ABSTRACT

Oxygen is a crucial component for living things. However, air pollution consisting of dust particles and emission gases including CO_2 and CO reduces air quality which will impact the availability of oxygen. One solution to overcome this problem is an air filter. However, current air filters are made of synthetic polymers that take years to decompose. Semi-synthetic polymers such as cellulose acetate are more environmentally friendly as they only take 6-9 months to decompose. The use of alang-alang was based on its abundant availability and high α-cellulose content (40.22%), while teak sawdust and tea dregs were chosen due to their high cellulose and lignin content and potential as nano activated carbon (NKA) materials. The synthesis was carried out by mixing cellulose acetate and NKA in various ratios (4:0 and 4:3). FTIR test results of SA showed the success of the reed cellulose acetylation process. The results of the NKA FTIR test showed that the sample with the ratio of tea pulp and teak wood was 3:1. This is because the sample has the highest wave number among all samples. CO and CO_2 gas adsorption tests showed that the MMM sample with a 4:3 ratio had the best adsorption performance, with absorption percentages of 65.52% and 75.80%, respectively. Compared to synthetic polymer-based membranes, this natural material-based MMM is more environmentally friendly and biodegradable. The combination of reed cellulose acetate and waste NKA has the potential to reduce air pollution while treating biomass waste that has not been optimally utilised.

Keywords: Alang-alang (Imperata cylindrica), Nano Activated Carbon, Cellulose Acetate, Tea Dregs, Adsorption, Emission Gas, Mixed Matrix Membrane