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Heavy Metal Contamination from Use of Some Rotary Evaporators

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COMMERCIALLY available rotary evaporators are widely used, particularly for the rapid removal of solvents under relatively mild conditions. They have been especially valuable in the concentration of biological extracts, where low temperatures are desirable to avoid destruction or modification of labile constituents.

In the determination of the nonprotein amino nitrogen constituents of plant extracts, it has been necessary to concentrate fractions obtained by ion exchange chromatography on a preparative scale. The concentrates, obtained after evaporation of the solvent (frequently 0.5 to 1.0*N* acetic acid) on a metal rotary sealed evaporator at 40° C. under reduced pressure, had a definite bluish hue when large fractions necessitated prolonged use of the evaporator. On exposure to hydrogen sulfide, copper sulfide was precipitated. It was first thought that the copper may have arisen from the ion exchange column through the process of grading the resin particle size on metal (copper-containing) sieves [Edge, R. A., *Chemist Analyst* **47**, 72 (1958)]. Further investigation demonstrated that amino acid solutions could be contaminated by copper without prior exposure to ion exchange resins. Moreover, nickel has been identified as a contaminant also arising from the Monel metal parts of the evaporator. The contamination is considered to arise from the metal rotary seal of the evaporator, by corrosion and/or abrasion during its operation.

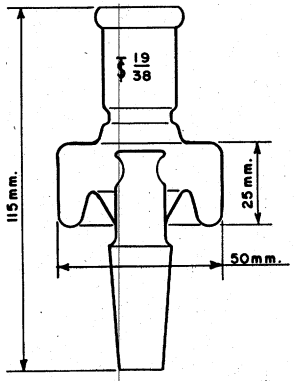

Figure 1

The degree of contamination varies with the particular volatile acid, volume concentrated, and the conditions which govern the period of contact of the vapor condensate with the metal rotary seal.

To circumvent this metal contamination, a short glass trap was constructed (Figure 1) and inserted between the evaporator and concentration flask. This trap was found most suitable where a reduction in space is required, although larger commercially available round glass condensers can be employed. After some continual use, a blue condensate was observed in the trap, but the concentrate was devoid of the contaminant.

In the isolation or analysis of milligram quantities of material, the presence of heavy metals may prove serious. In the preparation of 250 mg. of a dipeptide necessitating the concentration of 0.5*N* acetic acid solution, an 8.3% ash containing an appreciable quantity of copper and nickel oxides was found on analysis. Employment of a glass trap provides a necessary safeguard during the use of a rotary sealed evaporator wherein solvent comes in contact with the metal parts.

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