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COMPOSITION OF MATTER

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This invention relates to compositions of matter, and more particularly to mixtures of tetraethylthiuram monosulfide with a minor amount of tetraethylthiuram disulfide and to aqueous emulsions the dispersoid of which contains this mixture.

Tetraethylthiuram monosulfide is known to have value for various purposes in pest control, as more particularly set out in Australian Patent 8,103/32, British Patent 426,051, and U. S. Patents 1,972,961, 2,205,232, 2,206,520 and 2,227,496. A preferred manner of applying this compound, as more particularly set out in the British patent and the last two United States patents, is by including it in the dispersoid of an aqueous emulsion. These emulsions, however, have the disadvantage that on being exposed to low temperatures the tetraethylthiuram monosulfide separates out apparently due to crystallization. When this occurs the stability and usefulness of the emulsion are greatly impaired.

We have now found that mixtures of tetraethylthiuram monosulfide with minor amounts of tetraethylthiuram disulfide remain stable at comparatively low temperatures and that when incorporated in the dispersoid of an aqueous emulsion that the emulsion is stable at relatively low temperatures.

The mixtures of our invention may be obtained in any suitable manner as simply by mixing the two ingredients, but it is more convenient, in view of the fact that the monosulfide is commonly prepared by desulfurization of the disulfide, to obtain the mixtures by desulfurization of the disulfide with a deficiency of desulfurizing agent. Thus the mixtures of our invention may be obtained by desulfurizing tetraethylthiuram disulfide with sodium or potassium cyanide used in an amount insufficient completely to desulfurize the disulfide. Our invention is particularly useful in emulsions of the character described in U. S. Patent 2,206,520 in which the tetraethylthiuram monosulfide is dissolved in an equal quantity of coconut oil and the resulting solution emulsified with a substantially equal quantity of a casein-trisodium phosphate emulsifier solution composed of four parts trisodium phosphate dodecahydrate, 12 parts of casein and 150 parts of water, with or without about 2 parts of

sodium decyl sulfate to liquefy the emulsion. The data given in the following table illustrate the effect of varying amounts of the disulfide on the stability of such an emulsion at low temperature.

Table I

Per cent of disulfide	Extent of crystal formation after storage at 37° F. for—			
	24 hrs.	48 hrs.	72 hrs.	96 hrs.
EXP. A				
0.0	Slight			Heavy
0.2	do			Do.
1.0	None			Do.
2.0	do			Slight
5.0	do			Do.
EXP. B				
0.0	None		Heavy	
5.0	do		Trace	
10.0	do		None	
EXP. C				
Normal NaCN		Heavy		
10% deficiency		None		

From the above data the superior stability of the emulsion containing 10% of the disulfide is evident. This makes it possible to prepare a concentrated emulsion suitable for transportation which is sufficiently stable to withstand adverse temperature conditions.

While we have described our invention with reference to a particular emulsion it will be understood that the invention is not limited thereto. The effect of the disulfide is that of a pour-point depressant. It affects the monosulfide to make it fluid and pourable at relative low temperatures. It prevents crystallization at low temperature. The invention accordingly is useful in connection with any emulsion and is useful, moreover, wherever a fluid product, whether emulsion or not, is desired which is relatively stable against low temperatures.

The effect of the disulfide as a pour-point de-

pressant on the monosulfide is illustrated in the following table:

Table II

Per cent disulfide	State after storage at 37° F. for 48 hours	
		After stirring to induce crystallization
EXPERIMENT NO. 1		
0.0.....	Solid.....	
1.0.....	Fluid.....	Solid.
2.5.....	do.....	Do.
5.0.....	do.....	Do.
7.5.....	do.....	Fluid.
10.0.....	do.....	Do.
EXPERIMENT NO. 2		
0.0.....	Solid.....	
10.0.....	Fluid.....	Fluid.
25.0.....	do.....	Do.
33.3.....	Solid.....	
50.0.....	do.....	

The several embodiments of our invention illustrated above are given by way of illustration and not by way of limitation, and it is to be understood that variation may be made without departing from the spirit of the invention as long as the pour-point of tetraethylthiuram monosulfide is lowered by including therein a minor amount of tetraethylthiuram disulfide. In most applications we prefer to employ more than 5 per cent of the disulfide, although in some cases as little as 1 per cent exhibits the general characteristics of the invention. The upper limit is determined in a like manner by the fluidity of the products and preferably is not more than 10 per cent of the disulfide but suitably may range up to about 25 per cent..

While we have disclosed solubilized casein as the emulsifying agent, it will be understood that other protective colloids may be substituted therefor. Likewise, other wetting agents may be substituted for the sodium salt of the higher sulfated alcohols, or these materials may be omitted entirely. The coconut oil may be replaced by other oils which may or may not be solvents for the thiuram sulfide and in some cases the oil may be omitted. Other solvents may be employed.

We claim:

1. A composition of matter consisting in an aqueous emulsion the disperse phase of which contains tetraethylthiuram monosulfide in admixture with a minor amount of tetraethylthiuram disulfide sufficient to reduce the pour-point of the tetraethylthiuram monosulfide.
2. A composition of matter consisting in an aqueous emulsion the disperse phase of which contains tetraethylthiuram monosulfide and from about 5 to about 25 parts of tetraethyl thiuram disulfide for every 100 parts of the monosulfide.
3. A mixture consisting in tetraethyl thiuram monosulfide and a minor amount of tetraethylthiuram disulfide sufficient to reduce the pour-point of the tetraethylthiuram monosulfide.
4. A mixture consisting in tetraethylthiuram monosulfide and from about 5 to about 25 per cent tetraethylthiuram disulfide.
5. A composition of matter consisting in an aqueous emulsion the disperse phase of which contains tetraethylthiuram monosulfide and about 10 parts of tetraethylthiuram disulfide for every 100 parts of the monosulfide.
6. A mixture consisting in tetraethylthiuram monosulfide and about 10 per cent tetraethylthiuram disulfide.

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