



# Tosoh Corporation

*General Presentation*



*Delivering on our promise of quality products through The Chemistry of Innovation.*

**Tosoh Corporation** *is a global chemical company that supplies manufacturers with the materials they need to create the products that make modern life all that it is. And everything that it can be.*

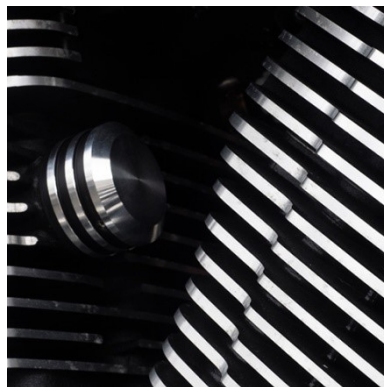
*We invite you to take a closer look at the wide world of Tosoh.*

# Fiscal 2018 Consolidated Net Sales

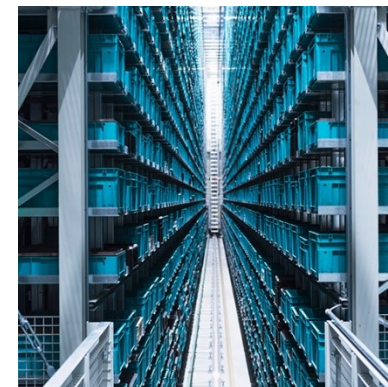
## US\$7.7 billion



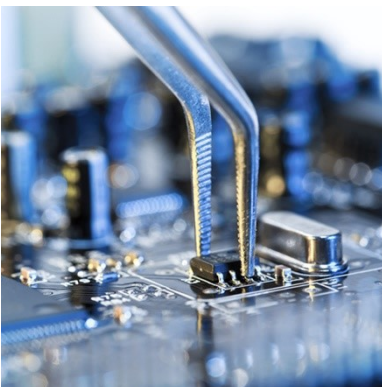
**CHLOR-ALKALI GROUP**  
Net sales: US\$3.2 billion  
Share of net sales: 40.7%



**PETROCHEMICAL GROUP**  
US\$1.6 billion  
Share of net sales: 21.2%



**SPECIALTY GROUP**  
US\$1.8 billion  
Share of net sales: 22.7%



**ENGINEERING GROUP**  
US\$798.4 million  
Share of net sales: 10.3%



**ANCILLARY**  
US\$387.1million  
Share of net sales: 5.0%

*Note:* For references purposes only, US dollar amounts have been translated, unless otherwise indicated, from yen at the rate of ¥106.24 = US\$1, the prevailing exchange rate at the end of the fiscal year ended March 31, 2018.



# 1,500 products\*



***Look around you, it is almost impossible to find a manufactured item that does not include something from Tosoh.***

\*Does not include the 10,000-plus parts that go into Tosoh's clinical diagnostic systems.



# 12,595 people

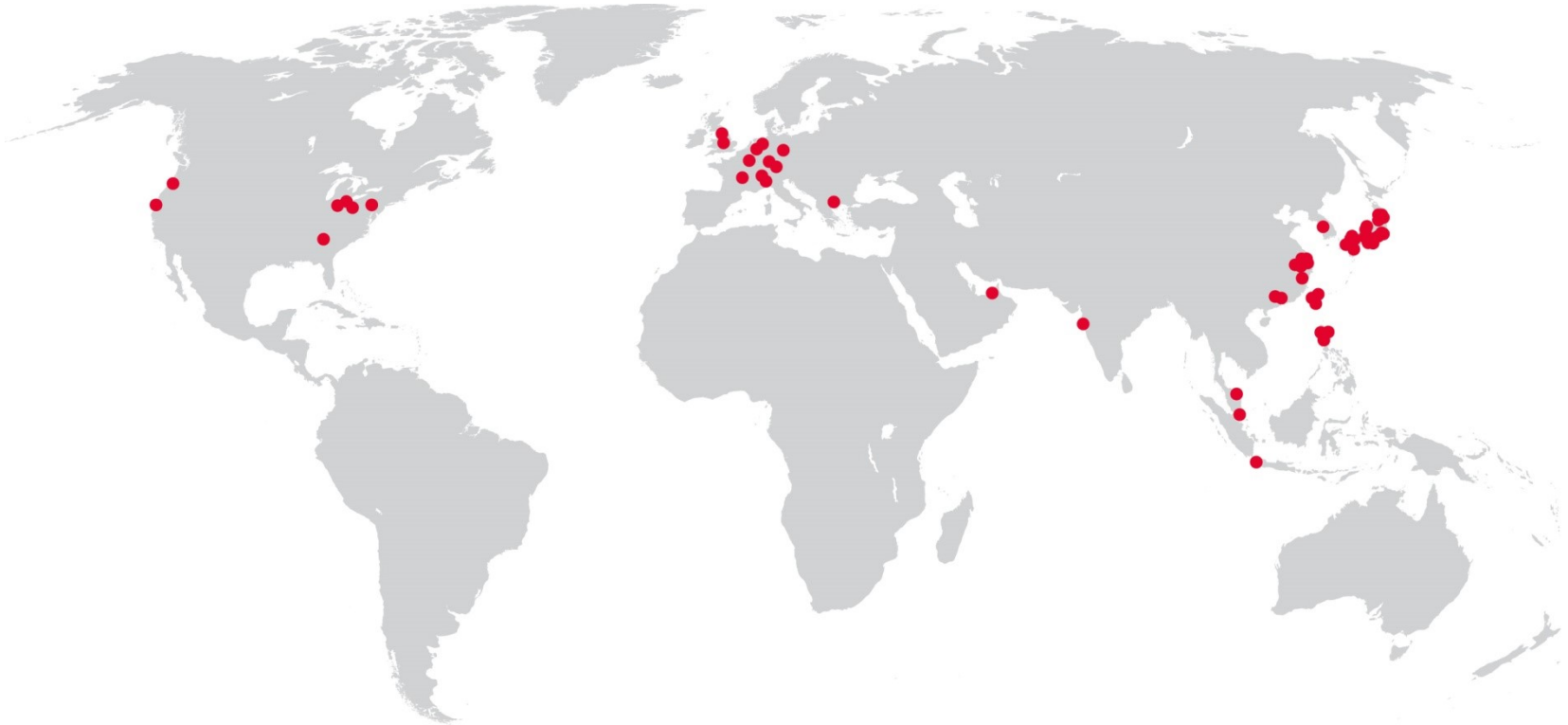


*Tosoh is committed to people, the source of its vitality.  
Tosoh is proud of the multiethnic, multicultural community it has become.  
Our diversity brings fresh ideas and creativity to all aspects of our business.*



# Global Group

106 companies 20 countries



*As we continue to expand globally, our focus remains on creating a corporate culture where people can realize their potential and be a part of the local community.*

# Environment

US\$24.2 million investment in fiscal 2018



*Tosoh is dedicated to improving the quality of life through environmental preservation, to ensuring the safety and health of its employees and society, and to achieving economic progress.*



# Research & Development

960 researchers    US\$146 million investment



*Through R&D, the Tosoh Group strengthens its businesses and enhances its ability to generate tomorrow's products today. The company combines its own R&D programs with joint research at external research facilities, including at universities and other educational institutions and at public research laboratories. Tosoh is also investing in venture funds.*





# Hybrid Business: Commodities & Specialties



# Products and Markets

*Tosoh serves the chemical and petrochemical, construction, automotive, consumer electronics, information technology, bioscience, and environmental markets.*



**Yokkaichi Complex  
Mie, Japan**

## **Petrochemicals Group**

Olefins  
Polymers

## **Chlor-alkali Group**

Chlor-alkali  
Cement  
Urethane

## **Specialty Group**

Organic Chemicals  
Bioscience Products  
Advanced Materials

## **Engineering Group**

Water Treatment  
Construction

# Petrochemicals

## Olefins

Ethylene  
Propylene  
C4 Fraction  
Tertiary-butyl alcohol  
Cumene  
Aromatic compounds, BTX (benzene, toluene, xylene)



### ***On the Road: A Part of Your Daily Life***

*Tosoh furnishes an array of materials that underpin the electronics, automobile, and plastics industries. Ethylene, one of Tosoh's core products, is basic feedstock for a vast array of petrochemical products such as polyolefin resins, which have a multitude of end applications ranging from films in packaging, flexible water pipes, coating cables, and synthetic rubber for use in rubber boats and raincoats, among others.*

## Polymers

Polyvinyl chloride (PVC)  
High-density polyethylene (HDPE)  
Low-density polyethylene (LDPE)  
Linear low-density polyethylene (LLDPE)  
Ethylene vinyl acetate (EVA) copolymer  
Adhesive polymer  
PVC paste (Ryuron<sup>®</sup>)  
Polychloroprene rubber  
Chlorosulphonated polyethylene (CSM)  
Alkylated CSM  
Polyphenylene sulfide (PPS) resins  
C<sub>9</sub> hydrocarbon resins



### ***In the Living Room: A Part of Your Daily Life***

*Tosoh is there while you're relaxing in your living room. Our polyvinyl chloride covers the inside of your house with easy to clean wallpaper and the outside with durable siding. It also covers the electrical cords that bring your appliances to life and the solar panels that provide your house with energy.*

# Chlor-alkali

## Chlor-alkali Division

Caustic soda

Vinyl chloride monomer (VCM)

Calcium hypochlorite (Niclon<sup>®</sup>)

Sodium bicarbonate

## Urethane Division

Isocyanate raw materials and functional urethane

Methylene diphenyl diisocyanate (MDI)

Toluene diisocyanate (TDI)

Hexamethylene diisocyanate (HDI)

Polyurethane adhesives

Coating resins

Elastomers

Polyisocyanates for polyurethane paints

Polyols



### ***In the Kitchen: A Part of Your Daily Life***

*Tosoh supplies essential products that go into plastics, glass, pulp and paper, aluminum, and soaps and detergents. Our resins are used in everything from refrigerators to mixing bowls and utensils; our caustic soda keeps clothes clean; and our Niclon<sup>®</sup> calcium hypochlorite makes drinking water safe.*

# Chlor-alkali

## Cement

Ordinary portland cement

Portland fly ash cement

Portland blast furnace slag cement



***For Strong Structures: A Part of Your Daily Life***

*Tosoh cement goes into buildings, bridges, and highways. And the recycling capacity of our cement plant helps significantly reduce the waste produced by Tosoh and communities surrounding the plant.*

## Organic Chemicals

Ethyleneamines

Polyurethane catalysts  
(TEDA, TOYOCAT<sup>®</sup> RZETA<sup>®</sup>)

Bromine

Hydrobromic acid

Flame retardants (FLAMECUT<sup>®</sup>)

Chelating agents (TS-300, TX-10)

Nonaqueous solvents (HC series)

Sodium P-styrene sulfonate (Spinomar<sup>®</sup> NaSS)

High-purity ethylene dichloride



### ***For When You Are Out and About: A Part of Your Daily Life***

*Tosoh provides cutting-edge technologies to the semiconductor, consumer electronics, automotive, pharmaceuticals, and medical industries.*



# Specialty

## Bioscience

Automated immunoassay analyzers (AIA<sup>®</sup>, AIA-CL series)

Reagent systems (AIA-PACK<sup>®</sup>, AIA-CLPACK<sup>®</sup>)

Automated glycohemoglobin (GHb) analyzers (HLC<sup>®</sup> series)

Real-time fluorescence monitoring systems (TRC<sup>®</sup> series)

High-performance liquid chromatography (HPLC) columns (TSKgel<sup>®</sup> series)

Separation media for bio-pharmaceutical purification (Toyopearl<sup>®</sup>)

High-performance gel permeation chromatography (GPC) Systems (EcoSEC<sup>®</sup> series)



### ***In Health Care Solutions: A Part of Your Daily Life***

*Tosoh produces a range of scientific and clinical diagnostics products that address the health concerns of developed and developing countries.*



## Advanced Materials

Yttria-stabilized zirconia powders & compounds  
(TZ and Zpex<sup>®</sup> series)

Grinding media (YTZ<sup>®</sup>)

Zirconia fine beads

Electrolytic manganese dioxide (EMD)

Zeolites for molecular sieves (Zeolum<sup>®</sup>)

Zeolites for catalysts (HSZ<sup>®</sup> series)

Silica glass materials

Fabricated quartzware

Machined quartzware

Sputtering targets



### ***For Conserving Natural Resources***

*Tosoh is taking steps to ensure its share of the surging market for rechargeable lithium-ion batteries, which conserve energy and are becoming increasingly important value-added components of automobiles and electronic products.*

# Engineering

## Water Treatment

(Organo Corporation)

Water Treatment Systems and Products

## Construction

(Tohoku Denki Tekko Co., Ltd., etc.)

Construction of machinery, plant, steel structure,  
environmental and sanitation facilities, containers

Electrical machinery

Instrumentation

Civil engineering

Maintenance and quality assurance

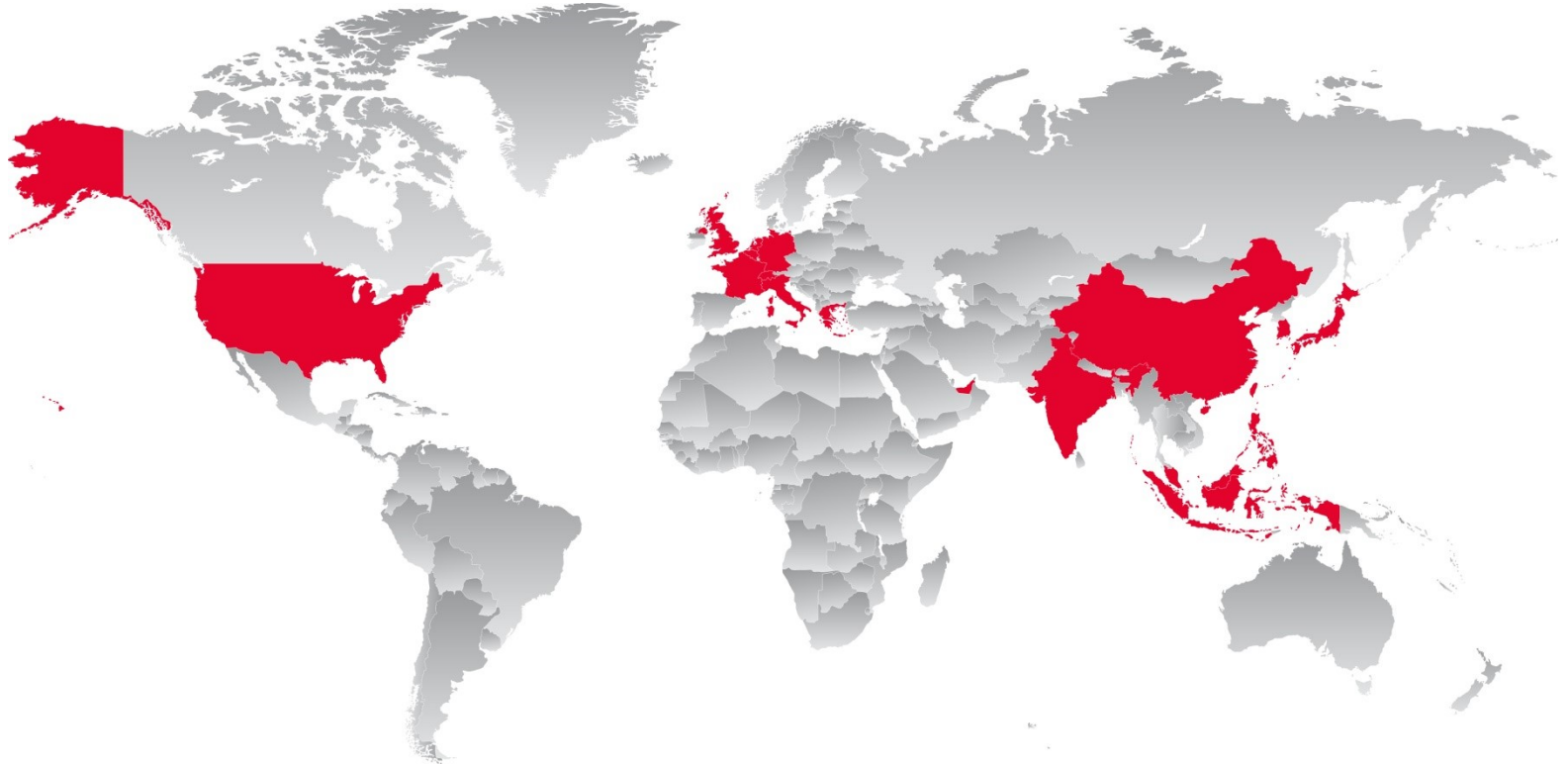


### ***To Keeping Water Pure: A Part of Your Daily Life***

*Tosoh subsidiary Organo Corporation has been an important contributor to progress in industry and daily lives since 1946. Its water treatment systems and products goes into waterworks, sewage treatment plants, power stations, pharmaceuticals manufacturing, food processing operations, information technology and electronics industries.*



# Global Presence



## **Global Solutions**

*Tosoh first ventured overseas over 50 years ago, establishing a presence in the United States in the early 1960s. Today, the Tosoh Group boasts a global network that generates a major portion of Tosoh's sales outside Japan.*



# Americas

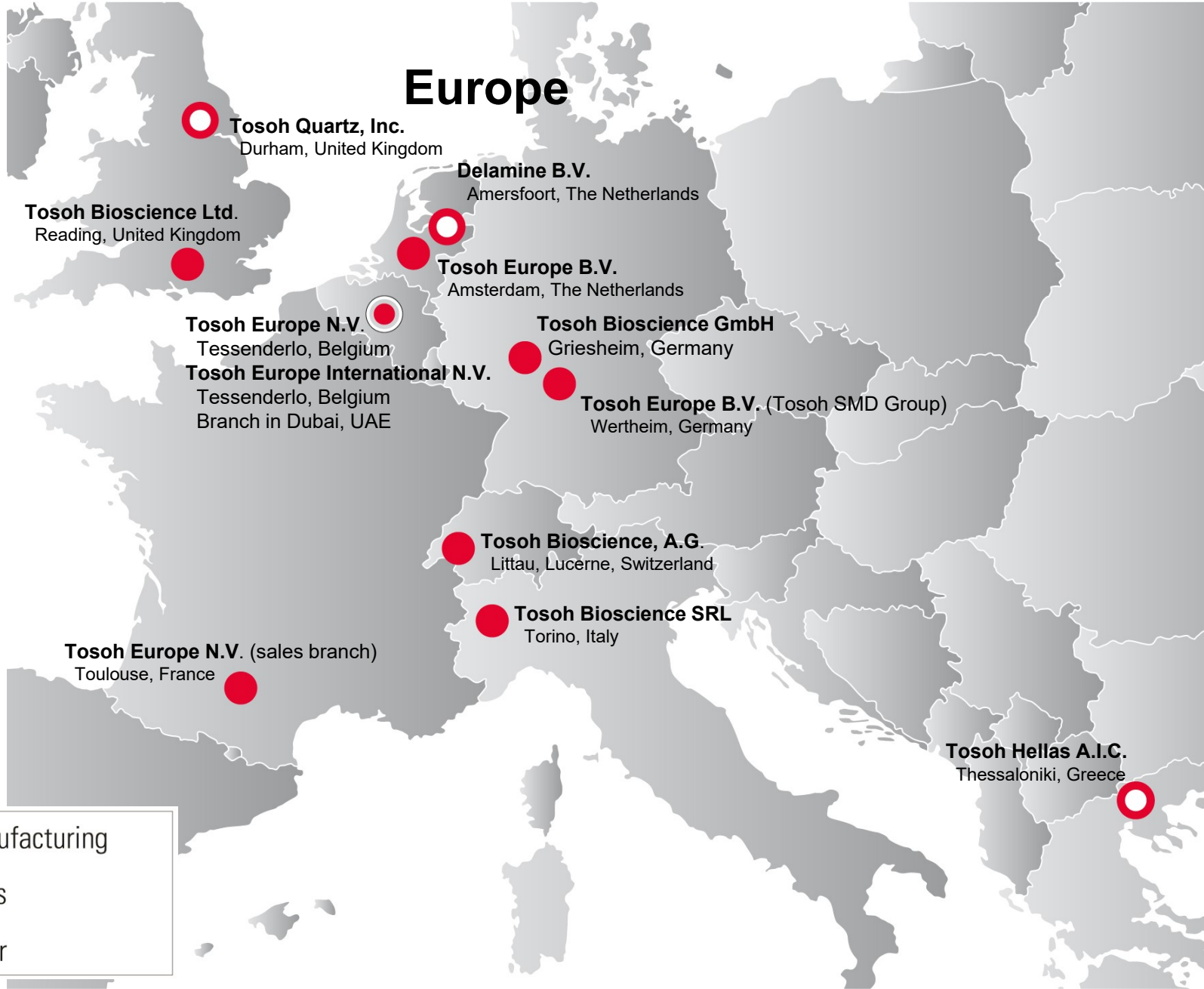


- Manufacturing
- Sales
- Other

● **Tosoh Bioscience Latin America SpA**  
(subsidiary of Tosoh Bioscience, Inc.)  
Santiago, Chile



# Europe

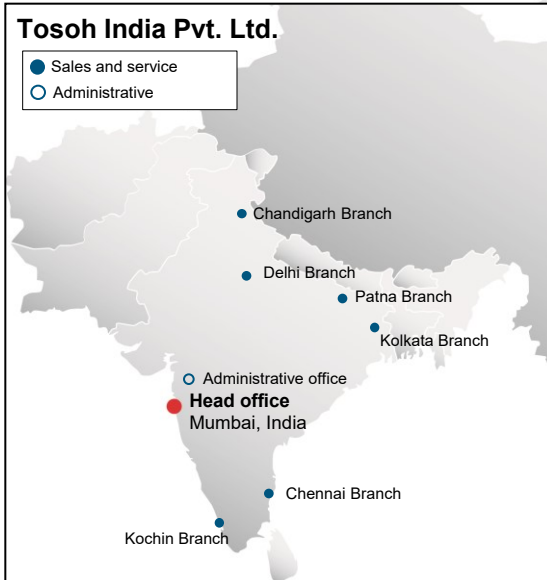


○ Manufacturing  
● Sales  
○ Other



# Southeast Asia

**Tosoh SMD Korea, Ltd.**  
Kyungki-Do, Korea



**Tosoh Quartz Co., Ltd.**  
Tainan, Taiwan

**Tosoh SMD Taiwan, Ltd.**  
Hsinchu, Taiwan

**Tosoh Quartz Co., Ltd.**  
Hsinchu, Taiwan

**Philippine Resins Industries, Inc.**  
Makati City, The Philippines

**Tosoh Polyvin Corporation**  
Batangas, The Philippines

**Mabuhay Vinyl Corporation**  
Makati City, The Philippines

**Tosoh Advanced Materials Sdn. Bhd.**  
Terengganu, Malaysia

**Other Tosoh Group Companies**

**Tosoh Asia Pte. Ltd.**  
Singapore

**Organo (Thailand) Co., Ltd.**  
**Organo (Asia) Sdn. Bhd.**

**P.T. Standard Toyo Polymer**  
Jakarta Pusat, Indonesia





# China





# Japan

## Nanyo Complex

Yamaguchi Prefecture

- Technology Center
- Inorganic Materials Research Laboratory
- Organic Materials Research Laboratory
- Yamaguchi Sales Office
- In-House Power Generation up to 776MW

## Fukuoka Branch

Fukuoka Prefecture

## Tosoh Hyuga Corporation

Miyazaki Prefecture

## Osaka Branch

Osaka Prefecture

## Yokkaichi Complex

Mie Prefecture

- Functional Polymers Research Laboratory
- Polymer Materials Research Laboratory
- In-House Power Generation up to 206 MW

## Tosoh Zeolum, Inc.

Toyama Prefecture

## Tosoh AIA, Inc.

Toyama Prefecture

## Tosoh Quartz Corporation

Yamagata Prefecture

## Tosoh SMC Corporation

Yamagata Prefecture

## Tohoku Tosoh Chemical Co., Ltd

Yamagata Prefecture

## Sendai Branch

Miyagi Prefecture

## Nagoya Branch

Aichi Prefecture

## Tosoh Corporation (Headquarters)

Tokyo

## Life Science Research Laboratory

## Advanced Materials Research Laboratory

Kanagawa Prefecture

## Polyurethane Research Laboratory

Kanagawa Prefecture

- Manufacturing
- Sales
- Other





# Global Sales and Marketing Offices



## Americas

Tosoh USA, Inc.  
*Grove City, OH, USA*

Tosoh Specialty  
Chemicals USA, Inc.  
*Alpharetta, GA, USA*

## Europe, North Africa SEA, India, Middle East

Tosoh Europe B.V.  
*Amsterdam, The Netherlands*

Tosoh Asia Pte. Ltd.  
*Singapore*

## China

Tosoh (Shanghai) Co., Ltd.



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## Additional Information

# Vinyl Isocyanate Chain

*The vinyl isocyanate chain is a fully integrated sequence of manufacturing operations that produce several key chemicals from the vinyl and isocyanate chains respectively.*

## Vinyl Chain

The vinyl chain starts with salt and naphtha. Salt is electrolyzed to yield chlorine, caustic soda and hydrogen. The naphtha steam cracking process yields ethylene, carbon monoxide and benzene. Chlorine is reacted with ethylene and hydrogen chloride (a by-product of MDI production) to produce ethylene dichloride (EDC), and the balance is used to manufacture other chlorine derivatives. Tosoh then converts EDC—which can also be combined with caustic soda to produce ethyleneamines, another major Tosoh product—to vinyl chloride monomer (VCM), which is converted into various polyvinyl chloride (PVC) resins.

## Isocyanate Chain

The naphtha-derived benzene, together with hydrogen and ammonia yields aniline, which, combined with formalin, and the vinyl chain's chlorine and carbon monoxide leads to methylene diphenyl diisocyanate (MDI), an essential raw material for polyurethanes.







# Organization

