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Effect of pH on the Size Distribution of Au Nanoparticles

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The size distribution of gold nanoparticles (NPs) is an important factor in their application to various fields of nanotechnology such as nanodevice fabrication, nanobio measurements, medical diagnosis, and so on, since the properties of nanoparticles depend on the size. As the pH of the reaction mixture was increased, the size distribution of gold NPs synthesized via sodium citrate reduction method was getting narrower and it finally became quite mono-dispersive when the pH was higher than ca. 7. 0.1M NaOH solution was used in controlling the pH, while the ratio between sodium citrate and HAuCl₄ was fixed to 3:1 whose initial pH was about 5. Scanning and tunneling electron microscopy and UV/Vis spectrometry were used to characterize the resulting Au NPs. The change of the size distribution of the NPs was discussed with the change of the reaction rate related to the change of hydroxyl ion concentration.

Keywords: Au nanoparticles, Size distribution, pH effect