

CUSTOM RESEARCH



KISCO
CREATING COLORS AND CHEMICAL SOLUTIONS



About KISCO Group

Kyung-In Synthetic Corporation (KISCO) is a large-scale developer and manufacturer of dyes, inks, fine chemicals and other functional materials that has been operating for almost 50 years. KISCO has 3 subsidiaries, JMC, DKC and WISECHEM that together make up the KISCO group. The combined KISCO group has a market capitalisation of around US\$ 300M and had sales of almost US\$ 310M in 2019. The group employs over 970 staff at 11 manufacturing plants in South Korea and Turkey. We have over 120 R&D staff and are supported by representatives and agents in over 60 different countries. KISCO core values include safety, the environment, respect for people and delivering on our commitments to our customers.

KISCO has a track record of successful, long-term partnerships and extensive experience with establishing and managing joint ventures. Through these partnerships KISCO is constantly expanding our range of activities and working with our partners to open up new markets and new applications for our technologies. We are based in Korea but our business is global.

Our name

Kyung-In refers to the region between Seoul and Incheon, Korea's major international airport. The Kyung-In region is home to thousands of companies providing ready access to a large range of suppliers and customers.



Our Subsidiaries and Joint Venture Companies

JMC Corporation

JMC (originally the Jeil Moolsan Company) was established in 1953 and is a world leader in the field of saccharin and sulfur-based fine chemicals. JMC was acquired by the KISCO group in 2004. JMC's research and development leverages the capabilities across the KISCO group and JMC provides raw materials for many other products manufactured by KISCO. JMC produces materials for fluorescent pigments/resins, medicinal intermediates, electronics, plastics and agriculture. JMC is also a large-scale manufacturer of saccharin, a safe, artificial sweetener that enables a drastic reduction in sugar content. We supply saccharin to some of the world's largest quality-oriented, multinational food and medicine producers.

Daito-KISCO Corporation (DKC)

DKC was established as a joint venture with Daito Chemix Corporation of Japan. DKC produces photosensitive materials that enable the fine patterning with lithography of LCD, OLED and semiconductors such as circuits for displays, laptops, tablets and mobiles. DKC brings together the experience of Daito Chemix with electronic materials and the experience of KISCO with colorants to produce materials that are fed directly into the supply chains of the major Korean electronics manufacturers.

WISECHEM

WISECHEM is a joint venture between KISCO and Korea Alcohol Industrial Co. Ltd that produces high quality pigments for the color filters in Liquid Crystal Displays (LCDs). WISECHEM established the first manufacturing capability in this field in Korea and now supplies materials into Korea's growing supply chain of electronic materials and devices. This has increased the competitiveness of other companies involved in the LCD market in Korea, a field where Samsung and LG have a 60% market share of global LCD panel manufacturing. WISECHEM has invested strongly in research and development and is continuing to introduce new colorants for high resolution, high performance LCDs.



KISCO Key Reactions

Acryl monomer for KrF/ArF photo resists

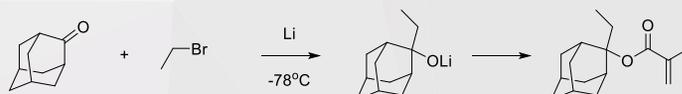
Capability

200kg/month

Core Technology

- Reaction : Organolithium Reagent Control
- Low Temperature : -78 °C
- Quality Control : Metal Contents w/ Single ppb [parts per billion]

Scheme



Reaction of Grignard Reagent Control

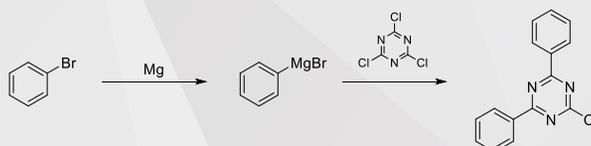
Capability

250kg/month

Core Technology

- Reaction : Grignard Reagent Control
- Purification : Hot Filtration and Recrystallization

Scheme



OLED Intermediates

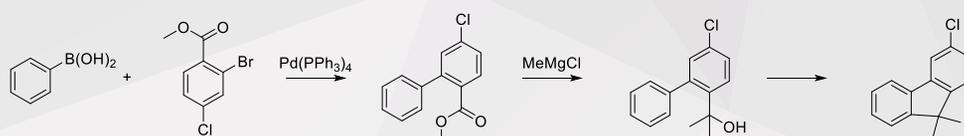
Capability

400kg/month

Core Technology

- Reaction : Suzuki-Miyaura reaction, Grignard Reagent Control
- Purification : Recrystallization [$>99\%$ (HPLC area %)]

Scheme

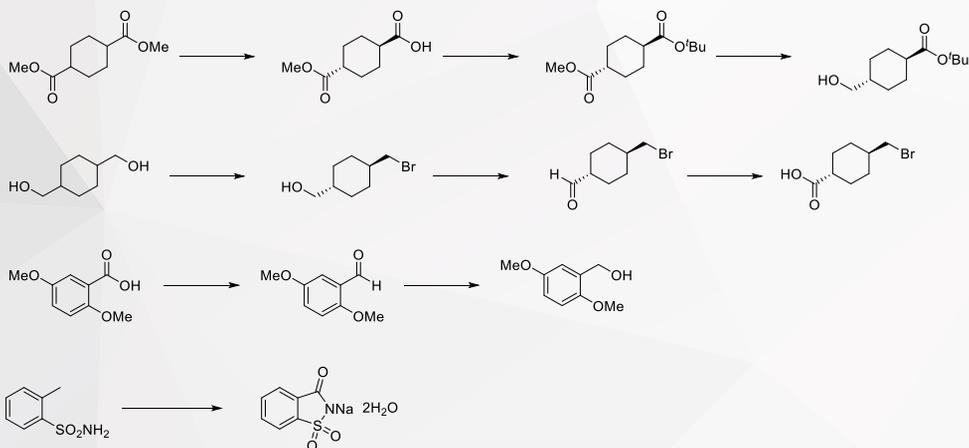


Reduction and Oxidation Chemistry

Core Technology

- Selective Reduction and Oxidation.
- Selective Halogenation

Scheme

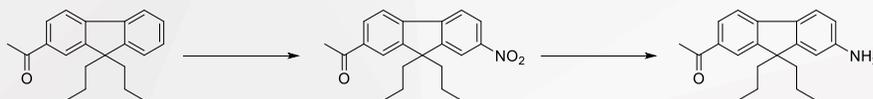


Nitration and Amination

Core Technology

- Selective Nitration and its Reduction

Scheme



Chlorosulfonation

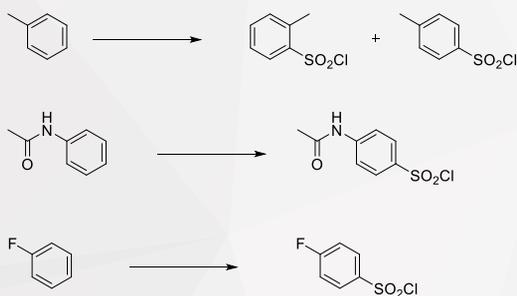
Capability

450kg/month

Core Technology

- Reaction : Isomer Contents Control
- Purification : Recrystallization
- Application : Intermediate of Sweetener, Pharmaceutical intermediate

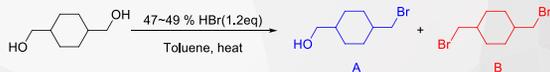
Scheme



KISCO Key Technologies

Flow Reactor

Coil Type



type	temp (°C)	HBr (eq)	Toluene	time	Reactor scale	Yield (%)	A(%)	B(%)
Batch	98	1.2eq	x 20	50hr	10L	52.1	91.8	1.0
Flow	150	1.2eq	x 9.8	4min	40ml	58.6	93.5	0.96

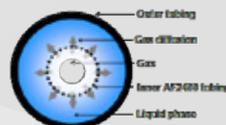
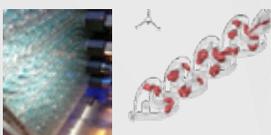


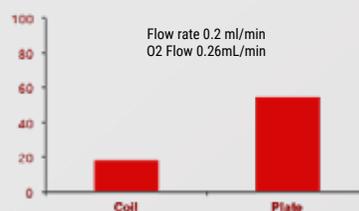
Plate Type



Gas-Liquid reaction
Auto clamp \rightarrow Flow Process



Reactivity (Coil type vs Plate type)



High Temperature/Low Temperature/High Pressure

Operating Conditions

	Temperature (°C)	Pressure (bar)	Size	Facilities
High Temperature Reactor	Max. 250	-1~5	SUS : 2,000L, 4ea	
Low Temperature Reactor	-80~180	-1~5	Glass-lined : 250L	
Thin Film Evaporator	20~250	10-5	Pilot Scale	
Flow Reactor	-60~250	30	Lab Scale, 2ea	

450 reactors, 50,000 tone p.a. manufacturing capacity. (Glass-lined : 500~6,000L SUS : 1,000~3,000L)

Metal Control Technology

Equipment	Model	Analysis Level	
Inductively coupled plasma-mass spectrometry [ICP-MS]	Perkin Elmer / Elan DRC II	ppb	
Inductively coupled plasma-mass spectrometry [ICP-MS]	Perkin Elmer / Nexion 300S	ppb	
Inductively coupled plasma atomic emission spectroscopy [ICP-AES]	Agilent / 5100VD	ppm	
Inductively coupled plasma atomic emission spectroscopy [ICP-AES]	Perkin Elmer / Optima2100DV	Si Analysis / 100ppb	

Successful case of KISCO CRO Business

Cost Innovation

Photoinitiator Manufacturing Cost Reduction

Customer's Inquiry: Our customer developed a new photoinitiator.

However, their product was too expensive → Goal: Reduce the manufacturing cost



- KISCO's Work: Design a new synthesis scheme
→ Reduce the number of reaction steps
- Optimization of process
→ Increase the yield and reduce process costs
- Out sourcing
→ Reduce the costs of raw materials



Our customer successfully launched the photoinitiator

Capabilities for custom research and manufacturing

The KISCO Group has research, development and production teams with a strong track record of developing new products and taking them from lab to production scale. The production capability is backed by an analysis team that understands the particular importance of high purity for materials for many different applications including electronics and fine chemicals in general. The KISCO analytical labs provide on-site Quality Control (QC) and Quality Assurance (QA) on all products. The KISCO analytical labs are accredited to international standards through the Korea Laboratory Accreditation Scheme (KOLAS).

KISCO's labs have the capability to purify materials to contain 10-100 ppb metal ions. KISCO is currently investing in equipment to improve our capability in this area to be able to routinely deliver products with less than 10 ppb metal content.

Examples of our current products include materials that are used in photoresists, in color filters for LCDs and the in binder that sits behind the liquid crystals. We produce these materials on a scale of up to 3 tonnes per month and routinely prepare these materials to have less than 100 ppb metal content. We have also produced early stage intermediates for pharmaceutical and agrochemical products.

KISCO's key strength in the area of custom research and manufacturing is the ability to develop and deliver high quality products at highly competitive prices.

