

17. Electron Microscopic Investigation on Gold Sol Particle, especially on the "Trigon" Particles

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We summerized up in the table I the results of the investigation with election microscope (SM-T4) on gold sol particles which were prepared by several methods, in relation to those items as colour of the sol, particle size and size distribution, shape and aspect of dispersion. We could not find any simple relation between the colour of the sol and the particle size.

Table I.

Method	Colour	Dia. (m μ)	Mean	Dispersion Aspect
Zsigmondy	Red	7—50	10	beadslike chain
"	Blue	20—50	50	planare congregated
Weimarn	Red	20—60	40	well dispersed
"	Blue	20—50	30	"
Faraday	Blue	10	10	congregated
Samezima	Red	10—20	12.3	disp. around masses
H ₂ O ₂ (Basic)	Red	20—50	30	well dispersed
"	Blue	20—30	30	"
H ₂ O ₂ (Acidic)	Yellow	10—100	—	"
Hydrazine	Red	15—70	30	chain in net
"	Blue	30—100	60	well dispersed
Phenylhydrazine	Red	7—50	20	net-like chain
"	Blue	5—20	10	chain
Svedberg	Red	50—70	60	well dispersed
"	Blue	6—20	10	small chains

We also investigated the influence of pH of the reactant solution of auric chloride before reduction, and found that as pH was increased with potassium carbonate solution from 5.6 to 9.4, the mean diameter of the resultant gold sol particles were decreased from 80 to 40m μ , when the solution was reduced with 0.3% hydrogen peroxide solution at 80°C. When pH was decreased with 0.1N hydrochloric acid soln. until 3.2, we obtained slightly turbid brown sol under the same condition. Taking electron micrographs of this solution, we found that triangle or hexagonal thin crystalline particles were grown-up in the solution. They were 1-3 μ in diameter and all showed beautiful striped patterns on the surfaces, and this was thought to have resulted from the interference of the wave of electron beam.