Renfert

making work easy

temp:ex

Version 05.18

Technical-scientific documentation

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Introduction

The cleaning liquid temp:ex described here is a cleaning liquid specially developed for the removal of zinc oxide based temporary cements.

Product development was carried out according to strict national and international guidelines and provides the user with an effective and efficient method of cleaning temporary and definitive restorations, without damaging the restoration when manually removing temporary cement with instruments.

temp:ex is a class 1 medical device

CE

Physical properties

Color	Blue
Odor	Odorless
PH value	13.5–14
Density (at 20 °C)	1.00–1.18 g/cm³

Forschungslabor für
dentale Biomaterialien

Universitätsklinikum
Erlangen

Material compatibility assessment of an alkaline cleaning fluid

The dental manufacturing chain involves a variety of successive treatment steps in the dental office. Among other issues, the complete removal of temporary cement remnants by a thorough cleaning protocol is essential for any permanent adhesive bonding of even for provisional re-cementation.
For that purpose, Renfert GmbH has developed a cleaning fluid to become effective on a broad variety of restorative materials with varying chemical composition, solubility, or resistance against acidic or alkaline solutions. During the development process, the material compatibility and cleaning efficiency of this new alkaline cleaning fluid was evaluated in the Research Laboratory for dental Biomaterials, Dental Clinic 1, at Universitätsklinikum Erlangen. The aim of the study was to qualitatively and quantitatively analyze the effect of the cleaning fluid on various material surfaces. A representative selection of restorative materials of different chemistry (ceramics, metals, and polymers) was tested in combination with the alkaline cleaning fluid.
The results of the qualitative surface observation under the Scanning-Electron-Microscope and of the quantitative assessment of the hydrolytic stability of the polymer-based materials clearly reveal that even a long-term soaking period of 10 - 60 minutes did not produce any detectable surface alterations. The results in the cleaning fluid did not significantly differ from the reference soaking procedure in water. Ceramic-based materials behave completely inert and resistant against the alkaline cleaning fluid. The water sorption test on polymer-based materials revealed a hydrolytic stability within the acceptance limits of the ISO 4049 standard for polymer-based filling, restorative and luting materials. All materials under investigation fulfill the standard specifications, irrespectively of soaking in water or even after 60 minutes soaking in the cleaning fluid.
Regarding the metal-based materials, the alkaline cleaning fluid did not produce any observable surface alterations. For this class of material, the weight loss was quantitatively measured before and after soaking in either the alkaline cleaning fluid or in water. This test resulted in no significant weight loss for all metal-based materials.

Conclusion:
In quintessence, the newly developed alkaline cleaning fluid from Renfert GmbH appears harmless against the investigated restorative materials and can be recommended without limitations in use.

The cleaning fluid has been marketed especially for cleaning of zinc-oxide temporary cements. The product today is available under the brand name **temp:ex** and is distributed by Renfert GmbH.

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Cleaning performance

Comparison of temp:ex with orange solvent

Setting up the experiment
The specimens (resin) were moistened using an ordinary commercial foam pellet (exposure time: 60 sec.), subsequently a (blunt) instrument (by scratching out) was used and finally a fresh foam pellet (by wiping) utilized to help remove the cement. Temporary zinc oxide cements with and without eugenol were tested. During the removal process the results were measured during regular intervals. The layer thickness of the temporary cement on the specimens was initially set at 0.25 mm in a standardized procedure.

It should be noted that this does not conform to the recommended procedure for temp:ex, but a direct comparison from daily practice was required. With temp:ex it is possible to remove temporary cement by simply placing it in the temp:ex liquid without manually scratching out the cement with an instrument.

Interim conclusion
It was clearly apparent that temp:ex removed temporary cement more quickly than the product with orange solvent. The difference was even more apparent

Acrylic resin copings with temporary zinc oxide eugenol cement

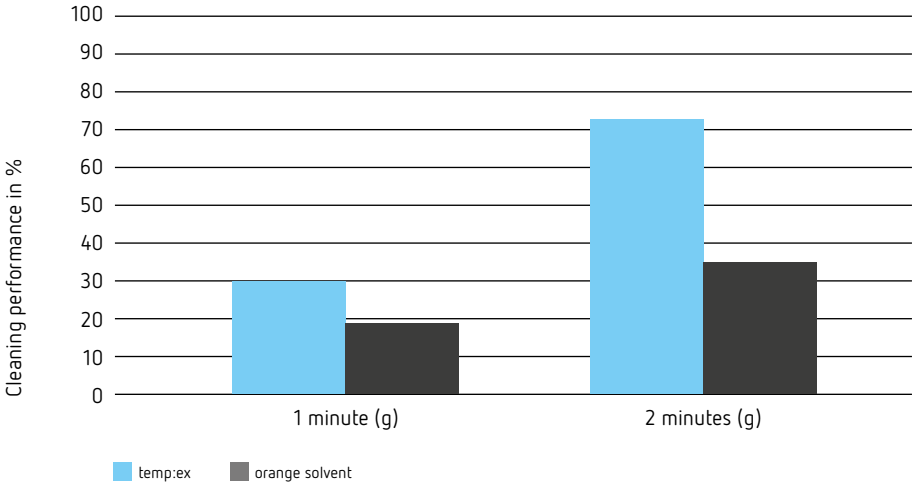


Figure 1
Daily practice comparison, temp:ex and orange solvent with temporary zinc oxide eugenol cement (Source: Renfert R&D)

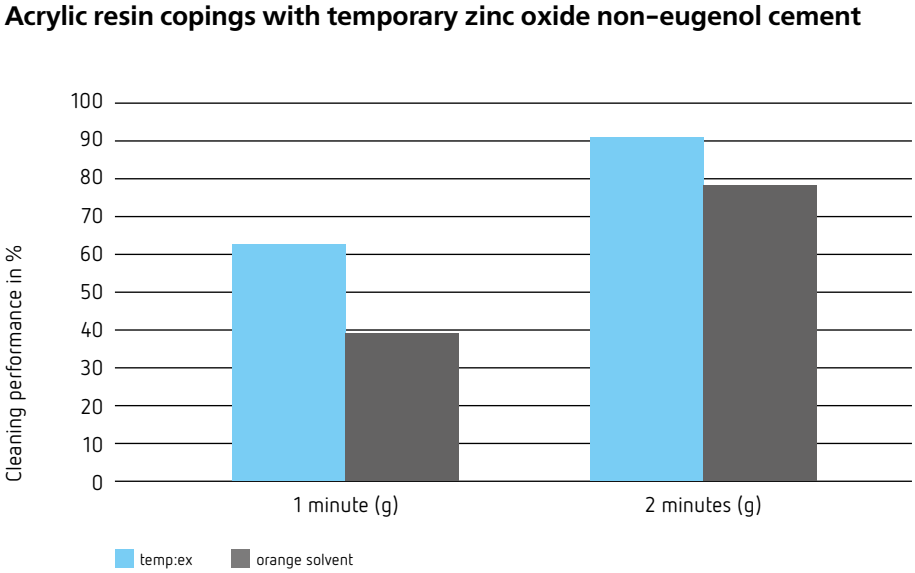


Figure 2
Daily practice comparison, temp:ex and orange solvent with temporary zinc oxide non-eugenol cement (Source: Renfert R&D)

with cements containing eugenol, where twice the amount of cement could be removed after an exposure time of two minutes as compared to orange oil based cleaning liquids.
The temporay cement test specimens without eugenol (non-eugenol) could be cleaned even more efficiently. A greater cleaning performance was also achieved with temp:ex here, although the difference was not quite as high as in the first test group.

The cleaning performance of temp:ex and acrylic resin copings was also compared with other commercially available products where temporary cement removal was included in list of possible product applications. In the test, indicated in Figure 3, the cleaning performance was tested by inserting acrylic resin copings into various cleaning liquids that work using the same principle as temp:ex namely they do not require any manual cleaning steps. The layer thickness of the temporary cement on the specimens was initially set at 0.25 mm in a standardized procedure.

Comparison of temp:ex with customary commercial competitors

Acrylic resin copings with temporary cement (eugenol)

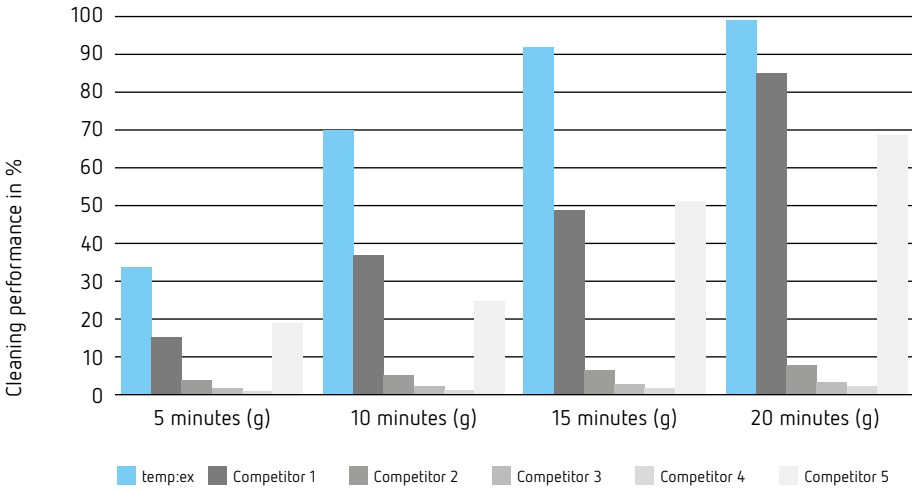


Figure 3
Cement removal in immersion bath, temporary cement with eugenol (Source: Renfert R&D)

Figure 4 shows the cleaning performance of temp:ex and competitor products on acrylic resin copings in a SYMPRO denture cleaning unit. The layer thickness of the temporary cement on the specimens was initially set at 0.25 mm in a standardized procedure.

Acrylic resin coping with temporary cement (without eugenol)

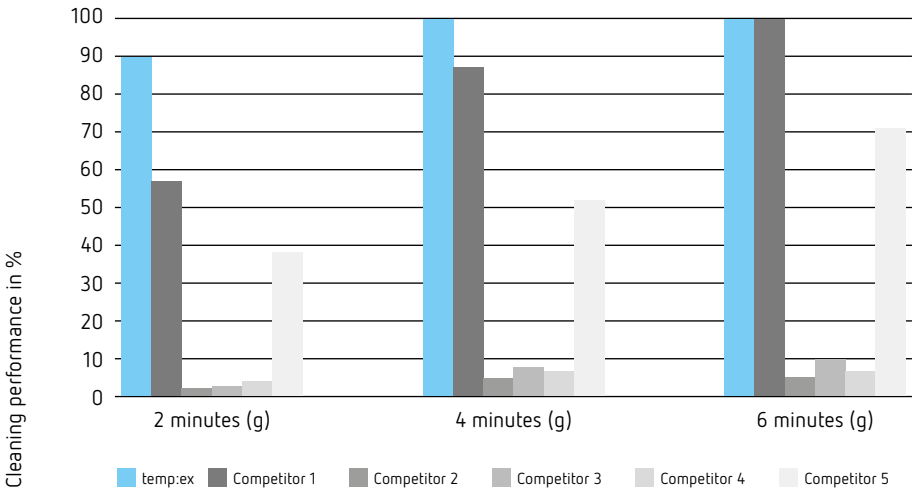


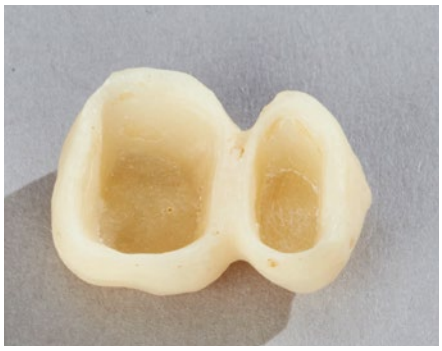
Figure 4
Cement removal using SYMPRO, non-eugenol temporary cement (Source: Renfert R&D)

Conclusion

The tests show that temp:ex can help optimize daily dental practice procedures. In all tests, the cleaning performance of temp:ex was better than either the conventional procedures or alternative cleaning agents. The time advantage was very obvious when using a pin-impact cleaning unit such as SYMPRO. Here, depending on the type of cement and layer thickness, a time saving of up to 50% was obtained when compared to the immersion bath alternatives.

Before

After



More information about temp:ex available at: renfert.com/tempex