Catalytic Wet Air Oxidation of Antibiotics over Supported Platinum on Different Supports Fractions Based CeO2 and ZrO2.

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Emerging contaminants have serious effects on the environment. Especially contaminants loaded in used water, where they are streamed and then affect fauna, flora, and contaminate soils. Antibiotics are considered as an emerging threat. Originated from leaking and incompletely treated wastewater loaded with pharmaceuticals, due to the excessive production and use. Antibiotics risks are diverse, the most pertinent are environment useful microorganism deterioration and harmful bacteria gaining antibiotics resistance. Those factors could generate in the future sanitary and environmental crisis.[1] Facing these issues, many technologies propose sufficient solutions to release only cleaned water, as example, adsorbents and membrane separations, which have successful separation results. The only issue is that membrane separation generates concentrated solutions, which are even more threatening and extremely hard to handle.[2] Catalytic wet air oxidation is one of the most efficient wastewater detoxification processes.[3]

We have investigated catalytic oxidation of model antibiotics solutions, mainly based on Tetracycline and Sulfamethoxazole for their different composition and presence in the environment. Different catalyst based on a noble metal (Pt) supported on various supports (Ce, Zr) are tested and compared, including the blank: wet air oxidation. The collected liquid samples are characterized using different methods. HPLC-UV and TOC-L analysis for model pollutant and remaining organic carbon quantification, HPLC-MS for byproducts identification. Concerning catalyst characterization, we have implemented ICP analysis for noble metal quantification and leaching investigation, specific surface characterization, XPS, and MEB. All those techniques support results discussion and proof for interpretations. The catalysts effect on catalytic wet air oxidation tests are very significant. For example, under 1% Pt/CeO_2 we could eliminate 98% of tetracycline and mineralize 51% of TOC at 50 °C , atmospheric pressure, however catalyst-free

test reached only 45% and 2% respectively. Moreover, for the collected samples byproducts are identified, and in the treated solutions the toxicity is inspected.

References

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