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Efficacious syntheses of alkylphenol ethoxylates and ethoxycarboxylates with long and single length PEG chain and their application to environmental fate study

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Abstract:

The Williamson alkylation of a phenolic hydroxyl group of a 4-*tert*-octylphenol by 2-[2-(2-chloroethoxy)ethoxy]ethanol in the presence of potassium carbonate afforded the corresponding 9-(4-*tert*-octylphenyl)-3,6,9-trioxanonan-1-ol (OP3EO) quantitatively. Using powdered sodium hydroxide in place of potassium carbonate in the presence of phase transfer catalyst, alkylation of the terminal hydroxyl group occurred to give a mixture of OP3EO, 18-(4-*tert*-octylphenyl)-3,6,9,12,15,18-hexaoxaoctadodecan-1-ol (OP6EO), 27-(4-alkylphenyl)-3,6,9,12,15,18,21,24,27-nonaoxaheptacosan-1-ol (OP9EO) and so on. Many types of OP_kEO (k=4, 5, 6...) could be obtained by using OP1EO and OP2EO as starting materials. The use of OP_kEO with a long and single length polyethylene glycol (PEG) chain was effective for studying the environmental fate of APEOs.

Keywords:

one-pot synthesis, alkylphenol ethoxylate, deuterium-labeled alkylphenol ethoxylate synthesis



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