Borate/Carbonate/Bicarbonate Buffer for Sample Preservation for Hexavalent Chromium Analysis
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In May 2010 CDPH proposed an alternate buffer for the preservation of water samples to be analyzed for hexavalent chromium. This buffer contained sodium tetraborate and potassium hydroxide (http://www.cdph.ca.gov/certlic/drinkingwater/Documents/Drinkingwaterlabs/Cr(VI)BorateBufferWebsiteUpdate051810.pdf)

CDPH's Drinking Water and Radiation Laboratory (DWRL) recently completed a maximum holding time study for hexavalent chromium in drinking water and ground water. The study included seventeen water samples, collected in Northern and Southern California, which were expected to contain hexavalent chromium and be challenging in terms of the stability of the hexavalent chromium. All samples were preserved with 1 mL of the borate/hydroxide buffer per 100 mL of sample. Although some of the samples did not reach a pH of 9.0 after addition of the buffer, the hexavalent chromium content of all samples was stable over a period of at least 28 days.

Subsequently, DWRL developed a new buffer, containing sodium tetraborate, sodium carbonate, and potassium bicarbonate, that has a significantly higher buffer capacity than the borate/hydroxide buffer used in the holding time study. CDPH recommends that the new borate/carbonate/bicarbonate buffer be used in the future at a rate of 1 mL for each 100 mL of sample. To date, the only potable water sample that was found not to reach a pH of 9.0 with this amount of buffer added was a sparkling bottled water with an original pH of 3.8.

The new buffer is prepared as follows:

Add 3.81 g of analytical reagent grade $Na_2B_4O_7 \cdot 10\ H_2O$, 4.94 g of reagent grade Na_2CO_3, and 13.4 g of reagent grade $KHCO_3$ to 100 mL of reagent water and allow all ingredients to dissolve. The resulting pH should be about 9.7.

It should be noted that the buffer ingredients were specifically chosen as indicated, i.e., the sodium salt of carbonate and the potassium salt of bicarbonate, due to solubility and chemical purity considerations. $KHCO_3$ is more soluble than $NaHCO_3$ and commercially available K_2CO_3 was found to contain hexavalent chromium at unacceptably high levels.

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