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DIAMINE SOAP AS DISPERSANT IN MAGNETIC TAPE FORMULATIONS

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ABSTRACT OF THE DISCLOSURE

In making magnetic tapes and the like it is necessary to first form a dispersion of the magnetic particles in an organic solvent. The invention relates to the use of a long chain fatty acid diamine soap as the dispersing agent. This can be used alone or in admixture with lecithin.

This invention relates to magnetic recording tapes and, more particularly, relates to magnetic recording tapes wherein a novel fatty acid soap of a long chain diamine is used as a dispersing agent in forming a dispersion of the magnetic iron oxide utilized in making the recording tape.

In the manufacture of magnetic recording media wherein a dispersion of magnetic particles is held in a resinous binder on a substrate it is the universal practice to first prepare a dispersion of a magnetic iron oxide in an organic solvent and a surfactant. These materials are ordinarily ground together as in a ball mill for many hours or days with the other nonresin components of the binder such as carbon black, silicone oil, fungicides and the like in order to secure the best possible dispersion. The magnetic iron oxide tends to form clumps resulting in a tape having a low output and nonuniform response characteristics necessitating the long grinding time. To a large measure, it is the degree of dispersion which determines the ultimate quality of the tape. After the dispersion is produced, it is mixed with a solution of the resinous binder to produce the composition which is used as a coating. This mixture is then applied to a tape base and the solvent evaporated to produce the final recording medium.

In preparing the dispersion, it is universal practice to incorporate a surfactant or wetting agent in the mixture to reduce surface tension and permit the binder constituent to penetrate between particles of the magnetic iron oxide to aid in breaking up the particles and to prevent agglomeration of the particles. The commonly used agent for this purpose is lecithin which is not fully effective as a surfactant but which is the best material for this purpose heretofore found. It has now been found that if a fatty acid soap of a long chain diamine is incorporated in the dispersion, a superior dispersion is produced resulting in a tape having a high, uniform output. The diamine soap may be used to entirely replace the lecithin or can be used in conjunction with it. Ordinarily, the dispersant mixture contains at least 50% of the diamine soap in order to secure effective results.

In the following nonlimiting examples illustrating preferred embodiments of the invention, the novel dispersant was employed in conjunction with a polyurethane resin system. The particular polyurethane employed is sold under the trade name of Estane 5701 by B. F. Goodrich. This particular polyurethane was made by reacting p-p'-diphenylmethane diisocyanate, adipic acid and butanediol-1,4 in such proportions that all of the isocyanate groups have reacted to give a substantially unreactive polymer having the following characteristics:

Specific gravity	1.21
Hardness (Durometer A)	88
Tensile strength at 73.4° F. (p.s.i.)	5840
300% modulus at 73.4° F. (p.s.i.).	
Taber abrasion resistance (gram loss-CS17 wheel, 1000 gr./wheel, 500 rev.)	0.0025

This polyurethane resin can be used either alone or in combination with other resins such as a vinyl chloride-vinyl acetate copolymer. The particular copolymer selected is one sold under the trade name VAGH by Union Carbide and Chemical Corporation. This particular vinyl chloride-vinyl acetate copolymer contains approximately: 91% vinyl chloride; 3% vinyl acetate; 6% vinyl alcohol.

This copolymer has an intrinsic viscosity in cyclohexanone at 20° C. of 0.57 c.p.s. and a specific gravity of 1.39.

However, it should be understood that the employment of these particular resin mixtures is for illustration purposes only, and that the crux of the present invention is the employment of a novel dispersing system for dispersing a magnetic iron oxide in an organic solvent which is then added to a solution of the selected resin. Thus, the novel dispersing system of the present invention could be used with any resin system.

In accordance with the present invention, a novel fatty acid soap of a long chain diamine is employed to replace all or part of the licithin which is normally used in preparing dispersions of magnetic iron oxides. One particularly suitable fatty acid soap is sold under the trade name Troykyd 98C, and this is a soap made by reacting stoichiometric amounts of a saturated fatty acid having from 12 to 18 carbon atoms and a diamine having from 12 to 18 carbon atoms in each chain. Troykyd 98C has a molecular weight of about 490. As the following examples show, this can be effectively combined with lecithin for use as a dispersant or it can be used along as a dispersant.

The following nonlimiting examples illustrate preferred embodiments of the invention:

EXAMPLE I

	Percent solids volume
1. Magnetic oxide	42.0
2. Conductive carbon black	7.9
3. Lecithin	2.4
4. "Troykyd 98C"	5.4
5. Additives [1]	4.9
6. Binder (20% VAGH-80% Estane 5701)	37.4
	100.0

[1] Silicone oil, fungicides.

Components 1 to 5 are dispersed in a pebble-mill using appropriate amounts of methylethyl ketone, methylisobutyl ketone and toluol for 48 hours. At the end of this grinding period a solution of the binder in similar solvents is added and grinding is continued for 24 hours. This mixture is then coated on a plastic base and dried.

EXAMPLE II

	Percent solids volume
1. Magnetic oxide	41.6
2. Conductive carbon black	7.8
3. Lecithin	4.0
4. "Troykyd 98C"	4.0
5. Additives [1]	5.2
6. Binder (30% VAGH-70% Estane 5701)	37.4
	100.0

[1] Silicone oil, fungicides.

The dispersion and coating of this example is the same as Example I.

EXAMPLE III

	Percent solids volume
1. Magnetic oxide	43.8
2. Conductive carbon black	7.8
3. "Troykyd 98C"	9.1
4. Additives [1]	2.6
5. Binder (Estane 5701)	36.7
	100.0

[1] Silicone oil, fungicides.

The dispersion and coating of this example is the same as Example I. Tapes made in accordance with these examples were tested and found to have a high output, low noise and a long still frame time. There was little decrease in still frame time after storage for 16 hours at 130° F. and 85% relative humidity.

I claim:

1. In the forming of a dispersion of a magnetic iron oxide in an organic solvent as a preliminary step in manufacturing a magnetic recording tape or the like, the improvement consisting essentially of employing as a dispersing agent a diamine soap having a molecular weight of about 490; said soap being made from a fatty acid having 12 to 18 carbon atoms and a diamine having from 12 to 18 carbon atoms in each chain.

2. The process of claim **1** wherein the dispersant comprises a mixture of the long chain fatty acid-diamine soap and lecithin, wherein the amine soap constitutes at least one half of the dispersant.

References Cited

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