



Chain transfer to Photodegradable Moieties

Alicia Sawdon, Danny Dodson, Andrea Kasko
Oakland University
and
Department of Bioengineering
UCLA

Our lab makes photodegradable hydrogels for tissue engineering and drug delivery. These hydrogels are made from different macromers which are polymerized using free radical initiators. The photodegradable group used by the Kasko group, ortho-nitrobenzyl ether, contains a nitro group, which is known to participate in radical chain transfer reactions. If the ortho-nitrobenzyl ether groups undergo chain transfer during the radical polymerization of the macromers, the photo-degradability of this system may be affected. Therefore, we want to quantify the extent of this chain transfer reaction using small molecule analogs of the ortho-nitrobenzyl ether group. Currently, I am measuring the chain transfer constant (C_x), which is equal to the ratio of the rate constant of chain transfer to the rate constant of propagation. C_x is found directly through the Mayo method, by measuring the decrease in polymer molecular weight as a function of increasing concentrations of the chain transfer agents. I have synthesized two chain transfer agents, 2-nitro-4,5-dimethoxy benzyl alcohol and 2-nitro-4,5-dimethoxy benzyl propanol ester. I have also optimized the polymerization conditions; the optimal monomer concentration is 250mM in PBS and the optimal concentration of APS/TEMED is 3mM/1.5mM; this leads to moderate conversions of about 5%, which is ideal for the Mayo method. The molecular weight is followed using GPC. The extent of conversion of monomer to polymer is measured by ^1H NMR, by following the disappearance of the vinyl protons. We expect that these model compounds will have a chain transfer constant of 10^{-2} based on previous literature.