

INTRODUCTION

The multi-channel olfactometer provides fast-response odour stimulation. It is a sophisticated tool for visualizing 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, stimulus concentration, onset and offset.

The preparation of high quality odour mixtures is a complex process. With the automated olfactometer and its software this is made a standard laboratory routine that 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 separate odour delivery ports. Each odour channel is an air dilution odour delivery system.

The air flow through the odorant line is controlled by a **computer 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 concentration of the final odorant is equal to the odour concentration in the head space of the odour vial divided by the ratio of odour line airflow and dilution line air flow.

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 the odour flow its concentration stabilizes after 0.5-1 sec.

A final valve insures that only stable odour stimuli are delivered. The **dual synchronous 3-way valve** with 4 ports and minimal dead space keeps the odour line switched to the exhaust port until odour equilibrium has been reached. One second after the activation of odorant valves, the final valve is switched and now diverts the odorant flow the odour port.

Thin **teflon tubing** throughout the system provides good mixing and fast odour delivery.

Additional **flow meters and manual gas valves** allow matching the impedances of exhaust line and the odour port line thus preventing pressure jumps during final valve switching.

APPLICATIONS

- Olfactory stimulation with pure odours, concentration gradients or multiple odour mixtures
- For electrophysiology or imaging studies of olfactory quality coding
- Investigation of higher cognitive functions using odour or multi-modal stimulation
- Learning and memory tasks using sequences of multiple odours and odour mixtures
- 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

- Available in several sizes:
 - 2 to 8 odours to two to eight different stimulus ports
 - 8 or 16 odours to one stimulus port
- Custom configurations possible with up to 20 independent mass flow controllers and 60 to 100 solenoid valves
- Can be combined with operant system e.g. Jet Ball
- Operant schedule programming on request
- Can be used with operant systems by third party vendors
- Can be used with humans