



# Solvent recovery and recycling

## Strategies to re-use recovered solvents

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### Introduction

During the last decades, huge amounts of solvents have been released into the atmosphere. This air pollution seriously affects the environment, and as a consequence, our health.

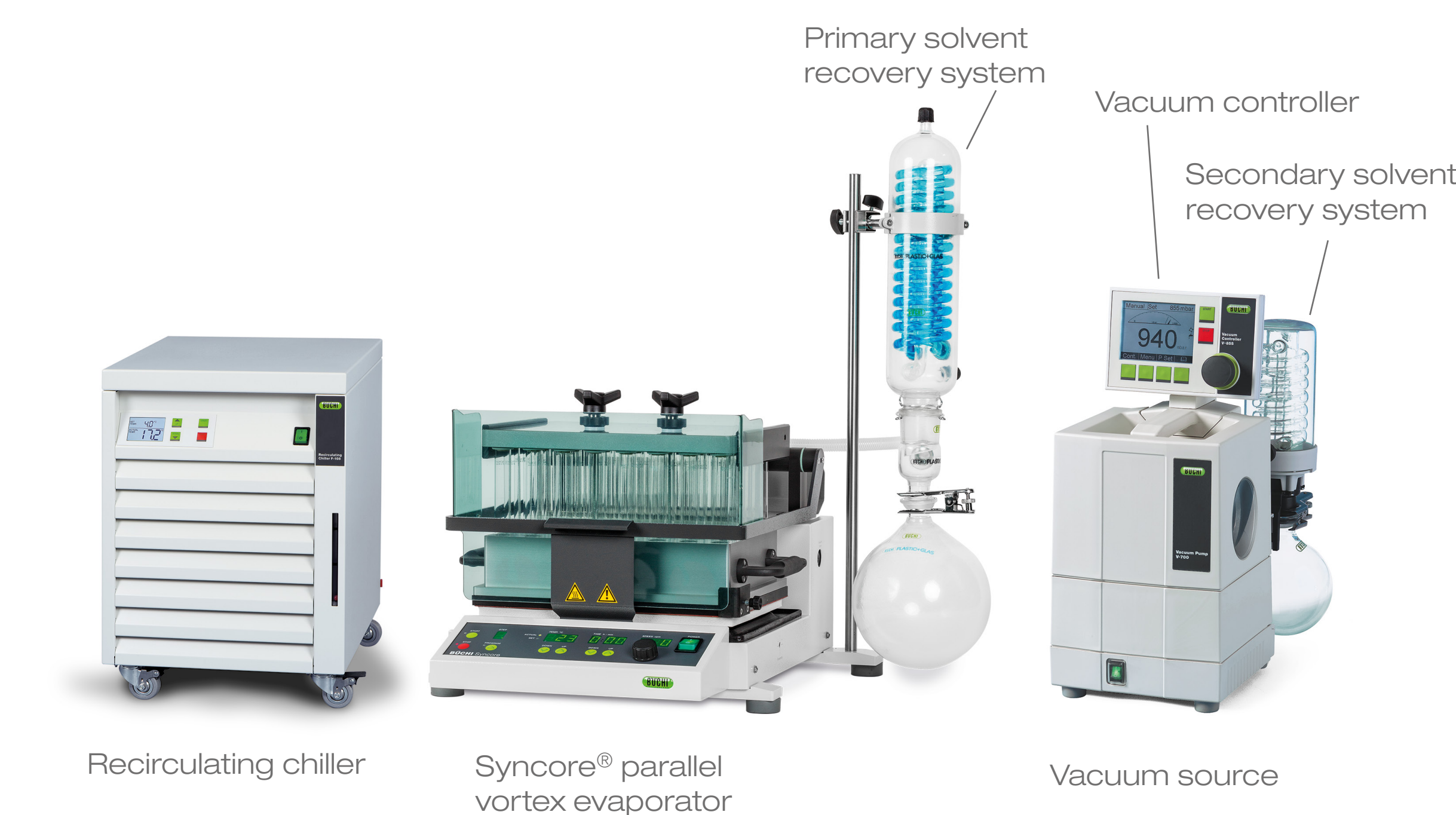
Lately, the environmental protection agencies (EPA) started a solvent “Emissions Reduction Program”. Laboratories in the environmental sector are strictly controlled. High solvent emissions and non-compliance with the regulations will lead to severe monetary fines.

Here we show:

- Solvent recovery during evaporation processes according to EPA guidelines
- Solvent recycling for university lab courses

### Solvent recovery

Parallel vortex evaporator equipped with a Solvent Vapor Recovery system with integrated control (SVR-N).



### Parallel concentration process

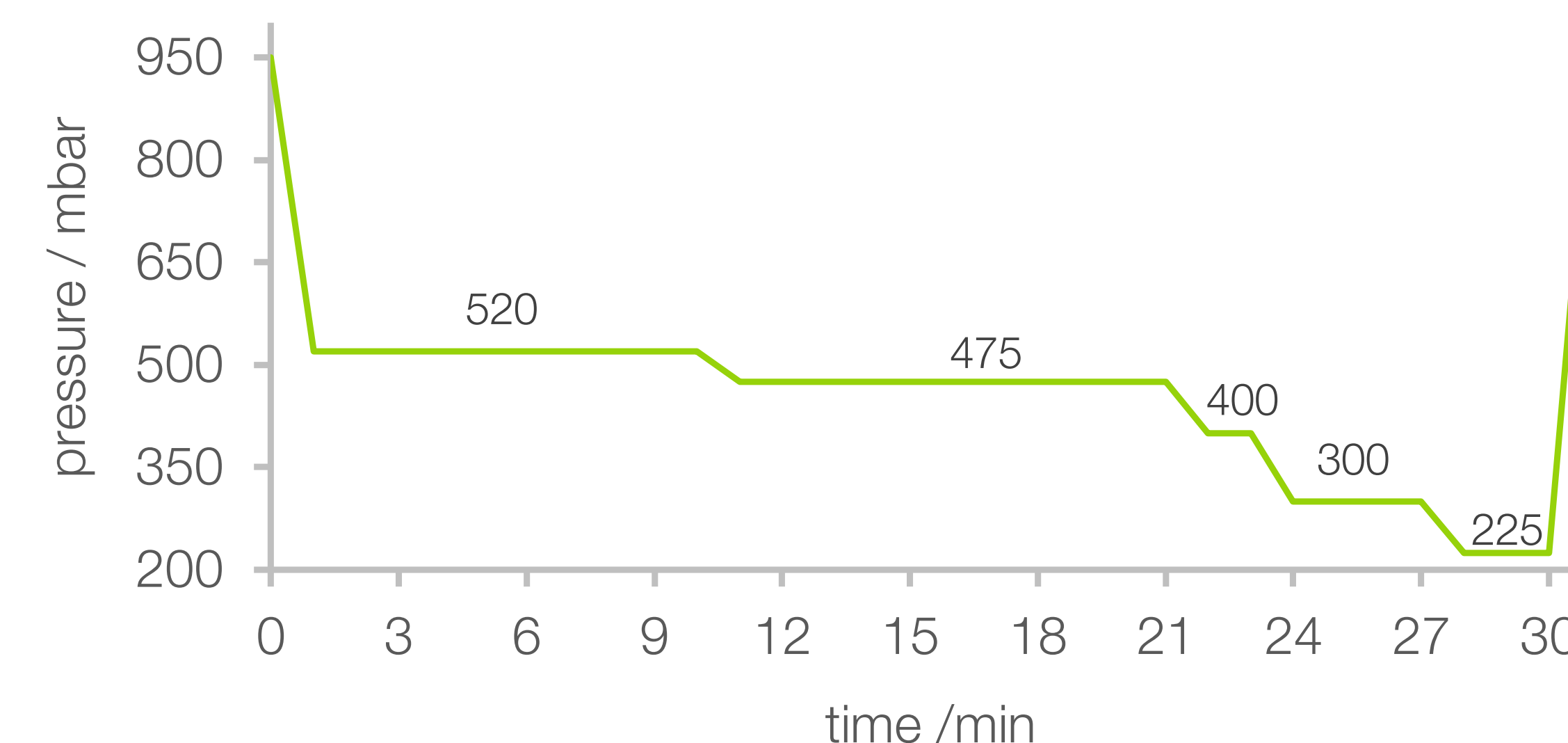
Application specific on-site support is offered to effectively prepare your environmental sample.

An environmentally friendly concentration process for samples dissolved in dichloromethane (DCM) is performed by applying the following parameters and a programmed pressure gradient.

V (Start)	40 mL	V (End)	1 mL
T (Heating plate)	50 °C	T (Cover)	50 °C
T (Cooling)	10 °C	Orbital movement	250 rpm

Twelve samples are concentrated in parallel using the BUCHI Syncore® Analyst R-12 in only 30 minutes, *i.e.*, 2.5 minutes per sample. The solvent is recovered at a 95 % efficiency and no nitrogen is used.

### Pressure gradient



### Re-using recovered solvents

After being recovered, there are several options for the distilled and collected solvents. Due to the high energy value and low price, the sale of recovered hydrocarbon solvents as cement kiln fuel is an attractive option for the lab and the cement manufacturer.

Other processes making use of the heat derived from burning recovered solvents are the generation of steam in specially equipped boilers, the firing of lime kilns, and the drying of road stone in coating plants.

Used chlorinated solvents have been sold to glue manufacturers and other industries where high purity solvent is not required.

### Solvent recycling: case study

Every semester, students of different faculties take part at practical laboratory courses where they learn to work properly with chemicals and lab equipment. In addition, the different techniques of synthesizing, purifying and analyzing substances are taught.

This leads to following issues:

- Huge amount of solvents needed for each technique
- Massive financial impact (purchase, transport, storage and disposal costs)
- Environmental aspect

The table below shows an example of cost savings per semester if solvents are recycled using an industrial rotary evaporator instead of being disposed after use.



Solvent	Diethyl ether	Toluene
Price [USD / L]	16.–	32.–
Total volume / semester [L]	300	150
Disposal costs [USD]	645.–	645.–
Total cost savings [USD]	5'445.–	5'445.–

### Conclusion

- High solvent recovery > 95 % with the Syncore®
- Compliance with waste minimization and pollution prevention programs
- Solvent purchasing and disposal cost reduction
- Reduced storage and transport costs
- Recycling of valuable solvents
- Economical and ecological handling of resources

