

PATENT SPECIFICATION

(11)

10
1 393 427

1 (3) 427

- (21) Application No. 51472/72 (22) Filed 8 Nov. 1972
(31) Convention Application No. 196 738 (32) Filed 8 Nov. 1971 in (19)
(33) United States of America (US)
(44) Complete Specification published 7 May 1975
(51) NT CL² A01N 17/14
(52) Index at acceptance
ASE 1A1G3 1A2C 1A2J 1A3F 1A5B1 1C14 1C15B1
1C15B2 1C15B3 1C15F3 1C2J 1C6A2A 1C6A2B
1C6D 1C7G 1C7N 1C8B



(54) RODENTICIDES AND PROCESS FOR THEIR PREPARATION

(71) We, VELSICOL CHEMICAL CORPORATION, a corporation organised and existing under the laws of the State of Delaware, United States of America, of 341 East Ohio Street, Chicago, Cook County, State of Illinois 60611, United States of America (assignee of STANLEY N. BURLLOW), do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improved rodenticide compositions and more particularly relates to water-resistant compacted rodenticide compositions.

Rodenticides and particularly poisons used for controlling rats and mice are typically formulated into food baits. These food baits are often in the form of hard pellets which can be conveniently handled and are acceptable to rodents. Such pellets are made by agglomerating ground cereal grains in combination with the toxicant. Sugar when used as the agglomerating agent also imparts improved acceptability to the product. Additional flavoring agents as well as preservatives are also incorporated into the bait.

While the described bait compositions have proven to be successful, they have in the past suffered from physical breakdown upon exposure to high humidity or excessive moisture. To avoid breakdown of the pellets and to enable their use, outdoors wax has been added to the pellets. The use of wax has improved the moisture and water resistance of bait pellets but has not proven to be entirely satisfactory. Only minor amounts of wax can be used while preserving the acceptability of the bait by rodents. Such amounts of wax do not impart the degree of water resistance desired in a product used under moist conditions.

It has now been found that compacted rodent bait compositions having excellent water resistance can be prepared without the use of wax. More specifically it has been

found that a water-resistant compacted rodenticide composition can be readily prepared by utilizing a gelatinized amylaceous material as the carrier.

Thus, one embodiment of the present invention resides in a water-resistant rodenticide composition comprising a gelatinized compacted amylaceous material having a water content below 14 percent by weight based on the total composition in admixture with a rodenticidal concentration of a rodenticide.

The composition of the invention is preferably in pellet form.

The particular rodenticide which is used in the compositions of the present invention is not critical and the well-known stomach poisons and anticoagulants can be employed. Preferred rodenticides useful in this invention are 3 - (α - acetylbenzyl) - 4 - hydroxycoumarin, 2 - di - phenylacetyl - 1,3 - indandione and the alkali metal, ammonia, and amine salts thereof.

Exemplary alkali metal salts are the sodium salts of 2 - diphenylacetyl - 1,3 - indandione and the potassium salt of 2 - diphenylacetyl - 1,3 - indandione. Exemplary amine salts are the trimethylamine salt of 2 - diphenylacetyl - 1,3 - indandione, the triethylamine salt of 2 - diphenylacetyl - 1,3 - indandione, the dimethylamine salt of 2 - diphenylacetyl - 1,3 - indandione, the propylamine salt of 2 - diphenylacetyl - 1,3 - indandione and the like.

The concentration of rodenticide which can be used in the compositions will vary somewhat with the particular toxicant employed. Generally an amount of from 0.0005 to 0.1 percent by weight based on the total composition is used.

The amylaceous material which can be used in the compositions of this invention can comprise any comminuted vegetable material consisting predominantly of starch. Particularly useful are ground cereal grains such as cereal flour, corn meal, oat meal, wheat flour, sorghum, waxy maize, mixtures thereof and the like. Starch itself such as corn starch can

[Price 33p]

also be used as the amylaceous component of the pellets. A preferred amylaceous material comprises a combination of corn meal and comminuted oats.

The amylaceous material is preferably in a finely divided particulate state such as in the form of a flour or finely ground meal. A particle size range capable of passing through a 50 to 100 mesh screen (U.S. Standard mesh sizes) is most preferred.

As previously indicated, the amylaceous material must be gelatinized in order to impart the desired physical properties to the compositions of this invention. This gelatinization can be effected by a heat treatment or a combination of heat treatment with mechanical shear in the presence of water as will be hereinafter described in greater detail. Upon completion of the gelatinization, the product is compacted and the water content is reduced to below 14 percent by weight of the total composition to produce a hard, water-resistant pellet.

The rodenticide pellets of this invention are prepared by a process which results in the surprising water resistance of the final product. Thus, a further embodiment of the present invention resides in a process for preparing a water-resistant rodenticide pellet which comprises:

(a) mixing a rodenticidal concentration of a rodenticide and amylaceous material to provide a blend;

(b) gelatinizing the amylaceous portion of the blend in the presence of sufficient water to provide a doughy mass;

(c) compacting the gelatinized blend; and

(d) drying the compacted product to a moisture content below 14 percent by weight.

To effect the process of the present invention, the rodenticide and amylaceous material are first mixed into a blend to insure a substantially homogeneous dispersion of the toxicant in the product. This mixing can be carried out in standard mixing equipment such as ribbon blenders and the like.

The blend is subjected to gelatinization conditions capable of gelatinizing the amylaceous material contained therein. The gelatinization can be effected by various means. One method of gelatinizing the blend is by subjecting the blend to pressure cooking in the presence of from 15 to 25 percent water based on the weight of said blend. Such pressure cooking comprises heating the blend to temperatures ranging from 215 to 350° F. under super-atmospheric pressure for a sufficient time to disrupt the starch granules contained in the amylaceous material.

The gelatinization can also be effected by heating the blend to a temperature of from 160 to 300° F. while subjecting the amylaceous mixture to mechanical shear forces. Preferably the application of shear force and

heating of the amylaceous mass are performed in the presence of from 15 to 25 percent moisture. The simultaneous heating and application of mechanical shear forces can be readily accomplished through the use of high shear force blending, kneading or extruding equipment which is provided with heating means. Steam jacketed sigma ("Sigma" a registered Trade Mark) blade blenders, dough mixers, kneader or extruder which force the product through a restricted orifice can be suitably employed.

The exact degree of gelatinization of the amylaceous material is not critical provided a substantial disruption of the starch granules in the amylaceous material is achieved. The degree of gelatinization will have an effect on the water resistance of the final product. Generally, a greater degree of gelatinization provides a final product of increased water resistance.

Upon completion of the gelatinization step of the process of the present invention the gelatinized blend is subjected to a compacting step. This compacting step is essential to impart water resistance to the rodenticide compositions of this invention. The compacting step generally comprises subjecting the gelatinized blend to mechanical pressure sufficient to form a substantially continuous composition. This compacting step can be carried out by subjecting the blend to mechanical pressure in a die of suitable dimensions to form a pellet of a desired shape. Pressures ranging from 15 to 25,000 lb per square inch can be effectively used. Typically, the higher pressures result in a product of greater water resistance.

The compacting step of the process of the present invention can also be carried out through the use of compacting rolls. These compacting rolls typically comprise two facing steel cylinders having cavities on their peripheral surfaces. The cylinders rotate towards each other at a synchronized rate such that the cavities on the surface of the cylinders directly oppose each other during rotation. The distance between the two cylinders can be varied thereby providing different compacting pressures. When using the compacting rolls the gelatinized blend heretofore described is fed into the rolls and is thereby formed into pellets having the configuration of the cavities in the cylinders.

The compacting rolls can also be corrugated rolls or cylinders having a corrugated or fluted surface in an axial direction. Such corrugated rolls permit the formation of rodenticide compositions in the form of flakes of varying thickness.

Upon completion of the compacting step, the product is dried to a moisture content below 14 percent by weight of the composition. Preferably the composition is dried to a moisture content ranging from 5 to 12 per-

cent by weight of the composition. The drying step can be conveniently carried out by conventional drying equipment such as forced air heating ovens and the like.

5 In addition to the essential ingredients of the rodenticide compositions of this invention, namely, the toxicant and the amylaceous materials herein described, it is often desirable to incorporate other additives including binding agents, flavoring agents, preservatives and the like.

10 Binding agents can comprise saccharides or polysaccharides such as sucrose, dextrose, maltose, dehydrated corn syrups, dextrin, starch hydrolyzates, gelatin, guar gum, carboxymethyl cellulose, sodium alginate and the like.

15 Preservatives can comprise any of the common preservatives used in foods to retard spoilage or decomposition of the product. Bactericides and fungicides can be effectively used. Exemplary preservatives are malathion, sodium benzoate, butylated hydroxytoluene (BHT) and the like.

20 It is desirable to incorporate the flavoring agents into the rodenticide compositions of this invention for the purpose of improving the acceptability of the compositions to rodents. For example, proteinaceous material such as fish meal, soya meal and whey solids can be efficaciously used. Artificial flavoring agents capable of imparting meat flavors, cheese flavors and the like can be used. Furthermore, flavor enhancers such as sodium chloride and monosodium glutamate can also be employed.

35 The preparation of the rodenticide compositions of this invention is more specifically illustrated in the following examples.

40 Example 1.

Preparation of Water-Resistant Rodenticide Pellets.

45 The following ingredients were heated and charged into a ribbon blender and were mixed into a uniform blend. The quantities are in parts by weight.

	Ingredients	Amount
	2-diphenylacetyl-1,3-indandione	0.005
	powdered sugar	4.995
50	malathion	0.010
	sodium benzoate	0.300
	Butylated hydroxytoluene	0.100
	sodium chloride	1.000
	fish meal	4.000
55	soya meal	10.000
	steel cut oats	20.000
	corn meal	59.590

60 Heating and blending of the mixture was continued and sufficient water was added to raise the total moisture content of the mixture to about 18 percent by weight. This mixture was then changed into a dough mixer main-

tained at a temperature of about 210° F. and was subjected to heat and mechanical shear until gelatinization of the amylaceous material was effected. The gelatinized product was then pelletized utilizing compacting rolls to provide pillow shaped pellets of a light brown color. The pellets had a moisture content of about 18 percent by weight. The pellets were then dried in a forced air oven until the moisture content was reduced to from about 8 to 9 percent by weight to yield a desired rodenticide composition of this invention.

Example 2.

Preparation of Water-Resistant Rodenticide Flakes.

The following ingredients are ground to a particle size capable of passing through a 50 mesh screen:

Ingredients	Amount Parts by Weight	
whole ground corn	60.0	
steel cut oats	20.0	
baker's fine sugar	5.0	85
soya meal	10.0	
fish meal	4.0	
salt	1.0	
3 - (α - acetonylbenzyl) - 4-hydroxy - coumarin	0.1	90

The ingredients are then blended in a Hobart ("Hobart" is a registered Trade Mark) mixer until uniform. Water in an amount sufficient to provide a total moisture content of about 25 percent by weight is added to the mixture. The resulting mixture is then charged into a pressure vessel and is heated to a temperature of about 350° F. for a period of about 2 hours. After this time the mixture is compacted by passing it through corrugated rolls capable of exerting a pressure of about 1000 pounds per linear inch. The resulting product is then dried in a forced air oven to a moisture content of about 14 percent to yield the desired water-resistant rodenticide flakes.

Example 3.

Preparation of Water-Resistant Rodenticide Pellets.*

The following ingredients are ground to a particle size capable of passing through a 100 mesh screen and are charged into a ribbon blender.

Ingredient	Amount Parts by Weight	
sodium salt of 2 - diphenylacetyl - 1,3 - indandione	0.0005	
wheat flour	85.0	
soya meal	10.0	
dextrose	5.0	120

The ingredients are mixed into a uniform blend. Water in an amount sufficient to provide a total moisture content of about 15 percent by weight of the blend is added.

The resulting blend is then gelatinized by subjecting it to the action of a sigma blade blender at a temperature of about 210° F. for a period of about 2 hours. After this time the gelatinized product is placed in dies to a mechanical pressure of about 25,000 pounds per square inch. The resulting compacted product is then dried to a moisture content of about 12 percent to yield the desired water-resistant rodenticide pellets.

WHAT WE CLAIM IS:—

1. A water-resistant rodenticide composition comprising a gelatinized, compacted, amylaceous material having a water content below 14 percent by weight based on the total composition in admixture with a rodenticidal concentration of a rodenticide.

2. A composition as claimed in claim 1, in which the rodenticide is selected from 3-(α -acetonylbenzyl)-4-hydroxycoumarin, 2-diphenylacetyl-1,3-indandione and the alkali metal, ammonia and amine salts thereof.

3. A composition as claimed in claim 2, in which the rodenticide comprises the sodium, potassium, trimethylamine, triethylamine, dimethylamine or propylamine salt of 2-diphenylacetyl-1,3-indandione.

4. A composition as claimed in any one of claims 1 to 3, in which the rodenticide comprises from 0.0005 to 0.1 percent by weight based on the total weight of the composition.

5. A composition as claimed in any one of the preceding claims, in which the amylaceous material comprises cereal flour, corn meal, oat meal, wheat flour, sorgum, waxy maize or mixtures thereof.

6. A composition as claimed in any one of claims 1 to 4 in which the amylaceous material comprises corn starch.

7. A composition as claimed in any one of the preceding claims in which the amylaceous material comprises a combination of corn meal and comminuted oats.

8. A composition as claimed in any one of the preceding claims in which the amylaceous material is in a finely divided particulate state.

9. A composition as claimed in claim 8, in which the amylaceous material is of a size capable of passing through a 50 to 100 mesh screen (U.S. Standard mesh).

10. A composition as claimed in any one of the preceding claims which also comprises a binding agent.

11. A composition as claimed in claim 10, in which the binding agent comprises sucrose,

dextrose, maltose, a dehydrated corn syrup, dextrin, a starch hydrolyzate, gelatin, guar gum, carboxymethyl cellulose or sodium alginate.

12. A composition as claimed in any one of the preceding claims which also comprises at least one flavoring agent.

13. A composition as claimed in claim 12 in which at least one flavoring agent comprises one or more of: fish meal, soya meal, whey solids, sugar, sodium chloride, monosodium glutamate, artificial meat flavor and artificial cheese flavor.

14. A composition as claimed in any one of the preceding claims which also comprises a preservative.

15. A composition as claimed in claim 14, in which the preservative comprises malathion, sodium benzoate or butylated hydroxytoluene.

16. A composition as claimed in any one of the preceding claims which is in pellet form.

17. A process for the preparation of the water-resistant rodenticide composition as claimed in any one of the preceding claims which comprises

(a) mixing a rodenticidal concentration of a rodenticide and amylaceous material to provide a blend;

(b) gelatinizing the amylaceous portion of the blend in the presence of sufficient water to provide a doughy mass;

(c) compacting the gelatinized blend; and

(d) drying the compacted product to a moisture content below 14 percent by weight.

18. A process as claimed in claim 17 in which the gelatinization is performed in the presence of from 15 to 25 percent water based on the weight of the blend.

19. A process as claimed in claim 17 or 18, in which gelatinization is carried out by heating under superatmospheric pressure to a temperature of from 215 to 350° F. for a sufficient time to disrupt the starch granules contained in the amylaceous material.

20. A process as claimed in claim 17 or 18, in which gelatinization is carried out by heating the blend to a temperature from 160 to 300° F. while subjecting said blend to mechanical shear.

21. A process as claimed in any one of claims 17 to 20 in which compacting comprises subjecting the gelatinized blend to mechanical pressure ranging from 15 to 25,000 pounds per square inch.

22. A rodenticide composition substantially as hereinbefore described with reference to any one of the foregoing examples.

23. A process for the preparation of a rodenticide composition substantially as hereinbefore described with reference to any one of the foregoing examples.

65

70

75

80

85

90

95

100

105

110

115

120

The ingredients are mixed into a uniform blend. Water in an amount sufficient to provide a total moisture content of about 15 percent by weight of the blend is added.

5 The resulting blend is then gelatinized by subjecting it to the action of a sigma blade blender at a temperature of about 210° F. for a period of about 2 hours. After this time the gelatinized product is placed in dies
10 to a mechanical pressure of about 25,000 pounds per square inch. The resulting compacted product is then dried to a moisture content of about 12 percent to yield the desired water-resistant rodenticide pellets.

15 **WHAT WE CLAIM IS:—**

1. A water-resistant rodenticide composition comprising a gelatinized, compacted, amylaceous material having a water content below 14 percent by weight based on the
20 total composition in admixture with a rodenticidal concentration of a rodenticide.

2. A composition as claimed in claim 1, in which the rodenticide is selected from 3-(α -acetonylbenzyl)-4-hydroxycoumarin, 2-diphenylacetyl-1,3-indandione and the
25 alkali metal, ammonia and amine salts thereof.

3. A composition as claimed in claim 2, in which the rodenticide comprises the sodium, potassium, trimethylamine, triethylamine, dimethylamine or propylamine salt of 2-diphenylacetyl-1,3-indandione.

4. A composition as claimed in any one of claims 1 to 3, in which the rodenticide
35 comprises from 0.0005 to 0.1 percent by weight based on the total weight of the composition.

5. A composition as claimed in any one of the preceding claims, in which the amylaceous material comprises cereal flour, corn meal, oat meal, wheat flour, sorgum, waxy
40 maize or mixtures thereof.

6. A composition as claimed in any one of claims 1 to 4 in which the amylaceous material comprises corn starch.

7. A composition as claimed in any one of the preceding claims in which the amylaceous material comprises a combination of corn meal and comminuted oats.

50 8. A composition as claimed in any one of the preceding claims in which the amylaceous material is in a finely divided particulate state.

9. A composition as claimed in claim 8, in which the amylaceous material is of a size capable of passing through a 50 to 100 mesh screen (U.S. Standard mesh).

10. A composition as claimed in any one of the preceding claims which also comprises
60 a binding agent.

11. A composition as claimed in claim 10, in which the binding agent comprises sucrose,

dextrose, maltose, a dehydrated corn syrup, dextrin, a starch hydrolyzate, gelatin, guar gum, carboxymethyl cellulose or sodium alginate.

12. A composition as claimed in any one of the preceding claims which also comprises at least one flavoring agent.

13. A composition as claimed in claim 12 in which at least one flavoring agent comprises one or more of: fish meal, soya meal, whey solids, sugar, sodium chloride, monosodium glutamate, artificial meat flavor and artificial cheese flavor.

14. A composition as claimed in any one of the preceding claims which also comprises a preservative.

15. A composition as claimed in claim 14, in which the preservative comprises malathion, sodium benzoate or butylated hydroxytoluene.

16. A composition as claimed in any one of the preceding claims which is in pellet form.

17. A process for the preparation of the water-resistant rodenticide composition as claimed in any one of the preceding claims which comprises

(a) mixing a rodenticidal concentration of a rodenticide and amylaceous material to provide a blend;

(b) gelatinizing the amylaceous portion of the blend in the presence of sufficient water to provide a doughy mass;

(c) compacting the gelatinized blend; and

(d) drying the compacted product to a moisture content below 14 percent by weight.

18. A process as claimed in claim 17 in which the gelatinization is performed in the presence of from 15 to 25 percent water based on the weight of the blend.

19. A process as claimed in claim 17 or 18, in which gelatinization is carried out by heating under superatmospheric pressure to a temperature of from 215 to 350° F. for a sufficient time to disrupt the starch granules contained in the amylaceous material.

20. A process as claimed in claim 17 or 18, in which gelatinization is carried out by heating the blend to a temperature from 160 to 300° F. while subjecting said blend to mechanical shear.

21. A process as claimed in any one of claims 17 to 20 in which compacting comprises subjecting the gelatinized blend to mechanical pressure ranging from 15 to 25,000 pounds per square inch.

22. A rodenticide composition substantially as hereinbefore described with reference to any one of the foregoing examples.

23. A process for the preparation of a rodenticide composition substantially as hereinbefore described with reference to any one of the foregoing examples.



1,393,427

5

5

W. P. THOMPSON & CO.,
12 Church Street,
Liverpool L1 3AB.
Chartered Patent Agents.

14

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1978.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from
which copies may be obtained.

