

A large, stylized graphic of a hand holding a pen, overlaid with a red square containing the word "engage" in white lowercase letters, with a small white cross symbol to the right of the word. The background is a blurred image of a hand holding a pen, with a large white cross shape overlaid on it.

engage+

**TOSOH CORPORATION**

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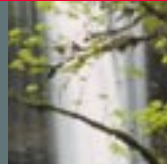
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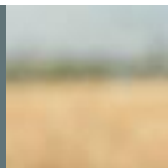
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Increasingly, we're part of your daily life.



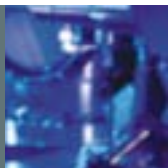
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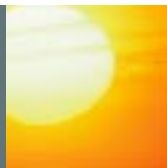
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## THE WIDE WORLD OF TOSOH

For some seven decades, Tosoh Corporation has manufactured and delivered the basic materials that a multitude of industries use to create the things that make up the modern world. Literally everything you may come into contact with on a daily basis—whether you can see it or not—is likely to be comprised of a Tosoh product in some way.

The products Tosoh makes support virtually all aspects of daily life—semiconductors, flat-panel displays, pharmaceuticals, agricultural products, food packaging materials, ingredients for cosmetics, fragrances and flavors, paints, adhesives, life-jackets, escalator handrails, oil and gas pipes, automotive-emissions control components, and much much more.

As such, our operations are truly vast. We process chemicals, cement, polyvinyl chloride, chloroprene rubber, and more—on a massive scale. We pioneer scientific and diagnostic instruments used in the medical profession to provide rapid diagnosis of life-threatening diseases such as diabetes and certain cancers. And we create products and provide services that are used to purify water, monitor the environment, and otherwise make for a cleaner planet.

Although the Tosoh name may not be a household word, we are in fact a multinational corporation with a global reach. We are comprised of more than 9000 people in more than 130 affiliates world wide, generating sales of roughly US \$3.9 billion annually. Headquartered in Tokyo, Tosoh is a comprehensive group of world-class companies located on almost every corner of the globe.



diverse

The Tosoh Group has a long list of accomplishments. We're number one in Japan in the production of caustic soda and vinyl chloride monomer (VCM), with a production capacity of over one million tons a year for each. Our main plant is nothing less than a self-contained city, with its own electricity generating power plant and its own port and shipping facilities. Dedicated Tosoh ships and trucks guarantee a distribution line of the utmost efficiency and reliability.

On the global stage, Tosoh has the world's largest production capacity of high-purity zirconia powders and electrolytic manganese dioxide (EMD), with around 20-percent of the market for alkaline dry cell batteries. We're a leader in key commodity markets in the Asia Pacific region. And we're a top worldwide producer of quartzware and sputtering targets.

Tosoh is a model of environmental responsibility, too. All Tosoh manufacturing sites in Japan have been awarded ISO 14001 certification for environmental management, and 100% of the products we create adhere to ISO 9000-series International Standards for quality assurance.

At Tosoh, we go to great lengths to meet the demands of the marketplace, and our clients appreciate the level of personalized service Tosoh is able to provide. **We'd like for you to get to know more about the Tosoh Group of companies.**



## PEOPLE MAKING A DIFFERENCE

Tosoh is comprised of a global collective of the world's finest minds. They come from many cultures, and have a variety of ethnic backgrounds. They are focused on Tosoh's vision of making the world a better place to live.

And since Tosoh provides so many important products and services that literally touch the daily lives of people the world over, each Tosoh staff member is inspired to contribute in his or her own unique way.

That may mean an analytical chemist making the next big breakthrough in our Tokyo Research Laboratory. Or it may mean a plant operator creating new production efficiencies at our Merak Plant in Indonesia. Or it may mean a quality assurance specialist raising the standards a level higher in Greece.

Conscientious actions such as these, and many more, combine to make a profound and positive contribution to the world in which we live. **Every single day.**

cultural<sup>+</sup>

Tosoh's people come from many cultures and have a variety of ethnic backgrounds.



## OUR INTERNATIONAL RESPONSIBILITIES

Tosoh first ventured overseas about 40 years ago, establishing a presence in the United States in the early 1960s. Now we have a global presence and reach. Over 25% of our sales are from abroad, and that figure continues to increase.

The Tosoh Group is comprised of more than 130 affiliates that call all the major centers of Europe, Asia, North America and of course Japan home. One of our key business initiatives is known as "Global Focus." As part of this, Tosoh Bioscience companies are able to promote life-science technologies for the medical market throughout the world.

International expertise is an integral part of the Tosoh makeup. We operate in a way that lets us apply knowledge from one part of the world to another. We go to great lengths to become an organic part of each local area in which we operate. We find this helps us stay competitive in a rapidly changing global economy. And provide for a better quality of life for our personnel and local communities.

**We take these responsibilities very seriously.**



We go to great lengths to become an organic part of each local area in which we operate.





## TOWARDS A **CLEANER** WAY OF LIFE

A large part of Tosoh's operations are directly related to the environment. As such, we recognize it as our moral imperative to take a leadership role in thoughts, actions and processes designed to ensure that the Group's growth is in harmony with—and proper respect of—planet Earth.

From product development through to waste processing, we put our considerable expertise and advanced technologies to work to ensure efficient use of resources, maximum safety, and minimum environmental impact—and recycling wastes into new materials wherever possible. Tosoh also excels in the research, development and production of analytical scientific instruments and services designed to monitor the environment, purify contaminated water supplies, and more.

Our recycling program contributes to the disposal of municipal waste, accepting from external sources waste materials such as used tires and refuse-derived fuel (RDF). We conduct regular environmental, health, and safety audits, and foster understanding within the corporate group and local communities.

Tosoh's aggregate capital expenditures for environmental, health, and safety projects since fiscal 1996 are now over ¥15 billion. We want future generations to be able to enjoy a cleaner place to live. We're not only doing our part, we're sharing our considerable discoveries.



respect

### Taking Responsibility

Environmental concerns are at the forefront of Tosoh Group's corporate activities. In Japan, Tosoh has been a member of the Japan Responsible Care Council since 1995. We've implemented a number of voluntary programs aimed at improving our manufacturing processes and operations, and all Tosoh facilities in Japan have been awarded ISO 14001 certification for environmental management. We've initiated a set of Guiding Principles on the Environment, Safety, and Health, which form the three pillars of Tosoh's corporate policy.

#### Environmental Protection

- Preserve and efficiently utilize resources
- Reduce harmful emissions

#### Safety & Health

- Prevent accidents and harmful incidents
- Quicken emergency response

#### Product Stewardship

- Design products and develop production processes that take into consideration environment, safety, and health issues
- Pre-assess systems for new products and production processes
- Assure product liability through quality control



## THE SEARCH FOR **A BETTER WAY**

Inspiration leads us to the farthest reaches of technology. Tosoh's research and development activities have been the driving force of growth throughout the company's history. Our research and development department maximizes its core strengths and maintains close relationships among sales and production entities.

Tosoh's R&D encompasses a wide variety of products and services designed to cause minimal environmental impact. We pursue progressive research by participating in Japanese national research projects, and in joint research with end-users and other companies.

Our R&D operations are vast. We are continuously striving to improve product development and are seeking new applications and peripheral products for our basic, petrochemical, and specialty businesses.

Tosoh conducts both academic and commercial research in biotechnology, scientific instrumentation, and advanced electronic materials. We are conducting basic and applied research for our fine chemicals, basic chemicals and specialty materials.

**At Tosoh, we're looking for a better way to make great things happen.**



invent<sup>+</sup>

Tosoh's research and development activities have been the driving force of growth throughout the company's history.



## PETROCHEMICAL GROUP

### The Essentials of Daily Life

Petrochemical products play an increasingly important role in our daily lives, used for such essentials as medicine and clothing, TV and radio components, automobile parts, building materials, paints, and much more. Petrochemical products will play an important role in the advancement of industrial and cutting-edge technologies.

As the range of applications expands, we are likely to see even greater changes and benefits in our daily lives. Tosoh is committed to nurturing new and better concepts for the development of petrochemical products and applications.

A close-up photograph of a woman with dark hair and eyes closed, kissing a baby on the cheek. The baby is looking towards the camera. The image is partially obscured by a large white graphic element that contains the 'nurture+' logo.

nurture<sup>+</sup>

Tosoh is committed to nurturing new and better concepts for the development of petrochemical products and applications.



## OLEFINS—ESSENTIALS FOR LIVING

Olefins, used in a wide variety of end-use applications such as electronic products, cosmetics, and rubber goods, are an invisible yet essential part of our everyday life. Tosoh is a fully integrated manufacturer of olefin products and derivatives. We offer a wide and comprehensive range of hydrocarbon-based products and derivatives, such as ethylene, propylene, cumene, and a host of other upstream and downstream products.



### ETHYLENE

Ethylene is one of Tosoh's core products. It is the basic feedstock for a vast array of petrochemical products such as a variety of polyolefin resins, which have a multitude of end applications. Tosoh's ethylene plant has adopted Lummus Crest technology and is operated by an advanced, highly-integrated computer network to ensure optimum efficiency.

### PROPYLENE

Propylene is an essential ingredient in the production of polypropylene, cumene and OXO process alcohol.

### C4 FRACTION

Tosoh relies solely upon its own C4 fraction and butadiene supply for the production of SKYPRENE®, a premium quality chloroprene rubber. A wide variety of other C4 hydrocarbons, such as butylene and butane can be extracted as well.

### CUMENE

Cumene, a propylene derivative, is produced by UOP process technology and is used for the production of phenol, a key ingredient for the production of phenolic resins, polycarbonate resins and epoxy resins.

### AROMATIC COMPOUNDS

*Benzene, Toluene, and Xylene (BTX)*

Using Lummus hydrogenation technology and a distillation process developed by ARCO together with UOP's aromatic extraction process, Tosoh's aromatics plant has become a significant producer of benzene, xylene, and toluene. From these aromatic compounds (BTX) are derived a wide variety of products, ranging from cosmetics, flavors and fragrances, to many types of household products.

To meet the ever-growing demand for polyethylene, Tosoh is offering products of consistent and stable quality. Tosoh is pioneering products and applications for an array of emerging needs. Polyethylene has become an integral part of our daily lives. From food packaging to products used in agriculture, engineering, fishing, distribution and other industries, it is an indispensable material for the modern world.



## NIPOFLEX®

### *Ethylene vinyl acetate copolymer*

Having outstanding clarity, gloss and weather resistance, our Nipoflex® resins offer flexibility over wide temperature ranges, as well as high-impact strength, elasticity and resistance to flex and environmental stress cracking.

## NIPOLON®, NIPOLON®-L, NIPOLON®-Z

- Low-density polyethylene (Nipolon®)
- Linear low-density polyethylene (Nipolon®-L, Nipolon®-Z)
- Ultra low-density polyethylene (LUMITAC®)

These resins are noted for their superior elasticity, transparency, shock resistance and processing characteristics.

## NIPOLON® HARD

### *High-density polyethylene*

Nipolon® Hard is often selected for its high tensile strength, hardness and excellent processing characteristics.

## MELTHENE®-M

### *Adhesive polymer*

Melthene®-M offers excellent adhesion with most substrates, without the use of solvents.

## MELTHENE®-H

### *Adhesive polymer*

Melthene®-H is saponified ethylene vinyl acetate copolymer, having weather resistance and excellent adhesion to various substrates.

## MELTHENE®-G

### *Adhesive polymer*

Melthene®-G is a modified EVA for use as an adhesive for lamination. It excels in its adhesive properties to a wide variety of materials and easy processing ability.

## SYNTHETIC RUBBER

## SKYPRENE®

### *Chloroprene rubber*

SKYPRENE® chloroprene rubber is often specified by design engineers because of superior properties, such as resistance to cold, heat, abrasion, ozone, oils, and chemicals.

## TOSO-CSM®

### *Chlorosulphonated polyethylene (CSM)*

TOSO-CSM® is produced from polyethylene by chlorination and chlorosulphonation with chlorine and sulphur dioxide gas. Various types of TOSO-CSM® are obtained according to the degree of chlorination and chlorosulphonation as well as the sort of polyethylene polymer. This product has excellent resistance against ozone, weather, oil, and chemicals. It can also be coloured in brilliant shades.

## extos®

extos®, a high performance grade of TOSO-CSM®, has excellent dynamic and low temperature properties besides the features of conventional chlorosulphonated polyethylene.

## RYURON®

### *Polyvinyl chloride paste*

Ryuron® paste is a PVC dispersion resin developed by Tosoh, based upon a seed micro-suspension polymerization process. PVC paste, designed to improve processing, has resulted in superior finished products.

## POLYPHENYLENE SULFIDE (PPS) RESINS

PPS is a unique engineering plastic material that combines many of the best properties of plastics and metals. It has a high temperature resistance, exceptional chemical resistance, inherent flame resistance UL 94V-0, superior electrical properties and outstanding precision moldability and dimensional stability.

## PETCOAL®

### *C9 Hydrocarbon resins*

Petcoal® is a family of aromatic hydrocarbon resins, which exhibit excellent solvency. These resins are compatible with a wide range of synthetic resins and rubbers. They have good thermal stability and weathering properties.



## BASIC GROUP

### Efficient Production Technology

Tosoh was founded in 1935 as a supplier of soda ash, and has since grown steadily to achieve its status as Japan's largest producer of caustic soda. Tosoh uses its superior process technologies and economies of scale to realize a true competitive advantage that can be passed on to customers.

A unique oxychlorination process has also allowed Tosoh to maintain the largest production capacity of vinyl chloride monomer (VCM) in Japan—over one million tons a year. Cement products demonstrate Tosoh's efforts in efficiency and waste-recycling. Ashes from the coal used to fire our boilers are recycled as a raw material in the production of cement. Tosoh is continuously striving to integrate the latest technologies into their already capable and proficient production systems.



value+

Tosoh uses its superior process technologies and economies of scale to realize a true competitive advantage that can be passed on to customers.

## CHLOR-ALKALI

### —A SUPPLY COMMITMENT TO MAJOR BASIC INDUSTRIES

A major producer of chlorine and caustic soda, Tosoh is constantly improving the quality of its products to the highest level. Operating one of the largest fully integrated chlor-alkali plants in Asia means Tosoh is among the most competitive suppliers of vinyl chloride monomer (VCM). This has positioned Tosoh as a major player and serves as the basis for continuous development of global markets. Tosoh will move forward in setting world standards for chlor-alkali supply and product innovation.



#### CAUSTIC SODA

Tosoh is Japan's largest producer of caustic soda. The latest ion exchange membrane technology featuring our proprietary BiTAC® bipolar membrane electrolyzer is employed in the manufacture of this vital basic chemical.

#### SODA ASH

Tosoh has produced soda ash since 1936 while continuously improving its process technology. In 1992, seeking to broaden its activities worldwide, Tosoh purchased equity interest in General Chemical Soda Ash Partners (GCSAP), one of North America's leading soda ash producers. In September 1996, the production of synthetic soda ash at the Nanyo Complex was ceased, and simultaneously marketing and sales of natural soda ash produced by GCSAP began.

#### VINYL CHLORIDE MONOMER (VCM)

Developed by Tosoh researchers, our unique oxychlorination process has allowed Tosoh to maintain the largest production capacity of VCM in Japan.

#### NICLON®

##### *Calcium hypochlorite*

Niclon® is typically used for sterilizing and disinfecting swimming pools and drinking water, and is also used in sewage treatment systems.

#### SODIUM BICARBONATE

Sodium bicarbonate is widely used in food products, animal feeds, bath additives, pharmaceuticals and fire extinguishers.

#### OTHERS

- Fused (magnesium) phosphate
- Calcium Silicate
- Calcium carbonate
- Calcium oxide (Quicklime)
- Calcium hydroxide (Hydrated Lime)
- Liquid chloride
- Hydrochloric acid
- Poly aluminum chloride
- Ferric chloride solution
- Sodium hypochlorite
- Calcium chloride
- Sodium sulfate
- Mixed fertilizers
- Magnesia fertilizer
- Limestone
- Phosphoric acid

## CEMENT

### —EFFICIENT PRODUCTION TECHNOLOGY

Tosoh began cement production in 1953. The idea of producing cement at a soda production plant using an ammonia soda process seemed both logical and economical. It also illustrates Tosoh's rational and efficient use of raw materials. Tosoh's Nanyo Complex produces a large amount of in-house generated electric power for production purposes. Ashes from the boilers of our co-generation power facility are recycled and used for the production of cement. The marketing and sale of Tosoh's entire cement production has been consigned to Taiheiyo Cement Corporation, one of Japan's leading cement manufacturers.



#### PRODUCTS:

- Ordinary portland cement
- Portland fly-ash cement
- Portland blast-furnace slag cement



## SPECIALTY GROUP

### Searching for More Useful Products

Comprised of four divisions—Organic Chemicals, Scientific Instruments, Specialty Materials, and Electronic Materials—Tosoh's specialty group consistently meets the highest standards of quality. They make products that are used worldwide in a variety of niche applications and deliver high value that customers can rely on.

In its constant pursuit of technical innovation and highest quality, the rapidly expanding Specialty Group supplies the semiconductor, pharmaceutical, medical and food industries.

Tosoh has developed proprietary expertise and has gained the technical knowledge required to pursue further growth in these speciality divisions. Moreover, Tosoh often wins acclaim for its achievements in the field of scientific instrumentation—from academia as well as government and scientific institutions.

search 

Each specialty group division is in pursuit of technical innovation and the highest quality.

# ORGANIC CHEMICALS

## —THE NEVER-ENDING SEARCH FOR GREAT NEW PRODUCTS

Tosoh focuses much attention on the development of value-added fine chemicals. We supply a broad range of fine chemicals for numerous applications, including pharmaceuticals, agrochemicals, electronics, organo-metallic catalysts, fragrances and flavors, urethane polymers and specialty coatings.

Tosoh's Organic Chemicals commands the largest share in the Asian market for ethylene amines and their derivatives and is a leading domestic producer of bromine, flame retardants, and industrial cleaning solvents.



EDA	Ethylene diamine	PEHA	Pentaethylene hexamine
DETA	Diethylene triamine	AEP	N-Aminoethyl piperazine
TETA	Triethylene tetramine	P	Piperazine
TEPA	Tetraethylene pentamine		

### ETHYLENE AMINES & DERIVATIVES (TEDA® & TOYOCAT®)

The most internationally sold chemicals among Tosoh's products. These products are stocked all over the world, allowing us to promptly respond to customers' requests. Sales offices are located in Japan, the Netherlands, the United States, and Singapore.

#### • ETHYLENE AMINES

Tosoh's continuous development and improvement of the EDC process has led to impressive product quality and reliability. Our technology has proven to be truly competitive in many fields for extremely diversified applications. Tosoh can produce other polyamines upon request.

*\*Delamine B.V., a Dutch joint venture with Akzo Nobel, produces the same product line.*

#### • TEDA® & TOYOCAT®

##### *Polyurethane catalysts*

TEDA® Triethylenediamine, also called 1,4-Diazabicyclo [2.2.2] octane, is a solid, white and crystalline tertiary amine compound. TEDA® is extensively used as a catalyst to promote both gelling and blowing activities in the production of flexible, semi-rigid and rigid polyurethane foams, as well as elastomers.

TOYOCAT® is the trade name of Tosoh's specialty tertiary amine catalyst for polyurethane foams. A broad range of TOYOCAT® grades are available, such as conventional catalysts, reactive catalysts, acid-blocked catalysts and trimerization catalysts. Customized grades are available to meet the special requirements of a wide variety of industries and applications.

#### OTHERS

- Chelating agents (TS-500)
- High-Purity ethylene dichloride

### ORGANIC INTERMEDIATES

#### *Multi-purpose organic-synthesis*

Since 1980 Tosoh has been producing halogenated intermediates, particularly bromine compounds, which are important intermediate materials for a wide variety of chemicals such as pharmaceuticals, and electronics. Today, Tosoh is Japan's top bromine manufacturer, and its halogenated intermediates are widely accepted in both domestic and foreign markets.

Tosoh is strengthening its presence in the custom synthesis business. Three Tosoh Group companies are creating synergies in organic synthesis technology aimed at bolstering its position in the high-growth markets for pharmaceuticals and specialty products geared to electronic materials. Tosoh Finechem Corporation possesses a low-temperature reaction technology using organometallic syntheses. Tosoh Organic Chemical Co., Ltd. possesses specialized technologies used in halogenation, especially in bromination and chlorination. Tosoh F-Tech, Inc., has developed a special fluorination technology.

#### *A Fully-Integrated Manufacturer of Organic Intermediates*

Cl, HCl and Br, HBr, from raw materials to end products

- Mono Bromo Alkanes
- Dibromo & Bromochloro Alkanes
- Halo Aromatics
- Mono Chloro Alkanes
- Halo Carboxylic Acids & Esters
- Halo Alkyl Amines
- Resist Monomer for Electronic Devices:
  - p-tert-butoxystyrene
- Piperazine Derivatives
- Benzaldehydes & Derivatives



## FLAME RETARDANTS

### • FLAMECUT® 110R,120G

Tetrabromobisphenol-A (TBA)...120G  
 TBA-Bis (2,3-dibromo-propyl ether)...121K  
 Decarbromodiphenyl oxide...110R  
 Our flame-retardant additives transform regular plastics into thermo and flame resistant plastics.

### • FINEMAG® SN, MO

#### *Inorganic flame retardants*

FINEMAG® SN is an amazing composite magnesium hydroxide with a higher catalytic effect than FINEMAG® MO. Produced using a unique technology, it demonstrates highly improved acid resistance and can be used in smaller amounts, proving itself to have better flame retardancy than conventional high quality magnesium hydroxide.

FINEMAG® MO is an inorganic flame retardant developed to reduce the smoke and toxic gases generated in a fire.

### SPINOMAR® NaSS

SPINOMAR® NaSS is widely used in dye improving agents for acrylic and polyester fibers, reactive emulsifiers for water-borne coatings and anti-static agents for textiles, plastics, and paper.

### BROMINE

Tosoh is Japan's top bromine manufacturer. Bromine is an indispensable raw material for inorganic pharmaceuticals, photosensitive materials, dyes, and medicines.

### HYDROBROMIC ACID

Due to high reactivity and unique physical properties, our hydrobromic acid is an indispensable raw material for organic intermediates, inorganic pharmaceuticals, photosensitive materials, dyes, medicines, and other applications, including lithium bromide and the catalyst for producing terephthalic acid.

## SOLVENTS

The HC series of solvents are hydrocarbon-based, derived from the aqueous solvent originally developed by Tosoh. It is based on Tosoh's original cleaning technology with 1,1,1-Trichloroethane (Toyoclean) refined over many years. Available for a wide range of cleaning requirements in the fields of metal processing, electronics, and electrical machinery.

### BENZYL ALCOHOL

Main applications for benzyl alcohol include auxiliary for color photography developers, solvent for paints and inks, dye assist for synthetic fibers, and retention agent for perfumery compounds materials.

### ASPARTAME

Two hundred times sweeter than natural sugar, Aspartame is the most widely used intense sweetener in the world. Tosoh, in a joint venture with DSM, has a unique enzymatic technology and world-class plant in the Netherlands. Aspartame is widely used in beverages, dairy products, frozen desserts and a host of other foods.

## SPECIALTY MATERIALS —WORKING TOGETHER TO BRING YOU THE BEST

By offering innovative products and applications that satisfy our customers' demands, we have been elevated to one of the world's leading manufacturers of advanced materials and electronics products—supplying the most widely known producers of consumer, industrial, and high-technology goods. Whether you need zirconia powders, electrolytic manganese dioxide, or other specialty materials, Tosoh is ready to meet your business needs.



### YTTRIA-STABILIZED ZIRCONIA POWDERS

Tosoh is the world's largest supplier of yttria-stabilized powders, which it produces through a hydrolysis process. This process ensures a uniform dispersion of yttria. Tosoh zirconia powders are known for being high purity, high quality products. Because of its superior mechanical properties, high fracture strength and resistance to abrasion, as well as smooth finish, zirconia is now widely used in many applications, from machine parts, electronic parts and tools, to optical fiber connector parts and watch cases.

### ZIRCONIA CERAMICS AND INJECTION MOLDED COMPONENTS

Tosoh is a recognized pioneer in the field of advanced ceramic materials. Utilizing its strength as the world's largest producer of high-purity zirconia powders and a leader in injection molding technology, Tosoh has commercialized a variety of new ceramic products such as ferrules for optical connector parts, precision tools, and electrically insulated tools.

### ZIRCONIA COMPOUNDS FOR INJECTION MOLDING

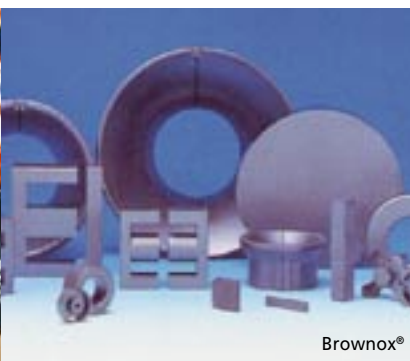
Tosoh, with over a decade of experience in the production of zirconia for parts and components, also is able to bring expertise as a large manufacturer to the production of other ceramic compounds. Tosoh is therefore able to produce other compounds on the request of customers.

### YTZ® GRINDING MEDIA

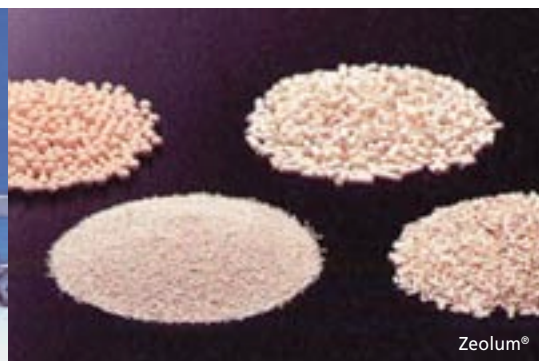
In cooperation with Nikkato Corporation, Tosoh markets a top-of-the-line yttria-stabilized zirconia grinding media that offers ultra high grinding efficiency without product contamination. Applications include piezoelectric and dielectric materials, ceramics and minerals, pigments and paints, magnetic materials, and pharmaceuticals.



Batteries



Brownox®



Zeolum®

### ELECTROLYTIC MANGANESE DIOXIDE (EMD)

Tosoh has the largest battery-grade EMD capacity in the world. With manufacturing facilities in Japan and Greece, Tosoh is able to meet the most demanding requirements of our customers. EMD is used in the production of dry cells and soft ferrites.

### BROWNNOX®



Widely regarded for their consistent purity and particle size, these highly-purified reactive compounds are in growing demand for ferrite and thermistor applications.

### ZEOLUM®

#### *Zeolite molecular sieves*

Zeolum® is a synthetic zeolite possessing strong selective adsorption properties. It is suitable for drying, purifying and separating a wider variety of feeds than any other adsorbent. Common uses of Zeolum® are the separation of nitrogen and oxygen from air, PSA systems, the removal of carbon dioxide and moisture from air, and the drying of naphtha cracked gas and organic solutions. Zeolum is also used for the drying and purification of refrigerants, prevention of cloudiness in multilayer glass, and the removal of trace moisture from urethane paints and sealants.

### HSZ®-SERIES

#### *Zeolite for catalysts*

HSZ®-series are high-silica zeolites with higher  $\text{SiO}_2/\text{Al}_2\text{O}_3$  mol ratios than zeolite molecular sieves. The HSZ®-series have high thermal and acid stability, making them useful in catalysts; as petroleum refining catalysts-hydrocracking, isomerization, and dewaxing; petrochemical catalyst (alkylation, isomerization) and absorbent applications; VOC removal and HC automobiles.

### TOYOBUILDER®

#### *Zeolite builder*

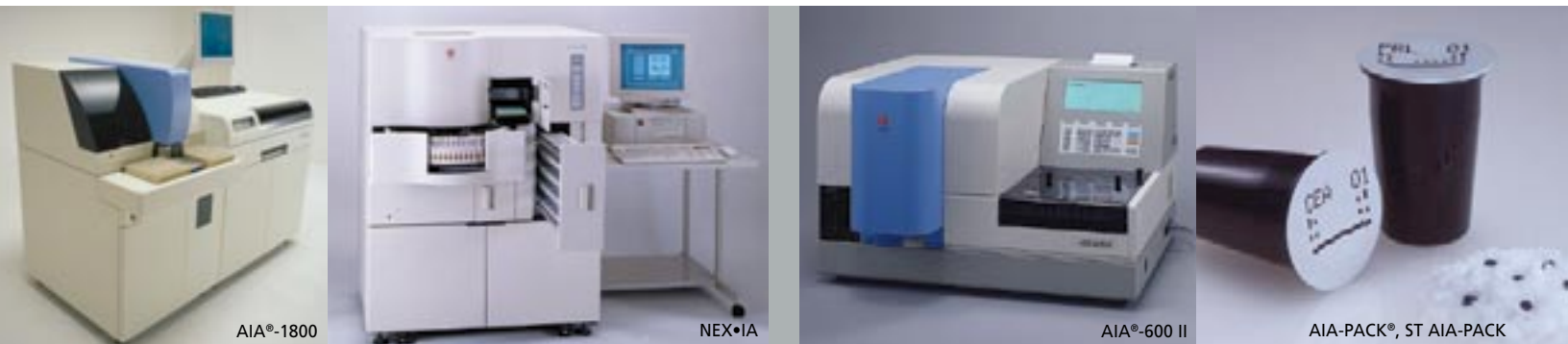
Toyobuilder® is a high-purity 4A type zeolite and is used as a detergent builder. Detergent manufacturers often select Toyobuilder® for its outstanding properties such as high ion-exchange capacity and speed, uniform particle size distribution, spherical particle shape, and excellent flow characteristics.

## SCIENTIFIC AND DIAGNOSTIC INSTRUMENTS AND SYSTEMS —SERVING INDUSTRY AND SCIENCE THE WORLD OVER

Tosoh is a world leader in the development and production of High-Performance Liquid Chromatography (HPLC) systems and packing materials. TSK-GEL®, a column packing for HPLC systems, was developed in 1971. This product and a wide range of companion materials have since become well established in world markets and are used for the most demanding separation applications.

Tosoh has also become an internationally recognized pioneer in the introduction of highly-sophisticated diagnostic systems. Often winning acclaim for its scientific achievement from academia as well as government and scientific institutions, Tosoh and its researchers are responding to some of society's more crucial needs. Fully automated systems incorporate the latest immunoassay technologies and are utilized for rapid diagnosis of life-threatening diseases such as diabetes and certain cancers.

These and a wide array of other Tosoh life-science technologies have been introduced and are being vigorously promoted throughout the world by Tosoh Bioscience companies.



### AIA® - 1800

*The newest fully-automated random-access enzyme immunoassay system*

The AIA®-1800 is the successor to the highly acclaimed AIA®-21 series. The AIA®-1800 alone provides continuous random access, full automation, full STAT capability, high throughput, operational simplicity, and an unprecedented degree of flexibility as a complete full featured platform. Designed under Open-LA21 standardization, the AIA®-1800 is compatible for creating highly-integrated laboratory automation systems.

### AIA®-21 / AIA®NEX•IA SERIES

*Fully-automated random-access enzyme immunoassay system*

The AIA®-21 / AIA®Nex•IA alone provides continuous random access, full automation, full STAT capability, high throughput, compact size, operational simplicity, and an unprecedented degree of flexibility as a complete full-featured platform. With three sample loading options, the AIA®-21 / AIA®Nex•IA can accommodate moderate, high-volume and TLA testing environments.

### AIA®- 600 II

*Automated immunoassay analyzer*

The AIA®-600 II is an immunoassay automated analyzer that builds on the proven reliability of Tosoh's original AIA®-600. It is equipped with advanced functions such as STAT assay results (in 18 minutes), primary tube sampling, and automated sample dilution and pretreatment. The AIA®-600 II is a full-featured compact system, offering all the automation, power and performance of a large system in a compact, benchtop design.

### AIA-PACK®, ST AIA-PACK

*Reagent system*

Tosoh's AIA-PACK® test cup technology will delight those charged with maintaining lab efficiency and productivity. These tiny, pre-measured, pre-packaged and labeled test cups eliminate human error, greatly minimize waste and save operator time. Quality reagents and automated procedures are the basis for the consistent performance of our AIA systems. Moreover the proven AIA-PACK®, ST AIA-PACK® used with the AIA®-21 / AIA®Nex•IA and AIA®-600 II allows short assay time for every test. The ST AIA-PACK® shows the same performance as the AIA-PACK® with ten-minute reaction time.



### HLC®-723G7

#### *Automated glycohemoglobin analyzer*

GHb (glycohemoglobin) is grouped into A1a, A1b and A1c categories according to the kind of glucose combined. Measurement of GHb is widely utilized today as an index for diabetic screening tests and also as a therapeutic index for the long-term blood glucose control of diabetes mellitus. Tosoh's fifth generation model (HLC-723GHbV) achieved complete separation of labile A1c from stable A1c on the chromatogram for the first time and also minimized interference from variant hemoglobin in three minutes of Variant Mode analysis. The new HLC-723G7 has even higher resolution and faster result reporting capabilities.

### IC-2001

#### *Ion chromatography*

The IC-2001 is a compact, full-function ion chromatography system with auto sampling on board that makes use of Tosoh's proprietary suppressor technology. With a new design and the latest high-performance separation columns, the IC-2001 provides high sensitivity anion and cation measurement that is simple and accurate.

### HLC®-SERIES

#### *High-performance liquid chromatography systems*

- **HLC®-8220GPC**

A fully-automated liquid chromatography system for gel permeation chromatography, the HLC-8220GPC combines a dual solvent delivery system and a highly efficient optical system, which reduces baseline noise to a very low level.

- **HLC-8121GPC/HT**

HLC-8121GPC/HT is a superior high-temperature GPC system designed and developed for extraordinary reliability, safety, high sensitivity, and fast start-up time.

### CCP® & 8020 SERIES

#### *High-performance liquid chromatography*

CCP® (computer controlled pump) provides both automatic self-optimization of minimum pulse flow as well as automatic compensation of liquid compression ratio. The Tosoh 8020 series consists of a highly sensitive and stable detector, data processor, and accessories.

### TOYOPEARL®

#### *Packing materials for medium-pressure liquid chromatography*

A totally porous, rigid spherical gel, TOYOPEARL® can be applied at high flow rates. It is most suitable for preparative separation and scaled-up industrial purification processes, and is widely used for purifying and separating biopolymers and other biochemicals.

### TSK-GEL®

#### *Packing materials and packed columns for high-performance liquid chromatography*

Extensively used in laboratories all over the world, our TSK-GEL® is designed for researchers seeking the highest level of performance. Covering the total range of HPLC, this product is made from small, spherical particles and offers high-resolution (even at high flow rates), and excellent reproducibility and long column life. Scaling up from analytical to preparative columns is made simple and easy.

## ELECTRONIC MATERIALS —ENABLING THE TECHNOLOGIES OF THE FUTURE

Tosoh brings its broad range of materials expertise to bear on the development of new products and solutions for semiconductor, flat-panel display, and materials markets worldwide. An integrated quartz (silica glass) business covers all major geographical markets and supplies global semiconductor and optical markets. The thin film materials business (sputtering targets) includes the manufacture and sale of a wide range of high purity deposition materials as well as PVD, CVD, etch and CMP Process Kit Management™ services. Through constant innovation made possible by development capability, Tosoh will provide the materials to enable the technologies of the future.



Material	Description
N	Fused from the internationally recognized Iota powder with oxy-hydrogen flames, resulting in low bubble content. A high-purity "NP" grade and a window-specific "OZ" grade are also available.
OP	Fused opaque quartz has excellent IR heat blocking characteristics. A tight distribution of very small bubbles produces a dense pure-white opaque material and subsequently excellent achievable surface finishes. OP fused from a higher-purity raw material is also available.
Synthetic	A high-grade synthetic silica "ES" grade with virtually no bubbles or inclusions, extreme high-purity, and excellent ultraviolet transmission. The "ED" grade manufactured by VAD process and a low-OH type variation called "ED-C" are also available.

### QUARTZ MATERIALS

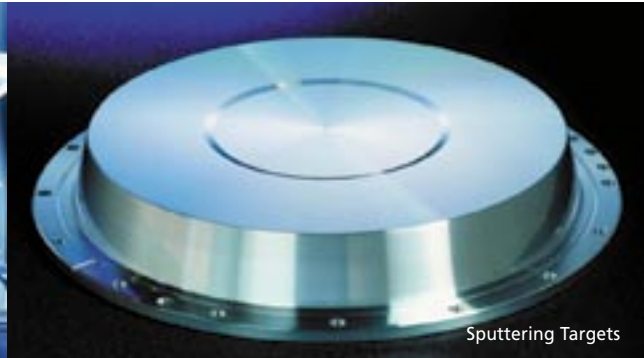
Based on over 60 years of experience and the highly competitive utility cost of the Tosoh Nanyo Complex, quartz materials production is excelling in quality and cost. Introduction of near net shape technology is just one example of our leading technological edge. Tosoh is also one of the few suppliers lining up transparent and opaque, natural and synthetic, and flame as well as electrically fused quartz materials.

### MACHINED QUARTZWARE

Machining facilities positioned at multiple locations provide for a reliable high-volume supply of machine quartz parts. Facility locations and integration combined with material supply maximizes a continuous and stable production of high-precision parts. The Tosoh Quartz Group has invested heavily in state-of-the-art machining centers in order to assure sufficient capacity under fluctuating business cycles. The recent equipment and the understanding of the materials as well as the fabrication processes, result in optimized machining.

### FABRICATED QUARTZWARE

Tosoh retains a global network of quartz fabrication facilities that provide customers with a uniform high-quality supply of products. The Tosoh Quartz Group has achieved a leading position in its field, bringing the art of quartz glassblowing to a new industrial and technological high. Cutting-edge technology, stringent quality control, and engineering support to improve our customers' bottom lines, are just some of the characteristics which make the Tosoh Quartz Group unique.



Sputtering Targets

### SPUTTERING TARGETS

Produced at our operating bases in Japan, United States, and Korea, Tosoh's sputtering targets are available in a variety of high-purity metals, metal alloys, cermet and ceramic compositions. Targets can be made in all shapes, sizes and purity levels to meet design specifications. Tosoh's sputtering targets are used for the production of semiconductors, magnetic recording media (rigid disks, rewritable-optical disks), recording heads, thermal print heads, flat-panel displays and thin-film resistors.

### PROCESS KIT MANAGEMENT™

Tosoh's wholly owned subsidiary, Tosoh SET, specializes in PVD/CVD & CMP Kit refurbishment for the semiconductor industry. The TSET Process Kit Management™ program combines parts cleaning with mechanical inspection, advanced surface treatment and parts replacement. Assembling all components into one kit box significantly reduces material management for Tosoh SET customers around the world.

- ITO
- Cr
- Co-Ni-Cr
- Co-Nb-Zr
- ZAO
- Ni-Cr-Si
- Cr-Si
- Al
- ZnS-SiO<sub>2</sub>
- SiO<sub>2</sub>
- Al-Cu
- Al-Si
- Al-Si-Cu
- C
- Ta
- TaSi<sub>2</sub>
- W
- WSi<sub>2</sub>
- Ti
- Ti-W
- Others



## SERVICE GROUP

Tosoh is dedicated to providing customers with the most effective and reliable products and services in the industry. We maintain a fleet of trucks, even our own ships, to guarantee state-of-the-art in quality distribution and logistics. The Service Group is an alliance of subsidiaries and affiliates that provides the critical support Tosoh relies upon to operate cost-efficiently and deliver the company's comprehensive products in a timely manner. Below are three Tosoh companies within the Service Group.

**Tosoh Analysis and Research Center Co., Ltd.**

Provides comprehensive services in the fields of materials analysis, specializing in organic, inorganic, polymer and electronic materials.

**Tosoh Information Systems Co., Ltd.**

Responsible for system consultation, business system development, operations and maintenance, LAN and WAN design, implementation and maintenance, and the provision of Internet services and IT training. Tosoh Information Systems assists in upgrading and integrating accounting systems at group companies. The aim is to enable management to quickly and easily assess performance throughout the entire Tosoh Group.

**Tosoh General Services Co., Ltd.**

Provides security, disaster prevention, payroll, facility maintenance and other services.

The logo for 'locate' features the word in a white, lowercase, sans-serif font. A small white cross symbol is positioned above the letter 'e'. The text is centered within a red square, which is itself centered within a white, rounded, cross-like shape. The background of the top half of the page is a gradient from orange to yellow, with a blurred image of a city skyline.

locate

We maintain a fleet of trucks and our own ships, to guarantee state-of-the-art in quality distribution and logistics.



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