USER GUIDE

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PureLink® Quick Gel Extraction and PCR Purification Combo Kit

For purification of DNA fragments from agarose gels and rapid, efficient purification of PCR products

Catalog number K220001

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life technologies™

Contents

Kit Contents and Storage

Shipping and storage

All components of the PureLink® Quick Gel Extraction and PCR Purification Combo Kit are shipped at room temperature. Upon receipt, store all components at room temperature.

Contents

The components included in the PureLink® Quick Gel Extraction and PCR Purification Combo Kit are listed in the following table.

Sufficient reagents are included to perform 50 reactions.

Component	Cat. no. K220001
Gel Solubilization Buffer (L3)	2 × 90 mL
Binding Buffer (B2)	15 mL
Wash Buffer (W1)	16 mL
Elution Buffer (E1) (10 mM Tris-HCl, pH 8.5)	15 mL
PureLink® Clean-up Spin Columns (in Wash Tubes)	50 each
PureLink® Elution Tubes	50 each

Intended use

For research use only. Not intended for any animal or human therapeutic or diagnostic use.

Description of the System

About the Kit

Introduction

Use the PureLink® Quick Gel Extraction and PCR Purification Combo Kit with silica membrane-based PureLink® Clean-up Spin Columns to rapidly and efficiently purify DNA fragments from agarose gels, and from PCR or restriction enzyme reactions.

A gel extraction protocol is included for purifying DNA from TAE or TBE agarose gels of various percentages, and with different melting points in ~30 minutes. For your convenience, purification protocols are provided for centrifugation and with a vacuum manifold.

A PCR purification protocol is provided to efficiently remove primers, dNTPs, enzymes, and salts from PCR products in less than 15 minutes. The purified PCR product is suitable for automated fluorescent DNA sequencing, restriction enzyme digestion, and cloning.

Note: The PureLink® Quick Gel Extraction and PCR Purification Combo Kit is **not** designed to purify supercoiled plasmid DNA or genomic DNA from agarose gels. **Only linear DNA fragments may be purified from gels using these kits.**

System overview, gel extraction

To purify DNA fragments from agarose gels using the PureLink® Quick Gel Extraction and PCR Purification Combo Kit, dissolve the excised gel using the Gel Solubilization Buffer. The Gel Solubilization Buffer enables efficient extraction of the DNA fragment from TAE or TBE agarose gels without any additional solutions or modifications to the protocol. After sufficiently dissolving the gel, you can purify and elute the DNA fragment using a centrifuge or vacuum manifold, as described in the following paragraph.

You will place the dissolved gel slice into a PureLink® Clean-up Spin Column containing a silica membrane. The DNA will bind to the membrane using a centrifuge or vacuum manifold. You will then wash the membrane with Wash Buffer containing ethanol to remove impurities and elute the purified DNA into an Elution Tube using Elution Buffer (10 mM Tris-HCl, pH 8.5). The purified DNA is suitable for use in a variety of downstream applications.

Continued on next page

System overview, PCR purification

To purify DNA fragments from PCR reactions, or restriction digests using the PureLink® Quick Gel Extraction and PCR Purification Combo Kit, mix the PCR product with Binding Buffer to adjust conditions so that they are optimal for subsequent dsDNA binding to the PureLink® Clean-up Spin Column.

Purifying DNA is based on the selective binding of dsDNA to silica-based membrane in the presence of chaotropic salts. The dsDNA binds to the silica-based membrane in the column. Remove impurities by thoroughly washing the column with Wash Buffer. Elute the dsDNA in low salt Elution Buffer or water.

Downstream applications

The purified DNA is suitable for various downstream applications, including:

- DNA sequencing
- Cloning
- Restriction enzyme digestion
- PCR reactions
- Labeling

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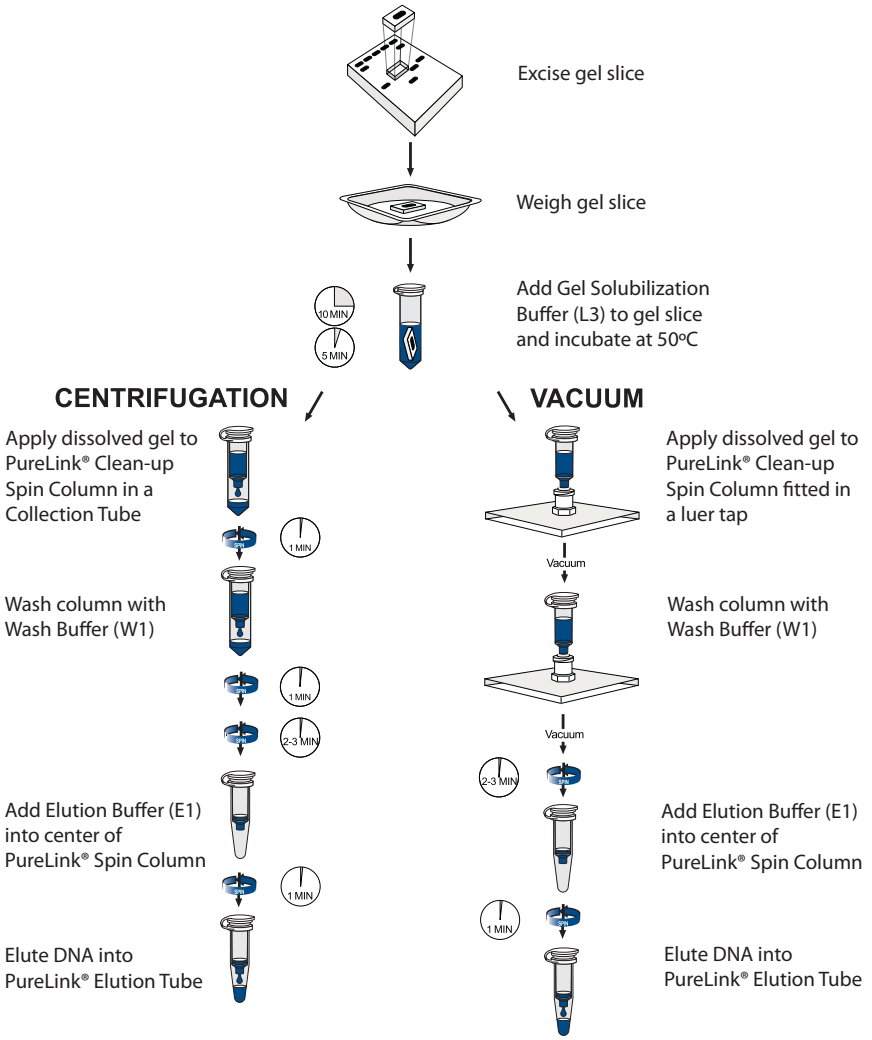
Kit specifications

Starting Material:	≤400 mg agarose gel slice, or 50–100 µL PCR product (50 ng–40 µg dsDNA)
Binding Capacity:	40 µg dsDNA per column
Column Reservoir Capacity:	800 µL
Wash Tube Capacity:	2.0 mL
Elution Tube Capacity	1.7 mL
Centrifuge Compatibility:	>10,000 × *g*
Elution Volume:	50 µL
DNA Recovery:	>80% for gel extraction, or Up to 95% for PCR purification (dependant on DNA fragment size)
DNA Fragment Size:	40 bp–10 kb
Separation Range:	0.1–12 kb from 10–40 mer primers
Primer Removal:	>99%

Experimental Overview

Gel extraction purification workflow

The flow chart below provides an overview for purifying DNA fragments from agarose gels using the PureLink® Quick Gel Extraction and PCR Purification Combo Kit.



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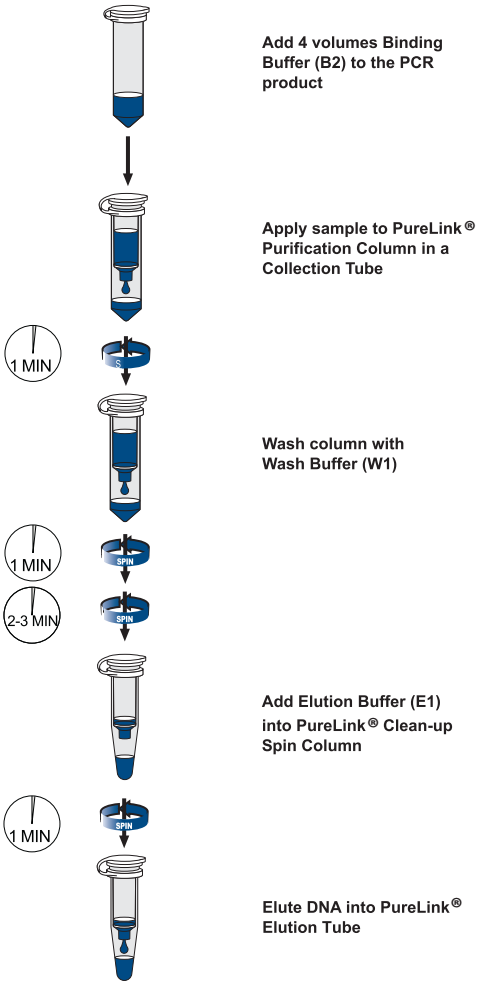
Experimental Overview, Continued

PCR purification workflow

The flow chart below provides an overview for purifying DNA from PCR reactions using the PureLink® Quick Gel Extraction and PCR Purification Combo Kit.



Methods

Before Starting

- The Gel Solubilization Buffer (L3) contains guanidine isothiocyanate (an irritant). This chemical is harmful when in contact with the skin, or when it is inhaled or ingested. **For your protection**, always wear a laboratory coat, gloves, and safety glasses when handling buffers.
- **Do not** add bleach or acidic solutions directly to solutions or sample preparation waste that contains guanidine isothiocyanate, as reactive compounds and toxic gases are formed.
- Dispose of buffers and chemicals in appropriate waste containers.

Follow the recommendations below to obtain the best results:

- Maintain a sterile working environment when handling DNA to avoid any contamination from DNases.
- Ensure that no DNase is introduced into the sterile solutions supplied with the kit.
- Make sure all equipment that comes in contact with DNA is sterile, including pipette tips and tubes.

Preparing Binding Buffer (B2) with isopropanol

Before beginning, prepare the Binding Buffer (B2) with isopropanol as follows:

1. Add 10 mL isopropanol to the Binding Buffer (B2).
2. Mark the box on the Binding Buffer (B2) label to indicate that isopropanol was added.
3. Store the Binding Buffer (B2) with isopropanol at room temperature.

Continued on next page

Preparing Wash Buffer (W1) with ethanol

Before beginning, prepare the Wash Buffer (W1) with ethanol as follows:

1. Add 64 mL 96–100% ethanol to the Wash Buffer (W1).
2. Check the box on the Wash Buffer (W1) label to indicate that ethanol was added.
3. Store the Wash Buffer (W1) with ethanol at room temperature.

Gel Extraction Protocol

General Guidelines

Introduction

Instructions for preparing the gel slice containing the DNA fragment of interest are included in this section.

Note

The PureLink® Quick Gel Extraction and PCR Purification Combo Kit is **not** designed to purify supercoiled plasmid DNA or genomic DNA from agarose gels. **Only linear DNA fragments should be purified from gels using these kits.**

Materials needed

- Agarose gel containing the DNA fragment
- Weighing paper or weigh trays
- Scale (sensitive to 0.001 g)
- Water bath or heat block set at 50°C
- 1.7-mL or 5-mL polypropylene microcentrifuge tubes
- Clean, sharp razor blade
- Gel Solubilization Buffer (L3) (*supplied with kit*)
- *(Optional)* 100% isopropanol

Agarose gels

DNA fragments can be purified from various percentages of TAE and TBE agarose gels and from agarose gels with different melting points, without modifying the protocol. **Follow specific directions regarding gels containing >2% agarose.**

DNA fragments

- The PureLink® Quick Gel Extraction and PCR Purification Combo Kit is suitable for purifying DNA fragments from 40 bp–10 kb in size. Larger DNA fragments may be purified from gels using these kits, but may result in lower DNA recovery.
- Ensure that the DNA fragment of interest is **completely** separated from other DNA fragments on the agarose gel.
- Each PureLink® Clean-up Spin Column can purify **up to 40 µg** of DNA. If you wish to purify a larger amount of DNA, use several PureLink® Clean-up Spin Columns. For best results, use 1 PureLink® Clean-up Spin Column per 10 µg of DNA fragment loaded onto the gel.

Preparing the Gel Slice

Excising the gel slice

After completing agarose gel electrophoresis:

1. Excise the area of the gel containing your desired DNA fragment using a clean, sharp razor blade. Minimize the amount of agarose surrounding the DNA fragment.
2. Weigh the gel slice containing the DNA fragment using a scale sensitive to 0.001 g. Place the gel slice into a 1.7-mL microcentrifuge tube (for ≤2% agarose gels) or a 5.0-mL microcentrifuge tube (for ≥2% agarose gels).

   Note: The maximum amount of starting material (gel) is ≤400 mg per tube. If your gel slice exceeds 400 mg, cut the gel into smaller slices so that no one piece exceeds 400 mg. Place additional gel slices into separate microcentrifuge tubes. During the purification procedure (pages 12 and 14), an additional Spin Column is required for each extra gel slice.
3. Proceed to **Dissolving the gel slice**, next page.

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Dissolving the gel slice

1. **For ≤2% agarose gels:**
   - Place ≤400 mg of the excised gel containing DNA (see page 9) into a **1.7-mL** polypropylene microcentrifuge tube.
   - Add 3 volumes of Gel Solubilization Buffer (L3) for every 1 volume of gel (e.g., add 1.2 mL Gel Solubilization Buffer for a 400-mg gel slice).

   For >2% agarose gels:
   - Place ≤400 mg of the excised gel containing DNA (see page 9) into a **5-mL** polypropylene tube.
   - Add 6 volumes of Gel Solubilization Buffer (L3) for every 1 volume of gel (e.g., add 2.4 mL for a 400-mg gel slice).
2. Place the tube(s) containing your gel slice and Gel Solubilization Buffer (step 1 of this procedure) into a 50°C water bath or heat block.
3. Incubate the tube at 50°C for at least 10 minutes. Invert the tube every 3 minutes to ensure complete gel dissolution.

   Note: High concentration gels (>2% agarose) or large gel slices may take longer than 10 minutes to dissolve.
4. After the gel slice appears dissolved, incubate the tube for an **additional** 5 minutes.
5. *(Optional)* For optimal DNA yields, add 1 gel volume isopropanol to the dissolved gel slice (e.g., add 400 µL isopropanol for a 400-mg gel slice). Mix well.
6. Proceed to **Purifying DNA from Gels Using a Centrifuge** (page 11) or **Purifying DNA from Gels Using a Vacuum Manifold** (page 13).

Purifying DNA from Gels Using a Centrifuge

Introduction

Use this procedure to purify DNA fragments using a centrifuge in approximately 30 minutes.

Required materials

Components required but not supplied:

- 96–100% ethanol
- Microcentrifuge capable of centrifuging at >10,000 × *g*
- DNase-free pipettes and tips

Components supplied with the kit:

- Wash Buffer (W1)
- Elution Buffer (E1)
  (10 mM Tris-HCl, pH 8.5)
- PureLink® Clean-up Spin Columns
- Wash Tubes
- PureLink® Elution Tubes

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Purifying DNA from Gels Using a Centrifuge, Continued

Binding, washing, and eluting DNA

Before beginning, add ethanol to the Wash Buffer (W1, see page 7).

1. Pipet the dissolved gel piece containing the DNA fragment of interest (steps 4–5, page 10) into the center of a PureLink® Clean-up Spin Column inside a Wash Tube.

   Note: Do **not** load >400 mg agarose per PureLink® Spin Column.

2. Centrifuge the tube at >10,000 × *g* for 1 minute. Discard the flow-through and replace the PureLink® Spin Column into the Wash Tube.
3. Add 500–700 µL Wash Buffer (W1), containing ethanol (page 7), to the PureLink® Spin Column.
4. Centrifuge the tube at >10,000 × *g* for 1 minute. Discard the flow-through and replace the PureLink® Spin Column into the Wash Tube.
5. Centrifuge the tube again at maximum speed for 2–3 minutes to remove any residual Wash Buffer and ethanol.
6. Discard the Wash Tube and place the PureLink® Spin Column into an Elution Tube.
7. Add 50 µL Elution Buffer (E1) to the center of the PureLink® Spin Column.
8. Incubate the tube for 1 minute at room temperature.
9. Centrifuge the tube at >10,000 × *g* for 1 minute. *The Elution Tube contains the purified DNA.* Discard the PureLink® Spin Column.
10. Store the purified DNA or proceed to your downstream application of choice.

Storing the purified DNA

Store the purified DNA at 4°C for immediate use or aliquot the DNA and store at –20°C for long-term storage. Avoid repeated freezing and thawing of the DNA.

Purifying DNA from Gels Using a Vacuum Manifold

Introduction

Use this procedure to purify DNA fragments using a vacuum manifold in approximately 30 minutes.

Required materials

Components required but not supplied:

- 96–100% ethanol
- Vacuum manifold and vacuum pump (capable of producing pressure of 15–20 in. Hg or –500 to –700 mbar)
- DNase-free pipettes and tips

Components supplied with the kit:

- Wash Buffer (W1)
- Elution Buffer (E1) (10 mM Tris-HCl, pH 8.5)
- PureLink® Clean-up Spin Columns
- Wash Tubes
- PureLink® Elution Tubes

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Purifying DNA from Gels Using a Vacuum Manifold, Continued

Binding, washing and eluting DNA

Before beginning, add ethanol to the Wash Buffer (W1, see page 7).

Perform all vacuum operations at room temperature.

1. Assemble the vacuum manifold according to the manufacturer's instructions.
2. Attach a PureLink® Clean-up Spin Column to the vacuum manifold.
3. Pipet the dissolved gel piece containing the DNA fragment of interest (steps 4–5, page 10) onto the center of the silica membrane of the PureLink® Spin Column. Apply vacuum until all of the liquid passes through the column, and then switch off the vacuum source.

   Note: Do not load more than 400 mg agarose per PureLink® Spin Column.
4. Add 500–700 µL Wash Buffer (W1) containing ethanol (see page 7) to the center of the PureLink® Spin Column.
5. Apply vacuum until all of the liquid passes through the column, and then switch off the vacuum. Remove the PureLink® Spin Column from the vacuum and place it into a Wash Tube.
6. Centrifuge the PureLink® Spin Column with the Wash Tube at maximum speed for 2–3 minutes to remove any residual Wash Buffer and ethanol. Discard the Wash Tube. Place the PureLink® Spin Column into an Elution Tube.
7. Add 50 µL Elution Buffer (E1) to the center of the PureLink® Spin Column.
8. Incubate the tube for 1 minute at room temperature.
9. Centrifuge the tube at >10,000 × *g* for 1 minute to elute the purified DNA *into the Elution Tube.* Discard the PureLink® Spin Column.
10. Store the purified DNA, or proceed to your downstream application of choice.

Storing DNA

Store the purified DNA at 4°C for immediate use or aliquot the DNA and store at –20°C for long-term storage. Avoid repeated freezing and thawing of DNA.

Gel Extraction Troubleshooting

Introduction Review the information below to troubleshoot your procedure for gel extraction.

Observation	Cause	Solution
Low DNA yield	Incorrect ratio of gel to Gel Solubilization Buffer	Ensure that the correct volume of Gel Solubilization Buffer (L3) is added for every 1 volume of gel used, based on the agarose gel percentage (see page 10).
	Incomplete solubilization of gel piece	• Verify that the temperature of water bath or heat block is at 50°C. • Cut large gel slices into several pieces to accelerate the gel dissolution. • Mix gel slice in the buffer every 3 minutes during the dissolution step.
	DNA fragment is too large	Increase the elution incubation time to >10 minutes.
	DNA is supercoiled	This kit is not designed to purify supercoiled plasmid DNA from agarose gels.
Low $A_{260/230}$ ratio	Guanidine carryover from the Gel Solubilization Buffer	• Do not get any buffer solution in the cap area of the tube. • Add a second wash step with Wash Buffer (W1): After your first wash with Wash Buffer, followed by centrifugation: 1. Add another 500–700 µL Wash Buffer, containing ethanol. 2. Centrifuge at 10,000 × *g*. Discard the flow-through and return the column into the Wash Tube. 3. Centrifuge at Maximum speed for 2–3 minutes to remove residual Wash Buffer and ethanol.
Enzymatic reactions are inhibited	Residual ethanol in the purified DNA	Traces of ethanol from the Wash Buffer can inhibit downstream enzymatic reactions. To remove Wash Buffer, discard Wash Buffer flow-through from the Wash Tube. Replace the column into the Wash Tube and centrifuge the column at >10,000 × *g* for 2–3 minutes to completely dry the column.

PCR Purification Protocol

Purifying DNA

Introduction

The purification procedure is designed for purifying up to 40 µg dsDNA using a centrifuge in a total time of 10–12 minutes.

Required materials

Components required but not supplied:

- 96–100% ethanol
- Isopropanol
- Microcentrifuge capable of centrifuging at >10,000 × *g*
- DNase-free pipettes and tips

Components supplied with the kit:

- Wash Buffer (W1)
- Binding Buffer (B2)
- Elution Buffer (E1)
  (10 mM Tris-HCl, pH 8.5)
- PureLink® Clean-up Spin Columns
- Wash Tubes
- PureLink® Elution Tubes

Follow the recommendations below to obtain the best results:

- Maintain PCR volume of 50–100 µL.
- Save an aliquot of PCR products before purification to verify and check amplicon on the gel.
- Perform all centrifugation steps at room temperature.
- Pipet the Elution Buffer in the center of the PureLink® Spin Column and perform a 1 minute incubation.
- Always use sterile water with pH 7–8.5, if you are using water for elution.

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Purifying DNA, Continued

Binding, washing, and eluting the DNA

Before beginning, add ethanol to the Wash Buffer (W1) and isopropanol to Binding Buffer (B2) as described on page 7.

1. Add 4 volumes of Binding Buffer (B2) to 1 volume of PCR reaction (50–100 µL). Mix well.
2. Remove a PureLink® Clean-up Spin Column in a Wash Tube from the package.
3. Add sample in Binding Buffer from step 1, above, to the PureLink® Spin Column.
4. Centrifuge the PureLink® Spin Column at room temperature at 10,000 × *g* for 1 minute.
5. Discard the flow through and replace the PureLink® Spin Column into the Wash Tube.
6. Add 650 µL Wash Buffer with ethanol (page 7) to the PureLink® Spin Column.
7. Centrifuge the PureLink® Spin Column at room temperature at 10,000 × *g* for 1 minute. Discard the flow-through from the Wash Tube and replace the PureLink® Spin Column into the tube.
8. Centrifuge the PureLink® Spin Column at maximum speed at room temperature for 2–3 minutes to remove any residual Wash Buffer. Discard the Wash Tube.
9. Place the PureLink® Spin Column in a clean 1.7-mL PureLink® Elution Tube (supplied with the kit).
10. Add 50 µL Elution Buffer (E1) or sterile, distilled water (pH >7.0) to the center of the PureLink® Spin Column.
11. Incubate the PureLink® Spin Column at room temperature for 1 minute.
12. Centrifuge the PureLink® Spin Column at maximum speed for 1 minute.
13. *The elution tube contains the purified PCR product*. Remove and discard the PureLink® Spin Column. The recovered elution volume is ~48 µL.

Storing the purified DNA

Store the purified DNA at 4°C for immediate use or aliquot the DNA and store at –20°C for long-term storage. Avoid repeated freezing and thawing of the DNA.

PCR Purification Troubleshooting

Introduction Review the information below to troubleshoot your procedure for PCR purification.

Observation	Cause	Solution
Low DNA yield	PCR conditions not optimized	Check the amplicon on the gel to verify the PCR product prior to purification.
	Incorrect binding conditions	• For efficient DNA binding always mix 1 volume of PCR (50–100 µL) with 4 volumes of Binding Buffer. • Be sure to add 100% isopropanol to the Binding Buffer as described on page 6.
	Ethanol not added to Wash Buffer	Be sure to add 96–100% ethanol to Wash Buffer as described on page 7.
	Incorrect elution conditions	Add elution buffer to the center of the column and perform incubation for 1 minute with Elution Buffer before centrifugation.
Downstream enzymatic reactions are inhibited	Presence of ethanol in purified DNA	Traces of ethanol from the Wash Buffer can inhibit downstream enzymatic reactions. To remove Wash Buffer, discard Wash Buffer flow-through from the Wash Tube. Replace the column into the Wash Tube and centrifuge the column at >10,000 × *g* for 2–3 minutes to completely dry the column.

Appendix

Estimating DNA Yield and Quality

Introduction

After purifying DNA, you may determine the quantity and quality of the purified DNA.

DNA recovery

DNA fragments of various sizes were purified using the PureLink® Quick Gel Extraction and PCR Purification Combo Kit as described in this manual. The concentration of the purified DNA was measured with Qubit® DNA Assay Kits (see page 22). The DNA yields are listed in the table below.

DNA Size	Amount Loaded	% DNA Yield*
400 bp	0.5 µg	>85%
740 bp	1 µg	>85%
2.9 kb	1 µg	>85%

***Note:** The DNA yield varies with the fragment size, amount of DNA loaded on the gel, gel slice size, elution volume, and incubation time.

DNA yield

Measure the DNA concentration using UV absorbance at 260 nm, agarose gel electrophoresis or Qubit® DNA Assay Kits.

Qubit® DNA Assay Kits

The Qubit® DNA Assay Kits (see page 22 for ordering information) provide a rapid, sensitive, and specific method for measuring dsDNA concentration with minimal interference from RNA, protein, ssDNA (primers), or other common contaminants that affect UV absorbance.

The kit contains a state-of-the-art quantitation reagent, pre-diluted standards for standard curve, and a pre-made buffer. The assay is designed for reading in standard fluorescent readers/fluorometer or Qubit® 2.0 Fluorometer.

Agarose Gel Electrophoresis

To estimate the yield using agarose gel electrophoresis, compare the purified PCR product to known quantities of a DNA fragment with the same size. Compare the band intensity of the purified PCR product to the DNA fragment used as a standard.

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Estimating DNA Yield and Quality, Continued

DNA yield, Continued

UV Absorbance

1. Prepare a dilution of the DNA solution in 10 mM Tris-HCl, pH 7.5. Mix well. Measure the absorbance at 260 nm (A_{260}) of the dilution (using a cuvette with an optical path length of 1 cm) in a spectrophotometer blanked against 10 mM Tris-HCl, pH 7.5.
2. Calculate the concentration of DNA using the formula:

$$\text{DNA } (\mu g/\text{mL}) = A_{260} \times 50 \times \text{dilution factor}$$

For DNA, A_{260} = 1 for a 50 μg/mL solution measured in a cuvette with an optical path length of 1 cm.

Note: Contaminating RNA will inflate the DNA content measured at 260 nm. To avoid any interference from RNA, use the Qubit® DNA Assay Kits for measuring DNA concentration.

Estimating DNA quality

DNA purified using the PureLink® Quick Gel Extraction and PCR Purification Combo Kit has an OD A_{260}/A_{280} value of >1.8 when samples are diluted in Tris-HCl pH 7.5–8.5 indicating that the DNA is substantially free of contaminants that would otherwise affect UV absorbance.

To confirm the integrity and the size of the purified DNA fragments, perform agarose gel electrophoresis.

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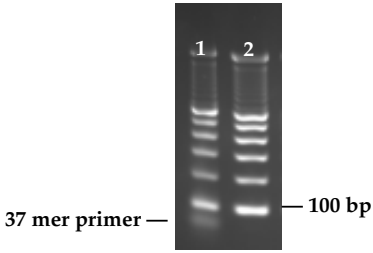
Analyzing primer removal

Analyze the efficiency of primer removal by agarose gel electrophoresis. In the example shown below, a 100 bp DNA Ladder (Cat. no. 15628-019) was mixed with an excess of a 37-mer primer. The mixture was purified as described in the manual.



Lane 1) 37-mer primer mixed with 100 bp DNA Ladder before purification.
Lane 2) 37-mer primer removed from 100 bp DNA Ladder after purification.

If greater sensitivity is required, the WAVE® System is an ideal method to estimate the efficiency of primer removal. The WAVE® System is an automated DHPLC (denatured high-performance liquid chromatography) system.

Accessory Products

Additional products

The following products are also available from Invitrogen. For more details on these products, visit www.invitrogen.com or contact **Technical Support** (page 23).

Product	Quantity	Catalog no.
PureLink® Quick Gel Extraction Kit	50 preps 250 preps	K2100-12 K2100-25
PureLink® PCR Purification Kit	50 reactions 250 reactions	K3100-01 K3100-02
EveryPrep™ Universal Vacuum Manifold	1 unit	K2111-01
Platinum® Taq DNA Polymerase High Fidelity	100 reactions	11304-011
Platinum® Taq DNA Polymerase	100 reactions	10966-018
UltraPure™ DNase/RNase-free Distilled Water	500 mL	10977-015
Qubit® dsDNA Assay Kit, High Sensitivity	500 assays	Q32854
Qubit® dsDNA Assay Kit, Broad-Range	500 assays	Q32853
Qubit® 2.0 Fluorometer	1 each	Q32857

E-Gel® agarose gels and DNA ladders

E-Gel® Agarose Gels are bufferless, pre-cast agarose gels designed for fast, convenient electrophoresis of DNA samples. E-Gel® agarose gels are available in different agarose percentages and well formats for your convenience.

A large variety of DNA ladders is available from Invitrogen for sizing DNA.

For more details on these products, visit www.invitrogen.com or contact **Technical Support** (page 23).

Technical Support

Obtaining support

For the latest services and support information for all locations, go to www.invitrogen.com.

At the website, you can:

- Access worldwide telephone and fax numbers to contact Technical Support and Sales facilities
- Search through frequently asked questions (FAQs)
- Submit a question directly to Technical Support (techsupport@invitrogen.com)
- Search for user documents, SDSs, vector maps and sequences, application notes, formulations, handbooks, certificates of analysis, citations, and other product support documents
- Obtain information about customer training
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SDS

Safety Data Sheets (SDSs) are available at www.invitrogen.com/sds.

Certificate of analysis

The Certificate of Analysis provides detailed quality control and product qualification information for each product. Certificates of Analysis are available on our website. Go to www.invitrogen.com/support and search for the Certificate of Analysis by product lot number, which is printed on the box.

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Limited warranty

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