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ORGANIC PIGMENTS IN PLASTICS CAN CAUSE ALLERGIC CONTACT DERMATITIS

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ABSTRACT
A short review on organic pigments in plastics as a cause of allergic contact dermatitis is presented. Previously, organic pigments have been reported as provoking allergic pigmented contact dermatitis when used in cosmetics. Here we present the case of a patient who developed allergic contact dermatitis from an organic pigment (Irgalite Orange F2G) in a plastic glove. This shows that organic pigments in plastics can also cause allergic contact dermatitis. The potential sensitizing capacity of organic pigments should be noted.

Key words: organic pigment - plastic - colourant - gloves - Pigment Orange 34 - Irgalite Orange F2G - additives in plastics - occupational dermatosis - allergic contact dermatitis - occupational allergy

1. INTRODUCTION

Pigments are inert, stable colourants, and unlike dyes, insoluble in the medium in which they are used. Both inorganic and organic pigments are used in plastics. Compared to the inoranic, organic pigments generally have superior brilliance and tinctorial strength, smaller particle size, but lower resistance to heat and light (1).

Organic pigments are used not only in plastics but also in coatings, e.g. paints, and printing inks, in cosmetics, e.g. lipsticks, and in the colouring of rubber. In the textile industry, organic pigments are used in pigment printing using a resin binder, or in certain pastes used in textile printing (2).

2. CONTACT ALLERGY CAUSED BY ORGANIC PIGMENTS IN PLASTICS

An organic pigment (C.I. Pigment Red, C.I. 15800) in cosmetics has been reported to provoke allergic pigmented contact dermatitis (3,4). We have not found any other reports of allergic contact dermatitis due to organic pigments in plastics apart from our own which is reported more fully elsewhere (5).
Our patient was a female cleaner, who had previously been sensitized to her rubber gloves. Becaused of rubber sensitivity the patient had used unlined plastic gloves, and within a year a new phase of typical sharpbordered glove eczema was found on her hands and arms. She had worn the gloves without inner gloves.

A patch test with the patient´s polyvinyl chloride (PVC) plastic glove produced a weak allergic reaction. Testing with the individual components of the glove´s material gave no allergic reactions, except for the pigment which showed two plus (2+) allergic reactions at concentrations of 2% and 0.5% in petrolatum.

The sensitizing pigment in our case (5) was Irgalite Orange F2G manufactured by Ciba-Geigy. It is also sold under many other trade names (table 1). The generic name of the pigment is C.I. Pigment Orange 34, and the constitution number is C.I. 21115. The chemical structure is seen in Fig. 1.

Pigment Orange 34 is based on 3,3´-dichlorobenzidine, and the coupling agent is phenyl methyl pyrazolone. It belongs to the disazo pigments, and is also known as a pyrazolone orange (1).

Pyrazolone oranges are low in cost and have good strength, but poor lightfastness and bleed resistance (7). Bleeding of the pigment and the poor state of the skin after contact dermatitis obviously promoted the development of sensitivity in this case.

Pyrazolone oranges can also be used in plastics other than PVC, e.g. cellulosic, polyethylene, polystyrene, phenolic, and polyester plastics (1). These disazo pigments are also widely used in the manufacture of printing inks and in the mass colouration of rubber(2).

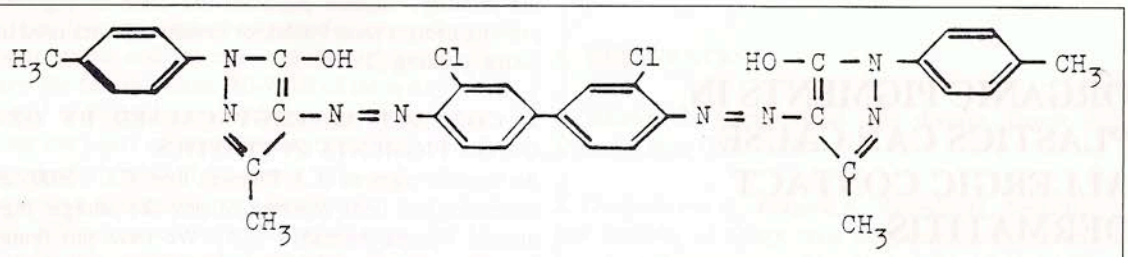

Fig. 1: Chemical structure of Irgalite Orange F2G (C.I. Pigments Orange 34, C.I. 21115) (6)

Table 1.

Trade names of C.I. Pigment Orange 34 (C.I. 21115) (6)
(The names of manufacturers are listed in Corour Index)

Aquarine Orange ONW
Benzidine Fast Orange 600
Diarylide Orange BO-55, BO-55D
Fanchon Orange YB-5834, YB-5835
Helio Fast Orange GR
Iragon Orange P-4S
Irgalite Orange F2G, F2GX
Irgaphor Orange R2G
Isol Diaryl Orange GT 7592, GX 7591
Light Orange JFG
Majestic ORange X-3082
Novopern Orange HL
Orange B, BS, BY
PV-Orange RL
Roma Pigment Orange B, BS, By
Romasperse Orange BA, BSA
Sanyo Pigment Orange FL
Sico Fast Orange D2850, K2850
Tinolite Orange MG
Unisperse Orange G-P

3. DISCUSSION

Plastics consist of large molecules, polymers (usually synthetic), and other ingredients, such as fillers, colourants and plasticizers. Plastics normally only produce allergic contact dermatitis when monomers or other starting materials, or semicured products are handled. In general completely cured synthetic polymers are not allergenic. Exceptions are urea formaldehyde polymers which give off formaldehyde. Plastics, however, can contain leachable additives causing contact allergy (8). This report shows that organic pigments are among these potentially sensitizing leachable additives in plastics.

The same organic pigments can be used in both plastics and rubbers (2). Organic pigments could be one explanation for those cases of plastic and rubber glove eczema in which only the materials of the paricular glove concerned have given positive patch test reactions (9,10).

A patient who had allergic reactions in epicutaneous testing with a dye used in plastics, produced negative patch test reactions with finished plastic products, obsiously owing to the fact that the dye was completely embedded in the plastic material (11). Thus only organic pigments (and dyes) which are completely fixed in the plastic materials should be used. If possible, the colourants should also be included in the patch test series whenever positive reactions to any plastic materials have been obtained.

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