AnaJet, Inc.

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Health Considerations For Formaldehyde on Dark Colored Garments Treated With AnaJet Pretreatment Solution

Summary

The amount of residual formaldehyde on a dark garment printed with an AnaJet system is significantly below the acceptable limits established by domestic and foreign government agencies. In short, the residual formaldehyde level is about 14.7PPM while the most stringent governmental standard allows 70PPM.

Introduction

In answer to health concerns about residual formaldehyde in dark garments after pretreatment of the garment and completion of printing, consider the following:

All organic life forms – humans, bacteria, plants, fish, dogs and cats produce formaldehyde. (1) The air we breathe contains 1 to 68 parts-per-billion of formaldehyde. Humans inhale it, exhale it and eat it in fruits and vegetables. In fact, the average person produces about 1.5 ounces of formaldehyde each day as part of normal metabolic processes.

Formaldehyde is normally present in human blood at a low steady-state concentration of approximately 1 to 2 parts-per-million (ppm). Formaldehyde does not accumulate in the environment or within plants, animals or people, as it quickly breaks down in the body and the atmosphere. Formaldehyde exists all around us naturally. It degrades in the presence of sunlight to CO_2 and H_2O. Animals readily metabolize formaldehyde using an enzyme called aldehyde dehydrogenase (ADH).

Formaldehyde is not easily absorbed thru the skin, however, the adverse effects of formaldehyde in textiles are likely to be skin irritation (2).

(For information about handling of pretreatment solution by equipment operators, please consult the AnaJet MSDS document.)

Discussion

Since the concern for the printed garment user is not the amount of formaldehyde in the pretreatment solution or the concentration in the air during pretreatment or garment printing, but how much is on the printed garment, the better metric is a weight ratio. That is milligrams of formaldehyde per kilogram of garment (mg/kg) and this metric is commonly used in most studies of governmental regulations. It is sometimes stated as parts per million (ppm).

In the European and other countries this weight measure is used and the most stringent acceptable level of formaldehyde on garments are (3):

Textiles for babies under 2 years old: 20 mg/kg maximum, or 20 ppm.

Textiles in direct skin contact: 75 mg/kg maximum, or 70 ppm.

Textiles not in direct skin contact: 300 mg/kg maximum, or 300 ppm

In France, Finland and Norway the allowable limits are higher for direct skin contact, 100 mg/kg (3). In Finland, Norway, and New Zealand the limits are higher for babies, 30 mg/kg.

We have measured the typical amount of pretreatment solution (AnaBright Pretreatment Solution P/N ABA-PRE1) applied to an adult t-shirt over an area of approximately 12 by 16 inches per AnaJet recommended application procedure and it contained less than 3.6 mg of formaldehyde for a 245 gm t-shirt or 14.7 mg/kg. This is 14.7 ppm. This ratio of 14.7 mg/kg would also be true for a baby t-shirt since the amount of pretreatment will scale with the size of the shirt. **So the level of formaldehyde present in AnaJet printed dark garments is much below the stringent governmental allowed level.**

These weights are for a wet pretreated t-shirt. Some of the formaldehyde is driven out by the heat press post print drying, resulting in an even lower concentration.

These numbers do not include the formaldehyde that might be in the t-shirt as received from the manufacturer. However, formaldehyde is found most often in synthetic fabrics, synthetic blends and wrinkle resistant fabrics (4), while the fabric materials recommended for AnaJet Apparel Printers are 100% cotton or cotton blends.

In the United States OSHA regulations for protective clothing equipment apply to concentration in liquids greater than 1% for skin contact and 0.1% for eye contact (5). AnaJet's pretreatment contains less than 0.01% formaldehyde by weight when diluted to the recommended concentration of 50% solution to 50% water.

The OSHA guidelines for airborne exposure are not applicable to finished garments since the pretreatment is fixed in the garments. For reference those airborne exposure limits are as follows (5):

The OSHA Time Weighted Average (TWA) exposure for an airborne concentration of formaldehyde is 0.75 parts formaldehyde per million parts of air (0.75 ppm) as an 8-hour TWA.

The OSHA Short Term Exposure Limit (STEL) for an airborne concentration of formaldehyde is two parts formaldehyde per million parts of air (2 ppm) as a 15-minute STEL.

Bibliography

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3. **New Zealand Consumer Affairs.** http://www.consumeraffairs.govt.nz/policylawresearch/product-safety-law/proposed-statement/proposed-policy-statement.pdf. *Proposed Government Product Safety Policy Statement on Acceptable Limits of Formaldehyde in Clothing and Other Textiles.* [Online] November 26, 2007.

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