Preparation and evaluation of some organic compounds having expected surface and biological activities

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Surface active agents can be defined as those which affect the interfacial tension between two surfaces such as solid / liquid, liquid / liquid or even liquid / gas. They include compounds with emulsifying, wetting, softening, penetrating and detersive properties. As can well be understood, not all surface-active agents must fulfill all the above requirements. The chemical constitution of the surface-active agents is an important factor in its behavior. For a compound to be a surface active agent, it is necessary that the molecule should contain two kinds of groups, one hyDROPhobic or oil-soluble and the other hyDROPhilic or water-soluble.These groups enable the compound to locate itself at an oil-water, interface in such a manner that the oil-soluble grouping is in the oil layer, while the water-soluble remains in the aqueous phase. These essential groups can occur in so many different forms, that such a wide variety of surface active agents exist, however, the oil-soluble group is provided by a hydrocarbon chain of sufficient length to give the required oil solubility. The water-soluble group can be sulfate, sulfonate, carboxylate and other groups.A surfactant is shorthand for surface active agent and covers a group of compounds that have an amphiphilic nature. They contain in their molecular structure two parts with different polarity, a hyDROPhobic (non-polar) part and a hyDROPhilic (polar) part. Fig. 1.Fig. 1. Schematic representation of surfactant moleculesThe hyDROPhobic part (tail) is commonly a hydrocarbon (branched or linear) which may contain aromatic structures. This part of the surfactant is soluble in oils (non-polar solvents); in contrast, the hyDROPhilic part (head) is an ionic or strongly polar group (e.g. ethylene oxide) and it has a great affinity to water. The hyDROPhilic part is called the head-group and is not necessarily placed at the end of the hydrocarbon chain. More than one hyDROPhilic or hyDROPhobic group can be present in a surfactant molecule. Recently, novel type form of surfactants consisting of two conventional surfactant molecules chemically bonded together by a spacer. These are called gemini (or dimeric) surfactants Fig. 2.Fig. 2. Schematic representation of gemini surfactant.A surfactant molecule is not fully compatible with either a non-polar or polar medium. There is always a conflict between the affinity of the head and the tail groups; this give surfactants their unique properties (i.e. it acts as foaming, wetting, dispersing, emulsifying agents). Relative sizes and shapes of the hyDROPhobic and hyDROPhilic parts play an important role for the physical properties of surfactants.1.

Classification of Surfactants:Surfactants are classified according to ionic nature of their head-group into anionic, cationic, non-ionic and zwitterionic surfactants. -Anionic and cationic surfactants carry negative and positive charges on their head -groups respectively, whereas the non-ionic are uncharged, but have polar head groups e.g. ethylene oxide and zwitterionic surfactants can be either anionic or cationic depending on the pH of the solution. Fig.3.Fig.3. The four different main types of surfactants.The following few lines give just idea about anionic, cationic and zwitterionic surfactants, before a somewhat detailed review concerning the subject of nonionic one.1.1. Anionic surfactants:Anionic surfactant molecule consists of a linear or branched chain with the polar negative group (carboxylate, sulfate, sulfonate and phosphate) carrier the surface character, sulfonates and sulfates are especially important anions, the most common counter-ions (cations) used are sodium and potassium,Examples of anionic surfactants Fig 4: