

# ODILE™ : Dinamic Dilution Olfactometer



## ODILE™ : Dynamic Dilution Olfactometer

The Dynamic Dilution Olfactometer quantifies odors using a panel. Its various electronic components fill several functions: presentation of dilutions to the panel, continuous analysis of the results and optimization of the preparation sequence of dilutions of the gas samples.

Thanks to its multiple functionalities, ODILE™ is the only instrument that quantifies odors using four different complementary techniques:

- Odor concentration and odor threshold determination
- Odor suprathreshold determination with comparison to a reference gas
- Hedonic scale assessment to determine the degree of appreciation
  - Evaluation of the relative intensity of odors

Furthermore, ODILE™ allows training and automatic evaluation of expert panels.



## How it Works

### Technical sheet

- Odor concentration & odor perception threshold determination with triangular choice, yes & no or blind methods.
- Evaluation of the odor relative intensity level, hedonic tone or individual appreciation on a 1 to 10 scale. Pure or known dilution levels can be used to determine the evolution of perception with dilution.
- Odor intensity determination with comparison to a reference gas (n-butanol). This task can be done by using pure or known dilution levels to determine the evolution of the intensity with dilution.
- Panel calibration with n-butanol.

## **The system**

ODILE™ is composed of several units: dilution unit, operating system software, odor station, air purification system and pressurized vessel.

### **Dilution unit**

The dilution unit consists of several mass flow-controllers & a saturator for:

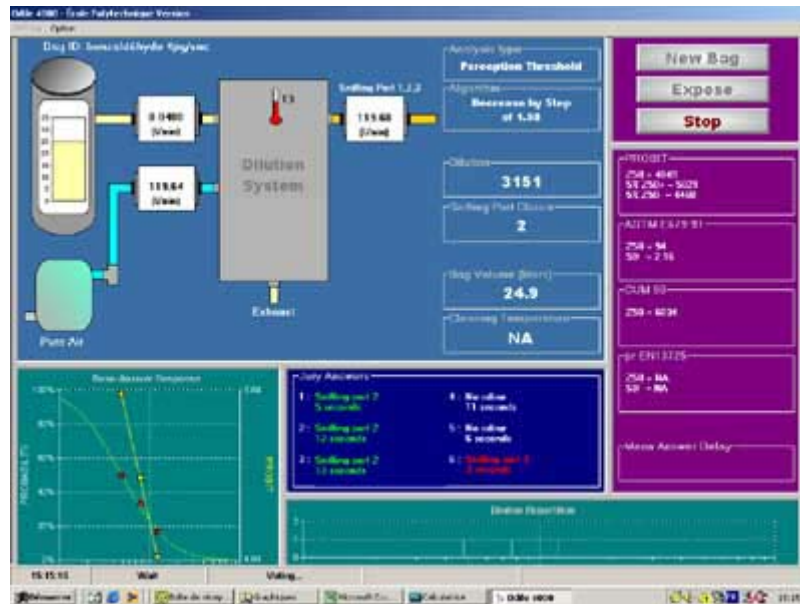
- obtaining a 1 to 2 000 000 dilution range without predilution and unlimited step units between each dilution level;
- generating air flow with n-butanol concentrations within 5 to 75 000 PPB(v);
- furnishing pure air flows to initialize the olfactory epithelium of panel members and proceeding to the triangular evaluation of the perception thresholds;
- purging the system between jury exposures;
- proceeding to a system cleaning after each olfactometric analysis;
- activating the auto-cleaning system for all pipes and electromechanical parts after each day of use.

The olfactometer is designed to prevent contamination between jury exposures and high concentrations before voting.

### **Operating system software**

ODILE™ includes operating system software running on Microsoft Windows 95, 98, 2000 or NT for electronic control of the unit. The software allows:

- dilution presentations to the jury;
- a real-time results analysis;
- using several algorithms of dilution presentations for the jury;
- a jury member evaluation procedure with suggested acceptance or rejection;
- the optimization of the gas sample's dilution preparation sequence;
- results computation by several techniques such as ASTM-679-91, ASTM-E544-75, CEN TC264/WG2'ODOURS', MUC 90 by-law and other dose-response analyses;
- statistic analysis of answer dispersion for the whole jury and for each individual;
- data archiving in three complementary databases with follow-ups for each individual's history as well as coherence with former analysis;
- printing the analysis report;
- evaluating the jury members' performance and sensitiveness.



A window in the graphic interface shows the dilution values, the jury's answers and the real-time statistic analysis results.

The operating system software and the electronic control card will be installed and configured at olfactometer's delivery on a PC. The PC must have the minimum characteristics: (Pentium, 200 MHz), two serial ports, Windows 95, 98, ME, NT, or 2000 operating system, 64 MB of RAM, 50 MB of hard drive disk space and a CD-ROM drive.

### Odor sniffing station

The olfactometer is equipped with six odor stations operating simultaneously. Each station consists of three to five odor sniffing ports and a voting box for communication between the jury and the operator.



Three sniffing ports are used for the olfactory perception thresholds analysis. The odorous gas is brought to one of them while the two remaining ports are fed pure air. A random rotation of the odorous gas feed is assured by an algorithm. Using this method, jury members are subjected to a blind test.

The fourth port is designated for odor intensity quantification and the last one is for n-butanol comparisons.

### Air purification system

In order to obtain pure and well conditioned air, ODILE™ is equipped with several devices:

- Pressurized vessel
- Active coal filter
- Particle filters
- Oil filter

## **4 Key factors in assessing the ODILE olfactometer**

### **First criterion: Types of odor analyses ODILE can handle**

- Measuring odor concentration by dilution to the olfactory perception threshold
- Measuring odor intensity on a 1 to 10 scale
- Measuring odor intensity with respect to a reference substance
- Measuring the hedonic aspect of the odor

### **Second criterion: Olfactometer operating range**

Regarding the operating range, even the simplest (1 mode) version of ODILE™ is at least equals or exceeds all its competitors.

The operating range of the olfactometer determines its capability to quantify both very faint and very strong odors. The wider the range, the easier it will be for the operator to assess different odor sources.

### **Third criterion: Olfactometric analysis completion time**

As regards the speed of an olfactometric analysis, ODILE™ is also ahead. Only the Dutch olfactometer (PRA) equals its speed.

It should be noted that odor quantification is effected by a human jury, which involves substantial labor costs. Since the jury is subject to fatigue, the longer the analysis takes, the fewer analyses will be feasible with a given jury.

### **Last criterion: Price**

As regards price, ODILE™ 1 mode is priced similarly to its competitors although it provides considerably better performance.

## **Advantages**

Each analysis is effected with 6 panelists simultaneously.

ODILE™ operations are virtually automated by the operating software. Its various modules provide:

- The presentation of dilutions to the panelists.
- Continuous results analysis.
- Use of various algorithms to present dilutions to the panelists.
- Results computation using several recognized assessment methods (ASTM, CEN, CUM).
- Analysis of the scatter of panel responses and of the responses of each panelist, and of the correlation between various odor parameters.

- Storage of all the data, with monitoring of the history of each panelist.
- Printing of the analysis report.

### **ODILE is**

1. An indispensable tool for major projects involving odor problems that are often quite complex.
2. Effective, multifunction: Programmed using advanced mathematical simulation models, and personalized according to the problems at hand.
3. User-friendly: Results displayed primarily in graphic format.
4. Compatible : Results easily exported to other software.
5. Tough, adaptable: Operates under Windows 95, 98, ME, 2000 and NT 4.0 and more; accepts graphic files (aerial photographs, digital maps) in BMP, JPG and other formats as backdrop to the results window.
6. Characterized by its wide operating range and its efficiency.
7. Able to provide quickly and at lower cost a broad range of olfactometric analyses.
8. A guarantee of credible results.
9. Able to quantify the odors tested by the panelists, and to ensure subsequent analysis for the accurate measurement of the odor concentration and intensity as well as of the hedonic aspect.

### **Potential Applications**

ODOTECH technology provides solutions for verifying compliance with standards and regulations, designing waste collection sites, designing equipment for odor mitigation, and for monitoring the respective performance.

On any waste management site, operators can now:

- Use the ODILE™ olfactometer to characterize the odors released by any specific operation (handling, processing and storage of old or new waste).
- Use the [TROPOS IMPACT©](#) software to simulate the dispersion of the odors in terms of present and expected weather conditions.
- Determine which sources have priority for odor control.

Choose the ideal time for each operation; or use applicable mitigation techniques to minimize the effect of odors on the surrounding area.

ODILE™ meets Québec, North-American and European reference standards:

- By-law 90 of the Urban Community of Montreal
- ASTM E679-91 and ASTM E544-75 in the USA
- European Standardization Committee : CEN TC264/WG2'ODOURS

## **Meets the International Standards**

a) ASTM E679-91 : Standard Practices for Determination of Odor Taste Thresholds by a Forced-choice Ascending Concentration Series Method of Limits.

b) ASTM E544-75 : Standard Practices for Referencing Suprathreshold Odor Intensity

c) CENTC264/WG2'ODOURS' : Odour concentration measurement by dynamic olfactometry, European Standardization Committee.(Dynamic olfactometer) 1994 Revision, Environmental Service,

d) CUM, Reference Method: Measuring the number of odor units, Air and Water Sanitation Branch, Urban Community of Montréal.

## **Design characteristics**

- Dilution range : 1 to 2 000 000 without pre-dilution;
- N-butanol generator: 5 to 75 000 ppb(v);
- Unlimited steps between dilution or butanol concentration;
- Flow of 20 l /min for each sniffing port;
- Full scale accuracy : 1%;
- Parallel evaluations of dilution numbers and relative n-butanol intensity;
- Equipment in contact with gases is corrosion resistant;
- Operates at 110 Volts or 220 Volts.

## **Inputs required**

- 110 Volts or 220 Volts;
- pressurized air at 5 atm for at least 400 l/min.

## **Reference standards**

- European Normalization Committee: CEN TC264/WG2'ODOURS'
- ASTM-E679-91 and ASTM-E544-75 (1993)
- MUC By-law 90

## **Warranty**

All the components of ODILE™ have a 12 months warranty from the date of installation.

## ODILE 1000 to 4100 and specifications

	1000	1500	2000	2010	2020	2500	2510	2520	3000	3010	3500	3510	4000	4100	
Number of jury members exposed simultaneously	1	1	6	6	6	6	6	6	6	6	6	6	6	6	
Minimum dilution	20	20	40	3	1	40	3	1	3	1	3	1	1	1	
Maximum dilution	50 000	50 000	2 000 000	2 000 000	2 000 000	2 000 000	2 000 000	2 000 000	2 000 000	2 000 000	2 000 000	2 000 000	2 000 000	2 000 000	
Step between dilutions	No limits	No limits	No limits	No limits	No limits	No limits	No limits	No limits	No limits	No limits	No limits	No limits	No limits	No limits	
Perception threshold	Triangular choice	Triangular choice	Triangular choice	Triangular choice	Triangular choice	Triangular choice	Triangular choice	Triangular choice	Triangular choice	Triangular choice	Triangular choice	Triangular choice	Triangular choice	Triangular choice	
Evaluation of the jury		Triangular 5 to 200 ppb n-butanol				Triangular 5 to 200 ppb n-butanol	Triangular 5 to 200 ppb n-butanol	Triangular 5 to 200 ppb n-butanol			Triangular 5 to 200 ppb n-butanol	Triangular 5 to 200 ppb n-butanol	Triangular 5 to 7,5 ppm n-butanol	Triangular 5 to 7,5 ppm n-butanol	
Hedonic character									11 qualities from -5 to +5	11 qualities from -5 to +5	11 qualities from -5 to +5	11 qualities from -5 to +5	11 qualities from -5 to +5	11 qualities from -5 to +5	
Intensity									11 intensities from 0 to 10	11 intensities from 0 to 10	11 intensities from 0 to 10	11 intensities from 0 to 10	11 intensities from 0 to 10	11 intensities from 0 to 10	
Comparison to n-Butanol													Odor: 1 to 2M dil Butanol: 5 ppb to 7,5 ppm	Odor: 1 to 2M dil Butanol: 5 ppb to 7,5 ppm	
Butanol source		certified cylinder				Certified cylinder	Certified cylinder	Certified cylinder			Certified cylinder	Certified cylinder	Saturator and cylinder	Saturator and cylinder	
Odor rose														11 discrete odors	
Accuracy	Less than 20% minimum relative error for any dilution or concentration.														
Stability	Average outlet flow fluctuation less than 5%														
Materials in contact with the odour	SS316 and Teflon														
Contamination	All models have internal purge between exposures and external purge after analysis. Dummy test can check the device and the jury.														
Cleaning	All models have an automatic thorough cleaning procedure.														
Quality of compressed air	90% déhumidified + 1 um filter.														
Compressed air consumption	60 l/min	60 l/min	410 l/min	410 l/min	410 l/min	410 l/min	410 l/min	410 l/min	410 l/min	410 l/min	410 l/min	410 l/min	410 l/min	425 l/min	425 l/min
Minimum pressure required	5 bar														
Power supply	110/220 VAC 50/60 Hz														
Power consumption	100 W	100 W	600 W	600 W	600 W	600 W	600 W	600 W	600 W	600 W	600 W	600 W	600 W	600 W	
Software	Complete analysis management software, generating the results and calculation reports. Its encompasses several standards (CEN, ASTM, CUM, ...) and data record with historica data base.														
Hardware configuration	Pentium II 500 Mhz. 500 Mb free space on hard disk. Two serial ports. Graphic resolution: 1024x768 and 16 colors. Operating system NT4 or W2000 or WindowsXP.														
Sniffing ports	One-panelist console	One-panelist console	Six-panelist desk	Six-panelist desk	Six-panelist desk	Six-panelist desk	Six-panelist desk	Six-panelist desk	Six-panelist desk	Six-panelist desk	Six-panelist desk	Six-panelist desk	Six-panelist desk	Six-panelist desk	
Number of sniffing ports	3	3	3 per station	3 per station	3 per station	3 per station	3 per station	3 per station	3 per station	3 per station	3 per station	3 per station	3 per station	3 per station	
Sniffing port type	50 mm outside diameter glass tube.														
Air speed at ports	0.2 m/s and 20 l/min														
Air temperature at ports	Ambient temperature +/- 3C														
Response panel	Language: French, English, Spanish, Portug														
Sample pressurisation	Certified-manufacture 250 l aluminium pressurized air chamber.														
Chamber operating pressure	1 bar														
Number of pressurised samples	One 80-liter bag. Optional: 3 80-liter bags available.														
Pressure control	manual	manual	manual	automatic	automatic	automatic	automatic	automatic	automatic	automatic	automatic	automatic	automatic	automatic	
Overpressure protection	2 safety valves														