Abstract

This study is based on developing an efficient photocatalyst for the photocatalytic degradation of Methylene Blue (MB) and Methyl Orange (MO) dyes and developing a fluorescent nanosensor for urea sensing as a milk adulterant. ZrO_2, ZnO, ZnO-ZrO_2 bimetallic nanoparticles, and Zn-doped g-C_3N_4 were the four catalysts used for the photodegradation of dyes. The prepared catalysts were characterized by UV-visible spectroscopy, photoluminescence (,PL) spectroscopy and SEM. ZnO-ZrO_2 bimetallic nanoparticles were observed to be more efficient and stable photocatalysts, suggesting the synergistic effect of ZrO_2 and ZnO. A change in the pH of the reaction mixture affected the photocatalytic activity of MO and MB. Zn-doped g-C_3N_4 nanoparticles were used as fluorescent nanosensors for urea detection. Turn-on response was noted for urea sensing. Fluorescence quenching was observed as the PL intensity of Zn-doped g-C_3N_4 nanoparticles decreased with increasing concentration of ureaThe ksv the samples. K_{sv} value for urea was calculated to be 1.08×10^3 M^{-1}. The LOD for urea was calculated to be 1.5×10^{-4} M and LOQ was found to be 5.17×10^{-4} M.