

by the uptake characteristics of silica. Fig 1(a-b) show consecutively the XRD pattern of PWA crystalline and silica amorphous phase. While Fig 1(c-e) show the XRD pattern of the PWA entrapped on silica with the ratio of PWA/SiO₂ is 0.45, 0.6 and 0.15 (wt/wt.), respectively. The selected of PWA loaded amount correspond to uniform distribution of the PWA on the silica pore shows overlapping between the typical crystalline structure of PWA and the amorphous structure of silica at ratio of PWA/SiO₂ is (0.15) and (0.45) (wt/wt.).

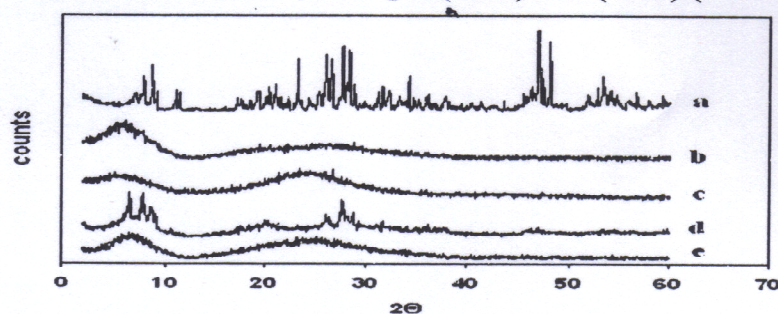


Figure 1.

XRD Pattern of (a) Pure PWA, (b) Pure SiO₂, (c) Ratio of PWA/SiO₂ (0.45), (d) Ratio PWA/SiO₂ (0.6) and (e) Ratio PWA/SiO₂ (0.15).

Fig 1(c) and Fig 1(e). revealed an overlapping between the typical crystalline structure of PWA and the amorphous structure of silica. The results indicated that at the ratio of PWA/SiO₂ (0.15) until 0.45 all of the PWA particles have inserted in the silica pores and the peak assign to the PWA particle has disappeared. If the ratio of PWA/SiO₂ increase to 0.6, a different spectral pattern is obtained that the sharp spectral peak attributed to the presence of PWA crystalline in the SiO₂-PWA mixture appear. It means that a part of PWA particle is not insert in the silica pores cause the silica pore has been full filled by PWA particles and saturated loading has been reached. Therefore it can be conclude that the saturated PWA loading on the silica pore is best at the ratio of 0.45 (wt/wt.) as show by Fig 1 (c). This ratio will be used for the designed of the composition of NS10W, NS15W and NS20W composite membrane prepared using sol-gel method.

Clarity analysis to optimize annealing time and temperature

The time required to produce transparent membrane is 10 hours at annealing temperature 140°C for all the composite membranes. After the post treatment of