

# Construction Chemicals

for a safe chromate reduction





## Leaders in quality and service

TIB Chemicals originates from the merger of Goldschmidt TIB Germany and Goldschmidt Quimica de México. As manufacturer of specialised Basic Chemicals, innovative Inorganic Specialty Chemicals and Coating Systems, the company supplies to a worldwide market.

The largest production facilities of TIB Chemicals are located in Mannheim (Germany) as well as San Luis Potosi (Mexico). The sales and marketing organisation operates globally, with representations on all continents.

Employing approximately 350 qualified personnel, the TIB Chemicals manufacturing history dates back over 130 years of tradition and know-how. With a yearly production of more than 400.000 tons of chemicals, TIB Chemicals generates revenues of over € 120 million.

The yearly growth of TIB Chemicals' accrual rate is above the average for the industry. High-quality products, custom-made solutions and a flexible distribution and logistics service for our entire customer base are the basis of our success. Customer requirements are met with prompt and individual attention. We thereby focus on our main target, to increase and to enhance the business success of our clients.

Subdivided into three business units, the company operates Basic Chemicals, Inorganic Specialty Chemicals and Coating Systems. Combined they form a strong unit with a solid financial base and with the logistic and organisational structure of a large international enterprise.

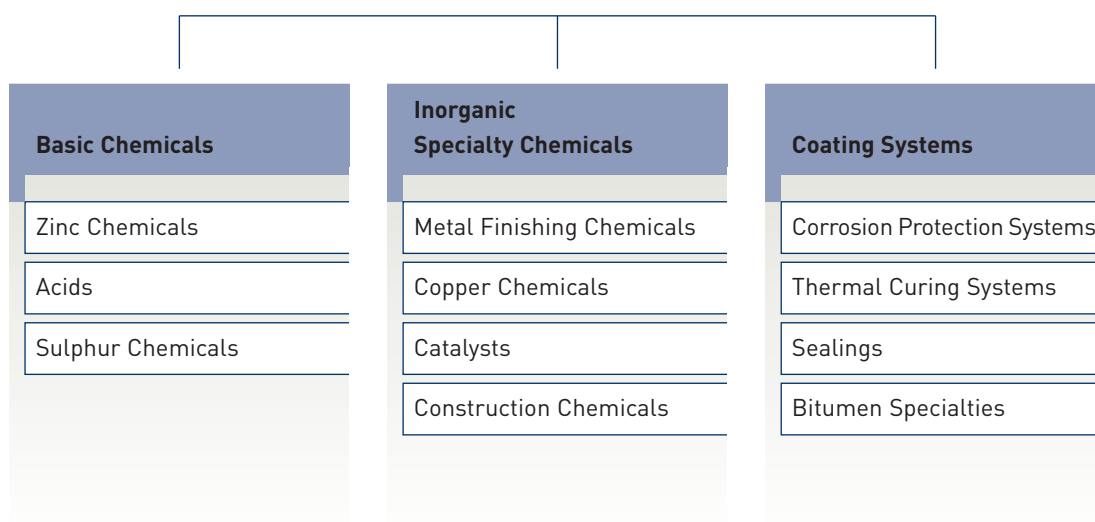


*TIB Chemicals successfully passed certification for the standards according to ISO 9001:2000.*





## TIB CHEMICALS



The three business units of TIB Chemicals produce and sell:

- ⚡ **Basic Chemicals** such as zinc chemicals, acids or sulphur chemicals, for chemical companies, the metal industry, the hot dip galvanising industry, the electroplating industry, the textile and plastic industries, for water treatment and for the production of food and beverages
- ⚡ **Inorganic Specialty Chemicals** based on the elements tin, zinc, copper and bismuth. These special compounds are used as electroplating chemicals in the electronics and metal industries, as copper chemicals in the automotive and chemical industries, as catalysts in the resin and paint industry, and also in chromate reduction for the construction industry
- ⚡ **Coating Systems** based on two component liquid polyurethane and epoxy systems, which have been developed as anticorrosion protection for the pipeline industry, for the valve-making industry, as well as for sewage outfall, water treatment and power plants. Thermal curing systems for electroplating, tool manufacturing and the packaging industry. Sealing compounds for gas and heating systems. Furthermore, modification and oxidation of bitumen as well as the production of bitumen-based systems for road surfaces

On the following pages, you will find our **Construction Chemicals**.



## Safe chromate reduction

Since 2005, only cements and cement-containing mixtures with a soluble chromium(VI) content below 2 ppm are allowed to be brought into the market. This limiting value is specified by the EC Guideline 2003/53/EG. Keeping this limiting value aims at the efficient reduction of the occurrence of contact dermatitis, an allergic skin disease caused by soluble chromium(VI) salts in the highly alkaline cement. Traces of soluble chromium(VI) salts are formed during the calcination process of cement klinker. Stannous salts, and here especially stannous sulphate, are highly efficient reducing agents for lowering the chromium(VI) content in cements under the limiting value of 2 ppm.

The use of TIB Chemicals' stannous sulphate, or of formulations based on this compound, offers additional advantages:

### **Efficient reduction of the Cr(VI) content with low consumption**

- ⚡ Stannous sulphate is highly efficient; only small doses have to be added to the cement
- ⚡ Depending on cement type and dosation rate, chromate reduction can be sustained for a long time
- ⚡ Dosation in the cement mill poses no problems

### **No influence on the cement properties**

- ⚡ No brown spots or coloration of the concrete or mortar surfaces
- ⚡ No influence on the workability of the cements and their final properties
- ⚡ In dry mix systems, interaction with other additives must be checked

### **Low technical effort**

- ⚡ Low capital expenditure for dosation units, as the addition of stannous sulphate in its solid form can be accomplished with the regular dosation equipment
- ⚡ Low maintenance effort, as no silos and complex dosation equipment are necessary. Stannous sulphate shows high storage and temperature stability. The tendency towards agglomeration is low, resulting in a high operational availability of the equipment
- ⚡ Solid as well as liquid formulations of the reducing agent are available
- ⚡ Liquid formulations can be accurately dosated by simple measures to the cements; handling is comparable to other process additives



*Stannous sulphate enables safe processing of cements*

### **Technical service you can rely on**

- ⚡ Adjustment of the products to the situation on site
- ⚡ Development of analytical procedures, e.g. for flowability or dosation rates of stannous sulphate
- ⚡ Continuous development of the stannous reduction technology in close cooperation with equipment manufacturers and scientific organisations

### **Made-to-measure deliveries**

- ⚡ Deliveries in variable package sizes, from tank truck to small plastic pails

### **High security of deliveries**

- ⚡ TIB Chemicals is the only manufacturer producing stannous sulphate at two independent sites. No matter what happens, supply security is guaranteed.
- ⚡ Well-stocked warehouses enable emergency supplies within short time frames
- ⚡ Safety stocks for our customers are no problem

### **Product safety on high level**

- ⚡ Investigations in product safety, e.g. for dust explosion properties
- ⚡ Corrosion tests
- ⚡ Sophisticated analytical controls to guarantee product quality
- ⚡ Collection of toxicological data for assurance of a high safety standard



*Modern plants for high product quality*



*Quality control in all sites*



*Well-stocked warehouses guarantee quick supplies*



Stannous sulphate plants in Mannheim ...

## Crystalline or powder form

### Same efficiency, different application advantages

TIB Chemicals produces stannous sulphate in two different modifications: crystalline or as a powder. Both products have the same chemical composition and the same reducing power; however, the physical properties are different. This shows in the flow and dosation properties of the products. Both products can be dosated easily and accurately with the same equipment. Furthermore, stannous sulphate powder can be conveyed pneumatically with great ease. Stannous sulphate crystalline exhibits less dusting due to the larger particle size distribution.

#### Physical properties

Property	SnSO <sub>4</sub> crystalline	SnSO <sub>4</sub> powder
Appearance	crystalline	powder
Bulk density	1.4-1.8 g/ml	0.8-1.2 g/ml
Tap density	approx. 2 g/ml	approx. 1.6 g/ml
Particle size distribution	D50 = 50-65 µm	D50 = 10-15 µm
BET surface	approx. 0.06 m <sup>2</sup> /g	approx. 1.2 m <sup>2</sup> /g

#### Chemical properties

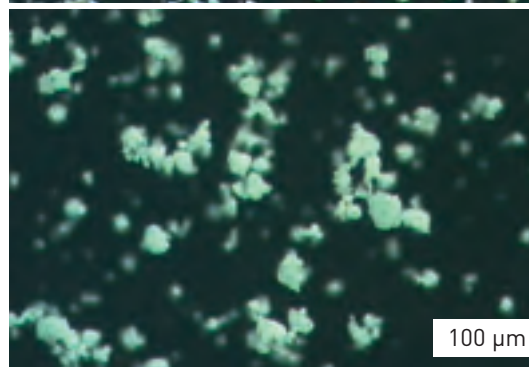
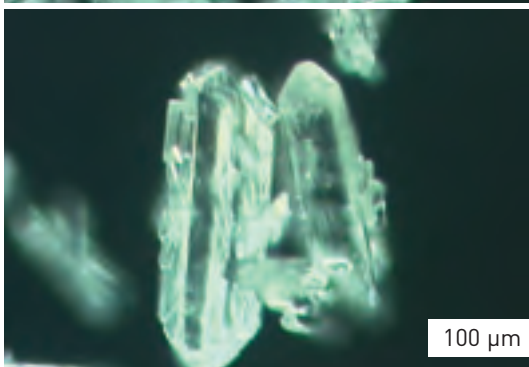
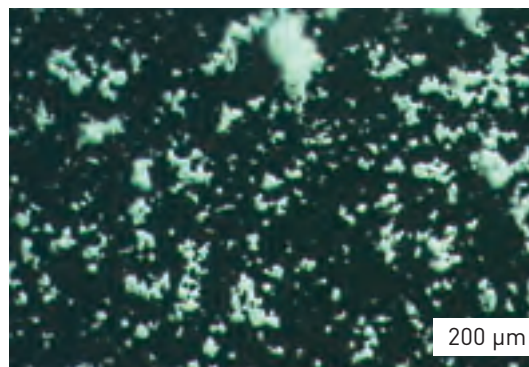
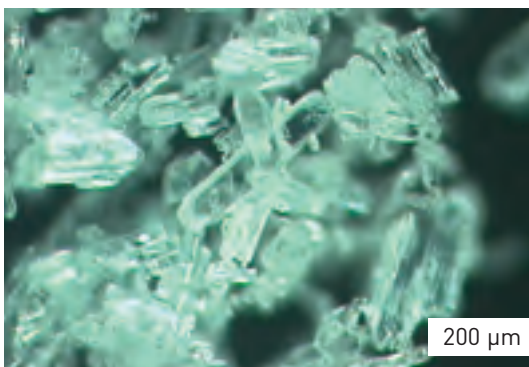
SnSO <sub>4</sub> content	> 97.7 %
Sn(II) content	54.5 ± 0.5 %
Sn total content	> 54.5 %
Free H <sub>2</sub> SO <sub>4</sub>	< 0.5 %
Water content	< 0.5 %
Solubility	clear/opalescent in 1 % H <sub>2</sub> SO <sub>4</sub>



... and in San Luis Potosi, Mexico

### Products with diverse crystal structures

Different drying technologies lead to different crystal structures. This is shown by the microscopic photographs below.



#### Stannous sulphate crystalline

Shows typical crystal needles which can grow to larger agglomerates

#### Stannous sulphate powder

consists of globular, porous aggregates which are built up by very small crystallites

REDOX L60 in action



## Solutions for all technical requirements

Different situations and technical requirements on site ask for a range of diverse products. TIB Chemicals has developed a portfolio of chromate reducers based on self-produced tin chemicals. This portfolio takes care of the different types of equipment and dosation technologies and ensures that for each application the right product is available. Our Research and Development Departments are working continuously on new and better solutions. Special requests are very welcome.

Product overview				Cement manufacturing	Admixtures	Manufacturing of additives
Product	Appearance	Sn(II) content	Bulk density/density			
Stannous sulphate crystalline	White crystals	54.5 %	1.4-1.8 kg/l	■	■	■
Stannous sulphate powder	White powder	54.5 %	0.8-1.2 kg/l	■	■	■
Stannous sulphate solution	Liquid	10 %	1.2 kg/l	■		■
REDOX S10	Grey-green powder	5 %	0.5-0.7 kg/l	■	■	
REDOX S80	Grey powder	43 %	0.8-1.2 kg/l	■	■	
REDOX S95	Light grey powder	53 %	1.7-2.3 kg/l	■	■	
REDOX L60	Dispersion	32 %	1.6-1.9 kg/l	■		
Stannous chloride dihydrate	White crystals	52 %	Approx. 1.6 kg/l			■
Stannous chloride solutions	Clear liquids	26 %	Depending on concentration	■		■



Cement mill

Storage stability	Packaging	Remarks
2 years 6 months	25 kg bags, 25 kg drums 1000 kg big bags	Highly efficient chromate reducing agent with good flowability and dosation properties
2 years 6 months	25 kg drums 800 kg big bags	Low abrasion in dosation equipment, recommended for pneumatic conveying
6 months	1000 kg IBC, 24 tons tank truck	SnSO <sub>4</sub> solution stabilised and non-stabilised available, recommended only for low Cr(VI) levels
2 years 6 months	25 kg bags, 25 kg drums 500 kg big bags	Recommended for dosation on FeSO <sub>4</sub> equipment, easy dosation in dry mix applications
2 years 6 months	25 kg drums 1000 kg big bags	Easy dosation in dry mix applications, reduced hygroscopicity, optimal flow properties
2 years 6 months	25 kg drums 1000 kg big bags	Efficient reducing agent with good flow properties for dry mix applications
6 months	1450 kg IBC	Low viscosity, stable dispersion for easy dosation with pumps
1 year	25 kg drums	Raw material for formulation of chromate reducers
6 months	1000 kg IBC	Easy dosation possible, in different concentrations, available with and without stabilisation



## The only manufacturer in Europe

TIB Chemicals has been producing tin chemicals since 130 years and today belongs to the leading manufacturers of inorganic tin chemicals in the western world.

Since 1970, we produce stannous sulphate. Right from the beginning, Goldschmidt – now TIB Chemicals – has relied on innovative technologies for manufacturing tin chemicals. Goldschmidt developed an electrochemical process for stannous sulphate solutions, which were crystallized to the solid form. The electrochemical process enabled the production of highly pure products that could not be achieved by chemical processes. This technical advantage made Goldschmidt's stannous sulphate the quality standard in industry, which was the straightedge for competition. This is also one of the reasons why today TIB Chemicals is the only manufacturer of solid stannous sulphate in Europe.

To further improve the quality of our stannous sulphate products, TIB Chemicals continuously explores new technical territories. At the beginning of 2001, the production of stannous sulphate solutions started at our Mannheim site, in newly designed electrolytic cells. The quickly increasing demand for solid stannous sulphate persuaded Goldschmidt in 2005 to erect a new plant in Mannheim, in addition to the expansion of the Mexican site. Once again new technologies were applied. Instead of the well-established crystallisation procedure for product drying, a new cost-efficient spray drying process was introduced.

In 2007, TIB Chemicals put new equipment into operation for the manufacture of formulated stannous sulphate products.

Today, TIB Chemicals operates two large and modern plants in Germany and Mexico and is well prepared for future challenges.





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