**ABSTRACT**

**Objective:** N-phenylbenzamides are important and biologically active compounds. N-phenylbenzamides have been synthesized by some routes. An attempt has been made to find out the new route to synthesize N-phenylbenzamides.

**Methods:** The reaction was carried out by reacting substituted benzoyl chlorides with 1,3-diphenylthiourea in the presence of triethylamine in THF at 70 °C. After 4hr the product was purified and identified.

**Results:** An excellent and pure yield of N-phenylbenzamides was obtained by reacting substituted benzoyl chlorides with 1,3-diphenylthiourea. The proposed mechanism follows imino alcohol-amide tautomerism and suggests the involvement of rearrangement intermediate.

**Conclusion:** 1,3-diphenylthiourea is inexpensive commodity chemical and it is found to be the useful reagent for the direct conversion to N-phenylbenzamide. The proposed mechanism follows imino alcohol-amide tautomerism and suggests the involvement of rearrangement intermediate. The synthesis gave pure, high yield, and the one and only isolated product.

**Keywords:** N-phenylbenzamide, 1,3-diphenylthiourea, Imino alcohol-amide tautomerism, Rearrangement intermediate.
Herein, we explained the proposed mechanism for the conversion to N-phenylbenzamide products. Nucleophilic substitution reaction between 1,3-diphenylthiourea and benzoyl chloride derivatives gave the attachment of one benzoyl ring to one of the amine, then continued with rearrangement to obtain N-phenylbenzamides. The proposed mechanism follows imino alcohol-amide tautomerism. In the case of hydroxide ion the result, after protonation, is an imidic acid (also called an imino alcohol), the tautomer of an amide, and in general less stable than the corresponding amide [10]. It obviously explained the products were amide tautomer.

Fig. 1: The proposed mechanism of N-phenylbenzamide synthesis

The proposed mechanism (fig. 1) involves further steps that include conversion of 1-benzoyl-1,3-diphenylthiourea (i) to N-phenyl benzamide (iv). Based on the observed products, we suggest the bulky size of 1,3-diphenylthiourea to give a hindrance so that only one amine successfully substituted by benzoyl moiety, resulting compound (i). Furthermore, rearrangement occurred due to the bulky steric strain owned by (i), converting it to compound (ii). The unstable compound (i) converted itself into compound (iii), which was the tautomer of (iv), and release compound (v) at the same time.

We proposed that rearrangement was the key intermediate in the conversions to the N-phenylbenzamide products. The rearrangement converting (i) to (ii) gave a possible route to provide compound (iii), the tautomer of an amida (iv). This suggestion was in accordance with the earlier study of proton-transfer tautomerization of benzanilide (N-phenylbenzamide) to its imidol form (N-phenylbenzimidic acid) reported by Tang [11]. Moreover, the conversions to the N-phenylbenzamides also released compound (v), phenylisothiocyanate. Presumably, any byproducts phenylisothiocyanate were lost in the ethanol phase during workup.

In conclusion, we have found that 1,3-diphenylthiourea is a useful reagent for the direct conversions to the N-phenylbenzamides. The proposed mechanism follows imino alcohol-amide tautomerism and suggests the involvement of rearrangement intermediate. The synthesis gave pure, high yield, and the one and only isolated product.

ACKNOWLEDGMENT
We gratefully acknowledge the support of the Department of Pharmaceutical Chemistry, Airlangga University.

CONFLICT OF INTERESTS
We hereby declare that there is no conflict of interest

REFERENCES