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Colloidal Silver

The proper Colloid Colors and Particle Size

Colloid Colors

There has been a fair amount of controversy in the public literature concerning the appearance of the "yellow" color. A lot of well meaning people have told me that "yellow is bad", "silver isn't yellow", "yellow is sulphur contamination", "yellow is iron contamination", and lots of other things. I finally found what I believe to be the answer to this question in a book titled Practical Colloid Chemistry, published in London in 1926. In the section on the "Colours of Colloidal Metals", sub-section on the "Polychromism of silver solutions" on page 69, I found the following statements:

"The continuous change in colour from yellow to blue corresponds to a change in the absorption maximum of the shorter to longer wave-lengths with a decreasing degree of dispersion. This is a general phenomenon in colloid chemistry illustrating the relation between colour and degree of dispersion."

This section goes on to describe the colors that show up in a wide variety of colloidal metal solutions. Interestingly, they ALL have a yellow phase. For true "electro-colloidal" silver, the particle size range that can appear yellow is .01 to .001 microns (10 to 100 angstroms) because that is the size of silver particle that best absorbs the indigo light, leaving only its inverse color, yellow, to be observed. The final transparent appearance only shows up after the particles have become evenly dispersed.

Sedimentation and Particle Size

The primary forces that influence colloids include: electrostatic repulsion and attraction; London-van der Walls attraction; and Brownian motion. Electrostatic forces are familiar. London-van der Walls attraction is a weak (but still effective) form of chemical bonding. Brownian motion is due to molecular collisions between a particle and the surrounding fluid matrix, it becomes apparent when particle size reaches a few microns. The effect predominates colloids 0.1 microns or smaller, the smaller the size the higher the velocity that can be imparted due to Brownian motion.

Particles larger than 2 microns are subject to removal by sedimentation (settling under the influence of gravity).