- CCN Concentration

In the atmosphere, aerosols play an important role in the formation of clouds as they provide site to water vapour to condense onto them. Knowledge of CCN concentration is fundamentally important because it provides the direct quantitative link between aerosol and cloud. The present work include the measurements of particle size distribution, cloud condensation nuclei (CCN), and droplet activation kinetics of laboratory generated wet aerosols (KI, CsI, NaCl, (NH4)2SO4), having different hygroscopic behavior. For this laboratory generated wet aerosols were passed simultaneously, through CPC, SMPS and CCN counter to measure the total number of particles (NCN), size distribution and CCN concentration as a function of supersaturation, respectively. The CCN concentrations were then normalized by the total number of aerosol particles, yielding CCN activation activated fractions (CCN/CN ratio). The results presented here suggest that increase in concentration of causes a reduction in particle activation. Under a constant supersaturation (SS) of 1.5 %, the CCN/CN of 0.1 % (strength) KI is 0.18±0.004, which reduces to 0.11±0.003 at 0.5% KI and further reduces to 0.10±0.008 at 1.0% KI. Moreover, this decreasing trend is more effective under high SS. The result also shows that the activation of mixture 0.1% (KI + CsI) is small as compared to individual 0.1% KI and 0.1% CsI. For example, under constant SS of 1.5 % the CCN activity of 0.1% KI and 0.1% CsI are 0.18±0.004 and 0.20±0.005, respectively, while for 0.1% mixture (KI+CsI) it is 0.13±0.01. In addition, the study also accounts for the presence of larger, multiply-charged particles while calculating the CCN activation fraction. It was found that if the mode diameter of the poly-disperse size distribution becomes greater than the dc critical diameter (diameter at which 50% of the particles get activated to CCNc) of the particles then multiple-charged particles results in non-monotonic CCN counter response curves (plots of CCN/CN vs. mobility diameter) having multiple peak, rather than simple sigmoidally shaped curve. Hence the determination of the 50% activation diameter is ambiguous.