

PHARMACEUTICAL PROCESS CHEMISTRY & ORGANIC SYNTHESIS LABORATORY

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Assistant Professor – Process Chemistry



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Research Area

- Synthesis of therapeutically important compounds with focus on anti-diabetics, anti-HIV agents, anti-mycobacterial, anticancer agents
- Pharmaceutical process research and development on lab scale of drug molecules, APIs and herbal compounds
- Applications of green chemistry to pharmaceutical processes with focus on reactions in aqueous, and aqueous-organic media
- Total synthesis of therapeutically important compounds and natural products
- Synthesis of drug conjugates and complexes to enhanced therapeutic profile

Teaching

- PT-510: Industrial process and scale-up techniques (M. Tech. and Med. Chem Sem-I)
- PT-560: Synthetic aspects of process chemistry (M. Tech. Sem-I)
- PT-610: Topics relevant to drugs and pharmaceutical industry (M. Tech. & MBA Sem-II)
- PT-630: Synthetic bulk drug technology (M. Tech. Sem-II)
- PT-820: Topics in organic process chemistry (Ph. D)

Industrial Research Projects (selected)

- Scale-up, validation and development batches of APIs such as Cefozopran, Entecavir, Candesartan, Pioglitazone HCl, Fondaparinux, Valsartan, Vinadifformine, Vincamine, Vinprocetine, Levosulpride, Oxaceprol, and intermediates (20+ projects)
- Scale up and validation studies of herbal extracts (curcumin, jamun etc.), antioxidants, cosmetic products, hydrogenation (4 projects)
- Identification, isolation and synthesis of process related impurities of drug molecules (5 projects)
- Lab scale Process R&D and scale-up of drug molecules and intermediates (4 projects)

Research Group

Ph.D Students



Prachi G. Ramteke

NIPER PhD Fellowship

M.Tech. (Pharm), NIPER, Mohali (2016-18)

prachiramteke95@gmail.com

Thesis title: DPC based Synthesis of Amide, Carbamate and Urea containing Drug molecules



Shivam Wankhede

NIPER PhD Fellowship

M.Tech. (Pharm), NIPER, Mohali (2016-18)

sswankhede3@mail.com

Research Area: Functionalization of Indoles



Shital Adpadkar

NIPER PhD Fellowship

M.Tech. (Pharm), NIPER, Mohali (2017-19)

shitalatp77@gmail.com

Thesis title: Development of Efficient and Green alternatives to Organic Synthesis



Pankaj Harkal

NIPER PhD Fellowship

M.Tech. (Pharm), NIPER, Mohali (2018-20)

pankajharkal25@gmail.com

Research Area: Synthesis and novel process development of drug molecules



Divakar Singh

NIPER PhD Fellowship

M.Tech. (Pharm), NIPER, Mohali (2015-17)

[\[pankajharkal25@gmail.com\]](mailto:pankajharkal25@gmail.com)

Research Area: Novel processes for Gliptins and related compounds

M. Tech Students (2020-22)



Ashvini Bhausaheb Tanpure

Thesis: *Synthesis and Process develop of Gliclazide via a carbazate intermediate*
9960453115, ashvinitanpure008@gmail.com



Naveena Mamidi

Thesis: *1H-benzo[d]imidazole-2-one based synthesis of Domperidone*
8686442065, mnaveena299@gmail.com



Trinadh Prathi

Thesis: *A facile synthesis of Ritonavir*
9502141751, trinadhprathi@gmail.com



Chaityalya Lavoo Chavan

Thesis: *Synthesis of Enzalutamide via Hydantoins*
8605688540, chaityalyachavan22@gmail.com



Divya Keloth

Thesis: *Improved synthesis of Carpatamide*
8919125654, divyakeloth21@gmail.com



Himanshi Kori

Thesis: *Facile synthesis of Lopinavir*
8982076178, korihimanshi1@gmail.com



Sudipta Baur

Thesis: *Synthetic process development for Lenalidomide*
7679142564, Boursudipta96@gmail.com

Alumni

Ph.Ds

Dinesh Kumar Tanwar (2017)	Thesis Title: Novel Synthesis of Sulfonylureas and related Compounds
Rohani Prasad Burman (2017)	Thesis Title: Synthesis of Natural Products of Biological relevance

Research Associates

Sourav Kalra (Research Associate)	Ph. D (Central University of Punjab, Bathinda, Punjab) ICMR Fellowship (2018-2020) Project: Design, Synthesis and biological evaluation of purine derivatives as anticancer agents via CDK inhibition
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M.Tech. 2019-21

Ajay Singh	Synthetic process development for antiviral drug - Lopinavir
Ankit Sahare	Synthesis of N-substituted thiazolidinediones
Mithun Patel	Synthesis of thiocarbamates from carbamates
Rahul Jangra	Synthetic process development for antiviral drug - Ritonavir
Tejendari Thakur	To optimize extraction of 4-hydroxyisoleucine from fenugreek seed
Vutchula Priyanka	Synthetic process development for rosiglitazone
Shubhender Singh	Synthesis of Alogliptin and Trelagliptin.
Sumit Naranje	Synthetic process development for Pioglitazone

M.Tech. 2018-20

Gagandeep Kaur	Noval synthesis of Sumatriptan
Pankaj Sanjivrao Harkal	Convergent, synthesis of Domperidone
Ranjana Ahirwar	Cost effective route of Umifenovir
Snehal Sunil Daware	Efficient synthesis of Linagliptin
Sandip Suresh Bionwad	Rizatriptane : new synthetic approach
Surekha Ashok Kadam	Synthesis of Fexinidazole

Anjali Goswami	New Synthetic approaches of Indomethacin
M.Tech. 2017-19	
Vaibhav Shivhare	Synthetic approach to arylamine derivatives naturally derived from marine sources
Shaikh Aamer	Glutamic acid based Synthesis of 4-Hydroxyisoleucine
Gayatri Rohit	Synthesis and Process Development of Evogliptin
Shital Atpadkar	Design and Synthesis of Novel Dual Aromatase and Sulfatase inhibitor
Kranthi Kumar	Synthesis and Process Development for isolation of E-Clomiphene
Nandaram Praveen	New process Development of Sitagliptin
Pranay Kamble	Synthesis of Salbutamol using Chemical and Chemoenzymatic approach
M.Tech. 2016-18	
Adilakshmi Vutla	Novel approach for synthesis of gedatolisib
Rohidas Jadhav	Traniee Officer- Regulatory Affairs at Glenmark Pharmaceutical
Anand Kamble	Novel approaches for the synthesis of glipizide
Neha Tekam	To develop the synthetic route of recently isolated bioactive molecules originated from marine sources, Carpatamide-A, B and C, Sanjunolide
Satyaprakash Gajbhare	Facile synthesis of Alogliptin and Trelagliptin
Prachi Ramteke	Novel Synthesis of Regorafenib
Shivam Wankhede	Synthesis of sulfonylureas as herbicides by non-conventional route
M.Tech. 2015-17	
V. Ravikumar	Process for preparation of Flibansein
Vishakha Dhiman	Synthesis of substituted Hydantoin and Antibaldness compounds RU58841
P. Vani nikhitha	Aspartic acid based synthesis of Anti-Diabetic Agents
Divakar Singh	Facile synthesis of Alogliptine and Terlagliptine
Jyoti Bhatti	Biomimetic synthesis of Carpatamide-A: Cytotoxic arylamine derivatives from marine derived <i>Streptomyces Sp.</i>
Krishan Verma	Design and Synthesis of Bioactive BIM (Bis-indolylmethane) derivative from marine actinomycetes
M.Tech. 2014-16	

Anjali Ratan	Process for Preparing Substituted Hydantoins and Synthesis of Antiepileptic Drug Ethotoin
Bhawana Deshmukh	Process for the Preparation of 1,2,4-Triazol-3-One and Synthesis of its Analogues as Antidepressant Agents
Devendra Rajak	An improved and scalable synthesis of indolic enamides: Coscinamide A, B and their analogues
Pinninti Dileep kumar	Synthesis of Isatin semicarbazone as anticonvulsant agents
Shantanu Gupta	Study toward Synthesis of Carpatamide A-B, Cytotoxic Arylamine Derivative from a Marine Derived Streptomyces sp.
M.Tech. 2013-15	
Kamlesh Kumar Jatav	Studies on various reactions in aqueous media and switchable solvents
Anchal Singh	Synthesis and process development of raloxifene and process related impurities
M. Ravi	Synthesis and process development of OXI8006, combretastatin like indole as a vascular disrupting agents
Ripudaman	Synthesis and process development of rizatriptan and process related impurities
Bhagwana Ram	Synthesis and process development of amiodarone and their derivatives as anti leishmanial derivatives
M. Siddardh Sai	Synthesis of novel isatin derivatives and their biological evaluation as anti-HIV compounds
M.Tech. 2012-14	
P. Sravan Kumar	Synthesis of noscapine-ascorbic acid conjugates
Nikunj Patel	Process research and development for synthesis of an anticancer drug vismodegib
Dasari Manikanta	Methodology development of regioselective ring opening of aspartic acid cyclic anhydride with various nucleophiles
Laxminarayana	Synthesis of novel drug lipid conjugates
Raghvender Reddy	Synthesis of novel sildenafil-fluoxetine hybrid molecules
Nishtha	A novel efficient approach towards the synthesis of potent insulinotropic 4-hydroxyisoleucine
Nandini Sarviya	Process development of propafenone synthesis and its analogues for MDR
Kumaraswami Musku	Synthesis and biological evaluation of novel indole derivatives as antitubercular agents
M.Tech. 2011-13	
Banu Petiwala	Synthesis of aromatase inhibitors
D. Ramya Sri	Synthesis of nitroindazole and benzimidazole derivatives
Gurpreet Kaur	Synthesis of curcumin-drug conjugates
Mukul Dhiman	Synthesis of drug-Phospholipid conjugates
M.Tech. 2010-12	

Monika Jain	Synthesis of 5-Arylidene-2-Imino-4-Thiazolidinones
Rohani Prasad Burman	An approach to Sulfonylurea from Sulfonylchloride and Urea derivatives
Neetu Dayal	Studies Towards Synthesis of (±)-Funebrine
Santosh Kumar Manupati	Synthesis of 1,2,5-substituted pyrrols

NIPER Publications

15. Kumar D, Chauhan G, Kalra S, Kumar B, **Gill MS**. A perspective on potential target proteins of COVID-19: Comparison with SARS-CoV for designing new small molecules. *Bioorganic Chemistry*, 104, 2020, 104236.
14. Burman RP, Gupta S, Bhatti J, Verma K, Rajak D and **Gill MS**. Convergent synthesis of Carpatamide-A: Cytotoxic arylamine derivative from marine derived Streptomyces sp. *Natural Product Research* 2019, 33: 1147-1157.
13. Mital A, Burman RP, Gour R, Jhamb SS, **Gill MS**. Synthesis, ADME evaluation, and in vitro antimycobacterial studies of a novel series of 2-thiazolylimino-5-arylidene-4-thiazolidinone derivatives. *Anti-Infective Agents* 2017, 15: 38-44.
12. Singh C, Koduri LV, Bhatt TD, Jhamb SS, Mishra V, **Gill MS**, Suresh S. In Vitro-In Vivo Evaluation of Novel Co-spray Dried Rifampicin Phospholipid Lipospheres for Oral Delivery. *AAPS PharmSciTech* 2017, 18: 138-146.
11. Tanwar DK, Ratan A, **Gill MS**. A facile synthesis of sulfonylureas via water assisted preparation of carbamates. *Organic & Biomolecular Chemistry* 2017, 15: 4992-4999.
10. Tanwar DK, Ratan A, **Gill MS**. Facile One-Pot Synthesis of Substituted Hydantoins from Carbamates. *Synlett* 2017, 28: 2285-2290.
9. Tanwar DK, Surendrabhai VR, **Gill MS**. An Efficient and Practical Process for the Synthesis of Glimpiride. *Synlett* 2017, 28: 2495-2498
8. Avasatthi V, Pawar H, Dora CP, Bansod P, **Gill MS**, Suresh S. A novel nanogel formulation of methotrexate for topical treatment of psoriasis: optimization, in vitro and in vivo evaluation. *Pharmaceutical development and technology* 2016, 21: 554-562.
7. Pawar H, Surapaneni SK, Tikoo K, Singh C, Burman R, **Gill MS**, Suresh S. Folic acid functionalized long-circulating co-encapsulated docetaxel and curcumin solid lipid nanoparticles: In vitro evaluation, pharmacokinetic and biodistribution in rats. *Drug Delivery* 2016, 23: 1453-68.
6. Iyer P, Bolla J, Kumar V, **Gill MS**, Sobhia ME. In silico identification of targets for a novel scaffold, 2-thiazolylimino-5-benzylidin-thiazolidin-4-one. *Molecular Diversity* 2015, 19: 855-70.

5. Jain M, Burman RP, Negi VS, Jhamb SS, Mital A, **Gill MS**. Synthesis and biological evaluation of 2-thiazolylimino-5-arylidene-4-thiazolidinone derivatives as potent antimycobacterial agents. *Anti-Infective Agents* 2015, 13: 105-113.
4. Choubey AK, Dora CP, Bhatt TD, **Gill MS**, Suresh S. Development and evaluation of PEGylated Enoxaparin: a novel approach for enhanced anti-Xa activity. *Bioorganic Chemistry* 2014, 54: 1-6.
3. Jain SK, **Gill MS**, Pawar HS, Suresh S. Novel curcumin diclofenac conjugate enhanced curcumin bioavailability and efficacy in streptococcal cell wall-induced arthritis. *Indian Journal of Pharmaceutical Sciences* 2014, 76: 415-422.
2. Singh C, Jodave L, Bhatt TD, **Gill MS**, Suresh S. Hepatoprotective agent tethered isoniazid for the treatment of drug-induced hepatotoxicity: Synthesis, biochemical and histopathological evaluation. *Toxicology Reports* 2014, 1: 885-893.
1. Singh C, Bhatt TD, **Gill MS** and Suresh S. Novel rifampicin-phospholipid complex for tubercular therapy: Synthesis, physicochemical characterization and in-vivo evaluation. *International Journal of Pharmaceutics* 2013, 460: 220-227.

NIPER Patents Granted

9. **Gill MS**, Sarvia N, Tanwar DK, Suresh S: Novel Process For Synthesis Of Propaphenone, Application No. 2757/DEL/2015; filed on September 02, 2015. Patent No. 384479, Granted on December 16, 2021, Patentee: NIPER, Mohali.
8. Tanwar DK, Ratan A, **Gill MS**: Process For Preparing Substituted 1-Sulfonyl Hydantoins, Application No. 201611039635; filed on November 21, 2016. Patent No. 383617, Granted on December 03, 2021, Patentee: NIPER, Mohali.
7. **Gill MS**, Suresh S, Tanwar DK, Burman RP, Deshmukh B, Panninti DK: Process For the Preparation Of Semicarbazides, Application No. 3385/DEL/2015; filed on October 20, 2015. Patent No. 377054, ranted on September 16, 2021, Patentee: NIPER, Mohali.
6. **Gill MS**, Suresh S, Tanwar DK, Burman RP, Ratan A: An Improved Process For The Preparation Of Sulfonylureas, Application No. 3386/DEL/2015; filed on October 20, 2015, Patent No. 373139, Granted on July 29, 2021, Patentee: NIPER, Mohali.
5. **Gill MS**, Tanwar DK, Sarvia N, Burman RP, Suresh S: A One Pot Process For Synthesis of Propranolol Having Formula I, Application No. 2643/DEL/2015; filed on August 26, 2015. Patent No.:371356, Date of Grant. July 7, 2021, Patentee: NIPER, Mohali.
4. Jain SK, Suresh S, **Gill MS**: Novel Curcumin-Drug Conjugates, Application No. 731/DEL/2012; filed on March 14, 2012. Patent No.: 359071, Date of Grant: February 22, 2021, Patentee: NIPER, Mohali.

3. **Gill MS**, Suresh S, Tanwar DK, Burman RP, Panninti DK, Deshmukh B: PROCESS FOR PREPARATION OF MONOSUBSTITUTED UREAS, Patent No.: 350922; Date of Grant: November, 2020, Patentee: NIPER, Mohali.
2. Sarasija S, **Gill MS**, Singh C: NOVEL NANO-FORMULATIONS OF DRUGS, Patent No. 333221; Date of Grant: February 27, 2020, Patentee: NIPER, Mohali.
1. Mital A, Tailor A, **Gill MS**: A GREEN PROCESS FOR THE SYNTHESIS OF 2-(HETEROARYLAMINO)-THIAZOLIDINE-4-ONE DERIVATIVES, Patent No.: 314629; Date of Grant: June 25, 2019, Patentee: NIPER, Mohali.

NIPER Patents filed

4. **Gill MS**, Pawar HM, Jadhav RG, Tanwar DK: Novel Synthesis of Glibenclamide, Provisional application No. 202111014762, Filed on March 31, 2021.
3. **Gill MS**, Ramteke P: Facile Synthesis of Amides of Carboxylic acids, Provisional application No. 202111015006, Filed on March 31, 2021.
2. Tanwar DK, Ratan A, **Gill MS**: One Pot Process for the Preparation Of Substituted Hydantoins, Application No. 201611039634; filed on November 21, 2016.
1. **Gill MS**, Suresh S, Tanwar DK, Burman RP, Ratan A: Improved Process For Preparation Of Unsymmetrical Ureas, Application No. 3387/DEL/2015; filed on October 20, 2015.

NIPER Presentations

9. **Gill MS**. Scalable Processes for the Synthesis of Sulfonyureas. National Seminar on "Emerging Trends in Pharmaceutical Sciences: From Research to Revenue" in technical collaboration with Association of Pharmaceutical Teachers of India (Punjab State Branch) on 29th June 2021, School of Pharmacy, Desh Bhagat University. Fatehgarh Sahib, Punjab, India.
8. Tanwar DK, Sarviya N, S. Suresh S, **Gill MS**. Green Synthesis of Propafenone: An Anti-Arrhythmic Drug. National Conference on Emerging Trends in Biological and Chemical Sciences, 25-16 March, 2016, S. Govt. Sc. College of Education and Research, Jagraon, Ludhiana, Punjab, India.
7. **Gill MS**. API Synthesis and Process Chemistry. PTU-PITTTR Sponsored Faculty Development Program on "Current Scenario and Future Prospective in Pharmaceutical Research", 8-12 March, 2016, GHG Khalsa College of Pharmacy, Gurusar Sudhar, Punjab, India.
6. Tanwar DK, N. Sarviya N, Suresh S, **Gill MS**. Novel Process of Synthesis for Propafenone. Professor Ram Chand Paul National Symposium on Progressive Trends in Chemical Sciences, January 23, 2016, Panjab University, Chandigarh, India.
5. **Gill MS**. Process Chemistry Approaches to Synthesis of Drug Molecules. 9th Chandigarh Science Congress, 25-27 February, 2015, Panjab University, Chandigarh, India.

4. **Gill MS.** Drug Conjugates as Novel Therapeutics. 8th Chandigarh Science Congress, 26-28 February, 2014, Panjab University, Chandigarh, India.
3. **Gill MS.** Synthesis of Drug Conjugates. Prof. R.C. Paul National Symposium on New Visions in Chemical Sciences, 15-15 February, 2014, Panjab University, Chandigarh, India.
2. Mital A, Tailor A, Negi VS, Jain M, Ramya Sri D. **Gill MS.** A Green Process for the Synthesis of 2-imino-thiazolidine-4-one Derivatives. DAV National Congress on Science and Technology, DAV Institute of Engineering and Technology, Jalandhar, Punjab, 30-31 May 2013.
1. Jain SK, Kaur G, **Gill MS**, Suresh S. Synthesis of Curcumin-Diclofenac Conjugate for increased curcumin bioavailability, DAV National Congress on Science and Technology, DAV Institute of Engineering and Technology, Jalandhar, India, 30-31 May 2013.