

# Sulphur Chemicals

specific and versatile





## 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.

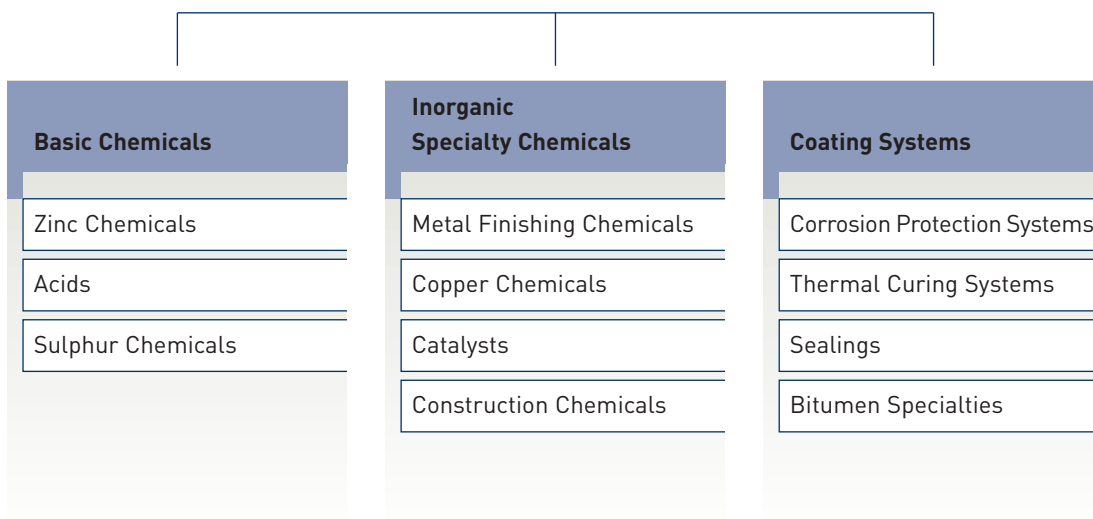


*TIB Chemicals successfully passed certification for the standards according to ISO 9001:2000.*





## 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 **Sulphur Chemicals**.



## Pure raw materials for highest quality

Our sulphur chemicals plant produces a wide variety of products, some of them in several versions, for many different applications. The range of products covers pre-formulated fixing salts as well as the individual ingredients necessary for analogous photography, ammonium thiosulphate for an immediately effective but also long-term fertilisation, and ammonium bisulphite which is used for the production of food additives or as an oxygen scavenger for crude oil extraction.

Our sulphur chemicals support our customers' production processes and increase the effectiveness of the manufactured goods in many different applications.

## Individual solutions for individual demands

We supply high-quality standard products in addition to individual solutions. On demand, we also develop components and formulations for new as well as for approved applications, in cooperation with our customers.

Besides our own production, we accept toll manufacturing orders, upon request with customer-owned packaging and labelling.



*Essential details ...*



*... permanently conserved*



*Agro N Fluid for use during the flowering time*



## High-quality products at attractive prices

Since decades, our products have been of constant first-class quality. Yet, we are able to offer our products at attractive prices, as we manufacture many of the ingredients in our own factories.

Our sulphuric acid plant provides, for example, sulphur dioxide (SO<sub>2</sub>), an important resource for the production of our sulphur chemicals. Thus, this primary material is always available in the requested quality.

## Flexible deliveries for all demands

Our deliveries are carried out according to our customers' demands. We deliver in different packaging types, we do partial shipments on call, or we provide our products ex works – In any case we will find the best possible option.

We guarantee short processing times. Supported by our long-time partners, we are able to provide the competent and reliable logistical service that our customers expect from us.



*Sulphites as bleaching agents ...*



*... and to support the barm formation*





## Thiosulphates – for long-lasting photographs

Our sulphur chemicals allow fast fixing of all analogous photographs – colour as well as black & white, manually as well as automatically in developing machines.

Colour films, photographic papers, reproductions or X-ray films – Fixing baths with thiosulphates made by TIB Chemicals enhance the reaction. For the photographic industry, we manufacture pre-formulated fixing salts according to individual recipes, but we also deliver the necessary individual ingredients.

### **Ammonium hydrogen sulphite solution approx. 70 % Ammonium bisulphite (ABS) – $\text{NH}_4\text{HSO}_3$**

$\text{SO}_2$  content: 42–47 %

For the preparation of rapid fixer solutions.

### **Ammonium sulphite solution approx. 35 %**

$(\text{NH}_4)_2\text{SO}_3$  content: 33–40 %

For the preparation of rapid fixer solutions  
and as a cache in fixing baths.

### **Ammonium thiosulphate crystals**

Active content as  $(\text{NH}_4)_2\text{S}_2\text{O}_3$ : min. 98 %

For the preparation of rapid fixing salts. Due to a particular production process, our ATS crystals have an improved stability and, additionally, a lower tendency to cake.

### **Ammonium thiosulphate solution approx. 60 % – photographic quality (ATS)**

$(\text{NH}_4)_2\text{S}_2\text{O}_3$  content: 58–61 %

For the preparation of rapid fixer solutions.

### **Ammonium thiosulphate mixtures**

**ATS 80/20:**  $(\text{NH}_4)_2\text{S}_2\text{O}_3$  content: 78–82 %

$\text{Na}_2\text{S}_2\text{O}_3$ : 18.5–21.5 %

**ATS 90/10:**  $(\text{NH}_4)_2\text{S}_2\text{O}_3$  content: 88–92 %

$\text{Na}_2\text{S}_2\text{O}_3$ : 8–12 %

For the preparation of rapid fixing salts.

### **Fixing salt**

$(\text{NH}_4)_2\text{S}_2\text{O}_3$  content: 74–78 %

Pre-formulated fixing salt for the preparation of fixing baths.

### **Potassium sulphite solution approx. 45 %**

$\text{K}_2\text{SO}_3$  content: 44.5–45.5 %

For the treatment of medical X-ray photos.

For the preparation of developers.

### **Potassium thiosulphate solution approx. 50 %**

$\text{K}_2\text{S}_2\text{O}_3$  content: 48.5–51.5 %

For the preparation of fixing baths.

### **Sodium thiosulphate**

**Crystals –  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5 \text{H}_2\text{O}$**

Content: min. 99 %

**Anhydrous –  $\text{Na}_2\text{S}_2\text{O}_3$**

Content: min. 98 %

For the preparation of fixing baths.

### **TIB Chrome 22 – $\text{C}_6\text{H}_{14}\text{O}_2\text{S}_2$**

2,2-Ethylene-dithio-diethanol

Content: min. 99 %

For the production of colour developers.

For silver complexation.



# ATS und KTS – for effective fertilisation

Among the sulphur fertilisers, **ammonium thiosulphate (ATS)** offers the highest sulphur content. Furthermore, ATS can be mixed with other fertilisers in any required proportion. Through the enrichment of urea fertilisers with ATS, significantly higher nitrogen-sulphur concentrations can be achieved compared to other liquid fertilisers.

Our ATS-Ammonia-Nitrate-Urea (UAN) solution is immediately effective but also has long-term effects. This is because ATS contains sulphur in two different bonding forms. The sulphate is immediately available for the plant, whereas the sulphur, which is transformed to sulphate by oxidation, serves in the soil as a long-term depot and can feed the plant over a longer period. As ATS is readily mixable with other agents, it can be brought out in only one working process, thus saving time and costs.

**Agro N Fluid** offers two significant advantages: It is highly efficient and well soluble in water. It can be dissolved at any concentration and applied according to the fruit grade. The solution can be quickly and easily sprayed, resulting in optimal results for our customers.

As plants cannot decompose the potassium silicates available in the soil, it is necessary to supply potassium via fertiliser. Potassium, and therewith **potassium thiosulphate (KTS)**, enhances wood formation and improves the plant statics. It further increases water absorption by the plant cells.

**Agro N Fluid**  
ATS content: 52–53 %  
Total nitrogen content: approx. 15 %  
Sulphur content: approx. 22 %

Agro N Fluid is a highly efficient, completely water-soluble N-fertiliser for pomiculture. Depending on the fruit grade and the bloom strength, it is applied from the beginning of flowering until maximum flowering is achieved. Agro N Fluid is available as a pink-coloured solution, in canisters and in drums.

Please contact us for further information about the best spraying time and optimum quantities.

**ATS solution – Agro with 1 % UAN**  
12 % nitrogene, 26 % sulphur  
We mix our standard solution with approx. 1 % UAN for a more temperature-independent storage.

ATS is an additive for liquid fertilisers. In combination with Ammonia-Nitrate-Urea solution (UAN), the active agent is suitable mainly for the fertilisation of rape, cereals, sugar beets and for grassland. Application to other cultures (potatoes, maize) is also possible.

**Potassium thiosulphate solution approx. 50 %**  
K<sub>2</sub>S<sub>2</sub>O<sub>3</sub> content: 48.5–51.5 %  
K<sub>2</sub>O content: approx. 25 %  
Sulphur content: approx. 17 %

KTS is an additive for potassium-based liquid fertilisers in case of a potassium deficit, for example during periods of rapid plant growth or during flowering, and for the fertilisation of chloride-sensitive plant cultures such as viniculture.

ABS for the production  
of caramel colour



## ABS, NBS, AS and KS – for state-of-the-art nutrition

For the processing of sugar beets and for the production of caramel colour, for viniculture or for vegetable gardening: ammonium hydrogen sulphite (ABS), sodium hydrogen sulphite (NBS), ammonium sulphite (AS) and potassium sulphite (KS) lead to optimal results and efficient working processes for our customers.

Both our standard products and the individual formulations are characterised by constant high quality, achieved through our high demands regarding the required ingredients and through our long-time production experience.

### Ammonium hydrogen sulphite solution approx. 70 % Ammonium bisulphite (ABS) – $\text{NH}_4\text{HSO}_3$

Standard concentration:  $\text{SO}_2$  content: 42–47 %  
Upon request, we can also deliver in other concentrations or with other specification parameters.

ABS is used as a catalysator for the production of the food additive **E 150 d**.

During the processing of sugar beets, our ABS improves the colour of the resulting juice.

During wine production, the solution supports the barm formation.

### Ammonium sulphite solution approx. 35 %

$(\text{NH}_4)_2\text{SO}_3$  content: 33–40 %

Like the ABS solution, our AS solution improves the colour of the juice produced during the processing of sugar beets and it supports the barm formation during wine production.

### Potassium sulphite solution approx. 45 %

$\text{K}_2\text{SO}_3$  content: 44.5–45.5 %

Potassium sulphite is used for the production of the food additive **E 224**. **E 224** is a preservative agent for various foods. Furthermore, potassium sulphite supports the barm formation during wine production.

### Sodium hydrogen sulphite solution approx. 38–40 % Sodium bisulphite solution (NBS)

$\text{NaHSO}_3$  content: 38–40 %

During the processing of sugar beets, our NBS aids in avoiding unwanted colourations.

Furthermore, the solution is used for the production of starch and the food additive **E 222**. **E 222** is used as a preservative, as antioxidant and as colour stabiliser, for example in dried fruits, fruit juices and jam.





## ABS and TIB Stim – reduce corrosion during crude oil extraction

Ammonium hydrogen sulphite solution (ABS) is an important component of a comprehensive corrosion protection programme.

Continuously injected at the pump station, **ABS** is an effective corrosion protector when seawater is used for crude oil extraction. ABS binds the oxygen contained in the seawater. Thereby, the corrosion effect is significantly reduced and the appliances involved remain functional for a longer time.

Upon request, we produce this solution also with added nickel or cobalt (so-called catalysed ABS).

**TIB Stim** is completely water soluble and remains stable also at high temperatures and high acid concentrations. These characteristics make TIB Stim a very effective agent for controlling the iron content in acidic formulations used in modern oil extraction.

### Ammonium hydrogen sulphite solution approx. 70 % Ammonium bisulphite (ABS) – $\text{NH}_4\text{HSO}_3$

SO<sub>2</sub> content: 42–47 %.

ABS binds the oxygen contained in the drilling fluids (for example seawater) in a harmless chemical reaction; thus, the oxygen is no longer available for corrosive reactions (redox reaction)

### Ammonium hydrogen sulphite solution approx. 70 % as catalysed version (ABS catalysed)

with added nickel or cobalt

In this reaction, nickel and cobalt act as catalysts.

### TIB Stim

**40 WLT:** Stannous chloride: 39–42 %

**50:** Stannous chloride: 49–52 %

Our solution is an effective reducing agent for the removal of foreign metallic materials that may be formed in the pipes by corrosion and which may impede the oil extraction (Fe(III)reduction).

Depending on the specific requirements, both products are also available in lower concentrations and with defined analysis values.





## Sulphides – for high-quality leather

**Sulphides** are essential ingredients for the manufacture of high-quality leather. They shorten the depilation process without any harmful effects on the leather quality. Both the liveness and the original texture of the leather are maintained.

**Unifyl B** gives the leather during the tanning process a soft amplitude, a good rotundity and a soft grip. The leather becomes homogeneous and lends itself better for processing.

**Unislip** avoids the sticking together or ripping of the skins during processing. The working bins can be filled with up to 20 % more skins without the risk of cracks or pleats.

### Sodium sulphide concentrated flakes

Na<sub>2</sub>S content: 60–62 %

### Sodium hydrogen sulphide concentrated flakes

NaHS content: 67–72 %

Na<sub>2</sub>S and NaHS flakes are used during the liming process. They denature proteins (the hair on the skins) for a better removal from the skins. Incomplete removal results in a hard, tinny leather. The tanning process aims at the pulping of the skin and the removal of both the hair and the epidermis. The use of sulphides results in an easier hair removal and an optimal swelling of the skin.

### Sodium tetrasulphide solution 40 %

Na<sub>2</sub>S<sub>4</sub> content: 38–45 %

Smoothing additive for leather processing.

### Unifyl B

is a filler material similar to protein, which is used mainly for the tanning of soft leather but also for chrome-, vegetable- and combined tanning of leather.

### Unislip

Unislip avoids damage of the skins caused by friction and knotting (e.g. sticking and ripping), while not chemically reacting with and binding to the leather.

Unislip improves the leather's tendency to slide and achieves a higher evenness, mainly during the tanning process. Unislip is well soluble in water and can easily be washed out again. In addition, it has a high compatibility.



#### ATS Agro 20 N

Thiosulphate as ATS: approx. 90 %

Nitrogen: min. 20 %

Sulphur: approx. 39 %

- ⚡ as an additive in the fertiliser industry, particularly for pomiculture

#### Fixing salt

$[\text{NH}_4]_2\text{S}_2\text{O}_3$  content: 74–78 %

- ⚡ for the preparation of fixing baths in the photographic industry

#### Potassium sulphite solution approx. 45 %

$\text{K}_2\text{SO}_3$  content: 44.5–45.5 %

- ⚡ for the treatment of medical X-ray photos
- ⚡ for the preparation of developers
- ⚡ as a reducing agent in the printing industry
- ⚡ for the support of barm formation during wine production
- ⚡ for the manufacture of the food additive E 224

#### Potassium thiosulphate solution

$\text{K}_2\text{S}_2\text{O}_3$  content: 48.5–51.5 %

$\text{K}_2\text{O}$  content: approx. 25 %

Sulphur content: approx. 17 %

- ⚡ for the preparation of fixing baths
- ⚡ as an additive for liquid fertilisers

#### Sodium hydrogen sulphide concentrated flakes

$\text{NaHS}$  content: 67–72 %

- ⚡ for the liming process in the tanning industry
- ⚡ for the precipitation of heavy metals

#### Sodium hydrogen sulphide solution approx. 30 %

$\text{NaHS}$  content: 29–31 %

#### Sodium hydrogen sulphide solution approx. 40 %

$\text{NaHS}$  content: 39–41 %

- ⚡ for the manufacture of thioglycolic acid
- ⚡ for ore flotation
- ⚡ as reducing agent, for example for the colouring of textiles
- ⚡ for wastewater treatment (precipitation of heavy metals)
- ⚡ for the manufacture of luminous pigments

#### Sodium hydrogen sulphite solution approx. 38–40 %

##### Sodium bisulphite solution (NBS)

$\text{NaHSO}_3$  content: 38–40 %

- ⚡ for fibre production
- ⚡ as a bleaching agent, for example in the paper and pulp industry
- ⚡ for the decomposition of raw materials
- ⚡ for starch production
- ⚡ for the manufacture of the food additive E 222
- ⚡ as antioxidant
- ⚡ as colour stabiliser
- ⚡ as reducing agent in wastewater treatment
- ⚡ for the manufacture of fabric softeners

#### Sodium sulphide concentrated flakes 60–62 %

$\text{Na}_2\text{S}$  content: 60–62 %

- ⚡ for the liming process in the tanning industry
- ⚡ for the manufacture of sulphur-based colours and pigments
- ⚡ for the manufacture of titanium dioxide
- ⚡ for wastewater treatment (precipitation of heavy metals)
- ⚡ for ore flotation
- ⚡ as reducing agent, e.g. for the colouring of textiles

#### Sodium tetrasulphide solution

Standard concentration: 40 %

$\text{Na}_2\text{S}_4$  content: 38–45 %

- ⚡ for the manufacture of sulphur-based colours
- ⚡ for the manufacture of lubricants
- ⚡ as flotation agent
- ⚡ for wastewater treatment
- ⚡ for sludge treatment
- ⚡ for the removal of metals from fumes washing water
- ⚡ for metal colouring
- ⚡ as antioxidant
- ⚡ for the cleaning of galvanic baths

#### Sodium thiosulphate crystalline – $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5 \text{H}_2\text{O}$

Content: min. 99 %

#### Sodium thiosulphate anhydrous – $\text{Na}_2\text{S}_2\text{O}_3$

Content: min. 98 %

- ⚡ for the preparation of fixing salts in the photographic industry
- ⚡ as dechlorinating agent, for example in the textile industry and in wastewater treatment (so-called anti-chlor)
- ⚡ for the manufacture of bath salts
- ⚡ for chrome-tanning in the leather industry
- ⚡ for the extraction of silver chloride from silver ore
- ⚡ for the manufacture of gold and silver baths for the galvanic industry
- ⚡ for the determination of the iodine value (analytical chemistry)

#### TIB Chrome 22 – $\text{C}_6\text{H}_{14}\text{O}_2\text{S}_2$

2,2-Ethylene-dithio-diethanol

$\text{HO}-\text{CH}_2-\text{CH}_2-\text{S}-\text{CH}_2-\text{CH}_2-\text{S}-\text{CH}_2-\text{CH}_2-\text{OH}$

Content: min. 99 %

- ⚡ for the manufacture of colour developers
- ⚡ as so-called catalyst poison in vitamin production
- ⚡ for the complexation of silver

#### TIB Stim

40 WLT: Stannous chloride: 39–42 %

50: Stannous chloride: 49–52 %

- ⚡ as reducing agent in oil extraction for the removal of foreign metallic materials (Fe(III)reduction)

#### Unifyl B

- ⚡ as a filler for use during the tanning process of soft leather as well as for chrome-, vegetable- and combined tanning of leather

#### Unislip

- ⚡ for use during liming to avoid damage of the skins and to improve the evenness (also during tanning)



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## For many different applications – our products at a glance

Be it for the colouring of textiles or for the production of luminous pigments, as a bleaching agent in the paper and pulp industry or for wastewater treatment: Sulphur chemicals made by TIB Chemicals achieve optimal results in many different applications.

### Agro N Fluid

ATS content: 52–53 %  
 Total nitrogen content: approx. 15 %  
 Sulphur content: approx. 22 %

- ⚡ as nitrogen fertiliser for pomiculture

### Ammonium hydrogen sulphite solution approx. 70 %

#### Ammonium bisulphite (ABS) – $\text{NH}_4\text{HSO}_3$

$\text{SO}_2$  content: 42–47 %

- ⚡ for the preparation of rapid fixer solutions
- ⚡ in the processing of sugar beets
- ⚡ as a catalyst for the production of caramel colour
- ⚡ for the manufacture of the food additive E 150 d
- ⚡ for the support of barm formation during wine production
- ⚡ as an oxygen scavenger during oil extraction
- ⚡ as a reducing agent for fibre production
- ⚡ as a bleaching agent, for example in the paper and wood industry
- ⚡ as a reducing agent for keratin
- ⚡ as a preservative agent in the cosmetics industry

### Ammonium hydrogen sulphite solution approx. 70 % as a catalysed version (ABS catalyzed)

with added nickel or cobalt

- ⚡ as an oxygen scavenger during oil extraction

### Ammonium sulphide solution

$(\text{NH}_4)_2\text{S}$  content: 40–48 %

- ⚡ as a catalyst in chemical production plants
- ⚡ for qualitative analysis in laboratories

### Ammonium sulphite solution approx. 35 %

$(\text{NH}_4)_2\text{SO}_3$  content: 33–40 %

- ⚡ for the preparation of rapid fixer solutions
- ⚡ as a cache in fixing baths
- ⚡ in the processing of sugar beets
- ⚡ for the support of barm formation during wine production
- ⚡ as a bleaching agent, for example in the paper industry
- ⚡ as a decomposition agent (for example for wood)
- ⚡ as a reducing agent in the chemical industry
- ⚡ as a preservative agent in the cosmetics industry

### Ammonium thiosulphate crystals (ATS cryst)

Active content as ATS  $(\text{NH}_4)_2\text{S}_2\text{O}_3$ : min. 98 %

- ⚡ for the preparation of rapid fixing salts in the photographic industry

### Ammonium thiosulphate solution approx. 60 % (ATS)

$(\text{NH}_4)_2\text{S}_2\text{O}_3$  content: 58–61 %

- ⚡ for the preparation of rapid fixer solutions in the photographic industry

### Ammonium thiosulphate solution Agro with 1 % UAN

nitrogen content: 12 %

sulphur content: 26 %

- ⚡ as an additive for the manufacture of liquid fertilisers

### Ammonium thiosulphate mixtures 80/20 and 90/10

- ⚡ for the preparation of rapid fixing salts in the photographic industry

