OPERANT MODULES

Olfactometer

PHENOSYS
Technology for Behaviour Analysis

INTRODUCTION

The multi-channel olfactometer provides fast-response odour stimulation. It is a sophisticated tool for visualising and quantifying activity in olfactory sensory neurons and the olfactory bulb for investigating olfactory quality coding. Our olfactometer systems allow perfect control of multiple stimuli and stimulus concentration.

The preparation of high quality odour mixtures is a complex process. With the automated olfactometer and its software this process becomes a standard laboratory routine. The olfactometer can be used and integrated easily for the behavioural assessment of odour-detection and for odour discrimination behaviour.

MODE OF OPERATION

The Olfactometer can have **one to several parallel channels** leading to one or two separate odour delivery ports. Each odor channel is an air dilution odour delivery system.
The air flow through the odorant line is controlled by a **mass flow controller** (range 0-100 sccm/min). For most of the time, this continuous air (or nitrogen) flow is diverted through an empty vial without odour substance. During odour delivery, the gas flows through one or several odorant vials. After exiting from the valve behind the odour vial, the odorant flow merges with the dilution air line. This is controlled by another **mass flow controller** (range 0-500 sccm/min).
The port valve switches rapidly between odour and background gas streams delivered to the odour port.

SETUP

Special valves are located in the main stream flow. This ensures continuous washing of the odorant residues and only negligible dead space. After activation of the odour flow, its concentration stabilizes after 0.5-1 sec.
A final valve allows the switching of rapid onset/offset odour pulses delivered as transient stimuli. The **dual synchronous 3-way valve** with 4 ports and minimal dead space allows rapid switching between odour and background gas streams.

Nearly rectangular odour stimuli can be generated. Thin **teflon tubing** throughout the system ensures fast odour delivery and minimizes odour contamination. Additional **flow meters and manual gas valves** allow matching the impedances of the background line and the odour line to prevent pressure jumps during stimulus application.

APPLICATIONS

- Olfactory stimulation with pure or mixed odours, concentration gradients
- For electrophysiology or imaging studies of olfactory quality coding
- Investigation of higher cognitive functions using odour
- Translational research: test routines for specific human disease models

KEY ADVANTAGES

- Multiple odour sources
- Fast switching of odour pulses
- High-pressure small diameter tubing system
- Training, two-odour, and multiple-odour discrimination tasks
- Concentration gradients adjustable automatically with multiple high precision mass flow controllers

OPTIONS

- Multiple combinations: 1 or 2 separate odour channels with 2 to 17 odours each leading to 1 or 2 different stimulus ports
- Can be combined with operant systems, e.g. Jet Ball
- Operant schedule programming on request
- Can be used with humans

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