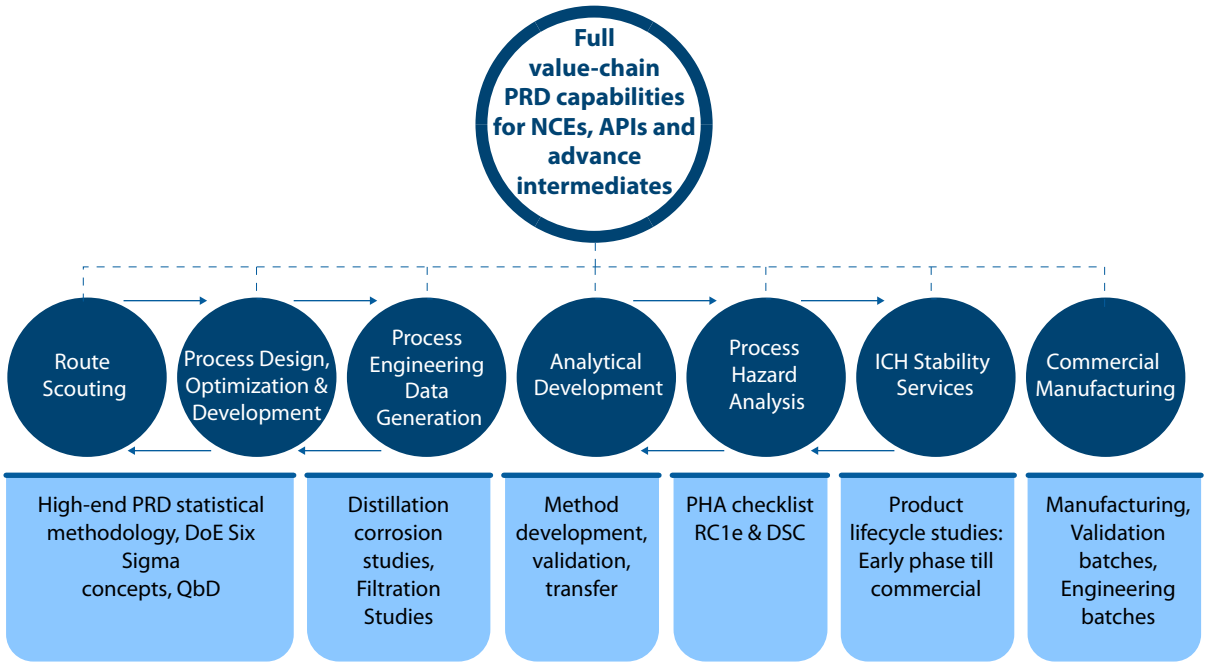
Syngene

Putting Science to Work

Chemical Development

Route scouting to Regulatory support

Chemical Development



Highlights

- 125+ fume hoods in multiple suites
- Automated lab scale jacketed reactors (-70- to 180 °C)
- Flow Chemistry
- Dedicated process engineering and safety lab
- HPAPI development from lab to Manufacturing scale
- Therapeutic and Diagnostic Oligonucleotide- from Lab to Manufacturing scale
- Performance and Speciality Materials - synthetic organic chemistry, polymer chemistry and scale-up activities
- Integrated analytical services- analytical method development, validation, transfer and reference standard qualification
- Regulatory Support

Process Engineering and Scaleup

Capabilities

- Design of experiments (DoE)
- Quality by design (QbD)
- Reaction Kinetics studies
- Process Modelling and Simulation
- Reaction Optimization studies
- Unit operation and processes
    - Filtration, Distillation, Extraction, Drying, Corrosion studies etc
- Process crystallization studies
- Advanced PAT tools for Process understanding (FBRM, PVM, React-IR etc)
- Flow Chemistry development
- Mass & Energy Balances
- Technology absorption and transfer

Process Safety Management

Capabilities

- Process Safety studies (DSC, RC1e, ARC, Vent Sizing etc)
- Powder safety studies (Fall Hammer test, MIE, MIT, Ignition test, MEC, LOC etc)
- Process Safety Information
- Process risk assessment (What-if, HAZOP, PHIRA, FMEA, Qualitative and Quantitative risk assessments etc)
- Pre-startup safety reviews
- Asset Integrity and reliability studies

Oligonucleotides

Salient Features

Process Development

- Natural & Modified | siRNA | ASOs | Anti-microRNA | Aptamer | CpG
- Conjugated oligos | Molecular beacons | Fluorescent oligos | Probes & Primers
- Backbone modifications | Base modifications | Sugar modifications
- Synthesizer & Scale: ÄKTA oligopilot 100 | 250 µmol - 6 mmol (100 mg - 5 g / batch (non-GMP))

Analytical Support

- Comprehensive analytical support | Method Development & Validation
- Combination of orthogonal techniques
- Impurity Analysis | Identification | Sequencing | Characterization
- Release specifications – General | Compendial | Oligo-specific methods
- Forced degradation | Informal stability | ICH stability

Manufacturing

- cGMP facility of 1500 sq. ft. | Fully qualified equipment and area
- Controlled environment to limit Endotoxin & Bioburden
- Located in a GMP certified/ USFDA inspected facility
- Synthesizer & Scale: ÄKTA oligopilot 400 | 4 mmol - 45 mmol (5 g - 135 g / batch (GMP/non-GMP))
- Support for regulatory filing | CMC documentation suitable for Phase 1/2 IND

Formulation

- Drug substance characterization and method development
- Formulation development and optimization
- Analytical methods development and pre-validation for the Drug Product
- Supportive stability study
- Component compatibility study and miscellaneous studies

High Potent API

Capabilities

- Integrated solutions from Discovery, Process R&D, Optimization, Scale-up & Clinical supplies to Commercialization
- OEL determination toxicity studies
- cGMP manufacturing
- Facilities designed to handle cytotoxic, cytostatic, and high potent compounds with OEL values in the range of >100 µg/m^3 to 0.01 µg/m^3
- Isolators for full spectrum of unit operations from Sampling, Dispensing and Weighing, Reactor charging, Filtration, Drying, Milling & Sieving to Packing
- Broad range of Reactors (Stainless steel, Glass lined, Hastelloy)
- Dedicated facility for Prep-HPLC and lyophilization of HPAPI molecules
- Development and manufacturing of ADCs, including the linker development, optimization, and characterization

Highlights

- Highly experienced process chemists, analytical chemists, process engineers, manufacturing and QC team
- cGMP facility for lab-scale to commercial-scale manufacturing including registration and validation batches for regulated market
- Integrated with a separate cGMP facility to manufacture non potent compounds.
- Provision to add reactor & matching downstream equipment to enhance capacity/capability
- PAI inspection for the API registration and validation batches

Performance and Specialty Materials

Capabilities

- Synthesis and Purification of Monomers/Polymers
- Functionalization chemistry
- Material Characterization
- Process Development & Process Engineering
- GMP and Non-GMP manufacturing capabilities

Monomers	Polymers	Materials
Acrylates; Schiff bases; Ionic liquids; Radical compounds; Macrocycles; Heterocycles, End functionalization of polymers; Light and air sensitive compounds	Supramolecular Polymer; Conducting Polymers; Polymer Self Assembly; Self-healing Polymers; Hydrogels; Silicones; Random/Block/star/comb copolymers	Inorganic Materials; Additives; Catalysts; Biomaterials; Nanomaterials-Nanofibers, CarbonNanoTube (CNT)

Highlights

- Excellent track record of continuous supply of polymers & specialty materials (250-500 kg/batch), Nano materials (1-2 kg) and additives (10-100 kg scale)
- cGMP compliant facilities inspected by USFDA and audited by global customers and QPs from Europe
- Innovation on specialty materials and polymers from lab scale to commercial manufacturing level

ICH Stability Studies

One of Asia's largest Stability and Analytical facility spread across 72,000 sq. ft.

Capabilities

- End-to-end offerings including
    - License application
    - Centralized logistics team to handle all inbound and outbound shipments fast clearance being In Sez
    - Statistical analysis
- Studies at different phases – FIH, NDA/ ANDA and Commercial
- Multiple walk-in and reach-in chambers covering all climatic zones as per ICH Q1 A(R2), Q1B, Q1C and Q1 F guidelines
- Dedicated centres customised to client requirements

Highlights

- Diverse experience in handling Generic, Animal Health, CPG, Nutrition and OTC products
- Comprehensive analytical solutions including method development, validation and in-house microbiology testing
- Backup chambers available as part of business continuity plan
- Biometric access control system for individual chambers apart from overall facility with access control
- Separate infrastructure for handling steroids, hormones, narcotics and other special categories
- USFDA, PMDA, Russian Regulatory Agency approved facility
- Electronic data management systems as per 21CFR, Part 11 compliance

Commercial Manufacturing

Capabilities

Manufacturing of Regulatory starting materials, APIs, HPAPI, NCEs & Novel advanced intermediates

Mfg. facility	nGMP	S1 Kilo Lab	Unit 2 Kilo Lab	HPAPI	S14	Mangalore
Range	160 L - 5000 L	10 L - 20 L	10 L - 50 L	60 L - 630 L	60 L - 8,000 L	2000 L - 12,500 L
Total Capacity	26,640 L	120 L	90 L	2010 L	63,600 L	69,600 L
Largest reactor	5,000 L	20 L	50 L	630 L	8,000 L	12,500 L
# Reactors	15	3	4	5	32	11
Total number of reactors (Manufacturing Volumes)					**70 reactors (>161,000 L)**	

Salient Features

- 24/7 operations to ensure optimal utilization of resources
- Broad range of Reactors (Stainless steel, Glass lined, Hastelloy)
- Broad range of Chemistries (Asymmetry catalysis, halogenation, etc.)
- High potency expertise (Cytotoxic, Cytostatic compounds up to 0.1 µg/m^3 - 8h OEL)
- High vacuum (< 10 Torr) & high temperature (140°C) distillations
- Hydrogenator for highly acidic/basic reactions with capacity up to 4 KL and 26 bar pressure rating
- 12 KL cryogenic reactor operating within a temperature range of -90°C to 140°C
- Particle size reduction to < 10 microns with nitrogen and air in class 100,000 area
- Batch sizes range between 100kg (Bangalore) to 40 MT per annum (Mangalore)
- PMDA (commercial) and USFDA (RSM) approved Bangalore S14 manufacturing facilities

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About Syngene

Syngene Syngene International Ltd. (BSE: 539268, NSE: SYNGENE, ISIN: INE398R01022) is an integrated research, development, and manufacturing services company serving the global pharmaceutical, biotechnology, nutrition, animal health, consumer goods, and specialty chemical sectors. Syngene's more than 6000 scientists offer both skills and the capacity to deliver great science, robust data security, and quality manufacturing, at speed, to improve time-to-market and lower the cost of innovation. With a combination of dedicated research facilities for Amgen, Baxter, and Bristol-Myers Squibb as well as 2.2 Mn sq. ft of specialist discovery, development and manufacturing facilities, Syngene works with biotech companies pursuing leading-edge science as well as multinationals, including GSK, Zoetis and Merck KGaA.

For more details, visit www.syngeneintl.com or write to us at bdc@syngeneintl.com

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