

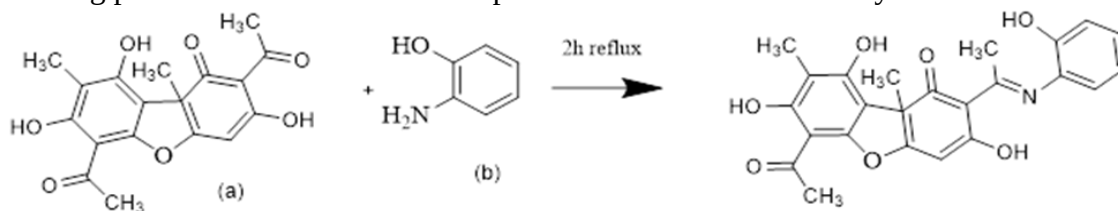
REACTION OF USNIC ACID ISOLATED FROM THE LICHEN RHIZOPLACA MELANOPHTHALMA WITH O-AMINOPHENOL: SYNTHESIS AND PHYSICOCHEMICAL CHARACTERIZATION OF A SCHIFF BASE

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Usnic acid [2,6-diacetyl-7,9-dihydroxy-8,9b-dimethyl-1,3(2H,9bH)-dibenzofurandione] is one of the most extensively studied lichen metabolites. Numerous usnic acid-containing lichens and their extracts are used in medicine, perfumery, cosmetics, and environmental applications. In its pure form, usnic acid has been incorporated into creams, toothpastes, mouthwashes, deodorants, and sunscreens; in some cases, it is used as an active ingredient, whereas in others it serves as a preservative. Despite the biological activity of naturally occurring usnic acid, certain physicochemical properties limit its practical applications. In particular, its poor water solubility and potential toxicological effects under certain conditions have been reported. Therefore, chemical modification of the usnic acid molecule to improve its solubility, biological activity, selectivity, and other physicochemical properties represents an important area of contemporary research. Accordingly, in the present study, a multifunctional Schiff base (hydroxyphenylimino) derivative of usnic acid was synthesized via a condensation reaction between usnic acid and 2-aminophenol. Although this compound has been previously synthesized, the present study focused on optimizing the reaction conditions, and the resulting product is intended to serve as a basis for subsequent chemical transformations.

In May and June 2026, the lichen *Rhizoplaca melanophthalma* was collected from mountainous regions of Uzbekistan. Usnic acid was isolated from the lichen by extraction, column chromatography, and recrystallization. Its structure was confirmed by infrared IR, ^1H and ^{13}C NMR spectroscopy. The reaction of usnic acid with o-aminophenol afforded light cream-colored crystals with an R_f value of 0.58 and a melting point of 257 °C. The isolated product was obtained in 85% yield.



The successful formation of the reaction product was confirmed by IR spectroscopy. In the IR spectrum of the product, the decrease in the intensity of the strong carbonyl absorption band at approximately 1685 cm^{-1} , characteristic of usnic acid, together with the appearance of a new absorption band at around 1630 cm^{-1} attributable to the $\text{C}=\text{N}$ bond, provides evidence for the occurrence of the condensation reaction. In addition, a decrease in the intensity of the absorption bands in the $3400\text{--}3500\text{ cm}^{-1}$ region, characteristic of the $-\text{NH}_2$ group, indicates that the amino group of o-aminophenol participated in the reaction. The weak and slightly broadened absorption bands remaining in this region are attributed to the phenolic $\text{O}-\text{H}$ groups that did not participate in the reaction and remain in the molecular structures of both the aminophenol-derived moiety and the usnic acid-derived moiety.