-3- hydroxymethylenecyclohexene and Their Schiff Base Derivatives Towards Disodium Diselenide: Isolation of Selenospirocycles vs. Azapentalenes", *Asian J. Org. Chem.*, **2019**, 8, 128-137.

References

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