In addition to our current product range of Ibuprofen grades, BASF offers Ibuprofen Sodium Dihydrate, which is a white to almost-white powder.

Ibuprofen Sodium Dihydrate is the sodium salt of Ibuprofen, belonging to the class of non-steroidal anti-inflammatory drugs (NSAIDs).

Ibuprofen Sodium Dihydrate is characterized by analgesic, antipyretic and anti-inflammatory properties, which is why it is used in the treatment of inflammatory conditions such as rheumatoid arthritis. Furthermore, it is used for treating mild and moderate pain, dysmenorrhoea, headache and fever.

1. Medical indication

Applications

Ibuprofen Sodium Dihydrate is mainly used for the following pharmaceutical formulations:

- Tablets
- Oral suspensions
- Suppositories
- Creams

Indications

Classified as NSAID, Ibuprofen Sodium Dihydrate is mainly used for treating pain, fever, and rheumatic disorders.

Ibuprofen Sodium Dihydrate is applied orally for treating headache, backache, toothache, algomenorrhea, influenza fever, arthralgia, ligamental pain, and pain after injuries/accidents/traumas. Marketed solid oral dosage forms are recommended for adults and teenagers.

In addition, Ibuprofen Sodium Dihydrate is widely used in suppositories. Furthermore, it is used locally for treating rheumatic disorders or sport injuries.

Contraindications

Contraindications for Ibuprofen Sodium Dihydrate are:

- Hypersensitivity against Ibuprofen or other APIs belonging to the group of NSAIDs.
- Patients with a risk of allergic reactions (e.g. asthma, urticaria, rhinitis) after intake of acetylsalicylic acid or other NSAIDs.
- Active gastric ulcer and/or duodenal ulcer
- Gastrointestinal bleeding
- Pregnancy 3rd trimenon

Precaution

Oral intake of Ibuprofen Sodium Dihydrate in patients suffering from asthma (currently or in the past) goes ahead with the risk of causing bronchial spasms.

In addition, precaution is necessary when Ibuprofen Sodium Dihydrate is applied to patients suffering from:

- Colitis ulcerosa or past peptic ulcer
- Renal, liver, or cardiac insufficiency
- Blood coagulation disorders

Pharmacology

The mode of action is believed to involve the reversible inhibition of the enzyme cyclooxygenase (COX) which is responsible for the biosynthesis of prostaglandins (PGs) from arachidonic acid in the cellular membrane.

Prostaglandins are distributed in the various tissues and have, among other properties, a powerful effect on the smooth muscles.

In case of an inflammatory stimulus or blood flow disturbances, PGs are synthesized in increased amounts and sensitize the tissues to the action of other agents such as histamine and kinins. As a result, symptoms such as pain and inflammation appear.

Fever occurs by the influence of the PGs on the heat regulation centre in the hypothalamus. There they raise the normal body temperature of 37 °C.

The inhibitory action of NSAIDs on PG synthesis is also the most probable cause of gastrointestinal side effects.
PGs play an important role for physiological functions, like the synthesis of protective alkaline secretion in gastric mucosa cells. The inhibition of the PG synthesis can lead to a reduced protection of the gastric mucosa and may cause sickness, abdominal pain and ulcers.

Among the NSAIDs, Ibuprofen has the best benefit to risk profile and the lowest incidence of serious gastrointestinal adverse effects.

**Pharmacokinetics**

According to the literature, Ibuprofen Sodium Dihydrate dissolves more quickly in vitro and is absorbed into blood plasma more quickly than conventional Ibuprofen, whereas tolerability and safety profiles of the two APIs are comparable:


The above publication reflects four studies investigating the dissolution, plasma pharmacokinetics and safety of Ibuprofen Sodium Dihydrate versus conventional Ibuprofen with the following results:

- Ibuprofen Sodium Dihydrate dissolved significantly more rapidly at pH 1.2, 3.5 and 7.2 compared to conventional Ibuprofen.

- Ibuprofen Sodium Dihydrate reached the $t_{\text{max}}$ significantly earlier than conventional Ibuprofen.

- Ibuprofen Sodium Dihydrate showed significantly higher $c_{\text{max}}$ compared to conventional Ibuprofen.

- Ibuprofen Sodium Dihydrate was characterized by significantly higher mean plasma concentration (10 min post-dose) compared to conventional Ibuprofen.

$t_{\text{max}}$ is the necessary time until the maximum plasma concentration of a drug is reached; this is relevant for the drug onset. Generally, reaching the $t_{\text{max}}$ early is of great advantage for analgesic treatment.

As consequence of Ibuprofen Sodium Dihydrate dissolving quicker in vitro and reaching the $t_{\text{max}}$ earlier in vivo, also pain relief should be expected starting faster after oral intake of Ibuprofen Sodium Dihydrate, compared to conventional Ibuprofen.

According to the literature, the first signs of pain relief occurred significantly earlier in Ibuprofen Sodium Dihydrate treated patients, and pain intensity was reduced to half after 30 min for Ibuprofen Sodium Dihydrate compared to 57 min for conventional Ibuprofen. In summary, Ibuprofen Sodium Dihydrate causes faster and more efficient pain relief during the first hour after oral intake compared to conventional Ibuprofen:


### 2. Chemical information

**Name**

Ibuprofen Sodium Dihydrate

**Chemical name**

2-(4-isobutylphenyl)-propionate sodium dihydrate

**CAS-No.**

31121-93-4
Structural formula

Empirical formula
\[ C_{13}H_{17}O_2Na \times 2H_2O \]

Molecular weight
228.26 + 36.03 [g/mol]

Appearance
White to almost-white powder.

3. Grades

<table>
<thead>
<tr>
<th>PRD-No.</th>
<th>Ibuprofen Sodium Dihydrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>30260589</td>
<td></td>
</tr>
<tr>
<td>50 kg</td>
<td></td>
</tr>
<tr>
<td>5 kg</td>
<td></td>
</tr>
<tr>
<td>0.5 kg (sample)</td>
<td></td>
</tr>
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</table>

Retest period
See separate documentation: “Q&R PI (not for regulatory purposes)” available at BASF’s WorldAccount: https://worldaccount.basf.com (registered access).

4. Specification

5. Regulatory status
Currently there are no monographs describing Ibuprofen Sodium Dihydrate in the major Pharmacopoeias (USP, Ph. Eur., and JP).

E-DMF and US-DMF are both available.

6. Storage
Ibuprofen Sodium Dihydrate should be stored in the original, tightly sealed container. It should be placed in a well-ventilated room at ambient temperature, and protected from light.

The retest period of Ibuprofen Sodium Dihydrate is 24 months for material stored in the original, unopened container and according to our recommendations.

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January 2010