A Review on Acridone Derivatives and its Importance

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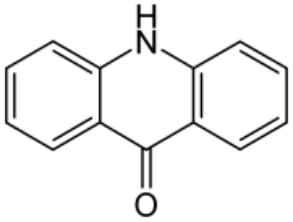
ABSTRACT

Acridoneis an organic compound containing a carbonyl group attached to the 9 position. It may be synthesized by the self-condensation of N-phenylanthranilic acid Acridone and its derivatives can be synthesized by a number of methods such as Ullmann condensation, by benzyne mechanism, by radical reaction of quinines etc. acridone nucleus due to its variety of pharmacological activities. These pharmacological activities include anticancer, antimicrobial, antiviral, antimalarial and anti-inflammatory activities. This review article literature survey summerizes the synthesis and pharmacological activities of acridone and its derivatives.

Keywords: Acridone, Medicinal Importance

INTRODUCTION

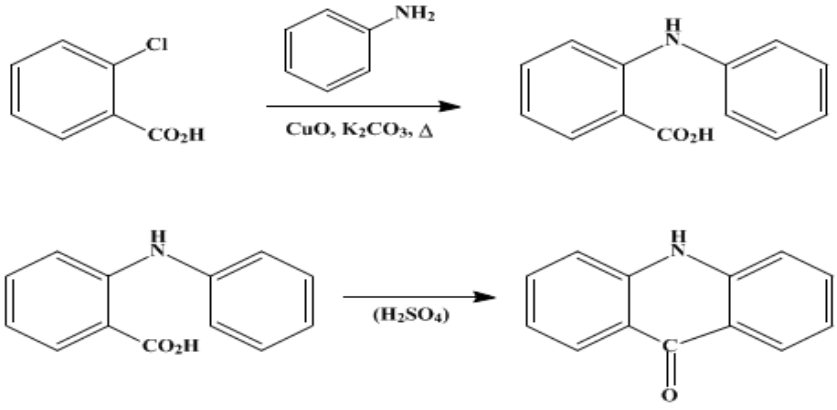


Acridone is an organic compound. Acridones are biologically active fused heterocyclic rings. Acridone constitutes the scaffold of some synthetic compounds with various pharmacological activities. Scaffold known to associate with several biological activities. It has carbonyl group at 9th position and nitrogen at 10th position. Acridone is also known by the name of 9(10H)-acridinone, acridine-9-one, 9-acridanone, acridinone and It is oxidized product of acridine. It may be synthesized by the self-condensation of *N*-phenylanthranilic acid [(1)].

Most recent derivatives still in its development stage, including 3-chloro-6-(2-diethylamino-ethoxy)-10-(2-diethylamino-ethyl)-acridone, have shown some promise as a potential antimalarial drugs [(2)].

Molecular Weight: 195.22
Molecular formula: $C_{13}H_9NO$
IUPAC name: 10H-acridin-9-one

SYNTHESIS OF ACRIDONE:



Ullmann synthesis:
Ullmann synthesis involves the condensation of o-halobenzoic acids with substituted aniline in the presence of copper powder and potassium carbonate to give N-(substituted phenyl) anthranillic acids. The N-(substituted phenyl) anthranillic acids cyclize to acridone/substituted acridones under the influence of strong acids [3].

RECENT REVIEW OF LITERATURE

Stankiewicz-Drogoń A et al [4]:
A new goup of acridone derivatives, obtained by reaction of acridone-4-carboxylic acid derivatives with aromatic amines, was tested to determine the inhibitory properties toward the NS3 helicase of hepatitis C virus (HCV).

Jumat Salimon et.al [5]: The newly synthesized compounds were characterized
Synthesis of diphenylamine-2,4'-dicarboxylic acid, Synthesis of 9(10H)-acridone-2-carboxylic acid, Synthesis of 9(10H)-acridone-2-methylcarboxylate 4**,** by IR, NMR and C, H, N, S analyses. All newly synthesized compounds were screened for their antibacterial (*Staphylococcus aureus, Streptococcus viridans and Escherichia coli*) and antifungal (*Gibberela, Cercospora arachidicola, Physolospora piricola and Fusarium oxysporum*) studies. The results revealed that all synthesized compounds have a significant biological activity against the tested microorganisms.

Claudia S Sepúlveda et.al [6]:
a series of N-substituted acridone derivatives was synthesized and evaluated against two haemorrhagic fever viruses (HFV).

Chao Huang et. al **[7]:**
A series of polyhalo acridone heterocyclic compounds were synthesized and evaluated for their *in vitro* antitumor activity. It was noteworthy that halogen atoms were present at the 1, 3 and 4 sites of the compounds, and an amide group or a cyano group was at the 2 site. The antitumor bioactivity screening revealed that all the compounds exhibited potent antitumor activity.

Belmont P et.al [8]:
Acridine derivatives are interesting chemotherapeutic agents that were first used as antibacterial and antiparasite agents. In this review we wish to concentrate our attention on the anticancer properties of acridines used in clinics since the 1970's. Based on recent results, an outlook on antitumour acridine chemotherapy will be proposed. The biological activity of acridines is mainly attributed to the planarity of these aromatic structures, which can intercalate within the double-stranded DNA structure, thus interfering with the cellular machinery. Recent understanding of the mode of action of acridines leads to continuous and exciting research in this heterocyclic family.

Grzegorz Cholewiński et. al [9]:
Acridine derivatives constitute a class of compounds that are being intensively studied as potential anticancer drugs. Acridines are well-known for their high cytotoxic activity; however, their clinical application is limited or even excluded because of side effects.

Numerous synthetic methods are focused on the preparation of target acridine skeletons or modifications of naturally occurring com-pounds, such as acridone alkaloids, that exhibit promising anticancer activities. They have been examined in vitro and in vivo to test their importance for cancer treatment and to establish the mechanism of action at both the molecular and cellular level, which is necessary for the optimization of their properties so that they are suitable in chemotherapy. In this article, we review natural and synthetic acridine/acridone analogs, their application as anticancer drugs and methods for their preparation.

Ryo Nishio et. al [10]: Synthesis of Acridone Derivatives Using Polymer-Supported Palladium and Scandium Catalysts.

Pharmacological Activities of acridone Derivatives:
- A new goup of acridone derivatives, obtained by reaction of acridone-4-carboxylic acid derivatives with aromatic amines, was tested to determine the inhibitory properties toward the NS3 helicase of hepatitis C virus (HCV) [11].

- anti-bacterial properties (acriflavine, aminacrine, ethacridine), their effectiveness against parasite infections (quinacrine, acranil).
- Anti- microbial drugs.
- anti - cancer drugs (nitracrine, amsacrine)

CONCLUSION

This review attempt has been made to compile the various aspect of acridone such as its method of synthesis, pharmacological uses and recent literature. The Present review work concludes that although various methods are available for the synthesis but the most commonly used method.

Several acridine/acridone analogs are in use in clinics due to their anti-bacterial properties (acriflavine, aminacrine, ethacridine), their effectiveness against parasite infections (quinacrine, acranil), anti microbial drugs. and as anti - cancer drugs (nitracrine, amsacrine).

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