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The Matrix – a DGK initiative to provide guidance to substantiating anti-pollution claims in cosmetics

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Introduction:

The concerns about the adverse effects air pollution can have on our health is on the rise worldwide. Pollutants are very varied in nature, can be of natural or anthropogenic origin with typical pollutants ranging from particulate matter (PM; originating e.g. from exhaust, smoke, pollen or ash) and gaseous compounds (e.g. nitrogen and sulfur oxides, volatile organic carbons or ozone) to light (e.g. UVR or blue light) and heavy metals [1]. The skin is exposed to pollutants daily, and this exposure can lead to signs of premature skin aging, damage to the skin barrier, pigmentation disorders as well as cell damage. In addition, preexisting skin problems such as dry and irritated skin as well as skin impurities can be exacerbated [2-4].
A variety of cosmetic products with different "anti-pollution" claims are already on the market. Due to the varied nature of the pollutants and the effects they can have, efficacy tests and claims need to be relevant and correctly substantiated. There is no single "one size fits all" type claim or test method [5]. There are already various publications summarizing the effects of pollution on the skin [1, 3, 6-8]. However, with regards to cosmetics the scope of effects and claims and claim substantiation much remains unclear.

The goal of this work was to compile knowledge and literature data in an easily accessible way. We chose to create an internet-based interactive matrix which can serve as a starting point and knowledge source for people interested in air pollution, the effects on skin and anti-pollution claims for cosmetics.

Materials & Methods:

The German Society for Scientific and Applied Cosmetics (DGK) working group [WG] "Anti-pollution", an interdisciplinary WG consisting of experts from industry and academia, was specifically formed to tackle the task to create an interactive matrix on the society's website. After outlining four main categories to be addressed, further subcategories were then assigned to them. The idea was to interlink the main and the subcategories within this matrix, through which users can navigate to gather information including potentially relevant test methods. Current literature was screened, and "one-pagers" (1-2 pages) developed for each subcategory. A standardized reporting outline was used to structure these. A limited number (1-5) relevant references were added as a starting point for delving into the respective topics. After thorough scientific and regulatory assessment, the pages were integrated in a website building tool. The sites were interlinked, tested and put online. The matrix was first created in German and then translated into English.

Conclusions:

We present here a novel, dynamic and interactive tool serving as a knowledge base for pollution and anti-pollution in the cosmetics industry.
The Matrix is accessible via the home page of the working group or directly via the URL https://dgk-ev.de/antipollution-matrix/ or the QR-Code on the right.
Users can switch between a version in English language and a version in German language.

Acknowledgements:

We thank the DGK presidium and scientific advisory board for their support in the creation of this Matrix.

Results & Discussion:

The Anti-Pollution Matrix consists of a landing page and four main categories of interest. These were 'Categories of Active Ingredients and Product Classes', 'Pollutants', 'Damage', and 'Methods' (Figure 1).

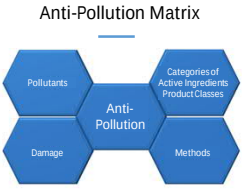

Figure 1: Beehive like structure on the home page of the working group. Users can click on each category to access all the topics with more information.

Upon entering the matrix, users find themselves on a landing page with an overview of each category and their subcategories (Figure 2A). After clicking on a subcategory, readers can see a list with specific topics related to the subcategory. (Figure 2B).

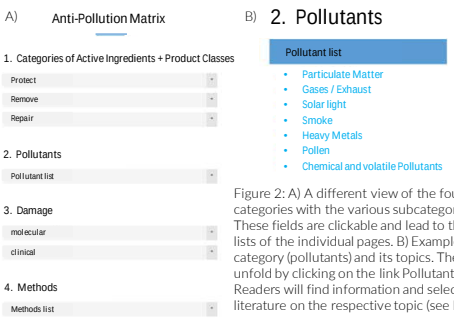

Figure 2: A) A different view of the four categories with the various subcategories. These fields are clickable and lead to the lists of the individual pages. B) Example of a category (pollutants) and its topics. These unfold by clicking on the link Pollutant list. Readers will find information and selected literature on the respective topic (see Fig. 3).

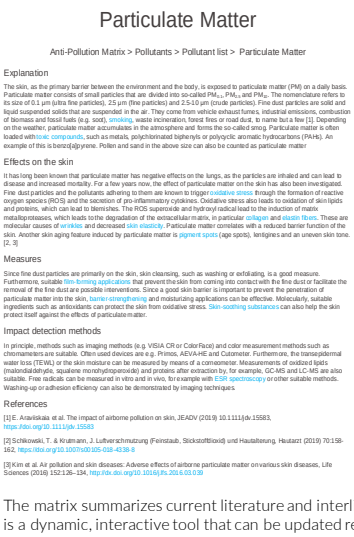

Figure 3: Final web page of a specific topic. Here the example of Particulate Matter from the Pollutants category is shown. Links to other matrix sites are highlighted in blue. The DOI links in the Reference section lead to the respective publication.

The matrix summarizes current literature and interlinks related topics. It is a dynamic, interactive tool that can be updated regularly. With this, it also differentiates itself from printed articles. The Matrix is not intended to be complete, but it is comprehensive enough to stimulate users to gain a better understanding of factors involved and to explore how to address their claim support challenges when developing cosmetic products.

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