

PAPAIN-CLARASE

(see Enzymes CBS, Why and when to use enzymes)

PAPAIN-CLARASE is the commercial name of a mixture of proteolytic enzymes extracted from papaya-tree carica papaya and purified and standardized by CBS. The enzymatic latex is harvested by tapping of the fruit before maturity and purified by a new patented process. **PAPAIN-CLARASE** contains a mixture of proteinases and peptidases isoenzymes like carboxy-exo-peptidase, chymopapain, papain and lysozyme. **PAPAIN-CLARASE** has both endo and exo-proteolytic activity and allows to reach the highest level of hydrolysis among the other commercially available food endo-proteases because it has a typical broad-spectrum attack on nine different peptide bonds. **PAPAIN-CLARASE** hydrolyzes proteins, amides and esters and particularly the bonds containing basic aminoacids or leucin or glycin. **PAPAIN-CLARASE** has a broad substrate specificity and can hydrolyze small peptides as well as casein, hemoglobin, gelatin, soya, fish, and meat proteins and other plant and animal proteins. The sulfhydryl groups of chymopapain and papain are responsible for a great part of its proteolytic activity. That means that reducing agents stabilize and protect its proteolytic activity while oxygen, heavy metals and oxidation catalyzers, are negative for its activity.

APPLICATIONS

Brewing	chillproofing of beer without any modification of beer organoleptic properties.
Extracts	preparation of yeast, meat, fish and vegetal extracts.
Fermentation	hydrolysis of proteins to increase the assimilable nitrogen in the fermentation media.
Fish	processing of fish solubles proteins and whole fish.
Meat	tenderization of meat.
Soya	processing of soluble and hydrolyzed proteins.
Protein processing	where the solubilization and modification of proteins are desirable PAPAIN-CLARASE can be used to hydrolyze gels to lower viscosities making easier the filtration and concentration. milk, whey, meat, fish, soya, etc, proteins processing.
Feed supplement	to improve animal feed utilization and efficiencies.
Leather	bating of hides.
Paper	removal of protein-coated broke.
Pharmaceutical	digestive aids, contact lenses cleaner, etc.
Photographic	removal of gelatin from film and silk screens.

ACTIVITIES

PAPAIN-CLARASE CP (concentrate powder) activity comprised between 65,000 and 75,000 NF tyrosine units/mg/hour and sold following activity (most commonly 72,000 NF). All other specific concentration below this level is available on demand in powder form and standardized with dextrines or saccharose or sodium chloride or lactose or other carrier on request.

PAPAIN-CLARASE CL (concentrate liquid) activity of 30,000 NF tyrosine units/mg/hour, the liquid medium consists on a specific buffer. All other specific concentration below this level is available on demand and standardized with sorbitol 70% w/w.

PAPAIN-CLARASE 3600 NF or 6500 NF activity of 3600 or 6500 NF tyrosine units/mg/hour standardized with sorbitol 70% w/w (liquid) or with lactose (powder).

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ACTIVITY DEFINITION

One NF tyrosine unit is the activity which will liberate the equivalent of one microgram of tyrosine per hour under the conditions of the assay as described by the National Formulary (NF). A copy of the papain assay is available on request (see Food Chemicals Codex). 60 NF tyrosine unit/mg/hour = 1 TU tyrosine unit/mg/min.

SOLUBILITY

Readily soluble in water. Improved enzyme dispersion throughout the substrate is obtained by presolubilizing the enzyme preparation in cold deaerated water (5-10°C) pH 5-7 by gently stirring to avoid vortex formation and subsequent enzyme oxidation. For brewing application the enzyme preparation could be solubilized in cold beer.

ACTIVATORS & COFACTORS

No activators or cofactors are required. However, PAPAINE-CLARASE that has lost some activity due to oxidation may be reactivated with mild reducing agents such as cysteine, hydrogen sulfide or sodium bisulfite.

EFFECT OF pH

The pH value for the optimal activity varies according to the substrate: 4-5 for gelatin, 6-7 for casein, 7-8 for hemoglobin, etc. PAPAINE-CLARASE shows optimum stability over the range of pH 5.0 to 9.0 at 60-70°C. Values below pH 3.5 and above pH 10.0 rapidly inactivate the enzyme.

EFFECT OF TEMPERATURE

The optimal PAPAINE-CLARASE activity temperature is 55-65°C but the enzyme is as well active at room temperature (+/-20°C). The enzyme shows high activity above 65°C to 85°C but inactivation begins at such temperatures.

INACTIVATION

Inactivation can be achieved by raising the temperature to 90-100°C for a few minutes. When high temperature inactivation is undesirable a combination of pH and temperature adjustments may be used. Temperatures above 70°C outside the range of pH 3.0 and 9.0 rapidly inactivate the enzyme.

INHIBITORS

Catalytic activity depends on the presence of a sulfhydryl group at the active site. Oxidizing agents, alkylating agents and heavy metals inhibit the enzyme by binding to the thiol group or forming a disulfide bond within the enzyme molecule. PAPAINE-CLARASE is quickly inactivated by iodine, iodoacetic acid, cupric oxide, hydrogen peroxide, potassium permanganate and other oxidizing agents. Several metal ions including copper, mercury, lead, zinc and iron demonstrate inhibitory effects on the enzyme. The inhibitory effect can be reversed by the addition of both cysteine and EDTA.

SUBSTRATES

Substrates susceptible to PAPAINE-CLARASE hydrolysis include most common proteins, i.e. gelatin, casein, gluten, collagen, elastin, globulins and muscle fiber proteins. PAPAINE-CLARASE demonstrates broad specificity hydrolyzing most peptide bonds. The physical state of proteins is extremely important as far as their susceptibility to protease hydrolysis is concerned. Native globular proteins are generally resistant to proteolytic attack due to their compact tertiary structure. Susceptibility of proteins to hydrolysis can be improved by denaturing the protein substrate to expose more peptide bonds to enzymatic hydrolysis. Heat, acidity or alkalinity, urea, detergents and reducing or oxidizing agents could be used in some cases to promote some protein denaturation and subsequent proteolysis.

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USE LEVEL

Enzyme requirements are dictated by processing conditions. Please contact our technical team for more details.

FOOD GRADE

PAPAIN-CLARASE complies with FAO/WHO JECFA and FCC recommended specifications for "food grade" enzymes. We can guarantee as well absence of any yeast, mold and total viable germs in 1 g of the product (see the Food Grade Quality Certificate supplied with each delivery).

**STORAGE
STABILITY**

In sealed containers, under cool (5-10°C) dry conditions the loss of activity is lower than 10% over one year.

PACKAGING

PAPAIN-CLARASE is available in liquid form in 6, 30 or 70 kg polypropylene barrels and in powder form in 40 kg cardboard boxes containing 4 plastic bags of 10 kg.

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