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Preparing Borax RapidBuffer for electrophoresis

Jenny Molloy[1], Nadine Mowoh[2], Stephane Fadanka[2], Cordellia Fulai[2]

[1]University of Cambridge, Beneficial Bio; [2]Mboalab

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Chongwaincordelliafulai

Molecular biologists often use tris-based conduction buffers like TBE or TAE in running DNA gels. These buffers are known to overheat at high voltages, causing problems with gel integrity, sample denaturation and more. The voltage thus needs to be limited to a maximum of 5-10 volts/cm (e.g 100 volts for a 10 cm gel) leading to extended running time, sometimes to hours.

With 10mM Sodium Tetraborate (CAS#: 1330-43-4, $Na_2B_4O_7$, Borax), the voltage can be increased to 35 volts/cm without any problem, reducing the time taken to run gels by up to 7 times for standard applications (e.g. separation of DNA fragments from 100 bp - 5 kbp).

Our lab's standard DNA gel buffer has become 20 g of Borax into 1 l of water which gives a 20x stock solution. Small gels run in 10-15 minutes at 200V.

SCOPE:

Preparation of gel electrophoresis buffer for separation of DNA fragments from 100 bp - 5 kbp

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Reagents

- Borax (Sodium Tetraborate, CAS#: 1330-43-4)

Materials and Equipment

- Beaker
- Measuring cylinder
- Distilled water
- Container with lid
- Weighing balance
- Weighing boat and spatula
- Magnetic stirrer

Preparing

1 Weigh out a certain amount of borate and place into a vacuum Tupperware half filled with silica beads. 12h
place the lid on top and cover tightly, then use the vacuum pump to extract air inside and allow to dry for **12:00:00** at **37 °C**).

1.2 Carefully pour it out into zip lock bags and seal to avoid it from absorbing moisture and store in cool dry place.

Preparation of 10x Borax RapidBuffer Solution 10m

2 Use a spatula to measure out and weigh **10 g** of Borax (Sodium Tetraborate, CAS#: 1330-43-4)

3 Pour powder into a graduated **1000 mL** glass beaker or flask

4 Using a **1000 mL** measuring cylinder, measure **800 mL** of distilled or deionised water and add to the **1000 mL** beaker.

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5 Add a magnetic flea and use a magnetic stirrer at **Room temperature** to fully dissolve the borax powder. 2m

6 Add distilled or de-ionised water to a total of **1000 mL** and stir again for **00:03:00** 3m

7 Pour the prepared solution into a clean, labelled screw-top **1000 mL** glass or plastic storage bottle and store at **Room temperature** until use.

Preparation of 1x Borax RapidBuffer Solution (500ml) 10m

8 Use a **100 mL** measuring cylinder to measure out **50 mL** of 10X RapidBuffer into a **500 mL** graduated beaker or flask.

9 Add approx **450 mL** distilled or deionised water, sufficient to make up the volume to **500 mL**

10 1X RapidBuffer solution is now ready for use and can be stored at **Room temperature** for use within one month.

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