

# Information about low-hazardous forming and pressing oils

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**Shaping and pressing oils** are the most often required additives in the ceramic industry. Depending on the type of shaping process and the article to be produced, these oils are either directly mixed into the body during preparation or applied either to the mould or to the material that is to be moulded. Here they act as greasing, lubricating and releasing agents.

The conventional shaping and pressing oils are composed of fossil oils, such as mineral oils, petroleum and waste oils, and of fatty acids from the refining of vegetable and animal oils.

Depending on their origin, mineral oils and their derivatives contain different amounts of aromatics i.e., unsaturated, ring-shaped compounds which are environmentally hazardous and are known to be significant pollutants.

As the majority of the conventional shaping and pressing oils are composed of chemical substances that are not exactly defined, no conclusions can be drawn regarding the combustion products that are to be expected.

In this regard, we refer to the law on environmental protection against noxious intrusions which went into effect already in 1974 and which is, among other aspects, concerned with the effects on the environment from air pollution in certain facilities belonging to commercial or government-owned plants.

Essentially, there are three different emission sources: automotive traffic, heating of households and small businesses, and industry.

Air pollution can also include chemical materials that are not considered to be hazardous as far as the regulations for chemicals are concerned. Emissions given off will act as a pollutant on the environment. For this reason, the tolerable maximum immission concentration (MIC) for each material has been determined. The limit values of the MICs were not chosen according to a toxicological view but rather according to distinguishable observations by the sensory organs.

The range of processing plants requiring approval has been steadily expanded. The evaluation is based upon the type and amount of the emitted substances. The regulations thus set the permissible emission values and leave it to the plant operator to ensure compliance.

The governmental regulations have brought about an increase in environmental awareness. This has resulted in a demand for even stricter suitability tests for the raw materials needed in production in order to reduce the environmental pollution within the processing area, as well as to lower the emissions in the vicinity of the production facility. Processes and/or raw materials must be selected such that no hazardous emissions result in order to limit air pollution efficiently at its source.

At Zschimmer & Schwarz, comprehensive studies have been made to develop **new shaping and pressing oils** that make a significant **reduction in pollution** possible. In addition, through the more **intensive effectiveness** of the additives, a **reduction in the necessary amount to be added**, and thus a further decrease in pollution, can be realized.

The basis of these newly developed products are **raw materials from natural gas synthesis** as well as **by-products from foodstuff production** on account of their defined compositions, they are **nearly free of aromatics as well as from sulphur and nitrogen compounds**.

In use, it was shown that these exactly defined pure compounds and their mixtures lead to **considerably less odour** during the production processes (mixing, shaping, drying, firing).

To further document the combustion products that can result from these shaping and pressing oils, a dissertation from the FH-Nuremberg has been published under the title

***"Methods for identifying carbonized products at low temperatures  
as a contribution to environmental protection".***

The aim of this study was to design a laboratory-scale plant that made it possible to define low temperature carbonized organic products in a setting similar to normal operation.

The results achieved with this plant were reproducible. Very fine-ranged IR spectrometric and gas chromatographic analyses could be made to show the presence of existing aromatics, such as benzol, toluene, xylene and benzpyrene. None of these compounds could be shown to exist in the newly developed shaping and pressing oils and their raw materials whereas in conventional mineral oil preparations up to 5 % and more could be detected.

In order to confirm the theory as well as the laboratory results, operational tests were performed by the *Institut f ur Bodenkunde und Bodenerhaltung* of the *Justus-Liebig-University* in Gie en, and an expert opinion of the exhaust gases was rendered.

Here it was detected that within the long-term testing under differing operational conditions, the low contaminant shaping and pressing oils used **decomposed completely**.

The amounts added were within the range of 0.5 to 3.0 %.

The carbon content of the raw clay (lignine, organic filtration, etc.) also contributed to contamination in the exhaust gases: these samples were especially examined for carbon-based combustion materials.

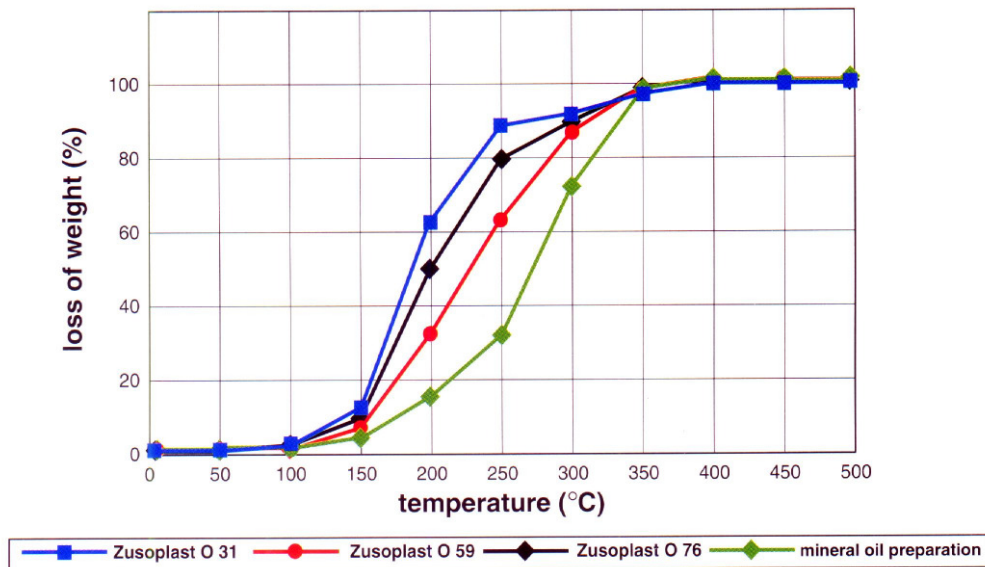
Only small amounts of low-molecular, non-toxic carbon compounds were formed, which were probably a result of a reaction with the basic load of carbon in the raw clay, and are dependent upon the same with regard to their amount.

The identification of the exhaust gases examined in the chimney gave **no evidence of existence nor of new formations of toxic compounds**. It can thus be assumed that the new shaping and pressing oils from Zschimmer & Schwarz decompose without **residue to carbon dioxide and water in oxidizing atmosphere** using conventional firing methods.

Using the mentioned products will lead to a significant **reduction in workplace contamination**, thus significantly improving workplace hygiene.

The necessary cleaning of the production plant can also be cut back considerably, thus decreasing idle time.

The following graph shows the **GTA curves** of the newly developed low-contaminant shaping and pressing oils in comparison to a conventional mineral oil preparation.



As the graph shows, the low contaminant oils from Zschimmer & Schwarz already **evaporate at lower temperatures**. Thus it is possible to dry shaped parts at lower temperatures when using the low contaminant shaping and pressing oils, while achieving the same required residual moisture. Likewise, at the same temperature, the drying cycle time can be reduced, or the product can be dried to a lower residual moisture content. Thus, depending on the application, production costs can be reduced or the throughput can be increased.

Since the commonly used shaping and pressing oils often cause irritation, reddening or eczema on various locations of the skin -including areas that did not come into direct contact with the substances- the newly developed low contaminant shaping and pressing oils contain a **skin protection component**, even though they are composed of pure raw materials. This component has been tested over years in the cosmetics branch and has no negative influence on the actual production.

Further examinations are being made by Zschimmer & Schwarz in close co-operation with users of low contaminant shaping and pressing oils, to make the correlation even clearer in order to confirm and improve upon the previously obtained results.

## **PRODUCT LIST:**

Pressed and squeezed bodies (oils are incorporated in the preparation):

ZUSOPLAST O 9      ZUSOPLAST O 31      ZUSOPLAST O 59      ZUSOPLAST O 70

Rotationally symmetric shaped bodies (glazed or unglazed):

ZUSOPLAST O 76      ZUSOPLAST O 119

Extruded products, expansion of sleeves in sewer pipes:

ZUSOPLAST O 44

Minimizing emissions of atomised oil when used with fast operating aggregates:

ZUSOPLAST O 59      ZUSOPLAST O 76

More products on request.