

ANTI-CORROSION ADDITIVE COMPOSITION FOR
CONCRETE COMPOSITIONS FOR USE IN REINFORCED
CONCRETE STRUCTURES

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an anti-corrosive additive composition for concrete compositions, and more particularly to an anti-corrosive additive composition for concrete compositions used in reinforced concrete structures.

RELATED APPLICATIONS

This application is a continuation-in-part of U.S. Application 10/447,975 filed May 29, 2003, hereby incorporated by reference.

2. Description of the Prior Art

For structures made of reinforced concrete, concrete has at least two functions, i.e. to absorb compressive strains and to protect reinforcing steel bars or re-bars against corrosion. The re-bars function to absorb shear and tensile stress.

The cost of corrosion is annually estimated to be in the billions with concomitant catastrophic collapses of structures and losses in lives. The protective effect of hardened concrete on re-bars depends, inter alia, on climatic and environmental conditions as a function of amount of cement, grain of concrete aggregate, water/cement factor and concrete compression.

In USP 4,869,752 to Jaklin, there is described the use of

concrete additive to prevent corrosion of steel structures or steel re-bars.

In USP 6,277,450 to Katoot, there is described the use of a coating process to coat the surface of the metals which is modified to an active moiety of metal hydroxide receptive to a fully cross-lined polymer of various thickness.

In copending application USSN 10/447,975, there is disclosed an anticorrosive additive comprised of an alkali based solution of dioic acid, alone or in admixture with other compositions for an anti-corrosion additive for concrete compositions providing for more effective corrosion protection for longer periods of time obviating costly precoating of surfaces of metals used in the building and construction industry.

However, there is a need for inclusion of a composition in the anticorrosive additive to reduce excessive air entrainment or foaming during preparation of concrete mixes and for controlled air content of the cured concrete. To improve freeze/thaw properties, it is most effective to control air entrainment within cured concrete to about 5 to 8% with evenly spaced apart bubbles having a specific surface of from 600 to 1,100 square inches per cubic inch spaced apart by 0.004 to 0.008 inches.

OBJECTS OF THE INVENTION

An object of the present invention is to provide an improved anti-corrosive additive composition including a more effective

mixes.

Another object of the present invention is to provide for an improved anti-corrosive additive composition to be admixed with concrete prior to pouring which reduces water permeability and concomitant corrosion of reinforcing steel members.

A further object of the present invention is to provide for an improved anti-corrosive additive composition for concrete substrates for controlled air content of cured concrete.

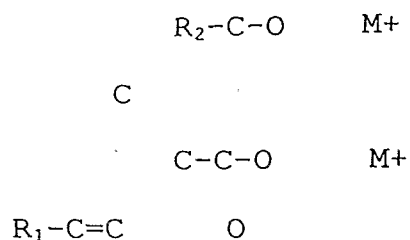
SUMMARY OF THE INVENTION

These and other objects of the present invention are achieved by an anti-corrosive additive composition comprised of an alkali based salt of dioic acid and a defoaming agent selected from the group consisting of polyether modified polysilicones and tri-alkane/alkene phosphates and mixtures thereof.

DETAILED DESCRIPTION OF THE INVENTION

The anti-corrosive additive composition of the present invention is comprised of an alkali based salt of dioic acid and the defoaming agent is selected from the group consisting of polyether modified polysilicone and tri-alkane/alkene phosphates and mixtures thereof.

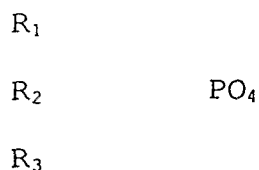
The alkali-based salt of dioic acid is represented by the following formula:



wherein M^+ is selected from the group consisting of Na^+ and K^+ ; R_1 is a C_1 to C_{24} branch linear aliphatic hydrocarbon and R_2 is a C_0 - C_{10} branch or linear aliphatic hydrocarbon.

The defoaming agent is selected from the group consisting of polyether modified polysilicanes and tri-alkane/alkene phosphates and mixtures thereof. Polyether modified silicanes are sold by BYK Chemie (Germany) under the trademarks BYK025 and BYK094.

The tri-alkane/alkene phosphates are illustrated by the formula:



where R_1 , R_2 and R_3 are C_1 to C_8 alkane or alkene hydrocarbons. Such a tri-alkane having the formula of $(C_4H_9)_3 PO_4$ is available from Akzo Nobel of Germany under the Trade name Phosflex 4.

The polyether modified polysilicanes are admixed in an amount from 0.1 to 2.0% by weight, preferably about 1% by weight to the alkali-based salt of dioic acid. The tri-alkane/alkene phosphates are admixed in an amount from 1.0 to 8.0% by weight, preferably

A method of preparing the alkali-based salt of dioic acid is disclosed in the aforementioned copending parent application.

The anti-corrosive additive composition of the present invention is admixed with a concrete composition in an amount of from 2 to about 5 pounds per cubic yard of concrete. Additionally, stabilizing agents such as benzoic acid, maleic acid and the like may also be admixed into the anti-corrosive additive composition of the present invention.

The following Examples are illustrative of the present invention.

EXAMPLE 1

A concrete mixture of the following components

<u>A</u>	<u>#</u>
Course Aggregats	1750
Fine Aggregats	1285
Portland Cement	611
Water Reducer	1125

is admixed with 272 lbs of water. The resulting cured concrete has an air content of about 2%. Results of such concrete mixture when admixed with 5.2 lbs of an alkenyl succinic acid metal salts("ASA") together with and without various amounts (in lbs) of defoamer as illustrated below in Table I.

TABLE 1

CONCRETE	A	A	A	A	A	A	A	A	A	A	A	A	A
Hycrete DSS Without Water	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
BYK 025	.016	.032					.016	.016			.008	.016	
BYK 094			.016	.032					.016	.016	.008	.016	
Phosphlex 4					.170	.340	.17	.34	.17	.34	.17	.34	
Percent Air	9	8	8	8	9	7	8	5	8	4	6	3.5	11

EXAMPLE 2

A concrete mixture of the following components:

B	#
Course Aggregate	1825
Fine Aggregate	1284
Portland Cement	436
Slag Cement	197
Silica Fumes	25
Water Reducer	1.125
High Range Water Reducer	3.375

is admixed with 175 lbs of water. The resulting cured concrete has an air content of about 2.3%. Results of such concrete mixture when admixed with 3.2 of ASA together with various amounts of a defoamer is illustrated below in Table II.

TABLE II

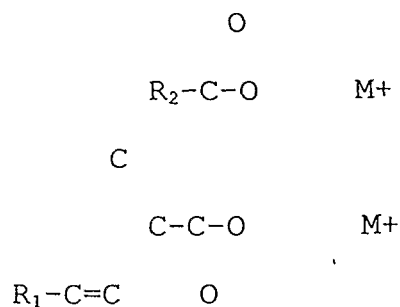
CONCRETE	B	B	B	B	B	B	B	B	B	B	B	B	B
Hycrete DSS Without Water	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
BYK 025	.016	.032					.016	.016			.008	.016	
BYK 094			.016	.032					.016	.016	.008	.016	
Phosphlex 4					.170	.340	.17	.34	.17	.34	.17	.34	
Percent Air	8	7	7.5	7	8	7	7	4.5	7.5	3.5	5	2.5	10

The foregoing examples are illustrative of the effectiveness

to control air entrainment between about 2 to 8% where a defoamer is present in an amount as above hereinabove set forth.

While the present invention has been described with respect to the exemplary embodiments thereof, it will be recognized by those of ordinary skill in the art that many modifications or changes can be achieved without departing from the spirit and scope of the invention. Therefore it is manifestly intended that the invention be limited only by the scope of the claims and the equivalence thereof.

1. An anti-corrosive additive composition for admixture with a concrete composition comprised of an alkali-based salt of dioic acid of the formula



wherein M⁺ is selected from the group consisting of Na⁺ and K⁺; R₁ is a C₁ to C₂₄ branch or linear aliphatic compound and R₂ is a C₀ to C₁₀ branch or linear aliphatic compound and a defoamer agent selected from the group consisting of polyether modified polysilicanes and tri-alkane/alkene phosphates and mixtures thereof.

2. The anti-corrosive additive composition as defined in Claim 1 wherein said concrete construction composition is concrete for concomitant use with rebars in reinforced concrete structures.

3. The anti-corrosive additive composition as defined in Claim 2 wherein said anti-corrosive additive composition is present in an amount of from about 3 to about 5 pounds per cubic yard of concrete.

4. The anti-corrosive additive composition in accordance with Claim 3 wherein said alkali-based salt of dioic acid is butane dioic acid dodecenyl disodium salt.

2 wherein said defoamer is said polyether modified polysilicane present in an amount of from 0.1 to 2.0% by weight based upon said alkali based salt of dioic acid.

6. The anticorrosive additive composition as defined in Claim 6 wherein said polyether modified polysilicane is preferably present in an amount of about 0.1% of said alkali based salt of dioic acid.

7. The anticorrosive additive composition in accordance with Claim 2 wherein said defoamer is said tri-alkane/alkene phosphate present in an amount of from 1.0 to 2.0% by weight of said alkali based salt of dioic acid.

8. The anticorrosive additive composition in accordance with Claim 7 where said tri-alkane/alkene phosphate is preferably present in an amount of about 5.0% by weight of said alkali based salt of dioic acid.