

COMPONENTS: (1) Copper(I) oxide; Cu_2O ; [1317-39-1] (2) Sea Water	ORIGINAL MEASUREMENTS: Ferry, J. D.; Carritt, D. E. <i>Ind. Eng. Chem.</i> 1946, 38, 612-7.																																
VARIABLES: pH of the sea water at 25°C.	PREPARED BY: T. P. Dirkse																																
EXPERIMENTAL VALUES: Solubility of Cu_2O in oxygen-free sea water at 25°C. <table border="1" data-bbox="249 527 1068 785"> <thead> <tr> <th>pH</th> <th>$10^4 C_{\text{Cu}}/\text{mol dm}^{-3}$</th> <th>pH</th> <th>$10^4 C_{\text{Cu}}/\text{mol dm}^{-3}$</th> </tr> </thead> <tbody> <tr> <td>7.11</td> <td>8.35^e</td> <td>8.51</td> <td>0.26^d</td> </tr> <tr> <td>7.40</td> <td>3.26^b</td> <td>8.56</td> <td>0.29^d</td> </tr> <tr> <td>7.70</td> <td>2.34^b</td> <td>8.60</td> <td>0.22^a</td> </tr> <tr> <td>7.80</td> <td>1.73^c</td> <td>8.73</td> <td>0.14^a</td> </tr> <tr> <td>8.12</td> <td>0.74^c</td> <td>8.88</td> <td>0.11^a</td> </tr> <tr> <td>8.12</td> <td>1.57^a</td> <td>8.92</td> <td>0.19^a</td> </tr> <tr> <td>8.46</td> <td>0.49^d</td> <td>8.96</td> <td>0.14^a</td> </tr> </tbody> </table> <p data-bbox="214 814 1223 1056"> ^a CO_2 was removed from the sea water by flushing with nitrogen. ^b HCl was added to the sea water and the pH was adjusted by adding NaOH. ^c gaseous CO_2 was added to the sea water after it was deaerated. ^d Same as in c except that the nitrogen was treated to remove all traces of oxygen. ^e Same as in d, except the Cu_2O was painted on to a solid surface. </p> <p data-bbox="263 1077 870 1100">The following equation fits the data in the Table:</p> $\log C_{\text{Cu}} = 4.03 - \text{pH}.$		pH	$10^4 C_{\text{Cu}}/\text{mol dm}^{-3}$	pH	$10^4 C_{\text{Cu}}/\text{mol dm}^{-3}$	7.11	8.35 ^e	8.51	0.26 ^d	7.40	3.26 ^b	8.56	0.29 ^d	7.70	2.34 ^b	8.60	0.22 ^a	7.80	1.73 ^c	8.73	0.14 ^a	8.12	0.74 ^c	8.88	0.11 ^a	8.12	1.57 ^a	8.92	0.19 ^a	8.46	0.49 ^d	8.96	0.14 ^a
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METHOD/APPARATUS/PROCEDURE: Cu_2O was placed in a vessel that had been evacuated and then filled with N_2 . Air-free sea water was forced into the vessel under nitrogen pressure. The mixtures were agitated at 25°C. After equilibration the mixtures were filtered and the pH of the filtrate was quickly measured with a glass electrode. After the cuprous copper had been air oxidized its concentration was determined colorimetrically with sodium diethyldithiocarbamate (1).	SOURCE AND PURITY OF MATERIALS: The Cu_2O was an electrolytic preparation. Nothing is said about the composition or source of the sea water.																																
ESTIMATED ERROR: No details are given.																																	
REFERENCES: 1. Ketchum, B. H.; Ferry, J. D.; Redfield, A. C.; Burns, A. E. <i>Ind. Eng. Chem.</i> 1945, 37, 456.																																	

COMPONENTS: (1) Copper(I) oxide; Cu_2O ; [1317-39-1] (2) Baltic Sea water.	ORIGINAL MEASUREMENTS: Ragg, M. <i>Farbe u. Lack</i> <u>1950</u> , 56, 435-41.
VARIABLES: None.	PREPARED BY: T. P. Dirkse
EXPERIMENTAL VALUES: <p>The solubility of Cu_2O in Baltic Sea water is given as 0.6 mg dm^{-3}. This appears to be the weight of Cu and not of Cu_2O in the solution, but this is not stated specifically. This amounts to $9.4 \times 10^{-6} \text{ mol dm}^{-3a}$.</p> <p>No temperature is stated. The author deals with the solubility of different heavy-metal compounds that are used in marine anti-fouling paints. Some of these solubility values are given at 18°C and others at 15°C, so the solubility value for Cu_2O is probably one or the other of these temperatures.</p> <p>The pH of the Baltic Sea water was given as 8.1 for other solubility values. It appears that the Baltic Sea water used for the Cu_2O solubility determination was at the same pH.</p> <p>^a Calculated by the compiler.</p>	
AUXILIARY INFORMATION	
METHOD/APPARATUS/PROCEDURE: <p>Cu_2O was added to the filtered Baltic Sea water and the mixture was shaken for several hours--until saturation. The liquid phase was filtered from the solid phase. The analytical method to determine copper is not described, but later in the article a rather complete description is given of a colorimetric method using dithizone.</p>	SOURCE AND PURITY OF MATERIALS: No information is given.
ESTIMATED ERROR: No details are given.	
REFERENCES:	

COMPONENTS: (1) Copper(I) oxide; Cu_2O ; [1317-39-1] (2) Water; H_2O ; [7732-18-5]	ORIGINAL MEASUREMENTS: Pocock, F. J.; Stewart, J. F. <i>J. Eng. Power</i> 1963, 85, 33-45.																																								
VARIABLES: Temperature and pressure of the steam.	PREPARED BY: T. P. Dirkse																																								
EXPERIMENTAL VALUES: <p style="text-align: center;">Solubility of Cu_2O in supercritical steam.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">pH</th> <th style="text-align: center;">temp/$^{\circ}\text{F}^a$</th> <th style="text-align: center;">Pressure/psig</th> <th style="text-align: center;">C_{Cu}/ppb</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">7.5</td><td style="text-align: center;">1148</td><td style="text-align: center;">4500</td><td style="text-align: center;">9.1</td></tr> <tr><td style="text-align: center;">7.7</td><td style="text-align: center;">1147</td><td style="text-align: center;">4500</td><td style="text-align: center;">7.7</td></tr> <tr><td style="text-align: center;">7.6</td><td style="text-align: center;">1152</td><td style="text-align: center;">4500</td><td style="text-align: center;">9.9</td></tr> <tr><td style="text-align: center;">9.6</td><td style="text-align: center;">1155</td><td style="text-align: center;">4500</td><td style="text-align: center;">11.5</td></tr> <tr><td style="text-align: center;">9.6</td><td style="text-align: center;">1149</td><td style="text-align: center;">4500</td><td style="text-align: center;">11.5</td></tr> <tr><td style="text-align: center;">9.6</td><td style="text-align: center;">1144</td><td style="text-align: center;">4500</td><td style="text-align: center;">7.7</td></tr> <tr><td style="text-align: center;">9.6</td><td style="text-align: center;">1149</td><td style="text-align: center;">2700</td><td style="text-align: center;">0.3</td></tr> <tr><td style="text-align: center;">9.6</td><td style="text-align: center;">1147</td><td style="text-align: center;">3900</td><td style="text-align: center;">4.7</td></tr> <tr><td style="text-align: center;">9.6</td><td style="text-align: center;">1118</td><td style="text-align: center;">3300</td><td style="text-align: center;">2.8</td></tr> </tbody> </table> <p>^a Average temperature during the course of the experiment.</p> <p>During these experiments some of the Cu_2O was reduced to Cu.</p>		pH	temp/ $^{\circ}\text{F}^a$	Pressure/psig	C_{Cu} /ppb	7.5	1148	4500	9.1	7.7	1147	4500	7.7	7.6	1152	4500	9.9	9.6	1155	4500	11.5	9.6	1149	4500	11.5	9.6	1144	4500	7.7	9.6	1149	2700	0.3	9.6	1147	3900	4.7	9.6	1118	3300	2.8
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METHOD/APPARATUS/PROCEDURE: Five grams of Cu_2O was placed on each of six trays in an autoclave. Supercritical steam was passed through the autoclave at a rate sufficient to insure saturation equilibrium. Sampling was continued for about 3 hours. Blanks were run to measure the amount of copper extracted from the stainless steel of the autoclave. The analytical method used to determine copper content is not mentioned or described.	SOURCE AND PURITY OF MATERIALS: Cu_2O was reagent-grade quality. It was pelletized and sintered at 1850°F under a helium atmosphere, then crushed, screened and washed to remove fines. The feedwater was demineralized and deaerated. NH_4OH was introduced to raise the pH.																																								
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