Under very slowly alternating field, i. e., below 1 kc, water itself had a large d. k. due to its slight impurities. This phenomenon was confirmed by the d. k. measurements of KCl aqueous solutions of various densities. The ratios of the d. k. of the pastes to that of KCl aqueous solution with the same conductivity were obtained by taking into account the increase of d. k. due to the ions. The results are shown in Table I.

| Sample | Volume Concentration | Ratio to the d. k. of water at | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 60 | 180 | 420 | $1.1\times10^3$ | $4.0\times10^3$ | $1.7\times10^4$ | $3.4\times10^4$ | $6.0\times10^4$ cps. |
| Kato Kaolin (upper part) | 0.159 | — | 3.4 | 4.3 | 11 | 13 | 10 | 7.5 | 6 |
| Kato Kaolin (lower part) | 0.323 | — | 7.4 | 9.3 | 15 | 21 | 8 | 7 | 6 |
| Fukushima-Silica | 0.510 | 1.1 | 1.5 | 1.5 | 1.5 | 0.5 | 0.4 | 0.4 | 0.3 |
| ZnO | 0.08 | 0.8 | 1.1 | 1.1 | 1.5 | 1.1 | 1.0 | 1.0 | 1.0 |

When the Kato Kaolin was suspended and sedimentated in water, upper and lower sediments of different colour were obtained. The "upper part" and the "lower part" in this table mean the upper and lower sediments.

The Kato Kaolin mud showed larger d. k. than that of the water in all frequency range, while the mud made from the Fukushima Silica showed smaller d. k. than that of the water in the range of frequencies larger than 4 kc.

Since the d. k. of the Kato Kaolin powder desicated for a long time at 110°C, was ca. 5, it was noticeable that the Kaolin mud had larger d. k. than that of its two components.

Conclusions: when the silica powder is mixed with water, both are mutually independent, while clay and water have mutual interactions of some kind, and these interactions may cause the plasticity of clay paste.

The authers are indedted to Prof. B. Arakatsu and Mr. N. Koizumi of Goto laborataory for their kind advices.

## 52. The Quantitative Determination of Chromium in Sea Water.

*Masayoshi Ishibashi* and *Tsunenobu Shigematsu.*

(Ishibashi Laboratory)

Chromium has been detected by some investigators in marine organisms, but no one determined in sea-water. In the present work, the authers have found Cr in sea-water spectroscopically and quantified it by colorimetry, using diphenylcarbazide as the reagent.

Chromium in sea-water is cocentrated in $Al(OH)_3$, precipitated as carrier. Aluminium hydroxide was dried and fused with a small amount of fusing mixture in Pt-crucible. The fused mass is then extracted with water, where the solution contains chromate, permanganate and vanadate. A few drops of $C_2H_5OH$ is added to the solution in order to reduce permanganate, and then neutralized with $H_2SO_4$.

If V presents, it interferes the colorimetry of Cr in presence of diphenylcarbazied. In this case, V should de extracted beforehand with $CHCl_3$ in the form of Cr oxinate. Then Cr is quantitatively determined by colorimetry, with diphenylcarbazide. The results are as follows:-

| Sample | Chromium content $\gamma/L$ |
|---|---|
| I (Aug. 12, '49 at Shirahama, Wakayama Pref.) | Cl=19.16‰ 0.07 |
| II (Dec. 25, '49 at 〃 ) | Cl=18.97‰ 0.05 |
| III (Feb. 21, '50 at 〃 ) | Cl=19 25‰ 0.04 |

## 53. Studies on Fishscale of Porcelain Enamel.

*Ikutaro Sawai* and *Megumi Tashiro.*

(Sawai Laboratory)

In order to produce fishscales artificially, the authors have treated steel plates, one side of which was coated by different kinds of enamels respectively by sulphuric acid. The volume of hydrogen which liberates at the enameled side by fishscaling was measured by the replacement of mercury. Tests were made on ground coat, antimony cover coat applied over ground coat and titanium cover coat applied over ground coat respectively. The applied quantity of the enamel was different for each case.

The results obtained are as follows; (1) For all types of enamel, the volume of hydrogen evolved at the fishscaling increases with the increase of the applied whight in the following manner: 0—1 $mm^3$ at 4 gr./$dm^2$., 1—2 $mm^3$ at 6 gr./$dm^2$ and 2—4 $mm^3$ at 8 gr./$dm^2$. No effects of types of enamel on the volum of hydrogen were found. (2) The fishscale produced has a shape of inverted frustum of a cone, the small base of which attached directly to the iroh base. The ratio between its height, radii of large and small bases was 1 : 5. 7 : 2. 3 and was independent of the size of the fishscale and the kind and weight of applied enamel. (3) The pressure of hydrogen necessary for producing a fishscale is calculated to be always about $110\times10^6$ dyne/$cm^2$, irrespective of the kind and applied weight of enamel. (4) Overfire decreases resistance to fishscale. (5) The mill addition of quartz power has a sure effect in preventing fishscale.