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**A DYNAMIC LIGHT SCATTERING INVESTIGATION INTO
THE DYNAMICS OF NON IDEAL TERNARY POLYMER
SOLUTIONS**

A thesis presented in partial fulfillment of the requirements for the degree of Doctor of
Philosophy in Physics at Massey University

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Abstract

Dynamic light scattering has been used to investigate three different non ideal ternary polymer systems. The three systems investigated were sodium caseinate and xanthan aqueous solutions, guar and dextran aqueous solutions and dextran and pullulan aqueous solutions. All solutions have been investigated at a temperature of 25°C.

Sodium caseinate and xanthan aqueous solutions with total polymer concentrations ranging from 0.01% w/w to 0.15% w/w and ratios of sodium caseinate of $x = 1:3, 1:2, 2:1,$ and $3:1$ have been investigated.

Guar and dextran aqueous solutions with total polymer concentrations ranging from 0.01% w/w to 0.06% w/w at a ratio of guar to dextran of $1:6$ have been investigated.

Dextran and pullulan aqueous solutions with total polymer concentrations ranging from 1% w/w to 10% w/w with ratios of dextran to pullulan of $1:3, 1:1,$ and $3:1$ have been investigated.

The solution concentrations have been chosen to fall in the semi-dilute range, while still being miscible.

Three different methods of analysis have been applied to resolve the field autocorrelations function into a sum of decaying exponentials; CONTIN, CONTIN multiq, and a Kohlrausch-Williams-Watts fit.

These resulting decay rates have been interpreted using the theoretical method outlined by Sun and Wang.

The CONTIN multiq method provided the best overall fit to the data. The Sun and Wang method has not provided results which are consistent with those reported elsewhere in the literature. Additional theoretical effort must be applied to interpret the results from dynamic light scattering on these novel non-ideal systems.

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