

# List of Tables

1.1 Synthesis protocols, phases and saturation magnetization ( $M_S$ ) values .....	19
2.1 Nomenclature of the pure and unsubstituted as well as Ni substituted ( $Fe_3C/Fe_3O_4$ )/C composites samples as follows.....	30
2.2 The nomenclature for the Mn-Substituted ( $Fe_3C/Fe_3O_4$ )/C nanocomposites.....	30
3.1 Obtained structural parameters of the $Fe_3C$ nanoparticles after the Rietveld refinement.....	39
3.2 Hyperfine parameters magnitudes ( $H_f$ , $Q_S$ , $IS$ , and $R_A$ ) revealed after fitting of the Mössbauer spectrum of the $Fe_3C$ sample.....	44
4.1 Summary of the Rietveld refined structural parameters of the orthorhombic $Zn_xFe_{3-x}C$ ( $0.1 \leq x \leq 1$ ) nanoparticles.....	56
4.2 The hyperfine field values ( $H_f$ ), isomer shift ( $\delta$ ), quadruple splitting ( $\Delta$ ), Inner line width ( $\Gamma$ ) and relative area ( $R_A$ ) of Fe-sites for $Zn_xFe_{3-x}C$ ( $x = 0.1$ and $0.5$ ) derived from Mössbauer spectra, recorded at room temperature. Isomer shift values are relative to Fe metal foil ( $\delta = 0.0$ mm/s).....	63
5.1 Details of the structural parameters obtained from Rietveld refinement by automatic Fullprof Match! Software.....	76
5.2 Summary of the Mössbauer magnetic hyperfine structural parameters for all the samples after fitting.....	82
5.3 The apparent reaction rate constant for Fenton and photo-Fenton degradation of PNP in	

presence of catalysts.....	91
5.4 The apparent reaction rate constant for Fenton and photo-Fenton degradation of MO in presence of different nanoparticles prepared in this study.....	93
6.1 Details of the structural parameters obtained from Rietveld refinement by automatic Fullprof Match! Software.....	100
6.2 The hyperfine field magnitude ( $H_f$ ), isomer shift ( $\delta$ ), quadrupole splitting ( $\Delta$ ), inner line width ( $\Gamma$ ) and relative area ( $R_A$ ) of Fe-sites for two nanocomposites. Isomer shift values are relative to Fe metal foil ( $\delta = 0.0$ mm/s).....	107