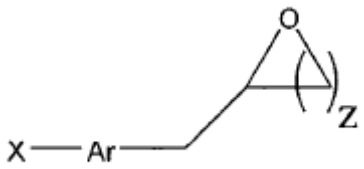
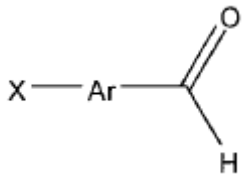
Tetramethylammonium iodide was filtered off to yield a filtrate. The filtrate was poured into DI water under stirring. The formed solid was filtered, washed thoroughly with water, and dried at room temperature giving 4 g of azo initiator with 2 benzyl alcohol groups, (E)-bis(4-hydroxyphenyl) 4,4'-(diazene-1,2-diyl)bis(4-cyanopentanoate).

Synthesis Example 2

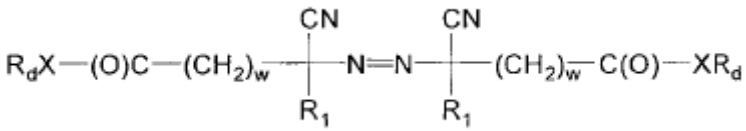
A solution was prepared with 0.3023 g of the azo initiator (E)-bis(4-hydroxyphenyl) 4,4'-(diazene-1,2-diyl)bis(4-cyanopentanoate) prepared in Synthesis Example 1, 3.51 g of styrene and 2.47 g of methyl methacrylate dissolved in 14 g of 2-butanone in a 100 ml flask, equipped with a magnetic stirring bar and cold water condenser. After a nitrogen purge for 30 minutes, the flask was immersed in an 80°C oil bath. The polymerization reaction was carried out with stirring at this temperature for 16 hrs. The reaction solution was then allowed to cool to room temperature. This solution was precipitated into methanol and the crude polymer isolated by filtration. The crude polymer was purified and isolated by first dissolving it into acetone and re-precipitating it in methanol, and then filtering off the polymer. The isolated polymer was dried in a 50°C vacuum oven until constant weight (3 g). The polymer was found to have a weight average molecular weight (Mw) of 18810 g/mol and a number average molecular weight (Mn) of 11814 g/mol. ~~1H~~ ^{1}H NMR showed the polymer contained 56.7 mol % styrene and 43.3 mol % MMA. Characteristic proton peaks assigned to benzyl alcohol end groups (4.6, 5.1 and 7.3 ppm) were clearly seen and estimated Mn based on proton NMR was in good agreement with Mn obtained from Gel Permeation Chromatography.

Synthesis Example 3

A solution was prepared with 0.70 g of the azo initiator (E)-bis(4-hydroxyphenyl) 4,4'-(diazene-1,2-diyl)bis(4-cyanopentanoate) prepared in Synthesis Example 1, 20.75 g of styrene and 7.0 g of methyl methacrylate dissolved in 42 g of 2-

	group having 6 to 20 carbon atoms or a substituted or unsubstituted heteroarylene group having 5 to 20 carbon atoms and X represents a halogen;
	where Ar represents a substituted or unsubstituted arylene group having 6 to 20 carbon atoms or a substituted or unsubstituted heteroarylene group having 5 to 20 carbon atoms and X represents a halogen;
	where Ar represents a substituted or unsubstituted arylene group having 6 to 20 carbon atoms or a substituted or unsubstituted heteroarylene group having 5 to 20 carbon atoms and X represents a halogen.

14. A functionalized free radical initiator comprising: a compound having the structure



wherein R_1 represents a substituted or unsubstituted alkyl group having 1-20 carbon atoms, w is 1-8, X is O or N and ~~Rd~~ R_d is at least one reactive group selected from a group consisting of i) to viii):