The CORAS-Bio centrifugal analyzer Roche Diagnostic Systems, Nutley, NJ 07110 is a valuable addition to many clinical chemistry laboratories, but the costliness of using the disposable cuvettes is an issue of growing concern. Wu et al. (1, 2) built and described a washer for the plastic cuvette rotors and pointed out the substantial consequent savings of cuvette recycling. Their washer performs satisfactorily in some respects and establishes the concept of recovering the plastic cuvette rotors, but it does not remove certain reagent components. These inter-test contaminations severely restrict the washer's usefulness.

A new commercially available cuvette rotor recycling system (Labadapt, Inc., Seattle, WA 98115) overcomes these problems. With a uniquely designed washing process, jets of water under precisely controlled pressure and direction simultaneously spin and clean both the cuvette's reaction compartment and its reagent and sample chambers.

The water-jet platform is completely encased in a housing of clear acrylic plastic to prevent contamination of the surrounding area and the operator with specimen or reagent. This feature and the washer's size (23 × 23 × 19 cm) offer flexibility of location in the laboratory. An automatic timer allows walk-away operation.

When tap water is used to drive the system's washer, cuvette rotors need to be re-rinsed several times in de-ionized water. A rinse rack simplifies this rinsing operation and can accommodate up to 12 cuvettes at a time.

If de-ionized water is used exclusively to drive the washer, the cuvette rotor may be transferred directly from the washer to the dryer, eliminating the need for a rinse. Four liters of de-ionized water is used per minute, which in our laboratory costs less than 5¢ per 5-min wash cycle. A controller to switch automatically between tap water and de-ionized water is being built.

Removal of phosphate provides a key test for a washer system. Several commonly used reagents contain phosphate in concentrations several thousand times that present in serum. Cuvette rotors first used for aspartate aminotransferase analyses involving a reagent containing 0.11 mol of phosphate per liter, as buffer, were washed with de-ionized water, dried, and then used for assay of inorganic phosphorus in control serum. We detected no phosphate carryover in 25 cuvette rotors so processed. All of 625 results for phosphorus were within 3% (± 2 mg/L) of the mean value. Similarly good results (Table 1) were obtained when 200 μL of 0.1 mol/L phosphate buffer was added directly to either the cuvette reaction or reagent compartments, followed by washing, drying, and subsequent inorganic phosphorus assay. Glycerol removal was likewise verified.

Using the washer with de-ionized or tap water as outlined above, we have encountered no problems of cross contamination for the 23 endpoints (including calcium and magnesium), enzyme, and EMIT* tests routinely run in our laboratory over the past year. Day-to-day quality-control results for these 23 analytes demonstrate that recycled and new plastic rotors perform equivalently in terms of accuracy and precision (data available on request). Coomassie Blue dye, used for the assay of total protein in CSF, stains the cuvettes blue, so these cuvettes are not recycled.

The cuvette dryer blows warm (50–60 °C) air up through a drying tower and completes the recycling process. The air escapes the tower through small holes positioned such that the air is directed into each cuvette. Up to 12 cuvette rotors may be dried in about an hour.

The Roche cuvette rotors are quite sturdy and with careful handling will survive at least 10 cycles. We have reused some rotors more than 25 times. Moreover, system versatility has enabled the CORAS-Bio operator to recycle cuvettes routinely in our laboratory with no loss in productivity. Very significantly, our laboratory expenditure for cuvette rotors has been reduced by 90%.

References

John D. Batjer
Lindsay Eades
Raymond J. Liekde
Arthur M. Zebelman

Lab. of Pathol.
Swedish Hosp. Med. Center
Seattle, WA 98104

Labadapt, Inc.
4015 N.E. 73rd St.
Seattle, WA 98115

*Inorganic phosphorus target concn for control: 69.0 (SD 1.5) mg/L.

Table 1. Phosphate Buffer Washout Experiments

<table>
<thead>
<tr>
<th>Compartment contaminated</th>
<th>Cuvettes</th>
<th>Rotors</th>
<th>Mean, CV, mg/L</th>
<th>Inorganic phosphorus concn</th>
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<tbody>
<tr>
<td>Reagent</td>
<td>150</td>
<td>6</td>
<td>70.0 ± 0.75</td>
<td>69.0 (SD 1.5) mg/L</td>
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<tr>
<td>Sample</td>
<td>50</td>
<td>2</td>
<td>70.3 ± 0.76</td>
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<tr>
<td>Reaction</td>
<td>125</td>
<td>5</td>
<td>70.3 ± 0.75</td>
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<tr>
<td>None</td>
<td>25</td>
<td>1</td>
<td>69.8 ± 0.71</td>
<td></td>
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