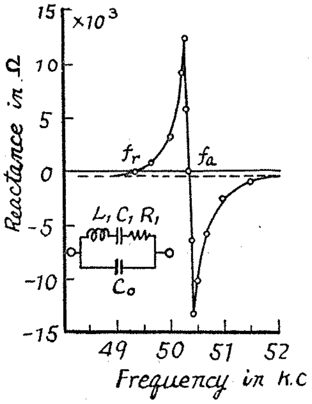

Fig. 2.

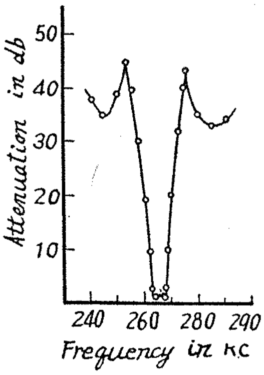

Fig. 3.

Table 2.

Const. of Vibrator	Unit	Ceramic Disc Type		Langevin Type	
		Sample 1	Sample 2	Sample 1	Sample 2
fr	κc	44.63	43.39	49.45	49.64
fa	κc	46.22	45.31	50.31	50.46
C_0	*pF*	6967	8081	5368	6616
Δf	κc	0.080	0.085	0.060	0.065
r		14.30	11.36	28.60	31.25
C_1	*qF*	487.5	71.20	187.6	211.2
L_1	*mH*	26.14	18.90	55.25	48.75
R_1	Ω	13.15	10.10	20.84	19.94
Q		558	511	824	764

9. Formation and Aging of Precipitates. (III)

Electron Microscopic Investigaton of Barium Sulfate Precipitates in Alcohol Solution

Eiji SUITO and Kazuyoshi TAKIYAMA

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Barium sulfate precipitates were formed in alcohol solution and the relations between the total concentration of $BaSO_4$, the concentration of alcohol and the solubility of $BaSO_4$ were studied.

The solubilities of $BaSO_4$ in alcohol solutions were determined by the following method. The electric conductivities of the saturated aqueous alcoholic solution of $BaSO_4$, whose concentration was known, and of alcohol solution of the same concentration were determined. The saturated aqueous solution of $BaSO_4$ was added to its alcohol solution until the same conductivity as the saturated $BaSO_4$ in the alcohol solution was obtained. Then from the quantity of the added saturated $BaSO_4$ solution the solubility of $BaSO_4$ in the alcohol solution was calculated. And the results are shown in Fig.1.

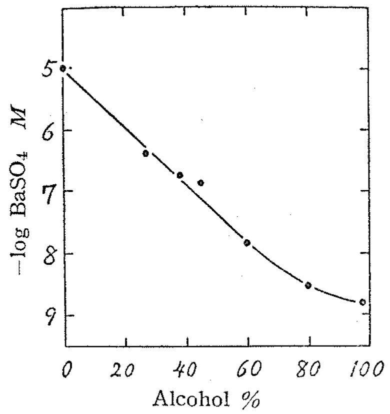

Fig. 1. The Solubility of $BaSO_4$ in alcohol solution.

The $BaSO_4$ precipitates were formed as follows: To 10 ml. of alcohol solution of known concentration were added 5 ml. of $Ba(OH)_2$ and H_2SO_4 which were same concentration. The precipitates were observed by electron or optical microscope. The results were shown in Table 1.

Table 1. The Properties of $BaSO_4$ Precipitates in Alcohol Solution.

No.	Total conc. M	Alcohol conc. %	Solubility M	Particle size mμ	Particle shape
1	5×10^{-2}	0	1×10^{-5}	400	Hexagon
2	〃	2.5	9×10^{-6}	90	〃
3	〃	10	5×10^{-6}	70	〃
4	〃	50	7×10^{-8}	10	Sphere
5	5×10^{-3}	0	1×10^{-5}	3200	Diamond
6	〃	2.5	9×10^{-6}	3000	〃
7	〃	5	8×10^{-6}	2500	〃
8	〃	7.5	7×10^{-6}	2000	〃
9	〃	10	5×10^{-6}	1100	〃
10	〃	15	3×10^{-6}	400	〃
11	〃	50	7×10^{-8}	10	Sphere
12	5×10^{-4}	0	1×10^{-5}	3500	Ellipse
13	〃	2.5	9×10^{-6}	3100	〃
14	〃	10	5×10^{-6}	3000	Diamond
15	〃	25	6×10^{-7}	2000	〃
16	〃	35	3×10^{-7}	70	〃
17	〃	50	7×10^{-8}	10	Sphere
18	5×10^{-2}	10	5×10^{-6}	70	Hexagon
19	4×10^{-2}	〃	〃	710	Diamond
20	3×10^{-2}	〃	〃	820	〃
21	1×10^{-2}	〃	〃	830	〃
22	5×10^{-3}	〃	〃	1600	〃

At the total concentration of 0.05 *M* the size of the particles precipitated from aqueous and three alcoholic solutions, *i.e.* 2.5, 10 and 50%, were 400, 90, 70, and 10 mμ respectively.

At the total concentration of 0.005 *M* the precipitated particles became smaller with increasing of the concentration of alcohol.

At the total concentration of 0.0005 *M* the precipitate in water began to deposit after 30 seconds from the time of mixing reagents and after about 2.5 minutes the precipitation was completed and the particle was ellipse and the size of it was 3.5μ. In 2.5% alcohol the precipitate was formed after a few seconds and the shape was diamond with rugged edges. In 35% alcohol the precipitate was formed as soon as the reagents were mixed and the shape of it was spindle. In 50% alcohol the particle was sphere and the size of it was 10 mμ. These changes in shapes of particles owing to those in the solubilities of $BaSO_4$ are in agreement with changes in shapes by changing the total concentration of $BaSO_4$ in water. That is, the precipitates of the same shape were deposited after the same time from mixing the reagents.

The size of precipitated particles formed in the alcohol solution of the same concentration became larger with decreasing of the total concentration as shown in Table 1. But it seemed there was no simple law in these relations.
(*See, This Bulletin*, **31**, 48 (1953), and *Proc. Japan Acad.* **28**, 133 (1951).

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10. Studies on the Zinc-ferrite

On the Relation between the Temperature of Preparation of the Fe_2O_3 and its Activity of Zinc-ferrite Formation

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Zinc-ferrite is known as the compound of spinel type $ZnFe_2O_4$, and its structure, formation temperature and magnetism *etc.* are affected by the property of Fe_2O_3. But on these points it has not been precisely determined up to present, so that we have intended to study on the relation between the preparation temperature of the Fe_2O_3 and its activity of zinc-ferrite formation.

As the sample, the pure Fe_2O_3 was prepared by means of decomposition i), $Fe(OH)_3$ by heating it at 300°, 500° and 800°C respectively, ii) $Fe(NO_3)_3$ by heating it at 900°C. and iii) ferrous oxalate by heating at 500°C in the air. The pure ZnO was prepared from pure $ZnSO_4$.

The Fe_2O_3 and the ZnO are mixed in the exact proportion so as to furnish ZnO. Fe_2O_3, and the mixture is heated at 500°, 600°, 700°, 800°, 900°, and 1300°C each for 15, 30, 60, and 120 min. Then the free ZnO in the roasted sample is leached in Maspratt's solution.