

# Analisis Ekonomi Produksi Graphene Aerogel Polyurethane Sponge Sebagai Adsorben untuk Separasi Minyak-Air. = Economic Analysis of Graphene Aerogel Polyurethane Sponge Production as Adsorbent for Oil-Water Separation.

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## Abstrak

Graphene aerogel polyurethane sponge (GAPU) dibuat dari grafit yang dioksidasi dengan metode Hummer menjadi grafena oksida (GO) kemudian ditambahkan polyurethane sponge (PU) untuk direduksi menjadi reduced graphene oxide polyurethane sponge lalu di freeze-dried untuk mengubah bentuknya menjadi aerogel. Dalam penelitian ini bertujuan untuk menentukan nilai ekonomis produksi GAPU sebagai adsorben untuk separasi minyak-air. Pada studi ini, dibuat tiga skenario produksi GAPU, yaitu 547, 6000 dan 12000 ton. Hasil menunjukkan nilai keekonomian GAPU dengan kapasitas 547 ton dengan harga jual US\$ 10,50 / Kg adalah NPV (net present value) sebesar US\$ 1.326.996, BEP (break event point) sebesar 44,21 %, IRR (internal of rate return) sebesar 15,53% dan PBP (pay back period) sebesar 6,48 tahun. Sedangkan untuk kapasitas 6000 ton dengan harga jual US\$ 2,80 / Kg adalah NPV sebesar US\$ 10.773.480, BEP sebesar 33,01%, IRR sebesar 26,18 % dan PBP sebesar 2,21 tahun. Skenario ketiga dengan kapasitas paling tinggi, yaitu 12000 ton dengan estimasi harga jual sebesar US\$ 2,20 / Kg adalah NPV sebesar US\$ 18.219.424, BEP sebesar 27,10 %, IRR sebesar 33,92 % dan PBP sebesar 2,19 tahun. Nilai keekonomian produksi GAPU lebih baik jika diproduksi dalam kapasitas 12000 ton dibandingkan dengan kapasitas 6000 ton dan 547 ton. Analisis sensitifitas jika harga jual produk turun 10% lebih berpengaruh buruk terhadap nilai keekonomian dibandingkan harga bahan baku naik 10%. Akhirnya, analisis ekonomi dengan syarat harga jual kurang dari (<) sebesar US\$ 18,18 / Kg, NPV > 0, BEP < 50% and IRR > 15% dinyatakan produksi Graphene Aerogel Polyurethane Sponge (GAPU) dinyatakan layak dan bernilai ekonomi tinggi

.....In this study, graphene aerogel polyurethane sponge (GAPU) has been made from graphite, and it was then oxidized by the modified Hummer method to be graphene oxide (GO). The reduced graphene oxide was blended into polyurethane sponge (PU), and this graphene oxide-polyurethane sponge composites was freeze-dried into an aerogel to change their shapes. This study was aimed to determine the economic value of GAPU composites as an adsorbent to separate oil-water. Three different scenarios of GAPU were designed, namely 547; 6,000 and 12,000 tons. The economic values of GAPU with a capacity of 547 tons and selling price of US\$ 10.50 / kg were the NPV (net present value) of US\$ 1,326,996, BEP (break event point) of 44.21%, IRR (internal of rate return) of 15.53% and PBP (payback period) of 6.48 years. While for the second scenario with capacity of 6000 tons with a selling price of US\$ 2,80 / Kg were an NPV of Rp US\$ 10,773,480, BEP of 33.01%, IRR of 17.32% and PBP of 2.21 years. The third scenario with capacity of 12,000 tons with an estimated selling price of US\$ 2,20 / Kg showed an NPV of US\$ 18.219.424, BEP of 27.10%, IRR of 33.92% and PBP of 2.19 years. The economic values of GAPU production was the best for capacity of 12,000 tons. Sensitivity analysis with a selling price of the product decreases by 10%, it has a more negative effect on the economic value than the price of raw materials increases by 10%. Overall, the economic analysis with the parameter condition such as the selling price is less than (<) of US\$ 18,18 / kg, NPV > 0, BEP < 50% and IRR > 15% concluded that the production of Graphene Aerogel Polyurethane

Sponge (GAPU) was feasible and had high economic value.