

# The Wonderful Wizardry of Finding a Gene - Battery-free method

## Introduction

In the last issue of the *SSERC Bulletin* (Issue 221, Summer 2007), a technique was described which could be used by pupils to carry out simple gel electrophoresis in order to simulate DNA profiling. The NCBE protocol which accompanies the original kit used for this technique recommends the use of three 9 V batteries to run each gel. However, as mentioned in the previous article, this can be cumbersome and somewhat expensive. NCBE now sell a 36 V mains transformer (Figure 1), which can be used safely with up to eight tanks at a time. This transformer is available from NCBE at a cost of £36. NCBE state that up to four gels tanks<sup>1</sup> can be run simultaneously with the connector provided (Figure 2a).



Figure 1 - 36 V p. supply before adaptation

In order to use the connector a few simple adaptations have to be made to the transformer as outlined in the link below and Figures 2a-c :

[www.ncbe.reading.ac.uk/NCBE/MATERIALS/DNA/PDF/TransformerV1.1.pdf](http://www.ncbe.reading.ac.uk/NCBE/MATERIALS/DNA/PDF/TransformerV1.1.pdf)

In addition, a three-pin mains power lead is required. This can be bought from any electrical supplier<sup>2</sup>. A connector box (Figure 3) may be built, if preferred, using the instructions within the following link:

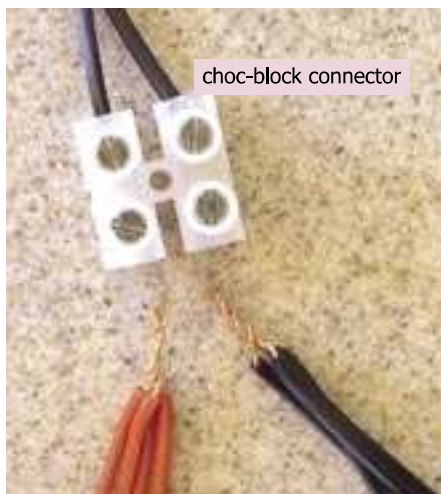
[www.sserc.org.uk/members/SafetyNet/bulls/222/Downloads/Box\\_template.pdf](http://www.sserc.org.uk/members/SafetyNet/bulls/222/Downloads/Box_template.pdf)

## Equipment Testing

In order to ensure that eight gel tanks could be run simultaneously in a safe manner, individual gel tanks were set up using standard NCBE protocols<sup>3</sup>.

Instead of using three 9 V batteries, we attached the gel tank to the transformer and measured the current drawn when using TBE buffer, distilled water or tap water.

**1** NCBE now also produce base units at a cost of £50 containing 8 of each of the following: gel tank, 4-toothed comb, 6-toothed comb, pair of wires plus crocodile clips, microsyringe dispensing unit. Link: [www.ncbe.reading.ac.uk/NCBE/MATERIALS/DNA/baseunit.html](http://www.ncbe.reading.ac.uk/NCBE/MATERIALS/DNA/baseunit.html)  
SSERC Bulletin 222 Autumn 2007



Figures 2a, b & c - Adaptations to connectors to allow up to 4 gel tanks to be connected to the one transformer.

It was found that one gel with 10 cm<sup>3</sup> of TBE buffer in the tank draws a current of around 0.012 A (see graph in Figure 4).

Given that the maximum recommended current which can be drawn is 0.41 A, it can be seen that the transformer will be well within its working limits when supporting the running of eight gels. We recommend the use of a maximum of eight gels with these transformers to avoid a tangle of wires.

**2** SSERC supplier was Rapid, each lead costing £1.45.

Link: <http://www.rapidonline.com/searchresults.aspx?style=0&kw=23-6452>

## Conclusion

The transformer supplied by NCBE allows the safe, simultaneous running of up to eight agarose gel tanks in approximately one hour and twenty minutes.

In the *Wonderful Wizardry of Finding a Gene* protocol 3% agar is used, as opposed to the more expensive agarose gel, and is run with distilled water in the tank. Using the NCBE transformer means that each gel, when set up in a group of eight (Figure 5), will run fully within 30 minutes. Therefore, this allows a full class set of gels to be run safely within the allotted class time, at less expense and with greater ease than with individual 9 V batteries.



Figure 3 - SSERC connector box

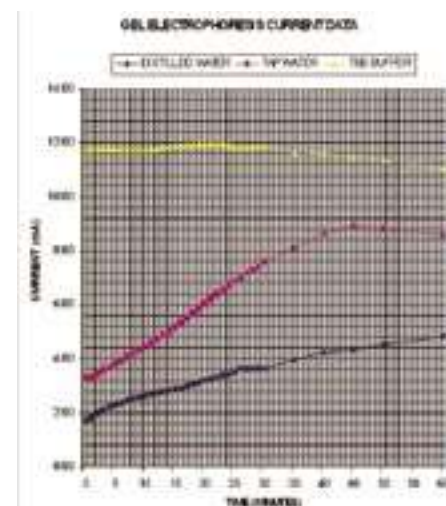


Figure 4 - Current drawn vs. time for running buffer (TBE), distilled or tap water.

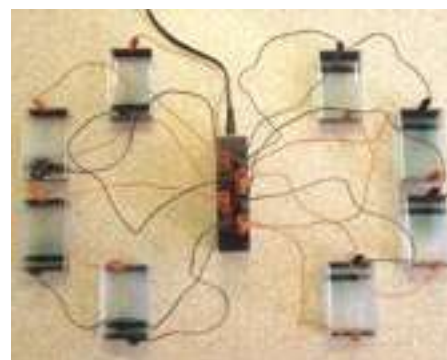


Figure 5 - Eight 3% agar gel tanks run simultaneously.

**3** Link: <http://www.ncbe.reading.ac.uk/NCBE/MATERIALS/DNA/PDF/LambdaTG.pdf>