Synthetic and Medicinal Importance of Pyrazole Derivatives

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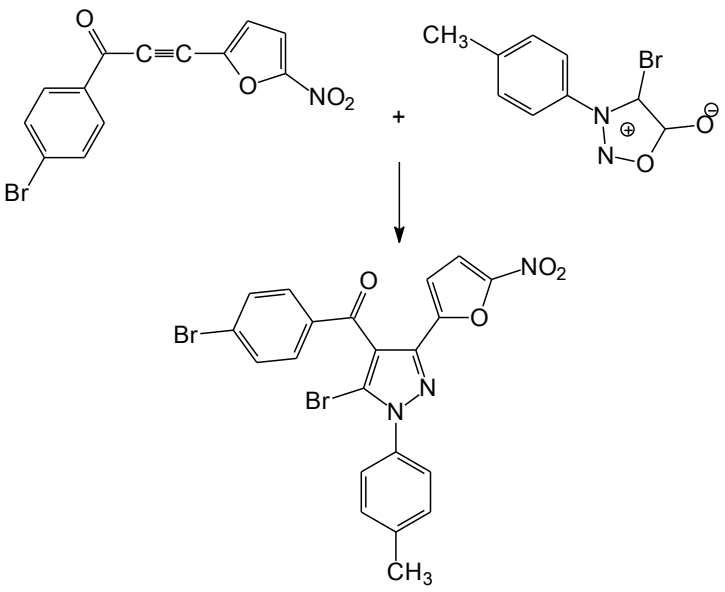
Abstract: Pyrazoles and its derivatives play an important role in synthetic as well as medicinal chemistry as these constitute the framework of numerous drugs, dyes and hence prompted the organic chemist to evolve several synthetic pathways for their synthesis. This is a review article which enumerates some of the current studies about medicinal importance and synthetic strategies of pyrazole derivatives which will be worthwhile for the researchers working in this area.

Keywords: Pyrazole derivatives, heterocycles, biological activities.

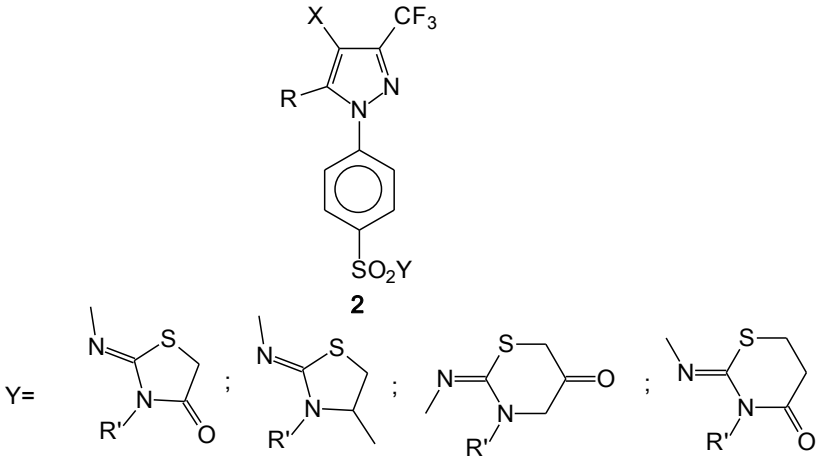
Pyrazoles are one of the most important classes of compounds among heterocycles. Much attention has been devoted to chemistry of pyrazoles due to diverse properties associated with them. Pyrazoles and its derivatives play an important role in synthetic and medicinal chemistry as these constitute the framework of numerous drugs and dyes. Besides this, they are immensely used in agrochemicals, as color additives in food and also for the estimation purposes in biochemistry and plastics.[1-4] A large number of pyrazoles derivatives have been found to exhibit biological activities such as analgesic,[5] antipuretic,[5] antifertility,[6] antimalarial,[7] anti-inflamatory,[8] herbicidal[9,10] and pesticidal.[11] Diverse biological, pharmaceutical and commercial importance of pyrazoles prompted the organic chemist to evolve several synthetic pathways for their synthesis. A large number of methods for the synthesis of pyrazole derivatives are recorded in literature.[12-17]

This mini review enumerates some of the current studies about medicinal importance and synthetic strategies of pyrazole derivatives which will be worthwhile for the researchers working in this area. Nitrofurranyl substituted pyrazoles of the type **1** showed high antibacterial and antifungal activity.[18]



1

Faidallah *et al*. synthesized 3-trifluoropyrazole derivatives **2** by the condensation of 1-trifluoromethyl diketones with 4-hydrazinobenzenesulfonamide hydrochloride exhibited antimicrobial activities.[19]

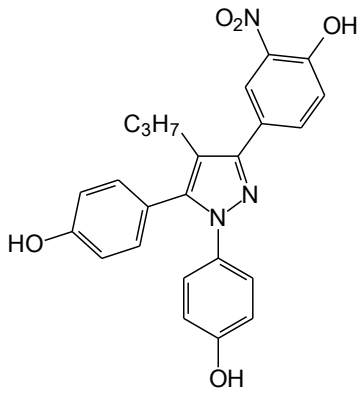


2

R= CH_3, Furyl X= H, Br

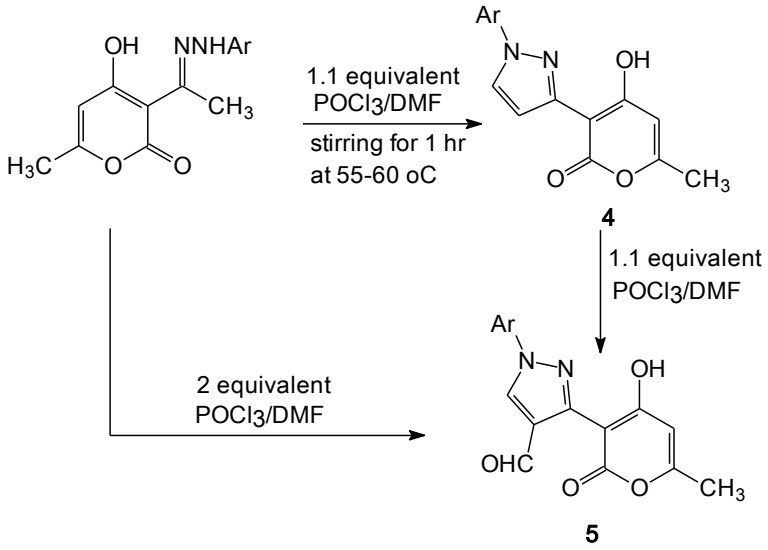
R'= cyclohexyl, Ph, naphthyl, *p*-ClC_6H_4, benzyl, benzoyl

Further, 2-nitro phenol derivaties of the tetra substituted pyrazoles **3** were found to bind satisfactorily with estrogen receptor.[20]

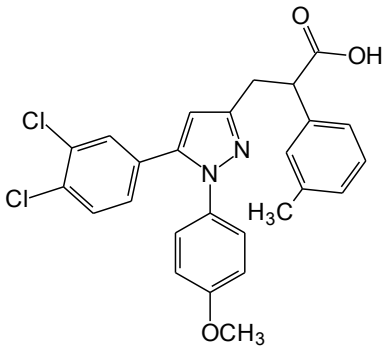


3

Vilsmeier-Haack reactions of DHA hydrazones have been reported to yield 4-formylpyrazoles **4** and 4-unsubstituted pyrazoles **5** by changing the reaction conditions.[21] This study provides a first example where 4-unsubstituted pyrazoles are available through the use of Vilsmeier-Haack reagent.

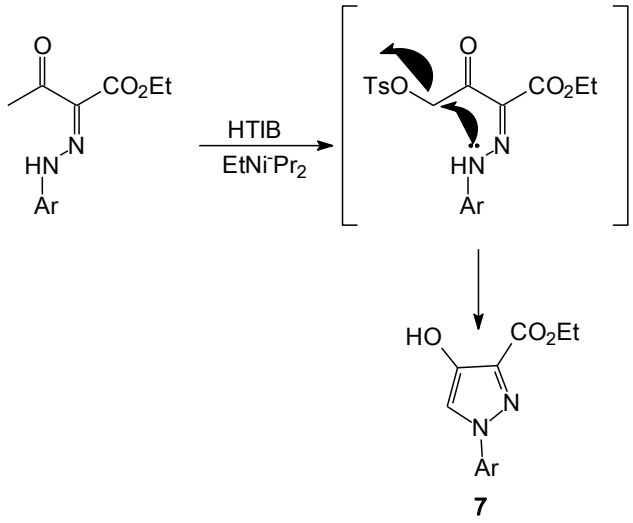


The SAR studies of 1,5-diarylpyrazoles of the type **6** showed good oral bioavailability and can be used for the treatment of GI disorders.[22]



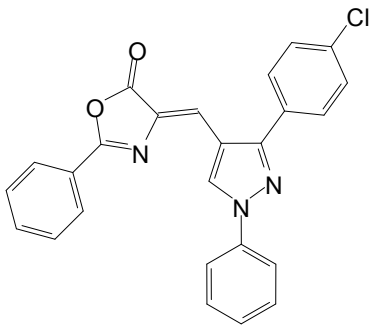
6

Pyrazoles **7** were synthesized by the oxidation of arylhydrazones with HTIB. The reaction was carried out in one pot in the presence of diisopropyletylamine. In the intermediate α-tosyloxycompounds (generated *in situ*), the intramolecular participation of amino group displaces the tosyloxy group to produce the cyclized products.[23]



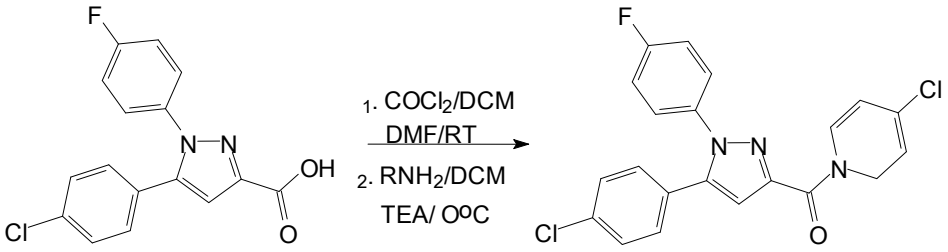
7

Trisubstituted pyrazoles of the type **8** have been tested for antimicrobial and anti-tubercular activities.[24]



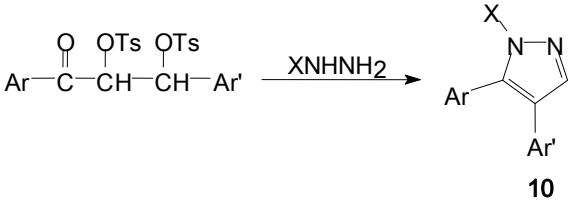
8

Venkat Ragavan R *et al*. studied antibacterial and antifungal activity of 1,5-diaryl pyrazoles **9** and concluded that aliphatic amide pharmacophore is important for antimicrobial activities.[25]



9

Parkash *et al*. synthesized various 1,4,5-triarylpyrazoles **10** by the reactions of α,β-chalcone ditostlate arylhydrazine. The result of the study clearly showed that unlike α-haloketones and α-tosyloxyketones, which behave analogously in most of their reactions the reactivitu of α,β-chalcone dibromides and α,β-chalcone ditosylates is quite different. Further, the study provides a new and convenient approach for the synthesis of 1,4,5-triarylpyrazoles.[26]



10

X= Ar'', $CONH_2$, $CSNH_2$

CONCLUSION

Though many procedure are established for the synthesis of pyrazoles derivatives, but much more effort yet to be given to develop new synthetic strategies with better yield of the product and do not involve toxic substrates. Further, biological activities with new dimension need to be explored for pyrazoles.

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