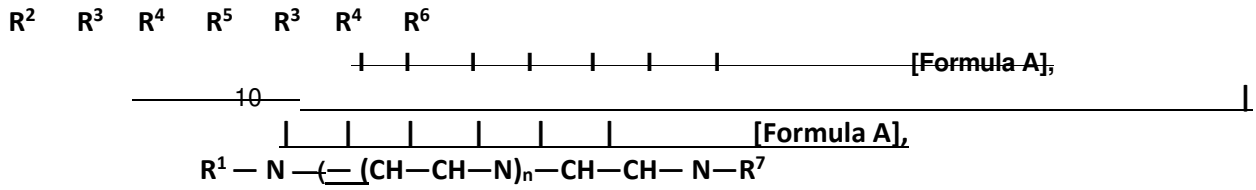
CLAIMS

1.A composition for modifying air in a cementitious composition, comprising:

the reaction product of at least one oxidizing agent and a compound comprising at least one polyalkoxylated polyalkylene polyamine~~, at least one polyalkyoxylated polyethyleneimine,~~ represented by structural formula A

~~5 or mixture thereof;~~

~~the at least one polyalkoxylated polyalkylene polyamine being represented by structural formula A~~



$$\begin{array}{ccccccc} R^2 & R^3 & R^4 & R^5 & R^3 & R^4 & R^6 \\ & & & & & & \end{array}$$

~~[Formula A],~~

~~10~~

[Formula A],

$$R^1 - N - (- (CH-CH-N)_n-CH-CH- N-R^7$$

~~and the at least one polyalkoxylated polyethyleneimine being represented by structural formula B,~~

~~$-(AO)_x-(EI)_y-$ [Formula B],~~

wherein

~~15~~ n represents an integer of 0 to ~~20~~4;

~~R^1~~R^I, R^2, R^3, R^4, R^5, R^6, and R^7 each individually represents a hydrogen, C_1-C_6 alkyl group, -CH_2-OH group, or ~~–~~ – $(AO)_x$~~- R^8group;~~ - R^8 group, and wherein at least ~~one~~two of ~~the~~ -R^I, R^2, R^3, R^4, R^5, R^6, and R^7 ~~is~~represent a ~~–(~~– $(AO)_x$ - R^8 group, ~~with the provision~~provided that when n ~~is~~= 0~~,~~ then at least ~~one~~two of R^I, R^2, R^3, R^4, R^6, and R^7 ~~is a~~represent – $(AO)_x$ - R^8~~ group~~;

wherein AO represents an alkylene oxide group ~~selected~~chosen from ethylene oxide~~ ("EO"),~~, propylene oxide~~ ("PO"),~~, butylene oxide~~ ("BO"),~~, or a mixture thereof~~,~~;

wherein the relative molar amount of ~~EO~~ ethylene oxide compared to other alkylene ~~oxides~~oxide groups within AO is zero

~~20~~ percent to less than fifty percent of the total~~, and~~;

wherein the total sum of the number of ~~EO~~ethylene oxide and ~~PO~~propylene oxide groups exceeds 25;

wherein x represents an integer of ~~1~~26 to 100;

wherein R^8 represents hydrogen or a C_1-C_6 alkyl group; and

~~25 —(EI)$_y$,— represents repeating ethyleneimine units in a linear or branched structure;~~

~~y represents an integer of 5 to 100; and~~

~~the relative number of (AO)$_x$— chains per repeating ethyleneimine unit is 0.1 to 1.0.~~

wherein the reaction product of the at least one oxidizing agent and the compound comprising the at least one polyalkoxylated polyalkylene polyamine represented by structural Formula A is effective for detraining air within a cementitious composition and is devoid of a linear or branched alkyl group having greater than six carbon atoms which would function to entrain air within the cementitious composition.

2.The composition of claim 1 wherein the reaction product ~~is an oxide~~ of the at least one oxidizing agent and the compound comprising the at least one polyalkoxylated polyalkylene polyamine is derived from polyalkoxylated product of ethylene diamine, diethylene triamine, triethylene tetramine, tetraethylene pentamine, pentaethylene hexamine, propylene diamine, dipropylene triamine, tripropylene tetramine, tetrapropylene pentamine, pentapropylene hexamine, N,N-dimethylethylene diamine, N,~~N'-~~ N’-dimethylethylene diamine, N,N-dimethylpropylene diamine, N,N’-dimethylpropylene diamine, N,N-diethylethylene diamine, N,N’-diethylethylene diamine, N,N-diethylpropylene diamine, N,N’-diethylpropylene diamine, or a mixture thereof.

~~5 dimethylethylene diamine, N,N-dimethylpropylene diamine, N,N'-dimethylpropylene diamine, N,N-diethylethylene diamine, N,N'-diethylethylene diamine, N,N-diethylpropylene diamine, N,N'-diethylpropylene diamine, or a mixture thereof.~~

3.The composition of claim 1 wherein the reaction product ~~is an oxide~~ of the at least one oxidizing agent and compound comprising the at least one polyalkoxylated polyalkylene polyamine is derived from polyalkoxylated product of ethylene diamine, diethylene triamine, triethylene tetramine, or mixture thereof.

~~10~~ 4.The composition of claim ~~1~~3 wherein the reaction product of the at least one oxidizing agent and compound comprising the at least one polyalkoxylated polyalkylene polyamine is ~~an oxide~~ derived from polyalkoxylated ethylene diamine, diethylene triamine, or mixture thereof.

5.The composition of claim 1 wherein the at least one oxidizing agent for providing the reaction product is selected from the group consisting of hydrogen peroxide, ~~performicacid~~performic acid, peracetic acid, perbenonzoic acid, chloroperoxybenzoic acid, monoperphthalic acid, perfsulfuric acid, molecular oxygen, ozone, or mixture thereof.

~~ozone, or mixtures thereof.~~

6.The composition of claim 1 wherein the at least one oxidizing agent for providing the reaction product is hydrogen peroxide.

~~5. The composition of claim 1 wherein the reaction product of at least one oxidizing agent and a compound comprising at least one polyalkoxylated polyalkylene polyamine, at least one polyalkyoxylated polyethyleneimine, or mixture thereof, is devoid of a linear or branched alkyl group having greater than six carbon atoms.~~

7.An aqueous composition comprising an aqueous coating composition and the composition of claim 1.

8.The composition of claim 1 further comprising ~~at least one agent effective to entrain air in a hydratable cementitious composition, the at least one agent comprising a higher~~a trialkanolamine, a lignosulfonate, a sulfonated naphthalene formaldehyde condensate, a sulfonated melamine formaldehyde condensate, an oxyalkylene-containing superplasticizer, an oxyalkylene-containing shrinkage reducing agent, or a mixture thereof.

~~oxyalkylene-containing shrinkage reducing agent, or a mixture thereof.~~

9.A composition comprising a hydratable cementitious binder and the composition of claim 1.

~~9. A composition for modifying a hydratable cementitious composition, comprising: at least one agent effective to entrain air in a hydratable cementitious composition, the at least one agent comprising a higher trialkanolamine, a lignosulfonate, a sulfonated naphthalene formaldehyde condensate, a sulfonated melamine formaldehyde condensate,~~10.The composition of claim 1 further comprising an oxyalkylene-containing superplasticizer, an oxyalkylene-containing shrinkage reducing agent, or a mixture thereof~~, and the composition of claim 1~~.

~~10.~~ 11.The composition of claim ~~11 wherein the at least one agent effective to entrain air in a hydratable cementitious composition is~~1 further comprising an oxyalkylene-containing superplasticizer~~; and the reaction product comprises at least one oxidizing agent and the compound represented by structural formula A~~.

12.The composition of claim 1 further comprising a set accelerator, a set retarder, or a mixture thereof.

~~14.~~ 13.The composition of claim ~~11~~10 further comprising a set accelerator, a set retarder, or a mixture thereof.

14.The composition of claim 1 wherein ethylene oxide groups are present in the amount of 0% to 40% based on the total weight of polyethers in the polyalkoxylated polyalkylene polyamine.

15.The composition of claim 1 wherein 10 molar percent to 100 molar percent of amine groups of the polyalkoxylated polyalkylene polyamine is oxidized into amine oxide groups.

16.The composition of claim 1 wherein the reaction product has a molecular weight of 500 to 7,000.

17.The composition of claim 1 wherein the reaction product has a molecular weight of 1,000 to 6,000.

18.The composition of claim 1 wherein the reaction product has a molecular weight of 2,000 to 4,000.

19.A composition ~~comprising~~for modifying air in a ~~hydratable~~ cementitious ~~binder~~composition, comprising:

the reaction product of at least one oxidizing agent and ~~the composition~~a compound comprising at least one alkoxylated polyethyleneimine represented by structural formula B,

~~of claim 1.~~

~~16. A coating composition comprising a binder material operative to form a coating upon a surface when applied thereto as a liquid aqueous coating composition and allowed to dry, and the composition of claim 1.~~

~~17. Method for modifying air properties in an aqueous composition, comprising adding to an aqueous composition the composition of claim 1.~~

~~18. Method for modifying air properties in an aqueous composition, comprising adding to an aqueous composition the composition of claim 11.~~

~~22~~ **—(AO)x—(EI)y— [Formula B],**

wherein AO represents an alkylene oxide group selected from ethylene oxide, propylene oxide, butylene oxide, or a mixture thereof;

wherein the relative molar amount of ethylene oxide compared to other alkylene oxides within AO is less than fifty percent of the total;

wherein the total sum of the number of ethylene oxide and propylene oxide groups exceeds 25;

wherein x represents an integer of 26 to 100;

wherein EI represents repeating ethyleneimine units in a linear or branched structure;

wherein y represents an integer of 5 to 100;

wherein the relative number of AO chains per repeating ethyleneimine unit is 0.1 to 1.0; and

wherein the reaction product of the at least one oxidizing agent and the compound comprising the at least one alkoxylated polyethyleneimine represented by structural Formula B is effective for modifying air within a cementitious composition and is devoid of a linear or branched alkyl group having greater than six carbon atoms which would function to entrain air within the cementitious composition.