

PREPARATIVE CHROMATOGRAPHY WORKSTATION AT LUT KOUVOLA

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Why Preparative Chromatography?

Modular | Multi-column | Multi-detector | Automated | Scalable

- Process streams in food processing and biorefineries are **crude mixtures**, not pure compounds [1]
- **Target compounds** can be impurities (purification) or product molecules (recovery)
- **Preparative chromatography** is one of the most selective industrial scale separations [2]
- LUT University's researchers have more than 25 years of experience [3, 4] in development of chromatographic separation processes

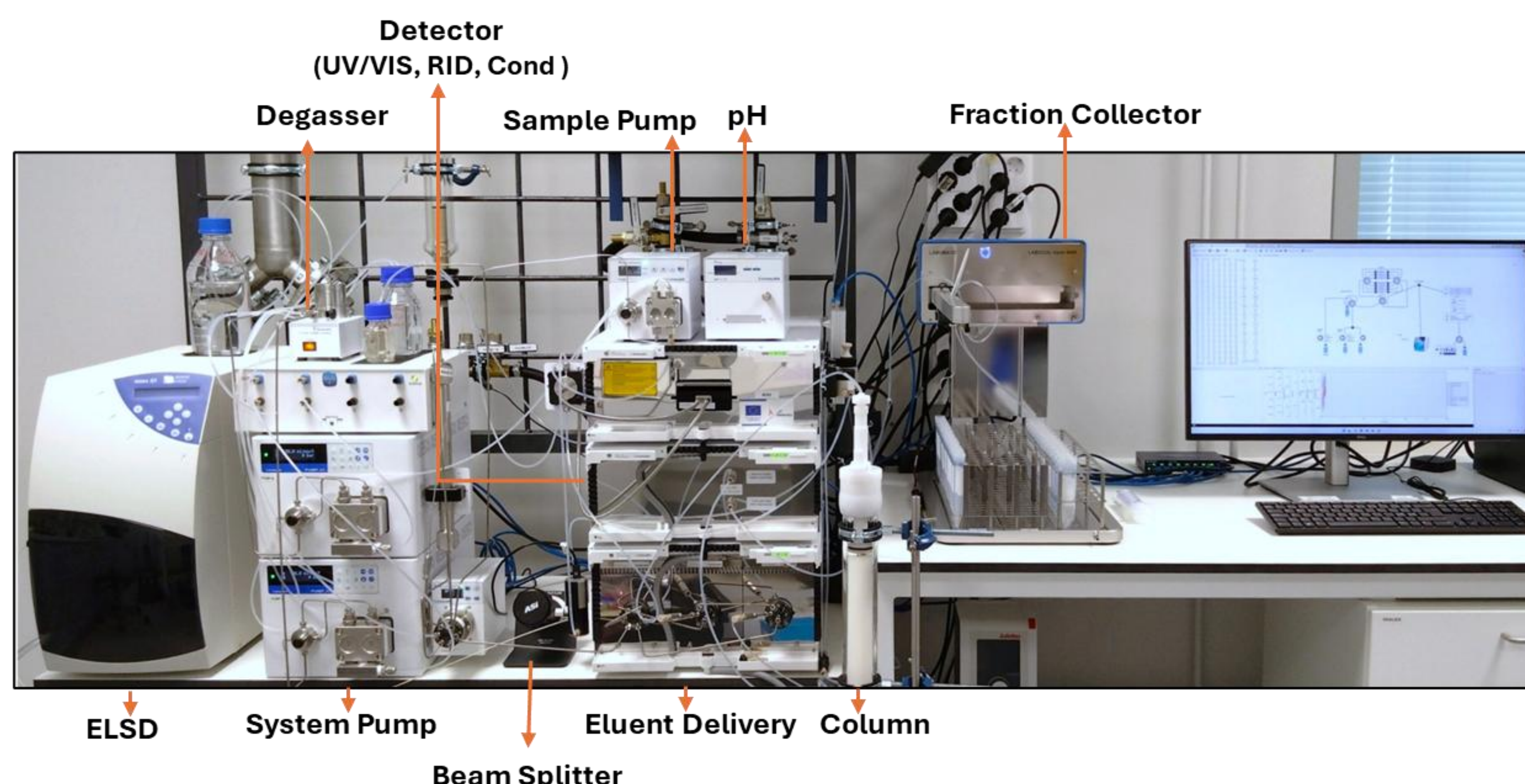
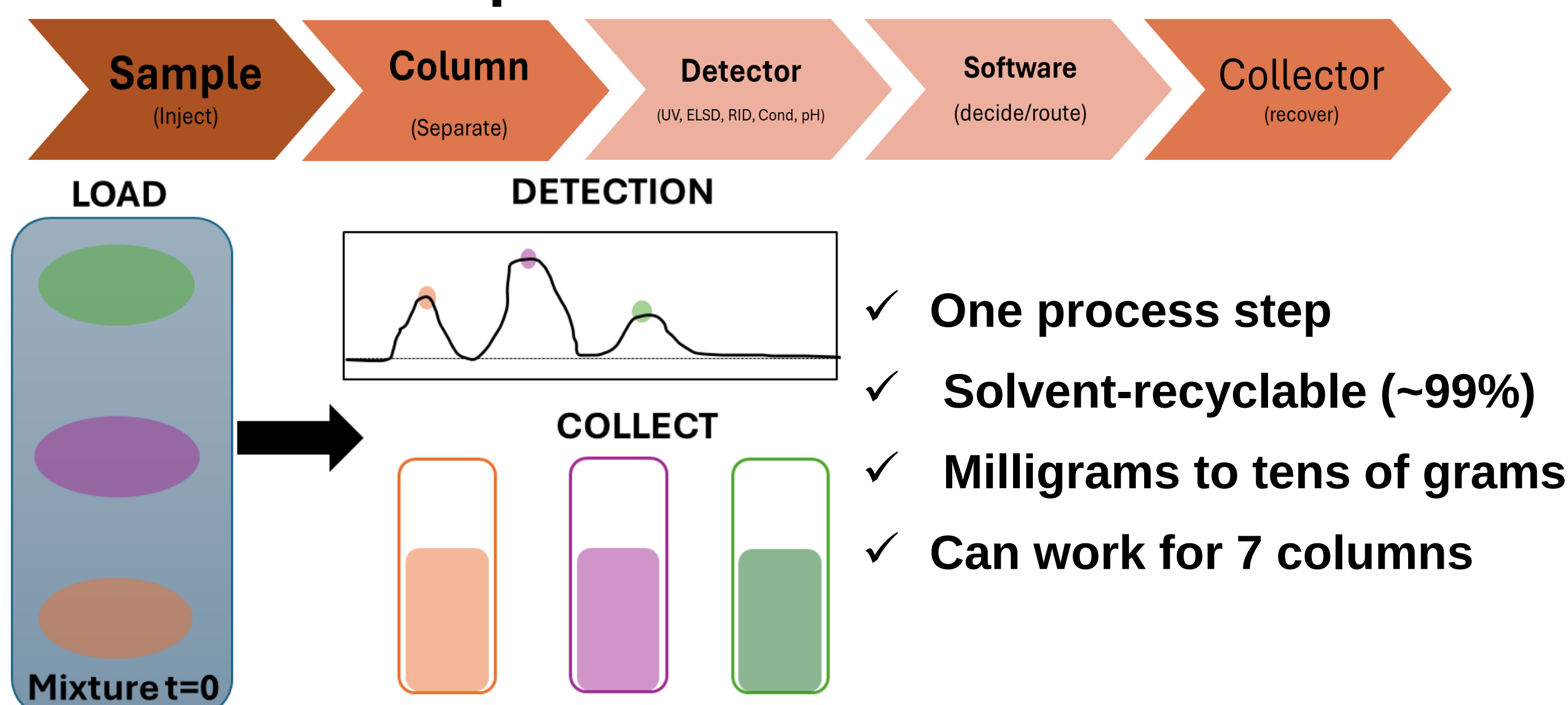
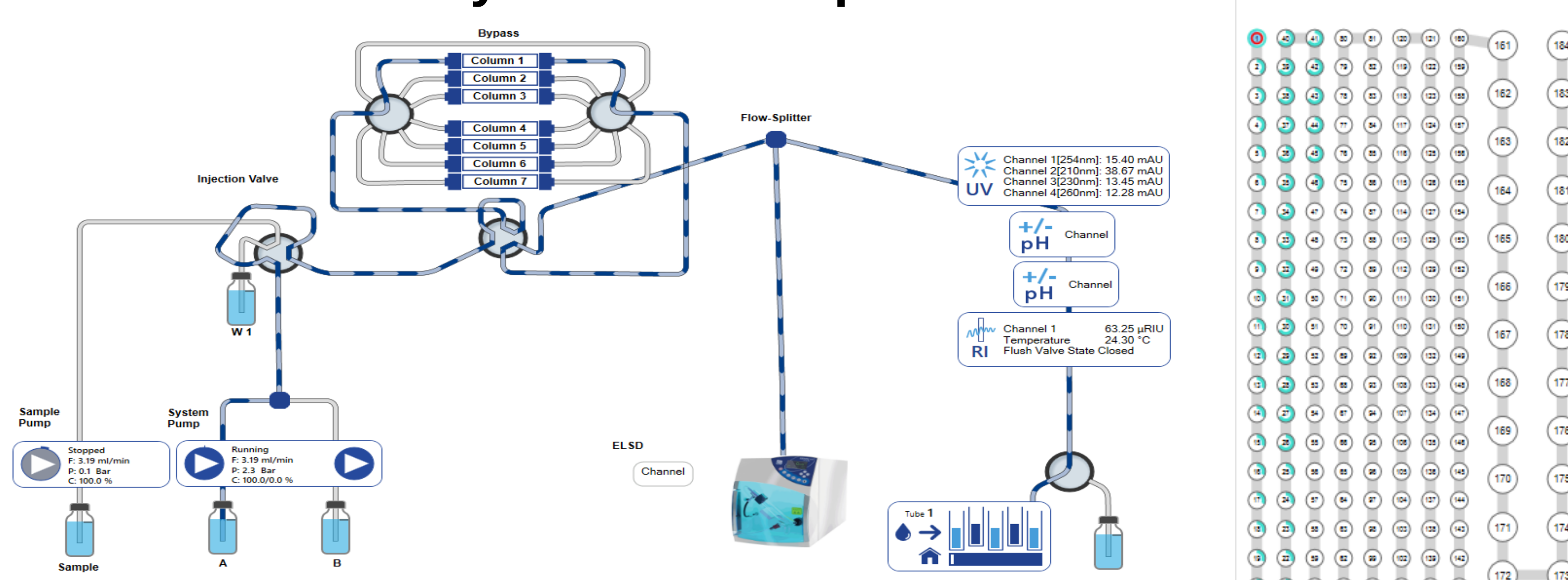


Figure 1. Instrumental setup of Preparative Chromatography Workstation (KNAUER Wissenschaftliche Geräte GmbH, Berlin, Germany)

The Separation Process



Fully automated operation



Preparative Chromatography vs. Other Purification Methods^[6]

Technique	Resolving Power	Conditions	Best Fit
Distillation	Poor for similar compounds	Heat, over 100 °C	Bulk solvents; not thermolabile compounds
Crystallisation	Only if target crystallizes well	Mild, slow, solvent-heavy	Final polish step, not standalone
Liquid-liquid extraction	Moderate	Mild, multi-step	Coarse clean-up before a finishing step
Preparative chromatography	Highest; resolves isomers, enantiomers	Mild, near-ambient, tunable	Replaces multiple purification steps

Advantages and Applications

- ✓ **Separate** complex mixtures
- ✓ **Detect** target compounds
- ✓ **Collect** selected fractions automatically
- ✓ **Recover** material for further characterization
- ✓ **Scale** purification for larger quantities

Applications [1,2]



References

- [1] Gomes, E.D.; Rodrigues, A.E. Sep. Purif. Technol. 2019, 216, 92–101.
- [2] Guiochon, G. J. Chromatogr. A 2002, 965(1–2), 129–161.
- [3] Tiihonen et al., J. Chromatogr. A, 982(2002), 69–84
- [4] Sainio, T., Kawajiri, Y., Chem. Eng. Sci., 2026, 124195

Preparative chromatography remains the most reliable method for isolating pure compounds from complex mixtures, combining high resolution, mild conditions, and scalability in one technique.