PHOTOCHEMICAL REACTION OF ADEDOSINE BY SINGLET MOLECULAR OXYGEN

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Abstract: Photo-oxygenation of Adenosine has been studied in presence of rose Bengal. The effect of pH has been studied on the product yield and time of the reaction. The reaction has been monitored by TLC at different time intervals. Mechanism has been proposed for the reaction.

Keywords : Photo-oxygenation, Adenosine Singlet oxygen, pH.

Introduction: Photochemistry of organic compounds has been a vast field of research. Organic photochemistry gives us the way for new chemical reaction[1-3]. Photochemistry of organic substrates have been extensively studied in recent years[4-12]. Singlet oxygen is known to react with different types of organic compounds, giving rise to a variety of product. The relationship between the structure of a dye and its mechanism and efficiency for photosensitization and the relationship between the chemical structure of the substrate and its mechanism of photo-oxidation has been characteristic to their photodynamic efficiency[13-15].The effect of various parameters like wave length, intensity, nature of solvent, pH etc. have also been studied[16-20].

Photo-oxygenation can be described as a reaction in which substrate gives initial oxygen adduct by combination with oxygen in presence of light and a sensitizer. The photo-oxygenation of purine represents a versatile and widely accepted tool for introducing oxygenated function in a mild and, simple and selective way[21,22]. The photosensitized oxygenation of purines depends upon the nature of the purine bases[21]

The purine ring system is undoubtedly among the most ubiquitous of all the heterocyclic compounds. This arises not only from the universal occurrence of adenine and guanine in DNA and RNA and of additional modified derivatives in various tRNA's but also from the subsidary use of the ring system in many biological system there is hardly a reaction sequence which does not involve in some way a purine derivative adenosine or guanosine mono, di and tri phosphates, associated cyclic phosphates and nucleotide coenzymes[23] Photo-oxygenation of a variety of organic compounds congaing the c=n bond have been reported[24-27]. Purines are basic chemical of life In the present paper photo-oxygenation of adenosine under acidic condition specially at pH-5.2 is reported.

Experimental: adenosine (2.0g) was dissolved in glycerol (200ml) in a beaker The solution was made acidic by adding acitic acid . rosebengal (0.1g) was added and the reaction mixture was transferred into the immersion well photo reactor (SAICmake)The solution was then irradiated with low-pressure mercury vapor lamp, which had been placed inside the photo reactor .Air was continuously bubbled through the solution with the help of an aerator. The temperature of reaction mixture was kept constant by continuous water circulation. The progress of the reaction was monitored by TLC using benzene: methanol (2:3) solvent system, which showed a single spot initially, corresponding to the reactant. Two new spot of the substrate appeared on the plate after 21h. The spot of substrate disappeared after 38h. Then the irradiation was stopped .The reaction mixture was worked out as follows .The dye was removed by animal charcoal treatment. The solution was concentrated on water bath under reduced pressure and then the beaker was placed as such over night in fridge when white crystalline mass appeared ,which was washed with distilled water and methanol and recrystallized with ethenol (product 2)

Results And Discussion: The Structure of the product has been confirmed by spectral and element analysis. The result of the elemental analysis are given in Table 1 and correspond well with the calculated values.

Table 1, Melting point, yield, elemental analysis of product 2

Product	Melting Point (°C)	Yield (%)	Elemental Analysis (%) Found (Calcd.)		
			C	H	N
2	140	37	35.98	1.80	33.51
	Lit. m.p185 ^{0}C		35.98	1.79	33.53

Spectral data of 2 : IR IN cm-^{1} : 3134 (O-H Stretching), 3438(N-H Stretching), 1400 (C-C Stretching), 1647 (C=N Stretching); ^{1}H NMR : δ 7.88 (aromatic protons), 5.6 (O-O-H atoms), 4.78(NH/OH)carbon);

Mass spectrum of the product (2) shows molecular ion peak at m/e 334 (M^+ peak), other peaks at are m/e 306, 300, 291, 189, 268, 265, 251, 167, 124, 81, 54 etc.

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