

EDVOTEK® MyLab™ #1104

# Spooling DNA on a Stick

STORE AT ROOM TEMP.



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Designed for the Classroom  
SINCE 1987

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## OBJECTIVES

The objective of this experiment is to spool chromosomal DNA from a buffer solution containing sodium chloride. The DNA was isolated from diploid cells which contain approximately 3 billion base pairs.

## COMPONENTS

This experiment contains reagents and disposables for 3 experiments.

- Chromosomal DNA in Buffer
- Spooling sticks
- Calibrated Transfer pipets
- Test tubes
- InstaStain® Blue card

## REQUIREMENTS

- 6 mL of freezer cold 70-100% isopropyl alcohol (rubbing alcohol)
- Distilled water
- Small plastic cup

Before you start the experiment, place the isopropyl alcohol (rubbing alcohol) in the freezer for at least 2 hours or overnight to ensure that it is freezer cold.

## GENERAL SAFETY PRECAUTIONS

Parental or adult supervision required.

1. Designate a clean and uncluttered area for performing experiments.
2. Read all instructions before you begin.
3. Do not eat or drink. Do not apply make-up or contact lenses. Adult(s) should not smoke while performing experiments.
4. Wash your hands before and after performing the experiment.
5. Gloves and goggles should be worn routinely as good laboratory practice.
6. Disinfect the counter top or bench with 70% isopropyl alcohol (rubbing alcohol, or place clean newspaper over the area to be used.

## SAFETY PRECAUTIONS FOR #DD1115

The DNA solutions and alcohol can be disposed down the drain. All other materials can be disposed in regular solid waste (trash).

**WARNING: Choking hazard. Products contain small parts.  
Not appropriate for children under 5 years old.  
No human or animal products are used in any experiments**

## SPOOLING OF CHROMOSOMAL DNA

All living organisms are composed of cells. Bacteria are single celled, while very complex organisms, such as humans, are composed of billions of many different cells. Human cells contain a nucleus, which contains 46 chromosomes (23 pairs). Chromosomes contain DNA which encodes all the genetic information that a person inherits from his/her parents.

Due to its size and abundance, chromosomal DNA forms viscous, clotted masses during alcohol precipitation and is easily collected on the rod. When scientists study DNA, cells are chemically lysed (broken open) and the DNA from chromosomes is released and then it is isolated. DNA is soluble in water and cannot be seen. The DNA solution is carefully overlaid with alcohol. Since alcohol is less dense than water, it will form a layer above the DNA solution. A stick is used to spool the two liquids at their interface to separate the DNA from the solution (Figure 1). DNA appears as a viscous, clotted mass as it is collected on the spooling stick (Figure 2).

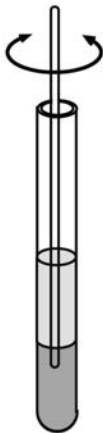


Figure 1

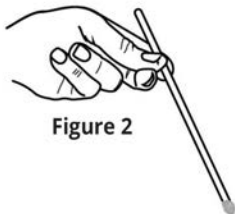


Figure 2

## EXPERIMENTAL PROCEDURES

1. Transfer 1 mL from the bottle containing the chromosomal DNA in buffer into a small test tube.
2. Carefully overlay the DNA solution with 1 mL of FREEZER-COLD isopropyl alcohol (rubbing alcohol).

Let the isopropyl alcohol slowly stream down the inside wall of the test tube. Isopropyl alcohol is less dense than water so it will remain in the upper layer.

3. Submerge the end of a spooling stick just below the interface of the isopropyl alcohol and the aqueous DNA solution.
4. Steadily swirl the stick several times in a circular motion to spool or wrap the DNA around the stick.
5. Remove the stick to see if the DNA precipitate is being collected. The precipitate will appear semi-transparent and gelatinous in texture.
6. Continue swirling to collect DNA from the solution.
7. After spooling for a minute or two, remove the rod from the test tube to observe the DNA. The DNA will initially appear as a viscous, gelatinous-like substance adhering to the stick.

As you continue spooling and the DNA adheres to the stick, the gelatinous texture will become more compact and fibrous in appearance.

8. Rinse the DNA on the spooling stick with isopropyl alcohol and let it dry for several minutes.

## EXPERIMENTAL PROCEDURES, continued

9. To facilitate visualization, you can stain the spooled DNA. \*Make sure you do this on a stack of paper towels:
    - With a transfer pipet, add approximately 10 drops of distilled water onto an InstaStain® Blue card to liquify the stain.
    - Transfer 2-3 drops of the blue liquified stain onto the DNA adhering to the stick.
  10. Now add 2-3 drops of the liquified blue stain to the test tube from which you spooled the DNA. The stain will bind to residual (left-over) DNA in the solution that did not spool onto the stick.
  11. Now add 2-3 drops of the liquified stain to a cup containing only water. Observe how the dye disperses in the water compared to the solution containing DNA.
- \* If the DNA is stained, it can not be used for further analysis or studies. As an optional activity or lab extension, DNA isolated from this type of experiment can be prepared for agarose gel electrophoresis.

## IT'S TIME TO MEASURE WHAT YOU LEARNED

### True or False.

Decide whether each of these statements is true or false.

If it is false, explain why.

1. Every single human cell contains 46 chromosomes.
2. Chromosomes are organizations of the substance called DNA.
3. Each nucleotide is composed of two parts of deoxyribose sugar.
4. The rungs of the DNA ladder are made up of the connected parts of deoxyribose sugar and phosphate.
5. DNA is dissolved by alcohol.

## TERMS AND CONDITIONS

- FOB: Washington, DC
- Safety Data Sheets are available on our web site and by request.

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*Answers to True/False Questions: 1. T, 2. T, 3. F, 4. T, 5. F*