

Pass the Buffer-in: Problem Handouts



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Pass the Buffer-in

Problem Statement

It's June, and you've just returned to campus to begin your summer as a research assistant in the biology department. Your first assignment is to prepare a pH 7.50 phosphate buffer solution to be used in the isolation of DNA from a cell culture. Unfortunately, someone misplaced the written protocol for preparing this solution - but, as your supervisor noted, "You've had general chem - I'm sure you can figure it out!" After some frantic searching, you come upon a slip of paper sticking out of a former worker's lab notebook with the following inscription:

35 mL concentrated (14.7 M) H_3PO_4

48.6 g KOH

Dilute to 1 liter

The mention of phosphoric acid draws your attention, but you're not sure whether this combination of reagents constitutes the missing directions for the pH 7.50 buffer solution.

1. What are the characteristics of a buffer solution? What will happen when these two substances are combined - will a buffer solution result?

You decide to go ahead and prepare this solution, but aren't sure whether it will give the correct pH. When you mention this to the grad student at the next bench, she yawns and says, "Why don't you just do the calculation?" "Gee, thanks for the advice!", you mutter.

2. Will this solution give the desired pH? If not, is there anything you could do to get it to the correct value?

While you're stirring the solution and waiting for the solid to dissolve completely, you start putting away the materials you used - and stop short when you realize that the bottle in your hand reads "NaOH", not "KOH". Groaning, you collapse into your chair: "There goes my lunchtime tennis match!"

3. Is this mistake a critical one, or can you ignore it?

Later that day, you ponder the irony of popping some buffered aspirin to relieve your buffer-induced headache.

4. What would you look for in checking ingredient labels to decide whether any other common items contain a buffer?

