Introduction

In the PACT Suite four buffer systems are used, each of which provides effective buffering across a broad pH range without changing the chemical composition of the buffering components. This simplifies analysis of results during optimization, since the pH of a solution can be varied but the buffer components used remain identical.

Recipe for SPG buffer stock solutions

SPG buffer is produced by mixing succinic acid, sodium dihydrogen phosphate, and glycine in the molar ratios 2:7:7 – succinic acid:sodium dihydrogen phosphate:glycine.* The three chemicals have three different buffering curves and their ratios have been selected to keep pH variation almost linear. The desired pH is obtained by mixing high- and low-pH stock solutions.

For a final volume of 100 ml:

1. **Weigh 1.48 g of succinic acid into an empty 100 ml beaker. Add 6.04 g sodium dihydrogen phosphate monohydrate and 3.28 g of glycine.**
2. **Add water to bring the volume to ~80 ml and stir until dissolved.**
3. **Adjust the pH to 4 or 9 by adding the appropriate amount 10 M NaOH.**
4. **Add water to complete the volume to 100 ml.**

   Use the resulting buffers as a 10x high-pH or low-pH stock solution for the SPG buffering system. A wide variety of pH values can be reached by mixing different ratios of high-pH and low-pH solution.

* When working with chemicals, always wear a suitable lab coat, disposable gloves, and protective goggles. For more information, consult the appropriate material safety data sheets (MSDSs), available from the product supplier.

Recipe for MMT buffer stock solutions

MMT buffer is produced by mixing DL-malic acid, MES and Tris base in the molar ratios 1:2:2 – DL-malic acid:MES:Tris base.* Varying the amount of NaOH or HCl added, enables buffering over a pH range from 4–9. The three chemicals have three different buffering curves and their ratios have been selected to keep pH variation almost linear. The desired pH is obtained by mixing high- and low-pH stock solutions.

For a final volume of 100 ml:

1. **Weigh 2.68 g of DL-malic acid into an empty 100 ml beaker. Add 8.53 g MES monohydrate and 4.85 g of Tris base.**
2. **Add water to bring the volume to ~80 ml and stir until dissolved.**
3. **Adjust the pH to 4 by adding the appropriate amount 10 M HCl or 9 by adding the appropriate amount 10 M NaOH.**
4. **Add water to complete the volume to 100 ml.**

   Use the resulting buffers as a 10x high-pH or low-pH stock solution for the MMT buffering system. A wide variety of pH values can be reached by mixing different ratios of high-pH and low-pH solution.

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Recipe for PCB buffer stock solutions

PCB buffer is produced by mixing sodium propionate, sodium cacodylate, and BIS-TRIS propane in the molar ratios 2:1:2 – sodium propionate, sodium cacodylate, and BIS-TRIS propane.* Varying the amount of HCl added enables buffering over a pH range from 4–9. The three chemicals have three different buffering curves and their ratios have been selected to keep pH variation almost linear. The desired pH is obtained by mixing high- and low-pH stock solutions.

For a final volume of 100 ml:

1. **Weigh 3.84 g of sodium propionate into an empty 100 ml beaker. Add 4.28 g sodium cacodylate trihydrate and 11.29 g of BIS-TRIS propane.**
2. **Add water to bring the volume to ~80 ml and stir until dissolved.**
3. **Adjust the pH to 4 or 9 by adding the appropriate amount 10 M HCl.**
4. **Add water to complete the volume to 100 ml.**

   Use the resulting buffers as a 10x high-pH or low-pH stock solution for the PCB buffering system. A wide variety of pH values can be reached by mixing different ratios of high-pH and low-pH solution.

Recipe for MIB buffer stock solutions

MMT buffer is produced by mixing sodium malonate, imidazole, and boric acid in the molar ratios 2:3:3 – sodium malonate:imidazole:boric acid.* The three chemicals have three different buffering curves and their ratios have been selected to keep pH variation almost linear. The desired pH is obtained by mixing high- and low-pH stock solutions.

For a final volume of 100 ml:

1. **Weigh 4.15 g of sodium malonate dibasic monohydrate into an empty 100 ml beaker. Add 2.55 g imidazole and 2.32 g of boric acid.**
2. **Add water to bring the volume to ~80 ml and stir until dissolved.**
3. **Adjust the pH to 4 by adding the appropriate amount 10 M HCl or 9 by adding the appropriate amount 10 M NaOH.**
4. **Add water to complete the volume to 100 ml.**

   Use the resulting buffers as a 10x high-pH or low-pH stock solution for the MIB buffering system. A wide variety of pH values can be reached by mixing different ratios of high-pH and low-pH solution.

* When working with chemicals, always wear a suitable lab coat, disposable gloves, and protective goggles. For more information, consult the appropriate material safety data sheets (MSDSs), available from the product supplier.