

## SYNTHESIS, CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY EVALUATION OF NEW CYCLIC IMIDES CONTAINING 1,3,4-THIADIAZOLE AND 1,3,4-OXADIAZOLE MOIETIES

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### ABSTRACT

In the present work a variety of new cyclic imides containing two heterocycles namely 1,3,4-thiadiazole and 1,3,4-oxadiazole were synthesized. The most important step in the synthesis of these imides is the preparation of key intermediate (compound (3)) which represents the main heterocyclic amine containing both 1,3,4-thiadiazole and 1,3,4-oxadiazole rings and from which all the new target cyclic imides are synthesized. Synthesis of compound (3) was performed via three steps the first one involved reaction of 2-amino-5-mercapto-1,3,4-thiadiazole with ethyl chloro acetate producing 2-(5-amino-1,3,4-thiadiazole-2-yl)thioethyl acetate<sup>1</sup> which introduced subsequently in reaction with hydrazine hydrate producing the corresponding aceto-hydrazide<sup>2</sup> and this in turn introduced in reaction with carbon disulfide in the third step producing the mentioned amine<sup>3</sup>. Compound<sup>3</sup> was introduced successfully in reaction with different cyclic anhydrides including (maleic, citraconic, succinic, phthalic, pyridinic and pyromellitic) anhydrides producing a series of new amic acids<sup>4-9</sup>. In the final step dehydration of amic acids<sup>4-9</sup> was performed via treatment with acetic anhydride and anhydrous sodium acetate producing the desired corresponding imides<sup>10-15</sup>. The new imides<sup>10-15</sup> were screened for their antimicrobial activity against four types of bacteria and one fungi and the results indicated that they exhibit good antimicrobial activity against the tested organisms.

**Keywords:** Cyclic imides, aceto-hydrazide, pyridinic and pyromellitic anhydrides, amic acids.

### 1. INTRODUCTION

Cyclic imides have been attracted much more attention of organic and medicinal chemists due to their biological activities, most of them are extensively used as analgesic<sup>1</sup>, antinociceptive agents<sup>2</sup> or as reactants for polymer synthesis<sup>3</sup>.

An imide nucleus can be also found in a structure of anxiolytic, antimicrobial, anticancer and anti-inflammatory substances<sup>4-6</sup>.

Also five membered heterocyclic compounds show various types of biological activities among them 2,5-disubstituted-1,3,4-thiadiazoles are associated with divers biological activities probably by the virtue (-N=C-S-) grouping, some of them possess antibacterial, antifungal and anticonvulsant

activities<sup>7-9</sup>. Similarly 2,5-disubstituted-1,3,4-oxadiazoles also display wide spectrum of activities such as antibacterial, antimalarial, anti-inflammatory<sup>10,11</sup>, antifungal and anticonvulsant<sup>12,13</sup>.

In light of the therapeutic importance of these rings we attempted to synthesize new molecules containing the above mentioned three biologically active moieties (cyclic imide, 1,3,4-thiadiazole and 1,3,4-oxadiazole). The incorporation of these three moieties into a single molecule can change the activity of the obtained new compounds, thus the present work involved synthesis of new cyclic imides containing both 1,3,4-thiadiazole and 1,3,4-oxadiazole moieties and investigation for their antimicrobial activity.

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web as compared to 4140 the 4145 mod grade has higher levels of chromium and molybdenum which will provide much deeper hardening into the steel after austenitizing quenching and tempering this alloy should not be confused with aisi 4145 as the chemical limits for the modified version are much higher