3xper Innoventure Limited

Corporate Presentation

August 2025

Table of Contents

1 Corporate Overview

2 Service offerings and Capabilities

3 Sustainability

4 Case studies

Corporate Overview

01

Our Legacy

Murugappa

- 125 years legacy
- Market cap – US$ 50bn, Revenue – US$ 10bn
- EBITDA – US$ 1.4 bn, PAT – US$ 1bn
- 9 listed companies and >83,000 people

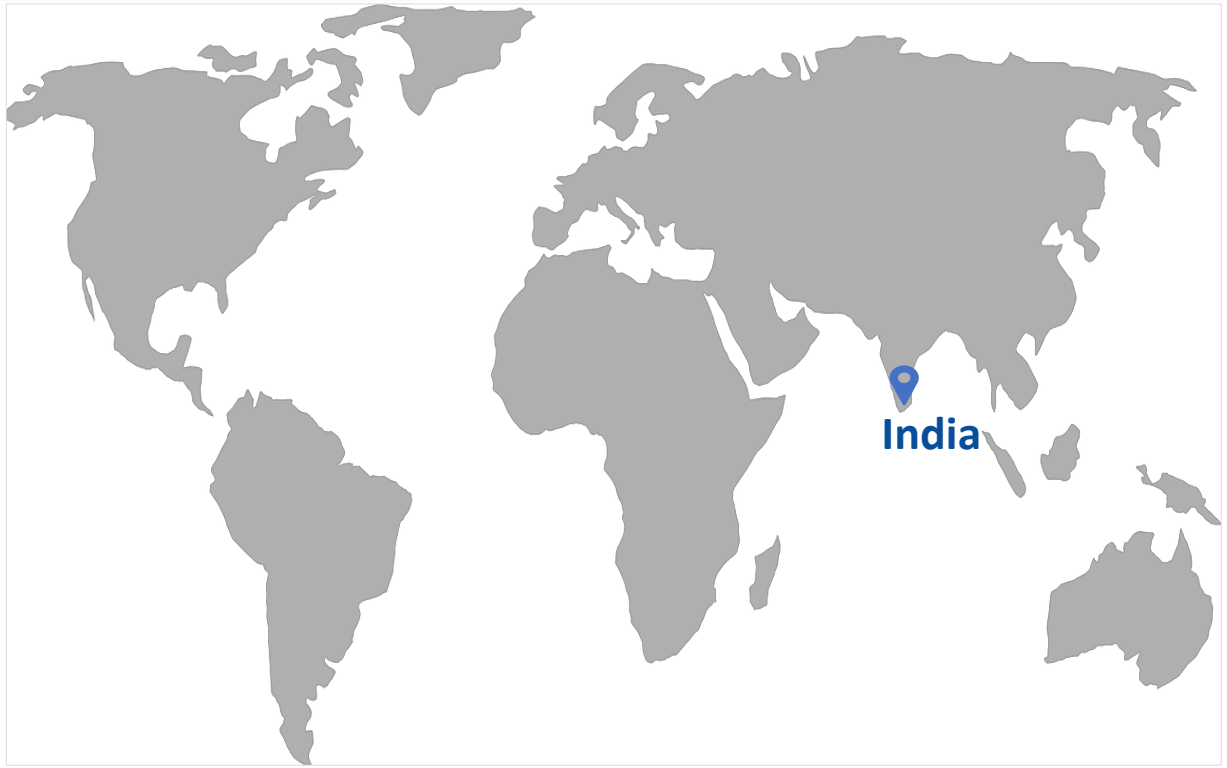
Tube Investments of India (Ltd)

- One of the listed companies of Murugappa group
- Business interests in automobile, financial services, medical devices etc.

3xper

- Subsidiary of TII and part of Murugappa Group
- Strategic expansion to cater global innovators companies in pharma and biotech space

Our R&D and Manufacturing Locations



- Our R&D facility is spread over 18,000+ sft at TICEL Bio park, an R&D ecosystem located in Chennai, Tamil Nadu India.
- Our green-field manufacturing facility is strategically planned at Naidupeta, Andhra Pradesh, a facility located about 60 miles from Chennai.

The Murugappa Way embedded with 3xper

Led by ethics. Guided by vision.

- The Murugappa way embodies 3xper's value system.
- The Five Lights below are a shining illustration of how this deep and shared DNA guides our operations.
- 3xper's core values integrated with the five lights of Murugappa, help us define 'who am I', 'how do I work' and 'how do I relate to my environment'.

murugappa

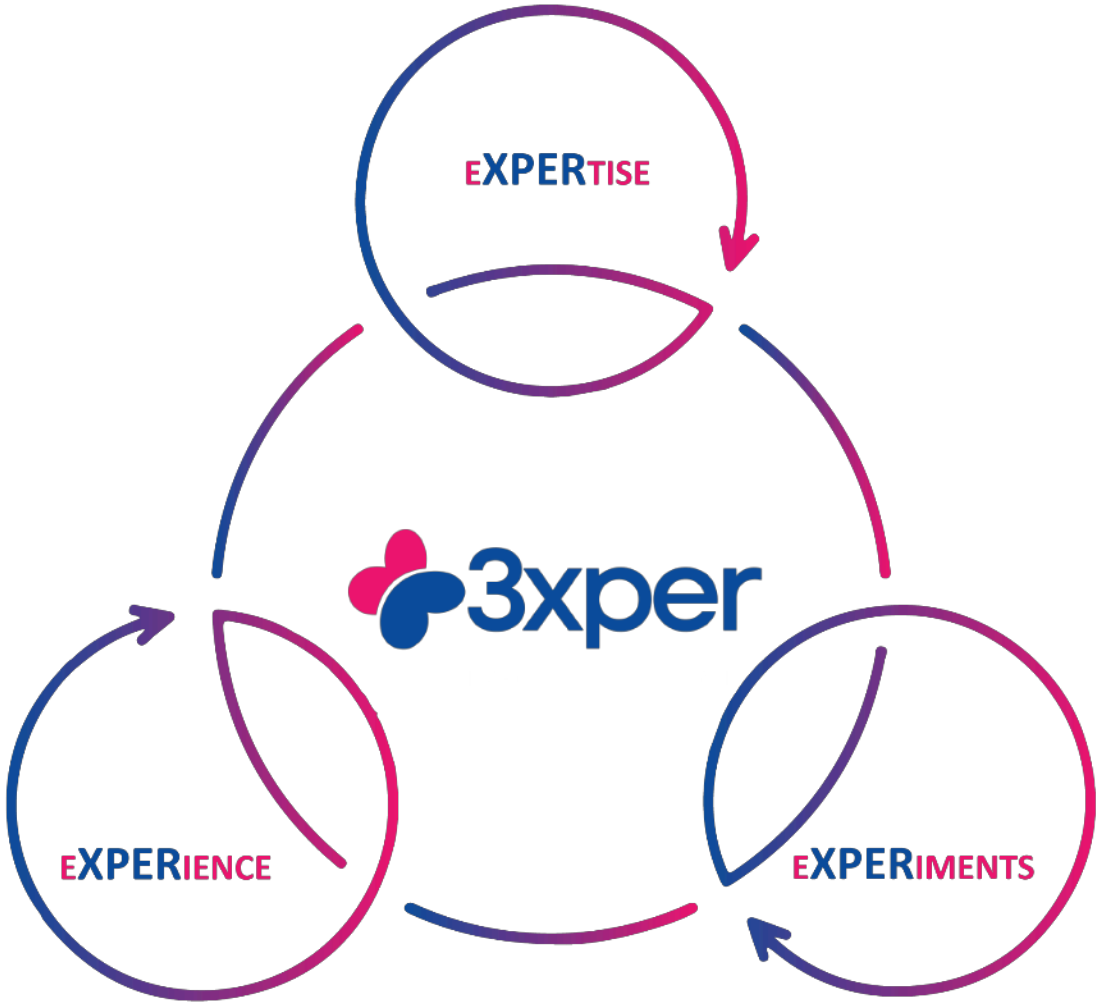
3xper

3xper's Core Values

At our core, guided by Murugappa Group's Five Lights, we encompass a set of unwavering values:

- **Integrity and Honesty**
- **Transparency**
- **Result Oriented Action**

The Brand Story



3xper is coined from keywords that form backbone of our Services

- e**XPER**tise : Access to the sharpest talent in the business
- e**XPER**ience : Seasoned professionals with experience leading core functional domains
- e**XPER**iments : Core priority to Research & Innovation

Service Offerings & Capabilities

02

Services Overview

3xper envisions a full-scale end-to-end chemistry service offerings providing seamless and efficient solutions across **discovery, development and manufacturing services.**

Our service offerings across the discovery development continuum

Early Discovery → **Pre-clinical** → **Clinical Trials [Phase I, II & III)** → **Launch and Commercial**

Discovery Chemistry

- Lead identification
- Synthetic Chemistry
- Analytical Chemistry
- Library synthesis
- Scaffold and Metabolites synthesis
- Random/ Late-stage functionalization
- Stable isotopes labelled compounds labelled

Development Chemistry

- Synthesis of building blocks, Linkers
- Process feasibility, development, optimization
- Continuous Manufacturing/ Flow chemistry & Enzymatic transformations
- Analytical Method Development, Qualification & Validation
- Impurity profiling including Nitrosamines
- Non- GMP supply of Drug substance, intermediates & Starting materials
- Stability studies

Manufacturing

- Development and supply of Intermediates & Key materials

  Development and manufacturing of Linkers (for ADC)
- cGMP supply of Starting materials, Intermediates & Drug substance
- Process validation of Starting materials, Intermediates, and Drug substance
- Commercial manufacturing of Starting materials, Intermediates, and Drug substance
- Continuous Manufacturing/ Flow chemistry and enzymatic transformations

Research & Development

2a

People- R&D

- **Initial pool of around 80+ Scientists (MSc / PhD / Post Docs) with extensive experience and expertise in CRO/ CDMO projects**
  - 50+ Chemists with 5 to 10 years of experience
  - 5 Team leads with 10 to 20 years of experience
  - 3 Group leaders with more than 20 years of experience
  - 20+ Analytical Chemist with 5 to 15 years of experience
  - 7 Process Engineers with 5 to 15 years of experience

Infrastructure

Infrastructure

- State-of-the-art facility built at 18,000 sq. ft with dedicated synthetic and analytical labs across four modules.
- 50+ Fume hoods and 5 walk-in Fume hoods
- Autoclaves (100mL to 5L) supported with enough safety features with all gas detectors
- MPLCs for quick purifications
- Temperature controlled storage facility
- Kilo lab – All glass reactors at 10L & 20L equipped for operations from -90 ^{o}C to 220 ^{o}C.
- Equipped with Huber system to handle temperature range of -80 deg C to 220 deg C
- Ideal for material generation, process robustness studies, scale up and crystallization studies

Chemistry expertise

Metal reactions

- Organometallic reactions under Schlenk
- Target based on Low temperature metalation / trans metalation

Heterocyclic Chemistry

- Macrocycles – large ring lactams
- Fused rings
- Bioisosters
- Preferential partial reduction of fused heterocycles under high pressure
- Nucleosides
- Nucleotides

Specialty chemistry

- Carbohydrates
- Late stage Fluorination / Methylation
- Remote C(sp3)−H functionalisation
- Free radical chemistry
- Prodrugs
- Chiral chemistry
- Transition metal catalysed coupling reactions

Hazardous reactions

- Azide
- Diazo chemistry
- Peroxide chemistry
- Pyrophoric reaction
- Nitration
- Free radical

Analytical R&D Labs- Infrastructure

- 400 MHz NMR
- UPLC/MS (SQD) with AP-ESI/APCI ion sources
- UPLC MS/MS (Triple quad) with AP-ESI/APCI ion sources
- UPLC with DAD & ELSD detectors
- HPLC with VWD, DAD & RI detectors
- GC-MS-FID & GC-FID with Head Space
- Preparatory HPLC with open bed fraction collector (UV, DAD)
- FT-IR & UV

Analytical Services

- At 3xper, we offer an extensive range of analytical services and solutions, all tailored to cater to the dynamic world of small molecules.
- We also provide Standalone Analytical Services- (FTE/FFS)

Method Development & Quantification

- Method Development using HPLC, GC, LCMS/MS, GCMS and other spectroscopic techniques.
- Assay Analysis, Method validation, verification, method transfer as per the ICH guidelines
- Method development for Chiral compound; determination of % ee of the isomers.
- Quantitative analysis by NMR

Characterization Studies

- Structure elucidation of small molecules using LCMS/MS, GC/MS, 1D and 2D NMR techniques.
- Identification and characterization trace level impurities.
- Solid phase characterization studies using powder XRD, FT-IR, DSC and TGA techniques.
- Stability studies including photo stability testing.

Isolation and Purification

- Milligram to gram level isolation and purification of Achiral and Chiral compounds using preparatory HPLC
- Purity enrichment up to ≥ 99%
- Trace impurity (such as Nitrosamine) isolation and quantification.

Manufacturing

2b

Manufacturing Facility

- ~100,000+ sq feet site for manufacturing facility with multiple scales of operations
  - **Pilot Block**
    - To accommodate tech transfer projects and scale up supplies up to 10 kilograms (batch size).
    - Fully operational
  - **Production Block 1(Semi-commercial plant)**
    - To accommodate cGMP scaleup batches from a few kilograms up to 100 kilograms (batch size).
    - Fully operational
  - **Production Block 2 (Commercial plant)**
    - To accommodate cGMP intermediate and API batches from 50 kg to 500kg to 4000kg [batch size].
    - Expected to be operational by end Q1 2026

Pilot facility

- The pilot facility caters supplies ranging from 1 kg to 10 kg batch sizes
- Operates as a GMP-like facility with separate intermediate and pharma areas
- Vessel sizes range from 50 L to 100 L
- The reactor MOC types available are GLR, SSR and AGR
- Equipped with all types of Downstream equipment such as Centrifuge, Driers, ANFD and Nutsche filter.
- Separate HVAC system for intermediate and Pharma areas
- Equipped to handle temperature ranges from -40^{o}C to 150^{O}C Celsius
- Reactors are equipped with dedicated heating and cooling systems

Semi-commercial facility Production Block -1

- The cGMP Production block-1 facility will cater supplies upto 100 kg batch size
- Vessel sizes range from 50L to 1000 L
- Two clean rooms with crystallization capabilities from 100L to 1000L reaction volume
- The reactor MOC types available in intermediate areas (GLR, SSR) and pharma areas (Hastelloy, GLR)
- Equipped with all types of Downstream equipment like Centrifuges, ANFDs, PNFs, RCVD as per GMP requirements
- Class 100,000 HVAC system
- Temperature conditions from -40 deg C to 150 o C
- Purified water systems as per USP requirements

Commercial Facility- PB 2 - Under Construction

- The GMP Commercial plant facility will cater supplies from 50kg to 4,000kg batch scale
- Vessel sizes range from 5000L to 25,000 L
- Two clean rooms with crystallization capabilities from 5000L to 25,000L reaction volume
- The reactor MOC types available are GLR, SSR, and AGR
- Equipped with all types of Downstream equipment like Centrifuges, ANFDs, PNFs, RCVD, Spray dryers as per GMP requirements
- Has a separate Class 100,000 HVAC system for intermediate and Pharma areas
- Temperature conditions from -80 deg C to 160 deg C. Purified water systems as per USP requirements
- Expected date of operation : Q1 2026.

Access to Technology Platforms

Continuous Manufacturing

Developed flow process for two APIs for process involving nitration and other involves Hoffmann rearrangement.

Enzyme transformation / Biocatalysis

Collaboration with strategic partner. Expertise in library of enzymes like KRED, IRED, Transaminases, Nitrilases, Transesterases, Nitrile Hydratases, Dehydrogenases. Access to 20,000 library of enzymes

Sustainability

03

Sustainability :

3xper continuously strives to work on green chemistries, waste reduction through continuous process, Biocatalysis and solvent recoveries to create a positive impact by reducing the carbon footprint on the climate and environment. This includes controlling direct and indirect emissions by measuring activity based and spend based approach

3xper is committed to

Safety

Conduct robust risk assessments to safeguard resiliency of our research, manufacturing, and commercial activities.

Environment

Establish criteria and engage with stakeholders to demonstrate meaningful environmental performance and improvement across the manufacturing lifecycle of our products and services.

Compliance

Compliance with all Environment, Health and Safety (EHS) standards and statutory requirements.

Potential non-compliance is identified through self-assessment and corrective action will be implemented.

Health & Safety

Targeting Zero accidents

Stakeholders are empowered to report near miss or unsafe conditions to leadership team for appropriate corrective actions

Waste Management

Reduce waste from operations through hierarchy of control for handling waste: Reduce, Reuse. Recycle and disposal.

Safety

04

Safety Practices

1 Infrastructure safety

- Forced Exhaust systems – Dedicated exhaust scrubbing systems
- HVAC systems – Once through type, Specific dedicated systems
- Multi-layer Fire safety network ;Fire Extinguisher/blanket/suit; Fire Alarm System; Fire Hydrant System
- Closed loop gas distribution system – Nitrogen, Hydrogen, Helium, Argon, Zero Air, with Sensors/Detectors
- Hazardous and Fire-resistant storage cabinets with access control system
- Fume Hood System for Chemicals and Reactions handling.
- Chemical Spill Control Kits
- Chemical storage with Compatibility

2 People safety

- Safety practices and procedures
- Personal protective equipment (PPEs)
- Safety Eye and Body wash Shower
- OHC
- Induction and Refresher Trainings
- External trainings by certified institutes
- Emergency Response Team
- Safety Sign and Caution Boards
- Mock Drills and Fire Drills
- Contract worker safety

Safety Practices

3 Process safety

- Process safety studies through our external partners
  - Reaction Calorimetry
  - Accelerating rate Calorimetry
  - Thermal Screening Unit
  - Differential Scanning Calorimetry
  - Powder safety studies like minimum ignition energy, dust explosion, conductivity, flammability etc.
- Partnership with *Intertek,* GVS CIBATECH and Kelvin International Safety services Ltd
- Inhouse expertise in Hazop study
- Hazard Identification and Risk Assessment
- Work Permit System
- Onsite Emergency Plan
- Incident Investigation system
- Standard operating procedures
- Mechanical integrity-Regularly inspect and maintain the equipment.
- Material Safety Data Sheets

4 Environment management

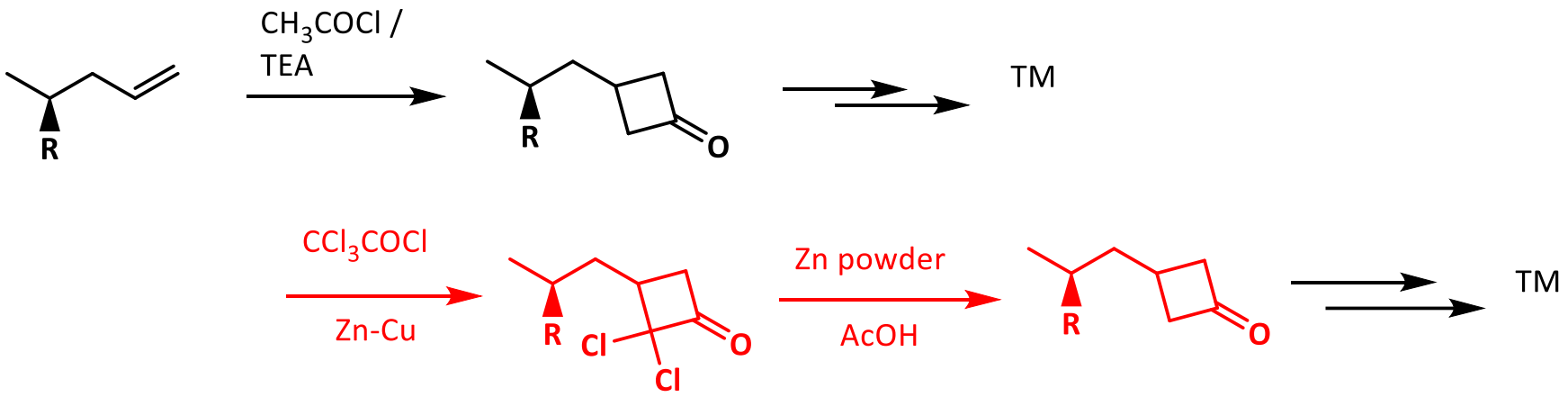
- Consent for operation (CTO)
- Hazardous waste agreement for disposal to authorized parties.
- Effluent collection and Disposal to authorized parties.
- Effluent collection in closed container
- Scrubbing System connected with Neutralize solutions.

Case Studies

05

Chemistry Case study-1

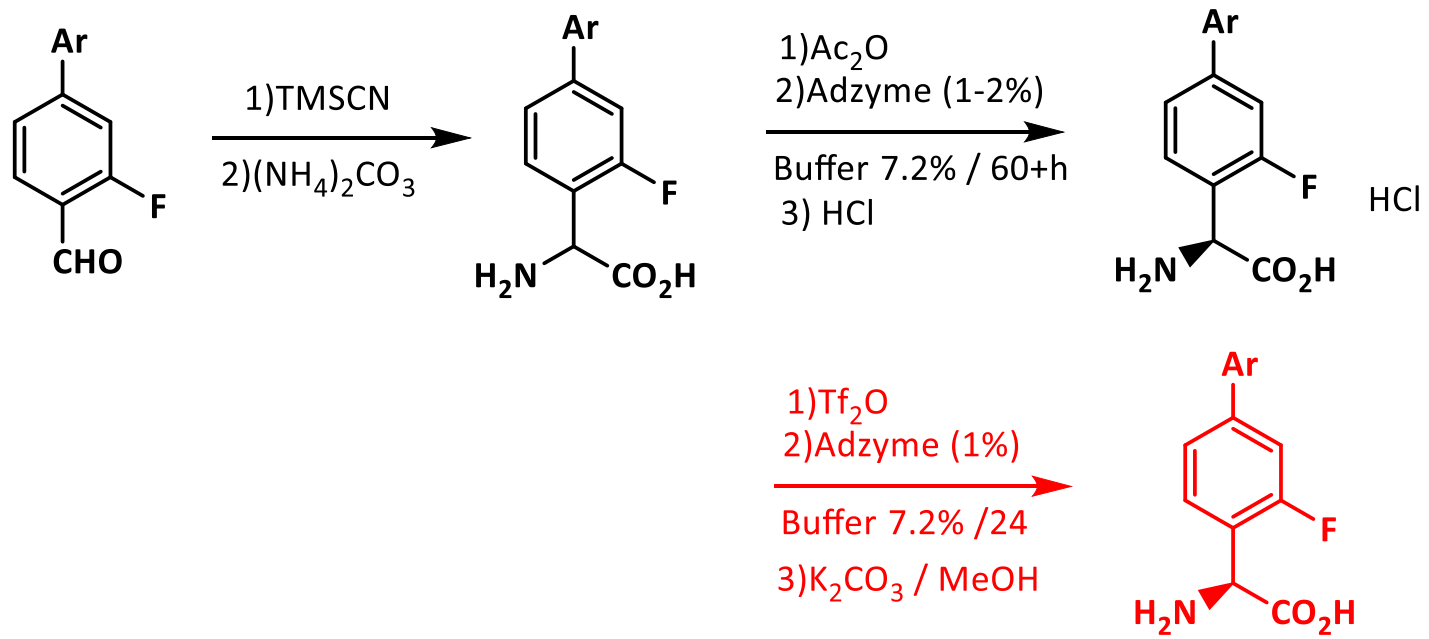
Dichloroketene as an alternative – Better conversion and faster turn-around time



- The suggested route needs to be done under -20 °C
- Max 7% conversion was observed
- Dichloroketene reaction done at 50 °C
- Complete conversion observed
- Isolated yield 70%

Chemistry Case study-2

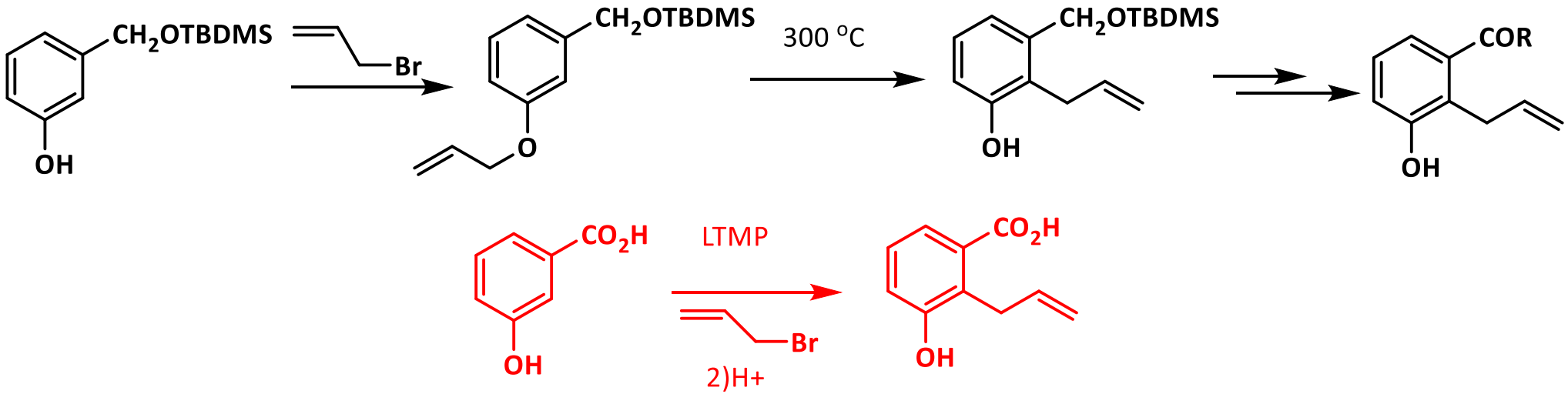
Achieving shorter reaction time with lesser enzyme loading enhanced scalability



- Enzymatic resolution was sluggish
- Required higher loading of the enzyme
- Acetic anhydride availability in bulk quantities was an issue
- Trifluoroacetamide proved to be a viable alternative
- Faster reaction with lesser loading of enzyme
- Easy deprotection

Chemistry Case study-3

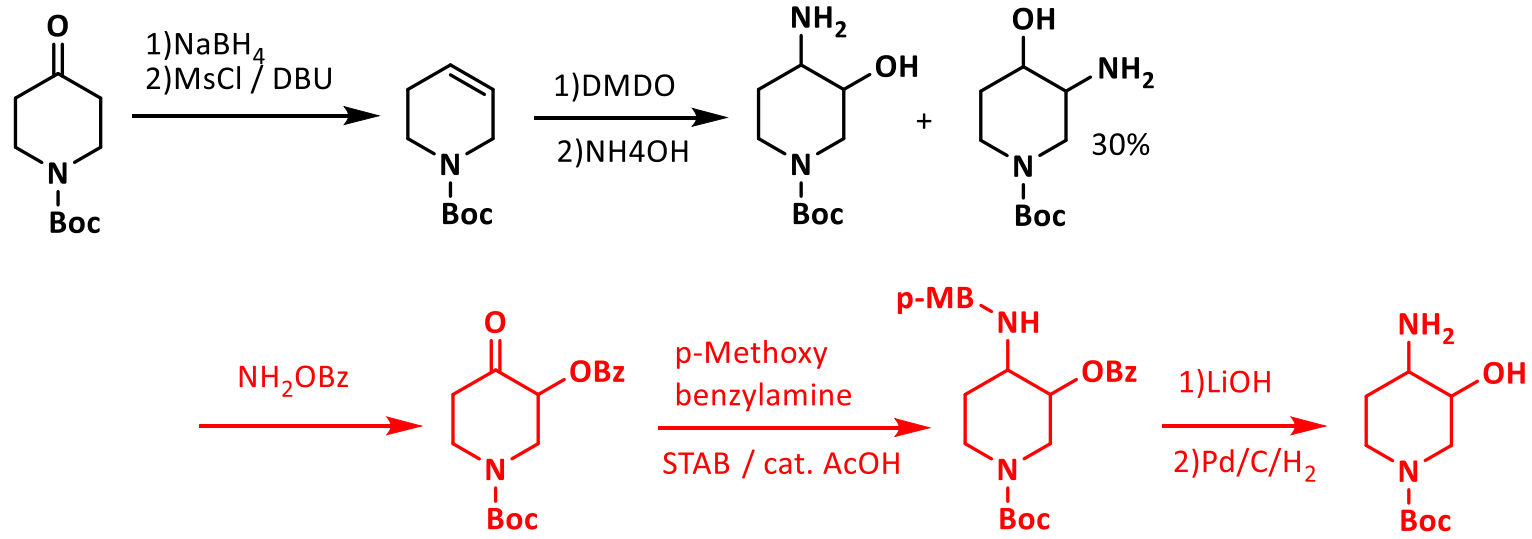
Simplified process for a KRM - Faster turn-around time



- Reported procedure involved high temperature Claisen rearrangement
- Not exclusive and less yielding along with other regio-isomers with chromatographic requirement
- Requires deprotection and Low temperature Swern oxidation for the secondary alcohol
- The developed route precluded all these issues and reduced the number of steps by 4

Chemistry Case study-4

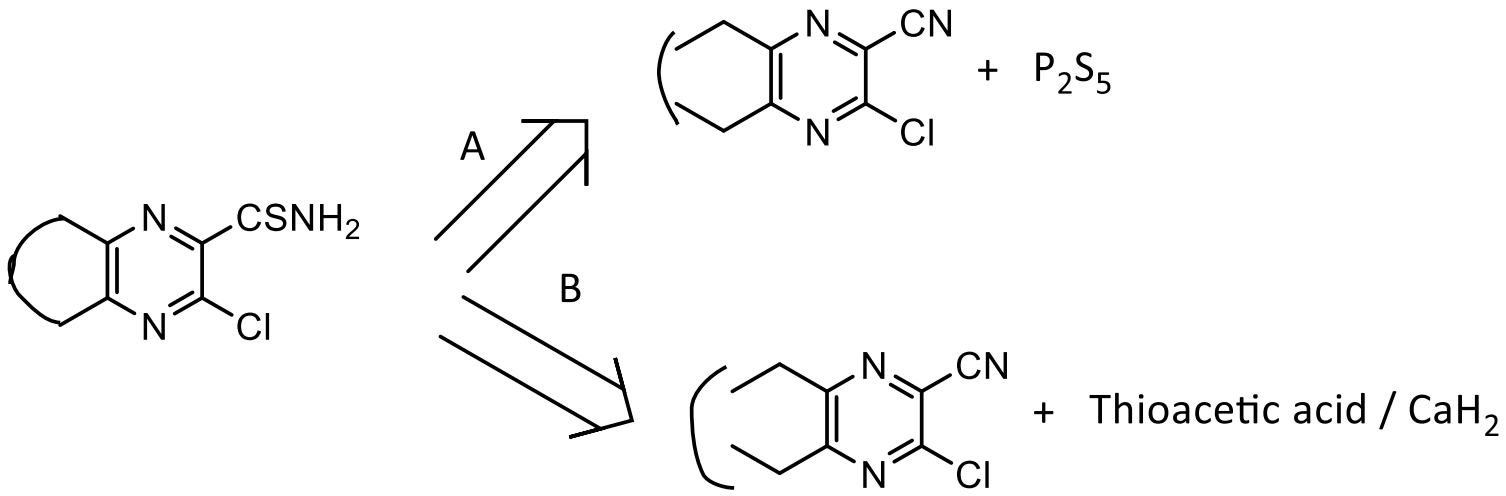
Regiospecific synthesis of key intermediate



- Cleaner route developed which was regio-specific
- Safer to scale-up

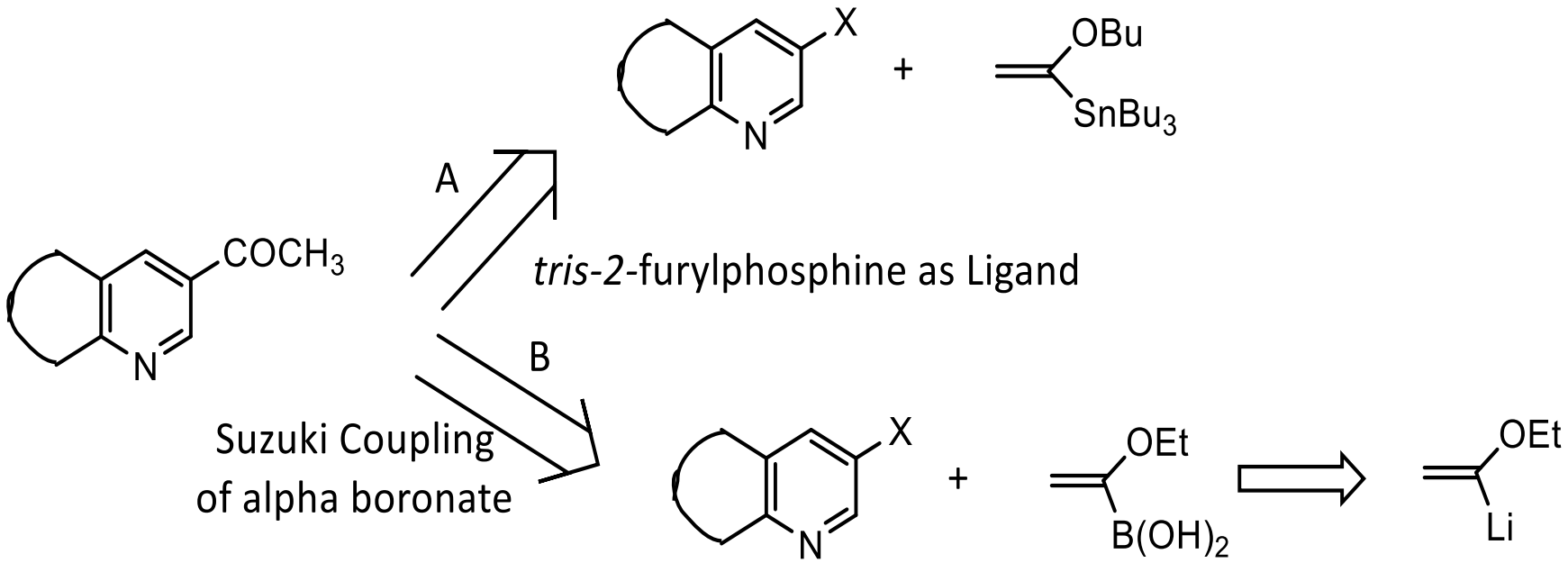
Chemistry Case study-5

Development of Novel methodologies – Unwanted side product completely avoided



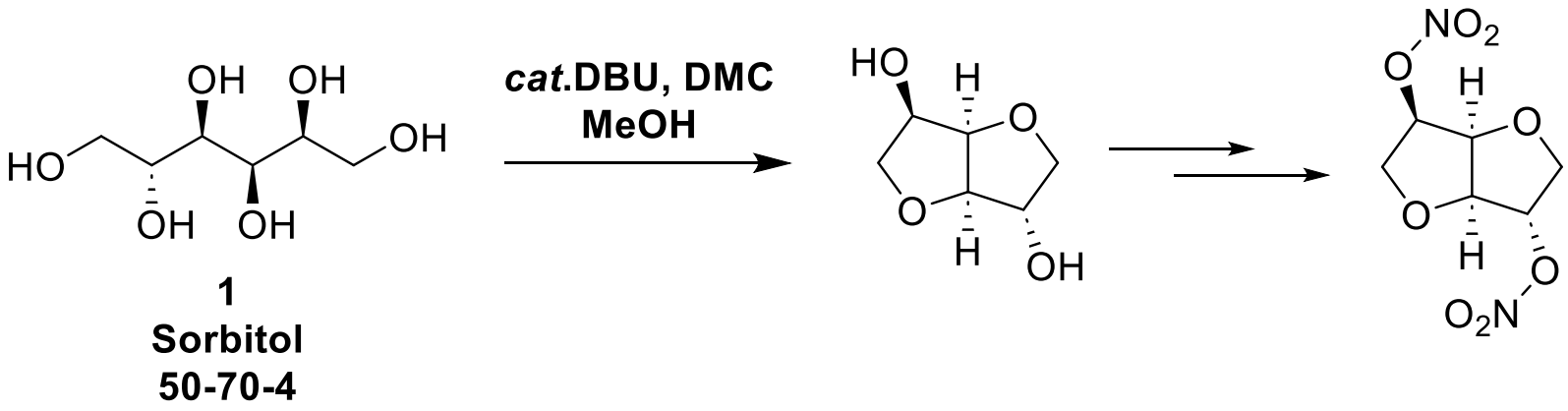
Chemistry Case study-6

Development of Newer Route – To overcome Non-availability of Key Ligand Issue and avoidance of tin reagent



Chemistry Case study-7

Development of Greener route – DMC is environment friendly

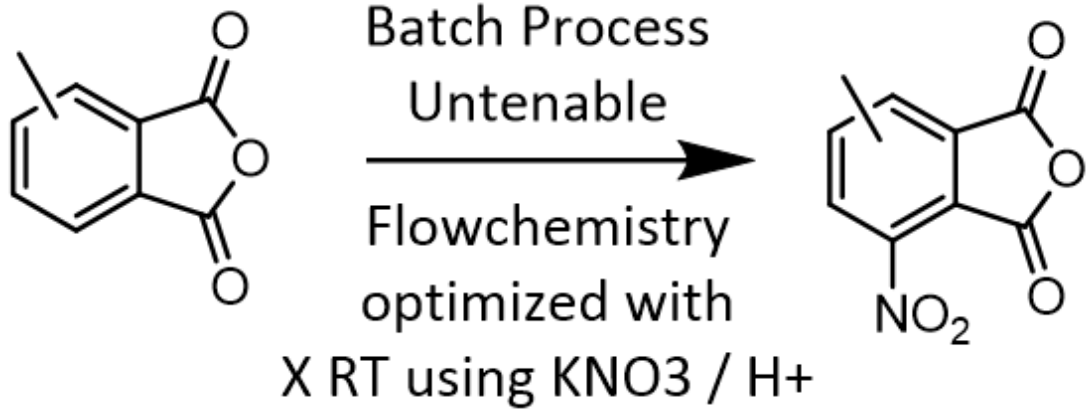


1
Sorbitol
50-70-4

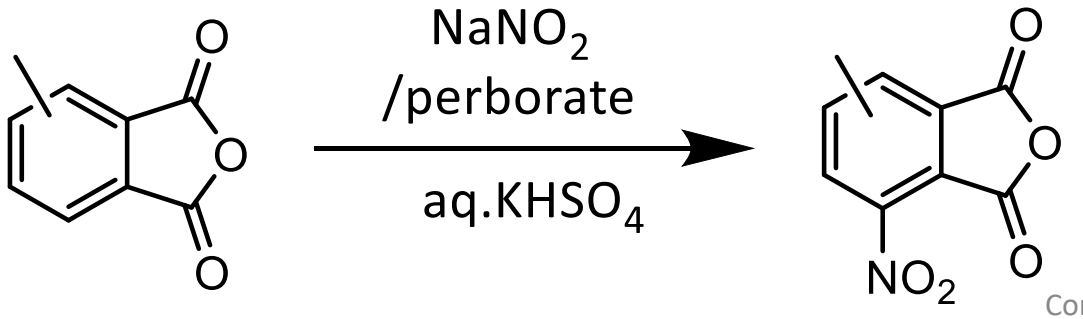
- The existing industrial route uses Con. H2SO4 followed by Con. HNO3 in high volumes
- Modified route does not involve these mineral acids
- Lesser volume of operations
- Direct scalability

Chemistry Case study-8

Example for Flow Chemistry : Application of modern techniques for safer process



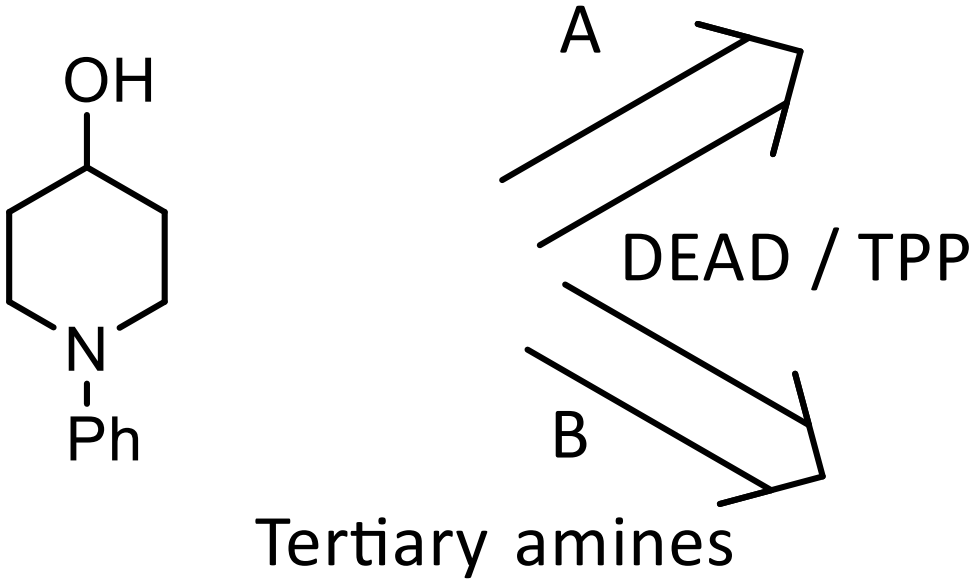
Green Chemistry Scalable Alternative



Chemistry Case study-9

Example of introduction of Novelty to well established name reaction

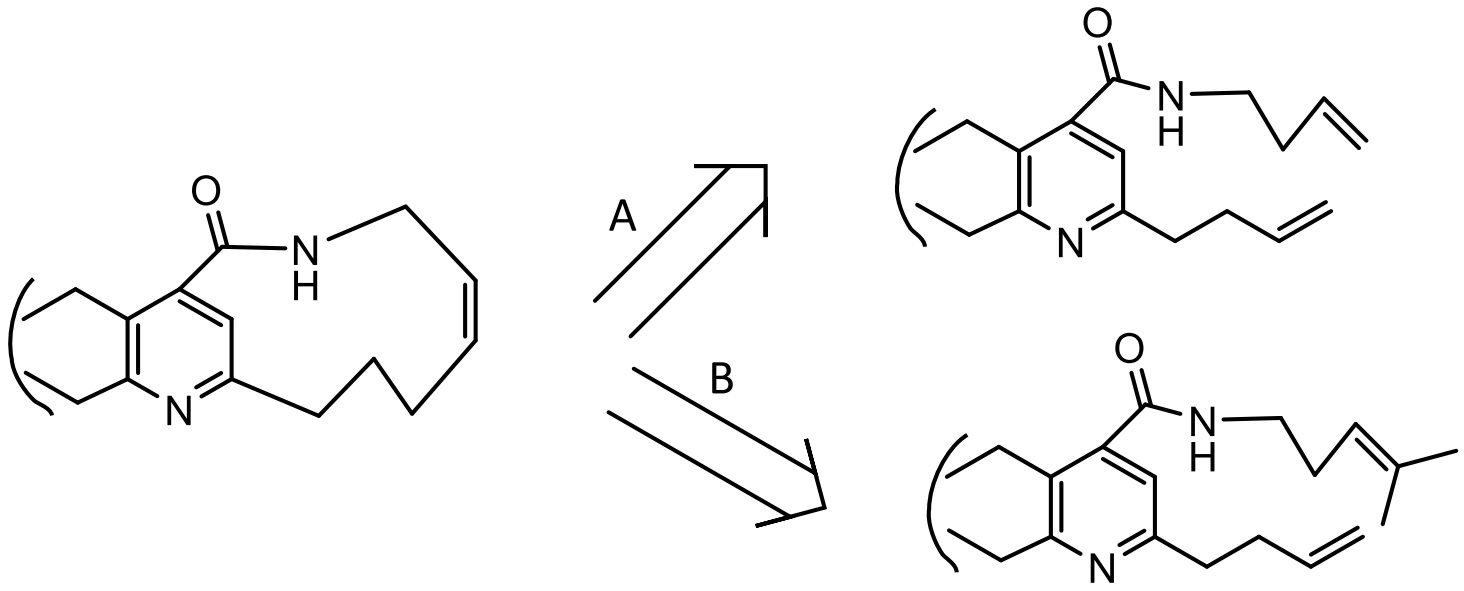
Conventional *Mitsunobu* of Sec-OH will not work



A New Methodology - *Base catalysed Mitsunobu* was developed with Hunig Base which gave moderate to good output

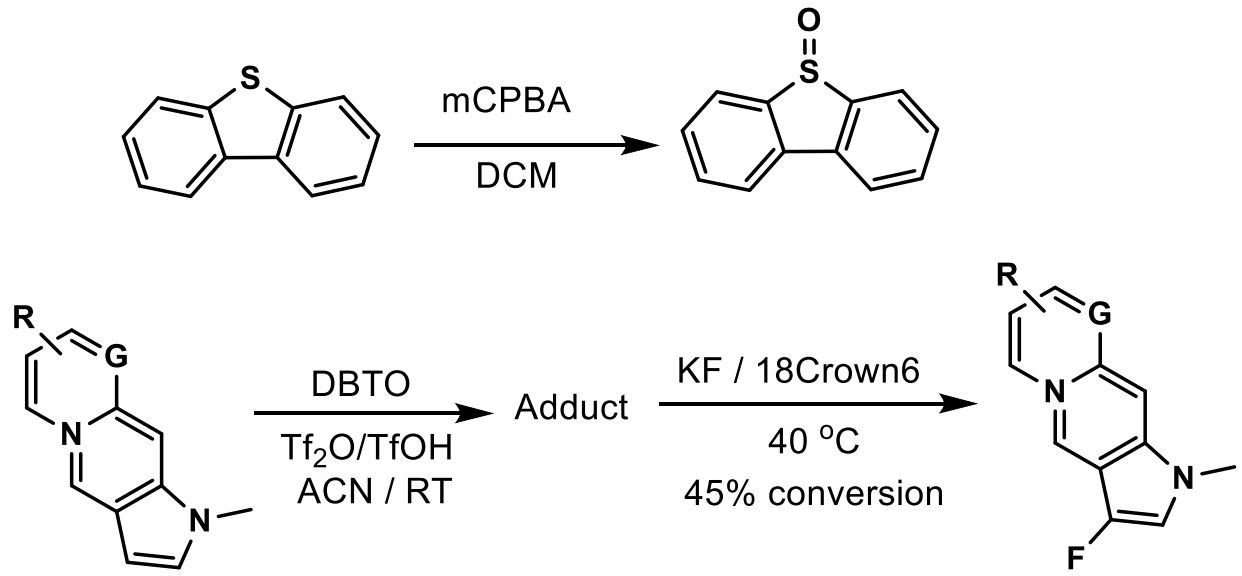
Chemistry Case study-10

Tricky Macrocyclisation – with the change done as shown in path B, volume of dilution reduced to 75% - Conveniently done on multi gram scales



Chemistry Case study-11

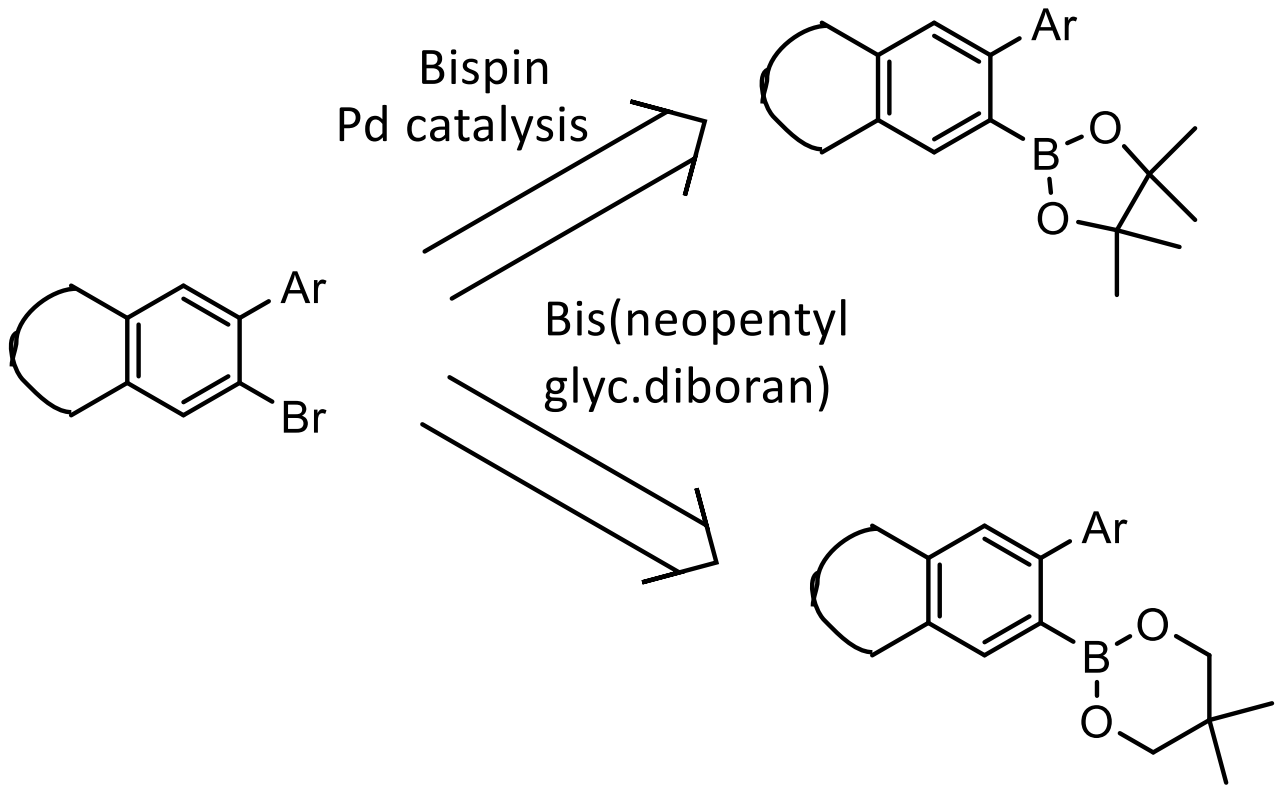
Late-Stage Fluorination



- Initial Trials of Random Fluorination on the metabolite resulted in 5% product (LCMS)
- The metabolite adduct was not stable at higher temperature
- No reaction observed at temperatures below 80 °C
- Introduction of 18Cr6 dramatically improved the product formation to 45%
- Gram scale isolation became possible

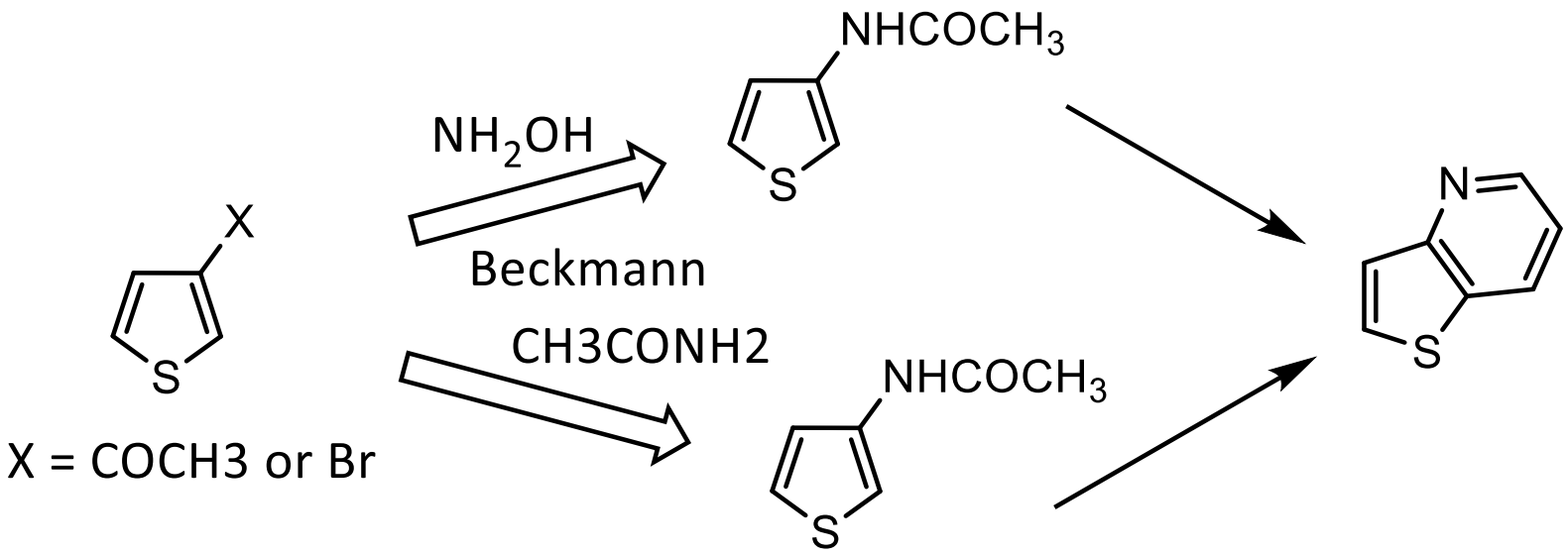
Chemistry Case study-12

Alternate Reagent – with understanding of reaction mechanism



Chemistry Case study-13

Alternate Route – To Avoid high energy intermediate



Analytical development Case Study – 1

1. UPLC-MS Method Development for Library compounds

- Developed a high throughput rapid UPLC-MS method.
- The method runtime - 2 min
- Analysed **10,000** library compounds.
- Shared real-time data to the client.
- Project was completed before target time

2. High throughput Purification of library compounds

- Developed a high throughput Preparatory LCMS method.
- Sample quantity = Ranged from 30 to 50 mg.
- Initial product purity = ~20-30%.
- The final compounds were enriched to **>95%** and achieved **~90%** recovery.

3. Characterization of Macrocyclic compounds with 11 chiral isomers

- Initial isolation of 11 chiral isomers of a macrocyclic (MW=900 Da) compound.
- Detailed MS/MS fragmentation studies were carried out.
- Various types of 2D NMR analysis were also carried out to elucidate the structures of all the isomers.

4. Analysis of relative impurities by single method

- A four steps synthesis of a drug molecule produces nearly 14 related impurities.
- Use of multiple analytical methods to identify all the 14 impurities in each step was cumbersome and time consuming.
- A single HPLC method was developed to successfully identify and quantify the final product as well as all the 14 relative impurities.

Analytical development Case Study – 2

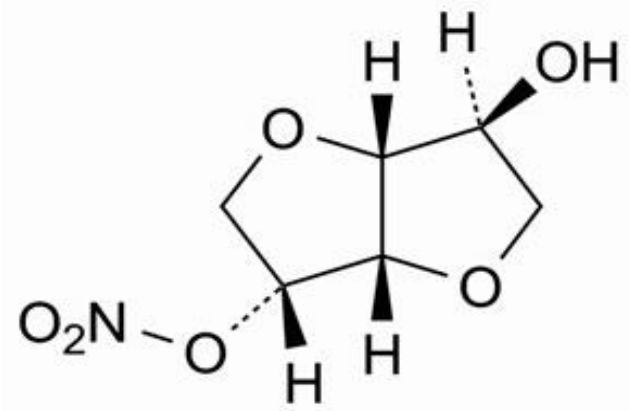
- During manufacturing of the diluted Isosorbide mononitrate (70% with lactose) a method was developed to evaluate the presence of general nitrosamines (NDBA, NMBA, NMPA, NDIPA, NEIPA, NDEA, NDMA) as potential contaminants, based on regulatory guidance.

- Detection of trace nitrosamines was challenging due to the complexity of the diluted API matrix.

- Developed a highly sensitive, robust UPLC-MS/MS method for simultaneous quantification of seven nitrosamines, achieving LOD-level detection with high precision even in complex matrices.

- Achieved : LOD of ≤ 0.005 ppm and LOQ of ≤ 0.011 ppm.

- Ensured regulatory compliance and enhanced product safety through effective nitrosamine control.



Thank you