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**EUROPEAN PATENT APPLICATION**

⑰ Application number: 82102823.0

⑸ Int. Cl.<sup>3</sup>: **C 11 D 7/54**

⑱ Date of filing: 02.04.82

**C 11 D 7/06, C 11 D 7/26**

⑳ Priority: 03.04.81 US 250638

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⑷ Date of publication of application:  
20.10.82 Bulletin 82/42

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DE FR GB IT

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⑸ Low temperature circulation cleaner.

⑷ A concentrated aqueous highly alkaline chlorinated cleaner comprising water, a highly alkaline material, a chlorine ion supplying agent, a citrate compound and a polyelectrolyte formed by reacting methyl vinyl ether with maleic anhydride.

This invention relates to aqueous alkaline cleaners. More particularly, this invention is concerned with a novel aqueous chlorinated highly alkaline cleaner which is especially useful in the food and beverage industry.

#### Background of the Invention

Aqueous alkaline solutions have been used for many years to clean glass and metal equipment, utensils, pipe lines and containers in the food and beverage industry. A chelating agent is generally included in the solution to promote cleaning. While there are many chelating agents, few of them are stable in highly alkaline solutions. Gluconic acid and heptagluconic acid are two of the few which are stable in highly caustic solution. Sodium tripolyphosphate, a widely used chelating agent, in highly caustic solution reverts to orthophosphate, which is ineffective as a chelating agent and is insoluble in concentrated caustic liquids.

Even though aqueous highly alkaline cleaners are useful for the described purposes, it is desirable that they also be chlorinated so that a sanitizing effect and enhanced cleaning can be obtained simultaneously. The chelating agents commonly used, however, are unstable in aqueous highly alkaline chlorinated cleaners, especially concentrated (10-25%) sodium hydroxide. Thus, nitrilotriacetic acid, ethylenediaminetetraacetic acid, gluconic acid, heptagluconic acid and various phosphonic acids are not stable in such solutions. Such chelating agents react with the hypochlorite and rapidly dissipate the available chlorine to ineffectively low concentrations. The salts of citric acid, well known as chelating

agents, are only temporarily stable in aqueous highly alkaline chlorinated cleaners and soon citrates drop out of the solution.

From the above it is clear that a need exists for a chelate-containing aqueous highly alkaline chlorinated cleaner of improved stability, both as to its chlorine content and its chelating agent.

#### Summary of the Invention

According to the subject invention, there is provided a novel concentrated aqueous highly alkaline chlorinated cleaner comprising water, a highly alkaline material, a chlorine ion supplying agent, a citrate compound and a polyelectrolyte formed by reacting methyl vinyl ether with maleic anhydride.

#### Detailed Description of the Invention

Concentrated cleaners provided by the invention desirably contain the above-recited ingredients within the following ranges:

<u>Ingredient</u>	<u>Percent By Weight</u>
Highly alkaline material	10 - 65
Chlorine ion supplying agent	0.5 - 5
Citrate ion supplying compound	0.5 - 5
Polyelectrolyte	0.3 - 5
Water	Balance

Although a few highly alkaline materials can be used in producing the cleaner, sodium hydroxide is preferably employed because of its availability, low cost and good cleaning action. Potassium hydroxide is, however, suitable

but it is more costly. The preferred range of sodium or potassium hydroxide is 20 to 40 percent by weight.

The chlorine ion supplying agent in the cleaner can be supplied by chlorine gas or by means of an aqueous solution of a chlorine containing compound which releases chlorine ions as, for example, sodium hypochlorite.

The citrate ion supplying compound most suitably used is citric acid or sodium or potassium citrate. While other citrates can be employed, they are likely to be more expensive and to add to the cost unnecessarily.

The polyelectrolyte employed in the cleaner is formed by copolymerizing methyl vinyl ether with maleic anhydride using known conditions. The resulting products are commercially available and are sometimes generically referred to as poly(methyl vinyl ether/maleic anhydride). They are anionic, solid at room temperature, and available in low, medium and high molecular weights. The low molecular weight products are preferably used in the concentrate cleaners provided by this invention. Some commercial products available for use in the invention are Gantrez AN-119; Gantrez AN-139 and Gantrez AN-169. Inclusion of a polyelectrolyte of the described composition is necessary for stability of the citrate ion.

Production of the concentrated cleaner is readily achieved by first adding the powdered polyelectrolyte to the water with suitable stirring or agitation. Mixing is continued until a uniform milky white dispersion is obtained. The alkaline material is then added in the form of a solution or as a granular solid with suitable stirring. If necessary, the mixture is cooled to keep its temperature at about 100°F.

The citrate ion supplying compound is then added. The temperature of the mixture may rise during such addition. The mixture is then cooled to about 90°F. The chlorine supplying agent is then added. When chlorine gas is used, the gas is added well below solution level with slow agitation. When aqueous sodium hypochlorite is used, it can be poured in with suitable stirring to effect dispersion.

A particularly suitable concentrate produced as described can have the following composition and properties:

	<u>Percent By Weight</u>
Na <sub>2</sub> O	11 - 12
Available chlorine	2.7 - 3
Specific gravity	1.245 - 1.265
Appearance	pale yellow clear liquid

The concentrated cleaners provided by this invention are dilutable with water to form use solutions. About 0.5 to 2 ounces of concentrated cleaner can be diluted with water to make 1 gallon of use solution which is widely useful for cleaning. Preferred are use solutions containing about 1% of sodium or potassium hydroxide and 50 to 200 ppm of available chlorine. Such use solutions are particularly suitable in cleaning milking parlors, dairy equipment and milk transport tankers. The use solutions can be used at temperatures from about 110°F to 150°F for such purposes with good cleaning and sanitizing results and no or low foaming during recirculation cleaning.

The lack of phosphates and silicates in the products makes them exceptionally acceptable as does their good storage

stability, good chelating action and low temperature cleaning effectiveness.

When the concentrates provided by the invention are stored at 70°F the chlorine loss can be expected to be no more than about 5 to 10% after three months and no more than about 30 to 35% after six months. Nevertheless, the concentrates will rapidly lose chlorine if stored at about 120°F which is, of course, an unnecessarily high storage temperature that can be easily avoided.

The following example is presented to further illustrate the invention.

Example

A concentrated cleaner is produced, using the above described process, having the composition:

	<u>Percent by Weight</u>
Caustic soda, 50%	30 - 40
Citric acid, anhyd. gran.	2 - 5
Chlorine	2 - 4
Polyelectrolyte (Gantrez AN-119)	1 - 2
Water, soft	Balance

What is claimed is:

1. A concentrated aqueous highly alkaline chlorinated cleaner comprising water, a highly alkaline material, a chlorine ion supplying agent, a citrate compound and a polyelectrolyte formed by reacting methyl vinyl ether with maleic anhydride.

2. A cleaner according to claim 1 having the composition:

	<u>Percent By Weight</u>
Highly alkaline material	10 - 65
Chlorine ion supplying agent	0.5 - 5
Citrate ion supplying compound	0.5 - 5
Polyelectrolyte	0.3 - 5
Water	Balance

3. A cleaner according to claim 2 in which the highly alkaline material is sodium or potassium hydroxide, the citrate ion supplying agent is citric acid, sodium citrate or potassium citrate, and the polyelectrolyte is poly(methyl vinyl ether/maleic anhydride).

4. A cleaner according to claim 3 in which the chlorine ion supplying agent is from chlorine gas.

5. A cleaner according to claim 3 containing 20 to 40 percent by weight of sodium or potassium hydroxide.



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. <sup>3</sup> )
X	FR-A-2 108 564 (ECONOMICS LAB.) *Page 2, line 19 - page 6, line 38; page 9, lines 5-6; claims* & US - A - 3 700 599  -----	1-3	C 11 D 7/54 C 11 D 7/06 C 11 D 7/26
			TECHNICAL FIELDS SEARCHED (Int. Cl. <sup>3</sup> )
			C 11 D 7/00 C 11 D 3/00
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22-07-1982	Examiner GOLLER P.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>&amp; : member of the same patent family, corresponding document</p>			