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Spongy Carbon Nitride (sg-C₃N₄) as the Adsorbent of Organic Dyes

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Carbon nitride is an organic polymer of the chemical formula of C₃N₄. Its structure closely resembles that of the layered structure of graphite, so it is called a graphitic carbon nitride and is denoted as g-C₃N₄. Due to the high nitrogen content, carbon nitride has high chemical and thermal resistance. Thanks to this, it is used as a support in catalysis. It is for this purpose that we used carbon nitride in our research.

Carbon nitride was doped by nickel and then was reduced at 525°C. Surprisingly, it was noted that the reduction at high temperature leads to an increase in the specific surface area of the catalyst, up to 380 m²g⁻¹. Moreover, during the reduction process, significant amounts of gases (like NH₃, CH₄, HCN) are released. It indicates that the evolution of gases causes more porosity of the structure.

One of the problems of the 21st century is the growing pollution of the environment. One of them is the pollution of waters with organic compounds that can be removed in sorption processes. This is where the obtained material was used. However, for better results, the metal was washed out of the system. The developed specific surface of carbon nitride was used in sorption processes of organic dyes, like rhodamine B and methyl orange. For example, the maximum sorption of RhB is close to 200 mg g⁻¹.

Biography:

Emilia Alwin is a PhD student in fourth year at the Faculty of Chemistry at Adam Mickiewicz University in Poznan. Emilia Alwin research focuses on heterogeneous catalysis using a carbon nitride as a support, which is doped with various noble and non-noble metals. The main research aspects relate to the use of these catalysts in the production of hydrogen, photocatalysis and sorption of organic dyes. The aim of the research is to further expand the possibilities of using modified carbon nitride structures.