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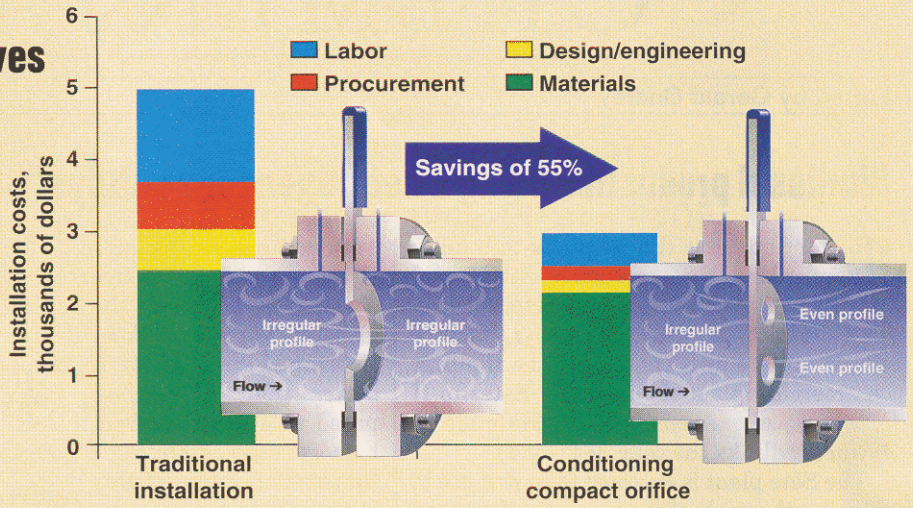
This flow conditioner improves the accuracy of flowmeters

A new Conditioning Orifice Plate (COP) that improves the accuracy of differential pressure (DP) measurements in pipelines that are restricted in having only short runs of straight pipe has been commercialized by Emerson Process Management (Chanhassen, Minn.; edlinks.che.com/3647-**533**). The standard orifice plate, the most common primary element used in all flow measurement, conventionally uses a single hole in the center. But the performance of that design is affected significantly when the flow pattern in the pipeline is disturbed, such as by upstream bends or valves. Long straight pipe runs are needed for the flow profile to stabilize. In contrast, the Rosemount COP has been designed with four equally sized and spaced holes. When properly positioned in the stream, the COP conditions the flow profile (picture) to achieve a more stable and accurate measurement, says Rosemount product marketing manager Kevin Green.

Although multiple-hole designs have been around for some time (*CE*, June 2000, p. 15), they have typically been used for line-pressure reduction. This Rosemount development is the first time such a design has been used as a measurement instrument for DP, says Green. The main benefit of the new design is that it requires only two pipe diameters (2D) upstream and 2D downstream of straight pipe-run to achieve the specified accuracy of ±0.5% [for an orifice-to-pipe-diameter ratio (beta) of 0.4]. For a conventional orifice plate used with the same situation, the accuracy would have degraded to 3.5% (0.4 beta), according to Rosemount.



A conventional orifice plate would require straight pipe lengths of up to 60D upstream and 7D downstream to achieve that same accuracy, says Green. The cost of the conditioning plate is, he adds, far less that the costs associated with using a conventional plate, which requires additional pipe material, labor, procurement and engineering costs (graph). Rosemount is also offering a 0.65 beta version, with an accuracy of ±0.75%, and the two betas cover 90–95% of industrial applications. Later this year Rosemount will introduce a 0.2 beta version to cover higher pressure ratings and larger pipe schedules.

Ultrafiltration membrane stack amplifies protein separation

Conventional ultrafiltration (UF) is normally suitable for separating proteins when the ratio of molecular weights is more than about 5 to 7. When the proteins are of comparable size, alternative methods such as affinity adsorption or chromatography are typically employed. However, these latter methods are difficult to scale up, expensive to operate, and often need to be tailor-designed for a specific protein pair, explains Kamalesh Sirkar, distinguished professor of chemical engineering at New Jersey Institute of Technology (NJIT; Newark, N.J.; edlinks.che.com/3647-**534**).

A highly selective UF-membrane system, which promises to be a simple, less-expensive alternative to chromatography and adsorption has been developed by Sirkar's research group. The most recent laboratory results indicate that the system can produce a pure protein from a mixture of two proteins with molecular-weight ratio of 1.03 — or a difference of just 3%, says Sirkar.

The system takes advantage of the fact that UF membranes show some selectivity for passing two different proteins, even those of comparable size, if the operating conditions (pH, ionic strength, flux, membrane charge) are optimized. Instead of using several membrane devices in series (a multistage system) to amplify the separation at each stage, NJIT's system incorporates three flat membranes, stacked together without washers or spacers. Unlike multistage systems, which require a separate pump and device for each membrane stage, and ultimately yield a permeate that is enriched with one protein over the other, the multimembrane stack passes only one protein. The loss of flux in a multimembrane stack is simply compensated for by increasing the feed pressure, says Sirkar.

Thus far, the group has produced pure proteins from three binary mixtures: myoglobin and β-lactoglobulin, and myoglobin and α-lactalbumin (published) and bovine serum albumin and hemoglobin (unpublished). Currently, work is underway to see if the technique can be generally applied to more complex, multicomponent mixtures, such as occur in industrial fermentation and cell-culture processes. Several companies have already expressed an interest, says Sirkar.

Air guidelines

The German Assn. of Engineers (VDI; Düsseldorf, Germany; edlinks.che.com/3647-**450**) has published Guideline VDI 3492, which specifies a method for determining the concentration of inorganic fibrous particles, such as asbestos fibers, in indoor air. The method allows assignment of detected fibers to classes, such as chrysotile, amphibole asbestos, and calcium sulphate.

LDPE

Huntsman (Salt Lake City, Utah; edlinks.che.com/3647-**543**) plans to build a 400,000-m.t./yr plant — claimed to be the world's largest — to produce low density polyethylene (LDPE) at the Wilton International site in the U.K. When the £180-million plant starts up, it will be supplied with ethylene from the Huntsman cracker facility at Wilton.