

Analysis of migration of medicinal ingredients in pain relief patch to the backing film by thermal desorption GC/MS

[Background] It is of great interest to study the migration of constituents of foods and pharmaceuticals into plastic packages, and vice versa. Here, migration of medicinal ingredients in a pain relief patch into the backing film was studied by thermal desorption (TD)-GC/MS to explore effective backing materials for a longer shelf life .

[Experimental] Pyrolysis-GC/MS system with a Multi-Shot Pyrolyzer (EGA/PY-3030D) directly interfaced to the GC injector was used. A commercial pain relief patch (4.4 cm x 6.5 cm) was used (labeled active ingredients: 10 g of methyl salicylate and 3 g of *L*-menthol in 100 g of medicinal gel). First, a standard ethanol solution of each active ingredient was analyzed by TD-GC/MS and a calibration curved was created. Next, using the created calibration curves, the amount of active ingredients in the original patch was determined by solvent extraction with ethanol using small piece of the patch (2 mm x 4 mm). Then, the pain relief patch was affixed to a 20 µm-thick backing film, polypropylene (PP) or polyethylene terephthalate (PET), wrapped in aluminum foil for a fixed period of time (1 to 24 h) at room temperature (25 - 27 °C). The amounts of the active ingredients migrated into the backing films were directly determined by TD-GC/MS using a 2 mm x 5 mm piece of the backing film. The determined amounts of active ingredients were normalized for unit area of samples and the degree of migration (%) was calculated from the ratio of the amounts determined before and after the patch was affixed to the backing film.

[Results] Fig. 1 shows the TD chromatogram of the PP film after affixing the patch and holding it for 20 h at room temperature. The percent migrations of methyl salicylate and *L*-menthol transported to the PP and PET films are shown in Fig. 2 and Fig. 3, respectively. The analysis shows that the PET film has a high migration barrier for methyl salicylate and *L*-menthol, when compared with that obtained with the PP film.

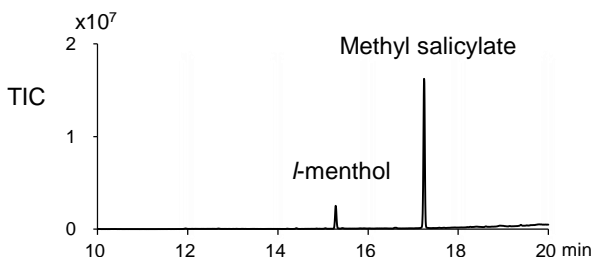


Fig. 1 TD chromatogram of PP film after 20 h contact

Furnace temp.: 100 – 200 °C (50 °C/min, 2 min), Split ratio: 1/50,
GC oven temp.: 40 °C (2 min) – 230 °C (20 °C/min, 5 min)
Separation column: Ultra ALLOY-FFAP (PEG20M: nitro-TPA ester),
L: 30 m, i.d.: 0.25 mm, df: 0.5 µm, Column flow rate: 1 mL/min,
Sample amount: 1.2 mg

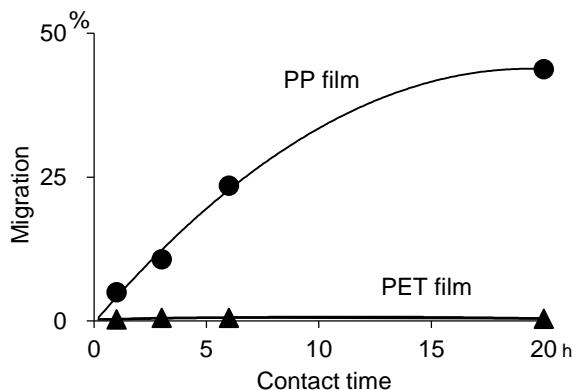


Fig. 2 Percent migration of methyl salicylate

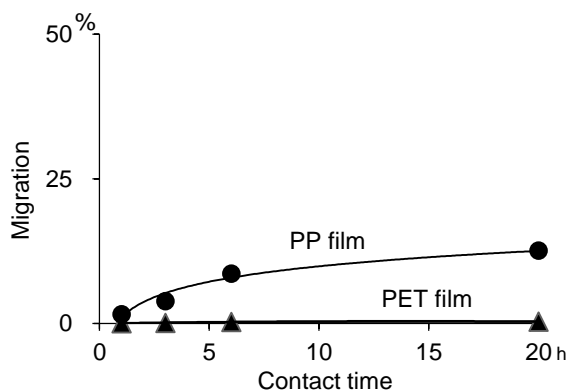


Fig. 3 Percent migration of *L*-menthol

Keywords : Medicinal ingredient, Polypropylene, Polyethylene terephthalate, Thermal desorption-GC/MS

Products used : Multi-functional pyrolyzer, UA-FFAP, Vent-free GC/MS adapter

Applications : Film manufacturer, Food industry, General polymer analysis

Related technical notes : [PYA1-025E](#), [PYA1-052E](#), [PYA1-055E](#)

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