

Technical Bulletin

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New ISO test method ISO 16190: 2021 for the determination of PAHs in Footwear materials is now published

In November 2021, the International Organization for Standardization (ISO) published the standard of ISO 16190:2021 for the determination of Polycyclic Aromatic Hydrocarbons (PAHs) in footwear materials.

The standard was prepared by Technical Committee ISO/TC 216, *Footwear*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 309, *Footwear*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement). This current edition cancels and replaces the first edition Technical Specification ISO/TS 16190: 2013 which has been technically revised.

The new test method is now aligned with EN 17132 and AfPS GS 2019:01 PAK in terms of the extraction procedure.

The most important change is that the extraction solvent is changed from n-hexane to toluene that will lead to more comparable results. Researchers found toluene as better extraction solvent over n-hexane for environmental sample as toluene is aromatic compound and more capable to disrupt solute-matrix interaction than n-hexane.

According to the new standard, a test sample is extracted using toluene in an ultrasonic bath, an aliquot is then analyzed using a gas chromatograph with mass selective detector (GC-MS).

The changes compared with the previous edition are as follows:

- the Introduction has been added;
- in the Scope, editorial changes have been made and a note has been added;
- the Normative references have been updated;
- Clause 3 “Terms and definitions” has been added and the following clauses have been renumbered;
- Clause 5 “Reagents” has been renamed and major technical changes have been made;
- Clause 6 “Apparatus” has been renamed, further equipment has been added and further minor technical changes have been made;
- Clause 7 “Sample preparation” has been added, which has been mainly taken from ISO/TS 16190: 2013, 6.2, and the following clauses have been renumbered;
- in Clause 8 “Procedure”, major technical changes and editorial changes have been made;
- Clause 9 “Expression of results” has been renamed and subclause headings have been added;
 - 9.1.2 “When a sum of PAH is requested” has been added;
 - In 9.2 “Performance of the test method”, the limit of quantification has been changed;
- in Clause 10 g), the option to state a sum of PAH has been added;
- Annex A has been added.

Polycyclic Aromatic Hydrocarbons (PAHs)

What is it?

PAHs are organic pollutants and consist of two or more fused aromatic rings of carbon and hydrogen atoms, which can be colourless, white, or pale-yellow solid compounds. Depending on their molecular weight, they are emitted either as gaseous phase (low molecular weight) or in the particulate form (higher molecular weight).

Sources

Known sources of PAHs in footwear materials (such as rubber and flexible plastics e.g., PVC, coated leather, artificial leather) are extender oils and carbon black which may unintentionally contain various levels of PAHs. Carbon black is used as reinforcing filler in rubber formulations or as pigment in plastics, whereas extender oils are used as plasticizer oils/softeners.

Potential health hazard

Many PAHs are mutagenic, carcinogenic (Benzo(a)pyrene is considered one of the most carcinogenic), teratogenic, and immunotoxic. High prenatal PAH exposure is connected to a low IQ and increased behavioural problems in the early-age child.