

Synthesis of CoO, NiO Nanoparticles, CoO@PANI and NiO@PANI Nanocomposites CoNiO₂, CoNiO₂ Doped PANI and Investigation of its Photocatalyst Activity

Ramdas S. Suralkar¹, Deepak M. Nagrik², Umesh S. Shelke³ Ravi S. Balaskar⁴

¹ Pratap College Amalner (M.S.) India.

² G. S. College Khamgaon (M.S.) India

³ Rajarshi Chhatrapati Shahu College Kolhapur (M.S.) India

⁴ Pratap College Amalner (M.S.) India

Abstract:

The use of ZnO, TiO₂ as photocatalyst for dye degradation has been reported with varying conc, pH, temperature conditions. The catalyst can be prepared by various method includes hydro thermal, Co-precipitation, gel filtration techniques. In this work Synthesis of CoO, NiO Nanoparticles, CoO@PANI and NiO@PANI nanocomposites CoNiO₂, CoNiO₂ doped PANI as photocatalyst for dye degradation are synthesized by Co-precipitation method.

Keywords: Dye degradation. Photocatalyst, nanoparticles, nanocomposites

1. Introduction:

Large quantities of toxic organic dyes are produced in the industry, which can cause many environmental problems and result in varying types of cancer throughout humans. Therefore, the development of cheap and environmentally friendly methods to remove these hazardous materials from the environment and underground water has become a critical challenge. In recent decades, the progressed photocatalysts have attracted a lot of attention, as well as the interest of many that consider the usage of photocatalyst technology as a new approach in discovering a solution for cleaning environmental pollutants. Healthy water is defined as the water that has lost its toxic chemicals and pathogens, and its existence is essential for continuing life. Besides, water stands as a vital raw material in many major industries including electronics, medicine, and food technologies. Nowadays, the transit of science and technology, along with the rapid progress of varying fields of technologies, have been able to provide new resolutions and achievements in various areas of science, especially throughout the treatment of industrial wastewater and sewage. Nanoscience has an exceptional stance on the subject of recognizing and eliminating various organic pollutants. Recently, the advent of novel technologies in the treatment of water and industrial waste has provided and introduced new resolutions, which involve the utilization of nanotechnology.

2. Experimental:

2.1 Material:

Aniline monomer, Ni (NO₃)₂·6H₂O, Co (NO₃)₂·6H₂O, ammonium persulfate (APS), acetone, methanol and hydrochloric acid all of GR grade, are purchased from a Merck (India) company, and they were used as received without further purification process. Double distilled water was used throughout this work.

2.2 Synthesis of CoO nanoparticles:

100 ml of 0.5 N NaOH is added drop by drop to the solution of 100 ml of 0.1N Co (NO₃)₂·6H₂O with constant stirring for 1 hr. after complete addition the mixture is stirred for 2 hrs. then the precipitate is filtered and washed 2 to 3 times with distilled water and kept in an