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<td>Suito, Eiji; Ueda, Natsu; Arakawa, Masafumi; Takiyama, Kazuyoshi</td>
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17. Electron Microscopic Investigation on Gold Sol Particle, especially on the "Trigon" Particles

Eiji Saito, Natsu Ueda, Masafumi Arakawa and Kazuyoshi Takiyama.

(Goto Laboratory)

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.

<table>
<thead>
<tr>
<th>Method</th>
<th>Colour</th>
<th>Dia. (μm)</th>
<th>Mean</th>
<th>Dispersion Aspect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zsigmondy</td>
<td>Red</td>
<td>7—50</td>
<td>10</td>
<td>beadslike chain</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>20—50</td>
<td>50</td>
<td>planar congregated</td>
</tr>
<tr>
<td>Weimann</td>
<td>Red</td>
<td>20—60</td>
<td>30</td>
<td>well dispersed</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>20—50</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Faraday</td>
<td>Blue</td>
<td>10</td>
<td>10</td>
<td>congregated</td>
</tr>
<tr>
<td>Samezima</td>
<td>Red</td>
<td>10—20</td>
<td>12.3</td>
<td>disp. around masses</td>
</tr>
<tr>
<td>H₂O₂ (Basic)</td>
<td>Red</td>
<td>20—50</td>
<td>30</td>
<td>well dispersed</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>20—30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>H₂O₂ (Acidic)</td>
<td>Yellow</td>
<td>10—100</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Hydrazine</td>
<td>Red</td>
<td>15—70</td>
<td>30</td>
<td>chain in net</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>30—100</td>
<td>60</td>
<td>well dispersed</td>
</tr>
<tr>
<td>Phenylhydrazine</td>
<td>Red</td>
<td>7—50</td>
<td>20</td>
<td>net-like chain</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>5—20</td>
<td>10</td>
<td>chain</td>
</tr>
<tr>
<td>Svedberg</td>
<td>Red</td>
<td>50—70</td>
<td>60</td>
<td>well dispersed</td>
</tr>
<tr>
<td></td>
<td>Blue</td>
<td>6—20</td>
<td>10</td>
<td>small chains</td>
</tr>
</tbody>
</table>

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 40μm, 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—3μ 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.