

100 mM Sodium Tetraborate (NaTB) Recipe

1. Using the mass of NaTB written on your falcon tube, calculate the total volume of buffer you are going to make, assuming a 100 mM concentration and a $m_w = 381.37$ g/mol.

$$\text{Hint: } \textit{liters} = \textit{grams} \times \frac{\textit{moles}}{\textit{grams}} \times \frac{\textit{liters}}{\textit{moles}}$$

For example, if you have 1200 mg of NaTB, you will make 31.47 mL of buffer.

2. Calculate how much sodium hydroxide (NaOH) you need to make 10 mL of a 1 M solution ($m_w = 39.997$ g/mol). The NaOH will be used to pH balance the NaTB buffer.
3. Weigh out an amount of NaOH as close to the calculated amount as possible. Record the exact amount you weighed. The amount that you weigh will always be slightly off from your target value. To account for this discrepancy, use the actual weighed mass to recalculate the total volume of 1 M NaOH you should make.
4. Add the volume of water calculated in step 3 to the NaOH pellets. Vortex until fully dissolved.
5. Subtract 15 mL from the volume calculated in step 1. Add this amount of water to your NaTB. Leaving out 15 mL provides you extra room for the NaOH need to pH balance. Vortex the solution until it's mostly dissolved. Without pH balancing, it will be difficult to fully dissolve at the moment.
6. Add 1 mL of 1 M NaOH to the NaTB solution. Vortex for 5-10 seconds. Pipette 20-30 μ L of buffer onto a pH strip that covers the 7-9 range. The target pH is 8.3. Your first measurement should indicate a pH <7.
7. Repeat step 6 until the pH hits 8.3. Be sure to **reduce the amount of NaOH added as you see the pH start to change**. In general, these pH changes are non-linear and tough to predict so it's always better to add smaller amounts of acids/bases to avoid overshooting your target.
8. Once your buffer has been pH balanced, add enough water to raise the total volume to the final volume calculated in step 2. This will put your final buffer concentration at \sim 100 mM. Note that it will be slightly lower due to the NaTB removed during your pH balancing.
9. Filter your finished buffer into a new container using 0.2 μ m membrane filters and syringes. This removes any NaTB or NaOH aggregates that never fully dissolved.
10. Label your buffer with the buffer's name, you and your partner's names, the date, the pH, and compound used to pH balance.
11. Store at 4 $^{\circ}$ C for up to two months.