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Synthesis of water treatment chemicals adaptable to rural clean and drinking water technology

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Statement of the Problem: A cross section of rural communities in Africa are plagued by diseases, many of which are water borne or attributable to the quality of drinking water accessible to such communities. Access to clean freshwater is very necessary to human life and for industries like steel, copper, food, paper and petroleum chemical or mineral processing industry. Due to its good solvent property, water tends to dissolve a broad spectrum of substances from the environment. These include toxins and toxicants emanating from various forms of domestic, agricultural, industrial and other anthropocentric activities including hazardous substances from natural phenomena like earthquakes and volcanic eruptions. Contaminated waters are highly undesirable as they constitute a significant source of disease and worldwide death. Polluted water usually contains organic matter such as hydrocarbons and their derivatives, inorganic matter such as clay, sand, acids and bases, heavy metals such Pb^{2+}, Cu^{2+}, Ni^{2+}, Al^{3+} and pathogenic microbes like *Vibro cholerae, Entamoeba histolytica and Salmonella* Typhi which are causative agents for water-borne diseases like cholera, dysentery and typhoid. Most rural communities in Africa including Cameroon cannot afford sophisticated water treatment systems and require cheap and simple operable techniques to treat water for domestic purposes and related uses. The goal of all water treatment technologies is to remove turbidity as well as chemical and pathogenic contaminants from water sources in the most affordable and expedient manner possible. The purpose of this study is to synthesize water treatment chemicals which can easily be adapted to domestic water treatment in rural community water systems in order to curb rampant spread of water borne diseases typical for rural communities in Africa. The water treatment chemical is environmentally friendly due to its propensity to biodegradation.

Materials & Methods: This bonafide water treatment chemical was produced from gum arabic and poly acryl amide through graft copolymerization using ceric ammonium nitrate as a catalyst for the reaction. Gum Arabic was purchased in powdered form which is the organic component of the product that confers biodegradable properties and acts as the back born for graft copolymerization. The graft copolymer was blended with *Moringa oleifera* seed extract which has antimicrobial activity.

Results: The results obtained showed that the percentage yield of the graft copolymer is a function of both the initiator and monomer concentrations. The grafted copolymer was characterized by IR spectroscopy. The IR spectral data for pure gum arabic and that of gum arabic-grafted polyacrylamide indicate that grafting actually occurred. The flocculation properties of the product were good.

Conclusion & Significance: The successful grafting of polyacrylamide onto gum arabic will enhance the search for materials transformation through chemical derivatization with attendant expansion of their spectra of application.

Recommendations: Recommendations are made for more research into the use of simple potent water treatment chemicals that will alleviate the plight of the rural populace with attendant amelioration of public health and economic advancement.

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