

### Separation of mixed nano-latex particles

CS-GXII series micro ultracentrifuge and S52ST swing rotor

Nano-particles have been receiving particular attention owing to the breakthrough in nano-technology in recent years. An ultracentrifuge that is operable at hundreds of thousands of x g or higher RCF is helpful in separation and purification of nano-particles. The density gradient centrifugation is one of the ultracentrifugal methods. This method is further divided into the sedimentation velocity method and the sedimentation equilibrium method. While particles are separated according to the particle settling velocity, mainly the difference in particle size by the sedimentation velocity method, particles are separated according to the difference in particle density by the sedimentation equilibrium method. Following is our experiment report on separation of 29-nm and 100-nm latex particles by the sedimentation equilibrium method.

#### Experiment

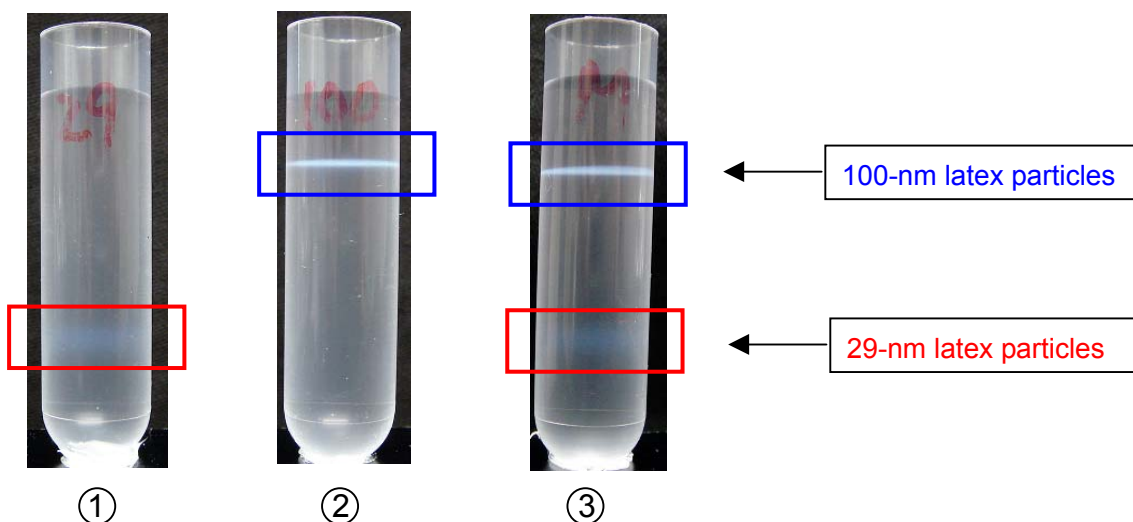
##### 1. Sample

- ① 0.1 ml of 29-nm polystyrene latex particles (Density 1.115 g/cm<sup>3</sup>)
- ② 0.1 ml of 100-nm polystyrene latex particles (Density 1.060 g/cm<sup>3</sup>)
- ③ 0.2 ml of mixed particles (0.1 ml of 29-nm particles and 0.1 ml of 100-nm particles)

##### 2. Conditions for centrifugation

Centrifuge: CS150GXII micro ultracentrifuge  
Rotor: S52ST swing rotor (Four tubes)  
Tube: 5PA tube (Actual capacity: 4.9 ml)  
Speed: 40,000 rpm  
Maximum RCF: 163,000 x g  
Time: 24 hours  
Temperature: 20°C  
ACCEL/DECEL mode: "8"/"8"  
Amount of sample: 2.7 ml  
Density gradient solution: 4.3 ml of 5-30% sucrose solution

##### 3. Result



#### 4. Explanation

As a result of centrifuging the mixture of 29-nm particles (density 1.115 g/cm<sup>3</sup>) and 100-nm particles (density 1.060 g/cm<sup>3</sup>) at 163,000 x g for 24 hours, it was divided into two bands. The band near the bottom consisted of 29-nm particles and the band near the top consisted of 100-nm particles. The result revealed the mixed latex particles were separated according to the difference in density, not the difference in particle size. The result also shows that an ultracentrifuge can separate nano-sized particles by the density-gradient equilibrium centrifugation method. It is a useful technique for separation of carbon nanoparticles or separation of fine pigments in ink or toner.

#### Instruments



CS-150GXII micro ultracentrifuge



S52ST swing rotor

For more information, visit our website at:

<http://www.hitachi-koki.com/himac.contact/index.htm>

**Hitachi Koki Co., Ltd. Life-Science Instruments Division**

1060, Takeda, Hitachinaka City Ibaraki Pref., 312-8502 Japan

Tel:(81)29-276-7384 (Dial in)

Fax:(81)29-276-7475

\*For the most current information, please access

<http://www.hitachi-koki.com.himac/>