



LABORATORY AND PILOT MIXER-SETTLERS TYPE MD



MD UX 1-4 : laboratory mixer settler, battery of 4 stages

Types of applications:

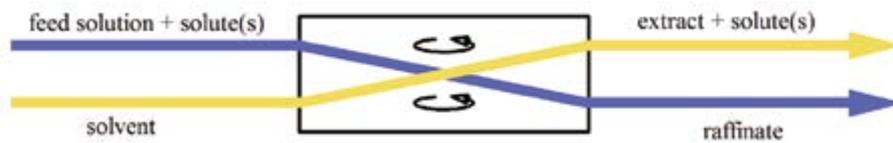
- **PHARMACEUTICALS:** Purification of active principles (*e.g. antibiotics*)
- **CHEMICALS:** Washing (*e.g. polymers*) or extraction (*e.g. acetic acid*)
- **FOOD INDUSTRY:** Purification of food components (*e.g. lactic and citric acids*)
- **HYDROMETALLURGY:** Separation or purification (*e.g. precious metals*)
- **VARIOUS INDUSTRIES:** Perfumes, aromas, essential oils, etc.



28-stage battery SX 2-0, PVDF construction
6 stages: primary extraction
10 stages: stripping
12 stages: secondary extraction

PRINCIPLE AND DEFINITIONS

Liquid liquid extraction consists in transferring one (or more) **solute(s)** contained in a **feed solution** to another immiscible liquid (**solvent**). The solvent that is enriched in solute(s) is called **extract**. The feed solution that is depleted in solute(s) is called **raffinate**.



The feed solution and the solvent are brought in intimate contact so as to carry out the transfer of the solute(s).

The two outgoing liquid phases extract and raffinate are separated by static decantation (mixer-settler) or by centrifugal decantation (Rousselet Robatel centrifugal extractors LX or BXP).



MD UX 1-1 : module of 4 stages

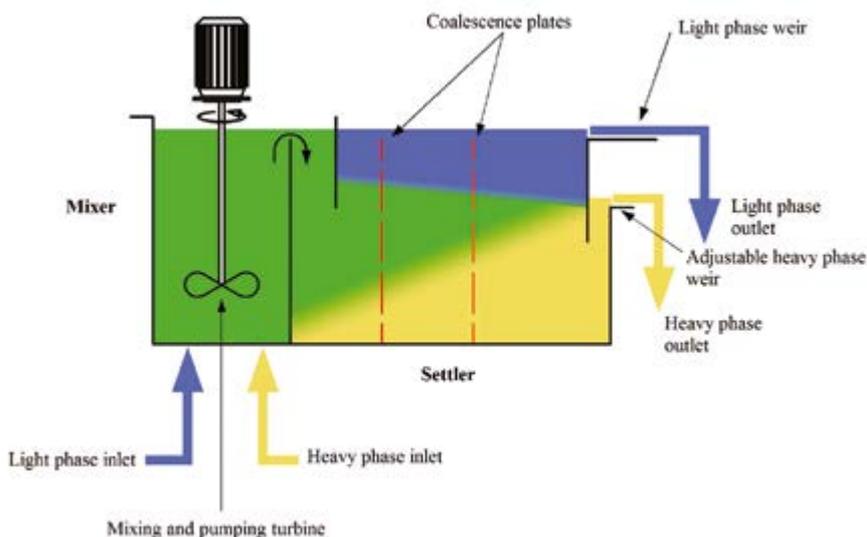
TECHNOLOGY

One stage of a mixer-settler is comprised of two zones:

Mixer: a mixing chamber where a mechanical agitator brings in intimate contact the feed solution and the solvent to carry out the transfer of solute(s). The mechanical agitator is equipped with a motor which drives a mixing and pumping turbine. This turbine draws the two phases from the settlers of the adjacent stages, mixes them, and transfers this emulsion to the associated settler.

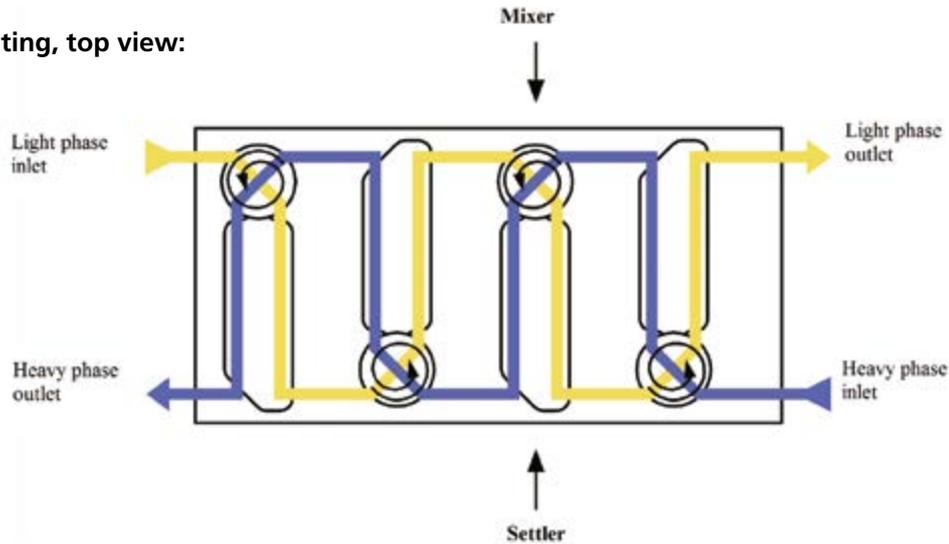
Settler: a settling chamber where the two phases separate by static decantation. Coalescence plates facilitate the separation of the emulsion into two phases (heavy and light). The two phases then pass to continuous stages by overflowing the light phase and heavy phase weirs. The height of the heavy phase weir can be adjusted in order to position the heavy/light interphase in the settling chamber based on the density of each one of the phases.

Cross section view of a mixer-settler:



MD UX 2-1 : detail of a single stage with engine (mixer) and settler (static decantation area)

Battery mounting, top view:



MD UX 1-1 : battery of 16 stages

CONSTRUCTION

Materials of construction: polyethylene, polypropylene, polyvinylidene fluoride, PTFE for sizes 1 and 2 only.

Engine equipment: the pumping turbine is driven in rotation by a three-phase, totally enclosed electric motor (IP55 protection) that can be explosion-proof. The motor is controlled by an AC variable frequency drive to adjust the speed of the agitation.

Sight glasses: a sight glass at the end of the settling chamber enables to visualize the separation between the two phases.

Covers: made from plexiglas or glass (depending on the sizes), can be positioned on the settling chamber to reduce solvent evaporation for instance.

Size: Rousselet Robatel provides 6 sizes of mixer-settlers ranging from 1 to 6 with many options for mixers and settlers of different volumes.

Recycling: the mixing efficiency or the phase separation may often be improved by increasing the flow rate of one of the phases → recycling of the phase from the settler to the mixer of the same stage.

Mixer-settlers of sizes 1 and 2 are equipped with internal recycling channels, a recycle phase selector, and a recycle flow regulator who carry out this functionality. Mixer-settlers of sizes 3 to 6 are equipped with connections for external recycling and the recycle flow can be adjusted by external piping systems.

Intermediate inlets and outlets: universal mixer-settlers UX are equipped with intermediate inlets and outlets at each stage. Various selectors permit operation of the required number of stages in a given battery and allow the division of the battery into several sections (for extraction, washing, back extraction for instance).

VERSIONS

Rousselet Robatel offers 3 versions of mixer-settlers:

- SX standard version Basic module
- RX version with internal recycling
- UX universal version with recycling of intermediate inlets and outlets



Mixer-settlers : special design for hydrometallurgy

TECHNICAL DATA

MIXER-SETTLERS	TYPE	NUMBER OF STAGES	LENGTH OF ONE STAGE	WIDTH OF 4 STAGES BASIC MODULE, NIPPLES EXCLUDED (mm)	HEIGHT WITH STANDARD MOTOR (mm)	MIXER VOLUME (L)	SETTLER VOLUME (L)	DECANTATION AREA (cm ²)	OVERALL FLOW RATE (Lxh)	WEIGHT OF BASIC MODULE MADE OF POLYETHYLENE (Kg)
SX	1-1	4	200	305	345	0,035	0,143	49	2/4	13,5
	1-2		200	305	357	0,050	0,200	49	2/5	14,2
	1-3		240	305	345	0,035	0,200	71	2/5	13,9
	1-4		240	305	357	0,050	0,257	71	2/6	14,6
	2-0		492	494	399	0,200	1,300	215	10/20	27,0
	2-1		492	494	399	0,200	1,700	285	10/20	25,0
	3-0	1	490	130	523	0,620	3,000	270	15/30	7,8
	3-1		690	130	523	0,860	5,000	450	20/40	9,4
	4-0		950	192	523	2,300	11,000	1000	40/80	14,8
	5-0		990	250	615	5,200	21,000	1300	150/200	33,0
	5-1		1490	250	615	5,200	36,000	2300	200/300	45,0
	6-0		990	290	655	8,500	29,000	1500	200/300	41,0
6-1	1490	290	655	8,500	50,000	2600	250/400	57,0		
RX	1-1	4	200	385	345	0,035	0,143	49	2/4	14,4
	1-2		200	385	357	0,050	0,200	49	2/5	15,3
	1-3		240	385	345	0,035	0,200	71	2/5	15,0
	1-4		240	385	357	0,050	0,257	71	2/6	16,0
	2-0		492	494	399	0,200	1,300	215	10/20	26,0
	2-1		492	566	399	0,200	1,700	285	10/20	24,0
UX	1-1	4	200	470	345	0,035	0,143	49	2/4	15,5
	1-2		200	470	357	0,050	0,200	49	2/5	16,6
	1-3		240	470	345	0,035	0,200	71	2/5	16,3
	1-4		240	470	357	0,050	0,257	71	2/6	17,5
	2-0		492	675	399	0,200	1,300	215	10/20	30,0
	2-1		492	675	399	0,200	1,700	285	10/20	28,0

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