



FEATURED PRODUCT

Thermal paper developers

Thermal paper is a special fine type of printing paper which will change colour when exposed to heat. It is extensively used in inexpensive devices such as credit card terminals.¹

The paper is coated with a dye and a developer, which change colour when exposed to heat. The colour former - often a pH sensitive leuco dye² - will shift to black or various colors when the matrix solidifies.

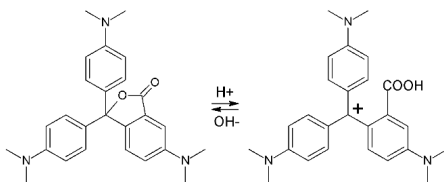


Figure 1: Transformation between leuco and a coloured form of crystal violet lactone



Thermal paper developers

The developer should be slightly acidic, and the substance predominantly used has been bisphenol A (BPA) because of its stability and heat resistance.

However, concerns raised surrounding the endocrine disrupting properties of BPA have led to replacements being produced.² The most popular up until recently has been bisphenol S (BPS). However, this compound has also raised concern and was added to the list of Substances of Very High Concern (SVHC) in January 2023 (as 4,4'-sulphonyldiphenol).

Several alternative compounds have been suggested and applied in recent years. Among them the sulfonamide compound Pergafast® 201 (3-(3-Tosylureido)phenyl 4-Methylbenzenesulfonate).

In the German market, Pergafast® 201 appears to have become the major substituent for BPA as a thermal paper developer. It is the dominating developer in tickets (e.g., for public traffic offences), which are usually of a higher paper quality. Other similar compounds like BTUM (4,4'-Bis(p-toluenesulfonylamino)carbonylamino)diphenylmethane) and the Urea-urethane complex UU have been used. Also, several BPS derivatives have been used or are proposed.

A 2018/2019 German market analysis (Eckardt et al.¹) states that the use of BPA has been falling since 2017. Today the major chemical in thermal papers is BPS, in place of BPA. Other BPS derivatives known as D8, D-90, BPS-MAE and TGSA (found mainly in adhesive labels) have also been growing steadily since 2017.

Major applications of Bisphenol A



VARIOUS POLYMERS:
POLYCARBONATES,
EPOXY RESINS,
POLYACRYLATES



**THERMAL
PAPER**



**DENTAL
RESINS**



**MINOR APPLICATIONS
INCLUDE USE IN
STABILIZERS
IN FLUIDS**

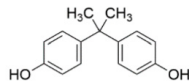


Figure 2: Bisphenol A (BPA)

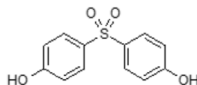


Figure 3: Bisphenol S (BPS)

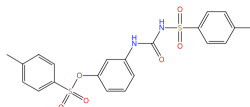
Product listing

ISO 17034
ISO/IEC 17025
ACCREDITED
PRODUCER

Chiron No.	Name	Structure	CAS
Sulfonamide/Urea thermal paper			

P15858.21

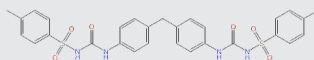
Pergafast® 201



232938-43-1

P15888.21

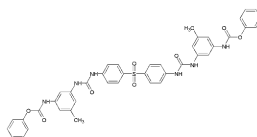
BTUM



151882-81-4

P15956.42

UU (Urea-Urethane complex)

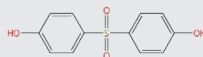


321860-75-7

Chiron No.	Name	Structure	CAS
Bisphenol thermal paper developers			

P12534.12

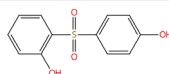
BPS



80-09-1

P12535.12

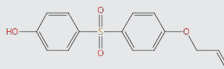
2,4-BPS



5397-34-2

P15401.15

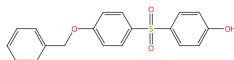
BPS-MAE



97042-18-7

P15398.19

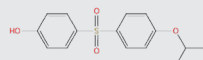
BPS-MPE



63134-33-8

P14403.15

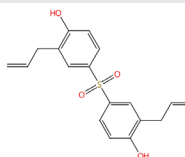
BPS 4-isopropyl ether (D-8 developer)



95235-30-6

15400.18

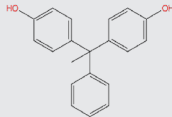
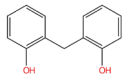
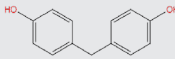
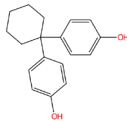
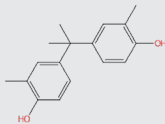
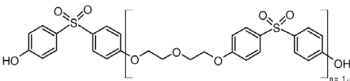
BPS 2,2'-diallyl (TG-SA)

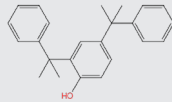
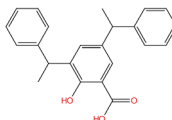


41481-66-7

Product listing

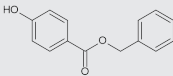
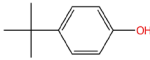
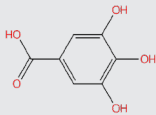
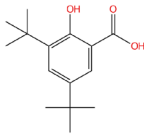
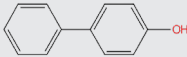
ISO 17034
ISO/IEC 17025
ACCREDITED
PRODUCER

Chiron No.	Name	Structure	CAS
Bisphenol thermal paper developers			
P12520.20	Bisphenol AP		1571-75-1
15575.13	BPF-ortho		2467-02-9
P12526.13	BPF		620-92-8
P12537.18	BPZ		843-55-0
12523.17	BPC (DMBPA)		79-97-0
15576.X	D90		191680-83-8

Chiron No.	Name	Structure	CAS
Other phenol thermal paper developers			
15578.24	2,4-Bis(1-phenylethyl)phenol		2772-45-4
n/a	3,5-Bis(α-methylbenzyl)salicylic acid		53721-15-6

Product listing

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ISO/IEC 17025
ACCREDITED
PRODUCER

Chiron No.	Name	Structure	CAS
Other phenol thermal paper developers			
10211.14	Benzyl 4-hydroxybenzoate (Benzyl-paraben)		94-18-8
1423.10	4-tert-Butylphenol		98-54-4
15577.7	Gallic acid		149-91-7
15579.15	3,5-Bis-tert-butylsalicylic acid		19715-19-6
1808.12	Biphenyl-4-ol (p-phenylphenol)		92-69-3

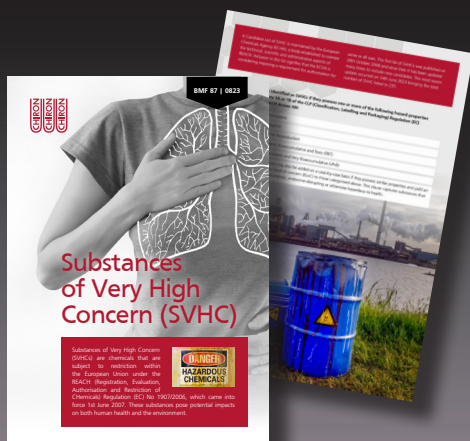
These substances pose potential impacts on both human health and the environment.

SVHC identifies chemicals equivalent to carcinogens, mutagens and reprotoxicants, which are very persistent, bioaccumulative and toxic.

Review more by downloading our SVHC Product listing.

DOWNLOAD NOW

Or, follow this link: <http://www.chiron.no/GetFile.ashx?id=11592>



Also see

BMF 103 - Bisphenols

Though their health effects are still debated, there is concern about bisphenols and their effects on human health and the environment.

It is thought that the synthetic chemical, BPA, weakly mimics the human hormone oestrogen, potentially causing adverse health effects.

The Environmental Protection Agency (EPA) has raised concerns about BPA because it is a 'reproductive, developmental, and systemic toxicant in animal studies and is weakly oestrogenic'.



Learn more about the applications, concerns and regulations associated with Bisphenols

DOWNLOAD NOW

Or, follow this link: www.chiron.no/en/documentation/resources/environmental/bmf-103-bisphenols/

References

1. Thermal paper, Wikipedia | https://en.wikipedia.org/wiki/Thermal_paper | Accessed 2023
2. Proposal for a restriction - 4,4'-isopropylidenediphenol (Bisphenol A) and bisphenols of similar concern for the environment | <https://echa.europa.eu/documents/10162/de36f39b-10fe-3e14-439c-d0928b-f3e283> | 2022
3. Chemistry and Applications of Leuco Dyes. Ramaiah Muthyala. 302 pag. Springer; 1997 edition | https://books.google.co.uk/books?id=FmtD8xySWD8C&source=gbs_book_other_versions | Accessed 2023
4. Eckardt, M.; Kubicova, M.; Tong, D.; Simat, T. J. Journal of Chromatography A, 1609 (2020). Determination of color developers replacing bisphenol A in thermal paper receipts using diode array and Corona charged aerosol detection - A German market analysis, National Library of Medicine | <https://pubmed.ncbi.nlm.nih.gov/31409488/> | 2020

For a quotation, please contact us today at sales@chiron.no



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