

H. Hara

Vol. 40, 1970

No.1

THE REVIEW OF PHYSICAL CHEMISTRY OF JAPAN

Founded in 1926

CONTENTS

Masaru Nakahara, Kiyoshi Shimizu and Jiro Osugi: Ionic Solutions under High Pressures I, Pressure and Temperature Effects on the Mobilities of the $\text{Co}(\text{NH}_3)_6^{3+}$ and SO_4^{2-} Ion.....	1
Masaru Nakahara, Kiyoshi Shimizu and Jiro Osugi: Ionic Solutions under High Pressures II, Pressure and Temperature Effects on the Dissociation of the $\text{Co}(\text{NH}_3)_6^{3+}\cdot\text{SO}_4^{2-}$ Ion-pair.....	12
Masatomo Fujimoto: Physico-Chemical Properties of Zinc and Cadmium in Gallium Arsenide.....	21
Masatomo Fujimoto: Solubility and Distribution Coefficient of Cadmium in Gallium Arsenide.....	34
Jiro Osugi, Muneco Sasaki and Ichiro Onishi: The Effect of Pressure on the Rate of the Benzidine Rearrangement IV, 2,2'-Dimethoxyhydrazobenzene.....	39
Takashi Moriyoshi and Katsuhiko Tamura: Effects of Pressure on Organic Reactions II, The Acid-Catalyzed Rearrangement of Pinacol.....	48
Takashi Moriyoshi and Masahiro Hirata: Effects of Pressure on Organic Reactions III, The Base-Catalyzed Reduction of Diisobutylketone.....	59

THE PHYSICO-CHEMICAL SOCIETY OF JAPAN

THE REVIEW OF PHYSICAL CHEMISTRY OF JAPAN

(Butsuri-Kagaku no Shinpo)

Found in 1926

President: Wasaburo Jono

Members of Council:

Toshio Maeda (Chief)

Jiro Osugi

Ryozo Goto

Renpei Goto

Elji Suito

Board of Editors:

J. Osugi (Chief) *Kyoto University*

R. Goto (Associate) *Kyoto Sangyo University*

E. Suito (") *Kyoto University*

S. Shida *Tokyo Institute of Technology*

T. Kitagawa *Yokohama University*

M. Tamura *Kyoto University*

H. Teranishi *Kyoto Technical University*

K. Suzuki *Ritsumeikan University*

K. Hirota *University of Osaka*

S. Seki *University of Osaka*

T. Imoto *Osaka City University*

R. Fujishiro *Municipal University of Osaka*

O. Toyama *Prefectural University of Osaka*

S. Ono *Prefectural University of Osaka*

S. Tsuchihashi *University of Kobe*

T. Makita *University of Kobe*

S. Hasegawa *Okayama University*

H. Togawa *Doshisha University*

Secretary:

K. Shimizu

M. Sasaki

K. Hara

December 20, 1970

Communications to the Editor should be addressed to Board of Editors, The Physico-Chemical Society of Japan, Faculty of Science, Kyoto University, Kyoto, Japan.

Business Correspondences should be addressed to: Secretary, The Physico-Chemical Society of Japan, Faculty of Science, Kyoto University, Kyoto, Japan.

Purchase Order should be addressed to: Maruzen Co., Ltd., Nihonbashi, Chuo-ku, Tokyo, Japan.

Published by

THE PHYSICO-CHEMICAL SOCIETY OF JAPAN

(Nippon Butsuri-Kagaku Kenkyu Kai)

Faculty of Science, Kyoto University, Kyoto, Japan

Printed by KAWAKITA INSATSU CO., Kyoto, Japan

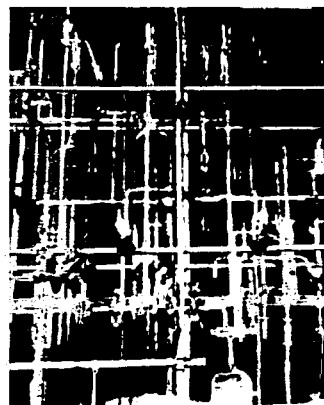
PRODUCTS FOR TODAY ———

PRODUCTS FOR TOMORROW

KANEGAFUCHI now serves more than 100 industries varying from food to feed, soaps to textiles, electric wires to plastics.

KANEGAFUCHI's variety of products include industrial chemicals, polymers, oil & fat products and fermentation products. Such diversified operation ranks KANEGAFUCHI a unique position in the industry.

KANEGAFUCHI's research activities which enabled successful achievement of today's products are continually producing a flow of new products to meet the challenge of tomorrow



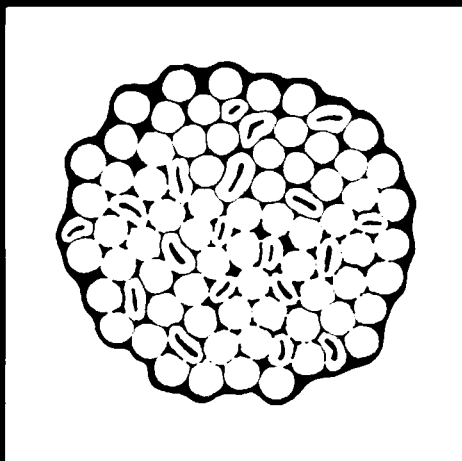
PRINCIPAL PRODUCTS :

- KANEVINYL (PVC & copolymer, PVC compound)
- KANE ACE-S (ABS resin)
- KANE ACE-B (PVC modifier)
- KANE PEARL (expandable polystyrene beads)
- KANEKALON (modacrylic fiber)
- Electric wires & cables
- Caustic soda, Hydrochloric acid, KANECHLOR (transformer oil, heat transfer medium), Butanol, Acetone
- Bakery yeast, RNP (ribonucleo-protein), MIKAMY-Feed (animal feed additives)
- Margarine, Shortening oil, Soap, Glycerine

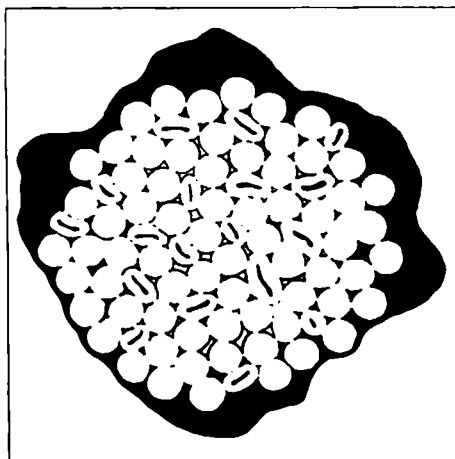
KANEGAFUCHI CHEMICAL INDUSTRY CO., LTD.

3,3-chome, Nakanoshima, Kita-ku, Osaka, Japan

Cable address : CHEMIKANE



Less is more.



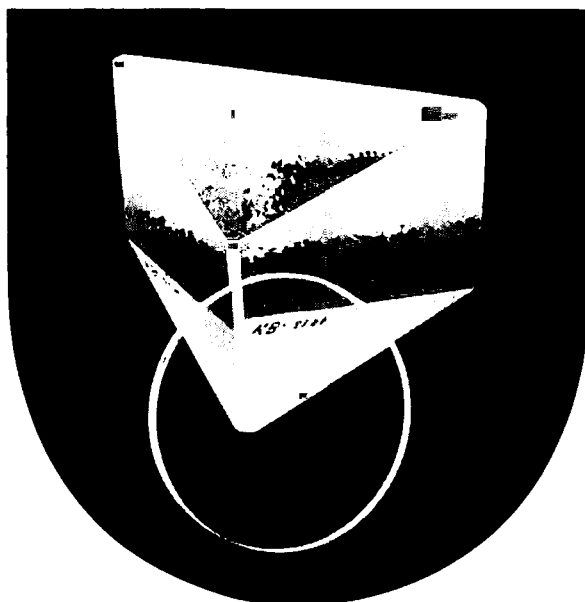
Warp yarn can be sized with starch. Or with Poval, our water soluble polyvinyl alcohol.
Starch is cheaper. Or so you think.
When you size with starch, you have to put a lot of starch on your yarn.
And when you've wound that yarn on the beam, what have you got?
A lot of starch.
Very little yarn.
Now, when you size with Poval, you use very little. Because its adhesion is so good. And it doesn't fall off. So you get more yardage on a beam. And have to change beams less often.
Also, you can work in a better environment, with lower air humidity.
Best of all, Poval protects your yarn better. Warp breakage goes down. Weaving efficiency goes up.
What kinds of yarn can you size with Poval?
Spun warps. And filament warps. Of practically any fiber known to man.
Find out what a little Poval can do. And leave starch where it belongs.
In your mashed potatoes.

KURARAY POVAL
(Polyvinyl alcohol)

Detailed technical information upon request.
Please mention field of application.
Formerly KURASHIKI RAYON CO., LTD.

KURARAY CO., LTD.
POVAL SALES DEPT.

8, Umeda, Kita-ku, Osaka, Japan / Cable Add.: KURARAY OSAKA
3-1, Nihonbashi-Tori, Chuo-ku, Tokyo, Japan / Cable Add.: KURARAY TOKYO



Single crystals of HORIBA., offered as complete products ready to use which are free from impurity absorption, have acquired worldwide reputations.

Our scintillators, such as NaI (Tl), CsI (Tl) or CaI_2 are also credited and used internationally by the nuclear scientists, for the established qualities.

	NaCl	KCl	KBr	KI	LiF	AgCl	KRS-5*	KRS-6*	CsI
Limit of transparency (microns)	~15	~21	~27	~31	~6	~30	~40	~34	~70
Refractive index:	1.555	1.498	1.559	1.667	1.394	2.071	2.629	2.336	1.987
Solubility:**	35.7	28.5	53.5	127.5	0.27	8.9×10^{-5}	0.02	0.32	44
Specific gravity: gr/cm ³	2.16	1.59	2.75	3.13	2.64	5.56	7.2	7.19	4.53
Melting point: °C	801	776	730	680	843	455	415	424	621
Maximum diameter: mm	120	120	120	120	100	60	60	60	60
Maximum height: mm	100	100	100	70	60	100	60	100	100

* KRS-5 is a compound single crystal of TlI and TlBr, and KRS-6 is a compound single crystal of TlCl and TlBr.

** g/100 gr water at normal temperature.

HORIBA, Ltd.

Head office & Factory:

Miyanohigashi-machi,
Kissyojin, Minami-Ku, Kyoto
Tel: (075) 313-8121

Tokyo branch office:

No. 2-18, Nishihatchobori, Chuo-ku,
Tokyo Tel: (03) 552-7661

ASAHI CHEMICAL INDUSTRY CO., LTD.

Capital: ¥ 23,884,584,400

President: KAGAYAKI MIYAZAKI

Head Office: 25, 1-chome, Dojima-hamadori, Kita-ku, Osaka, Japan

Tokyo Office: 12, 1-chome, Yurakucho, Chiyoda-ku, Tokyo, Japan

Other Branch Offices: Nobeoka, Nagoya, Fukuoka, Mizushima, Fuji,
Sapporo, Hokuriku, New York, Hamburg,
Hong Kong, Taipei, Beirut, Djakarta.

Plants: Nobeoka, Mizushima, Fuji, Kawasaki, Sakanoichi, Wakayama,
Matsudo, Hozumi, Iwakuni, Shiraori.

Laboratories: Tokyo, Nobeoka, Takatsuki

Asahi's history dates as far back as 1923 when the late Mr. Jun Noguchi, who was the first president of the company, erected a synthetic ammonia plant in Nobeoka, present site of the company's major plants. This is a memorable plant in that the first commercial production of synthetic ammonia in the world by the Casale process was successfully started at this plant.

Thereafter Asahi's production activity continued to expand, with the exception of the war years, into great many fields. Using ample electric power from its own power plants and standing on the firmly established basis that primary raw materials are available within the company, Asahi has been producing chemical fibers, synthetic resin, explosives, chemical fertilizers, chemical seasoning, industrial nitrocellulose and several scores of chemicals of ammonia, soda and chlorine derivatives.

This fact points to Asahi's special feature as a chemical company. Asahi ranks first in the production of viscose rayon in Japan and its cuprammonium rayon capacity is largest in the world. Using acrylonitrile monomer produced by Sohio process at its Kawasaki and Mizushima plants, Asahi produces polyacrylic fiber "Cashmilon" by its own process. Production of acrylonitrile monomer and polyacrylic fiber is also the largest in

Japan. Asahi's chemical seasoning (monosodium glutamate) Asahi Aji, MITASU, ranks second in output of similar chemical seasonings. Sun-Nitro, Asahi's unique chemical fertilizer, is building up for itself a spectacular sales. Asahi's industrial nitrocellulose and explosives production is the largest in Japan. Recently Asahi launched into three new fields of operation, i.e. nylon 6, synthetic rubber polybutadiene "ASADENE" and new building material "HEBEL" and "AHS Pile".

With a view to expanding into a more diversified chemical company, Asahi Chemical is now constructing at Mizushima, Okayama Prefecture, a petrochemical complex at which such industrial chemicals as high density polyethylene "SUNTEC" and acrylonitrile monomer are already in production and ammonia will soon be manufactured.

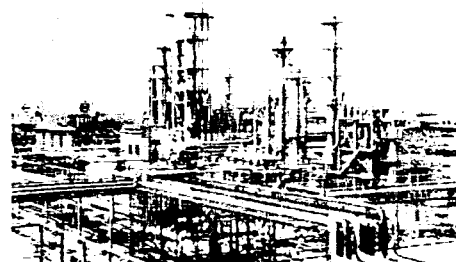
The products of Asahi are exported to more than 100 countries while its techniques and plants are exported to more than 10 countries including the U.S.A., England, France, U.S.S.R., Italy and Korea where all of these are enjoying a great reputation.

Asahi now has many powerful affiliates, including Asahi-Dow Limited and Shin Nihon Chemical Industry Co., Ltd. and is proceeding on the road to further growth as a multi-purpose chemical company.

Put all your titanium eggs in one basket?

To make optimum use of the advantages of titanium—superb corrosion resistance and highly desirable mechanical properties—titanium-lined and solid titanium equipment must be designed and manufactured with much care and more know-how.

Who could do the job better than a company that combines all the experience in steel and titanium metallurgy, machinery



design and manufacture, and testing techniques under one roof—in one basket, so to speak? Kobe Steel designs and produces a variety of devices and equipment either lined with or made completely of titanium, such as reactors, towers, heat exchangers, vessels, valves, pumps etc. for the petrochemical industry, electrolysis vats and electrodes for use in electrochemistry, and equipment for pulp, food, and synthetic textile processing.

Kobe Steel uses its own steels, its own titanium, its own know-how. That's why Kobe Steel can guarantee rigorous quality control at each and every production stage.

If you insist, we'll sell you just the titanium, too. Either way, it pays to get the details. Write to our nearest office.



 **KOBE STEEL**
MACHINERY DIVISION

HEAD OFFICE: 36, 1-chome, Waknohama-cho, Fukuoka-ku, Kobe, Japan
NEW YORK OFFICE: 529, 5th Avenue, New York, N.Y. 10017, U.S.A.
DÜSSELDORF OFFICE: 10, Immermannstr., Düsseldorf, West Germany