

TECHNOLOGIES TO MEASURE NANOPARTICLES IN AEROSOLS

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The technologies to measure nanoparticles have develop and currently it's possible measure aerosols with particles since 1nm using the electrical mobility methodology. Normally the choose of one or another equipment, depends the desired range and scan rate, and these factors depends the measurement technologies which implements every equipment.

The first technology to measure nanoparticles is using a optical chamber with laser and photodetectors. Normally this technology can measure particles since 300nm to plus 10µm, however some equipment use specific technologies in optical chamber and can measure particles since 90nm. This technology permits single particle detection, particle size measurement, mass particle calculation and distribution size calculation, all with a scan rates low tenth seconds.

The second technology is the condensation particle counter (CPC). The operational principle has 3 steps, the first is generating a supersaturated vapor zone, the second is passing the particles by this supersaturated zone to force the condensation around the particles, and finally the particles (with a bigger diameter by condensation) are countered using a laser. This technology permits single particle detection, measuring particles since 1nm to 3µm and 10Hz scan rate (very fast). But is not possible particle size measurement, mass particle calculation and distribution size calculation.

The third technology is the electrical mobility, which is based in the possibility to select the particle size using electrical field, this methodology is based in two steps, the first is generating a monodisperse aerosol, and second implementing a system to count this aerosol. The result is a system with capacity to measure particles since 1nm to 1 µm and high accuracy in size measurement. The electrical mobility equipment permits single particle detection, particle size measurement, mass particle calculation and distribution size calculation. The scan rate depends the counter technology and desired channels in size distribution, but normally the scan rate is between 0,1s to 60s.

In conclusion, the correct equipment depends the desired results. If the particles in study has a diameter >300nm, the optical chamber system are the best systems, if you only need counter the particles, the CPC equipment has a big range, low maintenance and high precision, and finally if is needed a detailed size distribution with particles <100nm the electrical mobility equipment are the best choose.

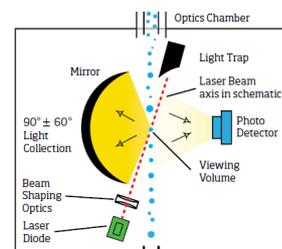


Fig. 1. Optical chamber

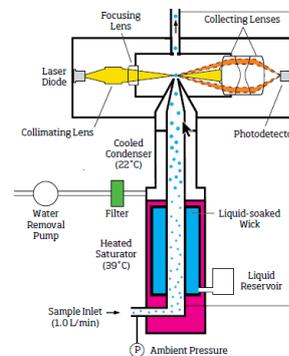


Fig. 2. Condensation particle counter

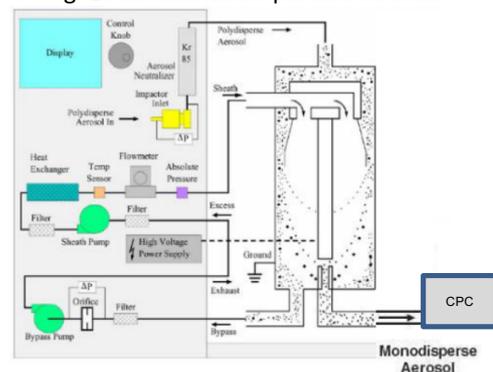


Fig. 3. Electrical mobility