

<p>COMPONENTS:</p> <ol style="list-style-type: none"> 1. Nickel(II) sulfite; NiSO_3; [7757-95-1] 2. Water; H_2O; [7732-18-5] 	<p>EVALUATOR:</p> <p>H.D. Lutz, Dept. of Chemistry, University of Siegen, FR Germany.</p> <p>February 1983.</p>
<p>CRITICAL EVALUATION:</p> <p>Nickel sulfite crystallizes from aqueous solutions in the form of the hydrates $\text{NiSO}_3 \cdot 6\text{H}_2\text{O}$ [1344-81-0] at room temperature (1,2) and $\text{NiSO}_3 \cdot 3\text{H}_2\text{O}$ [77902-26-2], $\text{NiSO}_3 \cdot 5/2\text{H}_2\text{O}$ [77902-27-3], and $\text{NiSO}_3 \cdot 2\text{H}_2\text{O}$ [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. $\text{NiSO}_3 \cdot 6\text{H}_2\text{O}$, 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 <i>et al.</i> (5), who report that the solubility of $\text{NiSO}_3 \cdot 5/2\text{H}_2\text{O}$ in water increases from 0.190 mass % of NiSO_3 ($m(\text{NiSO}_3) = 0.0137 \text{ mol kg}^{-1}$) at 293 K to 0.286 mass % ($0.0207 \text{ mol kg}^{-1}$) at 363 K. The data available may be around the correct order of magnitude, but a tentative value cannot be given.</p> <p>REFERENCES</p> <ol style="list-style-type: none"> 1. Klasens, H.A.; Perdok, W.G.; Terpstra, P. <i>Z. Kristallogr.</i> <u>1936</u>, 94, 1. 2. Lutz, H.D.; Eckers, W.; Engelen, B. <i>Z. Anorg. Allg. Chem.</i> <u>1981</u>, 475, 165. 3. Muspratt, J.S. <i>Justus Liebigs Ann. Chem.</i> <u>1844</u>, 50, 259. 4. Rammelsberg, C. <i>Ann. Phys. Chem.</i> <u>1846</u>, 67, 391. 5. Margulis, E.V.; Rodin, I.V.; Gubieva, D.N. <i>Zh. Neorg. Khim.</i> <u>1981</u>, 26, 2267; <i>Russ. J. Inorg. Chem. (Eng. Transl.)</i> <u>1981</u>, 26, 1220. 	

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<p>VARIABLES:</p> <p>Four temperatures: 293 - 363 K</p>	<p>PREPARED BY:</p> <p>H.D. Lutz</p>																									
<p>EXPERIMENTAL VALUES:</p> <p>The authors report the solubility of $\text{NiSO}_3 \cdot 5/2\text{H}_2\text{O}$ [77902-27-3] in pure water at 20, 50, 70, and 90°C.</p> <table border="1" data-bbox="205 564 1097 766"> <thead> <tr> <th>$t/^\circ\text{C}$</th> <th>NiSO_3^a mass %</th> <th>$m(\text{NiSO}_3)^{a,b}$ mol kg^{-1}</th> <th>NiSO_3^c mass %</th> <th>$m(\text{NiSO}_3)^{b,c}$ mol kg^{-1}</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>0.198</td> <td>0.01430</td> <td>0.190</td> <td>0.01372</td> </tr> <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> <p>a From concentration of Ni^{2+}.</p> <p>b Calculated by the compiler.</p> <p>c From the SO_3^{2-} concentration.</p>		$t/^\circ\text{C}$	NiSO_3^a mass %	$m(\text{NiSO}_3)^{a,b}$ mol kg^{-1}	NiSO_3^c mass %	$m(\text{NiSO}_3)^{b,c}$ mol kg^{-1}	20	0.198	0.01430	0.190	0.01372	50	0.215	0.01553	-	-	70	0.254	0.01835	-	-	90	0.292	0.02110	0.286	0.02067
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<p>METHOD APPARATUS/PROCEDURE:</p> <p>The solubility of nickel sulfite was determined from the concentration of Ni^{2+} in the saturated solution, and in some experiments also from the SO_3^{2-} 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 c_{Ni} stopped increasing with time. In all cases, 3 hr were sufficient for equilibrium. Nickel was determined colorimetrically, sulfite iodometrically.</p>	<p>SOURCE AND PURITY OF MATERIALS:</p> <p>Nickel sulfite was synthesized by precipitation from a concentrated solution of the sulfite by adding Na_2SO_3 (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.</p> <p>ESTIMATED ERROR:</p> <p>Temperature: ± 0.5 K (authors).</p> <p>REFERENCES:</p>																									