COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Water; H_2O; [7732-18-5]	Melbye, G. S. *Medd. Vetenskapakad. Nobelinst.* 1922, 4,1-11.
VARIABLES:	**PREPARED BY:**
Concentration of NaOH at room temperature.	T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of $Cu(OH)_2$ [a] in aqueous NaOH at room temperature.

C_{NaOH}/equiv dm^{-3}	$C_{Cu(OH)_2}$/equiv dm^{-3}
2.65	0.028
2.75	0.030
3.25	0.058
3.45	0.058
4.15	0.088
4.80	0.108
5.10	0.127
5.15	0.143
5.35	0.135
5.45	0.154
5.75	0.166
5.80	0.181
6.00	0.187
6.60	0.195
7.1	0.238

[a] This is an equilibrium involving a metastable solid, possibly $Cu(OH)_2$. The solubility values reported for $Cu(OH)_2$ are the largest values obtained in replicate determinations.

The data in the above Table can be expressed as follows:

$$C_{Cu(OH)_2} = 0.0450 \cdot C_{NaOH} - 0.095$$

This equation agrees with the data to within 1.4%.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
A solution of $CuSO_4$ was very slowly titrated down a glass rod into a NaOH solution. Care was taken to avoid the formation of a precipitate in the solution. This titration was carried out until the solution became turbid. The solution was then allowed to stand before being filtered. The aim was to dissolve the $Cu(OH)_2$ as it formed rather than by dissolution of solid $Cu(OH)_2$. A sample of the filtrate was diluted to about 1/25 with CO_2-free water. The precipitate was filtered off, dissolved in HCl and then titrated iodometrically to determine the copper content. The NaOH content of the filtrate was determined by titration. The work was all carried out at room temperature, about 22°C.	No details are given.
	ESTIMATED ERROR:
	The titration values for NaOH have an uncertainty of about 0.025 equiv dm^{-3}.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Water; H_2O; [7732-18-5]	Muller, E. Z. *Physik. Chem.* 1923, *105*, 73-118.
VARIABLES:	**PREPARED BY:**
Concentration of NaOH and temperature.	T. P. Dirkse

EXPERIMENTAL VALUES:

Table I. Solubility of CuO in aqueous NaOH at 18°C.

C_{NaOH}/mol dm^{-3}	C_{Cu}/mol dm^{-3}	C_{NaOH}/mol dm^{-3}	C_{Cu}/mol dm^{-3}
7.55	0.0036	16.63	0.0229
10.00	0.0075	17.04	0.0132
12.00	0.0127	17.41	0.0302
13.54	0.0167	17.98	0.0291
14.85	0.0197	18.92	0.0115
15.22	0.0191	19.05	0.0119
15.88	0.0214	19.32	0.0112
16.20	0.0246	20.01	0.0098

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The CuO was added to the NaOH solutions and the mixtures were shaken at least 5 weeks at the prescribed temperature. The liquid phase was separated from the solid phase by filtering or by centrifuging. The copper content of the liquid phase was determined by electrolysis.

SOURCE AND PURITY OF MATERIALS:

The NaOH was prepared from metallic sodium. The CuO was prepared by heating $Cu(OH)_2$ at 300°C.

ESTIMATED ERROR:

Nothing is stated, and no duplicate results are given.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO, [1317-38-0] (2) Sodium hydroxide, NaOH; [1310-73-2] (3) Water; H_2O; [7732-18-5]	Muller, E. *Z. Physik. Chem.* 1923, *105*, 73-118.

EXPERIMENTAL VALUES, cont'd.

Table II. Solubility of CuO in aqueous NaOH at 70°C.

C_{NaOH}/mol dm^{-3}	C_{Cu}/mol dm^{-3}	color of solid phase
11.79	0.0167	black
12.79	0.0219	"
14.13	0.0319	"
14.94	0.0377	"
16.75	0.0471	"
19.28	0.0167	"
19.37	0.0138	blue
20.52	0.0098	"

Table III. Solubility of CuO in aqueous NaOH at 80°C.

C_{NaOH}/mol dm^{-3}	C_{Cu}/mol dm^{-3}
7.55	0.0067
10.00	0.0155
12.00	0.0243
13.54	0.0349
14.88	0.0411
16.20	0.0555

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Water; H_2O; [7732-18-5]	Muller, E. *Z. Physik. Chem.* 1923, *105*, 73-118.
VARIABLES:	**PREPARED BY:**
Concentration of NaOH at room temperature.	T. P. Dirkse

EXPERIMENTAL VALUES:

Table I. Solubility of $Cu(OH)_2$ in aqueous NaOH.[a]

C_{NaOH}/mol dm^{-3}	days of shaking	C_{Cu}/g dm^{-3}	C_{Cu}/mol dm^{-3} [b]
12.36	2	2.98	0.0469
	8	2.26	0.0356
	37	1.52	0.0239
	76	1.22	0.0192
	83	1.20	0.0189
9.80	2	3.06	0.0482
	8	1.60	0.0252
	37	0.62	0.0098
	76	0.78	0.0123
	84	0.78	0.0123
6.85	2	1.42	0.0223
	8	0.64	0.0101
	38	0.54	0.0085
	84	0.37	0.0058
3.94	2	0.72	0.0113
	8	0.31	0.0049
	38	0.18	0.0028
	84	0.13	0.0020

[a] No temperature is mentioned but from the rest of the article the temperature appears to have been around 18°C.
[b] Calculated by the compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The mixtures were shaken at the prescribed temperature. The filtrate was separated from the solid phase by filtering or by centrifuging. The copper content of the filtrate was determined by electrolysis.	The NaOH was prepared from metallic sodium. The $Cu(OH)_2$ was a commercially available product which was stirred thoroughly with a 5% NaOH solution, then diluted with water, filtered, washed and dried.
	ESTIMATED ERROR: Nothing is said about this and there is no indication as to how reproducible the results were.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Water; H_2O; [7732-18-5]	Muller, E. *Z. Physik. Chem.* 1923, *105*, 73-118.

EXPERIMENTAL VALUES, contd.

In the span of time during which the mixtures were shaken, the solid phase, which was blue originally, changed to a brownish-black color. Much of the paper then deals with the mechanism of this process. The rate of loss of copper from the solution increased with increasing temperature. The conclusion of all the work is that the $Cu(OH)_2$ in contact with the NaOH solutions undergoes a change forming solid solutions of CuO with $Cu(OH)_2$. The composition of this solid solution is dependent on the concentration of copper in the liquid phase. The process does not form CuO as the end product. The author does not arrive at a completely satisfying (to himself) explanation or mechanism for this process. But the fact raises questions as to what solid is in equilibrium with the saturated solution. This question suggests that there may be various values given for the composition of solutions "saturated" with $Cu(OH)_2$.

The following results were obtained in an effort to determine the solubility of $Cu(OH)_2$ (before decomposition sets in).
The experiments were carried out very quickly and copper determinations were made only when - as shown by color - the solid phase had undergone no change.

Table II. Solubility of $Cu(OH)_2$ in aqueous NaOH at 18°C.

C_{NaOH}/mol dm^{-3}	C_{Cu}/mol dm^{-3}	C_{NaOH}/mol dm^{-3}	C_{Cu}/mol dm^{-3}
6.09	0.041	4.62	0.019
6.96	0.061	6.97	0.059
7.60	0.076	9.23	0.130
8.86	0.121	12.94	0.308
10.3	0.197	15.19	0.328
10.8	0.216	17.78	0.028[c]
12.2	0.248		
13.9	0.302		
15.5	0.087[c]		
18.1	0.013[c]		

[c] In these mixtures the solid phase remained blue. It was later identified as Na_2CuO_2.

Table III. Solubility of $Cu(OH)_2$ in concentrated solutions of NaOH at 18°C.

C_{NaOH}/mol dm^{-3}	C_{Cu}/mol dm^{-3} sample 1	sample 2
16.82	0.0821	0.0799
17.37	0.0788	0.0821
17.94	0.0651	0.0659
18.37	0.0322	0.0308
18.46	0.0243	0.0229
18.91	0.0212	0.0217
19.63	0.0201	- - - -

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Water; H_2O; [7732-18-5]	Jellinek, K.; Gordon, H. Z. *Physik. Chem.* 1924, *112*, 207-49.
VARIABLES:	**PREPARED BY:**
Concentration of NaOH at 19°C.	T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of freshly prepared $Cu(OH)_2$.

t/°C	e.m.f./mV	$C_{Cu^{2+}}$/mol dm^{-3} [a]	C_{OH^-}/mol dm^{-3}	$C_{Cu^{2+}} \cdot (C_{OH^-})^2$ [a]
19	-265	7.7×10^{-12}	0.156	1.9×10^{-13}
19	-252	2.2×10^{-11}	0.117	2.9×10^{-13}
19	-262	9.8×10^{-12}	0.0817	6.5×10^{-14}
19	-246	3.5×10^{-11}	0.0789	2.2×10^{-13}
19	-252	2.2×10^{-11}	0.0824	1.5×10^{-13}
19	-242	4.8×10^{-11}	0.0483	1.1×10^{-13}
19	-227	1.6×10^{-10}	0.0208	6.8×10^{-14}
19	-207	7.7×10^{-10}	0.0168	2.2×10^{-13}
19	-183	5.2×10^{-9}	0.0065	2.2×10^{-13}

The average value for K_s^o is 1.7×10^{-13} mol^3 dm^{-9}

[a] These values have been recalculated by the compiler.

Attempts were also made to determine K_s^o for CuO using the same experimental approach as used in the Table above, but the measured e.m.f. values were not constant.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

A suspension of $Cu(OH)_2$ in water was added to a measured amount of NaOH solution. The mixture was stirred one hour under a N_2 atmosphere. Then a Cu electrode was inserted in the solution and its potential was measured vs a calomel electrode. This e.m.f. was compared to that of a Cu electrode in a 0.05 mol dm^{-3} $CuSO_4$ solution (assumed to be 40% dissociated). The concentration of copper ion was calculated from this comparison as follows:

$$0.008 - \text{e.m.f.} = 0.029 \log (0.02)/[Cu^{2+}]$$

The OH^- ion concentration was determined by titration and it was assumed that the NaOH was completely dissociated. No corrections were made for junction potentials.

SOURCE AND PURITY OF MATERIALS:

The purest available materials were used. $Cu(OH)_2$ was prepared by adding aqueous NaOH to a solution of $CuSO_4$. The precipitate was washed 7 times with water. Care was taken to exclude CO_2 in all procedures.

ESTIMATED ERROR:

No details are given.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0] (2) Sulfuric acid; H_2SO_4; [7664-93-9] (3) Water; H_2O; [7732-18-5]	Posnjak, E.; Tunell, G. *Am. J. Sci.* 1929, *18*, 1-34.
VARIABLES: Concentration of H_2SO_4 in the temperature range 50-200°C.	PREPARED BY: T. P. Dirkse

EXPERIMENTAL VALUES:

Table I. Solubility of CuO in H_2SO_4 solutions at 200°C.

C_{CuO}/mass %	C_{SO_3}/mass %	C_{CuO}/mol kg^{-1} [a]	C_{SO_3}/mol kg^{-1} [a]	Solid phase [b]
0.02	0.05	0.0025	0.0062	A
0.17	0.30	0.021	0.038	"
2.37	2.96	0.315	0.391	"
4.57	5.58	0.639	0.776	"
8.58	10.08	1.33	1.55	"
11.93	13.03	2.00	2.16	"
17.16	18.94	3.38	3.70	"
18.46	19.83	3.76	4.01	A + B
18.72	21.65	3.95	4.54	B
18.02	22.73	3.82	4.79	"
14.36	30.99	3.30	7.08	"
13.36	33.36	3.15	7.82	"
8.21	43.62	2.14	11.3	"
6.35	45.81	1.67	12.0	"
2.14	65.48	0.831	25.3	"
1.00	70.00	0.434	30.1	C

[a] The mol/kg H_2O values were calculated by the compiler.

[b] The solid phases are: A = $3CuO \cdot SO_3 \cdot 2H_2O$; B = $CuO \cdot SO_3 \cdot H_2O$; C = $CuO \cdot SO_3$.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The mixtures were sealed in combustion tubes and placed in an air thermostat at 50 ± 1°C for at least a year. At higher temperatures the tubes were heated in steel bombs kept at 100 ± 3°C for at least 4 months, or kept at 200 ± 7°C for at least 2 weeks. After equilibration, the mixtures were filtered through an alundum filtration crucible. The copper content was determined electrolytically and the SO_3 content was determined gravimetrically as $BaSO_4$.	The CuO was prepared by adding dilute NaOH to a solution of $CuSO_4$. The precipitate was washed with hot water. No information is given about the purity or quality of the H_2SO_4 or of the water.
	ESTIMATED ERROR: Nothing is stated about the reproducibility of the results.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0]	Posnjak, E.; Tunell, G. *Am. J. Sci.* 1929, *18*, 1-34.
(2) Sulfuric acid; H_2SO_4; [7664-93-9]	
(3) Water; H_2O; [7732-18-5]	

EXPERIMENTAL VALUES, contd:

Table II. Solubility of CuO in H_2SO_4 solutions at 100°C.

C_{CuO}/mass %	C_{SO_3}/mass %	C_{CuO}/mol kg^{-1} [a]	C_{SO_3}/mol kg^{-1} [a]	Solid phase [b]
0.38	0.40	0.048	0.050	A
0.71	0.80	0.091	0.101	"
1.16	1.24	0.149	0.159	"
1.46	1.58	0.189	0.204	"
3.69	3.87	0.502	0.523	"
4.56	4.72	0.632	0.650	"
5.55	5.73	0.786	0.807	"
5.61	5.81	0.796	0.819	"
8.62	8.69	1.31	1.31	"
14.57	14.82	2.59	2.62	"
19.35	19.70	3.99	4.04	"
21.07	21.44	4.61	4.66	A + D
21.14	21.52	4.64	4.72	D
21.37	21.74	4.72	4.77	D + E
17.92	22.73	3.80	4.78	E
15.89	25.44	3.41	5.42	"
12.60	31.40	2.83	7.00	B + E
12.78	30.81	2.85	6.82	"
10.49	33.67	2.36	7.53	B
2.92	45.04	0.705	10.8	"
1.64	49.20	0.419	12.5	"
0.84	53.60	0.232	14.7	"
0.29	66.20	0.109	24.7	"

[a] The mol/kg H_2O values were calculated by the compiler.

[b] The solid phases are: A = $3CuO \cdot SO_3 \cdot 2H_2O$; B = $CuO \cdot SO_3 \cdot H_2O$; C = $CuO \cdot SO_3$; D = $3CuO \cdot 2SO_3 \cdot 5H_2O$; E = $CuO \cdot SO_3 \cdot 3H_2O$.

Table III. Solubility of CuO in H_2SO_4 solutions at 50°C.

C_{CuO}/mass %	C_{SO_3}/mass %	C_{CuO}/mol kg^{-1} [a]	C_{SO_3}/mol kg^{-1} [a]	Solid phase [b]
7.53	7.57	1.12	1.10	A
8.98	9.06	1.38	1.38	"
9.88	9.97	1.55	1.56	"
10.98	11.02	1.77	1.76	"
10.98	11.08	1.77	1.78	"
12.44	12.52	2.08	2.08	A + F
9.34	16.12	1.55	2.66	F
4.74	29.28	0.903	5.54	"
3.83	34.46	0.780	6.97	"
3.53	37.58	0.754	7.97	E
1.80	41.45	0.399	9.12	B
1.09	47.43	0.266	11.5	"
0.23	56.81	0.067	16.5	"
0.22	57.11	0.065	16.7	"
0.16	71.42	0.071	31.4	"

[a] The mol/kg H_2O values were calculated by the compiler.

[b] The solid phases are: A = $3CuO \cdot SO_3 \cdot 2H_2O$; B = $CuO \cdot SO_3 \cdot H_2O$; E = $CuO \cdot SO_3 \cdot 3H_2O$; F = $CuO \cdot SO_3 \cdot 5H_2O$.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0] (2) Sulfuric acid; H_2SO_4; [7664-93-9] (3) Water; H_2O; [7732-18-5]	Tunell, G.; Posnjak, E. *J. Phys. Chem.* 1931, 35, 929-46.
VARIABLES: Concentrations of H_2SO_4 at 50°C.	PREPARED BY: T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of CuO in H_2SO_4 solutions at 50°C.

C_{CuO}/mass %	C_{SO_3}/mass %	C_{CuO}/mol kg^{-1} [a]	C_{SO_3}/mol kg^{-1} [a]	Solid phase [b]
0.05	0.05	0.0063	0.0063	A
0.13	0.13	0.0164	0.0163	"
2.20	2.22	0.289	0.290	A + B
4.73	4.75	0.657	0.655	"
5.93	5.96	0.846	0.845	"
6.52	6.57	0.943	0.944	"
3.28	38.50	0.708	8.26	C
2.35	43.04	0.541	9.84	D
1.54	45.40	0.365	10.7	"

[a] The mol/kg H_2O values were calculated by the compiler.

[b] The solid phases are: A = $4CuO \cdot SO_3 \cdot 3H_2O$; B = $3CuO \cdot SO_3 \cdot 2H_2O$; C = $CuO \cdot SO_3 \cdot 3H_2O$; D = $CuO \cdot SO_3 \cdot H_2O$.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
The mixtures were sealed in Jena combustion tubes and placed in an air thermostat at 50 ± 1°C for one to three years. The mixtures were shaken daily. After equilibration, the mixtures were filtered through a dense Jena glass filter. The copper content was determined by electrolysis and the SO_3 content was determined gravimetrically as $BaSO_4$.	CuO was prepared by adding dilute NaOH to a solution of $CuSO_4$. The precipitate was washed with hot water. Nothing is stated about the other materials.
	ESTIMATED ERROR: No details are given.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Sulfuric acid; H_2SO_4; [7664-93-9] (3) Water; H_2O; [7732-18-5]	Binder, O. *Ann. Chim.*(11) 1936, 5, 337-409.
VARIABLES: Concentration of H_2SO_4 at 22°C.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of $Cu(OH)_2$ in H_2SO_4 solutions at 22°C.

C_{SO_3}/mass%	C_{CuO}/mass%	C_{H_2O}/mass%	C_{SO_3}/mol kg^{-1} [a]	C_{CuO}/mol kg^{-1} [a]	Solid phase [b]
1.82	1.68	96.50	0.236	0.219	A
1.79	1.67	96.54	0.232	0.217	"
1.79	1.69	96.52	0.232	0.220	"
3.79	3.69	92.52	0.512	0.501	"
3.78	3.68	92.54	0.510	0.500	"
3.77	3.66	92.57	0.509	0.497	"
5.16	5.07	89.77	0.718	0.710	"
5.15	5.05	89.80	0.716	0.707	"
5.20	5.06	89.74	0.724	0.709	"
7.19	7.04	85.77	1.05	1.03	"
7.22	7.05	85.73	1.05	1.03	"
7.29	7.11	85.60	1.06	1.04	"
8.20	8.12	83.68	1.22	1.22	"
8.28	8.14	83.58	1.24	1.22	"
8.43	8.30	83.27	1.26	1.25	"
8.94	8.77	82.29	1.36	1.34	A + B
8.90	8.77	82.33	1.35	1.34	"
8.93	8.77	82.30	1.36	1.34	"
10.95	7.59	81.46	1.68	1.17	B
11.32	7.87	80.91	1.75	1.22	"
12.03	7.26	80.71	1.86	1.13	"
13.21	6.53	80.26	2.06	1.02	"

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

$Cu(OH)_2$ and sulfuric acid solutions were mixed and shaken frequently in a thermostat until the copper concentration in the liquid phase became constant. The mixtures were then filtered through a glass frit and analyzed. Copper analysis was by electrolytic deposition. Sulfate was determined gravimetrically as $BaSO_4$.

SOURCE AND PURITY OF MATERIALS:

The $Cu(OH)_2$ was prepared by adding NH_4OH to aqueous $CuSO_4$ only in a quantity sufficient to dissolve the precipitate that formed. The solution was cooled to 0°C and added gradually to a solution of NaOH. The precipitate was washed with water until it was free of sulfate ions, then with alcohol, and finally with ether. It was dried in a vacuum. No other details are given.

ESTIMATED ERROR:

No details are given.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide, $Cu(OH)_2$; [20427-59-2] (2) Sulfuric acid, H_2SO_4; [7664-93-9] (3) Water; H_2O; [7732-18-5]	Binder, O. *Ann. Chim.*(11) 1936, 5, 337-409.

EXPERIMENTAL VALUES con'td:

Solubility of $Cu(OH)_2$ in H_2SO_4 solutions at 22°C.

C_{SO_3}/mass%	C_{CuO}/mass%	C_{H_2O}/mass%	C_{SO_3}/mol kg^{-1} [a]	C_{CuO}/mol kg^{-1} [a]	Solid phase [b]
15.23	5.72	79.05	2.41	0.910	B
17.07	5.21	77.72	2.74	0.843	"
17.54	4.92	77.54	2.83	0.798	"
20.09	4.08	75.83	3.31	0.676	"
22.54	3.54	73.92	3.81	0.602	"
24.26	3.07	72.67	4.17	0.531	"
26.31	2.49	71.20	4.62	0.440	"
27.54	2.09	70.37	4.89	0.373	"
28.62	1.79	69.59	5.14	0.323	"
32.21	1.29	66.50	6.05	0.244	"
34.26	1.26	64.48	6.64	0.246	"
37.36	1.26	61.38	7.60	0.258	"
39.29	1.24	59.47	8.25	0.262	"
40.25	1.23	58.52	8.59	0.264	"
42.13	1.19	56.68	9.28	0.264	"
42.25	1.17	56.58	9.33	0.260	"
44.08	1.12	54.80	10.05	0.257	C
45.16	0.82	54.02	10.44	0.191	"
46.61	0.79	52.60	11.07	0.189	"
48.31	0.73	50.96	11.84	0.180	"
49.02	0.75	50.23	11.78	0.188	D
51.52	0.09	48.39	13.30	0.023	"
54.22	0.08	45.70	14.82	0.022	"
57.28	0.09	42.63	16.78	0.027	"
63.34	0.07	36.59	21.62	0.024	"
67.49	0.06	32.45	25.98	0.023	"
72.00	0.09	28.91	31.11	0.039	D + E
72.52	0.12	27.36	33.11	0.055	E
74.02	0.13	25.85	35.77	0.063	"
75.29	0.11	24.60	38.23	0.056	"
76.52	0.19	23.29	41.04	0.083	"

[a] The mol/kg H_2O values were calculated by the compiler.

[b] A = $SO_3 \cdot 4CuO \cdot 4H_2O$, B = $SO_3 \cdot CuO \cdot 5H_2O$; C = $SO_3 \cdot CuO \cdot 3H_2O$; D = $SO_3 \cdot CuO \cdot H_2O$; E = $SO_3 \cdot CuO$.

Some work was also done at 100°C but the solubility data obtained at that temperature are not included in the article.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Copper(II) sulfate; $CuSO_4$; [7758-98-7] (3) Water; H_2O; [7732-18-5]	Binder, O. *Ann. Chim.(11)* 1936, 5,337-409.
VARIABLES: Concentration of $CuSO_4$ at 22°C.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of $Cu(OH)_2$ in aqueous $CuSO_4$ at 22°C.

C_{SO_3}/mass%	C_{CuO}/mass%	C_{H_2O}/mass%	solid phase	C_{SO_3}/mol kg^{-1} [a]	C_{CuO}/mol kg^{-1} [a]
5.80	5.72	88.47	$SO_3 \cdot 4CuO \cdot 4H_2O$	0.819	0.813
5.65	5.58	88.77	"	0.795	0.790
2.43	2.38	95.19	"	0.319	0.314
2.30	2.25	95.45	"	0.301	0.296
1.84	1.80	96.36	"	0.239	0.235
1.55	1.52	96.93	"	0.200	0.197
1.24	1.22	97.54	"	0.159	0.162
0.52	0.50	98.98	"	0.066	0.064

[a] The mol/kg H_2O values were calculated by the compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
$Cu(OH)_2$ and solvent were mixed and shaken frequently in a thermostat until the concentration of the copper in the liquid phase became constant. The mixtures were then filtered through a glass frit and analyzed. Copper was determined by electrolytic deposition. Sulfate was determined gravimetrically as $BaSO_4$.	The $Cu(OH)_2$ was prepared by adding NH_4OH to aqueous $CuSO_4$ only in a quantity sufficient to dissolve the precipitate that was formed. The solution was cooled to 0°C and added gradually to a solution of NaOH. The precipitate was washed with water until free of sulfate ions, then with alcohol, and finally with ether. It was dried in a vacuum. No other information is given.
	ESTIMATED ERROR: No details are given.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Water; H_2O; [7732-18-5]	McDowell, L. A.; Johnston, H. L. *J. Am. Chem. Soc.* 1936, *58*, 2009-14.
VARIABLES:	**PREPARED BY:**
Concentration of NaOH at 25°C.	T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of CuO in aqueous NaOH at 25°C.

C_{NaOH}/mol kg^{-1}	$10^5 C_{Cu}$/mol kg^{-1} from undersaturation	$10^5 C_{Cu}$/mol kg^{-1} from supersaturation
2.212	70.1	71.4
3.247	92.5	- - -
4.227	185	176

The solubility of CuO in conductivity water at 25°C was determined to be

2.5×10^{-5} mol dm^{-3}
3.5×10^{-5} mol dm^{-3}
3.7×10^{-5} mol dm^{-3}
1.7×10^{-5} mol dm

mean value is 2.9×10^{-5} mol dm^{-3}

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Equilibrium was approached from under and from supersaturation. Mixtures of CuO and alkali were shaken in a thermostat for at least 2 weeks, then allowed to sediment for a week. The clear liquid was then siphoned off and filtered. Copper content was determined by electrometric titration with $K_4Fe(CN)_6$ using a Pt electrode. Total alkalinity was determined by titration with H_2SO_4.

SOURCE AND PURITY OF MATERIALS:

Conductivity water was used throughout. CuO was prepared by adding dilute aqueous $CuSO_4$ and KOH to boiling water. The precipitate was washed until free of SO_4^{2-} ions. NaOH solutions were prepared from reagent grade solid.

ESTIMATED ERROR:

The authors give no estimate.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0] (2) Potassium hydroxide; KOH; [1310-58-3] (3) Water; H_2O; [7732-18-5]	McDowell, L.A.; Johnston, H. L. *J. Am. Chem. Soc.* 1936, *58*, 2009-14.
VARIABLES: Concentration of KOH at 25°C.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES: Solubility of CuO in aqueous KOH at 25°C

C_{KOH}/mol kg^{-1}	$10^5 C_{Cu}$/mol kg^{-1} from undersaturation	$10^5 C_{Cu}$/mol kg^{-1} from supersaturation
0.0417	0.07	0.07
0.0513	0.08	0.08
0.0586	0.151	0.158
0.0600	0.132	0.241
0.0741	0.196	0.189
0.0832	0.172	0.162
0.0932	0.409	0.414
0.0968	0.302	0.282
0.1027	0.145	0.184
0.1150	0.324	0.308
0.1175	0.300	0.273
0.1385	0.398	0.371
0.1608	0.489	0.604
0.1705	0.608	0.563
0.1772	0.534	0.518
0.2035	1.02	0.83
0.2165	0.96	0.73
0.2238	0.93	0.84
0.2637	1.34	1.25
0.2761	----	1.56
0.3163	4.04	3.72

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

CuO and the KOH solutions were mixed and shaken in a thermostat for at least 2 weeks, then allowed to sediment for one week. The clear filtrate was then siphoned off and filtered. Equilibrium was approached from both undersaturation and from supersaturation. Copper content was determined by electrometric titration with $K_4Fe(CN)_6$ using a Pt electrode. Total alkalinity was determined by titration with H_2SO_4.

SOURCE AND PURITY OF MATERIALS:

Conductivity water was used throughout. The KOH solutions were prepared from a potassium amalgam or from reagent grade solid. The CuO was prepared by adding $CuSO_4$ and KOH simultaneously to boiling water. The precipitate was washed repeatedly until all traces of sulfate ion were removed.

ESTIMATED ERROR:

The authors do not discuss this.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0] (2) Potassium hydroxide; KOH; [1310-58-3] (3) Water; H_2O; [7732-18-5]	McDowell, L. A.; Johnston, H. L. *J. Am. Chem. Soc.* 1936, *58*, 2009-14.

EXPERIMENTAL VALUES:

Solubility of CuO in aqueous KOH at 25°C (con't)

C_{KOH}/mol kg^{-1}	$10^5 C_{Cu}$/mol kg^{-1} from undersaturation	$10^5 C_{Cu}$/mol kg^{-1} from supersaturation
0.3244	4.66	3.44
0.544	4.91	5.36
0.650	4.66	3.72
0.753	11.7	11.0
0.860	11.2	9.8
1.000	16.1	16.2
1.337	26.1	24.4
1.633	32.4	34.3
1.963	71.0	65.7
2.333	82.7	79.6
2.495	80.1	73.1
2.848	91.8	94.1
3.180	117.2	121.4
3.380	132	87.0
4.015	171	144
4.151	144	150
4.227	164	156
5.065	184	167
5.253	203	181
6.05	297	---
8.38	---	435

The authors develop the following equation to fit the data. The concentrations are expressed as mol/kg H_2O.

$$C_{Cu} = 10.3 \times 10^{-6} C_{OH^-} + 81 \times 10^{-6} (C_{OH^-})^{2/a_{H_2O}} (\gamma_{KOH})^2$$

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; [20427-59-2] (2) Ammonium hydroxide; NH_4OH; [1336-21-6] (3) Water; H_2O; [7732-18-5]	Arkhipov, M. I. *Zhur. Prikład. Khim.* 1948, *21*, 235-44.
VARIABLES:	**PREPARED BY:**
Concentration of NH_4OH at 15, 20 and 25°C.	T. Michalowski

EXPERIMENTAL VALUES:

Solubility of $Cu(OH)_2$ in aqueous NH_3 solutions.[a]

Amount $Cu(OH)_2$ added/ g dm^{-3}	Period of standing, in hours	t/°C	C_{Cu}/g dm^{-3} A	B	C	C_{Cu}/mol dm^{-3} [b] A	B	C
15	18	20	3.56	7.70	8.90	0.056	0.121	0.140
20	18	20	3.75	7.90	9.40	0.059	0.124	0.148
30	18	20	3.87	8.20	10.40	0.061	0.129	0.164
40	18	20	3.94	8.40	11.00	0.062	0.132	0.173
50	18	20	- - -	- - -	13.58	- - -	- - -	0.214
80	18	20	- - -	- - -	13.80	- - -	- - -	0.217
120	18	20	- - -	- - -	14.33	- - -	- - -	0.225
20	3	20	3.99	8.10	9.90	0.063	0.127	0.156
20	6	20	4.13	7.70	9.60	0.065	0.121	0.151
20	18	20	3.99	8.00	9.60	0.063	0.126	0.151
20	48	20	3.99	8.00	8.60	0.063	0.126	0.135
20	72	20	3.99	7.90	8.80	0.063	0.124	0.138
20	6	15	- - -	8.20	9.80	- - -	0.129	0.154
20	6	20	- - -	7.90	9.70	- - -	0.124	0.153
20	6	25	- - -	7.50	9.40	- - -	0.118	0.148

[a] The concentrations of NH_3 are as follows: Columns A, 50 g dm^{-3}; columns B, 100 g dm^{-3}; columns C, 200 g dm^{-3}.

[b] Calculated by the editor.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Mixtures of $Cu(OH)_2$ and NH_4OH solution were shaken, allowed to stand for some time, then shaken again and filtered. The copper content of the filtrate was determined iodometrically.	The $Cu(OH)_2$ was prepared by adding NaOH to an ammoniacal solution of $CuSO_4$. The precipitate was washed with cold water and dried in a desiccator. No information is given about any of the other materials.
	ESTIMATED ERROR: No details are given.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Copper(II) sulfate; $CuSO_4$; [7758-98-7] (3) Water; H_2O; [7732-18-5]	Akselrud, N.V.; Fialkov, Ya.A. *Ukr. Khim. Zhur.* 1950, *16*, 283-95.
VARIABLES:	PREPARED BY:
Concentration of $CuSO_4$ at 18.0°C.	T. Michalowski

EXPERIMENTAL VALUES:

Solubility product constant of $Cu(OH)_2$ in aqueous $CuSO_4$ at 18.0°C.

C_{Cu}/mol dm^{-3}	pH	- log $K_s o$[a]
0		19.8820[b]
0.0100	5.08	20.1000
0.0300	4.75	20.2829
0.1810	4.25	20.4483
0.2854	4.16	20.4695
0.5235	4.03	20.4841
0.8725	3.94	20.4383
1.1411	3.91	20.3842
1.2412	3.11	20.3851

[a] These values were calculated from the following equation:

$$-\log K_s o = -\log Cu^{2+} - 2 \log K_w - 2pH.$$

[b] This value was apparently obtained by extrapolating the first several values to zero ionic strength. It is considered to be the thermodynamic solubility product constant value.

Editor's note: The value used for K_w is not given, and it is impossible to reproduce the calculations of the -log $K_s o$ values using the same value for K_w in all instances.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Solid $Cu(OH)_2$ was added to solutions of $CuSO_4$. The mixtures were stirred vigorously at 18.0 ± 0.1°C. The pH of the solutions was determined potentiometrically using a hydrogen electrode. The method used to analyze for copper is not described.	The $CuSO_4$ was chemically pure and was recrystallized twice from water. The $Cu(OH)_2$ was prepared by treatirg a 5% $CuSO_4$ solution, containing 0.75 ml of glycerine per liter of solution, with dilute aqueous NaOH. The precipitate was washed repeatedly with water until there was no further evidence for the presence of sulfate ions.
	ESTIMATED ERROR:
	No details are given.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2]	Arkhipov, M. I.; Pakshver, A. B.; Podbornova N. I. *Zhur. Prikład Khim.* 1950, *23*, 650-6; *J. Applied Chem. USSR (Engl. transl.)* 1950 *23*, 685-91.
(2) Ammonium hydroxide; NH_4OH; [1336-21-6]	
(3) Water; H_2O; [7732-18-5]	
VARIABLES:	**PREPARED BY:**
Concentration of NH_4OH at 20°C.	T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of $Cu(OH)_2$ in NH_4OH solutions at 20°C.

C_{NH_3}/g dm^{-3}	C_{NH_3}/mol dm^{-3} [a]	C_{Cu}/g dm^{-3}	C_{Cu}/mol dm^{-3} [a]
43.9	2.58	3.75	0.059
78.2	4.60	8.2	0.129
123.7	7.28	11.9	0.187
204.0	12.0	15.5	0.244

The above solutions were diluted with water to give the following equilibria.

0.248	0.0052
0.309	0.0062
0.353	0.0070
0.233	0.0026

[a] Calculated by the compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The solid $Cu(OH)_2$ (dried at room temperature) was added to a large excess of solvent at 20°C. The mixtures were allowed to stand for 24 hours at 20°C. They were then filtered and the copper content of the filtrate was determined iodometrically (1). Some of the saturated solutions were carefully diluted with water until $Cu(OH)_2$ precipitated. The solutions were then set aside in the dark for two days at 20°C before the filtrate was analyzed for copper content.

SOURCE AND PURITY OF MATERIALS:

The $Cu(OH)_2$ was prepared by a method described earlier (2). No further information is given.

ESTIMATED ERROR:

No details are given.

REFERENCES:

1. Bruhns, G. *Z. Anal. Chem.* 1920, 59, 337.
2. Arkhipov, M. *J. Applied Chem. USSR* 1948, *21*, 11,1107.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Water; H_2O; [7732-18-5]	Arkhipov, M. I.; Pakshver, A. B; Podbornova, N. I. *Zhur. Prikład Khim.* 1950, *23*, 650-6; *J. Applied Chem. USSR (Engl. transl.)* 1950, *23*, 685-91.
VARIABLES: Sodium hydroxide concentration and temperature.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES: Solubility of $Cu(OH)_2$

Table I. Solubility of $Cu(OH)_2$ in aqueous NaOH at 15°C.

C_{NaOH}/g dm^{-3}	C_{NaOH}/mol dm^{-3} [a]	C_{Cu}/g dm^{-3}	C_{Cu}/mol dm^{-3} [a]
56.4	1.41	0.10	0.0016
120.8	3.02	0.31	0.0049
172.8	4.32	0.89	0.0140
209.6	5.24	1.19	0.0187
240.0	6.00	2.61	0.0411

Table II. Solubility of $Cu(OH)_2$ in aqueous NaOH at 20°C.

C_{NaOH}/g dm^{-3}	C_{NaOH}/mol dm^{-3} [a]	C_{Cu}/g dm^{-3}	C_{Cu}/mol dm^{-3} [a]
68.4	1.71	0.25	0.0039
132.0	3.30	0.82	0.0129
202.0	5.05	2.87	0.0452
360.0	9.00	10.4	0.164

The above solutions were diluted with water to give the following equilibria.

0.051	0
0.203	0.0006
1.210	0.0071
4.180	0.0376

[a] Calculated by the compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The $Cu(OH)_2$ was dried at room temperature, added to an excess of NaOH solution, allowed to stand 24 hours, then filtered. The copper content of the filtrate was determined iodometrically (1). Some of the saturated solutions were also diluted with water until $Cu(OH)_2$ began to precipitate. These mixtures were set aside in the dark for 2 days and the solution was then analyzed for copper content.

SOURCE AND PURITY OF MATERIALS:

The $Cu(OH)_2$ was prepared by a method described earlier (2). Nothing is said about any of the other materials that were used.

ESTIMATED ERROR:

No details are given.

REFERENCES:

1. Bruhns, G. *Z. Anal. Chem.* 1920, *59*, 337.

2. Arkhipov, M. *J. Applied Chem. USSR* 1948, *21*, 11, 1107.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0] (2) Nitric acid; HNO_3; [7697-37-2] (3) Water; H_2O; [7732-18-5]	Sircar, S. C.; Prasad, B. *J. Indian Chem. Soc.* 1956, 33, 361-2.
VARIABLES:	**PREPARED BY:**
Concentration of nitric acid at room temperature.	T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility product of CuO in aqueous HNO_3.

C_{HNO_3}/mol dm^{-3}	C_{Cu}/mol dm^{-3}	pH	$10^{20}K_s^o$
0.0201	0.0100	5.28	1.9
0.0402	0.0200	5.20	2.3
0.0604	0.0301	5.11	1.9
0.0805	0.0384	5.02	1.5
0.1006	0.0482	4.95	1.6
0.1207	0.0580	4.84	0.8
0.1408	0.0676	4.74	0.6

The average value for K_s^o is 1.5×10^{-20}.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Mixtures of solid CuO and aqueous HNO_3 were shaken for 8 days, then filtered. The pH of the filtrate was measured with a pH meter. The copper content of the filtrate was determined iodometrically. The experiments were carried out in triplicate at 25-28°C. The copper in the filtrate was assumed to be present as Cu^{2+} ion and the activity coefficient of this ion was calculated using a principle described earlier (1).

SOURCE AND PURITY OF MATERIALS:

CuO was prepared by adding NaOH to aqueous $CuCl_2$, washing the precipitate and drying it at 110-115°C for 15 hours. There is no indication about the quality of the HNO_3.

ESTIMATED ERROR:

No details are given.

REFERENCES:

1. Das, N. K.; Aditya, S.; Prasad, B. *J. Indian Chem. Soc.* 1952, 29, 169.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Hydrogen peroxide; H_2O_2; [7722-84-1] (3) Water; H_2O; [7732-18-5]	Makarov, S.Z.; Arnol'd, T.I.; Stasevich, N.H.; Shorina, E.V. *Izv. Akad. Nauk SSSR, Otd. Khim. Nauk* 1960, 1913-20.
VARIABLES: Temperature and concentration of hydrogen peroxide.	PREPARED BY: T. Michalowski

EXPERIMENTAL VALUES:

Table I. Solubility of $Cu(OH)_2$ in aqueous hydrogen peroxide at -20°C.

$C_{H_2O_2}$/mass %	$10^4 C_{CuO}$/mass %	$C_{H_2O_2}$/mol kg^{-1} [a]	$10^5 C_{CuO}$/mol kg^{-1} [a]	Solid phase [b]
24.4	3.88	9.49	6.5	A + B
31.54	1.35	13.5	2.5	B
34.4	2.00	15.4	3.8	"
34.4	1.9	15.4	3.6	"
40.14	1.68	19.7	3.5	"
41.23[c]	8.76	20.6	1.9	B + C
44.54	1.03	23.6	2.3	C
51.1	0.51	30.7	1.3	"
52.7[c]	0.80	32.8	2.1	"
75.1	1.05	88.7	5.3	"
84.1	1.04	156	8.2	C + D

[a] The mol/kg H_2O values were calculated by the Editor.

[b] The solid phases are: A = ice; B = $CuO_2 \cdot H_2O$; C = $CuO_2 \cdot H_2O_2 \cdot H_2O$; D = H_2O_2.

[c] These values are in error in the original paper.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Solutions of H_2O_2 and solid $Cu(OH)_2$ were brought to equilibrium isothermally. Active oxygen was determined by titration with $KMnO_4$ in the presence of boric acid. The copper content of the solid phase was determined by electrolysis; that of the liquid phase was determined colorimetrically using dithizone.

SOURCE AND PURITY OF MATERIALS:

The $Cu(OH)_2$ was prepared by adding aqueous NaOH to a solution of $CuSO_4$ in the presence of glycerine. The precipitate was then washed with distilled water. The H_2O_2 was purified by vacuum distillation.

ESTIMATED ERROR:

No details are given as to temperature control, precision of analyses, or any other part of the procedure.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Hydrogen peroxide; H_2O_2 [7722-84-1] (3) Water; H_2O; [7732-18-5]	Makarov, S.Z.; Arnol'd, T.I.; Stasevich, N.H.; Shorina, E.V. *Izv. Akad. Nauk SSSR, Otd. Khim. Nauk* 1960, 1913-20.

EXPERIMENTAL VALUES, cont'd:

Table II. Solubility of $Cu(OH)_2$ in aqueous hydrogen peroxide at 0°C.

$C_{H_2O_2}$/mass %	$10^4 C_{CuO}$/mass %	$C_{H_2O_2}$/mol kg^{-1} [a]	$10^5 C_{CuO}$/mol kg^{-1} [a]	Solid phase [b]
0	0.23	0	0.29	A
2.47	0.55	0.74	0.71	"
4.82	7.77	1.49	10	"
8.26	11.6	2.65	16	B
25.75	5.65	10.2	9.6	"
33.51	4.4	14.8	8.3	"
40.50	1.5	20.0	3.2	"
46.13	1.55	25.2	3.6	"
46.66	1.5	25.7	3.5	"
49.51	2.25	28.8	5.6	"
50.57	9.51	30.1	24	B + C
55.70[c]	1.79	37.0	5.1	C
63.68	0.59	51.5	2.0	"
72.52	0.85	77.6	3.9	"

[a] The mol/kg H_2O values were calculated by the Editor.

[b] The solid phases are: A = $Cu(OH)_2$; B = $CuO_2 \cdot H_2O$; C = $CuO_2 \cdot H_2O_2 \cdot H_2O$.

[c] This is a corrected value. The value in the original paper is in error.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0] (2) Sodium perchlorate; $NaClO_4$; [7601-89-0] (3) Water; H_2O; [7732-18-5]	Schindler, P.; Althaus, H.; Hofer, F.; Minder, W. *Helv. Chim. Acta* 1965, *48*, 1204-15.
VARIABLES: Molar surface area of the CuO.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility product of CuO at 25°C.[a]

S/m^2 [b]	$\log {}^*K_{so}$ [c]
4340	8.27 ± 0.01
4210	8.22 ± 0.03
3760	8.18 ± 0.02
2530	8.08 ± 0.04
1790	8.04 ± 0.03
1210	7.97 ± 0.03
230	7.91 ± 0.02

[a] Each result is the average of 2 to 4 determinations.

[b] S is the molar surface area.

[c] ${}^*K_{so} = K_{so}/(K_w)^2$.

The use of linear regression analysis gives (with a 90% certainty) the following equation for the above data:

$$\log {}^*K_{so} = (7.89 \pm 0.05) + (8.0 \pm 1.7) \times 10^{-5} S.$$

From this, $\log K_{so}$ is calculated to be -19.51 ± 0.05 at 25°C.

Using the method of Davies (1), $\log K^\circ_{so}$ then is -20.35 ± 0.06 at 25°C.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The CuO was placed in a column and the solvent (water containing 0.2 mol $NaClO_4$ dm^{-3}) was forced through the column 10 to 20 times until the pH of the solution became constant. Then a sample of the solution was removed and analyzed for copper content by a complexiometric titration. The pH was determined by measuring the e.m.f. across a glass and an AgCl/Ag electrode placed in the solution. All measurements were made at 25.0 ± 0.5°C.

SOURCE AND PURITY OF MATERIALS:

CuO was prepared by adding an aqueous solution of $CuCl_2 \cdot 2H_2O$ and a methanol solution of KOH simultaneously to boiling water. The precipitated CuO was washed and then dried at 80°C over P_2O_5 in a vacuum.

ESTIMATED ERROR:

This is indicated in the reported results.

REFERENCES:

1. Davies, C. W. *Ion Association*, Butterworths, London 1960, p. 41.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Sodium perchlorate; $NaClO_4$; [7601-89-0] (3) Water; H_2O; [7732-18-5]	Schindler, P.; Althaus, H.; Hofer, F.; Minder, W. *Helv. Chim. Acta* 1965, *48*, 1204-15.
VARIABLES:	**PREPARED BY:**
Particle size and molar surface area of the solid phase.	T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility product of $Cu(OH)_2$ at 25°C.[a]

S/m^2 [b]	$\log {}^*K_s^o$ [c]
250	8.91 ± 0.06
1340	9.00 ± 0.02
1910	9.00 ± 0.02
2940	9.06 ± 0.01
4570	9.12 ± 0.02

[a] Each result is the average of 4 to 8 determinations.

[b] S is the molar surface area.

[c] ${}^*K_s^o = K_s^o/(K_w)^2$.

The data above can be represented by the following equation:

$$\log {}^*K_s^o = (8.92 \pm 0.04) + (4.8 \pm 1.5) \times 10^{-5}\ S.$$

$\log K_s^o$ for $Cu(OH)_2$ is calculated to be -18.48 ± 0.04 at 25°C,

and $\log K_s^{\circ o} = -19.32 \pm 0.05$ at 25°C in 0.2 mol $NaClO_4$ dm^{-3}.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The equilibration was accomplished in a column containing the $Cu(OH)_2$. The solvent was forced through the column 10 to 20 times and the pH of the solution was determined by measuring the e.m.f. across a glass electrode and an AgCl/Ag electrode immersed in the solution. After the pH became constant a sample of the solution was removed and analyzed for copper content by a complexiometric titration. The solvent was a 0.2 mol dm^{-3} solution of $NaClO_4$. All measurements were made at 25.0 ± 0.05°C. The method of Davies (1) was used to obtain the thermodynamic solubility product constant.

SOURCE AND PURITY OF MATERIALS:

The larger particle sized $Cu(OH)_2$ was prepared by the method of Oswald and Jaggi (2). The finely divided $Cu(OH)_2$ was prepared by treating an aqueous solution of $Cu(NO_3)_2 \cdot 3Cu(OH)_2$ with aqueous NaOH. The particle size was determined by the concentration of NaOH and the time allowed for the reaction.

ESTIMATED ERROR:

The uncertainty is included in the reported results.

REFERENCES:

1. Davies, C. W. *Ion Association*, Butterworths, London 1960, p. 41.
2. Oswald, H. R.; Jaggi, H. *Chimia* 1960, *14*, 22.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Water; H_2O; [7732-18-5]	Akhmetov, K. M.; Buketov, E. A.; Ugorets, M. I. *Tr. Khim.-Met. Inst., Akad. Nauk Kaz, SSR* 1967,3, 119-28.
VARIABLES: Concentration of NaOH and temperature.	**PREPARED BY:** T. Michalowski

EXPERIMENTAL VALUES:

Solubility of CuO in aqueous NaOH.[a]

	$10^5 C_{Cu}$/mol dm^{-3}					
t/°C	A	B	C	D	E	F
25	24.10	70.86	106.01	275.52	472.14	1122.67
50	39.86	111.21	178.36	403.94	653.12	1384.95
75	52.45	157.38	238.43	498.34	880.86	1542.33
125	88.13	224.00	346.23	771.16	1007.22	2014.38
150	103.87	258.10	416.56	876.08	1356.40	2360.71
175	125.90	311.61	459.55	971.04	1495.20	2650.74
200	154.23	336.79	582.30	1117.43	1731.16	3116.14

[a] The NaOH concentration (mol dm^{-3}) is: Column A = 1; Column B = 2.25; Column C = 3; Column D = 5; Column E = 7; Column F = 10.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:	SOURCE AND PURITY OF MATERIALS:
Mixtures of CuO and NaOH solutions were placed in Teflon containers. At temperatures below 100°C the mixtures were kept in a thermostat for 20-30 days. At higher temperatures the mixtures were placed in an autoclave for about 10 hours. The concentration of NaOH was determined by titration. The copper content was measured colorimetrically. Each value reported is the average of 2 to 4 determinations. The temperature was controlled to within 2°C in the autoclave and to within 0.5°C in the thermostat.	The water was distilled twice. The NaOH was reagent grade. Nothing is said about the CuO.
	ESTIMATED ERROR: According to the authors the average standard deviation is about 0.06.
	REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0] (2) Ammonium hydroxide; NH_4OH; [1336-21-6] (3) Water; H_2O; [7732-18-5]	Gubeli, A. O.; Hebert, J.; Cote, P. A.; Taillon, R. *Helv. Chim. Acta* 1970, 53, 186-97.
VARIABLES: Concentration of NH_4OH at 25°C and constant ionic strength of 1.0 mol dm^{-3}.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Solubility of CuO in ammoniacal solutions at 25°C.

pH	pCu_{tot} [a]	pNH_3 tot [a]	pH	pCu_{tot} [a]	pNH_3 tot [a]
11.03	5.68	1.426	12.05	4.51	0.903
11.35	5.60	1.426	12.20	4.58	0.903
11.85	5.75	1.426	12.70	4.41	0.903
12.55	5.79	1.426	13.30	4.51	0.903
11.95	5.12	1.125			
12.25	5.00	1.125			
12.70	5.02	1.125			

[a] All concentrations are expressed as mol dm^{-3}.

A graph of the solubility of CuO as a function of pH shows that the solubility decreases from pH 6 to 7.5 and then is constant at about 10^{-6} mol dm^{-3} for the pH range 7.5 to 11.65. As the pH increases beyond 12 the solubility of CuO increases.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Mixtures of CuO and solution were agitated steadily for several days, then allowed to settle for about a week. The copper content of the solution was determined colorimetrically (1) with 2,2'-biquinoline. The pH of the solution was determined with a glass electrode. Five series of solutions were used in which the total concentration of NH_3 was: 0.01, 0.02, 0.0375, 0.075 and 0.125 mol dm^{-3}. The pH of the solution was adjusted by adding $HClO_4$ or NaOH. All solutions were maintained at 25°C and brought to an ionic strength of 1.0 mol dm^{-3} by the addition of $NaClO_4$.

SOURCE AND PURITY OF MATERIALS:

The CuO was prepared by adding NaOH to a solution of copper perchlorate. The water was deoxygenated, deionized, and distilled twice. No information is given about the NH_4OH.

ESTIMATED ERROR:

This is given with each reported result.

REFERENCES:

1. Hoste, J.; Eeckhout, J.; Gillis, J. *Anal. Chim. Acta* 1953, 9, 263.

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) oxide; CuO; [1317-38-0] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Water; H_2O; [7732-18-5]	Solov'eva, V.D.; Svirchevskaya, E.G.; Bobrova, V.V.: Eltsov, N.M. *Tr. Inst. Metal. Obogashch., Akad. Nauk Kaz. SSR* 1973, *49*, 37-44.
VARIABLES:	PREPARED BY:
Concentration of NaOH and temperature.	T. Michalowski

EXPERIMENTAL VALUES:

Solubility of CuO in solutions of sodium hydroxide.

t/°C	C_{NaOH}/mol dm^{-3}	$10^5 C_{Cu}$/mol dm^{-3}
105	7.5	750
105	10.0	781
105	14.75	4677
105	18.0	10000
200	2.5	125
200	5.0	812
200	7.5	2000
200	10.0	3375
200	12.5	6250
200	15.0	10325
200	18.3	12800
200	19.6	1850

Editor's note: The composition of the solid phases in equilibrium with the above solutions is not given.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

The experiments were performed in steel autoclaves. The mixtures were probably brought to equilibrium isothermally. The solid phases were analyzed using X-ray diffraction and other physico-chemical methods. The liquid phases were analyzed chemically, but the procedures are not specified.

SOURCE AND PURITY OF MATERIALS:

The CuO was an analytically pure material and was further purified to remove Cu and Cu_2O. No other information is given.

ESTIMATED ERROR:

No details are given.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Sodium hydroxide; NaOH; [1310-73-2] (3) Water; H_2O; [7732-18-5]	Solov'eva, V.D.; Bobrova, V.V.; Orlova, L.F.; Adeishvili, E.U. *Tr. Inst. Metal. Obogashch., Akad. Nauk Kaz. SSR* 1973, *49*, 45-8.
VARIABLES:	PREPARED BY:
Concentration of NaOH and temperature.	T. Michalowski

EXPERIMENTAL VALUES:

Solubility of $Cu(OH)_2$ in NaOH solutions.

C_{NaOH}/mol dm^{-3}	10^5 C_{Cu}/mol dm^{-3}		
	20°C	105°C	200°C
2.0	98	210	350
4.0	201	423	960
5.6	405	641	1600
8.3	641	1280	3200
10.0	962	1920	3860
12.0	1920	3180	6400
14.5	2880	6400	9600
16.0	- - -	8000	11520
17.2	- - -	10880	13760
18.0	- - -	10240	11860
18.5	- - -	7340	10240

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

Very little information is given about the experimental details. Apparently, the solutions were allowed to equilibrate isothermally. There is no information about temperature control, preparation of solutions, assurance that equilibrium had been reached, or methods used for analysis.

SOURCE AND PURITY OF MATERIALS:

The $Cu(OH)_2$ was prepared by mixing NaOH and $CuSO_4$ solutions. The precipitate was allowed to stand in contact with 5% NaOH for 1 hour in the absence of air, then filtered, washed, and dried in a desiccator. No other information is given.

ESTIMATED ERROR:

No details are given.

REFERENCES:

COMPONENTS:	ORIGINAL MEASUREMENTS:
(1) Copper(II) hydroxide; $Cu(OH)_2$; [20427-59-2] (2) Selenium(IV) oxide; SeO_2; [7446-08-4] (3) Water; H_2O; [7732-18-5]	Ojkova, T.; Gospodinov, G. Z. *Anorg. Allg. Chem.* 1982, *484*, 235-40.
VARIABLES: Concentration of SeO_2 at 100°C.	**PREPARED BY:** T. P. Dirkse

EXPERIMENTAL VALUES:

Composition of the $CuO-SeO_2-H_2O$ system at 100°C.

C_{CuO}/mass%	C_{SeO_2}/mass%	C_{CuO}/mol kg^{-1} [a]	C_{SeO_2}/mol kg^{-1} [a]	Solid phase
0.194	1.01	0.0247	0.092	$CuSeO_3 \cdot 2H_2O$
0.184	4.04	0.0242	0.380	"
0.170	8.25	0.0233	0.812	$CuSeO_3 \cdot H_2SeO_3$
0.166	8.68	0.0229	0.858	"
0.144	17.17	0.0219	1.87	"
0.108	30.74	0.0196	4.01	"
0.100	33.85	0.0190	4.62	"
0.086	39.87	0.0180	5.98	"
0.078	43.07	0.0172	6.83	"
0.066	47.78	0.0159	8.26	"
0.056	52.56	0.0149	10.0	"
0.042	58.71	0.0128	12.8	"
0.038	60.96	0.0122	14.1	"
0.024	67.93	0.0094	19.1	"

[a] The values are given as mol/kg H_2O and were calculated by the compiler.

AUXILIARY INFORMATION

METHOD/APPARATUS/PROCEDURE:

$Cu(OH)_2$ was added to a solution of H_2SeO_3. The mixture was stirred for 24 hours, then placed in a sealed glass ampule and kept at 100°C for about 30 days. The solid and liquid phases were separated from each other by filtration. The copper content of the filtrate was determined colorimetrically with dithizone. The selenium content was measured iodometrically.

SOURCE AND PURITY OF MATERIALS:

The $Cu(OH)_2$ was freshly prepared but the method is not described. The H_2SeO_3 solutions were prepared by adding freshly sublimed SeO_2 to water.

ESTIMATED ERROR:

No details are given.

REFERENCES: