CURRICULUM VITAE

Dr. RAMESHA A. R.

Address for Correspondence

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Personal

Date of Birth: December 29, 1963, Nationality: Indian

Sex and Martial Status: Male, married

Education

1. **Post-Doctoral Experience** (Bio-Organic Chemistry, Modified DNA Synthesis, Feb 1998- March 2001), **At**: **Dr. Donald M. Jerina**, NIDDK, **National Institutes of Health** , Bethesda, Maryland, MD-20892, **USA**
2. **Ph.D. in Organic Chemistry** (1990-1994), Supervisor: **Professor S. Chandrasekaran**, Department of Organic Chemistry, **Indian Institute of Science**, Bangalore, INDIA-560 003.
3. **M.Sc. in Chemistry** (Specialisation Organic, 1984-1986, First Class, First Rank), **Mysore University**, Mysore, Karnataka, INDIA.
4. **B.Sc.** (1981-1984, First Class, Third Rank), DVS College, Shimoga, **Mysore University**, Karnataka, INDIA.

Academic Awards

1. **Poorna Krishna Rao Gold Medal** for securing first rank in M.Sc. Chemistry.
2. **Maharaja Sri Jayachamarajendra Wodeyar Gold Medal** for securing first rank in both first and second year M.Sc.
3. **Prof. M. G. Srinivasa Rao Memorial Cash Prize** for securing first place in M.Sc.
4. **Secured University First Rank in M.Sc**. and **Third Rank in B.Sc.**
5. **National Merit Scholarship** (1984-1986).
6. **Junior Research Fellow & Senior Research Fellow at Indian Institute of Science**, Bangalore (1990-1994).

Techniques Conversant with

NMR (multi nuclear) spectroscopy, Mass Spectrometry, HPLC (chiral, silica and reverse phase, PDA/DAD), GC, Head Space GC, Analytical method validation – HPLC and residual solvent validations, Calibration, Polarimetry, Elemental Analysis, CD, UV, IR, DNA Synthesiser. Conversant with the basics of computer (Windows, Chemdraw, Chem3D.).

Industrial Research Experience (total 18 years)

Process Development, R&D, and Pilot plant, Production.

1. **IDL-Nitro Nobel Basic Research Institute**, Malleshwaram, Bangalore, India.
   Position: Research Scientist (June 1987 to July 1990 & June 1994 to March 1995).

2 **Ray Chemicals Private Ltd,** Yelahanka, Bangalore, INDIA(subsidiary of R L Fine Chem.)
Position: R & D and Q C Manager (March 1995 to Dec 1997)

3. **R L Fine Chem Pvt. Ltd.,** No 15, KHB Industrial Area, Yelahanka, Bangalore, INDIA.
Position: **President-Tech (April 2001 till to date)**

Founder of www.publishchemidea.com an online database for chemistry Ideas.

Major Achievements in Academic/Industrial research:

- **Principal investigator/Guide for 3 PhD Thesis and 54 M Pharma/MSc projects.**
- Main author of Patents for the Manufacture of Des-Venlafaxine HCl, **Protriptyline HCl, Cyclobenzaprine HCl, Opipramol HCl, Lofepramine Maleate**, **Propiverine HCl**, **Amitriptyline N-Oxide , Loperamide N-Oxide**, Ritodrine HCl.
- Hands on experience in **preparing DRUG MASTER FILE (US and EDMF) in the CTD format. Compiled 34 DMF in CTD format. Extensive knowledge in USFDA and EDQM/CEP requirement.**
- **Worked extensively as a team leader in passing 4USFDA audits.**
- **Major contribution to process chemistry**:
    - Developed a new process for the reduction of organic compounds in **water-Green Chemistry** (100-300 kg batches).
    - Developed a new process for the N-alkylation in water based on GREEN CHEMISTRY.
    - Developed a new catalyst free dehydrogenation procedure in water (200 kgbatches).
    - Developed a new sulphur transfer reagent, MoS_4 $(C_6H_5CH_2NEt_3)_2$ for the synthesis of Disulphides. Which also has many interesting reducing properties (Ph D. thesis work)
    - Hands on experience on Grignard, Freidel crafts reaction, sodamide and sodium methoxide Based reactions in gram to 25-600 kg batches
    - New methods developed for the deoxyadenosine and deoxyguonosine adducts of polycyclic
    - Aromatic hydrocarbons, which are important class of compounds in site-specific mutagenisis Study
    - New process developed for an explosive equivalent to PETN.
    - hands on experience in scaling-up the reaction from milligram to 600 kg batches
- **Exceptionally good experience in scaling up Grignard, sodiumborohydride process (up to 600 kg)**. Always focus on scalable process and practical process.
- **Extensive knowledge in Process validation and Analytical Validation as per ICH/EU/FDA requirement**.
- **New process developed for many Drug Substances (process development**). **All these products are being done in commercial quantities (10-500 kg batches)-**
    - **Dibenzosuberone**
    - **Dibenzosuberenone (Green chemistry, Bromine free route)**
    - **Iminodibenzyl**
    - **Amitriptyline HCl**
    - **Cyproheptidene HCl**
    - **Doxepin HCl**
    - **Lorazepam**
    - **Cloxazolam**

- **Clonazepam**
- **Oxazepam**
- **Bromazepam**
- **Temazepam**
- **Flunitrazepam**
- **Etizolam**
- **Doxylamine Succinate**
- **Trimipramine Maleate and Mesylate**
- **Dothiepin hydrochloride**
- **Nortriptyline HCl**
- **Protriptyline HCl**
- **Desipramine HCl**
- **Clomipramine HCl**
- **Butriptyline HCl**
- **Citalopram HBr**
- **Opipramol Di HCl (Green chemistry)**
- **Pargeverine HCl**
- **Propiverine HCl**
- **Amitriptyline N-oxide**
- **Imipramine N-oxide /Trimipramine N-Oxide**
- **Loperamide N-Oxide**
- **Valathamate bromide**
- **Lofepramine Maleate**
- **Orphenadrine HCl/Citrate**
- **Amitriptyline Embonate**
- **Imipramine Pamoate**
- **3-Chloro Iminodibenzyl**
- **Fluphenazine Dihydrochloride**
- **Fluphenazine Decanoate**
- **Z-Flupentixol Decanoate**
- **Zuclopentixol Dihydrochloride/Zuclopentixol decanoate**
- **Melitracene HCl**
- **Flupentixol 2HCl**
- **Carbinoxamine Maleate**
- **Bio-diesel**
- **Ebastine base / fumerate**
- **Haloperidol Decanoate**
- **Cinnarazine**
- **Perphenazine Base**
- **Pyrathiazine Tecolate**

- **Fluoxamine maleate**
- **Sulfamethoxypyrazine**
- **Sulfadoxine**
- **Tramadol Hydrochloride**
- **Dapoxetine HCl**
- **Buclazine dihydrochloride**
- **Meclazine dihydrochloride**
- **Fenpiverinium bromide <0.1% impurity**
- **Almimizine tartarate**
- **Oxomemazine base and hydrochloride**
- **Zuclopenthixol decanoate**
- **Alprazolam**
- **Chlorprothexine HCl**
- **Desvenlafaxine Hydrochloride**
- **Des Tramadol hydrochloride**
- **Tapentedol**
- **Methanamine Hippurate**
- **Clozapine**
- **Promaxine HCl**
- **Tiotexine HCl**
- **Triazolam**

List of Publications

No	Title	Journal	Authors	Year, Issue Page no
1	Benzyltriethylammounium Tetrathiomolybdate: An Improved Sulphur Transfer Reagent for the Synthesis of Disulfides	*Synth. Commun.*	**A. R. Ramesha,** S. **Chandrasekaran**	**1992**, 22(22), 3277
2	A Facile Entry to Macrocyclic Disulfides: An Efficient Synthesis of Redox-Switched Crown Ethers	*J. Org. Chem*	**A. R. Ramesha,** S. **Chandrasekaran**	**1994**, 59, 1354
3	Highly Selective Sulfur Transfer Reaction in the Solid State	*J. Chem. Soc, Perkin Trans 1*	. **A. R. Ramesha,** S. **Chandrasekaran**	**1994**, 767
4	A New Improved Procedure for the Synthesis of 4-formyl Carene-Preccursor to Sandatrile-a Novel Perfumery Chemical	*Ind. J. Chem.,*	**A. R. Ramesha,** S. Narasimhan	**1992**, 640.
5	Sodium Perborate/Acetic Anhydride: A Convenient Reagent for the Conversion of Cyclic Acetals to Esters	*Synlett,*	Shridhar Bhat, **A. R. Ramesha, S. Chandrasekaran**	**1995**, 329
6	Interesting Reaction of Azides and Isocyanides with Tetrathiomolybdate	*J. Org. Chem*	**R. Ramesha**, S. Bhat, **S. Chandrasekaran**	**1995**, 60, 7682
7	Reductive Dimerisation of Organic Thiocyanates to Disulfides Mediated by Tetrathiomolybdate	*J. Org. Chem*	K. R. Prabhu, **A. R. Ramesha, S. Chandrasekaran**	**1995**, 60, 7142
8	A Facile Conversion of Amides to Thioamides with Tetrathiomolybdate	*Tetrahedron Lett.,*	P. Ilankumaran, **A. R. Ramesha, S. Chandrasekaran**	**1995**, 35, 8311
9	Chemistry of New Sulfur Transfer Reagents in Organic Synthesis	*Scientific Eng. Res. Council*	**R. Ramesha,** Preeti Dhar, **S. Chandrasekaran**	**1995,** 10.
10	Isomerization of Longifolene to Isolongifolene Catalyzed by Montmorillonite Clay	*Org. Prep. Proc. Int.*	**R. Ramesha**, S. Bhat , Prabhu	**1999**, 31(2), 227-230.
11	Induced Internal Redox Reactions of Tetrathiomolybdate : Applications in Organic Synthesis.	*" New Horizons in Organic Synthesis ", Eds. V. Nair and S. Kumar, New Age International (P) Ltd*	**A. R. Ramesha,** D. Bhar, P. Ilankumaran, K. R. Prabhu and **S. Chandrasekaran**	**1994**, 180-190
12	Mechanisms of Solution Reactions of Cyclopenta[c,d]pyrene oxide and Acenapthalene oxide.	*Polycyclic Aromatic Compounds*	Whalen, D; Doan, L; Poulose, B; Friedman, S; Gold A.; Sangaiah, R.; **A. R. Ramesha**; Sayer, J.; **Jerinal D. M**	**2000,** 21(1-4), 43-52.
13	Interesting Reaction of 2,2'-binapthol with 1,2-dibromoethane; Synthesis of a Novel Spirodienone	*Ind. J. Chem, Section A*	**A.R. Ramesha,** Vishnumurthy, K, Row, T. N. G and **S. Chandrasekaran**	**1999**, 38(9), 1015-1017.
14	Convenient Synthesis of 2(2-phenylethyl) benzoicacid: A Key Intermediate in the	*Synth. Commun*	**A. R. Ramesha** and Roy, A. K	**2001**, 31(16), 29-32.

	Synthesis of Dibenzosuberone			
15	Novel Trifluoroethanol mediated synthesis of benzo[*a*]pyrene 7,8-diol 9,10-epoxide adducts at the N^2-position of deoxyguanosine and the N^6-position of deoxyadenosine	*Tetrahedron Lett*	**A. R. Ramesha.**; Kroth, H.; Jerina, D. M	**2001**, 42, 1003-05
16	Solvent free synthesis of benzo[*a*]pyrene 7,8-diol 9,10-epoxide adducts at the N^2-position of Deoxyguanosine	*Organic Lett*	**A. R. Ramesha**, Kroth, H.; Jerina, D. M	**2001**, 3(4), 531-533
17	Novel Sterioselective control over Cis vs trans opening of Banzo[c]phenanthrene-3,4-diol 1,2-epoxides by the exocyclic N^2 –amino group of deoxyguanosine in the presence of hexafluoropropan-2-ol	*J. Org. Chem*	**H. Yagi**, **A. R. Ramesha,** G. Kalena, J. M. Sayer, S. Kumar and **D. M. Jerina** ,	**2002,** 67, 6678-6689
18	Structures of HIV-1 reverse transcriptase with pre- and post-translocation AZTMP-terminated DNA	*EMBO J.*	Sarafianos, S. G., Clark, A. D., Das, K., Ilankumaran, P., **A. R. Ramesha**, Sayer, J. M., **Jerina, D. M**., Boyer, P. L., Hughes, S. H. and Arnold, E	**21:** 6614-6624, **2002**
19	Protonation of Trimipramine salts of Maleate, Mesylate and hydrochloride using H^1, C^{13} and N^{15} NMR spectroscopy	*Magnetic Resonance in Chemistry*	B. S. Somshekar, G. A. Naganna Gowda, **Ramesha A. R.** and C. Khetrapal	**2005**, 43, 166-170
20	Protonation and structure of Doxylamine Succinate in solution in solution using H^1 and C^{13} NMR spectroscopy	*Magnetic Resonance in Chemistry*	B. S. Somshekar, G. A. Naganna Gowda, **Ramesha A. R.** and C. Khetrapal	**2004,** 24, 636-640
21	New Process for the Manufacture of Protriptyline and Cyclobenzaprine HCl.	*Indian Patent Filed*	Ramesha A. R., **Anjan K. Roy**	**2005**
22	New Process for the synthesis of Opipramol dihydrochloride	*Indian Patent Filed*	Ramesha A. R., **Anjan K. Roy**	**2005**
23	New Process for the synthesis of Lofepramine Maleate: A stable salt of **Lofepramine**	*Indian Patent Filed*	Ramesha A. R., **Anjan K. Roy**	**2005**
24	Trapping HIV-1 Reverse Transcriptase Before and After Translocation on DNA	*J. Biol. Chem*	Stefan G. Sarafianos, Arthur D. Clark Jr., Steve Tuske, Christopher J. Squire, Kalyan Das, Dequan Sheng, Palanichamy Ilankumaran, **Andagar R. Ramesha**, Heiko Kroth, Jane M. Sayer, Donald M. Jerina, Paul L. Boyer, Stephen H.Hughes, and Eddy Arnold	**2003,** Vol. 278, Issue 18, 16280-16288.
25	Structures of HIV-1 reverse transcriptase with pre- and post-translocation AZTMP-terminated DNA 2002	*The EMBO journal*	Sarafianos Stefan G; Clark Arthur D; Das Kalyan; Tuske, Steve; Birktoft Jens J; Ilankumaran Palanichamy; **Ramesha Andagar R**; Sayer Jane M; Jerina Donald M; Boyer Paul L; Hughes Stephen H; Arnold Eddy	**2002,** 21(23):6614-24**.**
26	Synthesis and Evaluation of Newer Analogues of Doxylamine for their Antihistamine Activity	*Indian Drugs*	Chaluvaraju C, Karvekar M. D and **Ramesha A. R**	**2008**, 45(6), 447-450
27	A Chemoselective deoxygenation of N-	*Tetrahedron Lett*	Narendra B Gowda, Gopal	**2010,** 51, 5690-

	Oxides by sodium borohydride raney nickel in water		Krishna Rao, **Ramesha A. R**	5693
28	Synthesis, characterization and pharmacological screening of various impurities present in Opipramol, Pargeverine and Propiverine bulk drugs	*Der Pharma Chemica*	Ravinesh Mishr, Anees A. Siddiqui, Mohd. Rashid**, Ramesha AR,** Rohini RM, Somila Khaidem	**2010,** 2(2), 185-194
29	One pot esterification and Ritter reaction: Chemo and regioselectivity from *tert*-butyl methyl ether.	*Tetrahedron Lett.*	Pankaj Dawar, M Bagavan Raju, **Ramesha A. R**	**2011,** 52, 4262-4265
30	Acylation of Grignard reagents mediated by *N*-methylpyrrolidone: A remarkable selectivity for the synthesis of ketones	*Organic & Biomolecular Chemistry*	Maravanhalli Sidde Gowda, Sushanth Sudhir Pande, **Ramesha Andagar Ramakrishna,** K Ramaiah Prabhu	**2011,** 9,5365-5368
31	Raney Nickel catalyzed reduction of unsaturated carboxylic acids with sodiumborohydride in Water.	*Synthetic Communication*	Narendra B Gowda, Gopal Krishna Rao, **Ramesha A. R**	**2012,** 42**,** 893-904.
32	Reduction of cinnamic acid with Sodium borohydride, raney nickel in water	*Chemspider Synthetic Page 521*	**Ramesha A. R**	**2012**, 11 Jan DOI:10.1039/SP521
33	Chemoselective addition of TBME to cyanoacetic acid	*Chemspider Synthetic Page 532*	**Ramesha A. R**	**2012,** 24 Jan DOI:10.1039/SP532
34	Nucleophilic addition of Grignard to acid chloride in the presence of N-Methyl pyrrolidine; *p*-fluoro-4'-chlorobutyrophenone	*Chemspider Synthetic Page 533*	**Ramesha A. R**	**2012**, 31 Jan DOI: 10.1039/SP533
35	Reduction of nitro arene by Fe/ammonium chloride	*Chemspider Synthetic Page 538*	**Ramesha A. R**	**2012,** DOI: 10.1039/SP538
36	Transfer hydrogenation of benzpthalide with limonene/palladium on carbon; 2-(2-phenylethyl) benzoic acid	*Chemspider Synthetic Page 535*	**Ramesha A. R**	**2012,** DOI: 10.1039/SP535
37	Large Scale reduction of Ketone with sodium borohydride; Benzhydrol	*Chemspider Synthetic Page 539*	**Ramesha. A. R**	**2012,** DOI: 10.1039/SP539
38	Tetrathiomolybdate mediated sulfur transfer; Dibenzyl disulfide	*Chemspider Synthetic Page 544*	**Ramesha A. R**	**2012,** DOI: 10.1039/SP544
39	Grignard addition to aldehyde via chlorobenzene metalation; Benzhydrol	*Chemspider Synthetic Page 559*	**Ramesha. A. R**	**2012,** DOI: 10.1039/SP559
40	Nucleophilic aromatic substitution with ethyl cyanoacetate; 2-carboxyethyl- 2'-nitro-4'-chloro benzyl cyanide	*Chemspider Synthetic Page 557*	**Ramesha A. R**	**2012,** DOI: 10.1039/SP557
41	A ligand-free, base-free copper catalyzed reaction: Arylation of ammonia and primary amines as their acetate salts	*Tetrahedron Lett.*	Maravanahalli S. Siddegowda, Hemmige S. Yathirajan and **Ramesha A. Ramakrishna**	**2012,** 53, **5219–5222**
42	Sulfur transfer reaction of tetrathiomolybdate with a sulfonic ester; Bis(3-aminopropyl)disulfide dihydrochloride	*Chemspider Synthetic Page 561*	**Ramesha A. R**	**2012,** DOI:10.1039/SP561

No	Title	Journal	Authors	Year, Issue Page no
43	Reduction of Undecylinic acid to Undecanoic acid using $NaBH_4$-Ni in water; Undecanoic acid	*Chemspider Synthetic Page 565*	**Ramesna A. Ramakrishna**	**2012**, DOI: 10.1039/SP565
44	Aromatic electrophillic substitution; 2,2-dimethyl phenylacetic acid	*Chemspider Synthetic Page 569*	**Ramesna A. Ramakrishna**	**2012:** DOI:10.1039/SP569
45	Sharpless aminohydroxylation with diTBDMS-2'-deoxyadenosine; N-Alkylated di-TBDMS-2'-deoxyadenosine	*Chemspider Synthetic Page 570*	**Ramesna A. Ramakrishna**	**2012, SP570**
46	Facile rearrangement of Lorazepam and Oxazepam	*Indian J. Chemictsyr Sect B*	**Sidde Gowda, M. S., Yathirajan, Ramesha A. R**	**2012, 51B(11), 1628-1632.**
47	Thermal Ring Contraction of a 1,4-Diazepine; 6-Chloro-4-(o-chlorophenyl)-2-quinazoline carboxaldehyde	*Chemspider Synthetic Page 574*	**Ramesna A. Ramakrishna**	**2012**, DOI: 10.1039/SP574
48	Thermal Ring Contraction of a 1,4-Diazepine; 6-Chloro-4-phenyl-2-quinazoline carboxaldehyde	*Chemspider Synthetic Page 576*	**Ramesna A. Ramakrishna**	**2012, SP576**
49	Benzoylation of 1,4-dichlorobenzene	*Chemspider Synthetic Page 576*	**Ramesna A. Ramakrishna**	**2013, SP584**
50	Isomerization of Longifolene to Isolongifolene; Isolongifolene	*Chemspider Synthetic Page 595*	**Ramesna A. Ramakrishna**	**2013, SP595**
51	Dehydration and re-hydration – Esterification and Ritter reaction in one pot	*Synthetic Communication*	Pankaj Dawar, M. Bagavan Raju, , **Ramesha A. R**	**2014,** 44, 836-846
52	Dimerization of ortho –nitro toluene	*Chemspider Synthetic Page 729*	**Ramesna A. Ramakrishna**	**2014**, DOI: 10.1039/SP729
53	**O-Methylation of Temazepam**	*Chemspider Synthetic Page 788*	Pankaj Dawar, **Ramesha A. R**	2015, **DOI: 10.1039/SP788**
54	**N-alkylation in water; 1,4-Dicinnamyl piperazine**	*Chemspider Synthetic Page 777*	**Ramesna A. Ramakrishna**	**2015,** DOI: 10.1039/SP777
55	**Ritter reaction and esterification with isobutyl alcohol ; Isobutyl 3-(tert-butylamino)-3-oxopropanoate**	*Chemspider Synthetic Page 750*	**Ramesna A. Ramakrishna**	**2014, DOI: 10.1039/SP750**
56	**New and practical method for Desvenlafaxine Succinate**	*PCT application filed*	**Ramesha A. Ramakrishna**	**2017**
57	**Enantiomers of Cyclobenzaprine Hydrochloride**	*Indian patent files*	**Ramesha A. Ramakrishna**	**2017**
58	**Ritodrine Hydrochloride**	*Indian Patent*	**Ramesha A. Ramakrishna**	**2017**

59	**Regioselective Synthesis, Antibacterial, Molecular Docking and Fingerprint Applications of 1-Benzhydrylpiperazine Derivatized 1,4-Disubstituted 1,2,3-Triazoles**	*Chemistry Select*	Shivaraja Govindaiah, Swamy Sreenivasa**, Ramesha Andagar Ramakrishna,** Tadimety Madhu Chakrapani Rao, and Hanumanthappa Nagabhushana	**2018,** 3, 8111-8117
60	**Ketone reduction to Methylene: Dibenzosuberone to Dibenzosubarane**	*Chemspider Synthetic Page 928*	**Ramesha Andagar Ramakrishna**	**2020**
61	**Reduction of Benzpthalide to 2-Phenylethyl benzoic acid**	*Chemspider Synthetic Page 929*	**Ramesha Andagar Ramakrishna**	**2020**
62	**Keto reduction with sodium borohydride in water**	*Chemspider Synthetic Page 930*	**Ramesha Andagar Ramakrishna**	**2020**

Papers on X-Ray Crystallography				
No	**Title**	**Journal**	**Authors**	**Year, Issue Page no**
1	4-(4-Carboxybenzyl)-1-methylpiperazin- -ium picrate, Hongqi Li,a* Q. N. M. Hakim Al-arique	*Acta Cryst*	H. S. Yathirajan,b B. Narayanac and **A. R. Ramesha**	**2009, E65,**
2	2-Amino-5-nitrophenyl 2-chlorophenyl ketone	*Acta Cryst*	Jerry P. Jasinski,a Ray J. Butcher, Q. N. M, Hakim Al-Arique, H. S. Yathirajan and **A. R. Ramesha**	**2009.** E65, 1908– 1909.
3	1-(2-Methyl-5-nitrophenyl)guanidinium picrate	*Acta Cryst*	J. P. Jasinki, R. J.Butcher, M. T Swami, H. S. Yathirajan, **A. R. Ramesha**	**2009,** E**65**, 02788-02789
4	Levocetirizinium dipicrate	*Acta Cryst*	Jerry P. Jasinski, Ray J. Butcher, M. S. Siddegowda, H. S. Yathirajan and **A. R. Ramesha**	**(2010).** E**66**, 3167
5	Desipramine hydrochloride: a non-merohedrally twinned structure	*Acta Cryst*	Jerry P. Jasinski, Ray J. Butcher, Q. N. M. Hakim Al-Arique, H. S.Yathirajan and **A.R. Ramesha**	**2010**. E66, 0674–0675
6	11-[3-(Dimethylamino)propyl]-6,11-dihydrodibenzo[b,e]thiepin-11-ol	*Acta Cryst*	J. P. Jasinki, R. J.Butcher, Q. N. M. Hakim Al0arique, H. S. Yathirajan, **A. R. Ramesha**	**2010,** E**66**, 0161-0162
7	1-[2-(2-Bromophenyl)ethyl]-4-chloro-2-nitrobenzene	*Acta Cryst*	J. P. Jasinki, R. J.Butcher, M. S.Sidde Gowda, H. S. Yathirajan, **A. R. Ramesha**	**2010,** E**66**, 03358
8	Etoricoxibium picrate	*Acta Cryst*	J. P. Jasinki, R. J.Butcher, M.S. Sidde Gowda, H. S. Yathirajan, **A. R. Ramesha**	**2011,** E67, 0107-0108
9	1-(2-Hydroxyethyl)-4-{3-[(E)-2-(trifluoromethyl)-9H-thioxanthen-9-ylidene]-propyl}piperazine-1,4-diium bis(3-carboxyprop-2-enoate)	*Acta Cryst.*	M. S. Siddegowda, Ray J. Butcher, Mehmet Akkurt, H. S. Yathirajan and **A. R. Ramesha**	**2011,** E67, 02017-02018
10	2-(2-Benzylphenyl)propan-2-ol	*Acta Cryst.*	Richard Betz, Thomas Gerber,a Eric Hosten, B. P. Siddaraju,b Hemmige S. Yathirajanb **A. R. Ramesha**	**2011**. E67, o3302
11	3,3-Dimethyl-2-benzofuran-1(3H)-one	*Acta Cryst.*	M. S. Siddegowda, Ray J. Butcher, Sema Ozturk Yıldırım, Mehmet Akkurt, H. S. Yathirajana and **A. R. Ramesha**	**2012.** E68, 0113
12	Oxomemazine hydrochloride	*Acta Cryst.*	M. S. Siddegowda, Ray J. Butcher, Mehmet Akkurt, H. S. Yathirajan and **A. R. Ramesh**	**2011.** E67, o1875

Papers on X-Ray Crystallization				
No	**Title**	**Journal**	**Authors**	**Year, Issue Page no**
13	Redetermination of Loperamide monohydrate	*Acta Cryst.*	Jerry P. Jasinski, Curtis J. Guild, A. S. Dayananda, H. S.Yathirajan and **A. R. Ramesha**	**2012,** E68, 0539–0540
14	2-Amino-N-[3-(2-chlorobenzoyl)-5-ethylthiophen-2-yl]acetamide	*Acta Cryst.*	Hoong-Kun Fun,a*‡ Suchada Chantrapromma,, A. S.Dayananda,c H. S. Yathirajanc and **A. R. Ramesha**	**2012,** E68, 0547–0548
15	Crystal structure of -Methyl 2,2-diphenyl-2-(prop-2-yn-1-yloxy)acetate	*Acta Cryst.*	H. P. Sumathi, Ulrich F, H. S. Yathirajan, A. S. Dayananda **and A. R. Ramesha**	**2012, E68, o874**
16	2-Amino-N-[3-(2-chlorobenzoyl)-5-ethylthiophen-2-yl]acetamide	*Acta Cryst.*	Hoong-Kun Fun,a*‡ Suchada Chantrapromma,b§A. S. Dayananda,c H. S. Yathirajanc and **A. R. Ramesh**	**2012.** E68, o547–o548
17	Crystal and Molecular Structures of Two 2-Aminothiophene Derivatives	*Crystals*	Maciej Kubicki , Grzegorz Dutkiewicz , Hemmige S. Yathirajan , Pankaj Dawar , **Andagar R. Ramesha** and Alaloor S. Dayananda	**2012,** *2*, 1058-1066
18	1-[Bis(4-fluorophenyl)methyl]piperazine	*Acta Cryst.*	A. S. Dayananda, Grzegorz Dutkiewicz, H. S. Yathirajan, A. R. Ramesha and Maciej Kubicki	**2012. E68, o2817**
19	Temperature-Dependent Ordering of the Methyl Group in the Crystal Structure of 5-(2-Chlorophenyl)-7-ethyl-1*H*-thieno [2,3-E][1,4]diazepin-2(3*H*)-one	*Crystals*	**G**rzegorz Dutkiewicz, Maciej Kubicki , Alaloor S. Dayananda , Hemmige S. Yathirajan and **Andagar R. Ramesha**	**2012, *2*, 1347-1356;**
20	Redetermination of the struc ture of *N*-(2-benzoyl-4-chlorophenyl)-2-chloroacetamide, C15H11Cl2NO2	*Z. Kristallogr. NCS*	Thammarse S. Yamunaı, Hemmige S. Yathirajanı, **Ramesha A. Ramakrishnaıı,** Thomas Gerberıii, Eric Hostenıii and Richard Betz*,	**2013**, NCS **228**
21	Flunarazine Hydrogen maleate	*Acta Cryst.*	Channappa N. Kavitha, Jerry P. Jasinski, Somer M. Matar, H. S. Yathirajan and A. R. Ramesha	**2013**, E**69**, o1344

Invited Lectures	
1	2020: Faculty Development programme at REVA University, Bangalore. 24th Jan 2020
2	2019: DIA USFDA EMA EDQM Workshop on Active Pharmaceutical Ingredients – Quality and Supply Chain Integrity, By DIA Global, Nov 18-19, **2019,** Ahmedabad, India
3	2019: DIA USFDA EMA EDQM Workshop on Active Pharmaceutical Ingredients – Quality and Supply Chain Integrity, By DIA Global, Nov 21-22, **2019,** Hyderabad, India
4	2019: 6TH WINTER PROCESS CHEMISTRY CONFERENCE, International Conference & Exhibition 9-11 DECEMBER **2019**, Birmingham, United Kingdom
5	2019: 9th March , Mysore University, Development of Practical Synthetic Methods in Organic Synthesis
6	2018: 4th Dec,Tumkur University, Development of practical Synthetic methods in Organic Chemistry
7	2018: 12th Jan, St. Joseph College, Bangalore, Industry Academia national symposium
8	2017: Nov 29th, JSS Pharma College Mysore, Identification of impurities in API
9	2017: July 13th, Sheraton, Bangalore on releasing Nexa GC, Identification impurities in API
10	2016: Nov 24th, JSS College of Pharmacy, Mysore. Development, manufacturing and regulatory aspects of API.
11	2016:: Oct 25th, How to theoretically identify impurities in API, 28, Oct 2016, IIT, Chennai, India
12	2016: Feb 20th, JSS College of Pharmacy, Mysore. Challenges of API manufacturing,
13	2016: March 18th, Tumkur University, Impurities in API.
14	2015: At Soundarya PU College, Hesaragatta Road, Bangalore, “Fun With Chemistry” July 23, 2015
15	2014: Department of Chemistry , University of Mysore on-“ Aminohy droxylation with deoxyadenosine derivative”, Dec 31, 2014
16	2015: How to identify impurities in API, 28, March 2015, APTI Meeting at Bijapur
17	2014: At Chemists Club, “Aminohydroxylation with 2’-deoxyadenosine” 28, Sept 2014
18	2012:Department of Chemistry, Mysore University: Developing practical synthetic methods in organic synthesis 07 Sept 2012.
19	2012: St. Josephs College, Bangalore: Chemistry in Industry – Development of new Synthetic Methodologies, 17, Feb 2012.
20	2012: JSS College of Pharmacy, Mysore: Impurities in Active Pharmaceuticals-An Overview, Jan 2012.
21	2013: Pharma Training Institute, Bangalore: Expert faculty on API, Jan 2010-2013.
22	2011: Acharya College of Pharmacy, Bangalore: Impurities in API, July 2011, AICTE Seminar.
23	2009: Acharya College of Pharmacy, Bangalore: Organic Synthesis –A Disconnection Approach, Oct 2009.
24	2008: Siddaganga Institute of Technology, Tumkur, : Green Chemistry , Oct 2008, AICTE Sponsored Seminar.
25	2009: AT Krupanidhi College, Bangalore: Analytical Method Validation of Drug Substance, Feb 2009. AICTE Sponsored seminar.
26	2007: AT Krupanidhi College, Bangalore: *Organic Synthesis –A Disconnection Approach*, Oct 2007.

References

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   Tel: +91-8860011188

Post Doctoral Work

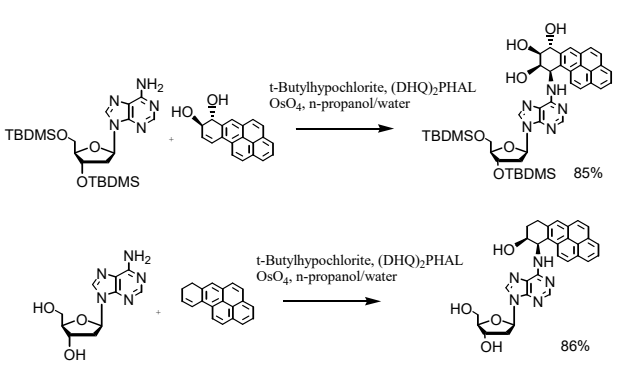
Synthesis of modified oligonucleotides and synthesis of deoxyadenosine and deoxyguanosine adducts of polycyclic aromatic hydrocarbons and their application in site-specific mutagenisis study

Worked with **Dr. Donald M. Jerina** and also in collaboration with K**. Barry Sharpless** on the amino hydroxylation of deoxyadenosine.

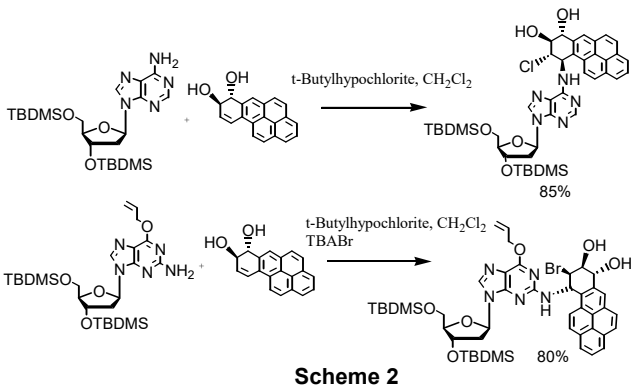
Sharpless amino hydroxylation is reported to work only with carbamates and sulphonamide. For the first time we have been able to show that the amino group of deoxyadenosine reacts in the similar way. This is the first example of a simple amine used in this reaction. This reaction works extremely well with/ without the protecting group on the deoxyadenosine and thus helps in functionalising adenosine in a single step (Scheme 1).

Many polycyclic aromatic hydrocarbons like benz[*a*]pyrene, cyclopenta[*c,d*]pyrene are mutagenic and tumerogenic in the mammalian cells. And it has been proved convincingly that the DNA adduct formed from these hydrocarbons are responsible for its tumeroginic and mutaginic activity. The bay region diol epoxide formed as the metabolic intermediate during cytochrome P4501A1 mediated oxidation, react with either deoxyadenosine or deoxyguanosine to form DNA-adduct. These modified adduct lead to the mutation during DNA replication, which ultimately led to tumour cells. Therefore, these DNA adducts are very important class of compounds in studying the carcinogenic behaviour of these substances.

During the formation of DNA adduct, several stereoisomers are formed from the cis/ trans opened diol-epoxide intermediate. Based on the above methodology it was possible to



Scheme 1



Scheme 2

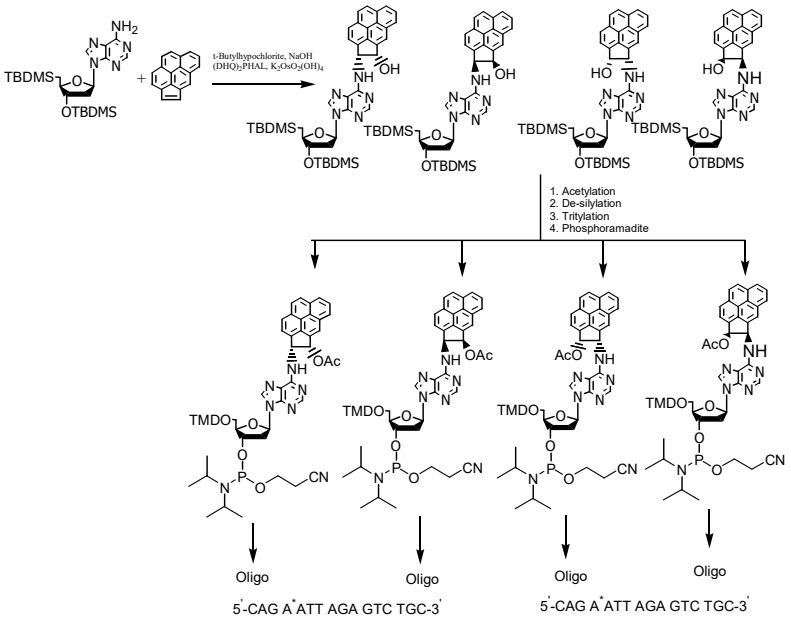
Synthesise the pure cis-DE2 adducts of adenosine in high yield.

During the course of identifying the new route for the synthesis of adducts, I have been able to find out a new reaction between deoxyadenosine and deoxyguanosine with the dihydrodiol of Benz[*a*]pyrene (Scheme 2). Which can be converted to cis-DE1 adducts.

Cyclopenta[c,d]pyrene is an unique PAH with five member ring on its periphery is widely present in nature. It known to be highly carcinogenic and mutagenic. The CPP-oxide formed as the metabolic intermediate

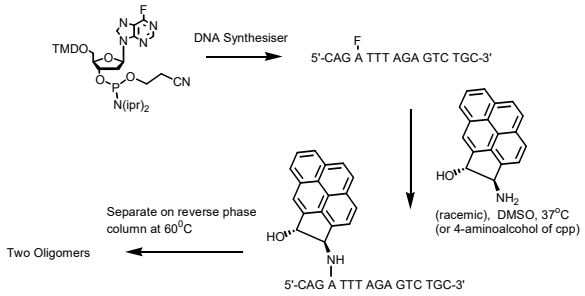
reacts with dA or dG of DNA leading to genotoxicity. For the first time we have been able to identify and characterise all the adducts and particularly dA adducts with CPP-oxide. We have also been able to synthesise and characterise all the possible dA adducts using the same methodology as described above for the first time (Scheme 3). An interesting feature of these adducts are that all the dA and dG adducts are cis opened product at the position 3,4. This unique reactivity of the CPP, PAH is totally different from other PAH.

These adducts were incorporated into the "hotspot" and "cold spot" oligo sequences via the standard phosphoramadite route. The modified oligonucleotides were then incorporated on to an *Ecoli* vector and studied for the mutation spectra.



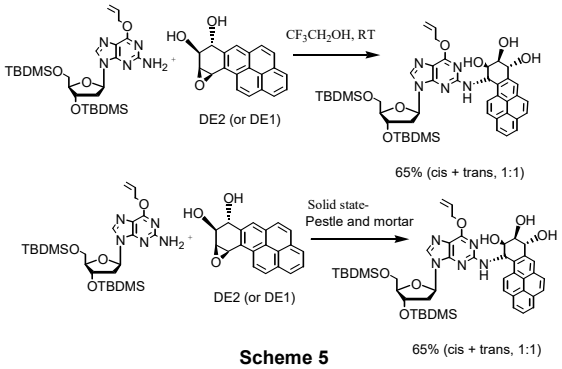
Scheme 3

We have also synthesised the trans adducts from post-oligomerization method as shown in the scheme 4. Totally 8 oligos corresponding to trans and cis opened oligo's were synthesised for the mutation studies.



Scheme 4

Deoxyguonosine adducts of benz[*a*]pyrene are difficult to synthesise. They are synthesised by the conventional route via the amino alcohol coupling to the corresponding halo dG in low yield. I have been able to develop two independent routes for the synthesis of these adducts which is essentially single step and high yielding. Which are very simple, single step and high yielding.



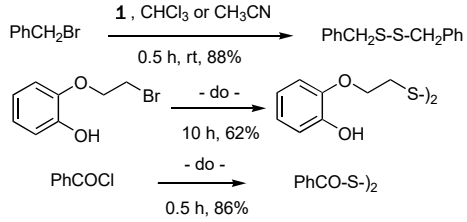
Scheme 5

Ph.D. Thesis Abstract

Title: Organosulfur Reactions in Organic Synthesis with Tetrathiomolybdate

In Part A of first chapter, a novel procedure is described for the preparation of disulphides. A variety of alkyl halides, benzylic halides and dihalides were treated with benzyltriethyl-ammonium tetrathiomolybdate [$(C_6H_5CH_2NEt_3)_2MoS_4$, **1**] to obtain the corresponding disulphides in excellent yields and thus it turns out to be very general and far superior to the existing methods (Scheme 1).

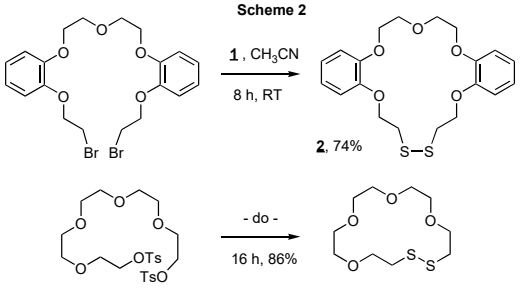
Scheme 1



Part B of the first chapter deals with the mechanistic studies of the sulphur transfer reaction of **1**. Based on several experimental results it is proposed that tetrathiomolybdate gets alkylated initially which induces an internal redox process involving the oxidation of the ligand and the concomitant reduction of the metal centre. The intermediacy of the $Mo_3S_9^{2-}$ has been proposed and spectral studies have been provided to lend support to the mechanistic pathway.

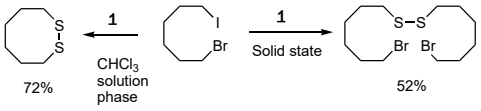
A general methodology for the synthesis of a number of macrocyclic disulphides and 'redox-switched' crown ethers (ring size varying from 7 to 20) have been delineated in Part A of Chapter 2 (Scheme 2). The fact that our reaction does not proceed via the formation of the corresponding dithiol, presents a major advantage in terms of mildness of reaction conditions, yield and eventually does not call for high dilution techniques.

Scheme 2



In part B of the second chapter, studies of association constants and metal ion transport across liquid membranes using 'redox-switched' crown ethers have been presented. The crown ether **2** , with disulphide linkage show remarkably high binding constant ($\sim 10^8$) for the silver ion while alkali metal ions are transported better than their oxo-analogues across the liquid membranes.

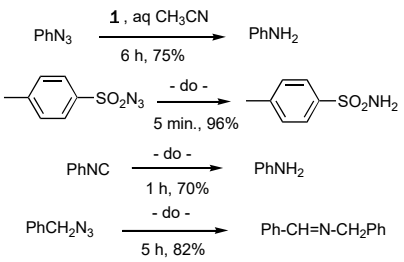
Scheme 3



In chapter three we have been able to show that many reactive substrates react in the solid state with **1** to give corresponding disulphides as the only products. This has been exploited in achieving a chemoselective sulphur transfer reaction in the solid state (Scheme-3). The change in the morphology of the solid was studied by scanning electron microscopy.

Nitrogenase, a molybdoenzyme, is responsible for biological nitrogen fixation and is known to reduce a number of nitrogen like molecules such as acetylene's, isocyanides and inorganic azides. Nitrogenase has been authenticated to comprise of Mo-S clusters in the active site and it has also been shown that tetrathiomolybdate is obtained as one of the products of hydrolysis of Mo-Fe protein. In studies presented in chapter 4, we have demonstrated that tetrathiomolybdate is a functional mimic of nitrogenase in that it reduces a variety of aryl azides, isocyanides and nitrogen like molecules (eg. diethyl azadicarboxylate) to the corresponding amines in good yields. Interestingly when **1** was treated with alkyl azides instead of reduction to the amines, the corresponding Schiff's base type compounds were formed in excellent yields (Scheme 4). We have also shown independently that in a microbial reaction carried out with bacteria endowed with nitrogenase system in molybdenum containing medium the same results are obtained. Our results apart from serving as a good synthetic methodology would be of far reaching relevance in the biochemical studies of nitrogenase.

Scheme 4



In conclusion, this research has opened a new arena to exploit the reactivity of tetrathiomolybdate towards organic substrates.