The photocatalytic activity of silver-doped TiO$_2$ (Ag-TiO$_2$) nanoparticles was studied by photocatalytic degradation of lomeofloxacin (LMF) using a photoreactor with a mercury lamp (PHILIPS, TUV 8 W T5, $E_{\text{max}} = 254$ nm). The 1 and 2% silver-doped TiO$_2$ nanoparticles were synthesized by liquid impregnation (LI) method. The resulting nanoparticles were characterized by surface analytical methods such as X-ray diffraction (XRD), scanning electron microscope (SEM), energy dispersive X-ray analysis and transmission electron microscope (TEM). The study shows 2% Ag-TiO$_2$ nanoparticles exhibited better results (95% degradation) in 1 h for the degradation of lomeofloxacin compared to 1% Ag-TiO$_2$ and pure TiO$_2$. XRD analysis indicated that the crystallite size of TiO$_2$ was 17.00 nm, while the crystallite size of 1% Ag-TiO$_2$ and 2% Ag-TiO$_2$ was 13.07 to 14.17 nm. TEM images show the particle size of Ag-TiO$_2$ nanoparticles were in the range 40–45 nm in length and 10–15 nm in breadth. Pseudo-first-order rate constants were found to decrease with increase in pH. The effect of UV intensity, catalyst dosage and initial concentration of LMF on the degradation rate were also studied and elaborately discussed.

Keywords: Titanium dioxide; Liquid impregnation; Photocatalysis; Lomeofloxacin; AOP