# Selective removal of HCN and aldehydes in mainstream smoke using impregnated activated carbon and functionalized silica gel

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Coconut based activated carbon and silica gels were functionalized with 3-aminopropyltriethoxysilane(APS) and N-(2-aminoethyl)-3-aminopropyltriethoxy-silane(AEAPS) in order to investigate the effect of the amine group and the pore size of the supports on the removal of hydrogen cyanide(HCN) and aldehydes in mainstream smoke(MS). The physicochemical properties of the supports was analyzed by using thermal gravity analyzer(TGA), $N_2$ adsorption and desorption isotherms(BET, $N_2$), SEM-EDS and etc.

According to our experimental data, there was no significant difference in the delivery amount of HCN and aldehydes between non-functionalized silica gels having meso-pores bigger than 20Å. In the case of silica-gels functionalized with APS(APS silica gel), the delivery amounts of hydrogen cyanide(HCN) and aldehydes decreased with the increase of APS concentration. Silica gel functionalized with AEAPS(AEAPS silica gel) showed higher removal efficiency than that of APS silica gels. The delivery amounts of HCN and aldehydes of activated carbon impregnated with APS and AEAPS increased with the increase of the APS and AEAPS concentrations. In accordance with the specific surface area analysis results, APS and AEAPS molecules decreased the specific surface area by blocking the micro-pores of the activated carbon. The volatile organic components removal efficiency by the micro-pores was higher than that of the amine group impregnated into the activated carbon.