

Background

Food packaging produced using waste paper can be contaminated with undesirable substances that may be transferred to the packed food. Under Article 3 (1) of Regulation (EC) No 1935/2004 of the European Parliament and of the Council of 27 October 2004 on materials and articles intended to come into contact with food, food packaging materials must be manufactured in accordance with good manufacturing practice so that, under normal or foreseeable conditions of use, they do not transfer their constituents to food in quantities which could endanger human health or bring about an unacceptable change in the composition of the food.

The 4th draft of the 22nd Ordinance amending the Commodities Ordinance (Mineral Oil Ordinance) of 07.03.2017 provides maximum quantities for the transition of MOAH from food contact materials and articles made of paper, cardboard or paperboard produced using waste paper. According to this, food contact materials and articles may only be placed on the market if the maximum level of 0.5 mg/kg of food is observed for the transition from MOAH (if necessary, by using a functional barrier). Up to this level, a transition is deemed not to have taken place and a functional barrier is considered suitable. The draft is currently in the notification process in Germany.

Barrier films or multi-layer films are often used today to prevent the undesirable transfer of MOAH and other unwanted substances from the packaging material to the foodstuffs packaged in it.

It must be checked in advance if the film to be used represents a barrier to migratory substances. To test the barrier properties of the film, migration can be simulated with selected model substances typically found in newspaper printing. Alternatively, a test to check the migration of mineral oil can be conducted if the focus is solely on the migration of mineral oil constituents.

Method for Migration Testing

The migration is carried out in accordance with DIN EN 14338 and DIN-SPEC 5010 to determine the transition of paper and cardboard by using modified polyphenylene oxides (MPPO) as a simulant. The surface of the test sample (food contact side) is coated with MPPO (Tenax©) and stored at the desired time and temperature test conditions. After storage, the mineral oil hydrocarbons absorbed on Tenax© are extracted with an organic solvent. Afterwards the HCs are determined by means of LC-GC/FID. The normal phase HPLC separates the MOSH fraction from the MOAH fraction. The respective fraction (MOSH/MOAH) is then detected by FID. Quantification is performed using the internal standard added before extraction.

Method for Barrier Testing with Gravex 913

A migration test is carried out in accordance with SVI Guideline 2015.01_internal bags [1] and DIN SPEC 5010.

A paper (donor) impregnated with surrogate substances (different polarities) or mineral oil is placed in a stainless steel migration cell and the barrier to be tested is placed underneath. 4 g Tenax© is used as absorption material (no direct contact of barrier with Tenax©, test setup see Figure 1). The tightly closed migration cell is then stored for a defined duration and at a defined temperature (adapted to the best before date of the packaged food, if necessary calculated according to the Arrhenius equation to perform the test at elevated temperature and thus reduce the test duration).

After storage the Tenax© is extracted and the extract is tested by GC-MS for surrogate substances or by online HPLC-GC-FID for mineral oil. In addition to a double determination of the sample, a positive control (instead of the barrier, permeable paper is used) and a negative control (aluminium used as a barrier) are also included. After evaluation of all tests the percentage of surrogate substances or mineral oil which migrated through the barrier is reported.

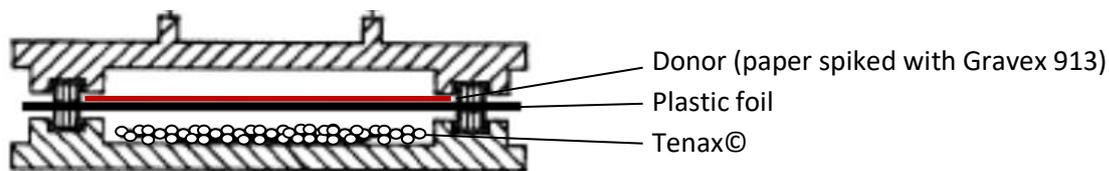


Figure 1: Experimental design



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