Silver sulfite crystallizes from aqueous solutions as the anhydrous salt Ag$_2$SO$_3$ (1). Numerical data on solubility of Ag$_2$SO$_3$ in water are scarce (2-4). In 1910, Baubigny (2) reported that the upper limit of the solubility is $1.60 \times 10^{-4}$ mol dm$^{-3}$, molarity, at 290 K. Rodin et al. (4) give a value of $8.1 \times 10^{-6}$ mol dm$^{-3}$ at 293 K. They also found a positive temperature coefficient of solubility. Data on the solubility product of Ag$_2$SO$_3$, defined as $K_{sp} (Ag_2SO_3) = [Ag^+]^2[SO_3^{2-}]$, are given by Chateau et al. (3) and Rodin et al. (4), viz. $1.5 \times 10^{-14}$ mol$^3$ dm$^{-6}$ at 298.2 K and $4.17 \times 10^{-15}$ mol$^3$ dm$^{-9}$, both molarity scale, at 293 K, respectively.

**TENTATIVE VALUES**

The solubility of Ag$_2$SO$_3$ in water at room temperature is approximately $1 \times 10^{-5}$ mol dm$^{-3}$ (molarity scale) ($3 \times 10^{-3}$ g/dm$^3$). The temperature coefficient of solubility is probably positive.

Silver sulfite is described to be soluble in excess of sulfurous acid or alkaline metal sulfites, forming complex ions, and readily soluble in acids, with decomposition (1).

**REFERENCES**

COMPONENTS:
1. Silver sulfite; Ag$_2$SO$_3$; [13465-98-0]
2. Water; H$_2$O; [7732-18-5]

ORIGINAL MEASUREMENTS:
Baubigny, H.

VARIABLES:
One temperature: 291 K

EXPERIMENTAL VALUES:
The author reports the solubility of silver sulfite in water at 16-19°C to be
4.74 x 10$^{-3}$ g in 100 cm$^3$ of soln (c(Ag$_2$SO$_3$) = 1.60 x 10$^{-4}$ mol dm$^{-3}$, compiler).
This value is said by the author to be a maximum value for the solubility of silver
sulfite because of a small impurity of Ag$_2$SO$_4$.

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:
Saturation method. Equilibrium was
established after 24 hr. An aliquot of the
supernatant solution was analysed
gravimetrically for silver (as the
chloride).

SOURCE AND PURITY OF MATERIALS:
Silver sulfite was precipitated by
bubbling sulfur dioxide through an
oxygen-free solution of silver nitrate.
The precipitate is said by the author to
be nearly free from silver sulfate.

ESTIMATED ERROR:
Temperature: ±1.5 K.

REFERENCES:
COMPONENTS:
1. Silver sulfite: \( \text{Ag}_2\text{SO}_3 \) [13465-98-0]
2. Water: \( \text{H}_2\text{O} \) [7732-18-5]

ORIGINAL MEASUREMENTS:
Chateau, H.; Durante, M.; Hervier, B.

VARIABLES:
One temperature: 298 K

PREPARED BY:
B. Engelen

EXPERIMENTAL VALUES:
The solubility product of \( \text{Ag}_2\text{SO}_3 \), defined as \( K_{sp}(\text{Ag}_2\text{SO}_3) = [\text{Ag}^+]^2[\text{SO}_3^{2-}] \), is reported to be \( K_{sp} = 1.5 \times 10^{-14} \text{ mol}^3 \text{ dm}^{-9} \) at 25°C.

AUXILIARY INFORMATION

METHOD APPARATUS/PROCEDURE:
The solubility product was determined by potentiometric measurements in the system \( \text{Hg/Hg}_2\text{Cl}_2/\text{KCl}_{\text{sat}}/\text{KNO}_3_{\text{sat}}/\text{NaHSO}_3+\text{AgNO}_3/\text{Ag} \) from the point of first precipitation of \( \text{Ag}_2\text{SO}_3 \) for various pH values. The pH was adjusted with \( \text{HNO}_3 \) and \( \text{HCl} \), respectively, and measured with a glass electrode.

SOURCE AND PURITY OF MATERIALS:
Commercial \( \text{Na}_2\text{SO}_3 \), \( \text{HNO}_3 \), \( \text{HCl} \), and \( \text{AgNO}_3 \) were used.

ESTIMATED ERROR:

REFERENCES:
**COMPONENTS:**
1. Silver sulfite; \( \text{Ag}_2\text{SO}_3 \); [13465-98-0]
2. Water; \( \text{H}_2\text{O} \); [7732-18-5]

**ORIGINAL MEASUREMENTS:**
Rodin, I.V.; Margulis, E.V.; Zhigur'yanova, S.A. 

**VARIABLES:**
Four temperatures: 293 - 363 K

**PREPARED BY:**
B. Engelen

**EXPERIMENTAL VALUES:**
The authors report the solubility of \( \text{Ag}_2\text{SO}_3\cdot\text{H}_2\text{O} \) in water at various temperatures, and its solubility product, defined as \( K_{S_0}(\text{Ag}_2\text{SO}_3\cdot\text{H}_2\text{O}) = [\text{Ag}^+]^2[\text{SO}_3^{2-}] = [\text{Ag}^+]^3 \).

<table>
<thead>
<tr>
<th>( t/\degree C )</th>
<th>( \text{mg Ag/dm}^3 )</th>
<th>( 10^5(\text{Ag}) )</th>
<th>( \text{mol dm}^{-3} )</th>
<th>( c(\text{Ag}_2\text{SO}_3) )</th>
<th>( 10^6 \text{mass} % )</th>
<th>( K_{S_0}(\text{Ag}_2\text{SO}_3) )</th>
<th>( 10^5c(\text{Ag}_2\text{SO}_3)^a )</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>1.74</td>
<td>1.61</td>
<td>2.38</td>
<td>4.17 x 10^{-15}</td>
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<tr>
<td>50</td>
<td>2.94</td>
<td>2.72</td>
<td>4.03</td>
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<tr>
<td>70</td>
<td>4.18</td>
<td>3.87</td>
<td>5.73</td>
<td>5.80 x 10^{-14}</td>
<td>1.94</td>
<td></td>
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</tr>
<tr>
<td>80</td>
<td>5.32</td>
<td>4.93</td>
<td>7.29</td>
<td>1.19 x 10^{-13}</td>
<td>2.47</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Calculated by the compiler from mg Ag/dm\(^3\).

**METHOD APPARATUS/PROCEDURE:**
The solubility of silver sulfite was studied by the isothermal saturation method. The experiments were done in closed flasks kept in a water thermostat, with mechanical stirring. The time required for saturation was 3 hr. Silver was determined colorimetrically.

**SOURCE AND PURITY OF MATERIALS:**
Silver sulfite was precipitated from \( \text{Ag}_2\text{SO}_4 \) solutions with \( \text{Na}_2\text{SO}_3 \). The mixture was stirred for 2 hr, then the precipitate was filtered off, washed with water and acetone, and dried in air at room temperature.

**ESTIMATED ERROR:**
Temperature: ±0.5 K.

**REFERENCES:**