

## Transglutaminase GS

### Ingredients

Sodium Chloride – Gelatin (fish gelatin) – Trisodium Phosphate (anhydride) – Maltodextrin – Transglutaminase – Vegetable Oil.

### Culinary data

Transglutaminase, often named as “meat glue” is an enzyme.

It enables :

- to “stick” proteins-rich foods as meat, poultry, fish and seafoods,
- to make medallions, sausages without casing, which stand on cutting,
- to stick vegetables, fruits all together in presence of gelatin (animal protein).
- to improve texture of proteins-rich products,
- to bind different textures together...

### Technological data

Transglutaminase is an enzyme which acts on proteins containing foods. It enables to make a gel from protein containing solution.

#### Use

Transglutaminase can be used in solution or by direct addition.

#### Solution

The amount usually used ranges from 5 to 10g enzyme per 1kg final product. The first step to prepare the enzymatic solution to be applied on the product. It's necessary to dilute the transglutaminase in ice water (40g water for 10g enzyme) then mix to obtain an homogeneous suspension. The solution should be quickly used (1/2h maximum) as it quickly gels and couldn't be uniformly applied. Then, the solution is applied on the surfaces to be binded together and the product molded.



A tight or a sous-vide molding leads to a uniform product since there are less “holes” in the junction zones and the enzyme action is higher. Then the product is put in the fridge for 24h (enzyme reaction time between 2 and 4°C)

#### Direct application

The enzyme can be directly applied on the product (moist products only). This method can be less uniform and can also lead to lumps formation in water excess. Direct application can also be sprinkled on the surface product. The amount usually used is 1g enzyme per 100cm<sup>2</sup> final product.

In France, whatever the application method used, the product must later be cooked to inactivate the enzyme and mustn't be eaten raw (cf. Legislation).

## Scientific data

### Influence of temperature

The transglutaminase is active up to 40°C. Above 50°C, it's gradually denaturated and becomes inactive. As any enzymatic reaction, the transglutaminase reaction is influenced by temperature. Higher reaction temperatures require less reaction time, whereas reactions at a lower temperature evolve slower. For example, 240min at 5°C or 20min at 40°C are required to obtain the same reaction level. In a same way, temperature directly influences enzyme inactivation during cooking. Higher the cooking temperature is, lower is the inactivation time. For example, you need to cook at least 2h at 65°C or 5min at 75°C to inactivate the enzyme.

### Effect of the acidity

Transglutaminase is stable on a pH range from 5 to 9. As a consequence in acidic products, the enzyme is inactive.

### Oxygen influence

Transglutaminase is sensitive to oxygen. The enzyme becomes inactive when it's put into long contact with oxygen containing air. That's why, to maintain the Transglutaminase activity, an oxygen absorber is added in the packet.

### Sensory properties

The transglutaminase doesn't affect the taste of food.

### Storage

Store in a closed hermetic packaging, in a cool and dry place. When the packet has been opened, it's advised to store the enzyme in sous-vide conditions and to freeze it to reduce the oxygen contact and residual enzyme activity.

## Legislation

Currently a majority of enzymes is regarded as being processing aid under the framework of Directive (89/107/EEC). Only France & Denmark have national enzyme laws. Transglutaminase use is prohibited in Denmark. In France, the law says that the product must be cooked before being eaten to ensure the enzyme inactivation. The following table, gives some cooking times and temperatures to ensure this inactivation:

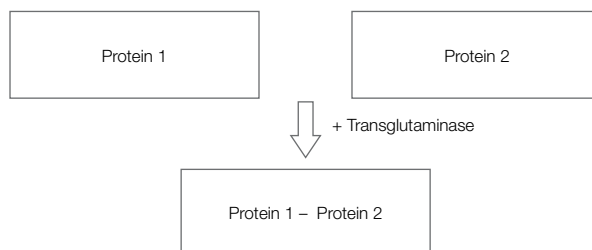
Cooking temperature	Time
65°C	2 h
70°C	15 min
75°C	5 min
80°C	1 min

### Origin

Transglutaminase is an enzyme which is widely distributed in nature. It can be found, for example, in blood where it is implicated in coagulation process. It also naturally exists in food including beef, pork, poultry, fish, shellfish and vegetables, all of which have been traditionally consumed. A food enzyme is a product obtained from a natural source (plants, animals or micro-organisms). A food enzyme contains one or more enzymes capable of catalyzing a specific biochemical reaction. Enzyme is added to food for a technological purpose at any stage of the food production process. Food enzymes have been used for centuries in foods such as beer, cheese and wine. At industrial scale, the transglutaminase is produced through fermentation process which is similar to making beer, wine and cheese, using conventional microorganisms.

### Chemical composition

Transglutaminase is an enzyme, made of amino acid chains. It's a protein in the chemical world. This enzyme acts on proteins containing foods and catalyses their cross-linking.



*Transglutaminase action on proteins containing in foods.*

### History

The transglutaminase, produced by fermentation, has been discovered in 1987. The production started in 1993 and is used in food as in other technology.

Informations extracted from manufacturer