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**FABRICATION OF ELECTROSPUN NANOFIBER FOR SENSING EMERGING
PHARMACEUTICAL POLLUTANTS OF PARACETAMOL IN WATER**

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POLLUTANTS OF PARACETAMOLS IN WATER**

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ABSTRACT

FABRICATION OF ELECTROSPUN NANOFIBERS FOR SENSING EMERGING PHARMACEUTICAL POLLUTANTS OF PARACETAMOLS IN WATER

The increasing amount of pharmaceutical pollutants in water, particularly paracetamol, has caused serious environmental and public health issues. Conventional detection approaches are frequently costly, time-consuming and ineffective for real-time monitoring. This study demonstrates the fabrication, characterisation and assessment of electrospun Polyvinyl alcohol/Iron chloride (PVA/FeCl₃) nanofibers as a cost-effective colorimetric sensor for detecting paracetamol in aquatic environments. The nanofibers were fabricated using a variety of electrospinning conditions, including a fixed feed rate of 0.30 mL/hr, applied voltages (12, 15 and 18 kV) and tip-to-collector distance (8, 11 and 15 cm). Their morphology was evaluated using Scanning Electron Microscopy (SEM), while functional group interactions were confirmed using Fourier Transform Infrared Spectroscopy (FTIR). The optimised nanofiber morphology was achieved at 18 kV and 11 cm tip-to-collector distance, resulting in bead-on-string structures with a large surface area that improve sensing capabilities. Sensing performance was assessed by determining the reaction time for a visible color change in the nanofiber upon contact with paracetamol solution, which indicated the formation of a colored complex. Colorimetric study revealed that paracetamol converted Fe³⁺ to Fe²⁺, resulting in a Prussian blue complex that changed to green in less than three minutes with optimum conditions. However, this resulted in rapid fiber dissolution, indicating the compromise between sensitivity and material stability. Overall, the findings suggest that PVA/FeCl₃ nanofibers hold enormous opportunities for paracetamol sensing. Future enhancements should focus on increasing fiber durability without decreasing sensitivity, making them suitable for real-time environmental monitoring applications.

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