Hydrosulfite Types

Hydrosulfite Conc. BASF
Hydrosulfite Conc. BASF N
Hydrosulfite F Conc. BASF
Hydrosulfite FE Conc. BASF

Reducing agents for the textile industry
**Nature**

Anhydrous sodium dithionite (Na$_2$S$_2$O$_4$), technical grade, stabilized

**Physical form**

Powder

**Storage stability**

Hydrosulfite Conc. BASF and Hydrosulfite Conc. BASF N have a shelf life of up to 24 months.

Hydrosulfite F Conc. BASF and Hydrosulfite FE Conc. BASF have a shelf life of up to 12 months.

**Storage**

All Hydrosulfite types must be stored in closed containers, and the containers must be protected from moisture.

If the products are not stored under suitable conditions or if moist scoops are used to take product out of the containers, or if moisture enters a containers, the product decomposes. The moist product becomes lumpy and it develops heat and gases (with the odour of sulphur dioxide), resulting finally in spontaneous combustion, particularly in the presence of atmospheric oxygen (cf. "Action in the case of spontaneous combustion" on page 7).

**Handling of partially decomposed product**

Hydrosulfite that has become lumpy must immediately be removed from the drum by passing it through a coarse sieve, after which the lumps must be dissolved in water. Only the residual, powdery product is fit for use.

**Impurities**

BASF’s Hydrosulfite types are practically free of heavy metals (below the level of detectability).
Properties

Physical and chemical data

Appearance
White powder

Solubility
Readily soluble in dilute alkalis: approx. 250 g/l at 20 °C. The solution is water-white without any turbidity.

Stability of the solutions
Hydrosulfite solutions have a strong reducing action and bind atmospheric oxygen. 1 m³ of air binds roughly 1.7 kg of hydrosulfite. Hydrosulfite reacts with atmospheric oxygen many times more rapidly than its own relatively slow decomposition. In working with dissolved hydrosulfite, contact with air must therefore be avoided as far as possible. In acid media, hydrosulfite decomposes to form mainly sulphur dioxide, sulphur and other sulphur-containing compounds. Alkalis have a stabilizing action on solutions of hydrosulfite, particularly when the solution is exposed to air.
**pH value**

(50 g/l in water)

<table>
<thead>
<tr>
<th>Hydrosulfite</th>
<th>Conc. BASF and BASF N</th>
<th>7 – 9</th>
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<tbody>
<tr>
<td>Hydrosulfite F</td>
<td>Conc. BASF and BASF FE</td>
<td>6 – 7</td>
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</table>

For pH measurements, oxygen must be completely excluded. The measurement must be carried out under nitrogen and with air-free water.

**Bulk density**

The Hydrosulfite types vary in their bulk density. This must be taken into consideration in volumetric metering.

<table>
<thead>
<tr>
<th>Hydrosulfite</th>
<th>Conc. BASF</th>
<th>1300 – 1400 g/dm³</th>
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<tbody>
<tr>
<td>Hydrosulfite Conc. BASF N</td>
<td>1150 – 1250 g/dm³</td>
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</tr>
<tr>
<td>Hydrosulfite F Conc. BASF and BASF FE</td>
<td>750 – 900 g/dm³</td>
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**Action**

In the textile industry, hydrosulfite is used mainly as a reducing agent for vat dyes and for the reductive clearing of dyeings on polyester. It is also suitable for stripping dyeings and for cleaning dye becks, dyeing machines, etc.

**Preparation of hydrosulfite solutions**

Hydrosulfite solutions are best prepared immediately before use. The alkali should be added to the bath first, after which the hydrosulfite powder is strewed into the bath with stirring.

The process can be carried out very economically by using a dissolving station and obtaining the product in containers.

This method has the following advantages:

- no dusting
- less risk of fire
- lower product wastage
In this method, a solution is prepared containing approx. 130 g/l of hydro-
sulfite together with the requisite amount of alkali (260 ml/l of NaOH
38 °Bé). The solution is then piped to the department where it is required.
This concentrated reducing agent solution only has to be diluted and is
then ready for use.

Applications

As a reducing agent for vat dyes

The main field of application for hydrosulfite is the reduction of vat dyes in
order to convert them into a water-soluble form with affinity for the fibre.
The vat dyes are either reduced direct in the dyebath or, as in pigmenta-
tion dyeing processes, pigment padding processes, and two-phase print-
ing, they are first applied to the textile material in an insoluble form and
then subsequently developed with hydrosulfite and caustic soda.

The reducing action of hydrosulfite depends on the temperature and the
pH. Under the conditions of an IN vat, the redox potential is approx.
–1000 mV. This potential is sufficient to convert all commercially available
vat dyes into the water-soluble sodium leuco compound, because all of
these dyes are reduced in the potential range of approx. –650 to –950 mV.

The dye must remain completely vatted throughout the whole dyeing pro-
cess. However, since the hydrosulfite is continuously decomposed by the
action of air, with consumption of alkali, the vat must always contain an
excess of hydrosulfite and caustic soda.

The presence of this excess must be ensured throughout the entire
dyeing process. The simplest method is to check the alkalinity with
phenolphthalein paper, and the reducing action with Vat Yellow paper.

The amounts of hydrosulfite necessary for the various dyeing processes
are indicated in our pattern card for Indanthren® dyes, MK/T 266.

For the reductive clearing of dyeings

Dyeings and prints produced with disperse dyes on polyester fibres,
triacetate fibres, and various fibre blends are cleared with alkaline
hydrosulfite solutions in order to obtain the best possible standard of
fastness.

4–8 ml/l caustic soda 38 °Bé
2–3 g/l Hydrosulfite Conc. BASF
0.5 g/l Uniperol® EL
20 min at 70–80 °C

For stripping or partial stripping of dyeings and prints

Hydrosulfite is suitable for the reductive stripping of dyeings and prints
produced with vat, direct, and reactive dyes on cellulosic fibres.

Vat dyes

In package systems and winches

Set the bath at 75–80 °C with

0.5 g/l Dekol® S
2–3 g/l Setamol® WS
10–15.5 ml/l caustic soda 38 °Bé
5 g/l Hydrosulfite Conc. BASF
1 g/l glucose
(for vat dyes that are sensitive to over-reduction)
2–3 ml/l Albigen® A

and treat the textile material for 3 min at 75–80 °C (with indirect steam).
Ensure that a fully vatted state is maintained.
Rinse with

1 ml/l caustic soda 38 °Bé
1 g/l Hydrosulfite Conc. BASF
1 g/l Setamol WS

for 5 min at room temperature, and then rinse with cold water with overflow. If necessary, then oxidize at 55 °C with

1 – 2 ml/l hydrogen peroxide 35 %.

On the jig

Liquor ratio 5 : 1 for pale shades and up to 10 : 1 for dark shades

Set the bath at 75 – 80 °C with

1 g/l Dekol S
3 – 5 g/l Setamol WS
20 ml/l caustic soda 38 °Bé
10 g/l Hydrosulfite Conc. BASF
1 g/l glucose
(for dyes that are sensitive to over-reduction)
2 – 3 g/l Albigen A

and treat the dyeing over 4 ends, but never longer than for 40 min at 75 – 80 °C (with indirect steam). Ensure that a fully vatted state is maintained.

As the dye-Albigen A addition compounds have low solubility (with formation of tarry deposits under certain conditions), short liquor ratios and long treating times must be avoided. If necessary, the stripping process should be repeated. The goods are then rinsed with cold water with overflow, and then oxidized with 1–2 ml/l of hydrogen peroxide 35 % at 55 °C.

Direct dyes

1.5 g/l soda ash
2 g/l Hydrosulfite Conc. BASF
2 g/l Albigen A

30 – 60 min at 50 °C
followed by intensive rinsing.

Reactive dyes

15 ml/l caustic soda 38 °Bé
5 ml/l Hydrosulfite Conc. BASF
2 ml/l Albigen A

30 – 60 min at 60 – 80 °C
followed by intensive rinsing.

For cleaning dyeing machines and equipment

Alkaline solutions of hydrosulfite are used to remove dye residues from dyeing machines, mixing vessels, rollers, etc. The cleaning action of the solutions can be promoted by adding Albigen A or Uniperol AC.

Safety

When using this product, the information and advice given in our Safety Data Sheet should be observed. Due attention should also be given to the precautions necessary for handling chemicals.

Contact of the products with oxidizing agents (hydrogen peroxide, sodium chlorite, and sodium hypochlorite) must be avoided under all conditions. Hydrosulfite must always be kept at a safe distance away from these agents.

Action in the case of spontaneous combustion

See our Technical Information Bulletin TI/T 311 e of July 1997: Measures to be taken in the case of fire or accidents in transportation.
Note

The information submitted in this publication is based on our current knowledge and experience. In view of the many factors that may affect processing and application, these data do not relieve processors of the responsibility of carrying out their own tests and experiments; neither do they imply any legally binding assurance of certain properties or of suitability for a specific purpose. It is the responsibility of those to whom we supply our products to ensure that any proprietary rights and existing laws and legislation are observed.