RESTRICTED SUBSTANCE CASE STUDY: Root Cause Analysis of Antimony.

August 2021

The case study is a part of our Detox Commitment, we share business case examples that support industry development.

Tesco has recommended testing of wastewater from their supplier units for the presence of restricted chemical groups. Testing found Antimony detected in the discharge wastewater at printing and dyeing facilities in China.

We used an independent laboratory to find out the root cause of antimony. From the investigation, polyester was to be the main source of antimony. As a result, the facilities with onsite Effluent Treatment Plant (ETP) have implemented a plan to improve the wastewater treatment technique.

Situation Description:
Antimony is a chemical element with the symbol Sb (from Latin: stibium) and atomic number 51. It is found in nature mainly as the sulphide mineral stibnite. China is currently the biggest antimony producing country.

The antimony concentration found is higher in raw wastewater than incoming water supplies, this indicates that the antimony is coming from production process.

Resistance to ignition is a common industry specification requirement in textile. Antimony is mainly used as the trioxide for flame-proofing compounds, always in combination with halogenated flame retardants except in halogen-containing polymers. The flame retarding effect of antimony trioxide is produced by the formation of halogenated antimony compounds, which react with hydrogen atoms. Oxygen atoms and OH radicals are also likely to react which inhibit fire. Antimony is also known to be a stabiliser and catalyst for the production of polyester.

From the polyester tests for antimony, a positive result found 200ppm of the compound present, concluding that most of the antimony comes from polyester in the production.

Improvement Plan:

Using independent laboratory recommendations, we suggested that mills consider the improvement options to reduce the antimony in discharge wastewater via specified treatment technology.

Detailed suggestions of chemicals that can be added to remove antimony as below:

Chemical	Antimony conc.	Chemical added	pH Value	Removal Rate
Polymerization Ferric Chloride	< 80 μg/L	97 mg/L	7.8	85%
Ferric Chloride	5 mg/L	500 mg/L	7	About 93%
	50 ~ 500 μg/L	108 mg/L	6	> 90%
Polymeric Ferric Sulfate	32.5~142.8 μg/L	150 mg/L	< 6	95%
	5 mg/L	500 mg/L	7	About 93%
Ferrous Sulfate	5 mg/L	500 mg/L	7	About 93%
Aluminium Polychloride	36 μg/L	130 mg/L	< 6	36%
Aluminium Sulfate	50 μg/L	103 mg/L	3~10	< 20%

Application/ *Sector:*
Manufacture of textiles, wearing apparel and related products.

Process:
Dyeing/ Printing

Function of detected restricted substance:
Flame retardant and stabilizer/catalyst for polyester

Enterprise using the improvement:
Tesco Stores Ltd (F&F Clothing)
Falcon Way, Shire Park, Welwyn Garden City, Hertfordshire, AL7 1TW www.tesco.com, Tesco PLC Sustainable Fabrics and cr.enquiries@Tesco.com

State of implementation plan:
The solution will be implemented at the time of publication

Date when alternative was implemented and in which country:
2021, China

Availability of the materials used in improvement:
On the market

Reliability of information:
There is evidence that the implementation plan is reliable.