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Abstract	:	Fertilizer industries are one of the most critical industries to support agriculture industries in Malaysia. A significant amount of wastewater also producing along with fertilizer production. The wastewater contains ammoniacal nitrogen, $\text{NH}_3\text{-N}$, and causes a real treat to fish due to its toxicity. Thus, this study aims to determine the performance of ultrafiltration process removal of ammoniacal nitrogen from fertilizer wastewater incorporated with bio-adsorption process by using different feed solution chemistry and temperature. The sample was obtained from a fertilizer company located at Gurun, Kedah. The obtained sample contains $\text{NH}_3\text{-N}$ and solely used for this study only. Membrane material of polyethersulfone (PES) was used for this study. As for the bio-adsorption process, bio-adsorbent which made from banana peel was used. The removal of $\text{NH}_3\text{-N}$ was investigated at solution pH values of 10.30 and 7 for different temperature. The results showed the highest $\text{NH}_3\text{-N}$ removal was 80.07% obtained under condition of p. 10.30 and 30°C. Hence, this combined process is feasible for significantly removing $\text{NH}_3\text{-N}$ from fertilizer wastewater. Scanning electron microscope (SEM) was used for surface membrane morphology characterization. Atomic force microscope (AFM) was employed to investigate membrane surface roughness. Results of AFM indicated that membrane fouling becomes more severe when surface roughness increasing, which was measured by the surface area difference where magnitude and frequency of surface peaks were taken to accounts. Flux decline was correlated to the surface roughness.