Matrix™

nucleic acid sparse matrix

A complete reagent kit designed to provide a highly effective and rapid screening method for the crystallization of nucleic acids and proteins - nucleic acid complexes. A variety of hamster ribosomes and other ribosomes RNA, DNA, RNA-drug complexes, and RNA-protein complexes have been crystallized using the Matrix protocol. By using sparse matrix sampling technology Matrix allows one to quickly test wide ranges of pH, salts, and precipitants using less than 100 µl of sample. Matrix utilizes PEG 300, 400, 800, 1500, as well as inorganic, PEG MME, and 1.5 hexanediol as precipitants. Many of the polymeric and low molecular weight organic precipitants are combined with various monovalent salts as precipitating agents. This combination of salts, low molecular weight organic, and polyethylene glycol, as well as the utilization of varying chain length PEGs has proven to be a successful combination for producing nucleic acid and protein / nucleic acid complex crystals.

Each Matrix kit contains ten milliliters of each of 48 unique reagents. Ready to use reagents are formulated using high purity salts, buffers, and precipitants with ultra pure water and are sterile filtered. Crystallization conditions are separately. Matrix does not include polymers. It is recommended that a polyethylene glycol such as PEG be added to the sample prior to screening and that various polymers be screened after preliminary crystallization conditions have been determined.

HR2-116 Matrix kit

Reference:

Matrix formulation

1. 0.01 M Mg Chloride, 0.05 M MES pH 5.8, 2.0 M Lithium Sulfate
2. 0.01 M Mg Acetate, 0.05 M MES pH 5.4, 2.0 M Ammonium Sulfate
3. 0.01 M Mg Acetate, 0.05 M MES pH 5.8, 0.2 M Ammonium Sulfate
4. 0.01 M K Chloride, 0.05 M MES pH 5.8, 0.2 M PEG 400
5. 0.01 M Mg Chloride, 0.05 M MES pH 5.8, 0.2 M PEG 400
6. 0.01 M Mg Chloride, 0.05 M MES pH 5.8, 0.15 M PEG 400
7. 0.01 M Mg Chloride, 0.05 M MES pH 5.8, 0.10 M PEG 400
8. 0.05 M Mg Sulfate, 0.15 M Ammonium Acetate, 0.05 M MES pH 6.0, 0.2 M Sodium Chloride
9. 0.01 M K Chloride, 0.05 M MES pH 5.5, 0.15 M PEG 400
10. 0.01 M Mg Chloride, 0.05 M MES pH 5.0, 0.30 M PEG 400
11. 0.01 M Mg Chloride, 0.05 M Na Carboxylic acid pH 6.0, 1.5 M Lithium Sulfate
12. 0.01 M Mg Chloride, 0.05 M Na Carboxylic acid pH 6.0, 1.5 M Lithium Sulfate
13. 0.01 M Mg Chloride, 0.05 M Na Carboxylic acid pH 6.0, 1.5 M Lithium Sulfate
14. 0.01 M Mg Chloride, 0.05 M Na Carboxylic acid pH 6.0, 1.5 M Lithium Sulfate
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18. 0.01 M Mg Chloride, 0.05 M Na Carboxylic acid pH 6.0, 1.5 M Lithium Sulfate
19. 0.01 M Mg Chloride, 0.05 M Na Carboxylic acid pH 6.0, 1.5 M Lithium Sulfate
20. 0.01 M Mg Chloride, 0.05 M Na Carboxylic acid pH 6.4, 1.5 M Lithium Sulfate
21. 0.02 M Mg Acetate, 0.25 M Na Acetate pH 6.4, 1.5 M Lithium Sulfate
22. 0.05 M Mg Sulfate, 0.25 M Na Sulfate pH 6.4, 1.5 M Lithium Sulfate
23. 0.02 M Ammonium Acetate, 0.25 M Na Acetate pH 6.4, 1.5 M Lithium Sulfate
24. 0.02 M Ammonium Acetate, 0.25 M Na Acetate pH 6.4, 1.5 M Lithium Sulfate
25. 0.04 M Mg Sulfate, 0.30 M Na Sulfate pH 6.4, 1.5 M Lithium Sulfate
26. 0.02 M Mg Chloride, 0.05 M Mg Sulfate pH 7.0, 1.5 M Lithium Sulfate
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Matrix is utilized in Natrix

Salts
Ammonium Chloride
Cesium Chloride
Lithium Chloride
Magnesium Chloride
Phenol Chloride
Ammonium Sulphate
Lithium Sulphate
Magnesium Sulphate
Ammonium Acetate
Magnesium Acetate

Organic

Polymers
Polyethylene glycol 2000
Polyethylene glycol 4000
Polyethylene glycol 8000
Polyethylene glycol MME 550

Polymers
Polyethylene glycol 2000
Polyethylene glycol 4000
Polyethylene glycol 8000
Polyethylene glycol MME 550

Organic

on-volatiles

Alcohols, oligomers, ionic, and on-volatiles

2-Methy1-2-pentanone
1,6 Hexanediol
**FAQs About Natrix**

The following are FAQs (frequently asked questions) about the use of Natrix™. We hope these answers will assist you in using Natrix.

**How do I accurately reproduce the Natrix reagents?**
First, think of Natrix as two sets of reagents; those with a buffer and those without. Reproducing the solutions without a buffer is simple. Use the package insert to determine the precise molarities and concentrations. No pH adjustments are required. For the solutions with buffers we suggest the following. First, make a 1.0 M stock of the buffer with the pH indicated on the package insert or the side of the reagent tube. Use HCl or NaOH to adjust the pH (at room temperature). Dilute this stock 1:10 (i.e. 1 ml to a final volume of 10 ml) with water and the other appropriate reagent components. Use ultra-pure water and sterile filter the solution with a 0.2 micron filter.

**How about an example?**
Okay, let's make Natrix reagent 15. If we were to make 100 ml of reagent 15 we would first add 5 ml of 1.0 M sodium cacodylate pH 6.0 buffer. We would then add 0.813 grams of magnesium chloride. Then add 5 milliliters of MPD and bring the final volume to 100 ml in a volumetric flask. Make no further pH adjustment. Adjust the final volume when the solution and flask are at room temperature.

**This is a pain if I need to optimize! What can I do?**
First, pick two variables (such as pH and MPD concentration) of the screen to alter in a two dimensional (x,y) grid. See our Optimize™ line of stock solutions for accurate reproduction of reagents. Make an appropriate stock concentration of the precipitant and pH so that you can dilute the sample directly into the crystallization plate. Try a 1.0 M buffer and 100% MPD stock for the previous example. Dilute the solutions with water and mix well by aspirating and dispensing the reservoir solutions numerous times.

**What kind of preservative is used with Natrix?**
None. The solutions are sterile filtered using a 0.2 micron filter and filled into sterile vials.

**Can I get the Natrix reagents individually?**
No. Please see our Optimize™ line of stock solutions for accurate reproduction of reagents.

**I am getting salt crystals, what is going on?**
As you can see in the formulation insert, Natrix contains a number of cations such as magnesium which can complex with anions such as phosphate, carbonate, and borate to form beautiful inorganic salt crystals. We recommend you avoid using high concentrations (0.1 M or higher) of phosphate, carbonate, or borate buffers to avoid these effects. Remove by dialysis or replace with biological buffers such as HEPES, Tris, and Bicine.

I am getting crystals but I am not sure they are protein. Look at the X-ray diffraction pattern. If this is not possible examine the crystals for birefringence. A destructive test is to touch the crystals with a needle. Macromolecular crystals are highly solvated and will be fragile, shattering when touched or manipulated. Inorganic salt crystals contain little water and will actually make a discernible crunch when broken with a probe. Finally, macroscopic crystals will readily absorb colored dyes where small molecule crystals will not. Upon standing (24 hours) the macroscopic crystals will absorb and concentrate the colored dye in the crystal where the salt crystal will remain clear and the surrounding solution will remain colored. Hampton Research offers a dye specially formulated for this application. The dye is called Izit and is catalog number HR4-710.

**How can I be certain to reproduce the crystals I obtain using Natrix?**
First, follow the formulation suggestions described earlier in this flyer. Then ask yourself these questions. Is the pH of the Natrix solution the same as your solution? Are you using fresh solutions or solutions which have been properly stored to avoid evaporation, pH change or degradation? Did the temperature remain the same? Is this sample from the same batch? Is the sample stable? Did you prepare the sample and perform the crystallization in exactly the same manner with the same volumes and techniques? Finally, when making final dilutions into the crystallization plate, pipet carefully, especially with viscous compounds.

**How should Natrix reagents be stored?**
The reagents are stable at room temperature for at least 6 months. One should avoid exposure to UV light to prolong the stability of the PEGs. The solutions are stable at 4°C for longer periods and can even be frozen.

**I have more questions, what should I do?**
Give our technical support department a call at (714) 699-1440, fax your questions to (714) 586-1453, or send e-mail to the attention of Hampton Research Tech Support at the following address: xtalox@sol.com. If you have any suggestions or comments regarding the use of Natrix please do not hesitate to contact us.
### Matrix Reagent Formulation

<table>
<thead>
<tr>
<th>Tube Number</th>
<th>Salt</th>
<th>Tube Number</th>
<th>Buffer †</th>
</tr>
</thead>
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<tr>
<td>1.</td>
<td>0.01 M Magnesium chloride</td>
<td>1.</td>
<td>0.05 M MES pH 5.6</td>
</tr>
<tr>
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<td>34.</td>
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<td>48.</td>
<td>0.2 M Ammonium chloride, 0.01 M Ca chloride</td>
<td>48.</td>
<td>0.05 M Na HEPES pH 7.0</td>
</tr>
</tbody>
</table>

† Buffer pH is that of a 1.0 M stock prior to dilution with other reagent components.

Matrix contains forty-eight unique reagents. To determine the formulation of each reagent, simply read across the page.

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**Hampton Research**

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Tel: (714) 699-1040 Fax: (714) 586-1453
E-mail: xaltonx@aol.com
WEB: http://www.hamptonresearch.com
4. Repeat the procedure for the remaining reagents.

5. Working gently to minimize sample loss, label the cover slips with the appropriate label.

6. Repeat the procedure for the remaining reagents.

7. Stain and observe the samples at 4x and the second at 10x. Prepare a slide with Cy5-labeled probes (Cy5-labeled probes or a 100x objective) and a second slide with Cy3-labeled probes (Cy3-labeled probes or a 40x objective) to determine the presence of each marker.

INTERPRETATION OF THE RESULTS

In conclusion, the fluorescent microscopy method is a powerful tool for identifying and localizing specific targets within a sample. The results obtained from this technique provide valuable information for various research applications, including the study of cellular processes, disease diagnostics, and drug discovery.

SAFETY PRECAUTIONS

- Always wear protective clothing and glasses when working with DNA samples.
- Keep all reagents at room temperature (20-25°C) to avoid condensation and contamination.
- Maintain a clean work area and dispose of waste properly.
- Avoid contact with的眼睛 and other mucous membranes while handling DNA samples.
- Follow all institutional guidelines for the safe handling and disposal of hazardous materials.