

Mie Plant Green Factory Promotion Efforts

Retrieval of the fluorine contained in wastewater 30% reduction in sludge by converting into fluorite, a valuable mineral

The new second 300mm wafer fab of Mie Plant set an objective to reduce the amount of fluorine-containing sludge generated by the wastewater treatment process by 30%. To this end, it introduced a fluorine retrieval and regeneration system to retrieve the fluorine from wastewater and process it into fluorite powder at our site.

Sludge Volume Reduction by Reduced Fluorine Concentration

Most of the industrial waste from our plant is fluorine containing sludge. A reduction in this volume would greatly reduce the environmental load.

As a sludge reduction measure, Mie Plant lowered the fluorine sludge generation volume by reducing the concentration of fluorine in the wastewater flowing into the coagulation and sedimentation, which is one of the wastewater purification processes.

As shown in the figure, wastewater is separated into concentrated hydrofluoric acid wastewater and diluted hydrofluoric acid wastewater in the process before coagulation and sedimentation. After that, fluorine is retrieved from the concentrated hydrofluoric acid wastewater using the fluorine recycling system, Ecocryster, and is regenerated into fluorite (valuable mineral).

The introduction of this system has realized the collection of a resource and a reduction in the volume of fluorine-containing sludge. It is also expected to reduce the amount of fluorine-containing sludge by advanced processing after coagulation and sedimentation as well as the environmental load.

* Fluorine and hydrofluoric acid

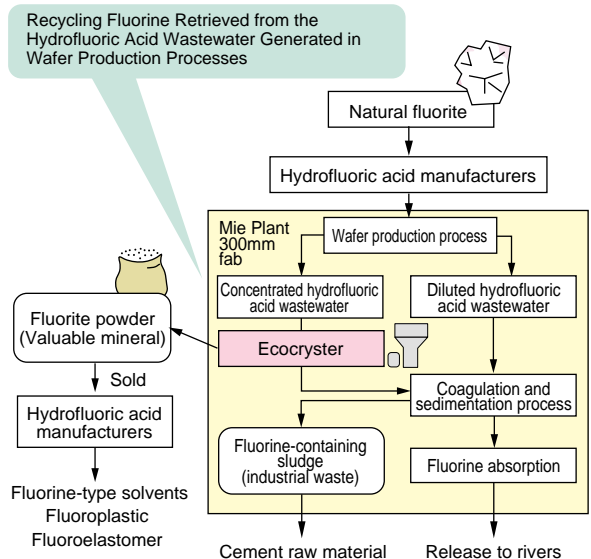
Although it is useful for the recalcification of teeth, fluorine is specified as a hazardous substance at certain wastewater concentration levels because it may result in poisoning if consumed in excess. Hydrofluoric acid is a fluorine compound solution that is essential for semiconductor etching and cleaning.



What is Fluorite?

The Japanese name "hotaruishi (means firefly stone)" was given to fluorite as it emits light when it is heated or under ultraviolet radiation. It is a compound of calcium and fluorine and is expressed by the chemical formula CaF_2 . Production sites are limited to the U.K., Argentina, China, and so forth; it is considered a precious substance throughout the world.

It is a raw material in the hydrofluoric acid essential for semiconductor production and transparent "hotaruishi" is the material in fluorite lenses, which offer high performance and little "color blurring" in combination with glass lenses and are used as interchangeable lenses for high-end cameras and telescope lenses.



Establishment of a Recycling Path by Fluorite Production from Fluorine

Although we conventionally recycled the generated fluorine-containing sludge as raw material for cement, the volume of fluorine-containing sludge acceptance by cement companies has been restricted and is decreasing constantly as demands for cement have fallen.

Fluorite production can solve the problem of fluorine-containing sludge disposal. While hydrofluoric acid is inevitable in the production of electronic devices such as semiconductors, it has become more and more difficult to obtain the raw material fluorite. The system to regenerate fluorite powder from the collected hydrofluoric acid wastewater is expected to contribute to the effective utilization of this precious resource and open up a new way for the establishment of a hydrofluoric acid recycling path in Japan.