On the performance of static mixers
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Introduction
The performance of various static mixers, the Kenics mixer, the Ross Low-Pressure Drop (LPD) and Low-Low-Pressure Drop (LLPD) mixer, the standard Sulzer SMX mixer, and the recently developed new designs of the SMX in our group, known as SMX(n) [1] (see Fig 1), is compared using both energy consumption, measured in terms of the dimensionless pressure drop, and compactness, measured as the dimensionless length, as criteria [2].

Qualitative comparison
Figure 2 reveals qualitative profiles for different designs.

Figure 2: Mixing profiles for different industrial mixers.

Quantitative comparison
Figure 3 (a) and (b) show a quantitative comparison using energy consumption (measured in terms of dimensionless pressure drop) and compactness (measured in terms of dimensionless length).

Figure 3: Quantitative comparison of mixing performance of various static mixers using cross-sectional flux-weighted intensity of segregation versus (a) dimensionless pressure drop $\Delta P^*$ and (b) dimensionless length ($l/D$). If $I_d=1$, no mixing at all, if $I_d=0$, complete mixing.

Conclusions
1. The Kenics is the most energy efficient motionless mixer, shortly followed by the LPD and the simplest versions of the new design series, the SMX(n) ($n, N_p, N_x$)=(1, 1, 3).
2. The SMX(n) ($n, N_p, N_x$)=(4, 7, 12) is the most compact mixer, shortly followed by the (3, 5, 9) versions.

References: