Developments of New Synthetic Methodologies for Furan-Fused Heterocycles

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Furopyranones and furopyrrrolones are furan-fused bicyclic heterocycles containing pyranone and pyrrolone framework respectively. The syntheses of these molecules attract attention due to the existence of their core structures in many natural products and pharmaceutical agents.[1-3] In this study, new synthetic methodologies were developed for the synthesis of furopyranone and furopyrrrolone derivatives. In the first section of this study, methyl 2-(2-methoxy-2-oxoethyl)-3-furoate was hydrolyzed forming 2-(carboxymethyl)-3-furoic acid which underwent intramolecular cyclization reaction using two different methodologies forming furopyranone derivatives.

\[ \text{O} \quad \text{O} \quad \text{O} \quad \text{O} \quad \text{Me} \]
\[ \rightarrow \]
\[ \text{O} \quad \text{O} \quad \text{O} \quad \text{O} \quad \text{Me} \]
\[ \rightarrow \]
\[ \text{O} \quad \text{O} \quad \text{O} \quad \text{O} \quad \text{Me} \]

In the second part of the study, 2-(carboxymethyl)-3-furoic acid was regioselectively converted to acyl azide, which was accomplished by utilizing the reactivity differences between the two acid functionalities within the molecule. This acyl azide was then transformed into urea derivative to perform cyclization reaction yielding a new furan-fused heterocycle, furopyrrrolone.

\[ \text{O} \quad \text{O} \quad \text{O} \quad \text{N} \quad \text{H} \]
\[ \rightarrow \]
\[ \text{O} \quad \text{O} \quad \text{O} \quad \text{N} \quad \text{H} \]

References: