

<b>COMPONENTS:</b> 1. Strontium selenite; $\text{SrSeO}_3$ ; [14590-38-6] 2. Water; $\text{H}_2\text{O}$ ; [7732-18-5]	<b>ORIGINAL MEASUREMENTS:</b> Ripan, R.; Vericeanu, G.  <i>Studia Univ. Babeş-Bolyai, Ser. Chim.</i> <u>1968</u> , 13, 31-37.																		
<b>VARIABLES:</b> One temperature: 291 K	<b>PREPARED BY:</b> Mary R. Masson																		
<b>EXPERIMENTAL VALUES:</b> All concentrations are expressed in units of $\text{mol dm}^{-3}$ <table border="1" data-bbox="322 500 1095 725" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Concentration</th> <th><math>K_{\text{SO}}</math> <math>\text{mol}^2 \text{dm}^{-6}</math></th> <th>Mean <math>K_{\text{SO}}</math> <math>\text{mol}^2 \text{dm}^{-6}</math></th> <th><math>\text{p}K_{\text{SO}}</math></th> </tr> </thead> <tbody> <tr> <td><math>2.832 \times 10^{-3}</math></td> <td><math>8.0 \times 10^{-6}</math></td> <td rowspan="6" style="text-align: center;"><math>7.9 \pm 0.8 \times 10^{-6}</math></td> <td rowspan="6" style="text-align: center;">5.10</td> </tr> <tr> <td><math>2.915 \times 10^{-3}</math></td> <td><math>8.5 \times 10^{-6}</math></td> </tr> <tr> <td><math>2.893 \times 10^{-3}</math></td> <td><math>8.4 \times 10^{-6}</math></td> </tr> <tr> <td><math>2.770 \times 10^{-3}</math></td> <td><math>7.7 \times 10^{-6}</math></td> </tr> <tr> <td><math>2.746 \times 10^{-3}</math></td> <td><math>7.5 \times 10^{-6}</math></td> </tr> <tr> <td><math>2.743 \times 10^{-3}</math></td> <td><math>7.5 \times 10^{-6}</math></td> </tr> </tbody> </table> <p>The concentration <math>c</math> in the saturated solution was calculated from the measured conductivity <math>\kappa</math> from the equation</p> $c = \frac{1000\kappa}{\Lambda^0}$ <p><u>Compiler's note</u>            Neither in the determination of the ionic conductivity of the selenite ion nor in the evaluation of the solubility product was hydrolysis of the selenite ion taken into account. This would give rise to errors, since, for example, in a 0.001M solution, <math>[\text{SeO}_3^{2-}] = 0.000955M</math>, <math>[\text{HSeO}_3^-] = 0.000045M</math> and <math>[\text{OH}^-] = 0.000045M</math>, and hydroxide and hydrogen selenite have different ionic conductivities from selenite. If the ionic conductivity of hydrogen selenite were known, the experimental results could have been interpreted correctly (cf. ref. 2), but this value does not seem to be available. However, because the calibration and sample solutions had concentrations of about the same order of magnitude, the errors would cancel to some extent, but the <math>K_{\text{SO}}</math> value cannot be regarded as reliable.</p>		Concentration	$K_{\text{SO}}$ $\text{mol}^2 \text{dm}^{-6}$	Mean $K_{\text{SO}}$ $\text{mol}^2 \text{dm}^{-6}$	$\text{p}K_{\text{SO}}$	$2.832 \times 10^{-3}$	$8.0 \times 10^{-6}$	$7.9 \pm 0.8 \times 10^{-6}$	5.10	$2.915 \times 10^{-3}$	$8.5 \times 10^{-6}$	$2.893 \times 10^{-3}$	$8.4 \times 10^{-6}$	$2.770 \times 10^{-3}$	$7.7 \times 10^{-6}$	$2.746 \times 10^{-3}$	$7.5 \times 10^{-6}$	$2.743 \times 10^{-3}$	$7.5 \times 10^{-6}$
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<b>METHOD APPARATUS/PROCEDURE:</b> The ionic conductivity of the selenite ion in water was determined by measuring the mean molar conductivities of a series of aqueous solutions of lithium selenite with concentrations below $2 \times 10^{-3} \text{mol dm}^{-3}$ . The mean molar conductivity at infinite dilution was found by extrapolation to be $172 \pm 2.9 \Omega^{-1} \text{cm}^2 \text{mol}^{-1}$ at 18°C. At that temperature, the ionic conductivity of the lithium ion is $33.4 \Omega^{-1} \text{cm}^2 \text{mol}^{-1}$ , so the ionic conductivity of the selenite ion is $105.2 \Omega^{-1} \text{cm}^2 \text{mol}^{-1}$ . The well washed strontium selenite was mixed with 150 ml of water and agitated intermittently for 1 hr. From this, 10-20 ml was taken in the conductivity cell and the conductivity measured. The sampling and measurement were repeated until a constant value for the conductivity was obtained. The value of $\Lambda^0 = (\lambda_+ + \lambda_-)$ , the molar conductivity, was calculated with $\lambda_- = 105.2$ and $\lambda_+ = 102 \Omega^{-1} \text{cm}^2 \text{mol}^{-1}$ .	<b>SOURCE AND PURITY OF MATERIALS:</b> Lithium selenite was prepared from sublimed selenium dioxide by neutralization with lithium hydroxide. An approximately 0.05M solution was standardized gravimetrically, and this was used to prepare the various dilutions. The composition of the selenite was checked by analysis.  <b>ESTIMATED ERROR:</b> Temperature: $\pm 0.5$ K Error in $K_{\text{SO}}$ (2s) = $0.8 \times 10^{-6}$ (compiler)  <b>REFERENCES:</b> 1. Landolt-Bornstein <i>Physikalisch-Chemische Tabellen II</i> 1923, p. 1105. 2. Monk, C.B. <i>J. Chem. Soc.</i> 1949, 429.																		

<b>COMPONENTS:</b> 1. Strontium selenite; SrSeO <sub>3</sub> ; [14590-38-6] 2a. Hydrochloric acid; HCl; [7647-01-0] 2b. Nitric acid; HNO <sub>3</sub> ; [7697-37-2] 3. Water; H <sub>2</sub> O; [7732-18-5]	<b>ORIGINAL MEASUREMENTS:</b>  Chukhlantsev, V.G.  <i>Zh. Neorg. Khim.</i> <u>1956</u> , <i>1</i> , 2300-5; *Russ. <i>J. Inorg. Chem. (Eng. Transl.)</i> <u>1956</u> , <i>1</i> , 132-8.																																																				
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<b>EXPERIMENTAL VALUES:</b> All concentrations are expressed in units of mol dm <sup>-3</sup> <table border="1" data-bbox="185 513 1131 746"> <thead> <tr> <th>Soln.</th> <th>Initial pH</th> <th>Final pH</th> <th>[Sr<sup>2+</sup>]</th> <th>pSr</th> <th>log α<sub>L(H)</sub></th> <th>p[SeO<sub>3</sub><sup>2-</sup>]</th> <th>pK<sub>SO</sub></th> </tr> </thead> <tbody> <tr> <td rowspan="3">HCl</td> <td>3.12</td> <td>8.49</td> <td>1.18 × 10<sup>-3</sup></td> <td>2.93</td> <td>0.15</td> <td>3.08</td> <td>6.01</td> </tr> <tr> <td>2.79</td> <td>7.76</td> <td>2.61 × 10<sup>-3</sup></td> <td>2.59</td> <td>0.40</td> <td>2.99</td> <td>5.58</td> </tr> <tr> <td>2.01</td> <td>5.87</td> <td>1.6 × 10<sup>-2</sup></td> <td>1.80</td> <td>2.15</td> <td>3.85</td> <td>5.65</td> </tr> <tr> <td rowspan="3">HNO<sub>3</sub></td> <td>1.98</td> <td>5.69</td> <td>1.84 × 10<sup>-2</sup></td> <td>1.74</td> <td>2.30</td> <td>4.03</td> <td>5.77</td> </tr> <tr> <td>2.88</td> <td>7.97</td> <td>1.89 × 10<sup>-3</sup></td> <td>2.72</td> <td>0.30</td> <td>3.02</td> <td>5.74</td> </tr> <tr> <td>2.45</td> <td>6.79</td> <td>5.89 × 10<sup>-3</sup></td> <td>2.23</td> <td>1.21</td> <td>3.44</td> <td>5.67</td> </tr> </tbody> </table> <p>The average value is <math>K_{SO} = 1.82 \times 10^{-6} \text{ mol}^2 \text{ dm}^{-6}</math>.            (<math>pK_{SO} = 5.74</math>)</p> <p><b>Notes.</b>  <math>[Se_{tot}] = [Sr^{2+}]</math> and <math>[SeO_3^{2-}] = [Se_{tot}]/\alpha_{L(H)}</math>            where <math>\alpha_{L(H)} = (1 + [H^+]/K_2 + [H^+]^2/K_1K_2)</math>            and the acid dissociation constants have the values <math>K_1 = 4 \times 10^{-3}</math> and  <math>K_2 = 1.0 \times 10^{-8}</math> (ref. 1).</p>		Soln.	Initial pH	Final pH	[Sr <sup>2+</sup> ]	pSr	log α <sub>L(H)</sub>	p[SeO <sub>3</sub> <sup>2-</sup> ]	pK <sub>SO</sub>	HCl	3.12	8.49	1.18 × 10 <sup>-3</sup>	2.93	0.15	3.08	6.01	2.79	7.76	2.61 × 10 <sup>-3</sup>	2.59	0.40	2.99	5.58	2.01	5.87	1.6 × 10 <sup>-2</sup>	1.80	2.15	3.85	5.65	HNO <sub>3</sub>	1.98	5.69	1.84 × 10 <sup>-2</sup>	1.74	2.30	4.03	5.77	2.88	7.97	1.89 × 10 <sup>-3</sup>	2.72	0.30	3.02	5.74	2.45	6.79	5.89 × 10 <sup>-3</sup>	2.23	1.21	3.44	5.67
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<b>METHOD APPARATUS/PROCEDURE:</b> Solutions of hydrochloric and nitric acids were saturated with strontium selenite by stirring in a thermostat at 20°C for 8 hr. The remaining solid phase was removed by centrifugation, then the pH was measured ("Moskip" pH meter, to 0.01 pH unit) and the strontium concentration was measured (method not stated).	<b>SOURCE AND PURITY OF MATERIALS:</b> C.P.-grade reagents were used. Strontium chloride (0.1N) was mixed with 0.1N sodium selenite to precipitate crystalline strontium selenite, which was washed with water and dried at 40°C. Strontium was determined by precipitating the oxalate, then titrating with permanganate, and selenium was determined gravimetrically.																																																				
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<b>METHOD APPARATUS/PROCEDURE:</b> The radioactive isotope $^{89}\text{Sr}$ was used. Radioactivity was measured on a "B" counter. The results represent the average values of four determinations (two duplicates in two positions), and the values were corrected for background radiation. The experimental procedure is described in (1). Calculations were carried out using the formula $L_i = \frac{A}{I_{\text{sp}} \cdot VM}$ where $A$ is the radioactivity of the sample in cpm, $I_{\text{sp}}$ is the specific radioactivity of a standard solution in cpm/mg Sr, $V$ is the volume in ml of the saturated radioactive solution, $M$ is the molecular weight of strontium, and $L_i$ is the strontium concentration.  [Compiler: presumably, the procedure was to prepare a sample of strontium selenite containing $^{89}\text{Sr}$ , and then to make a saturated aqueous solution of this solid, and determine its radioactivity as described above.]	<b>SOURCE AND PURITY OF MATERIALS:</b>  <b>ESTIMATED ERROR:</b> The spread in the results is 0.06 of a log unit. Temperature: probably $\pm 0.05$ K  <b>REFERENCES:</b> 1. Spitsyn, V.I.; Kodochogov, P.N.; et al., <i>Methods Involving Use of Radioactive Tracers</i> , p. 234, Izd. AN SSSR, Moskva, 1955. 2. Ingrì, N.; Kakolowicz, W.; Sillén, L.G.; Warnqvist, B. <i>Talanta</i> <u>1967</u> , 14, 1261. 3. Rumpf. P. <i>Compt. Rendu</i> <u>1933</u> , 197, 686.																																														

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<b>EXPERIMENTAL VALUES:</b>  <p style="text-align: center;">All concentrations are expressed in units of <math>\text{mol dm}^{-3}</math> at <math>25^\circ\text{C}</math>.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Time of mixing (days) at <math>25^\circ\text{C}</math></th> <th style="text-align: left;">Concentration of Sr</th> <th style="text-align: left;"><math>K_{\text{SO}}</math>, (authors) <math>\text{mol}^2 \text{dm}^{-6}</math></th> <th style="text-align: left;">Concentration of <math>\text{SeO}_3^{2-}</math></th> <th style="text-align: left;"><math>K_{\text{SO}}</math> (compiler) <math>\text{mol}^2 \text{dm}^{-6}</math></th> </tr> </thead> <tbody> <tr> <td>3</td> <td><math>1.4 \times 10^{-3}</math></td> <td></td> <td><math>1.35 \times 10^{-3}</math></td> <td></td> </tr> <tr> <td>5</td> <td><math>1.8 \times 10^{-3}</math></td> <td></td> <td><math>1.74 \times 10^{-3}</math></td> <td></td> </tr> <tr> <td>7</td> <td><math>2.07 \times 10^{-3}</math></td> <td></td> <td><math>2.01 \times 10^{-3}</math></td> <td></td> </tr> <tr> <td>10</td> <td><math>2.09 \times 10^{-3}</math></td> <td></td> <td><math>2.03 \times 10^{-3}</math></td> <td></td> </tr> <tr> <td>12</td> <td><math>2.11 \times 10^{-3}</math></td> <td></td> <td><math>2.05 \times 10^{-3}</math></td> <td></td> </tr> <tr> <td>Mean</td> <td><math>2.09 \times 10^{-3}</math></td> <td><math>4.37 \times 10^{-6}</math> <math>\text{p}K_{\text{SO}} = 5.36</math></td> <td><math>2.03 \times 10^{-3}</math></td> <td><math>4.23 \times 10^{-6}</math> <math>\text{p}K_{\text{SO}} = 5.37</math></td> </tr> </tbody> </table> <p>In their calculations, the authors omitted to allow for hydrolysis of the selenite ion. The compiler recalculated the results to take account of this, making use of the program HALTAFALL (1). The dissociation constant values were those of Hagiwara (2), namely <math>K_{\text{a}1} = 10^{-2.62} \text{ mol dm}^{-3}</math> and <math>K_{\text{a}2} = 10^{-8.32} \text{ mol dm}^{-3}</math>. For this system, the neglect of hydrolysis did not have a great influence on the results.</p>		Time of mixing (days) at $25^\circ\text{C}$	Concentration of Sr	$K_{\text{SO}}$ , (authors) $\text{mol}^2 \text{dm}^{-6}$	Concentration of $\text{SeO}_3^{2-}$	$K_{\text{SO}}$ (compiler) $\text{mol}^2 \text{dm}^{-6}$	3	$1.4 \times 10^{-3}$		$1.35 \times 10^{-3}$		5	$1.8 \times 10^{-3}$		$1.74 \times 10^{-3}$		7	$2.07 \times 10^{-3}$		$2.01 \times 10^{-3}$		10	$2.09 \times 10^{-3}$		$2.03 \times 10^{-3}$		12	$2.11 \times 10^{-3}$		$2.05 \times 10^{-3}$		Mean	$2.09 \times 10^{-3}$	$4.37 \times 10^{-6}$ $\text{p}K_{\text{SO}} = 5.36$	$2.03 \times 10^{-3}$	$4.23 \times 10^{-6}$ $\text{p}K_{\text{SO}} = 5.37$
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Mean	$2.09 \times 10^{-3}$	$4.37 \times 10^{-6}$ $\text{p}K_{\text{SO}} = 5.36$	$2.03 \times 10^{-3}$	$4.23 \times 10^{-6}$ $\text{p}K_{\text{SO}} = 5.37$																																
<b>AUXILIARY INFORMATION</b>																																				
<b>METHOD APPARATUS/PROCEDURE:</b>  Solid strontium selenite was equilibrated with water for 10 -12 days, in a thermostat at $25^\circ\text{C}$ . The saturated solution was filtered through a glass filter, then the concn. of strontium was determined by flame spectrophotometry, with an experimental error of 1.0 - 1.5% of the quantity measured.	<b>SOURCE AND PURITY OF MATERIALS:</b>  Strontium selenite was made by the reactions of aqueous solutions of strontium chloride and sodium selenite in stoichiometric proportions at $25^\circ\text{C}$ .																																			
<b>ESTIMATED ERROR:</b> Error in temperature probably $\pm 0.1 \text{ K}$ (cf. ref. 3). Error in $K_{\text{SO}}$ (2s) = $\pm 0.20 \times 10^{-6}$ (based on results for days 7 - 12).																																				
<b>REFERENCES:</b>  1. Ingri, N.; Kakolowicz, W.; Sillén, L.G.; Warnqvist, B. <i>Talanta</i> <u>1967</u> , 14, 1261. 2. Hagiwara, H. <i>Bull. Inst. Phys. Chem. Res., Tokyo</i> <u>1939</u> , 18, 648. 3. Selivanova, N.M.; Leschinskaya, Z.I.; Klushina, T.V. <i>Zh. Fiz. Khim.</i> <u>1962</u> , 36, 1349.																																				