

DNA IQ™ System

“Frequently Asked Questions”

By Kimberly Huston
Promega Corporation
genetic@promega.com

Promega's DNA IQ™ System^(a) (Cat.# DC6700) is designed to purify genomic DNA from a variety of samples. It has been optimized for use with the AluQuant™ Human DNA Quantitation System^(a) and the PowerPlex® Systems^(b,c,d). Two protocols are provided with the DNA IQ™ System—a Small Sample Casework protocol and a Database protocol. This article provides answers to commonly asked questions.

Q: Two protocols are provided with the DNA IQ™ System. What is the difference between the two?

The DNA IQ™ System isolates a maximum of 100ng of DNA from blood. If your sample contains less than 100ng of DNA, and you would like to isolate all of the DNA present, you should choose the Small Sample Casework protocol. The DNA isolated will be of varying concentration, as the amount of resin added is in excess. If your sample contains over 100ng of DNA, you should use the Database Protocol. In this instance, the DNA IQ™ Resin is saturated and the eluted DNA is of consistent concentration between samples. The Database Protocol integrates the DNA isolation and quantitation.

Q: Does the DNA IQ™ System isolate only human genomic DNA?

No. Genomic DNA isolated by the DNA IQ™ System is not human-specific. The system does not determine the source of DNA. Therefore, if your sample is not pristine and you want to determine the concentration of the human genomic DNA present, you will need to use a human-specific quantitation system such as the AluQuant™ Human DNA Quantitation System.

Q: Does the DNA IQ™ System isolate mitochondrial DNA?

The DNA IQ™ System will isolate all DNA present in a sample, including mitochondrial DNA.

Q: What sources have been used with the DNA IQ™ System?

The DNA IQ™ System has been optimized to isolate genomic DNA from liquid blood, swabs, FTA® and S&S paper. DNA has also been isolated from bone, hair, tissue, toothbrushes and cigarette butts, and from bloodstains on denim, t-shirt material and leather. Tissue, including hair, bone, sperm, and formalin-fixed, paraffin-embedded tissue, requires a Proteinase K digestion step. Heat-sensitive supports such as polyester should not be heated, as the fabric will melt and trap the DNA sample. Such support materials can be soaked at room temperature in Lysis Buffer or swabbed with an aqueous solution to remove DNA.

Q: Is the DNA IQ™ System automatable?

Yes. The DNA IQ™ System is amenable to automation. We have protocols for the Beckman Biomek® 2000. The Biomek® 2000 requires additional components to create a walk-away system. We are also evaluating other robotic systems.

Q: What is the composition of the Lysis Buffer?

The Lysis Buffer provided with the DNA IQ™ System is designed to work efficiently with the DNA IQ™ Resin. The Lysis Buffer composition is proprietary.

Q: Is the DNA obtained using the DNA IQ™ System single-stranded or double-stranded?

DNA isolated using the stain protocol, where the sample is heated in the presence of Lysis Buffer, is single-stranded. DNA isolated using the blood protocol is double-stranded. Thus DNA isolated with heat cannot be quantitated on agarose gels (yield gels) that are stained with ethidium bromide.

Q: What happens if I do not heat the sample to 65°C after adding the Elution Buffer?

The Elution Buffer is added in order to release the DNA from the resin. The efficiency of the elution hinges upon the temperature at which materials are heated. If the sample is not heated sufficiently, the yields of DNA obtained will be lower than expected.

Q: What happens if I remove the solid material from the Lysis Buffer before centrifuging in the Spin Basket?

The presence of the Lysis Buffer and the solid material in the spin basket is crucial to success. The mechanical forces involved in centrifugation aid in the extraction of DNA from solid materials. Spinning the Lysis Buffer through the spin basket allows optimal recovery of DNA from the solid material. If the solid material is removed, the yield of DNA will be lower than expected.

Q: What causes inconsistent DNA yields?

Inadequate mixing of the resin prior to removing aliquots will cause inconsistencies in DNA yield. The resin settles out of solution quickly, so it is important to mix the resin often when isolating DNA from numerous samples. It is also important to vortex the sample vigorously to keep the resin in solution and to break up aggregates that may form between each wash step. The presence of aggregates will also lower DNA yield.

Inconsistencies in yield will also occur if the resin is allowed to dry for more than 20 minutes. The DNA will bind irreversibly to the resin if allowed to dry for more than 20 minutes after washing.

A sample size of less than 100ng DNA will also cause inconsistencies in yield. If the sample does not contain 100ng of DNA, the DNA isolated will be the total amount of DNA contained in the sample. Thus, the concentration will be lower than expected, and quantitation will be necessary.

Q: Will the DNA IQ™ Resin affect any downstream applications?

We have successfully used the DNA isolated with the DNA IQ™ System in our PowerPlex® STR Systems. We have not observed any inhibition of downstream applications and have shown that the resin has no effect on the functionality or life of electrophoresis capillaries. However, if desired, the resin may easily be removed. Vortexing the eluted solution and placing it on the magnetic stand will capture the resin and allow transfer of the cleared supernatant to a new tube.

Q: My eluted DNA is not a clear solution. What could be the cause?

This problem occurs when heme or dyes are not efficiently removed from the sample and is indicative of insufficient washing. This can occur if all the liquid is not removed during washes or if a distinct resin pellet is not formed during washes. Another cause of contamination is use of too much starting material. If this is the case, the sample can be re-isolated using the DNA IQ™ System.

Q: Can the DNA IQ™ System be used to clean up DNA samples containing inhibitors that affect the success of PCR?

The DNA IQ™ System yields pure genomic DNA that is suitable for use in STR systems. DNA that has been purified by other methods and contains inhibitors, can be cleaned up using the DNA IQ™ System. Inhibitors will be removed, allowing successful downstream STR analysis.

PowerPlex is a trademark of Promega Corporation and is registered with the U.S. Patent and Trademark Office. DNA IQ and AluQuant are trademarks of Promega Corporation.

Biomek is a registered trademark of Beckman Instruments, Inc. FTA is a registered trademark of Flinders Technologies, Pty, Ltd., and is licensed to FITZCO, Inc.

(a,b,c,d) Refer to the patent and disclaimer statements on page 2.