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PACKAGING OF BENZENE HEXACHLORIDE

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The present invention relates to the handling of benzene hexachloride and more particularly is concerned with the packaging of benzene hexachloride in paper bags.

The gamma isomer of benzene hexachloride is a well known, widely used commercial insecticide. It is prepared in admixture with four other benzene hexachloride isomers by additive chlorination of benzene. These isomers and mixtures thereof are solid at normal temperatures. In a good many applications, the insecticidal properties of the gamma isomer of benzene hexachloride are utilized by compounding formulations of the gamma isomer and carriers. The carriers may take the form of inert solids, or may be organic solvents. To prepare formulations of this character, the benzene hexachloride is conveniently supplied as small solid particles.

One such form of solid, particulate benzene hexachloride, is known as flaked benzene hexachloride. This is a product prepared by soldifying molten benzene hexachloride on the periphery of a rotating, cooled drum and shaving off the thin film of solidified benzene hexachloride formed on the drum's periphery. The shaved benzene hexachloride is in the form of rather small thin particles, e. g. flakes.

Storage, shipment and handling of particulate, solid benzene hexachloride such as flaked benzene hexachloride has heretofore been complicated with difficulties. One economically suitable possibility packages say 50 to 100 pounds of benzene hexachloride in individual bags. However, attempts made heretofore to bag benzene hexachloride in this manner and store it for extended periods have met with certain shortcomings. The bags have ruptured all too rapidly, usually within two months of packing. Since the bagging of benzene hexachloride otherwise offers many advantages including ease of handling, convenience of storage, etc., bagging of solid, particulate benzene hexachloride without encountering bag failure offers considerable incentive.

According to the present invention, the discovery has been made that benzene hexachloride may be packaged in bags, especially paper bags, and stored therein for extended time periods ranging upwards of nine months. This extended bag life is accomplished by including in the benzene hexachloride composition a minor quantity of a solid, finely divided, inorganic alkaline material such as calcium carbonate. The presence of from 0.3 to 5 percent by weight of the solid inorganic alkaline material inhibits or substantially minimizes the tendency of benzene hexachloride compositions to attack paper bags and cause their failure.

In this connection, it is important that the concentration of solid, inorganic alkaline material be restricted to between 0.2 and 5 percent by weight of the benzene hexachloride, and more preferably be limited to from 0.5 to 1.5 percent by weight of the benzene hexachloride. It is within these concentrations that excellent protection against bag failure is most efficiently achieved. Benzene hexachloride containing the aforementioned minor concentrations of solid, inorganic alkaline material may be packaged and stored in paper bags for six months, or even longer. Rupture or other disintegration of the paper bags is obviated. Additionally, the benzene hexachloride is not unduly contaminated or diluted with components which might be undesirable.

The exact manner in which the solid, inorganic alkaline material is incorporated with the benzene hexachloride in the specified concentration can be varied to suit other considerations encountered in the manufacture of the benzene hexachloride. Especially suitable results are obtained by blending the inorganic alkaline material into molten benzene hexachloride. In conjunction with normal manufacturing procedures, this conveniently includes adding the inorganic alkaline solid to benzene hexachloride while it is in molten state during its manufacture. One typical circumstance of this character arises during the purification and recovery of benzene hexachloride from the reaction mixture provided by adding chlorine to benzene and forming benzene hexachloride As a rule, a considerable excess of benzene is present and must be removed. This is frequently accomplished by vaporizing the benzene from the benzene hexachloride. Temperatures for such vaporization are such that the benzene hexachloride is molten.

As already outlined, benzene hexachloride is conveniently offered for sale as a finely divided solid composition, usually as flaked benzene hexachloride. Flaking results, for example, from solidifying molten benzene hexachloride as a thin layer on the periphery of a rotating, cooled drum, and thereafter scraping the solidified benzene hexachloride on the drum's periphery. The detached benzene hexachloride is flaked. The inorganic alkaline solid may be added to the molten benzene hexachloride prior to distribution on the drum's periphery. Molten benzene hexachloride formed during benzene removal may be directly fed to the flaking operation in which case the inorganic alkaline solid is incorporated in the benzene hexachloride after it is melted and before it is flaked.

Improved bag life is also realized by adding the inorganic alkaline solid to benzene hexachloride after it has been solidified as, for example, by dusting flaked benzene hexachloride with the alkaline solid. This treatment may simply take the form of mixing the inorganic alkaline solid and particulate benzene hexachloride. More advisable, however, intimate mixing of the two components is practiced, preferably to coat the particulate benzene hexachloride with the inorganic alkaline solid. This coating may be effectuated with efficiency when the particle size of the inorganic alkaline solid is substantially smaller than the solid benzene hexachloride particle, i. e. the individual flakes of benzene hexachloride. Quite finely divided inorganic alkaline solids are thus recommended, e. g. solids of particle sizes up to 3 microns.

Subsequent to the incorporation of the minor concentration of inorganic alkaline solid in the benzene hexachloride with the consequent formation of a solid, particulate benzene hexachloride composition, the composition is packaged in paper bags (bags primarily of cellulosic materials) for storage, shipment and other conveniences. In many instances, the paper bags are large enough to contain from 50 to 150 pounds of benzene hexachloride. In such sizes, the packaged benzene hexachloride can be shipped, stored and otherwise handled with facility.

The following example demonstrates the manner in which the present invention may be practiced and the beneficial results stemming therefrom:

EXAMPLE

In these tests flaked benzene hexachloride compositions comprising a normal chlorination isomeric mixture containing the specified concentration of inorganic alkaline solids were packaged in sealed paper bags and stored under representative conditions. Approximately 70 pounds of the isomeric mixture were stored in each bag, the bag being of five plies of natural kraft paper. In each case, the packaged bags were periodically inspected and their appearance and strength ascertained. If upon reasonable handling the bag broke, or had ruptured under storage conditions, this was considered as bag failure. In each instance a control packaged bag not containing an alkaline solid was used for comparison purposes.

The following is a tabulation of the results:

Table

Test	Description of Bagged Composition		Comments
	Alkaline Solid	Concentration, Weight Percent	
A	None—Control		Bag failure in 63 days.
	Magnesium Silicate	1.33	Bag satisfactory after 270 days.
B	None—Control		Bag failure in 45 days.
	Calcium Carbonate	1.00	Bag satisfactory after 270 days.
C	None—Control		Bag failure in 61 days.
	Calcium Silicate	1.00	Bag satisfactory after 270 days.
D	None—Control		Bag failure in 66 days.
	Calcium Silicate	0.25	Bag satisfactory after 270 days.
E	None—Control		Bag failure in 62 days.
	Calcium Carbonate	0.224	Bag satisfactory after 270 days.
F	None—Control		Bag failure in 59 days.
	Calcium Carbonate	5.0	Bag satisfactory after 270 days.
	Calcium Silicate	5.0	Do.
	Magnesium Silicate	5.0	Do.

The calcium carbonate employed in the above tests was finely divided product sold under the trade name Calcene; the calcium silicate was a finely divided product sold under the trade name Silene; the magnesium silicate used was that sold under the trade name Magnesol.

In tests A, B, C, D and E, the respective alkaline solids were added to molten benzene hexachloride prior to flaking. In test F, the alkaline solids were mixed with already flaked benzene hexachloride.

The foregoing data demonstrate the improvement in bag life realized by incorporation of a minor quantity of inorganic alkaline solid in the benzene hexachloride packaged in paper bags. Thus, without inorganic alkaline solid present, bag failures occurred and almost always by the end of two months. In comparison, benzene hexachloride packaged in paper bags as herein specified did not encounter bag failure even after nine months.

The present invention is applicable to the packaging in paper bags of benzene hexachloride including the individual isomers as well as various isomeric mixtures. Of course, its use is usually in conjunction with isomeric mixtures of benzene hexachloride encountered in the addition chlorination of benzene. Thus, isomeric mixtures provided by the additive chlorination of benzene at temperatures from minus 80° C. to 70° C. are most frequently packaged. The isomeric mixture realized by additive chlorination of liquid benzene from which has been separated the solid benzene hexachloride that precipitates after substantial benzene conversion may also be packaged in this process. Removed isomers are mainly the alpha and beta isomers under such circumstances. Such benzene hexachloride compositions are comprised

substantially of isomers of benzene hexachloride except for impurities present as an incident to their manufacture.

Inadequate paper bag life is most pronounced when benzene hexachloride containing from about 75 to 200 parts per million by weight of hydrogen chloride is packaged. This minor quantity of hydrogen chloride is present in many benzene hexachloride compositions and can not easily be altogether removed. Thus, the present invention has particular relevance to packaging of particulate benzene hexachloride containing hydrogen chloride in the enumerated concentrations.

Quite a number of inorganic alkaline solids are useful for the purpose of extending bag life. Most useful have been the alkaline earth metal salts such as calcium salts, and more particularly the alkaline earth metal salts of weak inorganic acids such as carbonic acid, silicic acid, etc. Most notable alkaline earth metal salts are calcium carbonate and calcium silicate. Other useful inorganic alkaline solids include magnesium salts such as magnesium silicate, calcium oxide, calcium bicarbonate, sodium phosphate, and the like. When the inorganic alkaline solids are finely divided, they function with high efficiency. Inorganic alkaline solids having particle sizes in the range of from 0.3 to 3 microns are of suitable subdivision in this regard.

Although the present invention has been described with reference to specific details of certain embodiments, it is not intended that it be construed as limited thereto except insofar as such limitations appear in the appended claims.

I claim:

1. A method of packaging solid benzene hexachloride which comprises forming a composition of solid finely divided benzene hexachloride containing from 0.2 to 5 percent by weight of an inorganic alkaline solid and packaging said benzene hexachloride in a paper bag.

2. A method of packaging solid benzene hexachloride which comprises adding from 0.2 to 5 percent of an inorganic alkaline solid to benzene hexachloride subsequent to the formation of the benzene hexachloride, and thereafter packaging the benzene hexachloride as a solid in a paper bag.

3. The method of claim 2 wherein the inorganic alkaline solid is an alkaline earth metal salt.

4. The method of claim 2 wherein the inorganic alkaline solid is calcium carbonate.

5. A method of packaging solid benzene hexachloride which comprises forming a molten composition of benzene hexachloride, adding an inorganic alkaline solid to the molten benzene hexachloride in an amount sufficient to establish therein a concentration of from 0.2 to 5.0 percent by weight of the benzene hexachloride, solidifying the benzene hexachloride and packaging the solidified product in a paper bag.

6. A benzene hexachloride package comprising a sealed paper bag containing therein finely divided benzene hexachloride having dispersed therethrough from 0.2 to 5 percent of an inorganic alkaline solid by weight of the benzene hexachloride.

7. A benzene hexachloride package comprising a sealed paper bag containing therein finely divided benzene hexachloride having dispersed therethrough from 0.2 to 5 percent of finely divided calcium carbonate by weight of the benzene hexachloride.

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