Health and safety for the staff assigned to measurement and sampling

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The “Centro Olfattometrico Regionale” (below COR) of the “Agenzia Regionale per la Prevenzione e Protezione Ambientale del Veneto” (ARPAV) always does a risk analysis before performing a new investigation.

The COR executes a preliminary inspection on plant and comes required to the responsible if it has done a surveying on the occupational risks deriving from the exposure to chemical and biological agents relative to the own workers.

Data emission are also requested as obtained by self-performed controls, at least by the last twelve months.

The informations received by the company are compared with literature data in order to obtain the highest values for each substance.

The maximum values are compared with the existing limits of toxicity respectively derived from:

- Legislative Decree n. 626 of 19th sep, 1994 - Article 72-ter (D.Lgs. 626/94)
- ACGIH “Threshold limit values”;
- NIOSH “Pocket Guide to Chemical Hazards”.

If the maximum concentration value exceeds the limits of acute toxicity prescribed (D.Lgs. 626/94 – short term, IDLH – NIOSH), must be assessed the minimum number of dilutions to be made, so that the sample presented to the panel not constitutes a health risk.

As regards the health of the technician who executes the sampling, must evaluate, case by case, the use of specific personal protective equipment.

In any case, the panelists are informed about the risk assessment before the session of measurement.

1. Preliminary inspection

Like previewed from EN 13725 - Appendix J, the COR of ARPAV does always a preliminary inspection in order to estimate, between the other, the toxicity and the possible risk for the panelists about all the samples that will be taken. Indeed, the olfactometrical analysis that will follow will affect the air circulating inside the plant (1.1) and that is released into the atmosphere (1.2).

1.1 For the first argument, during the preliminary inspection, the responsible is asked if it has done a surveying on the occupational risks deriving from the exposure to chemical and biological agents relative to the own workers.

1.2 For the second argument, is requested the values of emissions of the plant, as obtained by self-performed controls, at least by the last twelve months.
1.3 For the wider issues, related to other possible sources of risk (fall, electric shock, etc.), the Italian law requires a statement on existing risks, under Article. 7, D.Lgs. 626/94.

All requests are then formalized in a report of inspection.

2. Data Processing

The informations received are reported in a spreadsheet, continually updated, which contains the concentration values obtained from previous investigations and other ones derived from the literature. The data are organized by type of plant, for example:

- Poultry farms,
- Landfill,
- Foundries,
- Plastics processing plants,
- Fertilizer production plants,
- Wastewater treatment plants,
- Waste treatment plants

For each compound, it is necessary to identify the most value between what declared by the company and what is already present in the database.

The maximum values of each substance are compared with the existing limits of toxicity respectively derived from:

- Legislative Decree n. 626 of 19th sep, 1994 - Article 72-ter (D.Lgs. 626/94)
- ACGIH - AIDII “Valori limite di soglia”.
- NIOSH “International Chemical Safety Cards”.

All the references define the occupational limits reported at the time of exposure. You must pay particular attention to:

2.1 Short term limit value: threshold value above which there must not be exposure and refers to a period of 15 minutes. It’s like the TLV-STEEL limit for ACGIH.

2.2 IDLH (Immediately Dangerous to Life or Health): refers to a concentration limit value which can occur instantly damage to human health. The current NIOSH definition (1987) is a situation “that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment.” It is also stated that the purpose of establishing an IDLH is to “ensure that the worker can escape from a given contaminated environment in the event of failure of the respiratory protection equipment.”.

2.3 TWA (Time Weighted Average): is the time-weighted average concentration for a working day (8 hours a day and 40 hours a week), on which nearly all workers may be exposed day after day without adverse effects

Part of this informations are derived from publications: it’s the case of “Valori limite di soglia” that, every year, the “Associazione Italiana Degli Igienisti Industriali” (AIDII) translates in Italian the corresponding publication of the “American Conference of Governmental Industrial Hygienists” (ACGIH).

The use of the italian version of the NIOSH “International Chemical Safety Cards” is more practical, as obtainable through the Internet connection “http://www.cdc.gov/niosh/ipcs/italian.html”, that produces the following information:
Schede Internazionali di Sicurezza Chimica

AMMONIACA (ANIDRA)  
ICSC: 0414

NH₃
Massa molecolare: 17.03  
(bombola)  
(cylinder)

D A T I F I S I C H E

STATO FISICO-ASPETTO:  
GAS COMpresso LIQUEFATo INCOLORE,  
CON ODORE FUGENTE.

PERICOLO FISICI:

Il gas a piu' leggero dell'aria.

PERICOLO CHEMIcI:

Compuesto sensibili agli ioni come ossidi di mercurio, argento e oro. La sostanza è una base forte, maggiore violentemente con acidi ed a corrosiva.  
Rigisco violentemente con forti ossidanti e alcalini.  
Attaccare rame, alluminio rosato e le loro leghe. Si scioglie in acqua producendo calore.

VIE DI ESPOSIZIONE:

La sostanza può essere assorbita nell'organismo per inalazione.

RISCHI PER INALAZIONE:

Causa una perdita, può essere raggiunta molto rapidamente una concentrazione dannosa di questo gas in aria.

EFFETTI DELL'ESPOSIZIONE A BREVE TERMINE:

La sostanza è corrosiva per gli occhi la cute e il tratto respiratorio. Inalazione di elevate concentrazioni può causare edema polmonare (vedi Note). Una rapida evaporazione del liquido può causare freddamento.

EFFETTI DELL'ESPOSIZIONE RIPETUTA O A LUNGO TERMINE:

La sostanza è molto tossica per gli organismi acquatici.

NOTE

I sintomi dell'edema polmonar espone non si manifestano prima di alcune ore e sono aggravati dalle sforzi fisici. Sono portant essenziali il riposo e l'osservazione medica. Si deve prevedere immediata somministrazione di un appropriate terapia insulata da parte di un medico o personale di luogo autorizzato. Capovolgere la bombola che dura nella parte superiore per prevenire fuoriuscita di gas  

Transport Emergency Card: TEC (R) - 2051105 or 20G2I7C  
Codice NFPA: H3, P1, R3
Using the link “http://www.cdc.gov/niosh/npg/” you log on to “NIOSH Pocket Guide to Chemical Hazards”, from which you extract more information:
[5] other values for the Exposure Limits, in particular IDLH;
[6] the conversion factor from ppm to mg/m³.

This search is performed for each of the identified compounds.

3. Risk assessment
You update a Table or build a new one, which is part of the document titled “Assessment of risks from exposure to toxic compounds in olfactometry”. This document is organized into chapters, one for each of the types of plant mentioned above.
The exceedances of Immediately Dangerous to Life or Health concentrations (IDLH - NIOSH) are highlighted. For these, there is more attention.
The exceedances of the reported exposure limits for the entire working life are also highlighted (TWA – NIOSH and TWA – ACGIH).
For all compounds identified are derived the "effects of short-term" on human health, from safety data sheets NIOSH.
### 2.4 Effetti degli inquinanti sulla salute umana

Vengono di seguito descritti i sintomi e i rischi connessi all’inalazione dei composti inquinanti evidenziati in Tabella 2.1 e in Tabella 2.2 (International Programme on Chemical Safety, 1999).

- **Ammoniaca**: senso di bruciore, tosse, affaticamento respiratorio, gola secca; è corrosiva nei confronti di occhi, pelle, e apparato respiratorio. I sintomi possono manifestarsi in tempi differenti. L’inalazione di ammoniaca ad elevate concentrazioni può causare edema polmonare.
- **Benzene**: mal di testa, nausea, affaticamento respiratorio, convulsioni, perdita di coscienza; è irritante per occhi, pelle, e apparato respiratorio. In concentrazioni elevate può causare perdita di coscienza e morte. L’esposizione prolungata o ripetuta può avere effetti sul sistema immunitario, e provocare una diminuzione delle cellule sanguigne. È una sostanza cancrogena.

You proceed with the evaluation of risks, stressing the aspects listed below:

3.1 are been considered the maximum concentration values found in the literature; some of these values represent specific situations that may occur in extreme conditions;

3.2 the concentration exceeding TWA values do not represent a danger to the panelists, because the olfactometric analysis provides they smell the odorous sample for a few seconds;

3.3 you must bear in mind that the samples are never presented to the panelists as such, but diluted from a minimum of 2.5 to a maximum of approx. 10⁻⁶ times;

3.4 If the maximum concentration value exceeds the limits of acute toxicity prescribed (D.Lgs. 626/94 – short term, IDLH – NIOSH), must be assessed the minimum number of dilutions to be made, so that the sample presented to the panel not constitutes a health risk.

As regards the health of the technician who executes the sampling, must evaluate, case by case, the use of specific personal protective equipment. In any case, the panelists are informed about the risk assessment before the session o’ measurement (EN 13725 - 8.6).

### 4. Conclusions

The proposed method has not certain the claims to be exhaustive. But, using a “dynamic approach” (the document is updated with each new investigation) and taking advantage of the availability of data from the web, is practical and accessible to anyone having the least knowledge that are required for the assessment of the toxicity of chemical compounds. In some cases, it has also been extended to the toxicity of biological pathogens.

### 5. References
