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(54) **A water-based lubricant**

(57) The present invention is directed at water-based lubricants comprising water, at least one organic polymer and at least one polyhydric alcohol. The inventive lubricants have proven effective in applications such as the fitting of concrete pipes in which they can be used to replace conventional mineral oil based lubricants. The water-based lubricants can be fabricated such that they are substantially free of conventional oil, which is advantageous in that the costs to produce these lubricants are lower than for conventional oil based lubricants and in addition, the lubricants are more environmentally friendly, are much easier to clean from stained cloth and other surfaces and involve much lower volatile organic contents than conventional lubricants.

EP 2 698 421 A1

Description

[0001] The present invention is directed at a water-based lubricant which is preferably free of oils. The water-based lubricant according to the present invention comprises water, at least one organic polymer and at least one polyhydric alcohol.

[0002] Today, many applications involving moving or rotating objects require lubricants to prevent the work-pieces and tools from overheating and excessive wear. The state of the art in lubricants today are mineral oil based lubricants, however, these have suffered from recent drawbacks as oil is extracted from non-renewable resources and the prices of oil have been on the rise for a considerable time. Moreover, mineral oils have further disadvantages that their heat capacity is relatively low, so that the efficiency in dissipating heat away from a work-piece is low as well. Further disadvantages of conventional oil based lubricants are that they are usually harmful to the health of the user and flammable. This requires technical efforts for occupational safety, fire-safety and disposal. Moreover, oil based lubricants have proven difficult to remove from soiled workers clothes.

[0003] There is therefore a need for alternative lubricants which are based on materials with a high heat capacity to improve the ability of the lubricant for dissipating heat away from a work-piece. In addition, there is a need for lubricants which are based on easily accessible base materials and which have a low flammability to improve worker safety. Finally, there is a need for lubricants that are easy to manufacture and handle, and easy to wash off from cloth, equipment, floors, skins, etc. The present application addresses these needs.

Summary of the invention

[0004] The present invention is directed at a water-based lubricant comprising water, at least one organic polymer and at least one polyhydric alcohol.

[0005] In a preferred embodiment of the present application, the water-based lubricant comprises less than about 1 wt.-% oil, more preferably less than about 0.5 wt.-% oil, even more preferably less than about 0.1 wt.-% oil and most preferably is essentially free of oil.

[0006] "Oil", as this expression is used in the context of the present invention, encompasses mineral oils as well as synthetic oils. These oils primarily comprise hydrocarbon components, in particular linear or branched alkanes. Mineral oils include white oils, liquid paraffin and liquid petroleum. Synthetic oils are e.g. alkanes obtainable by a Fischer-Tropsch process.

[0007] The organic polymer in the water-based lubricant is preferably a synthetic polymer. The organic polymer is more preferably a polycarboxylate and even more preferably a polyacrylic acid. In a preferred embodiment of the present application, the organic polymer may also comprise natural organic polymers such as starches, celluloses, alginates, etc. In another embodiment, it is preferred that the water-based lubricant is essentially free of non-modified natural organic polymers.

[0008] Non-modified in the context of this application means, that the natural polymer is not chemically modified such as for example by alkylation, crosslinking, etc.

[0009] The content of the organic polymer in the water-based lubricant preferably is in the range of about 5 to 20 wt.-% and more preferably about 7 to 15 wt.-%, based on the total weight of the water-based lubricant.

[0010] The composition may also comprise a base in a concentration sufficient to adjust the pH of the lubricant to the desired range. A preferred base for use in the water-based lubricant according to the present invention is an alkali or earth alkali hydroxide, most preferably sodium or potassium hydroxide.

[0011] The polyhydric alcohol for use in the water-based lubricant according to the present application is preferably a dihydric alcohol, and more preferably an alkylene diol, most preferably propylene glycol. Mixtures of two or more polyhydric alcohols may also be used. The polyhydric alcohol may be included into the water-based lubricant according to the present application with a content of preferably from about 10 to 35 wt.-%, more preferably about 15 to 30 wt.-%, and even more preferably about 20 to 25 wt.-%, based on the total weight of the water-based lubricant.

[0012] The water-content of the water-based lubricant according to the present application is preferably in the range of from about 20 to 75 wt.-%, more preferably about 40 to 70 wt.-%, and most preferably about 55 to 65 wt.-%, based on the total weight of the water-based lubricant.

[0013] In addition to water, at least one polyhydric alcohol and the at least one organic polymer, the water-based lubricant may further comprise one or more additives selected from stabilizers, surfactants, defoamers, preservatives, colloidal silica, corrosion inhibitors, pigments, fragrances and soaps.

[0014] A preferred stabilizer for use in the practice of the present invention is a synthetically modified natural polymer. A particular preferred synthetically modified natural polymer for use in the present application is an alkoxylated cellulose, preferably hydroxy ethyl cellulose. Hydroxy ethyl cellulose is for example commercially available as Natrosol® 250 from Ashland Speciality Ingredients. If the water-based lubricant contains an alkoxylated cellulose, this is preferably included in an amount of from about 1 to 5 wt.-%, preferably in an amount of from about 2 to 4.5, and in particular about 2.5 to

3.5 wt.-%, based on the total weight of the water-based lubricant.

[0015] A preferred defoamer is a defoamer based on fatty acids. Such defoamer is for example commercially available as Pronal 754S from Sika.

[0016] A preferred soap for use in the practice of the present application is mustikka bliw.

[0017] Colloidal silica may be incorporated into the water-based lubricant according to the present application in an amount of from about 0.5 to 5 wt.-%, preferably, in an amount of from about 1 to 3 wt.-%, and in particular in an amount of from about 1.2 to 2.5 wt.-% based on the total weight of the water-based lubricant. Colloidal silica is for example available under the trade name Sika Stabilizer-100® from Sika.

[0018] A preferred preservative for use in the practice of the present application is phenyl methoxy methanol which is available for example as Preventol D2 from Priechel GmbH.

[0019] In the practice of the present application, it is preferred that the combined amounts of defoamers, preservatives, soaps and surfactants do not exceed about 5 wt.%, preferably the amount is equal or less than about 3 wt.-%.

[0020] In a particular preferred embodiment of the present application the water-based lubricant comprises about 55 to 65 wt.-% water, about 7 to 15 wt.-% of at least one organic polymer and about 20 to 28 wt.-% of at least one polyhydric alcohol in addition to colloidal silica, a defoamer, a stabilizer, a preservative and a surfactant.

[0021] The present application is further directed to a method of preparing a water-based lubricant as described above, which comprises a step of mixing water with at least one organic polymer and at least one polyhydric alcohol to obtain a lubricant. Also in this method it is preferred that during the preparation of the lubricant less than about 1 wt.-%, preferably less than about 0.5 wt.-%, and even more preferably, less than about 0.1 wt.-% of an oil is added to the composition.

[0022] A further embodiment of the present application is directed at the use of a lubricant as described above, for the fitting together of concrete pipes. In such applications, it is preferred, that the water-based lubricant replaces at least a fraction of a regular mineral oil-based lubricant, preferably at least about 50% of said lubricant, more preferably at least about 80% of said lubricant and most preferably replaces essentially all of the conventional oil-based lubricant.

[0023] The water-based lubricants according to the present application are advantageous over conventional mineral oil-based lubricants as described above, in that they are environmentally friendly by reducing the amount of oils needed. In addition, the lubricant requires the addition of less components which are based on conventional mineral oils resulting in significant cost-benefits with regard to oil-based lubricants. As a further benefit, the lubricants are easy to manufacture and handle, and easy to wash off from cloth, equipment, floor, skins which have been stained with the lubricants. Finally, the water-based lubricants are frost resistant down to -15 ° C.

[0024] In the following, the water-based lubricant will be illustrated by way of examples, which however should not be considered as limiting in any way to the scope of the present application.

Examples:

[0025] Two water-based lubricants are prepared by mixing the ingredients indicated in Table 1.

Table 1:

Component	Amount	
Polycarboxylate	7.65%	10.0%
Propylene glycol	23%	23%
NaOH liquid 10%	5.1%	4.6%
Hydroxy ethyl cellulose	3.4%	2.5%
Colloidal silica	3.1%	2.25%
Sika Pump*	10.6%	7.80%
Defoamer	0.08%	0.06%
Preservative	0.07%	0.05%
Soap	0.1%	0.08%
Water	the remainder up to 100%	the remainder up to 100%
*Sika Pump is a mix of 80-90% water, 1-5% Glycerin and long polymers.		

Claims

1. A water-based lubricant comprising water, at least one organic polymer and at least one polyhydric alcohol.

2. The water-based lubricant according to claim 1, wherein the lubricant comprises less than 1 wt.-%, preferably less than 0.5 wt.-%, more preferably less than 0.1 wt.-% of an oil.

3. The water-based lubricant according to claim 1 or 2, wherein the organic polymer is a synthetic polymer, preferably a polycarboxylate, and more preferably a polyacrylic acid.

4. The water-based lubricant according to any of the preceding claims, wherein the polyhydric alcohol is propyleneglycol.

5. The water-based lubricant according to any of the preceding claims further comprising a stabilizer, preferably an alkoxylated cellulose.

6. The water-based lubricant according to any of the preceding claims, further comprising at least one additive selected from surfactants, defoamers, preservatives, colloidal silica, corrosion inhibitors, pigments, fragrances and soaps.

7. The water-based lubricant according to any of the preceding claims, comprising from about 20 to 75 wt.-% water, 5 to 20 wt.-% of the at least one organic polymer and 10 to 35 of the at least one polyhydric alcohol.

8. A method for preparing a water-based lubricant according to any one of claims 1 to 7, comprising mixing water with at least one organic polymer and at least one polyhydric alcohol to obtain a lubricant.

9. Use of a lubricant according to any one of claims 1 to 7 for the fitting of concrete pipes.

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EUROPEAN SEARCH REPORT

Application Number
EP 12 18 0569

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 November 2012	Bertrand, Samuel

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 18 0569

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