Miscibility study of poly acrylamide (PAM) and Acacia Senegal (gum arabic) blends

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ABSTRACT

The work entails the viscometric study of a common plant gum found in Nigeria (*Acacia Senegal*) blended with polyacrylamide (PAM). The gum was purified after collected and mixed in specific ratios of 10:90, 30:70, 50:50, 70:30 and 90:10 with PAM, before they were subjected to rheological study. The intrinsic, relative and specific viscosity for the bends were determined and presented in the research work. The plots of the relative viscosity against concentration of the gums at different temperature vary significantly at higher concentration, while the viscosity for gum Arabic/PAM (90:10) showed the most distinct variation between different temperatures. PAM was found to be more viscose than gum Arabic at both temperatures, while the viscosity index such as intrinsic, specific and relative viscosity for the synergistic combination between the polymers were found to decrease as we increased the composition of gum Arabic within the blend.

1. Introduction

Polymer blend may be defined as a combination of two or more polymers to produce a single material. Polymers are blended in order to achieve properties that cannot be achieved from a homo polymer [1, 2].
Viscometric method of studying compatibility is achieved much attention in the recent years because the method provides simple and an accurate means of studying polymer blends [3, 4]. In this study the use of viscometric method is highlighted. More importantly, the viscometric method was choosen because it is simple and required no expensive equipment's, yet offer the compatibility of the polymer blends constituents into compatible or incompatible.
However, there is a need to find simple and quicker methods for determining compatibility [5, 6]. Several blending procedures are available, and method commonly employed are; melting method, dry method and solution method of blending [7]. Polyacrylamide

formed from acrylamide subunits. It can be synthesis by a simple linear-chain structure or cross- inked, typically using N, N'-methylene biacyrlamide [8-10].
Nigeria produces different grades of exudates and is ranked as second largest world producer after Sudan, together they produce about 45,000 tons of gum Arabic to the market each year [11]. Gary and Ryan (2002) reported that the trees grow more in Borno, Yobe, Sokoto, and Bauchi states of Nigeria. The trees are used as potent weapon in the fight against land desertification and soil degradation in sahelian belt of the country without industrial uses [12-14].
The aim of the above work is to investigate compatibility of gum Arabic with Polyacrylamide blend so as to serve the work as a study for improving properties of the blend and compare this property with that of Individual polymer present in the blend.
Viscometric method is based on the study of interaction in dilute solution of two polymers in common solvent [15].