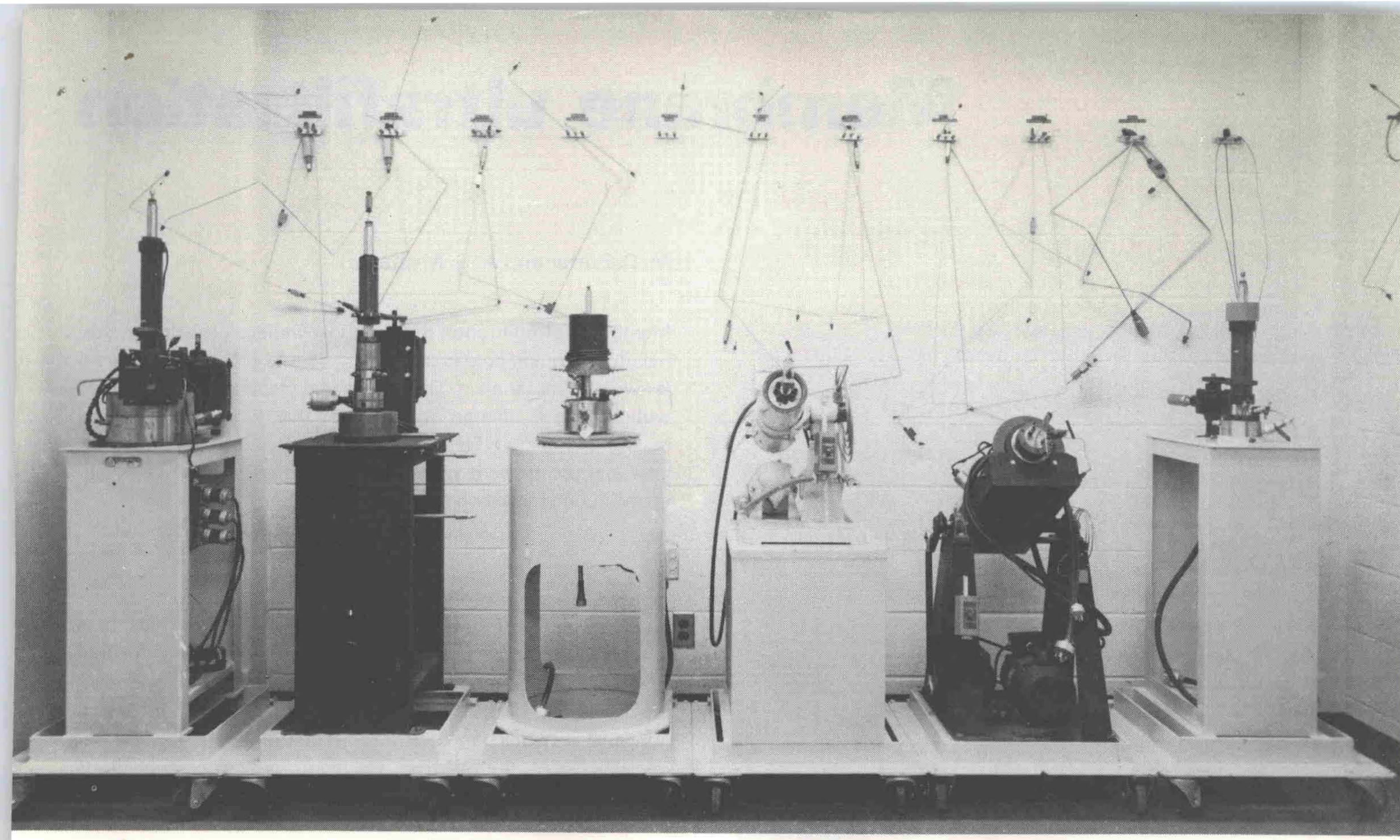

Figure 10. Stored autoclaves and attendant standardized tubing hookups

connected to a $^{1}/_{2}$-in. line, which extends through the *outside* wall of the cell and terminates under the lower exhaust stack. Steam (125 psi) is connected to the other end of the vent line and is used to purge it. By removing the dust cap from the exhaust stack, it is possible to purge the line directly into the sand pit outside the cell. We find this steup more efficient and cleaner than overhead vent lines.

The wall of the cell opposite the entrance is shown in Figure 7. The $^{1}/_{4}$-in. high-pressure tubing terminates in "L" fittings which are mounted on a length of unistrut and attached to the wall. This terminal block is located in the same position in each cell. A gas intensifier or accumulator is hung directly below this terminal block. The hook-shaped intensifier hangers are also located in the same position in each cell so that the intensifier and attendant tubing can be moved from cell to cell. The tubing and fittings between the terminal block and the accumulator, as well as between the block and the autoclave, are $^{1}/_{8}$-in., 15,000 psi.

Different types of electrical receptacles were used to prevent inadvertent mismatching of supply and load. These connections are not explosion-proof since most of our autoclaves are not equipped with explosion-proof motors or nitrogen-shrouded heaters.

Mobile autoclaves

The changing requirements of research demand a diversity of high-pressure reactors. To avoid having a cell for each piece of equipment, the equipment is arranged to move readily in and out of the cells. Autoclaves, which range in size from 50 cc to 3 gal, are mounted on 2 × 2-ft dollies (Figure 8 and 9) which are constructed of $2^{1}/_{2}$ × $^{1}/_{4}$-in. angle iron with appropriate braces for bolting to the fixed stand in each cell. A length of 1-in. angle iron welded along one side of the dolly acts as an alignment guide for setscrews in the hold-down clamp. The angle iron frame is mounted on 4-in. soft-rubber heavy-duty wheels. All wheels swivel to permit maneuvering equipment in tight places. The hold-down clamp is constructed of two 26-in. lengths of 3 × $^{1}/_{4}$-in. angle iron welded as shown in Figure 8. A plate is welded to one end of the clamp to ensure proper alignment of the dolly. The clamp is fastened to the floor similarly in each cell so that the dolly with autoclave can be clamped into the same relative position. Figure 9 shows a rocking clave in place within a cell.

Short lengths of tubing, which are peculiar to each autoclave, are held in labeled clamps on the wall of the autoclave storage room with unused autoclaves (Figure 10).

With this system an autoclave can be disconnected, removed from a cell, and replaced with another in a matter of minutes. Furthermore, having each autoclave mounted on a dolly has another less obvious advantage. When opening or closing an autoclave containing noxious or poisonous materials, it is possible to roll the unit into a full-length hood, secure it to the floor with the clamp previously described, and carry out the entire operation quickly and safely.

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Membrane ultrafiltration

M. C. Porter and A. S. Michaels

Membrane ultrafiltration removes low-molecular-weight materials from liquids containing polymeric and other high-molecular-weight materials. This molecular separation is effected without phase change which gives rise to unique technical results and costs. This first of five articles describes the process and compares it with competitive ones from an operability and economic viewpoint.

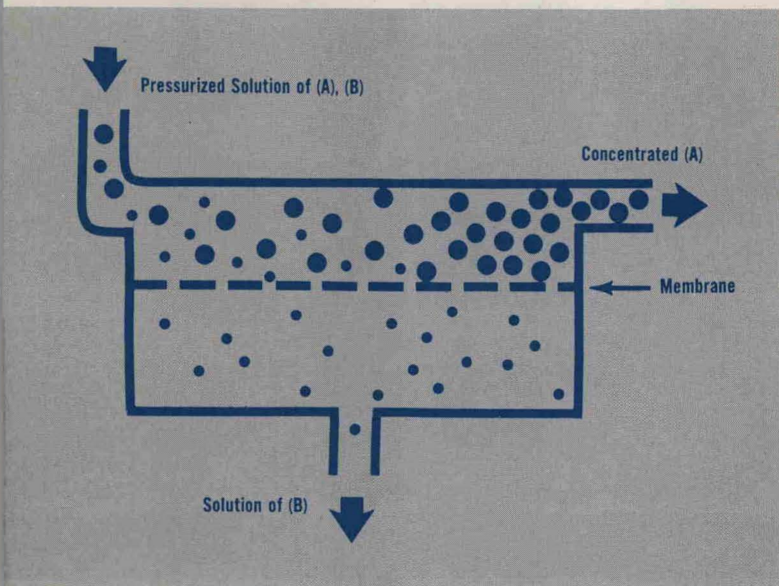

Figure 1. Schematic diagram of membrane ultrafiltration process

The emergence of low-pressure membrane ultrafiltration as an economic unit operation has generated considerable interest in several areas, among which is the food processing industry where it may be used for the concentration and purification of liquid foodstuffs, and for the recovery of valuable by-products from food-processing plant waste effluents. Virtually any aqueous food product whose nutritive values exist as macromolecular or colloidal substances can be inexpensively dewatered and/or demineralized by this versatile separations technique.

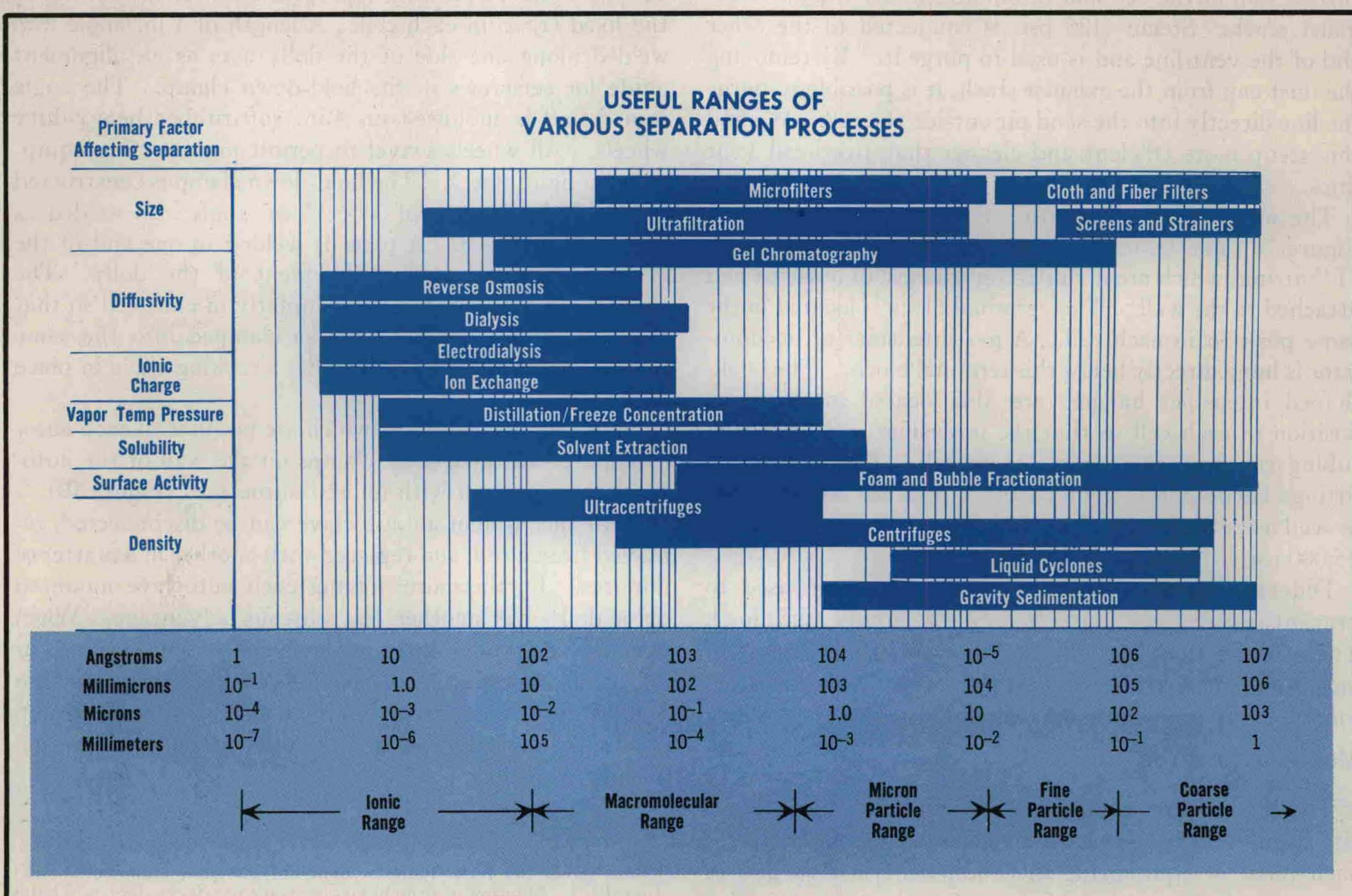

Figure 2. Useful ranges of various separation processes