

**POLYBENZOXAZINE-BASED CARBON AEROGEL AS A CATALYST  
SUPPORT: INFLUENCE OF SUPPORT TYPES ON CATALYST ACTIVITY  
FOR THE ADSORPTION OF 4-CHLOROPHENOL**



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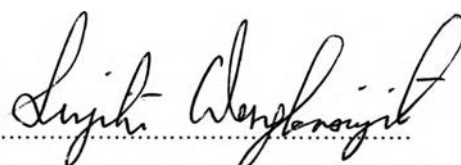
**Thesis Advisors:** Assoc. Prof. Sujitra Wongkasemjit  
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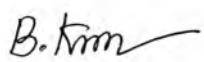
  
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## ABSTRACT

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Supanun Somlok: Polybenzoxazine-Based Carbon Aerogel as a Catalyst Support: Influence of Support Types on Catalyst Activity for the Adsorption of 4-chlorophenol.

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Keywords: Carbon Aerogel/Polybenzoxazine/Catalyst support/ 4-Chlorophenol

Carbon aerogel is a mesoporous carbon material, presenting several advantages, including higher stability in both acidic and basic media, an easily tunable surface chemistry, and a well-developed porosity. Polybenzoxazine (PBZ) is a great candidate as an organic precursor to produce carbon aerogel. In this study, polybenzoxazine aerogels were cost-effectively prepared via ambient drying method, and characterized using  $^1\text{H-NMR}$ , FT-IR, and SEM. The surface area of the obtained carbon aerogels is in the range of 350–450  $\text{m}^2/\text{g}$ . The performance of the carbon aerogel as a catalyst support, compared with other types of supports, was investigated its adsorption activity of 4-chlorophenol (4-CP) using Pt as a catalyst. It was found that the synthesized carbon aerogel was proved to be an impressive catalyst support to adsorp 4-CP.

## บทคัดย่อ

ศุภานัน สมโลก : คาร์บอนแอโรเจลที่ใช้เป็นตัวรองรับตัวเร่งปฏิกิริยาซึ่งผลิตมาจากพอลิเบนซอกซาซีน: อิทธิพลของตัวรองรับชนิดต่างๆในปฏิกิริยาการดูดซับของ 4-คลอโรฟีนอล (Polybenzoxazine-Based Carbon Aerogel as a Catalyst Support: Influence of Support Types on Catalyst Activity for the Adsorption of 4-chlorophenol) อ.ที่ปรึกษา : รองศาสตราจารย์ ดร.สุจิตรา วงศ์เกษมจิตต์ และ ดร.ธัญญลักษณ์ ฉายสุวรรณ 54 หน้า

คาร์บอนแอโรเจล เป็นสารประกอบประเภทคาร์บอนที่มีโครงสร้างเป็นรูพรุน ซึ่งมีประโยชน์หลายอย่าง เช่น ทนต่อกรดและด่าง ง่ายต่อการปรับเปลี่ยนผิวหน้าทางเคมี และสามารถควบคุมขนาดของรูพรุนได้ เนื่องจากพอลิเบนซอกซาซีนเป็นตัวเลือกที่ดีของสารตั้งต้นสารประกอบประเภทสารอินทรีย์ที่ใช้ในการผลิตคาร์บอนแอโรเจล ดังนั้นในงานวิจัยนี้ได้ทำการสังเคราะห์พอลิเบนซอกซาซีนแอโรเจลที่มีราคาเหมาะสมซึ่งถูกเตรียมโดยวิธีการทำให้แห้งที่สภาวะปกติ และถูกวิเคราะห์โดยใช้  $^1\text{H-NMR}$ , FTIR และ SEM โดยคาร์บอนแอโรเจลที่ได้มีค่าพื้นที่ผิวโดยประมาณ 350 ถึง 450 ตารางเมตรต่อกรัม การทดสอบประสิทธิภาพของคาร์บอนแอโรเจลที่ใช้เป็นตัวรองรับตัวเร่งปฏิกิริยาโดยเปรียบเทียบกับตัวรองรับชนิดอื่นๆ และใช้แพลททินัมเป็นตัวเร่งปฏิกิริยาให้กับการศึกษาปฏิกิริยาการดูดซับของ 4-คลอโรฟีนอล

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**ABBREVIATIONS**

BA-teta	Benzoxazine is based on bisphenol A and triethylenetetramine
BA-a	Benzoxazine is based on bisphenol A and aniline
P-eda	Benzoxazine is based on Phenol and ethylenediamine