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Dr. Marcus Holzmeier, Wuerzburg

Xantalgin Crono -

Highly accurate alginate impressions.

Introduction

Even today when digital impression techniques are gaining in importance, conventional impressions are still standard in daily practice. The decision for a certain impression material depends primarily on the intended treatment and purpose of the model to be created. Alginates have a large and important share of the dental impression market although for decades more technically sophisticated and more accurate silicone-based impression materials have existed. According to studies and surveys, alginates belong to the equipment of virtually every practice. This article shows that alginates with their good reproduction properties suitable for the given situation have a wide range of indications in which the precision and also the cost factor of silicones would far exceed the necessary objective.

Alginates excel when it comes to taking an impression for the production of anatomical models, which reproduce exactly the shape of the teeth and the adjoining jaw sections and soft tissue. Because it is easy to handle, alginate is still the most frequently used material for situation impressions today. Situation impressions using alginate have a wide range of indications, because the models produced in this way fulfil many different tasks. They can be used as a study model for reproducing the current dentition status, as an analysis model for checking occlusion and articulation, as a planning model for prosthetic, conservative or orthodontic treatments, as an opposing jaw model when manufacturing dental prostheses or as a working model for the manufacture of simple prostheses, orthodontic appliances, mouth guards, bleaching splints or even individual trays or templates.

Properties of alginates

Alginates are elastic, irreversible impression materials and provide very good detailed reproduction. An advantage of alginates is the strong temperature-dependency and the relatively free mixing ratio with water. Thus the setting time can be easily controlled by temperature and the viscosity by the quantity of the mixed water. Since water is only loosely bound in set alginate, it can easily be released but also easily absorbed from the environment depending on storage conditions. The result is swelling or if there is water loss shrinkage, i.e. the dimension of the original impression changes. Therefore, most alginate impressions must be poured immediately and can only be stored at 100% humidity in the short term. To avoid this limitation, new materials have been developed such as Xantalgin Crono from Heraeus Kulzer, which if stored correctly, will be last for up to five days without any significant dimensional changes. Indeed the principle of rapid further processing and model fabrication also applies here, however transportation to a laboratory or pouring out at the end of a working day or the next day, does not pose any difficulty for Xantalgin Crono. Because of cross-linking, set alginates have elastic properties and can provide good impressions of undercut areas. However it should be noted that the tear strength of alginate is considerably lower than that of silicone impression materials so that strong undercuts, wide interdental spaces or gaps under dentures must be blocked out before an impression is taken. Alginates have been in clinical use for decades and are well accepted by patients because of the relatively short setting time and generally pleasant taste. Alginates are hydrophilic by nature so that impressions can also be made in moist environments e.g. in the presence of saliva or blood residues without quality being severely compromised. The low contact angle of alginate supports an easy intraoral application and good elasticity facilitates removal from the mouth. However, because of

dimensional and surface changes following model production, alginate impressions can only be poured once.

Xantalgin Crono

In order to achieve the best possible detail reproduction of the dentition and mouth situation, the impression must remain in the mouth long enough for the alginate to set completely. Too early removal will result in irreversible plastic deformation and therefore an inaccurate model. To exclude this, the intraoral setting time of many alginates has been set short. Xantalgin Crono excels here in particular with an intraoral setting time of only one minute. A change in colour provides additional assurance when processing Xantalgin Crono. By the addition of natural pigments, Xantalgin Crono reacts with a clearly visible change of colour depending on the setting phase and the pH value present in the material. The colour change not only indicates the final setting of the material, but informs the user about the end of the mixing time and processing time, i.e. the latest time at which the impression tray has to be inserted into the patient's mouth. These intelligent material properties on the one hand help to avoid the insertion of alginate into the patients' mouth which has already set too much, while on the other hand prevents the risk of premature removal from the mouth. Another advantage of the colour change with Xantalgin Crono, which should not to be underestimated, is the psychological effect in the case of anxious patients or children. They can be distracted from the impression taking process by having a sample of the material in their hands so they themselves can track at what point the impression can be removed.

Clinical Application of Xantalgin Crono

One female patient presented with the request for orthodontic treatment for anterior crowding in the upper and lower jaws. In order to make a medically sound statement about the extent of treatment and cost as

well as treatment options, planning documents, consisting of models, radiographs and photographs are necessary in addition to a clinical examination. The impressions required for producing models were taken using a colour change alginate. The process in practical terms from the impression to the planning model will be described in more detail below with reference to the alginate used, Xantalgin Crono.

As with all impressions, it is also important to choose the right impression tray for an alginate impression. In case of metal stock trays in general use, it is important to pay attention on the correct size. The thickness of the alginate layer should not be too large on the one hand, but on the other hand there should be at least 5mm between the dentition and the tray wall for stability reasons. Since alginates do not adhere to metal or plastic surfaces, the tray must offer sufficient mechanical retention so that primarily Rim Lock trays or perforated trays are frequently used. These trays can be individualised using resin, wax or silicone depending on the impression situation. Prior to impression taking of prosthetically restored dental arches, they should be checked for large undercuts. It is advisable to block out these areas to prevent tearing of the set alginate or irreversible deformation upon removal. In the present case, impressions are to be taken of two fully dentulous dental arches with neutral occlusal conditions. (Fig. 1-3). With respect to the model analysis, particular attention must be given to the careful reproduction of crowding in the anterior region. After choosing the correct size of Rim Lock tray, three measuring spoons of Xantalgin Crono (previously shaken), are dosed into a mixing cup for the upper jaw impression and two measuring spoons for the lower jaw impression (Fig. 4). Using the special product measuring cup, the corresponding quantity of water is added. When mixing by hand care must be taken to mix thoroughly and evenly. Immediately after water is added, the Xantalgin Crono turns blue (Fig. 5). The end of the mixing time is indicated by a change in colour

from blue to violet (Fig. 6). At this time the alginate should be filled into the impression tray. In the present case the alginate was mixed in an automatic mixing unit to ensure consistent mixing quality. Dosing corresponds to hand mixing and the mixing time was set to 10 seconds. After mechanical mixing Xantalgin Crono is violet and immediately filled into the impression tray and smoothed. The accuracy of the impression can be increased if a small quantity of alginate is smoothed into the fissures with a finger immediately before the impression tray is placed in the mouth. The end of the processing time, i.e. the latest moment when the impression tray can be inserted into the patient's mouth, is shown by a colour change from violet to pink (Fig. 7). The impression tray must remain in the patient's mouth until the alginate has set completely to avoid any remaining deformation. With Xantalgin Crono this time is only approximately one minute and is shown by a colour change from pink to white (Fig. 8). Once the impression has set it is carefully removed by applying slight pressure to the alginate from the labial vestibule so that the material is not loosened from the tray. The lower jaw impression is then taken using the same technique. At the end of the impression taking there are two exact impressions of the dental arches and the adjoining soft tissue (Fig. 9, 10). After cursory pre-cleaning under running water, the quality of the impressions can be evaluated exactly before they are disinfected and poured or sent to the laboratory in a moist storage environment. In this particular case the impressions were disinfected for three minutes in a prepared Impresafe bath and poured immediately (Fig. 11). Alternatively storage or dispatch is possible in a sealed plastic bag (100% relative humidity). According to studies the composition of Xantalgin Crono is chosen so that the impressions can still be poured dimensionally stable for up to five days if stored correctly. Figure 11 shows that the Xantalgin Crono impression can be poured optimally with plaster because of its hydrophilic sur-

face. The liquid plaster wets the alginate particularly well. The ready and trimmed models reproduce exactly the morphology of the dentition and soft tissue. Intercuspation is also very easy to assess (Fig. 12). Not only tooth anatomy is reproduced in good quality, but also the visibility of the buccal soft tissue structures and the palate is perfect (Fig. 13). Because of the exact reproduction of the impression taken, it is possible to assess the margins of existing fillings.

Summary

Accuracy and dimensional stability are fundamental properties for impression materials. Dependent upon the indication presented here, the use of costly and work-intensive silicone impression materials is not always necessary. The objectives aimed for are easy to achieve with alginates for the selected indications. In particular Xantalgin Crono excels when it comes to anatomical impressions, casts for planning models or the manufacture of working models because of its good reproduction of the oral structures and ease of handling. The – compared to other products – improved tear strength as well as the dimensional and storage stability widen the indication spectrum and facilitate processes in the dental practice and laboratory.

Photos



Fig. 1: Initial situation of the jaw prior to impression taking: Orthodontic planning models are to be produced.



Fig. 2: Upper jaw: Anterior crowding and rotations are visible.



Fig. 3: Lower jaw: Various rotations and crowding.



Fig. 4: Xantalgin Crono is mixed with water in the specified ratio. At the start of mixing the alginate is blue.



Fig. 5: As long as Xantalgin Crono is violet it can be filled into the impression tray.



Fig. 6: If the colour of Xantalgin Crono changes from violet to pink, this is the latest moment the material should be inserted into the patient's mouth.



Fig. 7: After approx. 1 minute in the mouth Xantalgin Crono indicates the end of the intraroral setting time by a change of colour to white.



Fig. 8: Xantalgin Crono impression of the upper jaw: The consistency and the wetting properties allow an even, void-free reproduction of the dental arch and the functional impression of soft tissues.



Fig. 9: Homogeneous impression of the mandible. Because of its plasticity, Xantalgin Crono is easy to remove.

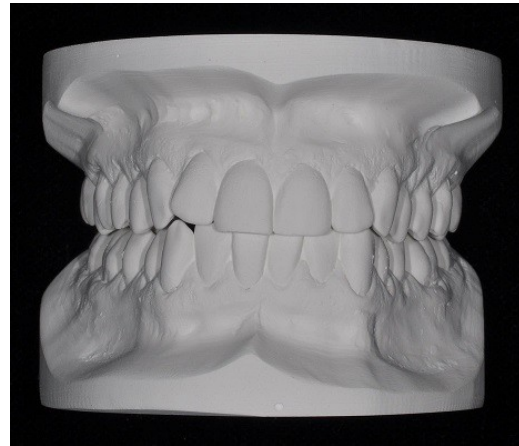


Fig. 10: Upper and lower jaw models reproduce the exact morphology of the dentition and soft tissue. Evaluation of intercuspation is quite easy.



Fig. 11: Upper jaw model: Not only is the dental anatomy reproduced accurately, but also the buccal soft tissue structures and palate can be recognised clearly.



Fig. 12: Lower jaw model: Homogeneous, realistic reproduction of the oral situation. Even the margins of existing filling can be evaluated accurately.

Author:

Dr. Marcus Holzmeier
D-97084 Wuerzburg

Contact:

Heraeus Kulzer GmbH
Grüner Weg 11
63450 Hanau