

CHEMINDIA “*InstaMix*”

Continuous Flow Reactors

Model: CFR

for Continuous Flow Reactions



Principle of Mixing	: Split And Recombine (SAR) Principle
No. of Reactants	: 2 or 3 Reactants
Phases	: Liquid -- Liquid; Liquid – Gas; Liquid-- Slurry
Applications	: Mixing of miscible liquids or creating dispersion of immiscible fluids, oils, emulsions.
Material Of Construction	: SS316L, Titanium, Inconel
Maximum Pressure	: 10,000 psi
Internal Volume	: 3ml ~ 100ml
Flow rate	: 1ml/ min ~ 3 Liters/min
Production Capacity	: 5 t /year ~ 1500 t/ year
Temperature Range	: - 80 °c to 300°c
Heating / Cooling method	: Non Jacketed Either by installing in CHEMINDIA's Micro Reaction Chamber or by dipping in suitable thermostatic bath Jacketed By connecting to thermostatic circulator
Inlet & Outlet tubing	: 1/8" tube connectors (Option 1/16")

*** Excellent and Effective Heat & Mass Transfer for better yields and purity

CHEMINDIA “*InstaMix*” Continuous Flow Reactors



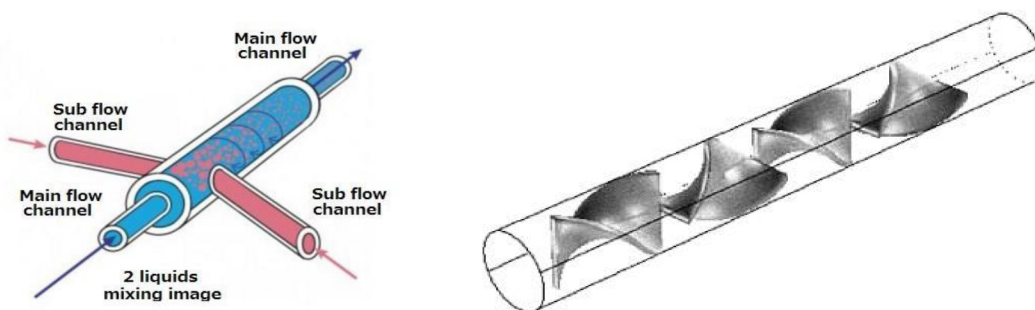
Model	Maximum Flow rate	Reactor Volume**	Production Capacity t/y	Temperature Range
Lab*	10ml/min	3 ml	5 t/y	-80°C ~ +300° C
CFR-I*	100ml/min	5 ml	50 t/y	-80°C ~ +300° C
CFR-II*	200ml/min	25 ml	100 t/y	-80°C ~ +300° C
CFR-III*	1 L/ min	50 ml	500 t/y	-80°C ~ +300° C
CFR-IV*	3 L/min	100 ml	1500 t/y	-80°C ~ +300° C

* Material of Construction: SS316L, Titanium, Inconel

** Higher volume Reactors can be supplied

Pressure Range : 0 ~ 400 bar

“*InstaMix*” Principle : Split And Recombine (SAR)
Mixing preceded by Turbulent Flow



Turbulent Flow Mixer creates turbulence flow in flow path.

SAR Mixers efficiently mix through a process of Division, Conversion and Inversion.

Division Process

Each time a liquid passes through an element, it is split in half. Number of Separations $N=2n$.
N: Number of Elements.



Conversion Process

The liquid glides along the inner spiral walls of the element, moving from the center part of the cylinder to the walls, and from the walls to the center part, being sorted in the process.

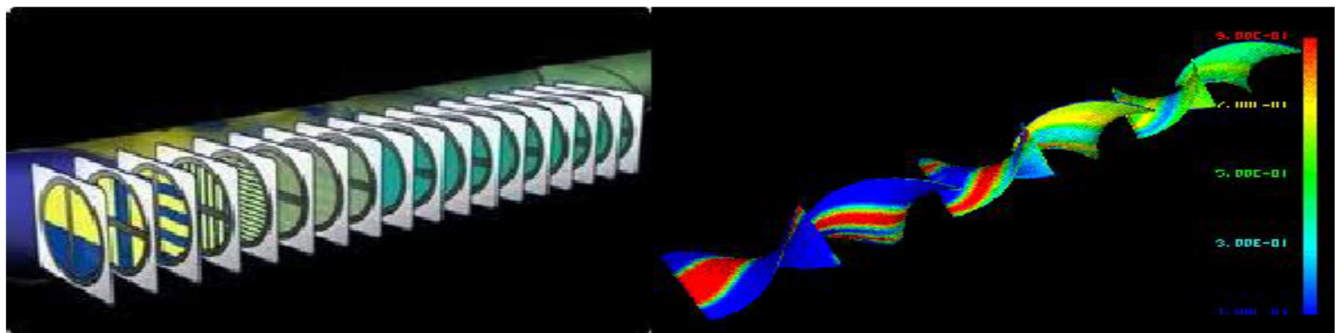


Inversion Process

The liquids direction of rotation changes in each element, receiving rapid inversion of inertial force, which agitates the liquid.



- Low Viscosity substances with mutual solubility are mostly mixed through the **Inversion** step
Ex: alkali & acid neutralization
- Even with two low viscosity substances, without mutual solubility, they are mostly dispersed during the **Conversion** step
Ex: Oil dispersion into water
- High viscosity substances are mostly mixed during the **Division and Conversion** steps



Simulation of Division, Conversion and Inversion Process

Accessories:

1. **Heating or Cooling Devices:** To heat or cool the reactants in Micro Reactor

Water / Oil Bath: Temperature range: Ambient to +250° C; Accuracy: $\pm 0.1^\circ \text{C}$



Micro Reaction Chamber: Temperature Range: Ambient $\sim +300^\circ \text{C}$
Accuracy: $\pm 0.1^\circ \text{C}$ up to 100°C
Accuracy: $\pm 1^\circ \text{C}$ from 100°C to 300°C



Low/High Temperature Liquid Circulators: Temperature Range: $-40^\circ \text{C} \sim +100^\circ \text{C}$
Accuracy: $\pm 0.1^\circ \text{C}$



2. **Coils:** **T shaped** and **Y shaped** coils with different residence times are available.
3. **Online Monitoring:** UV-Vis Detection($190\text{nm} \sim 600\text{nm}$)