

Photo-catalytic degradation of Rhodamine 6G under visible lamp using citrate stabilized ZnO nanoparticles

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INTRODUCTION



AIM AND OBJECTIVES

Aim

To synthesize and characterize citrate stabilised ZnO nanoparticles via sol gel for efficient photocatalytic degradation of Rhodamine 6G under visible light.

Objectives

To synthesise citrate stabilised Zinc Oxide nanoparticles.

Analyse structural, morphological and optical properties of the nanoparticles using UV/Vis, XRD, FTIR, SAED and TEM.

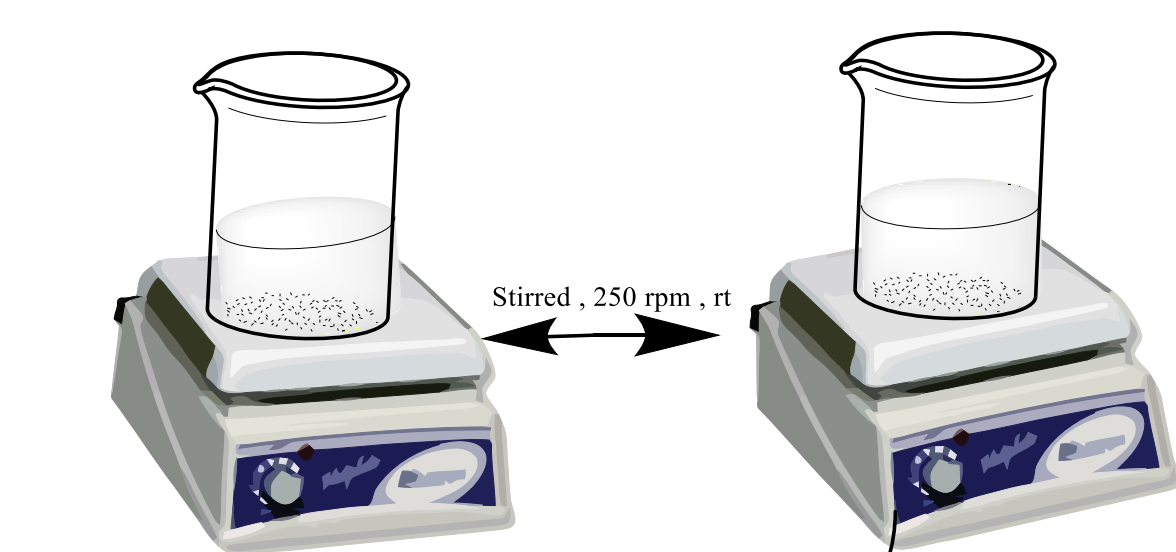
Photo catalysis of rhodamine 6G using ZnO nanoparticles under Visible light.

SYNTHESIS METHODOLOGY AND STRUCTURAL CHARACTERIZATION

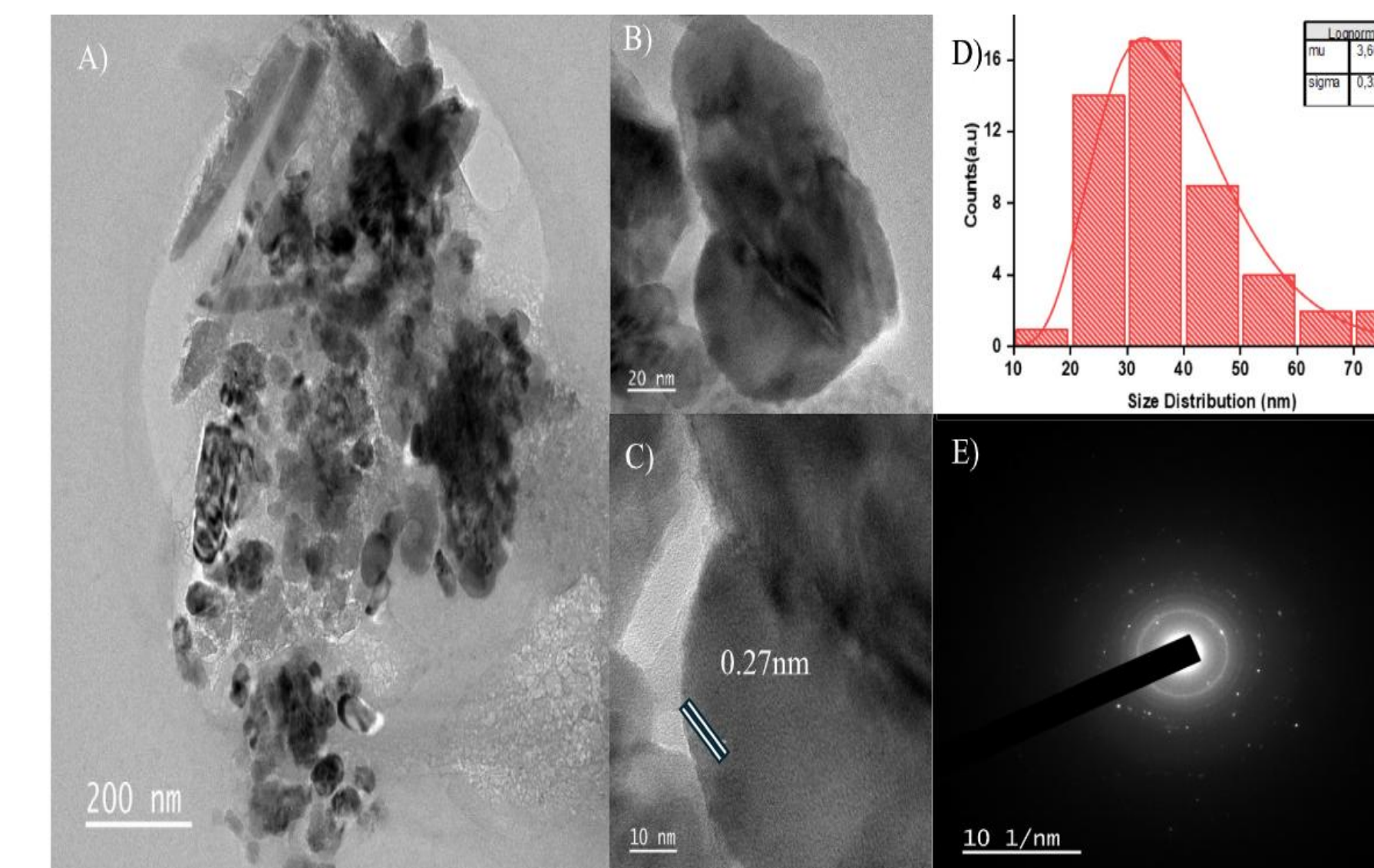
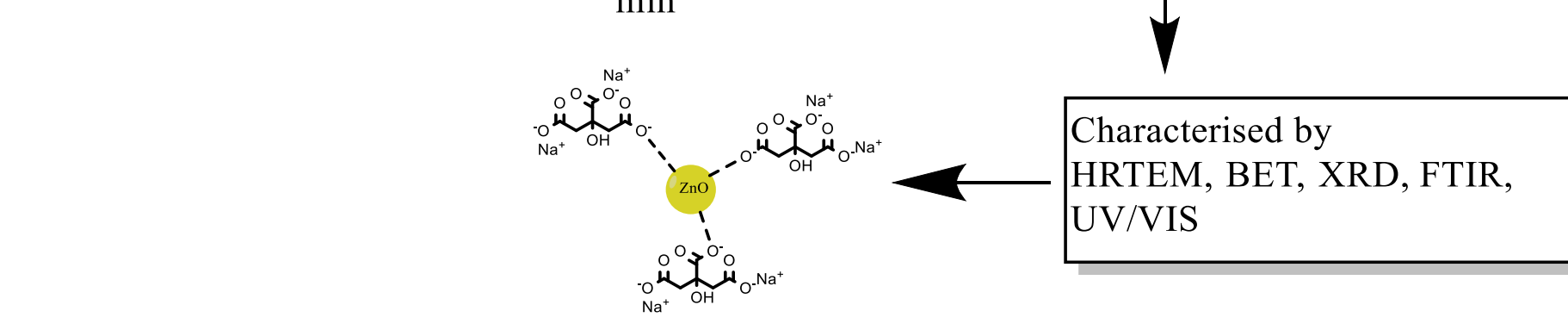
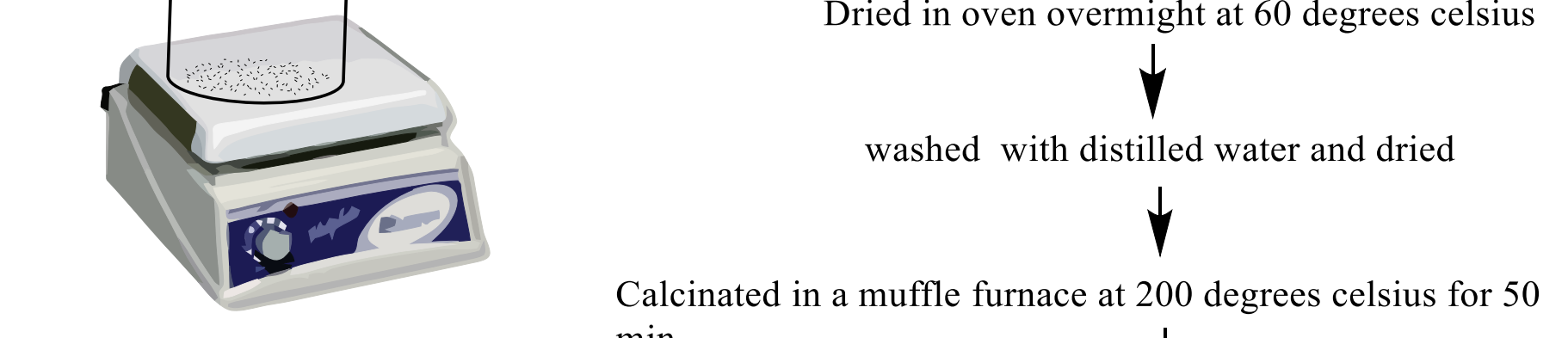
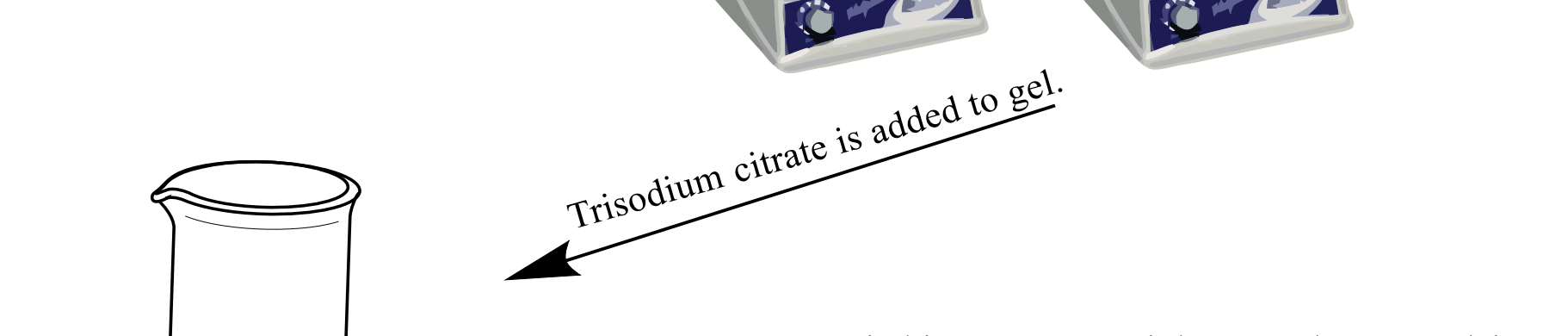
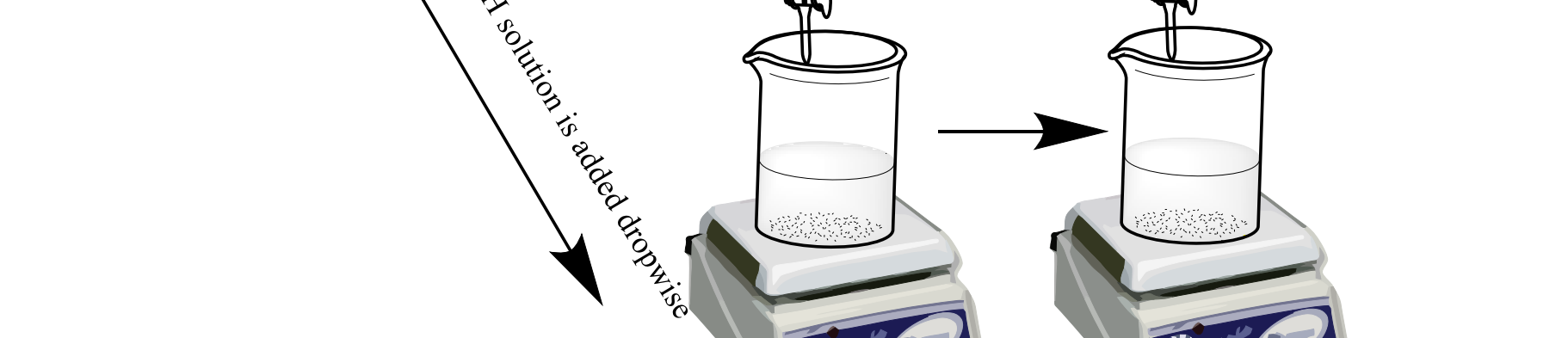
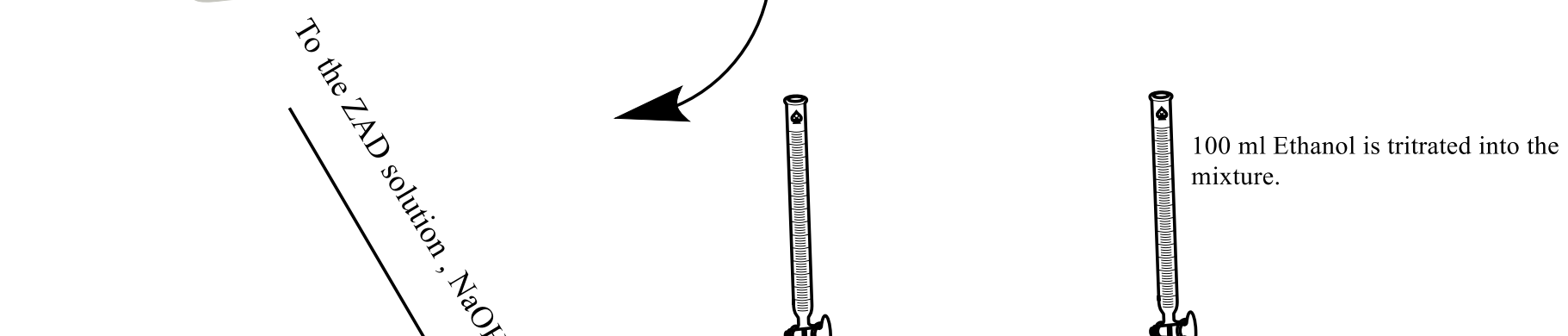
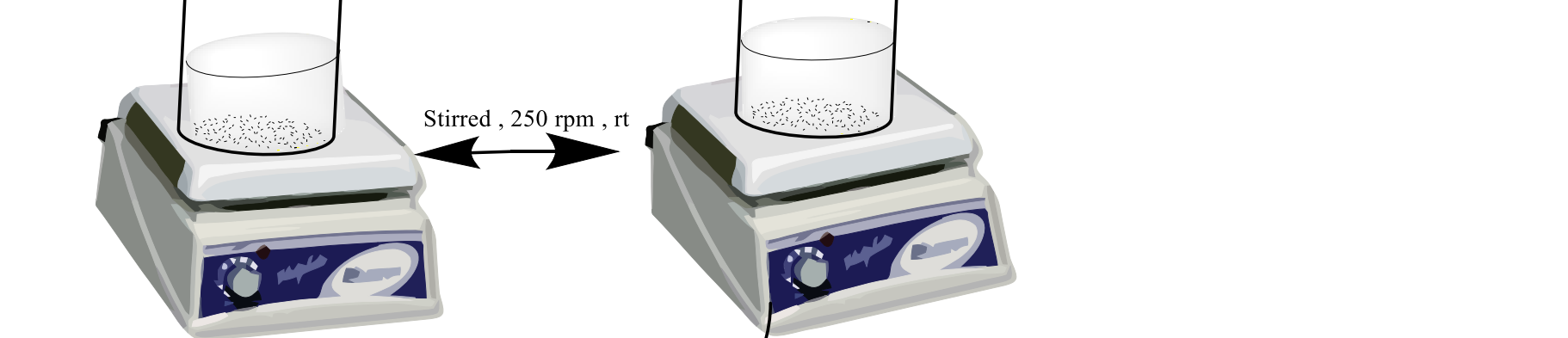
The schemes below summarize the methods used for synthesis and characterization.

Zinc Oxide citrate stabilised Nps Synthesis by Sol Gel Method

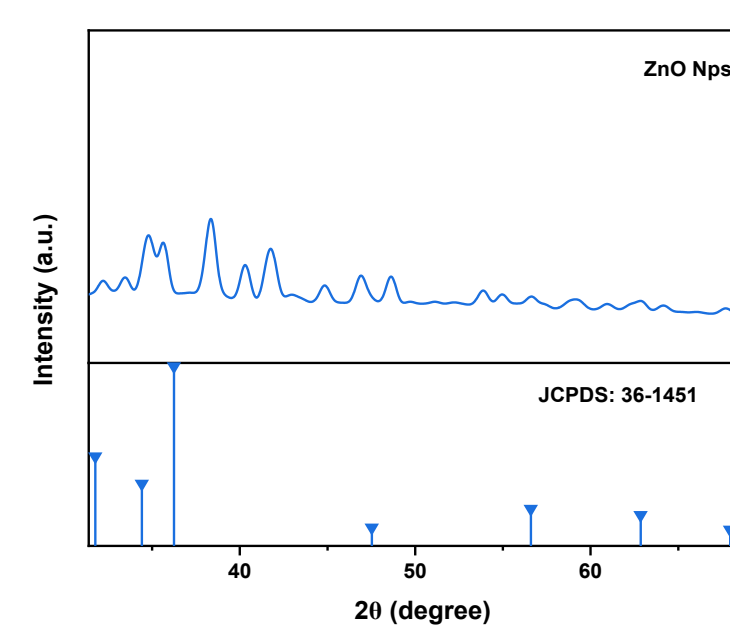
Zinc Acetate dihydrate precursor (2g) in 15 ml distilled water.



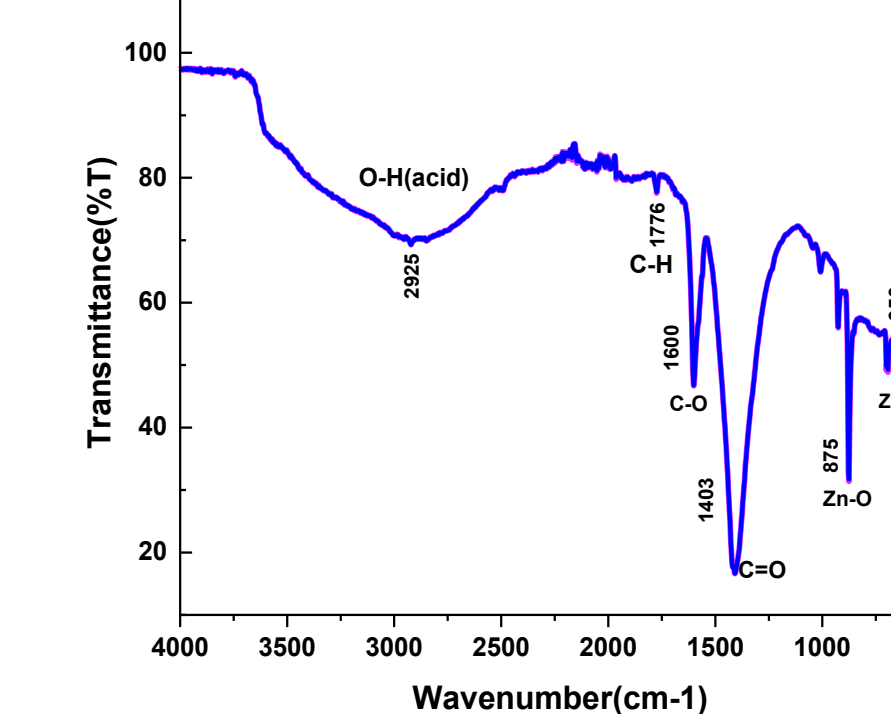
8g Sodium Hydroxide in 10 ml distilled water.



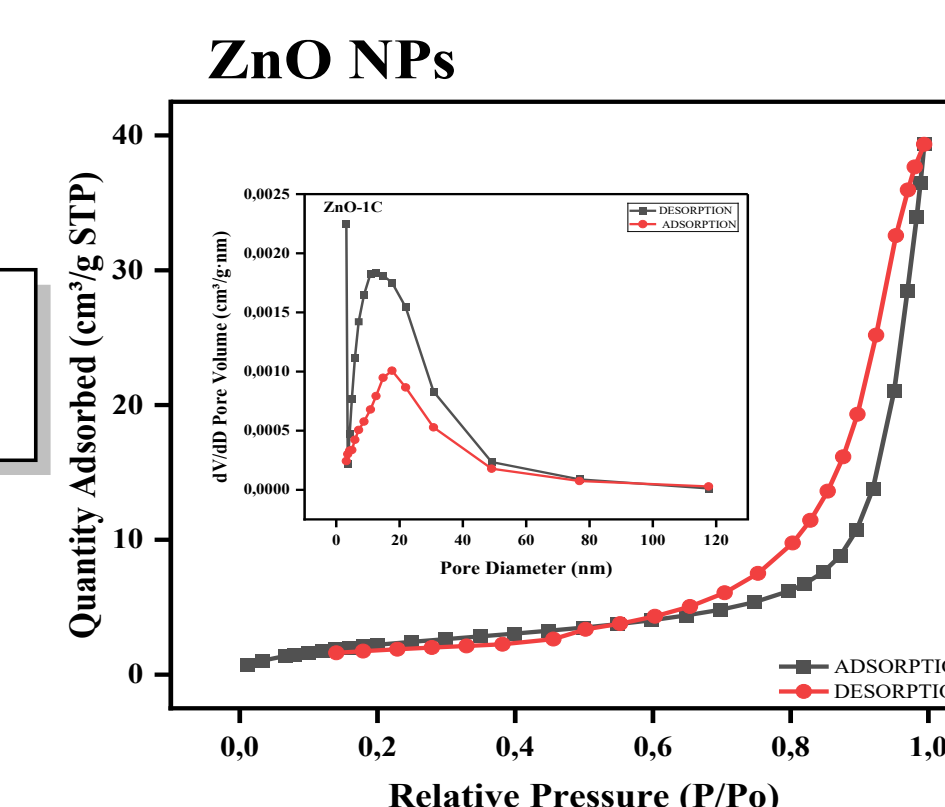
TEM average size 38 nm (10-60 nm)



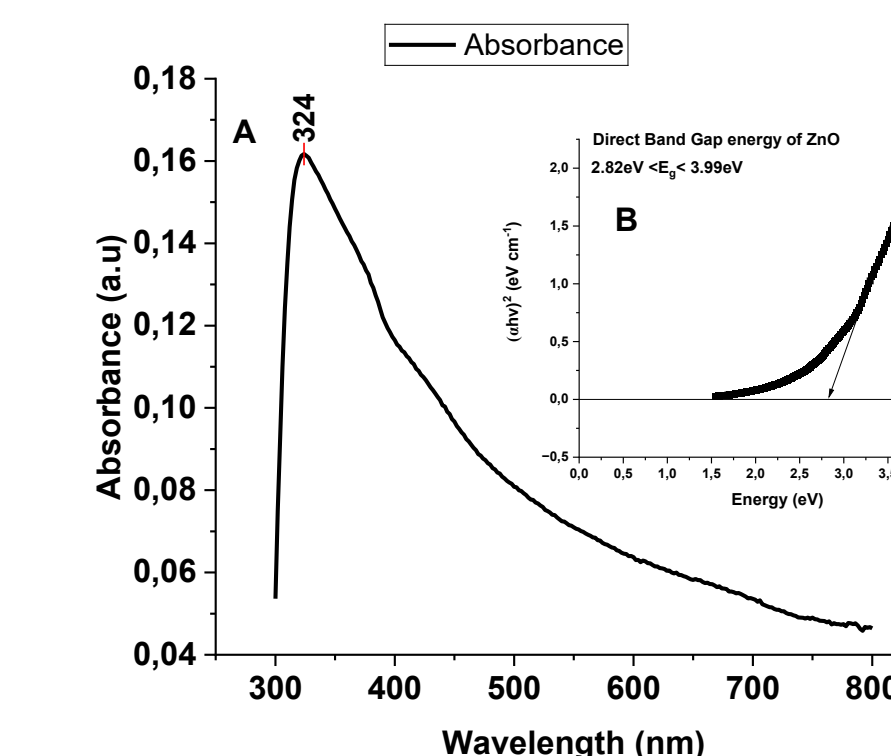
XRD 7.29 nm



FTIR 650 cm⁻¹

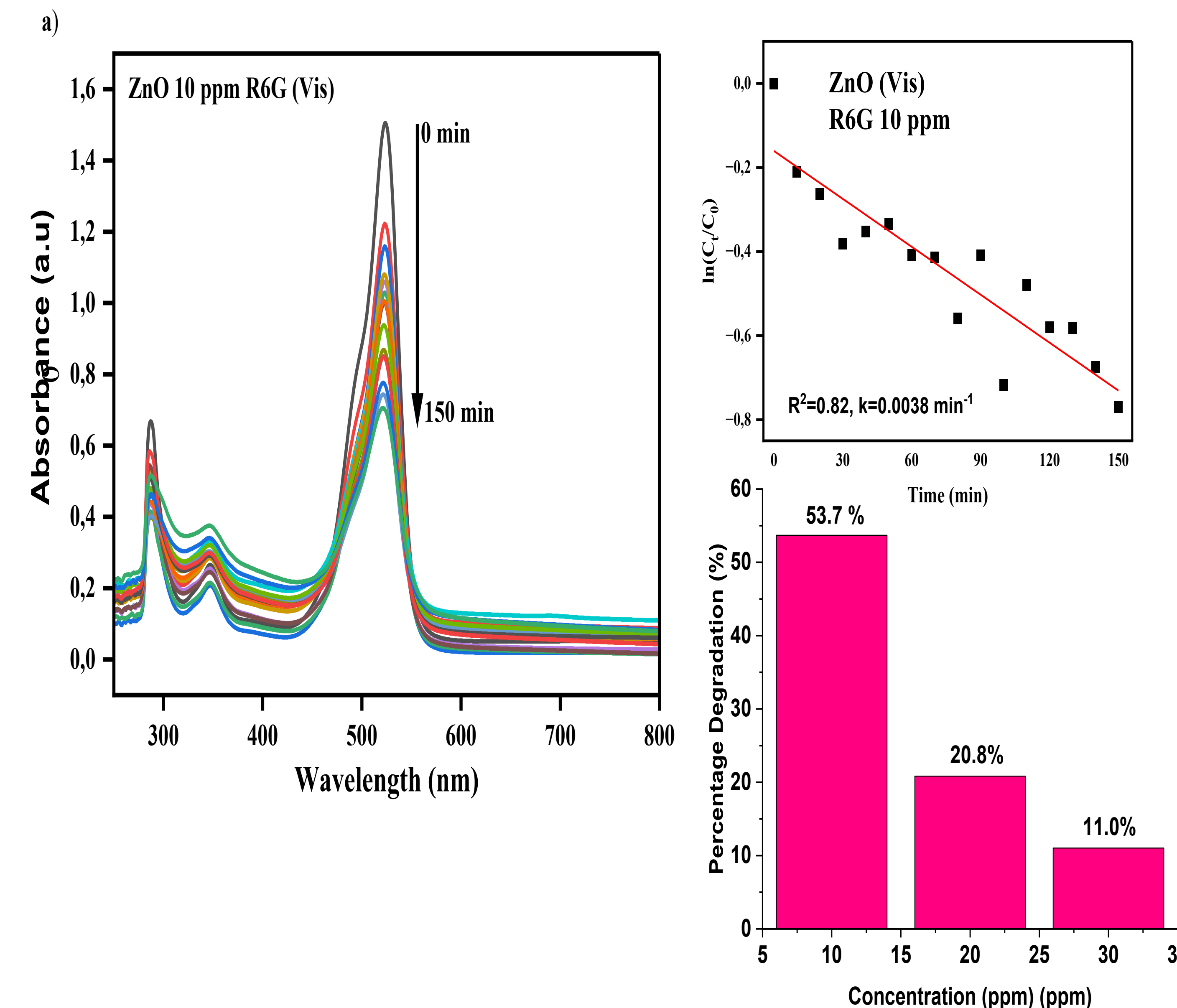


BET SSA 8.87 m²/g, 17 nm pore diameter



Bandgap 2.88 eV-3.99 eV

RESULTS AND DISCUSSION (PHOTODEGRATION)



CONCLUSION

Citrate-stabilized ZnO NPs with a hexagonal wurtzite structure and high colloidal stability were successfully synthesized for visible light water remediation. The nanoparticles effectively triggered the photocatalytic degradation of Rhodamine 6G (R6G) dye, as confirmed by a distinct blue shift in absorbance. The photocatalytic efficiency was concentration-dependent, achieving a maximum degradation of 53.7% for a 10 ppm, 20.9 % for 20 ppm R6G and 11.0 % for 30 ppm dye solution after 150 minutes.

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