

Taq Plus DNA Polymerase

Catalog # TQ02-E311

Lot # 1L2208-6

Product Description

Taq Plus DNA polymerase consists of a mixture of Taq DNA polymerase and an enzyme containing 3'→5' exonuclease activity. The fidelity of Taq Plus is 6X greater than that of Taq DNA Polymerase.

Components

	Component Name	1000U
	Taq Plus DNA polymerase (5U/μl)	200μl
b	10X Taq Plus Buffer (Mg ²⁺ plus)	4 x 1ml

Storage and Stability

Store at -20°C. To avoid repeated handling and multiple freeze/thaw cycles aliquot product into smaller quantities.

Scientific Background

The fidelity of Taq Plus is 6 times greater than that of Taq DNA Polymerase. Taq Plus also has stronger amplification performance, higher sensitivity and yield and is more tolerant of impurities within 5 kb amplifying range, compared to Taq DNA Polymerase. The resulting PCR products contain A at the 3'-end and can be directly cloned into T-Vectors

Applications of this product include routine PCR amplification of DNA fragments, generation of PCR products for TA cloning, DNA labelling and DNA sequencing.

References

1. Innis M A, et al: PCR protocols and applications: A laboratory manual, academic, New York, 1989.
2. Innis M A, et al: DNA sequencing with *Thermus aquaticus* DNA polymerase and direct sequencing of polymerase chain reaction-amplified DNA, Proc. Natl. Acad. Sci. USA. 1988, 85:9436-9440.
3. Weyant R S, et al: Effect of ionic and nonionic detergents on the Taq polymerase. Biotechniques. 1990, 9:308-309.

Activity

The activity of Taq Plus DNA Polymerase was determined to be 5 Units/μl according to the unit definition below:

Unit Definition:

One unit (U) is defined as the amount of enzyme that incorporates 10 nmol of dNTPs into acid-insoluble products in 30 minutes at 74°C with activated salmon sperm DNA as template/primer.

Quality Control

Exonuclease Activity: The product is tested in a reaction containing 10 U of Taq Plus DNA Polymerase and 0.6 μg of λ-Hind III DNA. After incubation at 37°C for 16 hours, there is no visually detectable change of pattern of DNA bands determined by agarose gel electrophoresis.

Endonuclease Activity: The product is tested in a reaction containing 10 U of Taq Plus DNA Polymerase and 0.6 μg of supercoiled pBR322. After incubation at 37°C for 4h, there is no visually detectable change of pattern of DNA bands determined by agarose gel electrophoresis.

Functional Assay: The human α-1-antitrypsin gene is amplified for 30 cycles in a 50 μl system using 1.25 U of Taq Plus DNA Polymerase and 100 ng of human genomic DNA as template. A single DNA band of 360 bp is detected by 1% agarose gel electrophoresis.

This product is manufactured in an ISO 9001 and ISO 13485 certified facility.

Taq Plus DNA Polymerase

Catalog #	TQ02-E311
Lot #	1L2208-6
Activity	5 U/μl
Stability	18 months from date of shipment at -20°C
Storage & Shipping	Store at -20°C. Transport at ≤0 °C. To avoid repeated handling and multiple freeze/thaw cycles aliquot product into smaller quantities.

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PCR Protocol

1. General reaction mixture for PCR:

Component	50 µl system
10X Taq Plus Buffer (Mg ²⁺ plus)	5 µl
25 mM MgCl ₂ ^a	optional
dNTP Mix (10 mM each)	1 µl
Template DNA ^b	Variable
Primer 1 (10 µM)	2 µl
Primer 2 (10 µM)	2 µl
Taq Plus DNA polymerase (5 U/µl) ^c	0.5 µl
ddH ₂ O	to 50 µl

- a. The final concentration of Mg²⁺ of this mixture is 2 mM, for most PCR reactions, the final concentration of Mg²⁺ should be 1.5 mM - 2 mM. If necessary, the concentration of Mg²⁺ can be increased by adding 25mM MgCl₂.
- b. The optimal reaction concentration is different for different templates. The recommended amount of DNA template for a 50µl reaction system is as follows:

Template Type	Amount
Genomic DNA of animals and plants	0.1-1 µg
Bacterial genomic DNA	10-100 ng
λDNA	0.5-5 ng
Plasmid DNA	0.1-10 ng

- c. The amount of Taq Plus DNA Polymerase can be adjusted between 0.25 - 1µl. Increasing the amount of Taq Plus DNA polymerase can improve the amplification yield under normal circumstances but may decrease the specificity of PCR amplification.

2. Thermocycling conditions for a routine PCR:

Temperature	Time	Cycle number
94°C	5 min (Initial denaturation)	
94°C	30 sec	} 30-35 cycles
55°C *	30 sec	
72°C	60 sec / kb	
72°C	7 min (Final extension)	

* The optimal annealing temperature should be 1-2°C lower than the T_m of the primers used.

Handling Notes

Taq Plus DNA Polymerase also shows polymerase activity at room temperature. Therefore, it is recommended to set up reaction systems on ice and then immediately start the reaction in a PCR amplifier, to reduce nonspecific amplification during preparation and get better PCR results.

Guidelines for primer design:

1. The primer should terminate with a G or C at the 3'-end.
2. Avoid continuous mismatching nucleotides among last 8 bases at the 3'-end of the primers.
3. Avoid hairpin structure at the 3'-end of the primers.
4. T_m of the primers should be within the range of 55°C-65°C.
5. Non-complementary sequence should not be included when calculating T_m of the primers.
6. Optimal GC content of the primer is 40-60%. Ideally, G and C nucleotides should be distributed uniformly along the primer.
7. T_m and GC content of forward and reverse primers should be as similar as possible.

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SAFETY DATA SHEET

Article 1 - Product Identification

Product Name: Taq Plus DNA polymerase
Catalog # TQ02-E311

This product is sold only for research use by qualified laboratory personnel, and is not to be used as a drug, medical device, food additive, cosmetic, nor household chemical. It is not to be used in diagnostic, therapeutic, consumer, agricultural, nor pesticidal applications.

Supplier of Datasheet: SignalChem Diagnostics Inc.
 Street Address: 190-13160 Vanier Place
 City, Prov. Postal Code: Richmond, BC, V6V 2J2
 Country: Canada
 Emergency Phone: 1-888-606-3424 (Toll free)
 1-778-326-0223 (local)

Article 2 - Hazard Identification

- **WHMIS Classification:** Not WHMIS controlled.
- **GHS classification:** Not GHS classified.
- **Hazard Pictograms:** No labelling applicable.
- **Signal words:** None.
- **Hazard statements:** None.
- **Precautionary statements:** Wear protective gloves/protective clothing/eye protection/ face protection. Avoid breathing dust. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- **Other hazards:** May cause eye and skin irritation. May cause respiratory and digestive tract irritation.

Article 3 – Composition/Information on Ingredients

Description: This product consists of the components listed below.

Component: Taq Plus DNA polymerase (5U/µl)

Chemical Characterization: Mixture

Common name	Chemical name	CAS-No.	Concentration
Glycerol	Glycerol	56-81-5	≥50%- <70%

Component: 10X Taq Plus Buffer

Not a hazardous substance or mixture

Article 4 – First-aid Measures

- **General information:** Consult a physician by providing the SDS.
- **After inhalation:** Breath in fresh air. If casualty cannot breathe, give artificial respiration and consult a physician.
- **After skin contact:** Immediately wash with soap and plenty of water and rinse thoroughly. Consult a physician.
- **After eye contact:** Rinse opened eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do so. Consult a physician.
- **After swallowing:** Not expected to present a significant ingestion hazard under anticipated conditions of normal use. If you feel unwell, seek medical advice.

Article 5 - Fire-fighting Measures

- **Suitable extinguishing media:** Use water spray, extinguishing powder, carbon dioxide, or other appropriate measure that is suitable to the environment.
- **Specific hazards arising from the substance or mixture:** None known.
- **Special protective equipment and precautions for fire-fighters:** Self-contained breathing apparatus if necessary.

Article 6 – Accidental Release Measures

- **Personal precautions, protective equipment, and emergency procedures:** Apply standard laboratory practices and personal protective equipment. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation.
- **Environmental precautions:** Do not allow to enter drains.
- **Methods and materials for containment and cleaning up:** Absorb on sand or vermiculite and place in closed containers for disposal.

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SAFETY DATA SHEET

Article 7 - Handling and Storage

- **Precautions for safe handling:** Wear chemical safety goggles and compatible chemical-resistant gloves. Avoid inhalation, contact with eyes, skin or clothing.
- **Conditions for safe storage:** Store according to product label instructions. Keep container upright and tightly closed.

Article 8 - Exposure Controls/Personal Protection

- **Components with limit monitoring values at workplace:**
Glycerol (CAS-No: 56-81-5)

Values	Control parameters	Regulations
TWA	10 mg/m ³ for mist	British Columbia, Canada
TWA	3 mg/m ³ for respirable mist	British Columbia, Canada
TWA	10 mg/m ³	Alberta, Canada
TWAEV	10 mg/m ³	Ontario, Canada
TWAEV	10 mg/m ³	Quebec, Canada
TWA	10 mg/m ³	USA

- **Appropriate engineering controls:**
Apply adequate ventilation including mechanical exhaust or laboratory fume hood. Follow standard laboratory practices.
- **Individual protection measures:**
Respiratory protection:
Use appropriate respirator if there is inadequate ventilation by following the government standards.
Hand protection:
Wear gloves and use proper glove removal technique to avoid skin contact. Discard gloves after use by following the applicable laboratory regulations. Wash and dry hands.
Eye/face protection:
Safety goggles with side-shields approved under appropriate government standards.
Skin/body protection:
Use appropriate clothing, footwear and any additional protection measures to protect from splashing or contamination.

Article 9 – Physical and Chemical Properties

Taq Plus DNA polymerase (5U/μl)

Appearance: Colorless liquid.	Danger of explosion: Product does not present an explosion hazard.
Odour/Odour Threshold: Not determined.	Explosion limits: Not available.
pH: ~7.2	Decomposition temperature: Not available.
Melting point/freezing point: Not determined.	Vapor pressure at 20 °C: Not available.
Boiling point/Boiling range: ~106°C	Density: Not determined.
Flash point: Not determined.	Relative density: ~1.12g/cm ³
Flammability (solid, gaseous): Not determined.	Vapor density: Not determined.
Ignition temperature: Not determined.	Evaporation rate: Not determined.
Auto-igniting: Product is not self-igniting.	Solubility in / Miscibility with Water: Fully miscible.

10X Taq Plus Buffer

Appearance: Colorless liquid.	Danger of explosion: Product does not present an explosion hazard.
Odour/Odour Threshold: Not determined.	Explosion limits: Not available.
pH: ~7.2	Decomposition temperature: Not available.
Melting point/freezing point: Not determined.	Vapor pressure at 20 °C: Not available.
Boiling point/Boiling range: ~106°C	Density: Not determined.
Flash point: Not determined.	Relative density: ~1.02g/cm ³
Flammability (solid, gaseous): Not determined.	Vapor density: Not determined.
Ignition temperature: Not determined.	Evaporation rate: Not determined.
Auto-igniting: Product is not self-igniting.	Solubility in / Miscibility with Water: Fully miscible.

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Article 10 - Stability and Reactivity

- **Reactivity:** Stable under recommended transport and storage conditions.
- **Chemical stability:** Stable under recommended transport and storage conditions.
- **Possible hazardous reactions:** No dangerous reactions known.
- **Conditions to avoid:** Heat and moisture.
- **Incompatible materials:** Not determined.
- **Hazardous decomposition products:** Not determined.

Article 11 - Toxicological Information

- **Acute toxicity:** Not available.
- **LD/LC50:** Not available.
- **Skin corrosion/irritation:** Not available.
- **Serious eye damage/eye irritation:** Not available.
- **Respiratory or skin sensitization:** Not available.
- **Germ cell mutagenicity:** Not available.
- **Carcinogenicity:** No components are listed in IARC, or NTP, or OSHA, or ACGIH.
- **Reproductive toxicity:** Not available.
- **Teratogenicity:** Not available.
- **Specific target organ toxicity - single exposure/ - repeated exposure (GHS):** Not available.
- **Aspiration hazard:** Not available.
- **Potential health effects:**
 - Inhalation: No data available
 - Ingestion: No data available
 - Skin: No data available
 - Eyes: No data available
- **Signs and Symptoms of Exposure:** No data available
- **Synergistic effects:** Not available.

Article 12 - Ecological Information

- **Eco-toxicity:** No data available.
- **Biodegradability:** Not applicable.
- **Bio-accumulative potential:** Not applicable.
- **Mobility in soil:** Not applicable.
- **PBT and vPvB assessment:** Not applicable.
- **Other adverse effects:** Not applicable.

Article 13 - Disposal Considerations

- **Disposal methods:** In accordance to applicable national, regional, or local laws and regulations. For additional handling information and protection of employees please refer to Article 7 and 8.
- **Contaminated packaging:** Disposal should be made in accordance to official regulations. Use water or cleansing agents to clean the area.

Article 14 - Transport Information

- **DOT:** Not dangerous goods.
- **IMDG:** Not dangerous goods.
- **IATA:** Not dangerous goods.

Article 15 - Regulatory Information

- **WHMIS Classification:** Non-hazardous.
- **GHS label elements:** Not applicable.
- **Signal word:** Not applicable.
- **Hazard statements:** Not applicable.

Article 16 - Other Information

The above information is believed to be correct but does not purport to be all-inclusive and shall be used only as a guide. SignalChem shall not be held liable for any damage resulting from handling or from contact with the above product. See the Technical Specification, Packing Slip, Invoice, and Product Catalog for additional terms and conditions of sale.

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