CHEMPYŁ DATABASE – a source of information on chemical risks in the working environment

Elżbieta DOBRZYŃSKA, Małgorzata POŚNIAK, Agnieszka WOŹNICA - Central Institute for Labour Protection – National Research Institute, Warsaw, Poland

Please cite as: CHEMIK 2012, **66,** 9, 998-1005

Introduction

In accordance with the 98/24/EC Directive [1] and the Regulation of the Minister of Health of 30 December 2004 (Journal of Laws 2005 No. 11 item 86) [2], an employer is obliged to determine whether the working environment contains a hazardous chemical agent and to carry out and document an assessment of the occupational risk posed by this agent. A literature review [3÷8] still shows a low awareness, especially in the case of small and medium enterprises, of risk assessment for chemical substances in working environment in Poland and other EU countries. The access to information on actual exposure to chemical substances at work, measurements taken and their results, or the adopted means of protection, is limited. In the majority of EU countries, including Poland, there are still workplaces where the occupational risk assessment has never been performed properly, and if it has taken place – it has never resulted in adopting any risk management measures. The risk assessment is usually a formal procedure, creating the false appearance of compliance with legal regulations applicable to the employer. There is still too much emphasis placed on the very risk assessment, perceived as the process of assigning a specific value to it, while ignoring the basic part of the whole process, i.e. defining the rules for risk protection [8]. Many experts emphasise the extremely low interrelation between the risk assessment, the prevention strategy adopted and the low level of assessments performed in enterprises.

The inspection of the Polish National Labour Inspectorate (PIP) performed in 2009 regarding the chemical risk [9] shows that in more than 2/3 of inspected entities the risk assessment regarding exposure to chemical substances is performed incorrectly, superficially and inadequately to the existing working conditions, whereas the technical and organisational steps taken to handle the chemical substances are not linked with the risk assessment. Similar conclusions are provided by the inspection conducted in 2010 and 2011 [4, 10], covering mainly the furniture industry and manufacturing laminate-based products. The basic problems include an improper identification of risks caused by chemical substances released and used in the working environment, in particular ignorance of or neglecting the hazards and regulations regarding these substances, mixtures or technological processes showing carcinogenic properties. The persons inspecting workplaces [4], apart from the incorrect scope of occupational risk assessment, frequently found that the risk assessments were based on outdated measurement resulst of harmful agents. Furthemore, the assessments lacked relevant harmful agents actually present in the working environment or included information regarding other working conditions. The reason for the annually repeating irregularities in the scope of chemicals was mainly the ignorance of valid legal regulations and the improper flow of information within the supply chain. According to labour inspectors [4], the lack of proper supervision over occupational safety and health (OSH) results from the low level of knowledge of hazards as well as the knowledge (including by OSH officers) of OSH rules and regulations valid at work with exposure to chemical substances and dust. The risk involving the agents harmful to human health, including risks at workplaces where explosive atmosphere can appear, is neglected by employers, supervisors and also the employees. Furthermore, the occupational risk assessment at workplaces is often carried out by external companies omitting on-site visits, not possessing the proper working condition recognition and not having the required knowledge of fire and explosion risks.

At the same time, employers most frequently complain about the lack of access to information, necessary to fully identify dangerous chemical substances occurring at workplaces, including carcinogens. The reported reasons for shortcomings include, among other things, lack of the possibility to take advantage of free specialty advisory services and technical support in the scope of chemical safety and unavailability of publications for the employers on the occupational safety and health requirements e.g. for persons handling dangerous chemicals, including the assessment of occupational risk while carrying out this kind of work [9]. The integration of this data, and other materials, by adopting a new approach to the supervision over chemicals took place just within the ChemPył knowledge base of chemical and dust risks, developed in the Department of Chemical, Aerosol and Biological Hazards of the Central Institute for Labour Protection – National Research Institute (CIOP-PIB). The ChemPył database will not only fill this gap, but also provide a proper practical support for potential users. Gathering in one place the data necessary to assess the occupational risk caused by chemical agents will stimulate the improvement of occupational safety and health.

Materials collected within the ChemPył knowledge base

According to the law of 27 July 2001 on database protection [11]: "the database signifies a set of data or any other materials and items collected by adopting a specific systematic approach or method, individually available in any way, including the electronic means requiring a considerable, in terms of quantity or quality, investment outlay to develop, verify or present its content". The ChemPył database, developed more than 10 years ago in the Central Institute for Labour Protection – National Research Institute (CIOP-PIB), has been converted into an information base regarding the chemical agents occurring in the working environment, their properties, occupational exposure limits and the measurement results for those agents at selected workplaces and processes in a specific industrial sector. Furthermore, the base contains most up-to-date regulations on hazardous chemical substances and dusts providing access to their full text and materials regarding both the exposure and risk assessment. Upgrading the existing database aimed at presenting data included therein in the more user-friendly form and making it easier for users to handle the information contained therein at any stage of treating a hazardous chemical substance and at every workplace – employee's, employer's or specialist's, dealing with assessing and limiting the occupational risk in the working environment. A schematic diagram of the upgraded ChemPył database is shown in the form of bookmarks in Figure 1.

The home page of the database is designed to introduce the user into its content, while providing clear, legible information on materials contained therein to make the navigation trouble-free.

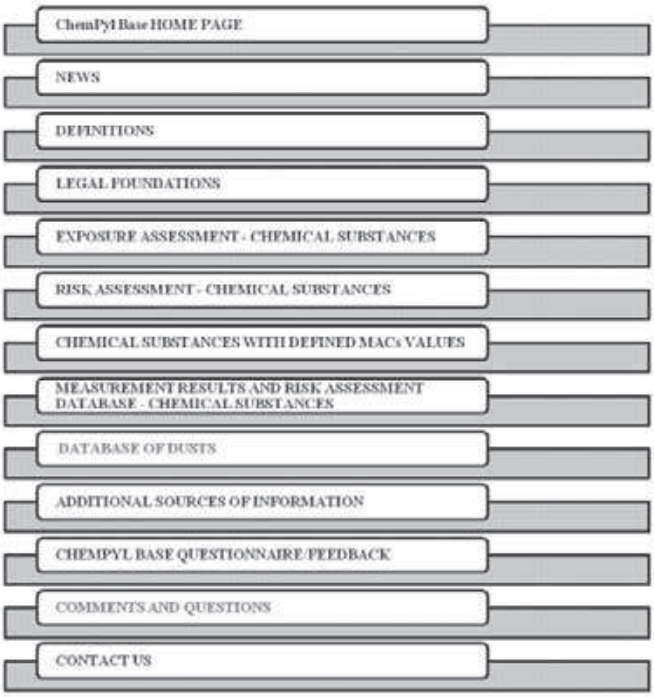

Fig. 1. Diagram showing the content of the upgraded ChemPył database

The "News" bookmark will contain information on new items and changes appearing within the website and on changes introduced in legislation, new directives, regulations and standards, newly developed methods for determining chemical agents in the working environment, and other new related items. Another bookmark includes the most important "definitions", describing legal requirements and other materials published on the database website. These definitions, to make the search easier, are arranged in alphabetical order and this is the form they are displayed (i.e. after choosing a letter) on the website. The definitions published in the ChemPył database have been updated in terms of content and supplemented by new data, and each definition presents its source, i.e. literature references.

The database also contains legally binding regulations on the occurrence/usage of chemical substances in the occupational environment. As shown by the National Sanitary Inspectorate (PIS) and the National Labour Inspectorate (PIP) reports regarding their activity [4, 10], one of the basic problems in 2010, and thus a reason for the irregularities regarding chemicals re-appearing every year was mainly the ignorance of the valid law. A serious problem here is also the ignorance of or neglecting the risks and regulations on carcinogenic substances, mixtures or technological processes. Frequently, as shows the analysis performed, the knowledge of the law is at a low level, especially in the case of small enterprises. Small and medium-sized enterprises do not always employ persons who can follow any changes in the law and respond to them flexibly. The employer does not keep up with, and in some situations does not even attempt to follow, the development and actual content of legislation. Therefore, the collection and systematic update of legal regulations in one place strictly regarding the occurrence and the use of chemical substances in working environment can make the process much easier for entrepreneurs. To facilitate the access to individual legal acts within the base, the section "Legal foundations" is divided into detailed regulations and EU Directives. The regulations are subdivided into detailed and work safety regulations for processes/professions/positions where hazardous substances occur. Each document is accompanied by a reference to information on respective documents (and consolidated texts), being in the majority available in the Internet Legal Act System on the Polish parliament website (http://isap.sejm.gov.pl/).

The process of occupational exposure resulting from a chemical substance is a multi-stage process, and this is the form it is presented in the ChemPył database (Fig. 2). It should be emphasised that the majority of employers in the enterprises inspected by the National Labour Inspectorate (PIP) find it difficult to consider the risks resulting from using hazardous chemical substances and mixtures [4, 8 ÷ 10]. The basic problem is the improper identification of the risk constituted by the chemical agents emitted or used in the working environment. The supervision performed by the National Sanitary Inspectorate over the occupational environment conditions has confirmed the continual tendency to typical irregularities, e.g.: lack of updated measurement results and the tests of harmful working environment factors, in particular chemical substances [4].

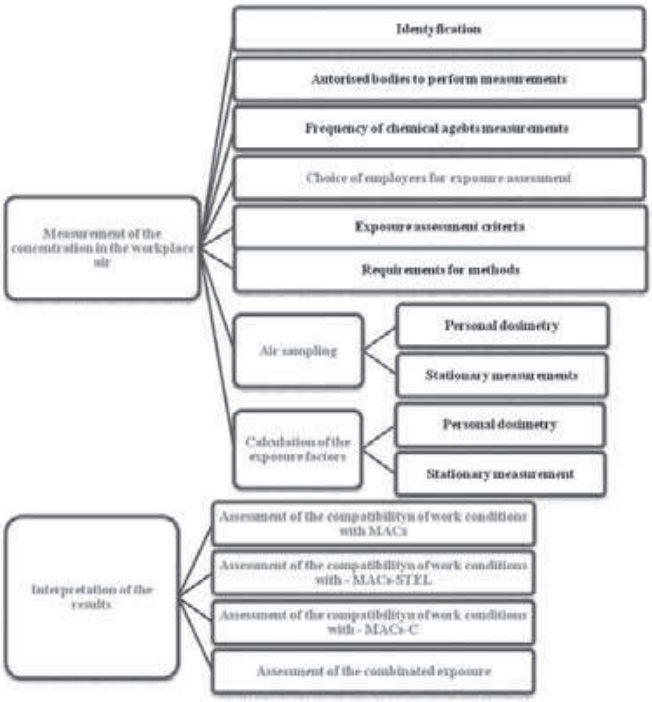

Fig. 2. Diagram showing the way of presenting information on the assessment of exposure to chemical substances in working environment in the ChemPył database

The material regarding the occupational exposure to dusts in the ChemPył base has been gathered to form a separate catalogue and it covers the following issues: identification of dusts found in the workplaces air, the rules for sampling, recommended standards and methods for measuring dust concentrations, information on the assessment of compliance with MAC values and combined exposure, and the measurement results including the workplace/process characteristics in selected technological processes.

The occupational risk assessment has been considered as the key and substantial start point for arranged risk identification and further improvement of occupationalsafety and health. A correct performance of the assessment and the implementation of necessary preventive measures is a basic pre-condition for maintaining high safety standards among employees. The National Labour Inspectorate [8÷10] reports show that companies most commonly do not identify all hazards, including the serious ones, e.g. the ones occurring while working in contact with chemical agents. There are many reservations raised about planning and taking corrective and preventive measures as a result of

assessing the occupational risk. The employers often do not consider the occupational risk assessment as a tool making it possible to fully identify the hazards and determine correct steps to avoid or reduce them. This is the reason why the database contains a section strictly devoted to these issues. The information on methods for assessing the risk including preventive measures are presented in the ChemPył Base as displayed in the schematic diagram (Fig. 3), showing the assignment of particular menu items to a master component. This information is preceded by a brief introduction into the assessment of risk arising from chemical agents.

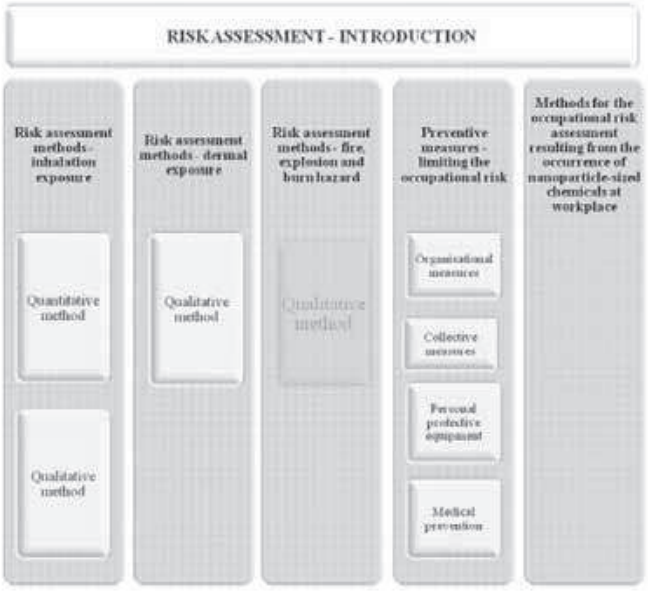

Fig. 3. Diagram showing the way of presenting information on risk assessment in the new knowledge base

Another item – an independent database – within the ChemPył base is a set of information on chemical substances that can occur in the working environment and that have determined values of maximum admissible concentrations (MACs). According to labour inspectors, one of the problems for the majority of companies inspected in 2010 [10] was their low level of knowledge on risks resulting from the exposure to chemical agents and dusts in working environment, including carcinogenic ones, and as a result, neglecting the risks, not only by employers, but also by supervisors and the very employees. Gathering in one site the information on chemical substances harmful to human health that can occur in working environment will make it much easier for the interested persons to obtain necessary knowledge, thus saving their time. The database of substances includes the names of chemical substances with determined hygienic standards, their synonyms, classification, and the information on first aid in case of poisoning by inhalation, swallowing, or skin or eye contact. The base contains also physical and chemical as well as toxicological properties for each chemical compound. Furthermore, for each substance is provided MACs value and the recommended methods for measuring them in the workplace air [14]. The material has been developed i.a. based on material safety data sheets (MSDSs) [13] as shown in the schematic diagram in Figure 4.

The knowledge on the actual scope of exposure to hazardous chemicals at workplace or the nature and the range of its health effects is very limited in the majority of the EU countries. Testing the actual exposure level considering the changes caused by economic and technological progress is important not only for legislators, but also for the employer who is focused on improving the work safety and hygiene at workplaces. Making available the transparent and comparable data regarding production, exposure and health effects for chemical substances in particular member countries, but also in the whole European Union, could make the process much easier. The integration and collecting information on exposure to chemical agents (including mainly the measurement results for chemicals in working environment) in one database can not only constitute a source of information on the range and consequences of exposure that can help to manage the chemical risk much better than this is the case at present, but also create an efficient tool for i.a. epidemiologic research. Therefore, the ChemPył database authors have extended its scope by a base of real cases/problems resulting from the occurrence of chemical and dust agents at selected workplaces to show the employer how to handle the problems in practice - from the moment of risk identification until using proper preventive measures. The base contains information on the tasks performed by the employee and their course during one shift, preventive measures applied, the identified substances used in the process, the results of measurements taken at a preselected workplace and the assessment of related occupational risk. On the basis of collected information a material to be published on the base has been prepared. It should be emphasised that the database of results will be gradually updated and extended by new industrial sectors, plants and processes by using the materials collected for research conducted in the Central Institute for Labour Protection – National Research Institute and measurements taken by work environment laboratories.

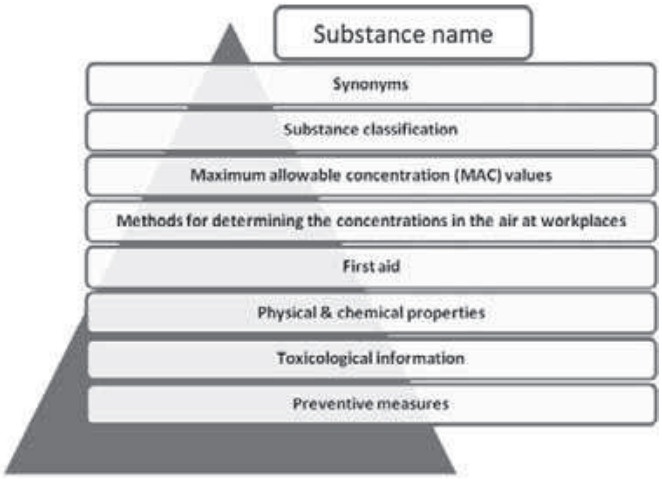

Fig. 4. Diagram for searching information on a selected chemical substance in the upgraded ChemPył database

The presented measurement results and assessments should not be treated as a ready risk assessment for each plant. This type of database containing exemplary results of chemical agent measurements and occupational risk assessment should make it easier for the employers and work safety managers to indentify the hazardous agents and to help in planning and taking measurements necessary to assess the exposure to chemical agents at workplace and perform the risk assessment. Any information published in the database is anonymous, making it impossible to identify the entity where the measurements were taken. A proposal of schematic diagram of access to the above-mentioned items of information is presented in Figure 5.

An important component of the database can be the examples for the so-called good practices published on the website. The good practice in occupational safety and health, according to the European Agency for Safety and Health at Work (OSHA-EU) in Bilbao [15], defines the steps to be taken to improve working conditions and to promote safety and health at work.

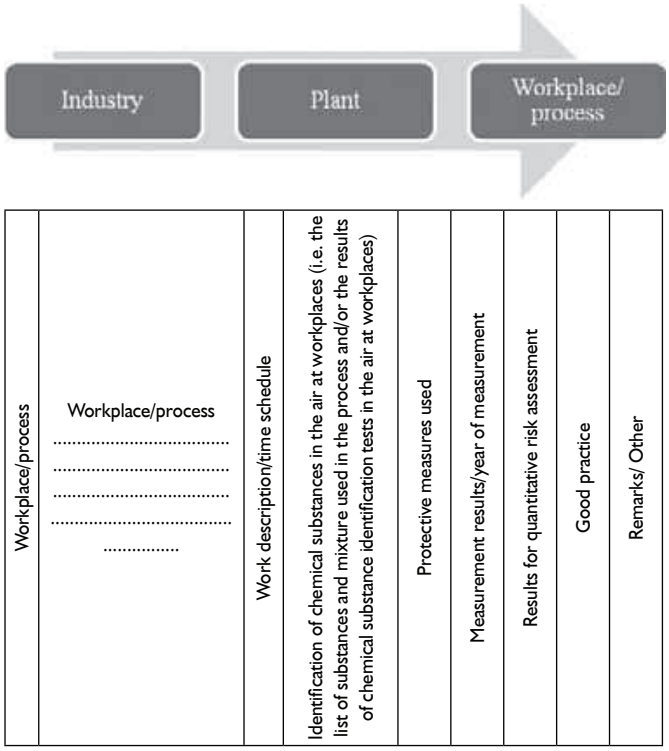

Fig. 5. Presenting the measurement results and the risk assessment at a specific workplace in a selected plant and selected industry sector

Another component of the ChemPył Database constitutes a set of links to websites available to users, where other, frequently more detailed information on a specific problem can be found. Its purpose is to help to find additional sources of information on performing the assessment of exposure and occupational risk posed by chemical agents at workplaces.

Furthermore, the Database website includes a questionnaire designed for the users to provide feedback on materials published and assess their usefulness. The questionnaire also allows the users to interfere in the published material and to improve it and upgrade at the stage of creating particular components. It is also planned to introduce the bookmark "Comments and answers to submitted questions", where questions regarding the assessment of exposure and chemical risk submitted by website users along with answers provided by CIOP-PIB experts will be published.

Summary

The information collected in the ChemPył database aims at helping website visitors to perform the assessment of occupational exposure and risk and to reduce or avoid the harmful effect of chemical and dust agents on employees' health. Any steps taken to upgrade and update the knowledge base aim at using it as a useful tool in everyday work, not only for the specialists dealing with the assessment of and reducing the occupational risk posed by chemical and dust agents but also for employers, employees and specialists managing the occupational safety and health in enterprises where exposure to these agents occurs. Practical examples, specific to a particular economic sector, presented in an employer-friendly way can constitute an important support to perform the occupational risk assessment. The authors of the ChemPył base aim at providing a complete source of information covering this scope.

The publication has been prepared as part of programme "Improving the safety and working conditions" co-financed in the years 2011-2013 for state services by the Ministry of Labour and Social Policy. The programme is coordinated by: Central Institute for Labour Protection – National Research Institute.

Literature

1. Dyrektywa 98/24/WE w sprawie bezpieczeństwa pracowników i ochrony zdrowia przed ryzykiem związanym z czynnikami chemicznymi w miejscu pracy.
2. Rozporządzenie Ministra Zdrowia z dnia 30 grudnia 2004 r. w sprawie bezpieczeństwa i higieny pracy związanej z występowaniem w miejscu pracy czynników chemicznych (Dz. U. 2005 nr 11 poz. 86).
3. Raport Ministerstwa Pracy i Polityki Społecznej (2007): *Ocena stanu bezpieczeństwa i higieny pracy w 2006 roku*, Warszawa.
4. Sprawozdanie „Działalność Państwowej Inspekcji Sanitarnej w 2010 roku w zakresie higieny pracy", PIS, czerwiec 2011.
5. Walters D.R. and Grodzki K. (2006): *Beyond Limits? Dealing with Chemical Risks at Work in Europe*, Amsterdam: Elsevier.
6. Walters D. R. (2002*): Working Safely in Small Enterprises in Europe,* ETUC, Brussels.
7. Rzepecki J. (2006): *Costs and benefits of implementing OSH management systems in enterprises*. Bezpieczeństwo Pracy - Nauka i Praktyka **12,** 2006.
8. Sprawozdanie Głównego Inspektora Pracy z działalności Państwowej Inspekcji Pracy w 2008 roku, Warszawa 2008.
9. Sprawozdanie Głównego Inspektora Pracy z działalności Państwowej Inspekcji Pracy w 2009 roku, Warszawa 2010.
10. Sprawozdanie Głównego Inspektora Pracy z działalności Państwowej Inspekcji Pracy w 2010 roku, Warszawa 2011.
11. Ustawa z dnia 27 lipca 2001 r. o ochronie baz danych (Dz.U. 2001 nr 128 poz. 1402).
12. M. Suchecka (2011): *Nowości w portalu www.ciop.pl.* Bezpieczeństwo Pracy 2011, **2,** 26-29.
13. Bazy danych do kart charakterystyk substancji niebezpiecznych, wersja 8.0 karty 1-645, CIOP-PIB, 2008.
14. *Czynniki szkodliwe w środowisku pracy. Wartości dopuszczalne 2010* - pod red. D. Augustyńskiej i M. Pośniak, wyd. CIOP-PIB, 2010.
15. Zarządzanie BHP, Dobre praktyki http://www.ciop.pl/22086.html

Elżbieta DOBRZYŃSKA – (M. Sc.) Assistant in the Department of Chemical, Aerosol and Biological Hazards in the Central Institute for Labour Protection – National Research Institute. Scientific interests: chromatographic techniques in the analysis of the work environment, the assessment of the risks associated with the presence of chemicals in the workplace.

Małgorzata POŚNIAK – (Ph.D.) Assistant Professor; she is a head of the Department of Chemical, Aerosol and Biological Hazards in the Central Institute for Labour Protection – National Research Institute. Scientific interests: analysis of chemical pollution in workplaces air and the assessment of occupational exposure and risk.

Agnieszka WOŹNICA – (Eng.) Technical-engineering staff-member in the Department of Chemical, Aerosol and Biological Hazards in the Central Institute for Labour Protection – National Research Institute.