What is claimed is:

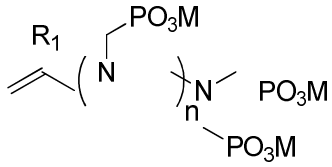
1. A method for making a cement concrete binder, comprising using a concrete superplasticizer having a phosphorous acid group at a concentration of 0.05%-0.3% of the total weight of the cement concrete binder, wherein the

concrete superplasticizer having a phosphorous acid group is prepared by the following method, comprising

performing a free radical copolymerization ~~of~~ between a phosphorous-containing monomer A and a polyether macromonomer B,

wherein

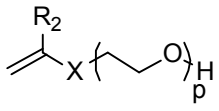
the monomer A has a structure represented by a general formula (1):




**(1)**

in which $R_1$ is H or $CH_3$, n is an integer from 0 to 6, M is a hydrogen atom, an alkali metal ion, an alkaline-earth metal ion, ammonium ion, or an organic amine group;

the monomer B is represented by a general formula (2):




**(2)**

in which $R_2$ represents H or $CH_3$; X = O, $CH_2O$, or $CH_2CH_2O$; p represents an average addition mole number of ethylene oxide and is an integer from 20 to 90; and

a molar ratio of the monomer A: the monomer B is 3 to 8 : 1.

2. The method of claim 1, wherein the concrete superplasticizer having a phosphorous acid group has a weight average molecular weight ($M_W$) of 20000 to 80000.

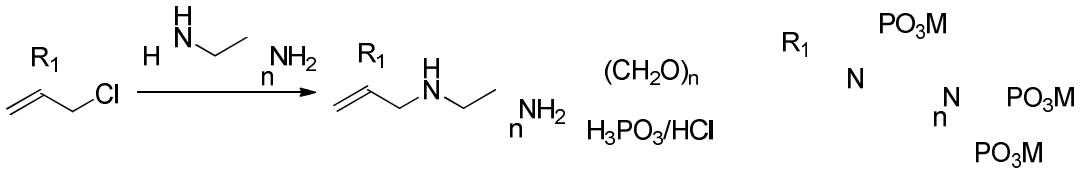
3. The method of claim 1, wherein

the monomer A is prepared by reacting a chlorinated alkene and an amine compound in an aqueous phase;

wherein the chlorinated alkene is allyl chloride and/or methyl allyl chloride; and

the amine compound is ammonia, ethylenediamine, diethylenetriamine, triethylenetetramine, tetraethylenepentaamine, pentaethylenehexamine, hexaethyleneheptaamine, or polyethylenepolyamine.

4. The method of claim 3, wherein the synthetic scheme of the monomer A is as follows:




step 1 step 2

wherein step 1 is the classical nucleophilic substitution reaction; and

step 2 is the phosphitylation reaction of amino groups, wherein the amino groups are all amino groups attached with H atoms, including primary and secondary amino groups.

5. The method of claim 1, wherein the monomer B is an etheric unsaturated polyether macromonomer, selected from vinyl polyethylene glycol ether, allyl polyethylene glycol ether, 3-buten-1-ol polyethylene glycol ether, methyl allyl polyethylene glycol ether, and 3-methyl-3-buten-1-ol polyethylene glycol ether, and a mixture thereof in any ratio.

6. The method of claim 1, comprising the steps of:

adding the monomer B and an oxidizing agent into a reaction container before beginning of the free radical copolymerization reaction,

dropwise adding an aqueous solution of the monomer A, a chain transfer agent and a reducing agent to the reaction container after the beginning of the free radical copolymerization reaction;

wherein

the oxidizing agent and the reducing agent are water soluble to form a redox initiator system;

the oxidizing agent is hydrogen peroxide at a weight concentration of no greater than 30%, and the reducing agent is selected from sodium bisulfite, sodium metabisulfite, sodium hypophosphate, Mohr's salt, L-ascorbic acid, isoascorbic acid, and sodium formaldehyde sulfoxylate;

the chain transfer agent is one of mercaptoethanol, mercaptoacetic acid, 2-mercaptopropionic acid, and 3-mercaptopropionic acid, or a mixture thereof in any ratio;

the amount of the oxidizing agent, the reducing agent and the chain transfer agent used are 2 to 10%, 0.5 to 5%, 0.5 to 5% of the total moles of monomers (A+B), respectively;

the polymerization concentration and the polymerization temperature are controlled to be 30 to 60wt% and 30 to 60°C;

the dropwise addition time of the monomer/reducing agent solution is controlled to be 2 to 6h;

the polymerization concentration is a sum of weight percent concentrations of all the monomers in the mixed solution;

after the dropwise addition is finished, the polymerization reaction time is controlled to be 4 to 8h; and

the polymerization reaction is finished, the concrete superplasticizer having a phosphorous acid group is obtained.