Nickel sulfite crystallizes from aqueous solutions in the form of the hydrates NiSO$_3$·6H$_2$O [1344-81-0] at room temperature (1,2) and NiSO$_3$·3H$_2$O [77902-26-2], NiSO$_3$·5/2H$_2$O [77902-27-3], and NiSO$_3$·2H$_2$O [77902-28-4] above 40, 55, and 85°C, respectively (2). Besides the crystalline hydrates, amorphous nickel sulfite hydrate is formed very easily by precipitation of nickel salts with sulfites (2). Nickel sulfite, i.e. NiSO$_3$·6H$_2$O, is claimed to be nearly insoluble in water (3,4), readily soluble in sulfurous acid (3,4) and in other acids, with decomposition. Numerical data on the solubility of nickel sulfite were given by Margulis et al. (5), who report that the solubility of NiSO$_3$·5/2H$_2$O in water increases from 0.190 mass % of NiSO$_3$ (m(NiSO$_3$) = 0.0137 mol kg$^{-1}$) at 293 K to 0.286 mass % (0.0207 mol kg$^{-1}$) at 363 K. The data available may be around the correct order of magnitude, but a tentative value cannot be given.

REFERENCES

COMPONENTS:
1. Nickel(II) sulfite; NiSO₃; [7757-95-1]
2. Water; H₂O; [7732-18-5]

ORIGINAL MEASUREMENTS:
Margulis, E.V.; Rodin, I.V.; Gubieva, D.N.

VARIABLES:
Four temperatures: 293 - 363 K

EXPERIMENTAL VALUES:
The authors report the solubility of NiSO₃·5/2H₂O [77902-27-3] in pure water at 20, 50, 70, and 90°C.

<table>
<thead>
<tr>
<th>t/°C</th>
<th>NiSO₃ᵃ</th>
<th>m(NiSO₃)ᵃᵇ</th>
<th>NiSO₃ᶜ</th>
<th>m(NiSO₃)ᵇᶜ</th>
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</thead>
<tbody>
<tr>
<td>20</td>
<td>0.198</td>
<td>0.01430</td>
<td>0.190</td>
<td>0.01372</td>
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<tr>
<td>50</td>
<td>0.215</td>
<td>0.01553</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>70</td>
<td>0.254</td>
<td>0.01835</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>90</td>
<td>0.292</td>
<td>0.02110</td>
<td>0.286</td>
<td>0.02067</td>
</tr>
</tbody>
</table>

ᵃ From concentration of Ni²⁺.
ᵇ Calculated by the compiler.
ᶜ From the SO₃²⁻ concentration.

METHOD APPARATUS/PROCEDURE:
The solubility of nickel sulfite was determined from the concentration of Ni²⁺ in the saturated solution, and in some experiments also from the SO₃²⁻ concentration. The solution of nickel sulfite was carried out in deoxygenated distilled water (solid/liquid ratio 1:4) in closed flasks placed in a water thermostat, with mechanical stirring. Saturation was assumed when cNi stopped increasing with time. In all cases, 3 hr were sufficient for equilibrium. Nickel was determined colorimetrically, sulfite iodometrically.

SOURCE AND PURITY OF MATERIALS:
Nickel sulfite was synthesized by precipitation from a concentrated solution of the sulfite by adding Na₂SO₃ (105% of the stoichiometric quantity) at room temperature with mechanical stirring. The obtained sulfite precipitate was washed, using distilled water which had been deoxygenated by boiling to avoid oxidation of the sulfite.

ESTIMATED ERROR:
Temperature: ±0.5 K (authors).

REFERENCES: