

HEAT-SENSITIVE RECORDING MATERIAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a heat-sensitive recording material which is superior in light resistance, weather resistance, oil resistance, and optical readability in the near infrared region.

2. Prior Art

In general, a heat-sensitive recording sheet is produced by applying a support, such as paper, synthetic paper, film, plastic, etc., the coating which is prepared by individually grinding and dispersing colorless chromogenic dyestuff and an organic color-developing agent, such as phenolic material, etc. into fine particles, mixing the resultant dispersion with each other and then adding thereto binder, filler, sensitizer, slipping agent and other auxiliaries. The coating, when heated by thermal per, thermal head, hot stamp, laser beam, etc., undergoes instantaneously a chemical reaction which forms a color. These heat-sensitive recording sheets have now been finding a wide range of applications, including industrial measurement recording instruments, terminal printers of computer, facsimile equipments, automatic ticket vending machines, printer for bar-code-label, and so on. In recent years, as the applications of such recording is diversified and the performance of such recording equipment is enhanced, high qualities are required for heat-sensitive recording sheets. For example, even with small heat energy in a high speed recoding, both the clear image with a high density and the better preservability such as better resistance to light, weather and oil, etc. are required. These heat-sensitive recording sheets are also utilized as thermosensitive labels. Since, however, color formation in these recording sheets is in the visible region, they cannot be adapted for reading by a semiconductor laser in the near infrared region which is widely used as a bar code scanner in a POS system, etc.

On the other hand, Japanese Laid-Open Patent Publication Nos. 59-199757 and 60-226871 disclose a heat-sensitive recording sheet containing a combination of a conventional color developing agent (phenolic resin, hydroxybenzoate and bisphenol-A) a fluorene-type leuco dyestuff having excellent color-developing ability in the near infrared region.

However, these heat-sensitive recording sheets have a remarkably inferior stability (inferior resistance to light, weather and oils) of the recorded image. Hence, in long storage under condition of exposure to light, moisture, etc., the recorded image is discolored, the image density is reduced, and sometimes the image disappears, which deteriorates a optical readability in near infrared region. By the adhesion of serum, or by contact with plasticizer (DOP, DOA etc.) in wrapping film, such as vinyl chloride film, the image density is prominently lowered or the recorded image disappears, which causes a remarkable reduction of a optical readability in the near infrared region. In view of above defects, the practical use of these heat-sensitive recording sheets was difficult.

SUMMARY OF THE INVENTION

It is the object of this invention to provide a heat-sensitive recording material which is superior in optical readability in the near infrared region.

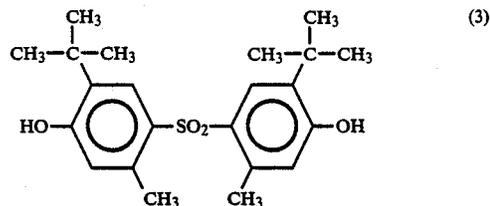
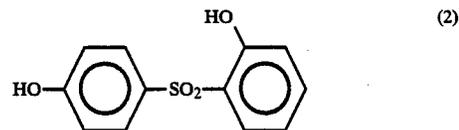
It is the another object of this invention to provide a heat-sensitive recording material which is better in light resistance, weather resistance and oil resistance.

The above problems are solved as follows.

The heat-sensitive recording material of this invention is superior in optical readability in the near infrared region; better in light resistance, oil resistance, weather resistance (which provides a material having superior preservability); usable under severe conditions in bar-code-label, etc. heat-sensitive recording material is produced by using a support with a color-developing layer which contains as main ingredient a colorless or pale colored basic chromogenic dyestuff and an organic color-developing agent, said color-developing layer comprising as said organic color-developing agent at least one substance selected from the group consisting of 2,4,-dihydroxydiphenylsulfone and bis-(3-tert-butyl-4-hydroxy-6-methylphenyl) sulfone and as said colorless basic chromogenic dyestuff 3,6,6'-tris-(dimethylamino)spiro[fluorene-9,3'-phthalide].

DETAILED DESCRIPTION OF THE INVENTION

Among the organic color-developing agent of this invention, 2,4'-dihydroxydiphenylsulfone (melting point of 181°-183° C.) are well known, while bis-(3-tert-butyl-4-hydroxy-6-methylphenyl)sulfone is a new organic color-developing agent described in Japanese Laid-Open Patent Publication No. 61-230983 (Japanese Patent Application No. 60-73824). The above organic color-developing agents have following structural formulae:



The above organic color-developing agents have a common molecular structure, in which two phenol rings are bound with sulfone group.

The effects of this invention considers to be produced by such structural features.

In the explanation of above general formulae (I) and (II), the term "lower" for defining alkyl group and alkoxy group, usually represents those groups containing from 1 to 5 carbon atoms. And alkyl group and alkoxy group may be linear or branched.