# INTRODUCTION

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A biocide is defined as a product that is intended to kill or exert some controlling effect on harmful organisms by chemical or biological means. [1] They are able to kill microorganisms by interacting with the cell membrane. [2]

Such polymers plays an important role for many of its applications. Contamination by microorganisms is of great concern in several areas such as medical devices, health care products, water purification systems, hospital and dental equipments, etc.[3]. So they gain interest from research and industry due to their potential to provide quality and safety benefits to various materials and environments depending on the type of applications. [4]

Functional polymers have the potential advantages of small molecules with the same functional groups. Their usefulness are related to both the functional groups and to their polymeric nature whose chrematistic properties depended on the extraordinarily large size of the molecules. [5,6]

If the antimicrobial agents are attached or formed on a polymeric material, it would be an ideal solution to overcome problems associated with low-molecular-weight materials. As compared with conventional antimicrobial agents of low-molecular-weight, the advantage of polymeric antimicrobial agents or the biological active synthetic polymers are that they are nonvolatizable, chemically stable, and slow to permeate the skin of human or animal.[7] Antimicrobial polymeric materials with low molecular weight are used for the sterilization of

water, for soil sterilization, and as antimicrobial drugs, but they have the drawbacks of the residual toxicity of the agents, even when suitable amounts of the agents are added.[8,9] High molecular weight of polymers having antimicrobial properties have some advantages over low molecular weight agents because they are more stable against volatilization, dissolution, and diffusion on the surface of the material to be protected.[10]

Polymeric antimicrobial agents hold great promise for enhancing the efficiency of some existing antimicrobial agents, prolonging their activity, reducing their toxicity, as well as reducing the environmental problem associated with other [11] because most of these molecules are toxic to the environment. [12]

Nowadays a strong demand prevails for 'functional polymer' with very specific properties, Many polymers with reactive functional groups are now being synthesized, tested and used not only for their macromolecular properties, but also for the properties of functional groups. [3]

Recently, much attention has been directed to specialty polymers of the most useful materials.[13] as polymeric quaternary ammonium compounds

## 1-polymeric quaternary ammonium materials:-

probably the class of biocidal polymers that have received the most attention over the years has been that of the polymeric quaternary ammonium materials .[14] , known in the field as the "poly quats"

Quaternary ammonium compounds (QACs) are widely used because they are relatively safe broad-spectrum biocides, but the use of these compounds in some fields has been limited by the discovery of microbial resistance phenomena against QACs [15] and even all types of biocides. [16]

Many studies have been carried out on the antimicrobial activity of cationic biocides. The cationic biocides, whose target sites are the cytoplasmic membranes of microbes, kill microbial cells thus exhibiting bactericidal action [17-20]. They have occupied an important place in the field of external disinfectants as membrane-disrupting antimicrobial agents. In particular, quaternary ammonium salts are representative of this type, and they have been extensively used as potent growth-inhibitors of microorganisms in agriculture, clinics and so on [21]

Hazziza-Laskar et al.[22] showed that, hydroxytelechelic polybutadienes (HPB) carrying covalently bound quaternary ammonium salts (HPBQA) were successfully prepared in three stages. The first include the preparation of 1-(*N,N*-dimmethylaminopropyl)-1,1,3,3-tetra-methyldisiloxane ($M`_2A$) by hydrosilation, in which the addition occurred mainly in the terminal position of the double bond, isomers might be formed in small portions due to inverse addition or double bond isomerization . Increasing of the concentration of the catalyst ($H_2PtCl_6$) would increase the concentration of the isomers. The second stage include the grafting of $M`_2A$ onto the 1,2-units of HPB. High yield was obtained and the (-OH) functionality decrease slightly. In the third stage, the quaternatization of the pendant tertiary amino groups with alkyl bromide