| Forsch | 0.0033 | Capillary[2] |
| Authors | 0.00227±0.00005 at −187.3°C | Oscillatory rotation of a cylinder |

1) J. E. Verschaffelt and Ch. Nicaise, *Comm. Leiden*: No. 151, 35 (1917).
2) C. Forsch: *Phys. Zeitschr.* 1, 177 (1900).

Details of this work will be reported elsewhere in the near future.

---

18. High Frequency Titration. (III)

Induction Period in the Gold Sol Formation

Teizo WATANABE and Naokazu KOIZUMI

(Goto Laboratroy)

The reaction of gold sol formation was studied by the high frequency titration method. On tracing the reduction process of hydrochloroauric acid with hydrogen peroxide, it was necessary to examine the correlation of titri neter reading to the concentration of hydrochloroauric acid. Accordingly, the deflection of microammeter of the titrimeter was preliminarily observed, when the solution of 1 % hydrochloroauric acid was drop by drop added to 125 ml. of distilled water.

The rate of change in the meter reading was nearly constant until 2 ml. of the added acid solution (the total concentration of mixed solution corresponding to 0.016 %), but when larger volume of the acid solution was dropped in, the corresponding rate of change became much smaller than before and in case of the concentration higher than 0.028 %, it was difficult to detect any change in the reduction process by the present titrimeter.

The effect of the high frequency field on the gold sol formation was also observed, but for a while this effect was left out of consideration.

The sample solution used is as follows,

Hydrochloroauric acid solution	0.125–0.7 %	5 ml.
Potato starch	1.5 %	13 ml.
Distilled water		112 ml.
Hydrogen peroxide	5 –33 vol %	5 ml.

The traced curves of the reduction process are shown in the figure. At the point A, the yellow color of hydrochloroauric acid almost disappeared and the deflection of microammeter became large, then in many cases the solution colored deeply at the point B, and the reaction finished at the point C. In the less dilluted Au–solution or with the more concentrated hydrogen peroxide solution, the curves became much steeper (as shown in the dotted curve) and the time interval between the initial point of the reaction and the point A became shorter.

Assuming that this time interval correspods to an induction period, it may be related to the concentration of hydrochloroauric acid by the equation,

$$\tau = K \, A^{3/2} + C, \text{ (constant temperature)}$$

where τ is the induction period, A the initial concentration of the auric acid solution, and K and C are constants.

Another expression relating to the concentration of hydroxide will be written in the form,

$$\tau' = -K' \, B + C', \text{ (const. temp.)}$$

where τ' is the induction period, B the initial concentration of hydrogen peroxide, and K' and C' are constants.

Curve of Au Sol Formation
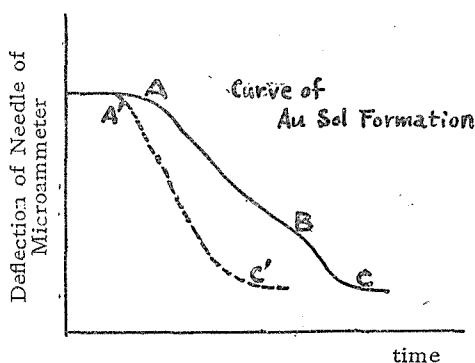
Furthermore, from the temperature coefficient of τ' the energy for activation was determined as 9200 cal./mole.

Although the reaction mechanism is not clear, it may be considered that hydrochloroauric acid in the induction period may play an effective role.

The authors express their gratitude to Prof. Goto for his valuable advices.

---

19. Thermodyaamic Properties of Higher Fatty Acids

in Organic Solvents

Itsuro YAMAKITA and Hiroshi AIDA

(Goto Laboratroy)

The authors measured the distribution of higher fatty acids (palmitic, myristic and lauric acids) between two liquid layers made up of two slightly miscible organic solvents (cyclohexane–methanol) at various concentrations and temperatures.

The distribution ratio varies with the concentration of the solute at a given temperature and can be expressed by the following equation, which is derived from the assumption that fatty acid forms dimer besides monomer in the upper (cyclohexane) layer, but monomer only in the lower (methanol) layer:

$$C_1/C_2 = k_1 + (2k_1^2/k_2). \, C_2$$

(59)