# DNA Extraction & Gel Electrophoresis

SBI4U | Student laboratory assignment | 1 of 4

## Prepare for your investigation

Name: _____ Date: _____ Class: _____

## Research question

How can DNA be isolated from cells, and how do agarose concentration and electrophoresis conditions influence DNA fragment separation?

Learning goal: use the virtual model to gather evidence, explain dna extraction & gel electrophoresis and communicate a supported conclusion.

Materials: WorksheetGalaxy virtual laboratory, this assignment, calculator or spreadsheet if needed. Virtual observations only; do not recreate hazardous procedures or perform physical fitness tests without teacher approval.

1. Define two relevant scientific terms from the Background Information tab. (K/U)

2. Write a prediction or hypothesis with a scientific reason. (K/U, T/I)

3. Identify the variable or feature compared, the measured outcome and constants or consistent observation criteria. (T/I)

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## Perform the virtual laboratory

Open the corresponding virtual lab and read Background Information. Follow the investigation instructions below. Record authentic simulated results; do not invent data.

Part A — DNA extraction

• Complete each extraction step in order and record what changes are visible.

• Identify the purpose of detergent, salt, filtration and cold ethanol.

• Explain why the precipitate cannot be assumed to be pure DNA.

Part B — Gel electrophoresis

• Select agarose concentration, voltage and run time.

• Load a DNA ladder and two unknown prepared fragment samples into separate wells.

• Run the gel and record band migration distances.

• Repeat with at least one changed condition and compare separation.

• Estimate unknown fragment sizes using the ladder and explain limitations.

Submission

• Complete the Lab Report tab and use Print / Save as PDF . Submit the resulting PDF to your teacher using the school's LMS or email.

Extraction sequence completed and explained

Three wells loaded without mixing samples

At least two electrophoresis runs recorded

Data table with units and gel interpretation

Conclusion supported by simulation evidence

Discussion of assumptions and limitations

Record each completed observation using the simulator’s record control when available. Use Data & Graphs to review results. Export CSV if available; attach additional rows or screenshots when needed.

Record the exact settings and any changes to the method.

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## Observations & results

Enter the actual results. Keep trial IDs consistent between continued tables. Attach the full exported data or extra sheets when the procedure requires more rows. Include units as displayed.

Data table 1

| Trial / item | Run | Agarose | Voltage | Time | Quality |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Data table 2

| Trial / item | Lane | Band | Migration (mm) | Estimated size (bp) |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Qualitative observations / sample calculation (show units where applicable)

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## Analysis, conclusion & assessment

4. Present a labelled graph of a measured relationship, or an annotated diagram / comparison chart for qualitative investigations. Attach it separately. Explain the pattern using recorded evidence. (C, T/I)

5. Analysis: How did agarose concentration, voltage and time affect migration? (K/U, A)

6. Compare two contrasting observations from your investigation of DNA Extraction & Gel Electrophoresis. Explain the difference using the background information. (K/U, A)

7. Use a specific recorded result to answer the research question. Explain the scientific reasoning behind it. (K/U, A)

Conclusion and evaluation: answer the research question, revisit the prediction using evidence, identify a model limitation and propose an improvement. (T/I, A)

Submit this assignment plus your completed Lab Report (printed or saved as PDF from the lab) and any supporting data/figures.

| K/U: accurate concepts /10 | T/I: method, data, reasoning /12 | C: clear tables, units, report /8 | A: explanation, conclusion, transfer /10 |
|---|---|---|---|
| | | | |

Total: /40