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Synthesis, characterization, and antioxidant activity of 2-{(*Z*)-[(2-hydroxyphenyl) methylidene]amino}benzoic acid, Schiff base ligand, and its Copper(II) and Nickel(II) complexes

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Schiff bases are molecules that resemble aldehydes or ketones but have the carbonyl group substituted by an imine or azomethine group. As a result, they have the ability to form metal complexes with transition metals through coordination. Schiff base ligand characteristics can be changed after forming the complexes with the transition metals. So, the study of formation of Schiff base metal complexes with different metals help to enhance the activities of the Schiff base ligand. These Schiff bases and their metal complexes have a wide range of uses in several disciplines, including industrial, analytical, and biological. Additionally, they are bioactive molecules with antioxidant, anti-inflammatory, anti-cancer, anthelmintic, anticonvulsant, antibacterial, and antitubercular properties. The objective of this work was to synthesize 2-{(Z)-[(2-hydroxyphenyl) methylidene] amino} benzoic acid from salicylaldehyde and 2-amino benzoic acid in ethanol, as well as four Cu(II) and Ni(II) complexes with the ligand: metal ratios 1:1 and 1:2 and assess their antioxidant activity. Ligand and complexes were synthesized with 60–70 yield percentage. The synthesized ligands and complexes were characterized using UV-visible and IR spectral studies. Two of the complexes have four-coordinate geometry, whereas the other two have six-coordinate geometry, according to the analytical results. The FRAP assay has been used to quantify the antioxidant activity of synthetic substances. All the synthesized compounds showed antioxidant activity in the reduction of ferric ions. The synthesized ligand and the metal complexes exhibit lower ferric reducing capacity than that of Ascorbic acid (3.4301 ± 0.006351 mmol Fe^{2+}/g). In contrast to the complexes, Ligand exhibits a greater ferric reducing activity (1.6284 ± 0.004079 mmol Fe^{2+}/g). But in the metal complexes antioxidant activity was lowered when compared with the ligand due to the complexation with metal through the ONO atoms. When compared to the Cu(II) complexes, Ni(II) complexes had comparatively the highest antioxidant activity.

Keywords: Antioxidant activity, Ascorbic acid, FRAP assay, Salicylaldehyde, Schiff base