



Special Feature A Century of Challenges

From Explosives to Chemicals
and from Fine Chemicals to a
Smart Chemicals Company®

"Continuously providing society with the best products through ceaseless progress and the combined forces of our consciences." By following this corporate slogan, the Nippon Kayaku Group has survived turbulent times, from World War II and post-war reconstruction to Japan's period of rapid economic growth and the collapse of Japan's asset bubble. One of our traits has been our ability to constantly evolve our business activities in a flexible manner under this unwavering slogan to meet the dramatic and repeated changes that have taken place in our business environment. The Nippon Kayaku Group's mainstay products, too, have undergone constant change to meet the needs of the times as well as the needs of Japan's industry and consumers. At the heart of this change and success has been our advanced fine chemical technologies developed since our founding. As a smart chemicals company, we will dedicate management resources to domains where we stand above competition in order to continually contribute to society.



The Nippon Kayaku Group's History

A Century of Value Creation by Responding to Change with KAYAKU spirit

Functional Chemicals
Business

Pharmaceuticals
Business

Safety Systems Business

Agrochemicals Business

Major Milestones of the
Nippon Kayaku Group

1910



1916
Successfully produces
black sulphur dye in Japan

Beginning of Synthetic Dye Production in Japan

Japan relied upon imports for all synthetic dyes from the Meiji period to the Taisho period. These imports were cut off temporarily during World War I causing a nationwide shortage and creating an urgent need to develop synthetic dyes in Japan. For this reason, the government encouraged the domestic production of these dyes. With the start of black sulphur dye, Nippon Kayaku opened the door to production of synthetic dyes in Japan.



1940 Post-war Reconstruction,
Rapid Economic Growth and Environmental Pollution

1940

Approves
corporate
name change
to Nippon
Kayaku Co.,
Ltd.



1951
Launches direct dye
"Kayarus", dye for textiles
made from cotton and hemp
cellulose



1954
Develops fluorescent dye



1960
Launches "Kayalon
Polyester", a disperse dye
for polyester textiles



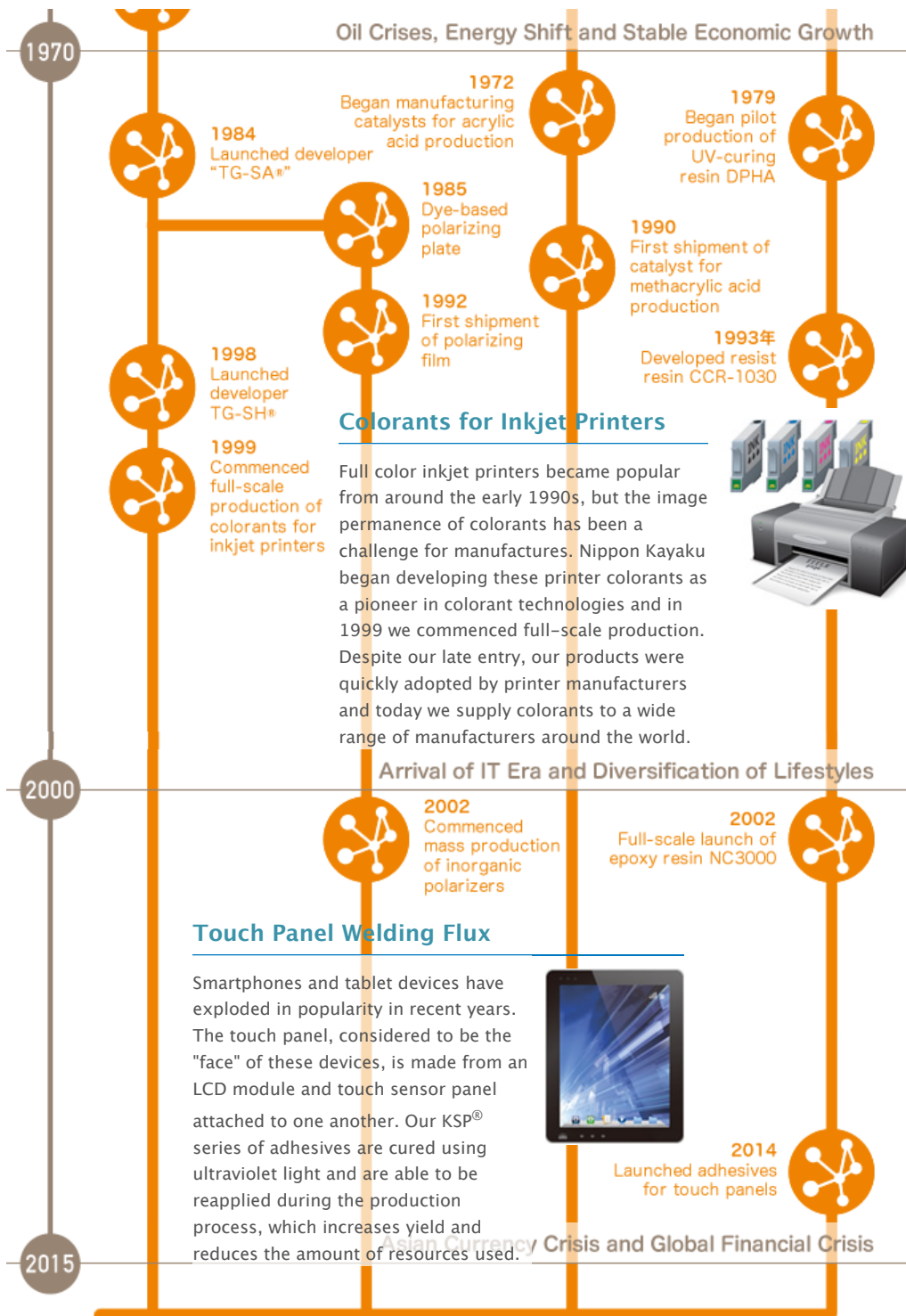
1969
Launches "Kayacryl®" dye
for acrylic textiles



1963
Concludes a licensing
agreement with Standard Oil
Co., Ohio (US) for acrylic acid
technology (catalysts)

1969
Begins
production of
epoxy resins





Colorants for Inkjet Printers

1999 Commenced full-scale production of colorants for inkjet printers

Full color inkjet printers became popular from around the early 1990s, but the image permanence of colorants has been a challenge for manufactures. Nippon Kayaku began developing these printer colorants as a pioneer in colorant technologies and in 1999 we commenced full-scale production. Despite our late entry, our products were quickly adopted by printer manufacturers and today we supply colorants to a wide range of manufacturers around the world.



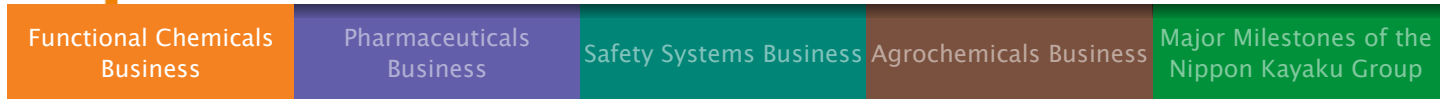
Arrival of IT Era and Diversification of Lifestyles

Touch Panel Welding Flux

Smartphones and tablet devices have exploded in popularity in recent years. The touch panel, considered to be the "face" of these devices, is made from an LCD module and touch sensor panel attached to one another. Our KSP® series of adhesives are cured using ultraviolet light and are able to be reapplied during the production process, which increases yield and reduces the amount of resources used.



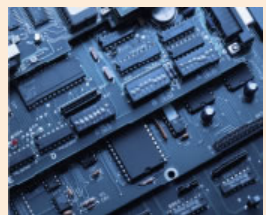
2014 Launched adhesives for touch panels



From Fine Chemicals to a *Smart Chemicals Company*®

Continually delivering functional chemicals with less environmental impacts and that contribute to energy efficiency

The Functional Chemicals Business is developing and supplying functional chemicals with less environmental impacts and that contribute to energy efficiency. For example, our environmentally friendly NC-3000 series of epoxy resin is able to cure with a high degree of flame resistance without adding a flame retardant such as phosphorous or halogen. These adhesives are used for not only semiconductor encapsulation but also printed circuit boards and other fields. The high degree of quality and reduced environmental impact of these products has been proven, earnings them the status of de facto standard in the marketplace today.



In addition, we are contributing to energy and resource savings through the development of high yield catalysts for making acrylic acid and methacrylic acid as well as colorants for industrial inkjet printers that do not produce waste water yet create vivid, solid colors thanks

to our long-standing colorant synthesis technologies. These have earned us a strong reputation among our customers.



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1932
Launches Aspirin, an anti-inflammatory analgesic agent

Meeting demand for aspirin

Aspirin had the largest demand of the important pharmaceuticals that the Government of Japan encourages to be produced domestically, and aspirin was primarily an official drug. At the time, imported pharmaceuticals made up a majority of the domestic market, and amid growing voices for a Japanese pharmaceutical company to initiate private sector production, Nippon Kayaku launched Aspirin Yamakawa, an anti-inflammatory analgesic, in 1932. Aspirin Yamakawa would go on to cover a multitude of domestic drug markets.



1940 Post-war Reconstruction, Rapid Economic Growth and Environmental Pollution

1940

Approves corporate name change to Nippon Kayaku Co., Ltd.



1948
Commences production of antibiotic Penicillin

Beginning of anti-cancer drugs

Nippon Kayaku's Pharmaceuticals Group successfully developed its first anti-cancer drug in February 1969. The drug, Bleomycin, appeared in the April 27, 1969 edition of the Asahi Shimbun newspaper under the headline "High expectations for novel drug used in cancer treatment." This marked the beginning of Nippon Kayaku's long history with anti-cancer drugs.



1967
Launches NEOLAMIN™ 3B intravenous multivitamin



1969
Launches BLEO™, an antitumor antibiotic



Oil Crises, Energy Shift and Stable Economic Growth

1970



1973
Launches MUSCALM™, Antispasmodic agents

Development of nitroglycerin injections

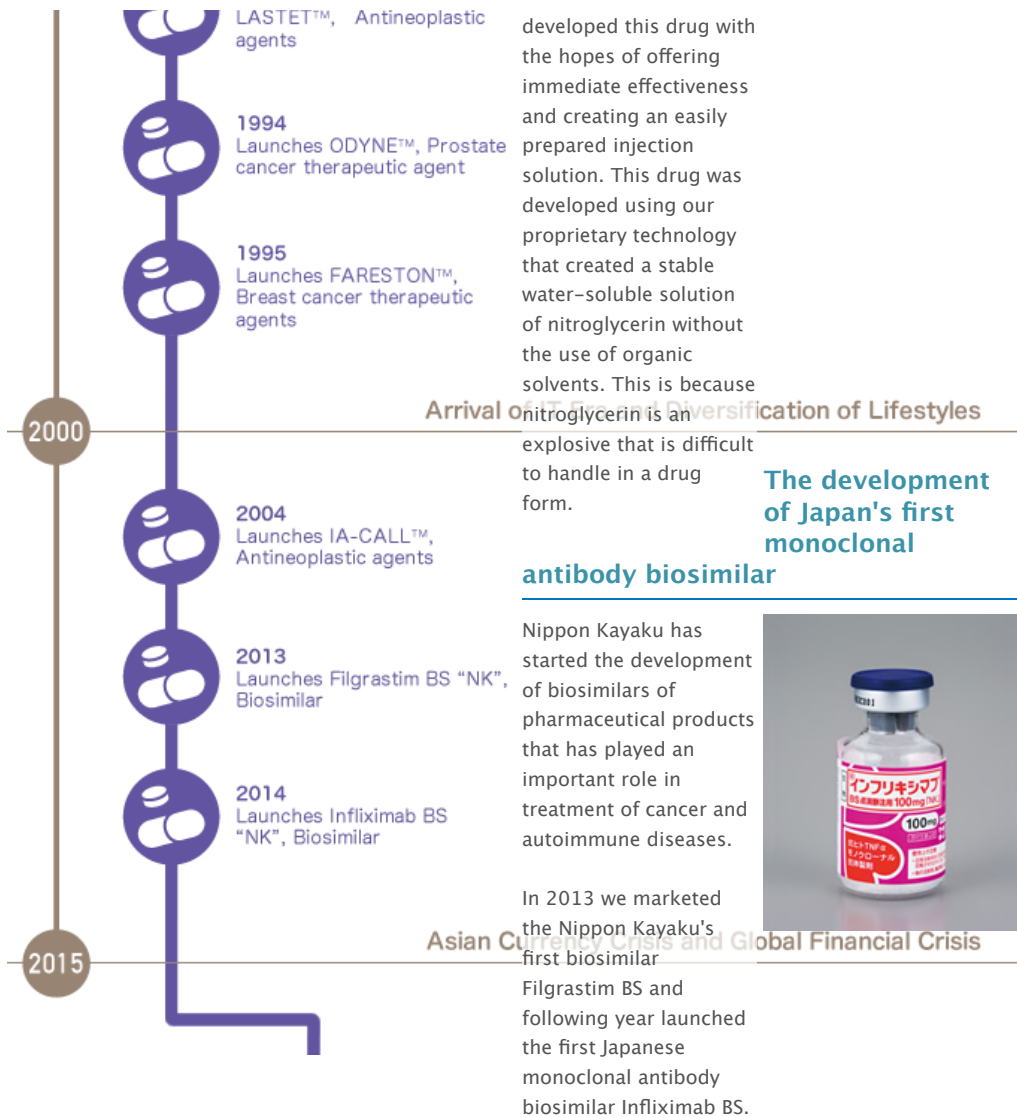
In 1984, we launched MILLISROL™, the world's first water-soluble nitroglycerin injections. In addition to a sublingual tablet used as a treatment for angina already in use, Nippon Kayaku



1984
Launches RANDA™, Antineoplastic agents



1987
Launches BESTATIN™ and



developed this drug with the hopes of offering immediate effectiveness and creating an easily prepared injection solution. This drug was developed using our proprietary technology that created a stable water-soluble solution of nitroglycerin without the use of organic solvents. This is because nitroglycerin is an explosive that is difficult to handle in a drug form.

The development of Japan's first monoclonal antibody biosimilar

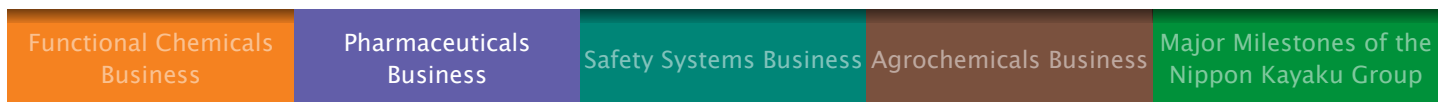
antibody biosimilar

Nippon Kayaku has started the development of biosimilars of pharmaceutical products that has played an important role in treatment of cancer and autoimmune diseases.



In 2013 we marketed the Nippon Kayaku's first biosimilar

Filgrastim BS and following year launched the first Japanese monoclonal antibody biosimilar Infliximab BS.



From Fine Chemicals to a *Smart Chemicals Company*®

We are committed to prompting innovations by using our technological expertise. It is our goal to contribute to society by consistently supplying high-quality pharmaceuticals to improve patient outcomes, and to achieve more efficient medical spending.

Nippon Kayaku is now working on the development of polymeric micelle anti-cancer drugs through a joint Multi-national Phase III Clinical Study. In addition, we are also participating in a joint Multi-national Phase III Clinical Study of monoclonal antibody biosimilar treatments for breast cancer as part of our proactive efforts to develop biosimilar treatments following the success of FILGRASTIM BS and INFLIXIMAB BS, which have already been launched.

We are committed to prompting innovations by using our technological expertise, including in the development of generic anti-cancer drugs. It is our goal to contribute to society by consistently supplying high-quality pharmaceuticals to improve patient outcomes, and to achieve more efficient medical spending.



MINK Web – an informative site targeting medical professionals developed by Nippon Kayaku



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Foundation of Nippon Kayaku Seizo Co., Ltd.



1917
Receives the first private sector license in Japan for manufacturing dynamite

Beginning of Industrial Explosives Production

In 1914, after the start of World War I, Japan's downtrodden economy staged a turnaround to strong economic growth. With an increase mine production, dynamite, which was disposed of by the military and largely relied on imports suffered an extreme shortage. As demands for private sector production sharply increased, Nippon Kayaku Seizo Co., Ltd. became Japan's first company to make dynamite in 1916 in response to the heightened needs of industry.



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1959
Launches C-Type Instantaneous Electric Detonator



1962
Wins the Okochi Memorial Award for the production of Initiating Explosive "DDNP"



1962
Launches ANFO Explosives

1970

Oil Crises, Energy Shift and Stable Economic Growth



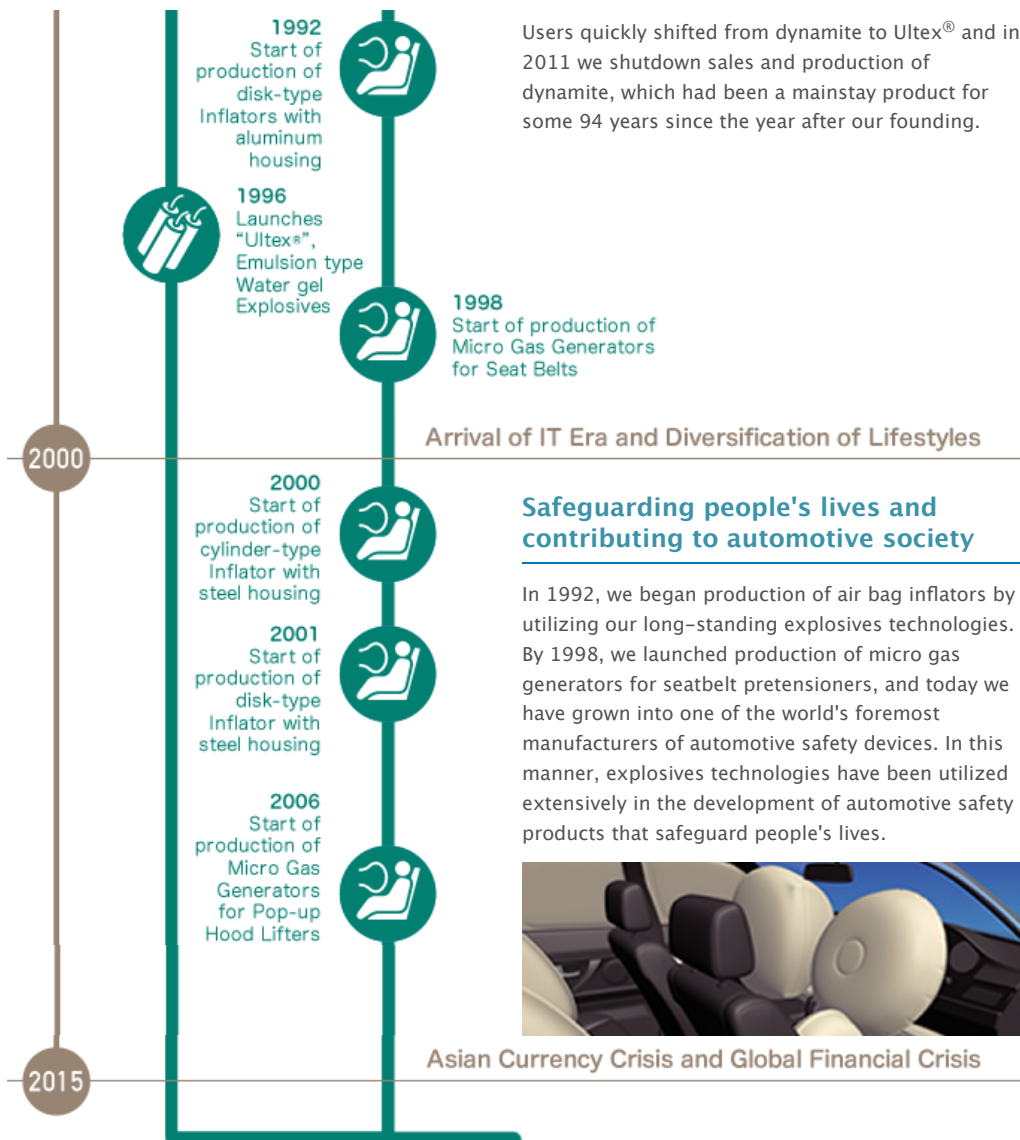
1980
Launches "Kayamite", Emulsion type Water gel Explosives

1989
Start of production of Squibs



Launch of Ultimate Water Gel Explosives

Sixteen years after we launched emulsion type water gel explosive Kayamite, developed in-house as a water gel explosive that greatly enhances safety during manufacturing and use while maintaining a similar power as dynamite, in 1996 we launched emulsion type water gel explosive Ultex[®], named for the fact that it represents the ultimate explosive.



Users quickly shifted from dynamite to Ultex® and in 2011 we shutdown sales and production of dynamite, which had been a mainstay product for some 94 years since the year after our founding.

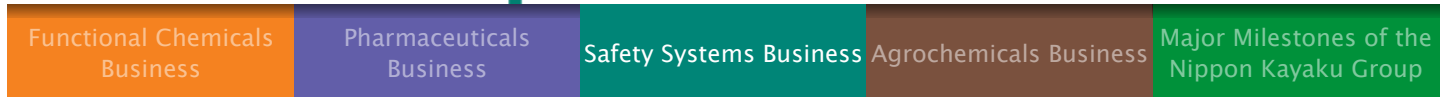
Arrival of IT Era and Diversification of Lifestyles

Safeguarding people's lives and contributing to automotive society

In 1992, we began production of air bag inflators by utilizing our long-standing explosives technologies. By 1998, we launched production of micro gas generators for seatbelt pretensioners, and today we have grown into one of the world's foremost manufacturers of automotive safety devices. In this manner, explosives technologies have been utilized extensively in the development of automotive safety products that safeguard people's lives.



Asian Currency Crisis and Global Financial Crisis



From Fine Chemicals to a *Smart Chemicals Company*®

With explosives safety technologies as our core competencies, we are providing safety to more people around the world mainly through our automotive safety components.

Automobile production in Southeast Asia is expected to see strong growth rates, second only to China in the world, and nearly 60% of the market is occupied by Japanese automakers. In 2011, ASEAN NCAP, safety evaluation standards for new vehicles, was established, with safety testing commencing in 2013. This has dramatically increased the use of automotive safety components in automobiles. Given this, the Safety Systems Group examined market entry in Southeast Asia, with these discussions culminating in the establishment of Kayaku Safety Systems Malaysia Sdn. Bhd. in December 2012. The air bag inflators and micro gas generators for seatbelt pretensioners made here are exported within ASEAN and to India, contributing to automotive safety in these areas.





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Manufacturing Agrochemicals from Picric Acid

In 1931, Nippon Kayaku began making Chloropicrin, a soil fumigant agrochemical that is highly effective against insect pests and soil-borne diseases, using the raw material of dye agents, known as black sulphur. This agrochemical greatly contributed to the control of soil-borne disease and pest insects that had been difficult to keep under control until then. At the same time, it also formed the foundation for the development of our agrochemicals business in the post-war era.



1931
Commences production of Chloropicrin, a soil fumigant to protect plants from insect pests and soil-borne diseases

1940

1940 Post-war Reconstruction, Rapid Economic Growth and Environmental Pollution

New Agrochemicals Contributing to Increased Food Production

Following World War II, the Government of Japan implemented policies to increase food production, and as a result there were heightened expectations for synthetic agrochemicals that could contribute to plant protection. Nippon Kayaku licensed technologies from Geigy of Switzerland and first commenced production of technical grade Diazinon[®] for hygienic use in 1957, and after some quality improvements, we launched the insecticide called Diazinon[®] Granule for agricultural use in 1964. This product proved to be highly effective against insect pests in paddy rice and agricultural soil, greatly contributing to the development of agriculture in Japan.

Approves corporate name change to Nippon Kayaku Co., Ltd.



1957
Commences production of technical grade Diazinon[®] for hygienic use



1964
Commences production of Diazinon[®] Granule for agricultural use



1970

Oil Crises, Energy Shift and Stable Economic Growth

Diazinon[®] SL sol



1987
Launches insecticide, Cyclosal®



1990
Launches Diazinon® SL sol

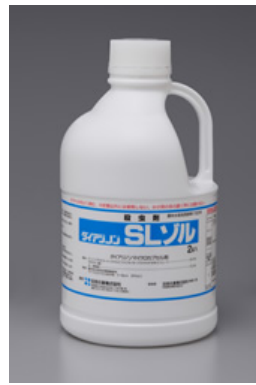


1992
Launches R-731, rodent repellent against biting damage



1999
Launches insecticide, Matric® Flowable

Diazinon® SL sol was developed using Nippon Kayaku's micro encapsulation technologies. The active ingredient is enclosed in micro capsules, making it safer and long-lasting. This product is now widely used to control the larva of beetles that eat sweet potatoes. Conventionally, agrochemicals had to be applied several times during a growing season, but this product can control insect pests simply by applying it only once prior to the planting.



2000

Arrival of IT Era and Diversification of Lifestyles



2005
Launches hygienic-use insecticide, Safrotrin® MC



2010
Launches spreading agent/adjuvant, Widecoat®



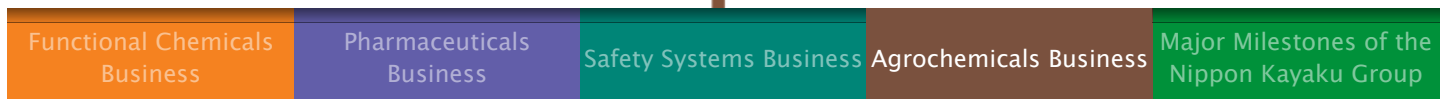
2011
Launches insecticide, Leaf Guard®



2016
Launches insecticide & acaricide, Fuhmon® for mites

Asian Currency Crisis and Global Financial Crisis

2015



From Fine Chemicals to a *Smart Chemicals Company*®

Providing agrochemicals with excellent effects, safety and environmental compatibility together with formulation technologies that make them easy to use and increase performance

On February 15, 2016, the Agrochemicals Division launched spiracle-blocking insecticide Fuhmon®, which is ideal for Integrated Pest management (IPM) that does not rely only on chemical pesticides. This product offers four unique features: (1) it is made from polyglyceryl fatty acid ester which is used as food additive; (2) there are no limitations on the number of applications and it can be used even the day prior to harvesting vegetables; (3) it can protect plants from damage by spider mites, aphids, and whiteflies simultaneously; and (4) it is effective against insects that have become resistant to conventional chemical pesticides. Fuhmon® contributes greatly to protecting plants from various pests, which in turn contributes to the stable production of agricultural crops. Going forward, we will continue to contribute to agriculture while developing and supplying technologies and materials required by all aspects of this field.





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1910

1916
Foundation of Nippon Kayaku Seizo Co., Ltd.

1928
Acquires Teikoku Senryo Seizo Co., Ltd.

1931
Establishes Yamakawa Seiyaku Co., Ltd.

1940 Post-war Reconstruction,
Rapid Economic Growth and Environmental Pollution

1940

Approves corporate name change to Nippon Kayaku Co., Ltd.

1943
Merges and absorbs Teikoku Senryo Seizo Co., Ltd. and Yamakawa Seiyaku Co., Ltd..

1945
Approves corporate name change to Nippon Kayaku Co., Ltd.

1962
Establishes corporate motto and corporate spirit

1963
Recipient of the Deming Prize

The Deming Prize

In 1961, Mr. Yasusaburo Hara, then President of Nippon Kayaku, decided to establish a candidacy for the Deming Prize based on the implementation of a consistent company-wide fundamental policy and the recognition that a company's mission to society is to supply high quality products at affordable prices. Over the next two years, all 4,150 employees took part in a quality control campaign for promoting quality assurance. These efforts paid off in 1963 when the company was presented with the Deming Prize. Since then, quality activities have become a source of pride and an ongoing tradition for Nippon Kayaku.



Oil Crises, Energy Shift and Stable Economic Growth

1970

1986
Establishes new corporate symbol

1991
Establishes POLATECHNO CO., LTD.

1992
Releases the Environmental Safety Declaration

releases the Environmental Safety Declaration

1993
Establishes Taiwan Nippon Kayaku Co., Ltd

1995
Acquires certification for quality assurance management system
Establishes NIPPONKAYAKU FOOD TECHNO CO., LTD.

1996
Establishes Wuxi Advanced Chemical Co., Ltd.

1998
Establishment of Asunaro House

1999
Invests in capital of
INDET SAFETY
SYSTEMS a.s.

Arrival of IT Era and Diversification of Lifestyles

2000

2000
Establishes NIPPON KAYAKU TOKYO Co., Ltd. and
NIPPONKAYAKU FUKUYAMA Co., Ltd.

2002
Establishes KAYAKU CHEMICAL (WUXI) CO., LTD.

2004
Launches Pink Ribbon campaign

2006
Establishes Kayaku Safety Systems (Huzhou) Co., Ltd.
Establishment of Nippon Kayaku Korea Co., Ltd.
Name changed to NIKKA FINE TECHNO CO., LTD.

2007
Establishment of Kayaku Safety Systems de Mexico, S.A.de.C.V.

2008
Starts up Kayaku Japan Co., Ltd. Acquires MicroChem Corp.

2010
Establishment of Shanghai Kayaku International Trading Co., Ltd.

2012
Establishment of Kayaku Safety Systems
Malaysia Sdn.Bhd.

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Quality Improvement Promotion Activities

Nippon Kayaku's initiatives for improving quality began with the voluntary introduction of statistical approaches to QC* activities by plant engineers in 1948.

After receiving the Deming Prize in 1963, Nippon Kayaku organized its very first In-house QC Circle Conference in 1966 as a venue to present the results of its QC activities. Since then, we have expanded the scope of these activities into "Small Group Activity Meetings" mandatory for all employees, with this name later changed to the "Meeting of the Movement for Tomorrow." The scope of these activities has been expanded from quality improvement to energy savings, improving occupational health and safety, and environmental conservation. The "Meeting of the Movement for Tomorrow" serves as venue for giving presentations and networking among employees, and now involves Nippon Kayaku Group companies from outside Japan. Additionally, starting in 2014, we re-launched and revamped our proprietary small group activities to include not only improvements, but also human resource development and CSR.

*QC : Quality Control