Conclusions

Polyvinyl chloride based membranes were prepared using different concentration of hydrophilic nano bentonite and nano alumina and changes occurred in their chemical and physical properties were studied. Hydrophilicity of composite membranes was improved and it was highest for 4 % alumina composite and 2% HB composite. By SEM analysis, it was observed that surface morphology of membranes was varied and porosity of membrane start decreasing due to crosslinking of polymer and high dose of inorganic particles. EDS analysis verified the presence of nanoparticle in the membrane. By XRD, it was observed that polymeric membrane generally possess amorphous nature and it shifts to a semi-crystalline phase with addition of inorganic nanoparticle. Tensile strength of composite membranes was increased by addition of nanoparticles. TGA analysis verified the improvement of thermal stability in composite membranes. Water retention test was done to measure porosity. Highest porosity was found 78.47% for 4% alumina composite and for 1% HB composite i.e. 76.16%. Mean pore radius was calculated using GEF equation and all the membranes had pore in the range of nano size.

Membranes were used for separation of model humic acid solution to investigate the effect of blending nanoparticles over performance and antifouling nature of composite membranes. Membrane flux increased with the presence of nanoparticles and highest flux was 409.6 L/m^2h and 386.4 L/m^2h for 3% PVC/Alumina membrane and 1 % PVC/HB membrane respectively. As the solute concentration in feed is increased, flux was declined. Total fouling was effected by varied concentration of nanoparticle and it was lowest for 3% PVC/Alumina membrane and 1 % PVC/HB membrane. Fouling increased for higher feed concentration. Flux recovery was 97.22 for 3% PVC/Alumina membrane and 95.06% for 1% PVC/HB membrane at 10 mg/L feed. Highest rejection

was observed at 10 mg/L feed, i.e. 95.7% and 94.6% for 3% PVC/Alumina membrane and 1 % PVC/HB membrane respectively. It also dropped with higher feed concentration. Total resistance to separation due to membrane, irreversible fouling and concentration polarization was also affected and it was lowest for 3% PVC/Alumina membrane and 1 % PVC/HB membrane.