A Structural Report on Organo-Silanes: A Review

Kirshan Kumar[1], Jasbhinder Singh Dhaliwal*[1]

[1] *(Department of Chemistry, Lovely Professional University, Phagwara, India)*

Introduction Of Chemistry Of Organosilanes

These organosilicon compounds with C-Si bonds are considered as the carbon analogues of silicon. There is no natural occurence of organosilanes in the environment. This created many obstacles for the early investigators until the first organosilane i.e. tetraethylsilane was discovered by Friedel and Crafts in 1863 [1]. C-Si bond in organosilanes is relatively stable towards homolytic fission, with this is it is breakdown by using the reagents.by the attack of nucleophilic or by the attack of electrophile at the Silicon atom [2].

Structural Aspects

By studying the structural aspects of organosilanes the following points has been observed-

1. The structure in the general form of functional organosilanes is $X_3Si(CH_2)_nY$, in this formulated form the part X will be alkoxy group most probably in the structure, which is further capable of hydrolysis. In addition to this one more substitutents that is the Y acting as the organo - functional group in varities as chlorine group substituent, amine group substituent, epoxy group substituent or mercapto group substituent.

2. The most best point is that the Non-functional category of the compounds of oganosilanes which have equal structure as functional orgnaosilanes but the exception in this case is that two detachable X groups which are specifically present at the opposite extremes of the chain.

3. One more category of the organo silanes are specifically the dual-functional having the generalized form as the structure $X_3Si(CH_2)_n\ Y_m(CH_2)_nSiX_3$. In this super special structure the component Y as a segment is basically amine group or sulphur group as a chain will be present.

In the literature is basically described that the silanes represnt normally quadricovalent with Si making tetrahedral sp^3 hybridized bonds as shown in Figure 1, where Y is an organofunctional moiety attached directly to the silicon atom or through a carbon chain while X can be halide functionality, organic moiety or any alkoxy group. **(Figure 1)**

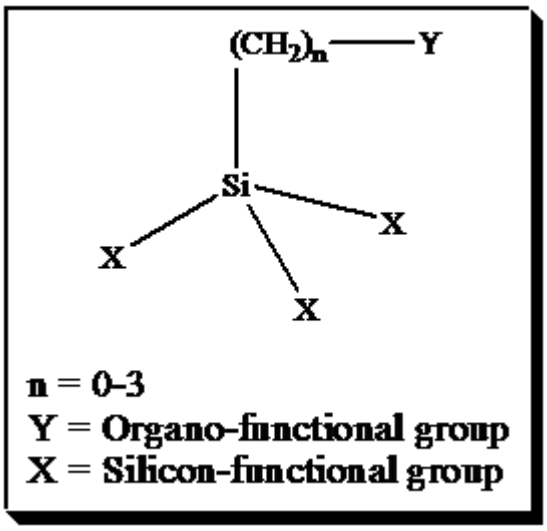

Figure 1: General structure of trialkoxysilane.

The alkoxy groups play an important role in chemical binding to any inorganic material while the organic functionality permits an interaction with organic polymers.

Alkoxysilanes And Organoalkoxysilanes

The specific category of Alkoxy-silanes which have the specific structures as in the form of ($Si(OR)_4$) and in addition to this one more category the organo - alkoxysilanes ($R'_nSi\text{-}(OR)_{4-n}$) have been employed for the synthesis of diverse organic-inorganic hybrid materials [3-5]. Besides this, alkoxysliyl groups can also be effectively engaged in surface modification of inorganic materials, as protecting groups in several organic reactions, as coupling agents between metal oxides and polymers and for coating bio-active as well as corrosion resistant surfaces.[6-9]. The alkoxysilane coating can provide resistance to moisture, chemical and UV radiations [10]. They are also used in thermoplastic and thermoset systems. Silanes having alkoxy group they have wide diverse properties as many modifying agents which further acts as dispersion state in the advanced technology of polyolefin in the composite filed of science [11]. Application which are shown by these organo silanes have much importance in many fields for example in poly condensation field, as precursors for many molecules. The growing interest in alkoxysilanes owes to their exceptional features like reaction controllability, ease of handling and their ability to hydrolyze and undergo polycondensation to form wide range of products [12].

Silsesquioxanes

The alkoxy groups of the silanes can be hydrolysed to design siloxane-based nanomaterials also known as polysilsequioxanes (SSQQs) [13]. Alkoxysilanes provide enhanced hydrophobicity to the materials that can be used as oil absorbents while the gels derived from alkoxysilanes also enjoy tremendous applications [14]. From

the alkoxy silanes by usning sol gel methods, many many organo metallic specific absorbents [15]. To this process we can also replace by bulk polymerization as an alternative method [16].

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