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FLOUR IMPROVING COMPOSITION AND METHOD

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My invention relates to the treatment of wheat flour and other milling products, and more particularly has reference to the bleaching of flour and the like by means of non-flammable organic peroxide compositions.

Organic peroxides, notably benzoyl peroxide, derived from hydrogen peroxide, have long been used in bleaching agents for flour. They are quite flammable, and decompose in the presence of spark, flame, or temperatures about 105° C., and are even explosive under certain conditions. Therefore, considerable caution has been necessary in the handling of these organic peroxides.

To prepare organic peroxides for bleaching flour, it is necessary that the organic peroxide be in dry finely divided form in order to be intimately mixed with the flour. To accomplish fine grinding, the organic peroxide is ordinarily mixed with an inert material, such as dicalcium phosphate or the like, and then ground to the desired fineness. Although these inert materials prevent the decomposition of the organic peroxides during the grinding process, they have no effect on the flammability of the organic peroxide.

When alkali or alkaline earth metal carbonates containing, per mole, about two to about ten moles of water of crystallization are used as a carrier for grinding the organic peroxides, the flammability of the organic peroxides, when used in the amount of about twenty-five per cent, can be prevented. The organic peroxide bleaching compositions containing alkalinous metal carbonates having, per mole, about two to about ten moles of water of crystallization are subject to packing and lumping, and as such are not satisfactory for use, and for this reason, it is necessary to include a packing and lumping inhibitor with the organic peroxide alkalinous metal carbonate compositions.

An object of this invention is to provide non-flammable organic peroxide compositions in dry powdered form.

Another object of this invention is to provide a non-flammable organic peroxide bleaching composition having great bulk, and thereby better dispersion properties.

A further object of this invention is to provide a non-flammable organic peroxide bleaching composition that does not increase the ash content of the flour to any appreciable extent.

Magnesium carbonate has about twice the bulk of diluents or carriers heretofore used in combination with organic peroxides, and for this reason, when ground to a finely divided powder, disperses throughout the flour to a greater extent than other carriers.

Potassium or sodium carbonate, when used as a carrier and containing water of crystallization, in combination with organic peroxides, does not increase the ash of the flour to the extent as does calcium sulfate or calcium phosphate or other water insoluble compounds.

Liquid peroxides, as acetyl peroxides, or inactive peroxides, as phthalyl peroxide, are not suitable for the purpose of this invention. The peroxides intended for use in the present invention are the so-called active organic perodixes, these being primarily the peroxides of the kind that release nascent oxygen. The active organic peroxides of the type mentioned are the ones which are particularly objectionable because of flammability.

In my prior patent, No. 2,208,471, July 16, 1940, I have shown that the flammability of the active organic peroxides can be prevented by means of certain aluminum sulfates containing about twenty-four moles of water of crystallization. I have now found that this result can also be accomplished by combining with the active organic peroxides alkali and alkaline earth metal carbonates containing, per mole, about two to about ten moles of water of crystallization.

Accordingly, the dry powdered bleaching composition of the present invention comprises, in addition to the active organic peroxide, a sufficient quantity of an inorganic compound of the character above mentioned to prevent the flammability of the peroxide. Among these compounds are calcium carbonate, magnesium carbonate, potassium carbonate and sodium carbonate, containing from about two to about ten moles of water of crystallization, the latter characteristic being the one which renders the compounds effective in preventing flammability of the active organic peroxides. In this respect, the salts used in the present invention differ in form from the calcium sulfate, calcium phosphate and magnesium carbonates heretofore employed with organic peroxides. The preferred compound of this invention for preventing flammability is magnesium carbonate containing three moles of water of crystallization.

The inorganic compounds of the present invention, due to their water content, are more or less damp, and hence not susceptible to fine grinding, and for this reason, a packing inhibitor, such as anhydrous magnesium carbonate, in finely divided form should preferably be used to facilitate

fine grinding and to prevent packing of the bleaching composition. In place of anhydrous magnesium carbonate other packing anhydrous inhibitors, such as anhydrous tricalcium phosphate, aluminum oxide or aluminum silicate may be used.

Benzoyl peroxide is the preferred peroxide used as the active organic peroxide, but other active peroxides, as cinnamoyl and phenyl acetyl peroxide may also be used as the bleaching component of the composition.

Illustrative of the preparation of the preferred non-flammable organic peroxide composition, 25 grams of dry benzoyl peroxide, 65 grams of magnesium carbonate containing about three moles of water of crystallization, and 10 grams of anhydrous magnesium carbonate are mixed together and ground to a finely divided powder. The resultant product is non-flammable, non-explosive, and is ready for use as a flour bleaching agent.

In place of the water-containing magnesium carbonate of the example given above, potassium carbonate, calcium carbonate or sodium carbonate containing from about two to about ten moles of water of crystallization may be used.

In practicing the flour bleaching method of this invention, the non-flammable benzoyl peroxide, water-containing magnesium carbonate, anhydrous magnesium carbonate composition, produced as above described, is fed directly into the flour stream at any convenient point during the milling operation, and intimately mixed with the flour by means of powder feeding machines now in general use in the mills, in the proportion of about ½ ounce to one barrel (196 pounds) of flour. For a thorough distribution of such small amounts of the bleaching composition in the flour, the composition should be in the form of a dry free flowing finely divided powder. A satisfactory bleaching is obtained by exposing the flour to the action of the bleaching composition for about twenty-four hours.

In the appended claims I have characterized the peroxides as active and having substantial flour bleaching properties, in order to distinguish them from those organic peroxides which are of insufficient activity and bleaching power to effect bleaching of the flour. The term "alkalinous metal" is employed in the claims as generic to the alkali metals and the alkaline earth metals.

Having described my invention, I claim:

1. A flour bleaching composition comprising a dry free flowing powdered mixture of an active organic peroxide having substantial flour bleaching properties and an alkalinous metal carbonate containing, per mole, about two to about ten moles of water of crystallization, in sufficient amount to prevent flammability of the organic peroxide, and an anhydrous packing inhibitor.

2. A flour bleaching composition comprising a dry free flowing powdered mixture of an active organic peroxide having substantial flour bleaching properties and an alkalinous metal carbonate, containing, per mole, about two to about ten moles of water of crystallization, in sufficient amount to prevent flammability of the organic peroxide, and anhydrous magnesium carbonate.

3. A flour bleaching composition comprising a dry free flowing powdered mixture of benzoyl peroxide and an alkalinous metal carbonate containing, per mole, about two moles to about ten moles of water of crystallization, in sufficient amount to prevent flammability of the benzoyl peroxide, and an anhydrous packing inhibitor.

4. A flour bleaching composition comprising a dry free flowing powdered mixture of benzoyl peroxide and magnesium carbonate containing, per mole, about three moles of water of crystallization, in sufficient amount to prevent flammability of the benzoyl peroxide, and an anhydrous packing inhibitor.

5. A flour bleaching composition comprising a dry free flowing powdered mixture of benzoyl peroxide and magnesium carbonate containing, per mole, about three moles of water of crystallization, in sufficient amount to prevent flammability of the benzoyl peroxide, and anhydrous magnesium carbonate.

6. A flour bleaching composition comprising a dry free flowing powdered mixture of benzoyl peroxide and calcium carbonate, containing, per mole, about six moles of water of crystallization, in sufficient amount to prevent flammability of the benzoyl peroxide, and anhydrous magnesium carbonate.

7. A flour bleaching composition comprising a dry free flowing powdered mixture of benzoyl peroxide and sodium carbonate containing, per mole, about ten moles of water of crystallization, in sufficient amount to prevent flammability of the benzoyl peroxide, and anhydrous magnesium carbonate.

8. A method for bleaching wheat flour and other milling products which comprises mixing with the dry milling product a dry free flowing powdered mixture of an active organic peroxide having substantial bleaching properties and an anhydrous packing inhibitor, and an alkalinous metal carbonate containing, per mole, from about two to about ten moles of water of crystallization, the peroxide being in sufficient amount to bleach the milling product and said carbonate being in such amount as to prevent flammability of the peroxide, and subjecting the dry milling product to the action of said mixture for a sufficient time to bleach the product.

9. A method for bleaching wheat flour and other milling products which comprises mixing with the dry milling product a dry free flowing powdered mixture of benzoyl peroxide having substantial bleaching properties, and an anhydrous packing inhibitor, and an alkalinous metal carbonate containing, per mole, from about two to about ten miles of water of crystallization, the peroxide being in sufficient amount to bleach the milling product and said carbonate being in such amount as to prevent flammability of the peroxide, and subjecting the dry milling product to the action of said mixture for a sufficient time to bleach the product.

10. A method for bleaching wheat flour and other milling products which comprises mixing with the dry milling product a dry free flowing powdered mixture of benzoyl peroxide, an anhydrous packing inhibitor and magnesium carbonate containing, per mole, about three moles of water of crystallization, the benzoyl peroxide being in sufficient amount to bleach the milling product and the said anhydrous non-packing inhibitor being in sufficient amount to prevent flammability of the peroxide, and subjecting the dry milling product to the action of said mixture for a sufficient time to bleach the milling product.

11. A method for bleaching wheat flour and other milling products which comprises mixing with the dry milling product a dry free flowing

powdered mixture of benzoyl peroxide, anhydrous magnesium carbonate and magnesium carbonate containing, per mole, about three moles of water of crystallization, the benzoyl peroxide being in sufficient amount to bleach the milling product and said carbonate being in sufficient amount to prevent flammability of the peroxide, and subjecting the dry milling product to the action of said mixture for a sufficient time to bleach the milling product.

12. A method for bleaching wheat flour and other milling products which comprises mixing with the dry milling product a dry free flowing powdered mixture of benzoyl peroxide, anhydrous magnesium carbonate and calcium carbonate, containing, per mole, about six moles of water of crystallization, the benzoyl peroxide being in sufficient amount to bleach the milling product, and the calcium carbonate being in sufficient amount to prevent flammability of the benzoyl peroxide, and subjecting the dry milling product to the action of said mixture for a sufficient time to bleach the milling product.

13. A method for bleaching wheat flour and other milling products which comprises mixing with the dry milling product a dry free flowing mixture of benzoyl peroxide, anhydrous magnesium carbonate and sodium carbonate, containing, per mole, about ten moles of water of crystallization, the benzoyl peroxide being in sufficient amount to bleach the milling product, and the sodium carbonate being in sufficient amount to prevent flammability of the benzoyl peroxide, and subjecting the milling product to the action of said mixture for a sufficient time to bleach the milling product.

14. A flour bleaching composition comprising a dry free flowing powdered mixture of an active organic peroxide having substantial flour bleaching properties and an alkalinous metal water soluble compound containing, per mole, about two to about twelve moles of water of crystallization, in sufficient amount to prevent flammability of the organic peroxide, and an anhydrous packing inhibitor.

15. A flour bleaching composition comprising a dry free flowing powdered mixture of an active organic peroxide having substantial flour bleaching properties and an alkalinous metal water soluble compound containing, per mole, about two to about twelve moles of water of crystallization, in sufficient amount to prevent flammability of the organic peroxide, and anhydrous magnesium carbonate.

16. A flour bleaching composition comprising a dry free flowing powdered mixture of benzoyl peroxide and an alkalinous metal water soluble compound containing, per mole, about two to about twelve moles of water of crystallization, in sufficient amount to prevent flammability of the benzoyl peroxide, and an anhydrous packing inhibitor.

17. A flour bleaching composition comprising a dry free flowing powdered mixture of benzoyl peroxide and an alkalinous metal water soluble compound containing, per mole, about two to about twelve moles of water of crystallization, in sufficient amount to prevent flammability of the benzoyl peroxide, and anhydrous magnesium carbonate.

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