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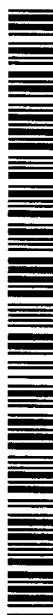


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(54) Title: A TIMBER PRESERVATIVE

(57) Abstract: This invention relates to a timber preservative solution, to a method of treating timber using the preservative solution and to timber so treated. Boron based timber preservatives are common in the art, since boron is an effective fungicide, termiticide and insecticide that is also environmentally friendly, of low toxicity and fairly simple to apply since it diffuses readily into the timber in the presence of moisture without the need for pressure impregnation or sophisticated machinery. However, the ability of boron to diffuse in this manner results in a commensurate propensity to leach from the timber fairly quickly. This necessitates frequent repeat treatment of the timber to ensure that it remains protected. The timber preserving solution comprises a timber preserving water soluble inorganic salt solute, such as boric acid, borax, boric oxides or, preferably, Disodium Octaborate Tetrahydrate (D.O.T.), dissolved in an aqueous polymer solvent, such as commercially available aqueous polymer products. The boron compound is preferably mixed with the aqueous polymer solvent in a range of concentrations of from about 20 g/l BAE (boric acid equivalent) to about 300 g/l BAE. The timber preserving solution of the invention can be used in remedial or in-situ treatment of cured timber and to first time or primary treatment of timber, that is treatment of the green timber prior to drying or curing.

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A Timber Preservative

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20 **Background to the invention**

This invention relates to a timber preservative.

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Timber preservatives are used to protect timber from attack by various fungi, including wet and dry rot as well as numerous insects, including wood borer, beetles, subterranean termites, carpenter ants and drywood termites.

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Boron based timber preservatives are common in the art. Not only is boron an effective fungicide, termiticide and insecticide, but it is also environmentally friendly, of low toxicity to mammals and fairly simple to apply as a solution, foam or dust as it diffuses into the timber in the presence of moisture and does not require pressure impregnation or other sophisticated machinery.

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Boron acts as a slow acting stomach poison in timber destroying organisms, which accumulate the poison in their system as they digest the treated timber.

The ability of boron to diffuse readily within timber results, unfortunately, in a commensurate

5 propensity to leach from the timber fairly quickly. Because of this it is generally necessary to retreat the timber every 6 to 12 months to ensure that it remains protected from fungal, insect or termite attack. This leads to increased costs and inconvenience.

10 Various methods have been employed to limit the movement of boron out of the timber, including coating the timber with varnish or wax emulsions. Unfortunately, the varnishes are generally of a brittle nature and crack when the timber expands or contracts allowing the boron to leach out, in addition, the wax emulsions are prone to collecting dust particles and can harbour moulds.

15 As a result there is a need for a timber preserving solution which will allow the boron compound to penetrate the timber and then prevent the boron from leaching out of the timber, while allowing the egress of water out of the timber.

20 **Summary of the invention**

According to this invention a timber preserving solution comprises a timber preserving water soluble inorganic salt solute dissolved in an aqueous polymer solvent.

25 The timber preserving water soluble inorganic salt solute may conveniently include a boron compound such as but not limited to boric acid, borax, boric oxides and Disodium Octaborate Tetrahydrate (D.O.T.).

30 In the preferred form of the invention, D.O.T. is preferably employed. In this invention, the term "boron" is not used to refer to elemental boron, but to the borate used in the timber preservative.

35 The aqueous polymer solvent in which the boron compound is dissolved preferably includes an acrylic emulsion and may conveniently include, commercially available aqueous polymer products.

A couple of different aqueous polymer solvents may be combined together, alternatively, a

5 single aqueous polymer solvent may be employed on its own.

Where more than one aqueous polymer solvents are used, the ratios in which they are combined will depend on the application for which the timber preserving solution is to be employed and the cost considerations to be taken into account. For most general
10 applications, however, the aqueous polymer solvents may be employed in a ratio of 1:1.

The boron compound is preferably mixed with the aqueous polymer solvent in a range of concentrations of from about 20g/l BAE (boric acid equivalent) to about 300g/l BAE.

15 The invention extends to a method of preparing a timber preserving solution including the steps of dissolving a timber preserving water soluble inorganic salt solute in an aqueous polymer solvent, the method including the steps of mixing the inorganic salt solute with the aqueous polymer solvent, thereby to produce a mixture in which the solute is dissolved in the solvent.

20 In the method of the invention, the inorganic salt solute may include a boron compound such as but not limited to boric acid, borax, boric oxides and Disodium Octaborate Tetrahydrate (D.O.T.).

25 The method may conveniently include the specific step of mixing the boron compound with the aqueous polymer solvent in a range of concentrations of from about 20g/l BAE to about 300g/l BAE.

30 The timber preserving solution of the invention can be used in remedial or in-situ treatment of cured timber and to first time or primary treatment of timber, that is treatment of the green timber prior to drying or curing.

To this end, the invention includes a method of treating timber with a timber preserving solution containing a timber preserving water soluble inorganic salt solute and an aqueous
35 polymer solvent.

Whether used as a primary or remedial treatment, the timber preserving solution can be

5 applied to the timber in any way that permits distribution of the solution over the timber surface to be treated, including dip treating, spraying and painting the timber with the solution.

10 The timber to be treated can take any form, including furniture, but is typically in the form of sawn boards, planks or poles.

Primary timber treatment is best done by dip treatment.

15 For primary treatment of timber, the method may include the step of treating the timber at a moisture content greater than the dried and cured moisture content generally prescribed for the timber type in issue.

20 In this form of the invention (for primary applications of the timber preservative), the timber may be treated at a moisture content of at least between 25% and 60% and preferably a moisture content of about 50%.

The timber preserving solution may also be used in the remedial treatment of dried or cured timber, including the treatment of unprotected furniture.

25 The method of the invention preferably includes the step of allowing the timber to dry after treatment, sufficiently to permit polymerization of the polymer in the solution. In this way the boron is sealed into the wood by the polymer coating.

30 The invention also extends to timber impregnated with a timber preserving water soluble inorganic salt solute dissolved in an aqueous polymer solvent.

Description of embodiments of the invention

35 The timber preserving solution of this invention finds ready application in the protection of timber from attack by various fungi, insects and termites. The solution, the method of manufacturing such a solution and its application to timber products will be described below

5 by way of example.

The timber preserving solution comprises a timber preserving water soluble inorganic salt solute dissolved in an aqueous polymer solvent.

10 The timber preserving water soluble inorganic salt solute is a boron compound and particularly a boron compound as found in Disodium Octaborate Tetrahydrate (D.O.T.).

Disodium Octaborate Tetrahydrate (D.O.T.) is available from a number of manufacturers. The choice of source depends on various factors, including the solubility of the D.O.T., the
15 cost and the application for which the timber preserving solution is required. However the D.O.T. employed in this invention is generally chosen from that marketed by Borax Consolidated Limited under the trade names POLYBOR and TIMBOR or that marketed by Optimum Minerals (Pty) Ltd under the trade name LARDEREL.

20 The aqueous polymer solvent in which the boron compound is dissolved is common in the art and is also available from various manufacturers. The waterborne polymer solvent preferably includes an acrylic emulsion and the polymer solvent employed in this invention is generally chosen from those marketed under the trade names SELFGUARD and SELFBIND, but it is not limited to these waterborne polymer solvents.

25 One or more aqueous polymers are used. Where more than one aqueous polymer is used, the ratios in which they are mixed with one another will depend on the application for which the timber preserving solution is to be employed and the cost considerations to be taken into account. Generally however the SELFGUARD and SELFBIND will be employed in a ratio
30 of 1:1.

The D.O.T. is mixed with the aqueous polymer solution in concentrations of from about 20g to 300g D.O.T. per litre of solution to yield preservative solutions with BAE (boric acid equivalent) values of about 20g/l to about 300g/l (20g/l D.O.T. is equivalent to 20g/l BAE).

35 The concentration of the solution will depend on the intended application of the timber being preserved and the severity of the problem to be avoided.

5 Concentrations of about 20g/l BAE will generally be used in remedial applications where the timber is being retreated or for in situ applications and will generally not be used in primary or first time treatment of timber.

10 D.O.T. in solution at concentrations of around 300g/l BAE will normally be employed in applications where H3 or higher hazard classes are required to be met.

In use, the timber preserving solution is applied to the timber in question to form a coating on the outer surface of the timber.

15 Any type of timber can be treated, even furniture, but the timber to be treated is typically in the form of sawn boards or planks or poles. The timber preserving solution of the invention can be used in remedial or in-situ treatment of cured timber and to first time or primary treatment of timber, that is treatment of the green timber prior to drying or curing.

20 In primary timber treatment, the boron derived from the D.O.T. diffuses into the timber while the polymer remains largely on the exterior surface of the timber where it polymerises to form a protective coating. The polymer is able to stretch and contract as the situation may demand. In addition, once dry, the polymer acts as a one way membrane, allowing moisture egress from the timber while preventing the boron of the D.O.T. from leaching out and
25 reducing or preventing moisture ingress into the timber.

Where the timber preserving solution is used for re-treatment or remedial treatment of dry or cured timber, but where the solution is applied to dry timber, relatively poor boron penetration is obtained, resulting, essentially, in envelope treatment of the timber.

30 The polymer solvents referred to above possess ultra-violet light protection properties, which reduces degradation of the protective coating once subjected to sunlight. Ultra-violet light protection also offers indirect protection to the timber.

35 The timber preserving solution can be applied to the timber in a number of ways, including dip treating, spraying or painting the timber with the solution. However, the best known method of treating the timber is to dip the timber in the solution.

5 Primary timber treatment provides for particularly effective penetration of boron into the timber. For this form of treatment to be most effective, it is important that the timber be green and or moist. That is, the timber should be un-dried and uncured. The moisture content of the timber can be between 25% and 60%, but moisture contents of between 30% and 50% have been found to yield the best results.

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The length of time for which the timber is dipped in the timber preserving solution depends on the size and thickness of the timber in question, but is typically about 3 minutes.

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The timber is then left to dry for between 12 and 24 hours, until the polymer coating has cured. It is preferable to allow the timber to dry in a covered environment, to prevent excessive loss of moisture from the coated timber until the boron has diffused properly. Once dry, the polymer coating assists in preventing the boron compound from diffusing out of the timber. The polymer coating also tends to render the timber waterproof.

20

Other methods of application, such as spraying or painting the timber preserving solution on to the timber to be treated, are more likely to be applied in remedial applications or for in situ applications.

25

The timber preserving solution of the present invention can be applied to most types of timber; both hard and soft, provided the timber (in primary applications) has a high enough moisture content to allow for thorough penetration of the boron into the timber. It is then envisaged that high concentrations of the timber preserving solution will only need to be applied to the timber during primary treatment. Thereafter, occasional remedial treatment to reseal the timber with a weak remedial solution may be all that is required.

30

5 **Claims**

1. A timber preserving solution comprising a timber preserving water soluble inorganic salt solute dissolved in an aqueous polymer solvent.
- 10 2. A timber preserving solution according to claim 1 in which the timber preserving water soluble inorganic salt solute includes a boron compound.
- 15 3. A timber preserving solution according to claim 2 in which the boron compound includes boric acid, borax, boric oxides and Disodium Octaborate Tetrahydrate (D.O.T.).
4. A timber preserving solution according to claim 3 in which the boron compound is D.O.T.
- 20 5. A timber preserving solution according to any one of the preceding claims in which the aqueous polymer solvent includes an acrylic emulsion.
6. A timber preserving solution according to any one of the preceding claims in which the aqueous polymer solvent includes commercially available aqueous polymer products .
- 25 7. A timber preserving solution according to claim 6 in which the aqueous polymer solvent includes more than one commercially available polymer product .
- 30 8. A timber preserving solution according to claim 7 in which at least two commercially available aqueous polymer solvents are combined in varying ratios.
9. A timber preserving solution according to any one of the preceding claims in which the aqueous polymer solvent additionally contains an ultraviolet light protection system.
- 35 10. A timber preserving solution according to any one of the preceding claims in which the boron compound is mixed with the aqueous polymer solvent in concentrations of from about 20g/l BAE (boric acid equivalent) to about 300g/l BAE.

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11. A method of preparing a timber preserving solution including the steps of dissolving a timber preserving water soluble inorganic salt solute in an aqueous polymer solvent, the method including the steps of mixing the inorganic salt solute with the aqueous polymer solvent, thereby to produce a mixture in which the solute is dissolved in the solvent.
- 10
12. A method of preparing a timber preserving solution according to claim 11 in which, the inorganic salt solute may include a boron compound including but not limited to boric acid, borax, boric oxides and Disodium Octaborate Tetrahydrate (D.O.T.).
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13. A method of preparing a timber preserving solution according to claim 12 which includes the specific step of mixing the boron compound with the aqueous polymer solvent in concentrations of from about 20g/l BAE to about 300g/l BAE.
- 20
14. A method of treating timber comprising the steps of applying, to the timber, a solution containing a timber preserving water soluble inorganic salt solute and an aqueous polymer solvent.
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15. A method of treating timber according to claim 14 in which the timber is treated prior to drying or curing.
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16. A method of treating timber according to claim 15 including the step of treating the timber at a moisture content greater than the dried and cured moisture content generally prescribed for the timber type in issue.
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17. A method of treating timber according to claim 16 in which the timber is treated at a moisture content of between 25% and 60%.
18. A method of treating timber according to claim 17 in which the timber is treated at a moisture content of at least 50%.
19. A method of treating timber according to claim 14 in which the timber is treated once dry to provide envelope treatment of the timber.

- 5
20. A method of treating timber according to any one of claims 14 to 19 in which the timber preserving solution is applied to the timber by dip treating the timber with the solution.
- 10
21. A method of treating timber according to any one of claims 14 to 19 in which the timber preserving solution is applied to the timber by spraying the timber with the solution.
- 15
22. A method of treating timber according to any one of claims 14 to 19 in which the timber preserving solution is applied to the timber by painting the timber with the solution.
- 20
23. A method of treating timber according to any one of claims 14 to 22 in which the timber to be treated is in any form.
24. A method of treating timber according to claim 23 in which the timber to be treated is in the form of sawn boards, planks or poles and is dipped in the timber preserving solution.
- 25
25. A method of treating timber according to any one of claims 14 to 24 in which the treated timber is allowed to dry subsequently to treatment to an extent sufficient to permit curing of the polymer.
- 30
26. Timber impregnated with a timber preserving water soluble inorganic salt solute dissolved in an aqueous polymer solvent.
27. Timber impregnated with a timber preserving solution according to any one of claims 2 to 12.
- 35
28. A timber preserving solution substantially as described in this specification with reference to the examples described in the accompanying specification.
29. A method of treating timber substantially as described in this specification with reference to the examples described in the accompanying specification.

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30. Timber impregnated with a timber preserving solution substantially as described in this specification with reference to the examples described in the accompanying specification.

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