

Iodine production and applications

Speaker

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The history, production and applications of iodine in the past centuries will be reviewed and the iodine chemistry and industrial applications in the 3rd century of iodine will be anticipated in this lecture.

1. The 1st century of iodine chemistry (1811~1910)

Production: French chemist, Bernard Courtois, discovered iodine as a novel element from seaweed ash in 1811. Iodine production from seaweed ash started in Normandy, France in 1814. Another iodine resource, caliche, was discovered in Chile in 1840 and production started in 1868. Iodine production from the 3rd resource of iodine, natural gas brine, started in the end of 1st century. Applications: Potassium iodide was used as a remedy for goiter in 1816. The earliest account of iodine tincture applied to wounds was recorded in 1862 (American Civil War).

2. The 2nd century of iodine chemistry (1911~2010)

Production: Iodine production from brine started in various places; USA (1926), Italy (1927), Japan (1934). Various production methods were developed such as copper method, activated carbon absorption method, starch absorption method, blowing out method, and ion-exchange resin method. Iodine is mainly produced from the countries; Chile, Japan, USA, and Indonesia, around Pacific Ocean today. Applications: Many applications of iodine were developed in the 2nd century of iodine as follows: X-ray contrast media: Iodine blocks X-rays and is used to get detailed image of brain and heart. Disinfectant: Iodine is used as a disinfectant for external wounds or a gargle. A typical example is povidone iodine (Betadine). Polarizing Film: Iodine is used for the polarizing film which acts as the switch on the LCD screens of TVs, Mobile Phone, and PC. Some of these applications are related to polyiodide which belong to the type of compounds known as hypervalent iodine.

3. The 3rd century of iodine chemistry (2011~)

Production: Recycling iodine is environmentally and economically important because it is a scarce and limited resource. Novel Application of iodine: Perovskite Solar Cell is one of the promising applications of iodine. Hypervalent iodine chemistry and halogen bonding chemistry would be the important fields of iodine chemistry in the 3rd century of iodine.

Dr. Tatsuo Kaiho is the Technical Advisor of Godo Shigen Co., Ltd. (Chiba, Japan), one of the most well-known iodine manufacturing companies in the world. He is a former Director of Nihon Tennen Gas Co., Ltd. and a former Director of Kanto Natural Gas Development Co., Ltd. Dr. Tatsuo Kaiho (born 1952) obtained his MSc (1976) from Osaka University. He joined Mitsui Chemicals Co., Ltd. in 1976. On leave from Mitsui, he worked as a visiting scientist at Massachusetts Institute of Technology (1979-1982) and obtained a PhD degree (1983) from Osaka University. From 2017-2022 he worked as a visiting professor at Department of Engineering of Chiba University. As Director of the Society of Iodine Science, Dr. Kaiho developed novel iodine-containing materials and processes and presented independent research at many conferences, including the International Conference of Hypervalent Iodine Chemistry (2010) and the Symposium of Iodine Science (2011). Dr. Kaiho has received several awards, such as the Distinguished Chemist Award from Chiba Prefectural Government (2001), the Organic Synthesis Award from Society of Synthetic Organic Chemistry Japan (2002) and the Society of Iodine Science Award (2012). He organized the 4th International Conference of Hypervalent Iodine Chemistry (2014) in Narita, Japan.



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