Personal OPLC Separation Unit POSU 50

A Flexible Tool for Semi-preparative and High Throughput Analytical Applications

Acquiring the proven OPLC technology from OPLC-NIT, Ltd., JC Scientific Co. Ltd. has transferred the manufacturing of OPLC equipment from Hungary to Hong Kong in Year 2013.

Personal OSU 50 chromatograph is designed for on-line and off-line analysis and isolation of compounds in complex matrix. Efficient and semi-disposable adsorbent layer avoids the necessary and tedious steps in sample preparation in HPLC. All compounds retained on the layer can be visuallized. The Personal OPLC Separation Unit POSU 50 (Fig.1) works with a HPLC pump(s), injector and detector as an on-line OPLC system (Fig.2) or works with a HPLC pump as an off-line system.

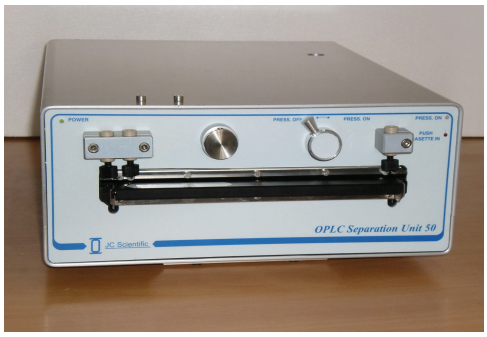


Fig. 1 Personal OPLC Separation Unit POSU 50 (FEW version) with a built-in hydraulic pump.

Fig. 2 On-line POSU 50 Isocratic OPLC System with ECOM ECP2010 Pump, ECD 2600 UV-VIS Detector and DataApex Clarity Chromatography Software

The Advantages of OPLC Separation Unit POSU 50:

- **The POSU 50 with the innovative Flowing Eluent Wall (FEW) design enables the elimination of edge effect of chromatoplate by directing a portion of the eluent to the edges.**
- **High separation efficiency of OPLC is achieved by using a pump to deliver the eluent at constant, optimal linear flow velocity into/through the layer. For low R_f value components, overrun can be employed to extend the migration distance. Full length of layer (maximum available theoretical plates) is utilized for on-line separation and detection.**
- **POSU 50 is equipped with Cassette Systems for linear unidirectional, bidirectional and two-dimensional development. OPLC layers and cassettes for analytical and semi-preparative separation are available. POSU50 works with sample applicators, densitometers for in situ detection and TLC/MS interface in off-line mode. It also works with all injectors, hyphenated detectors (OPLC-MS, ELSD, UV, Flurescence, RD) and fraction collectors in on-line operating mode. POSU 50 is a flexible tool of analysis and isolation.**
- **Semi-preparative scale-up from analytical separation is direct and simple. Same type and size of adsorbent, a thicker layer, and the same eluent are used for efficient semi-prep separation.**
- **High Throughput Parallel Analysis with 16 sample bands in unidirectional development and 70 sample spots in bidirectional development per run. (4 sec per sample for a typical 5 min run)**
- **An ideal chromatographic system for working with the innovative BioArena methodology for bioassay-guided isolation of active natural and synthetic compounds and for studying the fundamental reactions and mechanisms of the active components, microorganisms and co-factors interacting in situ in the layer.**

JC Scientific

What is OPLC?

Over**p**ressured **L**ayer **C**hromatography (OPLC) is a powerful separation technique that uses a solvent pump (optional item) to deliver eluent into a pressurized ultramicro chamber containing an analytical or preparative planar adsorbent bed to separate the components of a mixture (Fig.3). The eluent is forced to flow into/through the sealed adsorbent layer via the inlet hole and groove on the Teflon covering sheet of the cassette (Fig. 4) at an optimal constant linear velocity. The openable planar adsorbent bed and the forced flow allows OPLC to combine the benefits of HPLC and TLC/HPTLC to provide rapid, efficient separations using a variety of stationary phases

Fig. 4 OPLC 20x20cm cassette

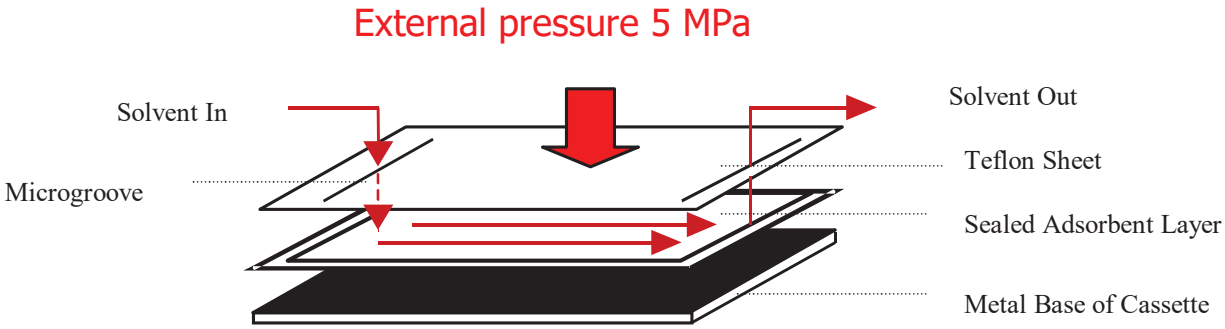


Fig. 3 Sealed Chromatoplate under an External Pressure – A Flat Column Concept

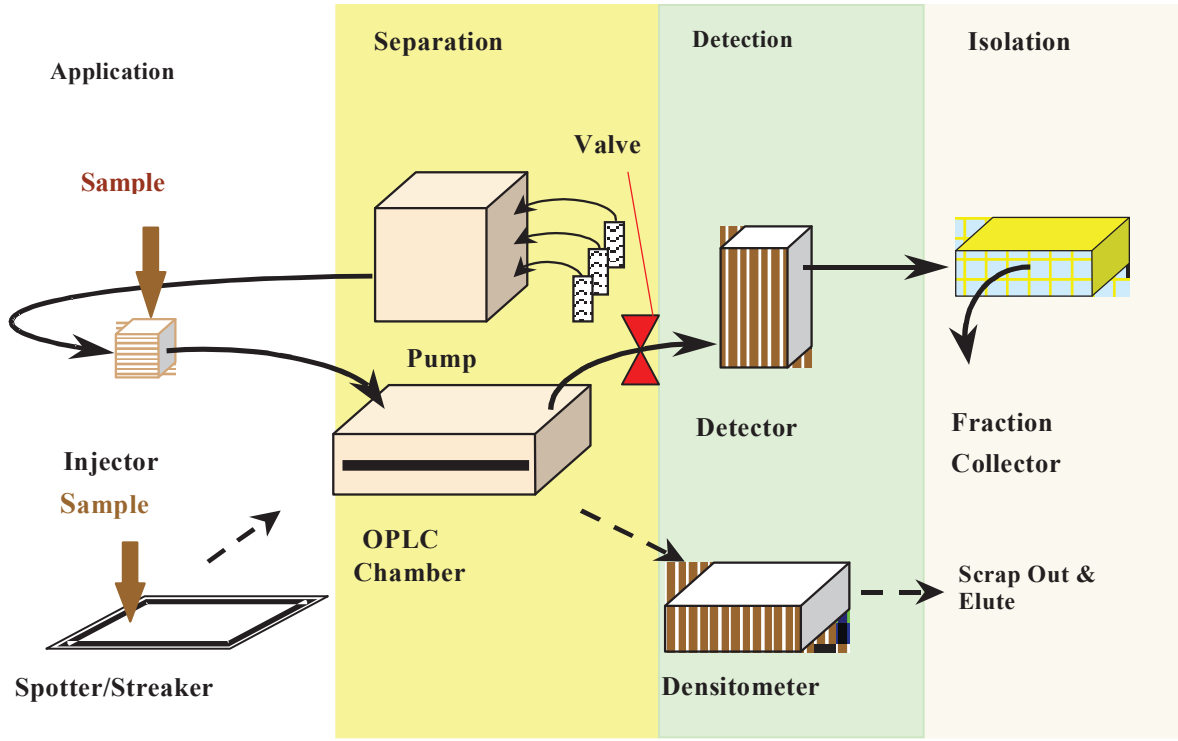


Fig. 5 Schematic of OPLC process

High Chromatographic Efficiency

Inside POSU 50, an external pressure of 50 bar is applied over the layer to reduce the interstitial void volume between silica particles. This results in more compact and more uniform packing and substantially improves the separation efficiency (Fig. 6.). Typical number of theoretical plates at optimum linear velocity (N) for 5 µm particle and 17 cm migration distance is around 15000.

POSU 50 works with a HPLC pump to force mobile phase flow through layer at optimum and constant linear velocity, results in fast separation with low diffusion of chromatographic spots (Fig. 7 and Fig. 8). Chromatographer can run to the full length of 5µm layer with little loss of column efficiency.

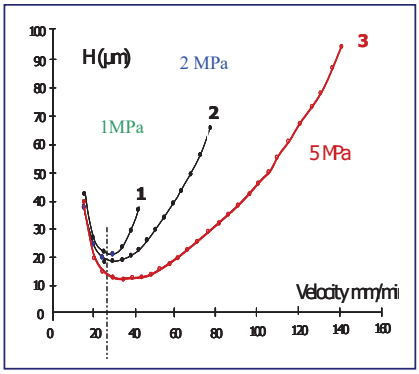


Fig. 6 As external pressure increases, efficency improves

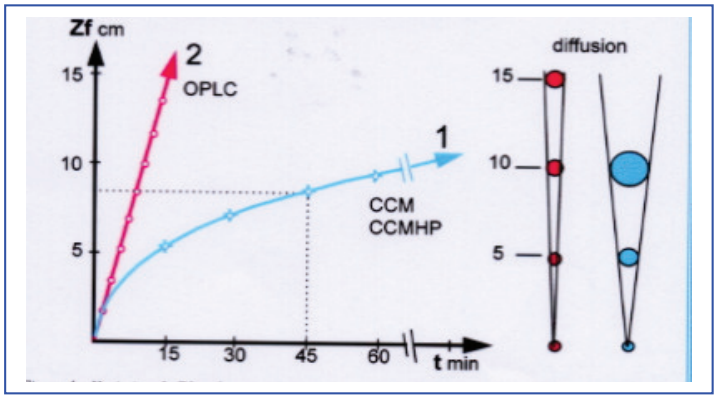


Fig. 7 The distance of solvent front (Zf) vaires linearly with time in OPLC (forced flow by pump) but non-linearly in TLC (flow by capillary action).

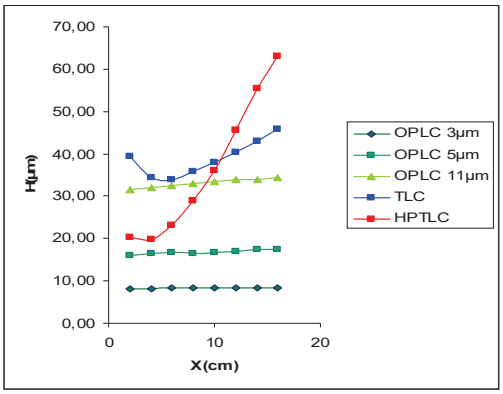


Fig. 8 Variation of HETP (H) as a function of development distance, in TLC and OPLC

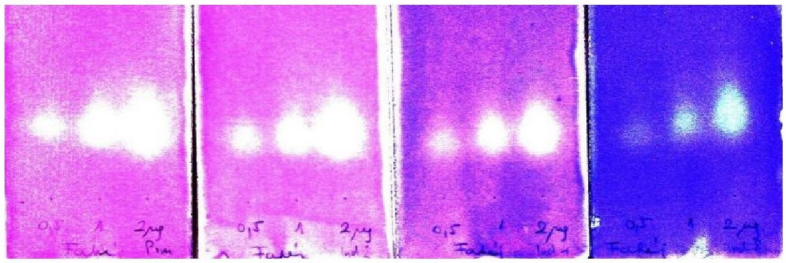
Ideal chromatographic technique for bioassay-guided isolation of active natural and synthetic compounds in the innovative BioArena System

The HPLC column cannot be used for biological detection and interaction as living cells do not grow in such a closed environment. Contrary, living cells can grow well on open silica layer, and biological detection and interactions of separated substances in situ in the adsobent layers will be a crucial and indispensable methodological solution for isolation, identification and characterization of new anitmicrobials, antineoplastics, biopesticides as well as for studying fundamental biochemical reactions and mechanisms [E. Tyihák, et al., J. Chromatogr. A(2011), doi:10.1016/j.chroma.2011.11.049].

BioArena system is a further development of direct bioautography to exploit the potential of biological detection on open silica layer using aimed series of endogenous and/or exogenous molecules (co-factors). Interaction of microbial indicator cells, the separated components and different co-factors in situ in the spots of the absorbent layer leads to new possibilities in bioassay-guided detection, fractionation and isolation. Fig. 9 shows the effect of Indigo Carmine on the anitbacterial activity of cinnamic acid.

OPLC, with its high efficiency and on-line fraction collection capability, is an ideal chromatographic technique used in the BioArena System.

Psm	IC 1 mg/ 100 mL	IC 20 mg/ 100 mL	IC 40 mg/100 mL



0.5, 1 and 2 µg cinnamic acid in each layer

Fig. 9 BioArena Study: Effect of Indigo Carmine (IC) on the Antibacterial Activity of Cinnamic Acid

(Tyihák E. et al. J. Chromatogr A 1232 (2012) 3-18.)

- Using Indigo Carmine for elimination of O_3 molecules from the chromatographic spots of cinnamic acid it has been established that the antibacterial activity of cinnamic acid decreased dose-dependently
- It is supposed that O_3 can be formed in the Chromatographic spots of cinnamic acid, which is responsible mainly for the antibacterial effect of cinnamic acid.

Other Typical Applications :

QC of pharmaceutical products: Cleaning validations of manufacturing vessels, determination of impurities in drugs and reaction mixtures
Natural products: Extraction of pharmacologically active compounds
Drug metalolism: Metabolites isolation in biological fluids
Oligomers and synthetic polymers: Natural oligomers (e.g. peptides) and synthetic polymers (e.g. polystyrene) separation
Toxicology: Determination of toxins in foodstuffs (e.g. aflatoxins)

Specifications:

OPLC Layer Accommodated: 5 x 20 cm and 20 x 20 cm,
External Pressure: 5.0 MPa (50bar), Eluent Pressure Limit: 40 bar
Dimension (W x D x H): 296 x 390 x 135mm (12 x 15.5 x 5.3 inches), Weight: 19kg (42lb)
Operating Conditions: 5-40°C, Max. Relative Humidity 80%, Power: 110V/ 60 Hz or 220V/ 50Hz, 160VA

Ordering Information:

P/N	Description
200001	POSU 50 Separation Unit supplied with R-rinsing Cassette, A5 and A20 cassettes, including SK003 starter kit. 110 V/60 Hz or 220 V/50 Hz, 160VA

A broad range of OPLC layers are available, including Silica for normal Phase separations, C18 for Reverse Phase separations and others. Stationary Phase are available in 5, 8 and 11µm. **Please contact JC Scientific Co. Ltd. or your local representative for ordering information of layers and accessories.**

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