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Bisphenols: Analysis, Assessment and Compliance

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What are bisphenols and why are some of them a health and regulatory concern?

Bisphenols are a group of substances commonly used as monomers in the manufacture of various plastics and coatings, such as polycarbonates and epoxy resins. Due to their versatile technical properties, they are used in a wide range of food contact materials, including packaging, coatings, printing inks and adhesives. Bisphenols share a characteristic structure consisting of two phenol rings linked via a single bridging atom. The bridging atom can vary its chemical composition (Fig. 1). Different structures of the bridging group give rise to different bisphenols, for example bisphenol A (BPA, $X=C(CH_3)_2$), bisphenol S (BPS, $X=SO_2$) and bisphenol F (BPF, $X=CH_2$).

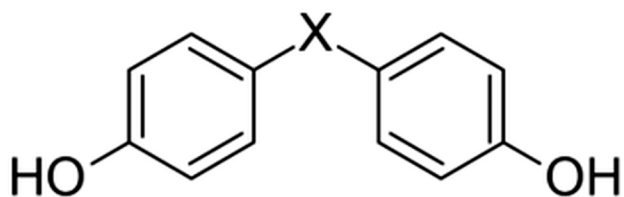


Fig. 1: General structure of a bisphenol. X represents a bridging group that links the two phenyl rings through a single atom. This bridging atom may carry various substituents.

Bisphenols can migrate from food contact materials into food and thereby be ingested by humans. Their health relevance is primarily based on their ability to interact with the endocrine system. Scientific studies have shown that in particular BPA has hormone-like properties and can interfere with biological regulatory mechanisms. Therefore, some bisphenols have been classified as reproductive toxicants or are considered as endocrine disruptors. They can mimic or disrupt the natural action of hormones and are consequently the subject of increased scientific and regulatory assessment. These findings have led to toxicological re-evaluations of certain bisphenols and to a significant tightening of regulatory requirements in Europe and, among other countries, in Switzerland.

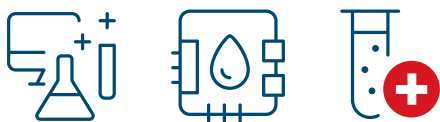
Regulation of bisphenols

With Regulation (EU) 2024/3190, the requirements for bisphenols in food contact materials have become significantly more stringent. The regulation not only addresses BPA but also covers other hazardous bisphenols and bisphenol derivatives that are classified as reproductive toxicants, mutagens, carcinogens, or endocrine disruptors.

The aim of the regulation is to further reduce consumer exposure to bisphenols originating from food contact materials. As a result, the use of BPA and other hazardous bisphenols is prohibited or severely restricted in many applications. At the same time, the regulation is intended to prevent BPA from simply being replaced by alternative bisphenols that may possess similar harmful properties. The current Swiss Regulation on Food Contact Materials also refers to the requirements of Regulation (EU) 2024/3190 for BPA and other hazardous bisphenols.

A particular challenge is presented by recycled materials, where bisphenols may be unintentionally present in recycling streams as a result of their historical use. Such residues in recycled materials are generally not considered as an intentional use of BPA and therefore do not fall under the use prohibition established by the regulation. Nevertheless, food contact materials must continue to comply with the safety and compliance requirements set out in Regulation (EC) No 1935/2004.

To demonstrate compliance, the regulation sets stringent analytical requirements. The absence of BPA, hazardous bisphenols, and hazardous bisphenol derivatives must be verified using analytical methods capable of achieving a limit of detection of 1 µg/kg material. Testing is performed using an appropriate extraction procedure that enables a comprehensive assessment of the material under investigation.



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Since the amendment of February 2026, Regulation (EU) 2024/3190 refers to Regulation (EC) No 1272/2008 (CLP Regulation) for the definition and classification of hazardous bisphenols. Bisphenols classified in Part 3 of Annex VI to the CLP as CMR substances (carcinogenic, mutagenic or toxic to reproduction) or as endocrine disruptors must be treated and regulated in the same way as BPA.

According to the July 2026 update, this includes in particular bisphenol S (BPS), bisphenol AF (BPAF) and 4,4'-(1,3-dimethylbutylidene)diphenol (CAS 6807-17-6). Tetrabromobisphenol A (TBBPA) is also covered by the regulation, although it is currently of less practical relevance for food contact materials.

Suitable analytical methods are already available for the bisphenols considered currently relevant. In addition, other bisphenols such as BPF and BPB can also be determined, meaning that the analytical approach is already designed to accommodate possible future regulatory extensions.

Analysis

The determination of bisphenol compounds is performed using highly sensitive **LC-MS/MS analysis** on a **SCIEX 7500** system. With an instrumental detection limit (LOD) of **1 ng/mL**, the method enables reliable trace-level detection and quantification. The achievable detection limit in the test material depends on the matrix and the sample preparation procedure.

Our analytical portfolio includes the determination of BPA, BPS, BPF, BPB, BPAF and 4,4'-(1,3-dimethylbutylidene)diphenol. The methods used are continuously reviewed and further developed in accordance with the latest scientific findings and evolving regulatory requirements.

Sample preparation

For reliable determination of bisphenols, the sample material is homogenized prior to analysis. Depending on the material, this is achieved either by grinding in a ball mill under cryogenic conditions ("CryoMill") or by cutting the sample into smaller pieces. The analytes are subsequently extracted with acetonitrile under optimized conditions to ensure the most complete possible release from the matrix.

Upon request, the extraction conditions can be adapted to meet specific requirements. However, it should be noted that the limit refers to a content determination and therefore the extraction procedure should be as exhaustive as possible.

Liquid inks and varnishes can only be analyzed after drying or curing. Dried coating samples can be examined provided that the matrix is sufficiently resistant to the extraction conditions, and that only low levels of bisphenols are expected. Drying or curing should be carried out by the customer under the intended conditions of use to ensure that the analyzed material is representative of the final application.

Method validation

Our analytical method has been validated for various migration and extraction media.

Even in samples containing high levels of BADGE (bisphenol A diglycidyl ether) or other epoxy derivatives, the method provides accurate and reliable determination of bisphenols without relevant interferences.

For challenging matrices, such as food, oil-rich samples, materials containing high concentrations of epoxy derivatives, or other potentially interfering components, the applicability of the method can be verified on a case-by-case basis where necessary.

For any questions, please contact us at fcm@sqts.ch

References

EU 2024/3190

Commission Regulation (EU) 2024/3190 of 19 December 2024, in the consolidated version of 23 February 2026, amended or corrected by Commission Regulation (EU) 2026/250 of 2 February 2026.

C/2025/6721

Guidelines for the implementation of Commission Regulation (EU) 2024/3190 on the use of bisphenol A (BPA) and other bisphenols and bisphenol derivatives with harmonised classification for specific hazardous properties in certain materials and articles intended to come into contact with food. 17 December 2025.