



PRODUCT INFORMATION

**Thermo Scientific**  
**GeneJET PCR Purification Kit**  
**#K0701, #K0702**

[www.thermoscientific.com/onebio](http://www.thermoscientific.com/onebio)

**#K0701**

**Lot**

50 preps

**Expiry Date**

### **CERTIFICATE OF ANALYSIS**

The kit was tested in the purification of PCR products according to the protocol described in the manual. The quality of the purified DNA was evaluated spectrophotometrically, by agarose gel electrophoresis, digestion with Thermo Scientific FastDigest restriction enzymes and automated fluorescent sequencing.

**Quality authorized by:**



Jurgita Zilinskiene

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## COMPONENTS OF THE KIT

GeneJET PCR Purification Kit	50 preps #K0701	250 preps #K0702
Binding Buffer	12 mL	60 mL
Wash Buffer (concentrated)	9 mL	45 mL
Elution Buffer (10 mM Tris-HCl, pH 8.5)	15 mL	30 mL
GeneJET Purification Columns (preassembled with collection tubes)	50	250

## STORAGE AND STABILITY

Thermo Scientific GeneJET PCR Purification Kit should be stored at room temperature (15-25 °C). For columns we recommend 4 °C storage for periods greater than 1 year. Any precipitate that forms in the buffers during storage can be redissolved by incubating briefly at 37 °C, then cooling to room temperature before use.

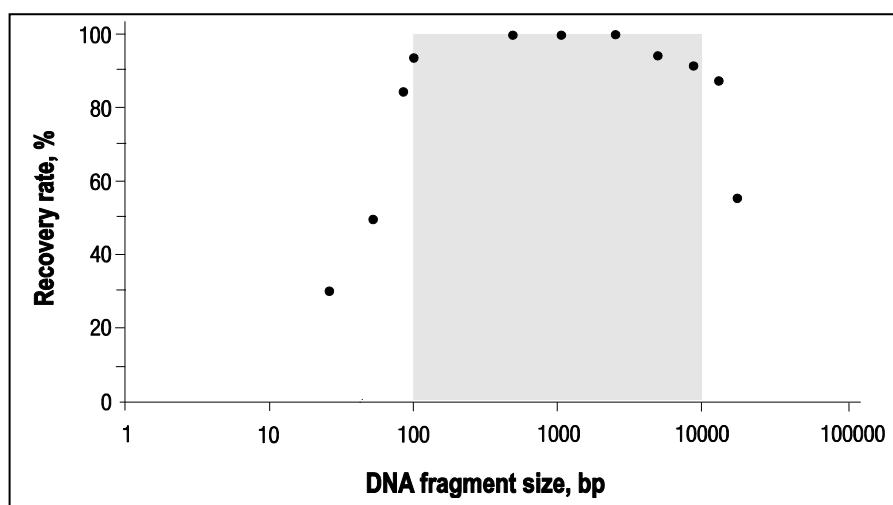
**Note. Close the bag with GeneJET Purification Columns tightly after each use!**

## DESCRIPTION

The GeneJET™ PCR Purification Kit is designed for rapid and efficient purification of DNA from PCR and other enzymatic reaction mixtures.

The kit utilizes a proprietary silica-based membrane technology in the form of a convenient spin column, eliminating the need for tedious resin manipulations or toxic phenol-chloroform extractions.

The GeneJET PCR Purification Kit effectively removes primers, dNTPs, unincorporated labeled nucleotides, enzymes and salts from PCR and other reaction mixtures. The kit can be used for purification of DNA fragments from 25 bp to 20 kb. The recovery rates are 90-100% in a 100 bp – 10 kb DNA fragment size range (see Fig. 1). Each GeneJET purification column has a total binding capacity of up to 25 µg of DNA and the entire procedure takes just 5 min. The purified DNA can be used in common downstream applications such as sequencing, restriction digestion, labeling, ligation, cloning, *in vitro* transcription, blotting or *in situ* hybridization.



**Fig. 1.** Recovery dependence on DNA fragment size

## PRINCIPLE

A reaction mixture containing DNA is combined with the binding buffer and added to a purification column. A chaotropic agent in the binding buffer denatures proteins and promotes DNA binding to the silica membrane in the column. As an added convenience, the binding buffer contains a color indicator that allows for easy monitoring of the solution pH for optimal DNA binding. Impurities are removed with a simple wash step. Purified DNA is then eluted from the column with the elution buffer. The recovered DNA is ready for use in downstream applications.

## IMPORTANT NOTES

- Prior to the initial use of the kit, dilute the **Wash Buffer** (concentrated) with ethanol (96-100%):

	<b>50 preps #K0701</b>	<b>250 preps #K0702</b>
Wash Buffer (concentrated)	9 mL	45 mL
Ethanol	45 mL	225 mL
Total Volume	54 mL	270 mL

After the ethanol has been added, mark the check box on the bottle to indicate the completed step.

- Examine the **Binding Buffer** for precipitates before each use. Re-dissolve any precipitate by warming the solution to 37 °C and cooling to 25 °C.
- Wear gloves when handling the **Binding Buffer** as this solution contains irritants (see p.7 for SAFETY INFORMATION).

## ADDITIONAL MATERIALS AND EQUIPMENT REQUIRED

- Ethanol 96-100%.
- Isopropanol.
- 3 M sodium acetate, pH 5.2 (may be necessary).
- Microcentrifuge.
- 1.5 or 2 mL microcentrifuge tubes.
- Heating block or water bath (may be necessary).

## PURIFICATION PROTOCOLS

### Note

- Read IMPORTANT NOTES on p. 3 before starting.
- All purification steps should be carried out at **room temperature**.
- All centrifugations should be carried out in a table-top microcentrifuge at **>12000 × g** (10 000-14 000 rpm, depending on the rotor type).

### Protocol A. DNA purification using centrifuge

Step	Procedure
1	Add a <b>1:1 volume</b> of <b>Binding Buffer</b> to completed PCR mixture (e.g. for every 100 µL of reaction mixture, add 100 µL of Binding Buffer). Mix thoroughly. Check the color of the solution. A yellow color indicates an optimal pH for DNA binding. If the color of the solution is orange or violet, add 10 µL of 3 M sodium acetate, pH 5.2 solution and mix. The color of the mix will become yellow.
2 for DNA ≤500 bp	<i>Optional:</i> if the DNA fragment is ≤500 bp, add a 1:2 volume of 100% isopropanol (e.g., 100 µL of isopropanol should be added to 100 µL of PCR mixture combined with 100 µL of Binding Buffer). Mix thoroughly. <b>Note.</b> If PCR mixture contains primer-dimers, purification without isopropanol is recommended. However, the yield of the target DNA fragment will be lower.
3	Transfer up to 800 µL of the solution from step 1 (or optional step 2) to the GeneJET purification column. Centrifuge for 30-60 s. Discard the flow-through. <b>Notes.</b> If the total volume exceeds 800 µL, the solution can be added to the column in stages. After the addition of 800 µL of solution, centrifuge the column for 30-60 s and discard flow-through. Repeat until the entire solution has been added to the column membrane. <b>Close the bag with GeneJET Purification Columns tightly after each use!</b>
4	Add <b>700 µL</b> of <b>Wash Buffer</b> (diluted with the ethanol as described on p. 3) to the GeneJET purification column. Centrifuge for 30-60 s. Discard the flow-through and place the purification column back into the collection tube.
5	Centrifuge the empty GeneJET purification column for an additional 1 min to completely remove any residual wash buffer. <b>Note.</b> This step is essential as the presence of residual ethanol in the DNA sample may inhibit subsequent reactions.
6	Transfer the GeneJET purification column to a clean 1.5 mL microcentrifuge tube (not included). Add <b>50 µL</b> of <b>Elution Buffer</b> to the center of the GeneJET purification column membrane and centrifuge for 1 min. <b>Note</b> <ul style="list-style-type: none"> <li>• For low DNA amounts the elution volumes can be reduced to increase DNA concentration. An elution volume between 20-50 µL does not significantly reduce the DNA yield. However, elution volumes less than 10 µL are not recommended.</li> <li>• If DNA fragment is &gt;10 kb, prewarm Elution Buffer to 65 °C before applying to column.</li> <li>• If the elution volume is 10 µL and DNA amount is ≥5 µg, incubate column for 1 min at room temperature before centrifugation.</li> </ul>
7	Discard the GeneJET purification column and store the purified DNA at -20 °C.

## Protocol B. DNA purification using vacuum manifolds

Step	Procedure
1	Perform DNA binding stage according to steps 1 - 2 in Protocol A on page 4.
2	Prepare the vacuum manifold according to the supplier's instructions. Place the GeneJET purification column(s) onto the manifold. <b>Close the bag with GeneJET Purification Columns tightly after each use!</b>
3	Transfer up to 800 $\mu$ L of the solution (from step 1 or 2 as in protocol A) to the GeneJET purification column. <b>Note.</b> If the total volume exceeds 800 $\mu$ L, the solution can be added to the column in stages. After each application, apply the vacuum and discard the flow-through. Repeat until the entire volume has been applied to the column membrane.
4	Apply the vacuum to draw the sample through the column. Switch off the vacuum after the entire sample has passed through the column.
5	Add <b>700 <math>\mu</math>L of Wash Buffer</b> (diluted with the ethanol as described on p. 3) to the GeneJET purification column.
6	Apply the vacuum to draw the solution through the column. Switch off the vacuum after the solution has passed through the column. Place the purification column back into the collection tube.
7	Centrifuge the empty GeneJET purification column for an additional 1 min to completely remove any residual wash buffer. <b>Note.</b> This step is essential as the presence of residual ethanol in the DNA sample may inhibit subsequent reactions.
8	Transfer the GeneJET purification column to a clean 1.5 mL microcentrifuge tube (not included). Add <b>50 <math>\mu</math>L of Elution Buffer</b> to the center of the GeneJET purification column membrane and centrifuge for 1 min. <b>Note.</b> <ul style="list-style-type: none"><li>• For low DNA amounts the elution volumes can be reduced to increase DNA concentration. An elution volume between 20-50 <math>\mu</math>L does not significantly reduce the DNA yield. However, elution volumes less than 10 <math>\mu</math>L are not recommended.</li><li>• If DNA fragment is &gt;10 kb, prewarm Elution Buffer to 65 °C before applying to column.</li><li>• If the elution volume is 10 <math>\mu</math>L and DNA amount is <math>\geq</math>5 <math>\mu</math>g, incubate column for 1 min at room temperature before centrifugation.</li></ul>
9	Discard the GeneJET purification column and store the purified DNA at -20 °C.

## TROUBLESHOOTING

Problem	Possible Cause and Solution
<b>Low DNA yield</b>	<p><b>Inefficient DNA binding</b> Verify that a 1:1 volume of Binding Buffer is added to the reaction mixture. Ensure the solutions are mixed well. Check the color of the solution. A yellow color indicates an optimal pH for DNA binding. If the solution color is orange or violet, add 10 <math>\mu</math>L of 3 M sodium acetate, pH 5.2 solution and mix. The color of the mix will become yellow.</p> <p><b>Inefficient membrane wash</b> Ensure that the recommended volume of ethanol has been added to the Wash Buffer (concentrated) prior first use (see p. 3).</p> <p><b>Inefficient DNA elution</b> Add Elution Buffer directly to the center of the membrane and not to the side of the GeneJET purification column. Use 20-50 <math>\mu</math>L of Elution Buffer and ensure that the volume completely covers the surface of the membrane. Increase the Elution Buffer volume twice or perform two elution cycles when purifying larger amounts of DNA. (e.g., &gt;15 <math>\mu</math>g). In step 5 of Protocol A (step 7 of Protocol B), ensure all residual wash buffer is removed from the membrane. Longer centrifugation time (extra minute) can aid in removal of wash buffer.</p> <p><b>PCR reaction mixture does not contain DNA</b> Check for the presence and yield of the PCR product by running an aliquot of the reaction on an agarose gel.</p>
<b>Downstream reactions are unsuccessful</b>	<p><b>Presence of residual ethanol</b> In step 5 of Protocol A (step 7 of Protocol B), ensure all residual wash buffer is removed from the membrane. Longer centrifugation time can aid in removal of wash buffer.</p> <p><b>Inefficient membrane wash</b> Ensure that the collection tube is not overfilled during the wash step and that any of the wash buffer has remained in the bottom of the GeneJET purification column. Always discard the flow-through after centrifugation.</p> <p><b>Eluate contains excess salt</b> Ensure that the wash step 4 of Protocol A is effective. Incubate the GeneJET purification column with the Wash Buffer for several minutes before proceeding to centrifugation.</p>
<b>DNA does not remain in an agarose gel well</b>	<p>In step 5 of Protocol A (step 7 of Protocol B), ensure all residual wash buffer is removed from the membrane. Longer centrifugation time can aid in removal of wash buffer.</p>



## SAFETY INFORMATION



### Binding Buffer

Hazard-determining component of labeling: **guanidinium thiocyanate**

#### Xn Harmful

#### Risk phrases

R20/21/22 Harmful by inhalation, in contact with skin and if swallowed.

R32 Contact with acids liberates very toxic gas.

R52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

#### Safety phrases

S9 Keep container in a well-ventilated place.

S23 Do not breathe gas/fumes/vapour/spray.

S36/37 Wear suitable protective clothing and gloves.

S60 This material and its container must be disposed of as hazardous waste.

S61 Avoid release to the environment. Refer to special instructions/safety data sheets.



### Binding Buffer

#### Warning

#### Hazard statements:

H302 Harmful if swallowed.

H412 Harmful to aquatic life with long lasting effects.

#### Precautionary statements:

P273 Avoid release to the environment.

P264 Wash thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P301+P312 IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

P330 Rinse mouth.

P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

#### References

1. Vogelstein, B. and Gillespie, D., Preparative and analytical purification of DNA from agarose, Proc. Natl. Acad. Sci. USA, 76, 615-619, 1979.
2. Marko, M.A., Chipperfield, R. and Birnboim, H.C., A procedure for the large-scale isolation of highly purified plasmid DNA using alkaline extraction and binding to glass powder, Anal. Biochem., 121, 382-387, 1982.
3. Boom, R., Sol, C.J.A., et al., Rapid and simple method for purification of nucleic acids, J. Clin. Microbiol., Mar, 495-503, 1990.

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