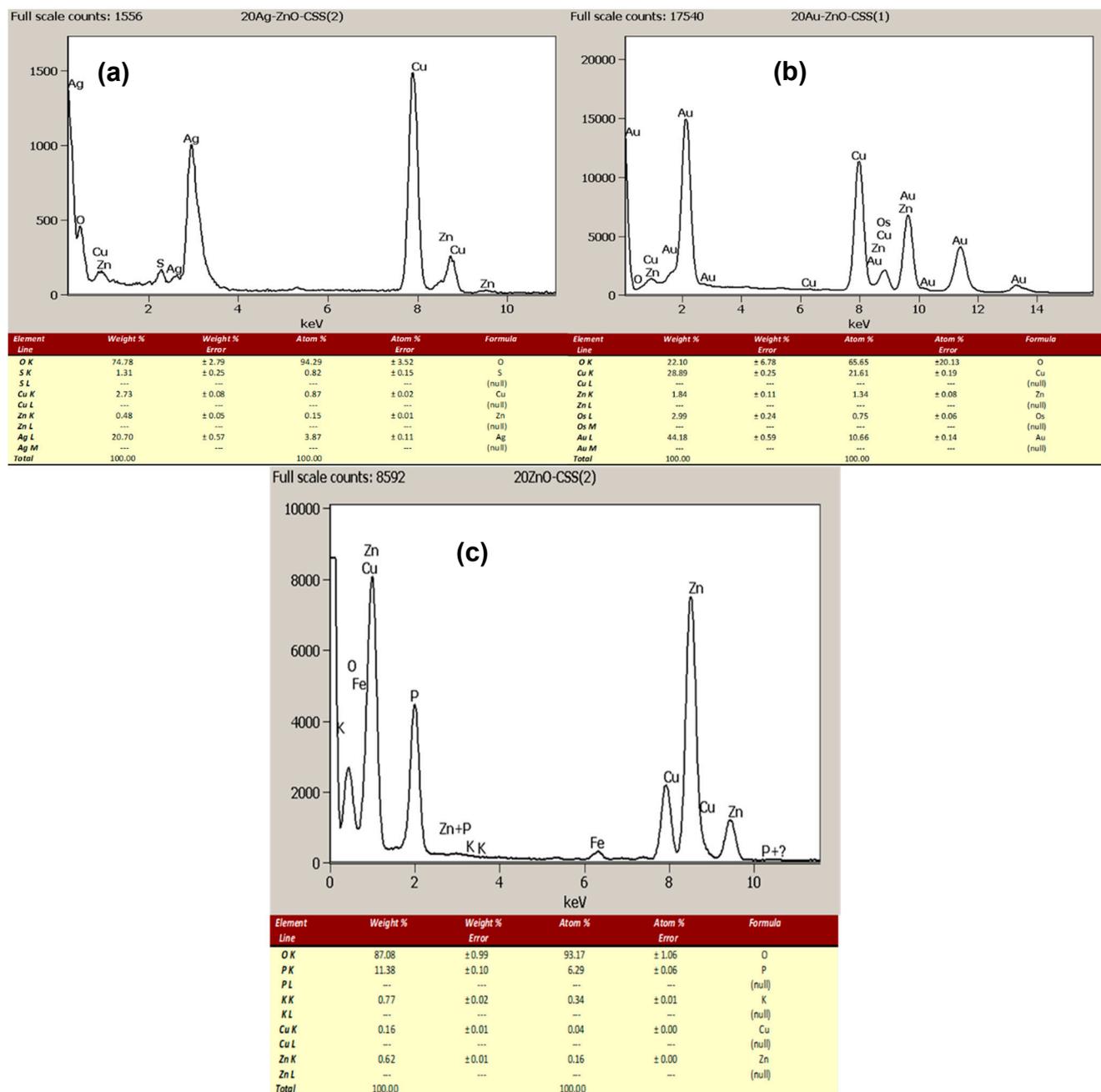


## Supplementary data



**Figure S1:** EDS mapping for (a) 1% Ag-ZnO-CSs, (b) 1% Au-ZnO-CSs and (c) 20/80 ZnO-CSs

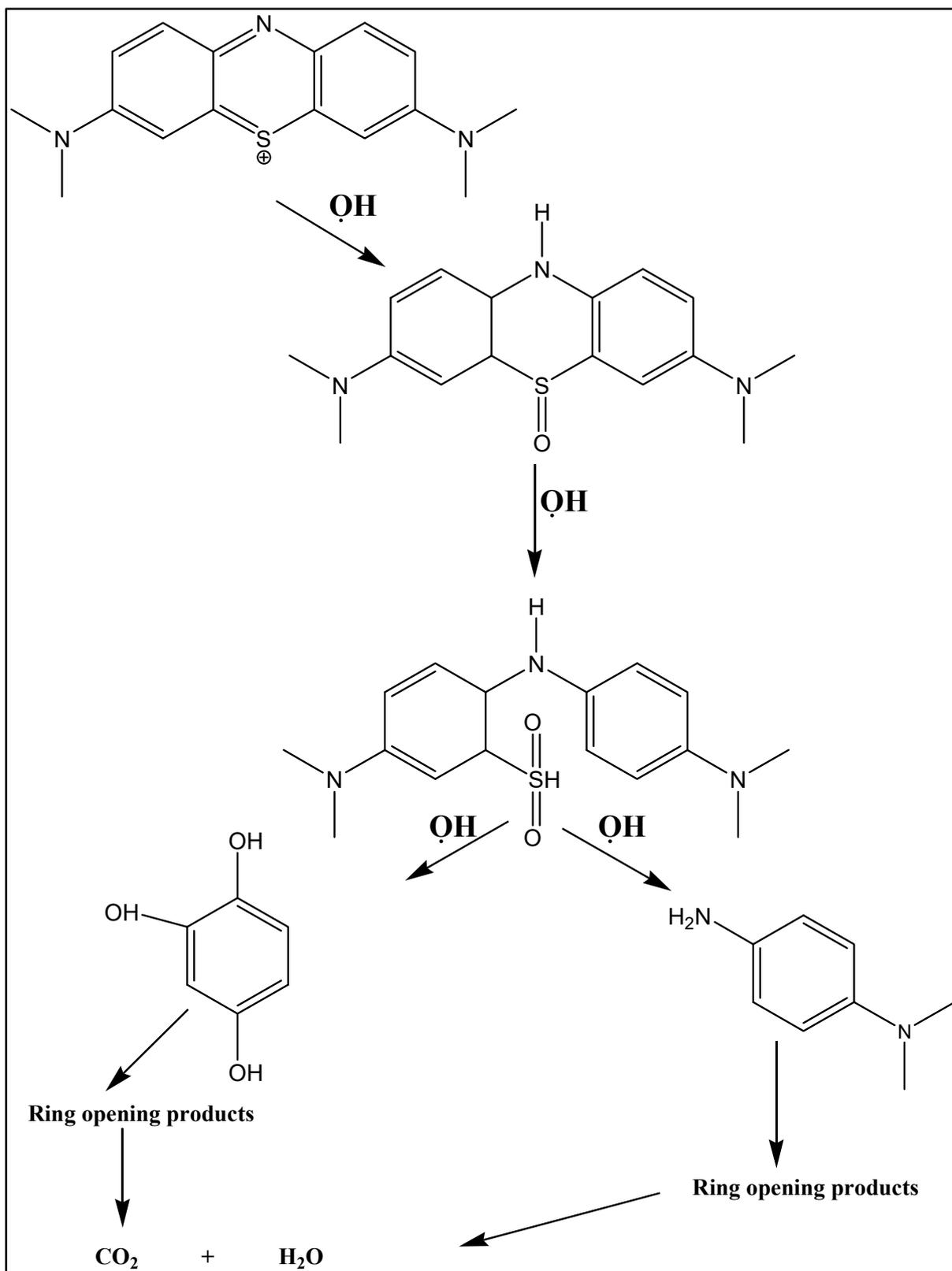


Figure S2: The photocatalytic degradation mechanism of the MB dye

## Section S1

### *pH studies*

The Biobase portable benchtop pH meter (model PHS-25CW) from Masiye Labs, RSA, was employed for pH monitoring. Prior to utilisation, the pH meter was calibrated following the manufacturer's guidelines. These investigations aimed to find the optimal pH for photocatalysis of MB dye. Utilising a 30 mg 20/80 ZnO/CSs catalyst, a solution of MB dye (20 ppm) underwent degradation through UV irradiation as outlined in Section 2.9. pH levels ranging from 3 to 10 were examined over a 120-minute reaction duration, with pH adjustments made using either HCl or NaOH solutions.

### *Dosage studies*

Various amounts of photocatalyst, ranging from 15 to 90 mg, were tested for degrading a solution of MB dye (20 ppm) under continuous stirring at 400 rpm using a 450 W UV lamp. The reaction duration was set at 120 minutes, with the solution's pH maintained at 5.

### *Concentration studies*

Concentration studies involved testing MB dye concentrations ranging from 5 to 20 mg/L, with the solution's pH set at 5. The reaction proceeded for 120 minutes, employing a 450 W UV lamp, 90 mg of photocatalyst, and continuous stirring at 400 rpm using a magnetic stirrer.

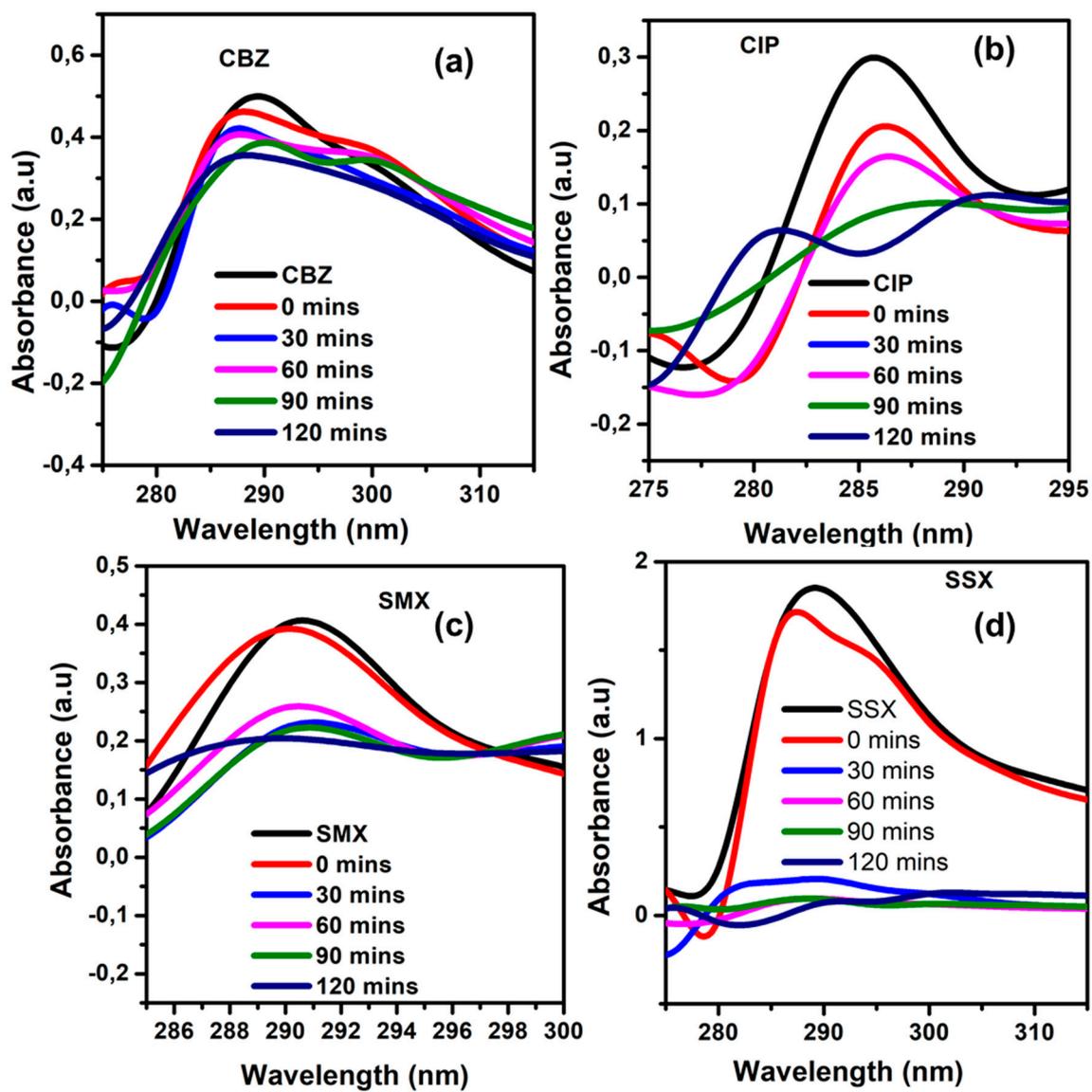


Figure S3: Photodegradation Curves for (a)CBZ, (b) CIP, (c) SMX and (d) SSX by the 1%Au-ZnO-CSs photocatalyst