

# Pemanfaatan bonggol jagung dalam pembuatan karbon aktif sebagai adsorben gas buang CO, CO<sub>2</sub>, dan hidrokarbon dari emisi kendaraan bermotor = Utilization of corncob in the manufacture of activated carbon as adsorbens of CO, CO<sub>2</sub>, and hydrocarbon exhaust gases from vehicle emissions

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## Abstrak

Sektor transportasi merupakan penyumbang terbesar pencemaran udara, di mana emisi gas buang CO, CO<sub>2</sub>, dan HC berdampak negatif terhadap kesehatan dan lingkungan. Karbon aktif dapat digunakan sebagai adsorben gas buang kendaraan bermotor (sepeda motor). Bonggol jagung berpotensi digunakan sebagai bahan baku pembuatan karbon aktif karena memiliki kandungan lignoselulosa yang tinggi. Pembuatan karbon aktif bonggol jagung dilakukan melalui tahap preparasi dan dehidrasi, aktivasi kimia pertama menggunakan larutan KOH 20% b/v dengan perbandingan massa sampel terhadap larutan 1:4 selama 24 jam, karbonisasi pada suhu 500 selama 2 jam dan diayak dengan ukuran 60 mesh, dilanjutkan dengan aktivasi kimia kedua menggunakan variasi KOH 1% b/v, 3% b/v, dan 5% b/v dengan rasio dan waktu yang sama seperti aktivasi kimia pertama. Sampel yang didapatkan kemudian diaktivasi fisika menggunakan gas N<sub>2</sub> 0,15 NL/menit pada suhu 600 selama 1 jam. Karbon aktif yang didapatkan, kemudian diimpregnasi menggunakan larutan MgO 1 M dengan variasi rasio massa sampel terhadap volume larutan adalah 1:5, 1:10, dan 1:15. Proses aktivasi kimia dua tahap berpengaruh memperbesar karakterisasi iodin yang dihasilkan, sedangkan impregnasi MgO akan menurunkan karakterisasi iodin yang dihasilkan dan meningkatkan efektivitas penjerapan gas buang. Sampel dengan karakterisasi iodin terbaik didapatkan pada sampel AK2F 5% dengan luas permukaan 1142,77 m<sup>2</sup>/gr, sedangkan sampel dengan efektivitas penurunan gas buang terbaik didapatkan pada sampel impregnasi 1:10 dengan penurunan gas buang CO, CO<sub>2</sub>, dan HC sebesar 52,05%, 56,80%, dan 73,96%. Berdasarkan hal tersebut, karbon aktif bonggol jagung dapat dijadikan alternatif adsorben dalam adsorpsi gas buang emisi kendaraan bermotor (sepeda motor).

.....The transportation sector is the largest contributor to air pollution, where exhaust emissions of CO, CO<sub>2</sub>, and HC have a negative impact on health and the environment. Activated carbon can be used as an adsorbent for exhaust gases of motor vehicles (motorcycles). Corncob has the potential to be used as a raw material for making activated carbon because it has a high lignocellulose content. The manufacture of corncob activated carbon was carried out through the preparation and dehydration stage, the first chemical activation using a 20% w/v KOH solution with a sample ratio to a 1:4 solution for 24 hours, carbonization at a temperature of 500 for 2 hours and sifted with a size of 60 mesh, followed by the second chemical activation using a KOH variation of 1% w/v, 3% w/v, and 5% w/v with the same ratio and time as the first chemical activation. The samples obtained were then activated by physics using N<sub>2</sub> gas of 0.15 NL/min at a temperature of 600 for 1 hour. The activated carbon obtained, then impregnated using a solution of MgO 1 M with variations in the ratio of sample mass to solution volume are 1:5, 1:10, and 1:15. The two-stage chemical activation process has an effect on enlarging the characterization of iodine produced, while mgo impregnation will decrease the characterization of the iodine produced and increase the effectiveness of exhaust gas absorption. The sample with the best iodine characterization was obtained in sample AK2F 5%

surface area of 1142.77 m<sup>2</sup> /gr, while the sample with the best exhaust gas reduction effectiveness was obtained in impregnation samples of 1: 10 with a decrease in CO, CO<sub>2</sub>, and HC exhaust gases by 52.05%, 56.80%, and 73.96%. Based on this, corncob activated carbon can be used as an alternative adsorbent in the adsorption of exhaust gas emissions from motor vehicles (motorcycles).