Abstract of the Thesis

Toxic heavy metals, including Vanadium (V), Cobalt (Co), Nickel (Ni), Cadmium (Cd), Mercury (Hg), Lead (Pb), and Arsenic (As), pose serious health risks by contaminating the environment and essential commodities. We have effectively identified the toxic heavy metals found in food and pharmaceutical items for this reason. Then, as a practical application, we have effectively decreased the toxic heavy metals found in food and pharmaceutical items. In our first research work; a method for quantifying toxic heavy metal concentrations in Cholic acid using Quadrupole Inductively Coupled Plasma Mass Spectrometry (Q-ICP-MS) is presented. The research successfully met the accuracy and precision standards set by various regulatory bodies. This method demonstrates efficiency and reliability in determining trace metals in Cholic acid. Our study focuses on quantifying toxic heavy metals in medicine and food, proposing the use of eco-friendly rice husk ash (RHA) synthesized silica nanoparticles (SNPs) for efficient reduction. The unique aspect of this study lies in its novel approach and application of SNPs, offering valuable insights and contributing to the development of safer and higher quality medicines and food products. It emphasizes the importance of reduce toxic heavy metal contamination in these essential commodities, highlighting the innovative use of synthesized SNPs as adsorbents. The chapter sets the stage for subsequent chapters by outlining the research's significance and the approach used. The chapters establish the context for the research, underlining the critical need to address toxic heavy metal contamination in pharmaceuticals and food products. The introduction of SNPs as adsorbents presents an innovative solution to tackle toxic heavy metal contamination. This research focuses on utilizing SNPs derived from RH to efficiently reduce toxic heavy metals in pharmaceuticals and potatoes. The study employs various characterization techniques, emphasizing safety assessment through TGA, FT IR, SEM, EDX, DLS, TEM, AFM, XRD, and ICP-MS. Results demonstrate SNPs' effectiveness in reducing toxic heavy metals in Losartan and potatoes, providing a promising, low-cost, and environmentally friendly method for enhancing food safety and addressing agricultural product contamination.