

List of chemicals/chemical groups Breast Cancer UK recommends should not be in cosmetics and personal care product ingredients lists:

Criteria for inclusion of a chemical compound in the list

In summary, only ¹synthetic endocrine disrupting chemicals (EDCs) with possible links to breast cancer in humans, mammary cancer in animals or those that are EDCs that affect sex hormones (oestrogen/androgen/progesterone), and are permitted for use in the EU, are included in the list. Evidence of a breast cancer link is based on scientific research published in peer reviewed journals, or books identified by [PubMed](#) or UK university-based library searches. Government reports, such as those by the EC's Scientific Opinion on Consumer Safety, or European Chemicals Agency, and WHO IARC reports are also cited as evidence.

Only compounds used in cosmetics or personal care products permitted for use in the EU that may be linked to breast cancer were considered for inclusion. These included:

1. Compounds that are known or suspected EDCs which affect oestrogen*
2. Compounds that are known or suspected EDCs which affect sex hormones other than oestrogen*
3. Compounds that have been shown to cause/are suspected of causing breast cancer in humans
4. Compounds that have been shown to cause/are suspected of causing mammary cancer in animals
5. Compounds that are carcinogenic or damage DNA

*evidence of endocrine disruption must be based on at least two independent studies

Compounds must conform to at least two of the above or have additional supporting evidence they may affect breast cancer risk (e.g. they are associated with other types of cancer; may act as reproductive toxicants in animal studies (which may suggest effects on breast tissue development) or there are additional assays (other than those used to show oestrogenicity) that demonstrate *in vitro* effects on human breast tissue.

Other potentially harmful effects, such as allergies, do not form part of our criteria to identify potentially harmful chemicals, although we note whether compounds may be associated with other health problems.

Where evidence for human exposures is minimal, compounds were not included in the list. For example, styrene polymers were initially included as they may release styrene (which is

¹ an exception to this is formaldehyde, which is classified as a human carcinogen by IARC. This was included in our list as formaldehyde releasing preservatives are synthetic compounds

associated with breast cancer risk) but our research indicated that release of monomers was infrequent and there was no further supporting evidence that styrene polymers affect breast cancer.

Following comments by one of our evaluators (see below) we removed chemicals where only a single assay had demonstrated the compound was oestrogenic.

All compounds that fulfilled our criteria were potential or known endocrine disrupting chemicals. This is likely to be because carcinogens are unlikely to be present in EU cosmetics due to relatively robust regulations that prohibit their use.

How were chemicals chosen for inclusion?

- PubMed searches were carried out to try and identify compounds that may be linked to breast cancer. Search terms included combinations of: 'breast cancer', 'EDC', 'endocrine disrupting chemical', 'endocrine disruptor', 'oestrogenic', 'cancer', 'cosmetics'. Known cosmetics ingredients were searched in combination with the above.
- Google searches using search terms such as "harmful chemicals found in cosmetics" and "harmful cosmetics ingredients" were carried out to identify cosmetics ingredients other NGOs and consumer organisations considered harmful.
- Oestrogenic chemicals identified from research we commissioned into [oestrogenicity of anti-ageing creams](#) were considered for inclusion
- Chemicals identified from previous Breast Cancer UK research were considered for inclusion
- Potential/known endocrine disrupting chemicals highlighted by HEAL and other HEAL partners were investigated for inclusion
- Chemicals listed on the [campaign for safe cosmetics](#) website (and associated publications) were considered for inclusion (note: this is a US organisation; many of the chemicals listed are not permitted/used in EU cosmetics)
- Chemicals listed on the [EWG's skin deep cosmetics database](#) website with medium or high hazard scores were considered for inclusion (note: EWG is a US organisation; many of the chemicals listed are not permitted/used in EU cosmetics)

What information was included in the final table?

Name of chemical or group; cas number; commonly listed chemical name(s); use; examples of personal care products where they are found; recognised as an EDC or potential EDC by [TEDX](#) and/or the UN and type of endocrine disruption; link to breast cancer and/or impact on oestrogen/ androgen/progesterone/other hormones; effects on breast cell division; other

health effects; ²EWG hazard score; whether listed on Breast Cancer Prevention Partners' Red list of chemicals of concern; relevant ³EU regulations; references.

How was the information in the table checked for accuracy?

Two independent scientific evaluations were received; one was from an emeritus professor of cancer biology working at a UK university and another from the US-based NGO, Breast Cancer Prevention Partners.

Were changes made to the chemicals that featured on the list following scientific evaluations?

Evaluator 1 recommended including several compounds/compound groups to our list. Some of these are no longer permitted for use in the EU or didn't fulfil our criteria (e.g. only one assay had demonstrated they are oestrogenic), so weren't added. Two compounds suggested by evaluator 1 fulfilled our criteria and were added to the list.

Whilst Evaluator 2 agreed that all the compounds on our list are of concern (i.e. present on their red list, apart from aluminium in antiperspirants and padimate O), and some are of serious concern, they only consider four of these are associated with breast cancer risk.

They also acknowledge that they are aware of the limitations of the data overall, and the decision to include chemicals is a matter of interpretation and how much evidence BCUK feels is necessary.

They also pointed out that certain chemicals we included on the list are classified as potential EDCs based on only one assay or study. We agreed that one assay is insufficient evidence and as a result we removed two chemicals from our original list. We also added additional references to demonstrate evidence of endocrine disruption was always based on more than one study or assay type.

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² The EWG scoring criteria for chemicals in cosmetics was included to highlight that these chemicals are of concern to other science-based organisations who investigate cosmetics ingredients and to indicate which are believed to be most harmful.

³ EU cosmetics regulations (Regulation (EC) No. 1223/2009 of The European Parliament and of the Council of 30 Nov 2009 on cosmetics products) and Annexes and EU REACH regulations