

Some Challenges within a Branch of Study of Protective Properties of Barrier Materials in the Czech Armed Forces

Pavel OTŘÍŠAL^{1*} and Zdeněk MELICHAŘÍK²

¹LTC Dipl. Eng., NBC Defence Institute of the University of Defence Brno, Czech Republic

²Dipl. Eng., Faculty of Physical Culture, Palacký University Olomouc, Czech Republic

Introduction

Very often people speak to Chemical Weapons (CWs) and Chemical Warfare Agents (CWAs) misused in Syria in current time. Their employment in both military and non-military operations is always connected with questions concerning two basic areas, thus specialized forces' protection and their decontamination from the time of the First World War. From the military professionals—members of the Czech Armed Forces (CAF) Chemical Corps (CCs) point of view these questions are more detailed in relation to the problems of ensuring of high quality isolative protection of the whole body surface and on specification of the mutual relationship which can be characterized as the relation of protective material and its resistant characteristics defined with the breakthrough time. The question is: What is the state in the area of testing of protective properties of isolative protective materials used for CAF CCs specialists' isolative protection in current time?

Main Part

Although questions related to reaction on a created crisis concerning with CWAs usage in Syria are mentioned so specialists' protection against this phenomena is the item which is relatively well explored and relatively satisfactorily solved. That is primarily worked with an idea and perhaps with a fact that the CWAs amount is regulated in the World with the help of international agreements concerning their disarmament [1]. With the knowledge of the fact that arsenals of CWs exist in the World to this time so the probability of their mass military employment is with Alliance and Czech security documents assessed as minimal. Just from this presumption the attention of scientific and research workers has been focused on the research of barrier materials' resistance against a wide group of dangerous substances represented by so called Toxic Industrial Chemicals (TICs) [2,3].

Operational deployment of both NATO and European Union forces are nowadays possible practically wherever in the World, thus in countries where a level of the security of industrial infrastructure is very discussable at least from the qualitative and quantitative point of view [4]. These moments have become a principal challenge for development of the branch of specialists' protection in all types of military operations. In a relatively short period of time it has been necessary to overpass from chemical methods of testing and finding of resistance characteristics of isolative materials to methods based on a physical principle. Chemical methods are mainly characterized by their high non-universality, thus by their absolute inapplicability in relations to TICs [5-7]. Physical methods are vice versa very advantageous mainly from the reason of their wide efficiency from the point of their universality point of view. Gravimetric determination of CWAs and TICs concentration increase in the area behind the barrier is independent on chemical reactions which are typical just for a selective determination of concentration of permeated sulfur mustard gases – a typical representative of a group of CWAs. Furthermore, enlargement of a spectrum of tested chemicals and even applicability of modern testing methods is not only the military question but also the challenge for the Czech Republic Fire Rescue System's specialists. The most significant

and an absolute advantage is the possibility of performing of relatively easy recalculation of measured values on the values demanded in accordance with related norms, mainly with EN 6529 [8].

Physical methods it is possible to calibrate with the employment of classical procedures. During the calibrations of measurement sets' active parts relatively good results have been reached. These results are comparable with standard, generally used and introduced analytical methods [9]. With the fulfillment of the demand of the occasion of performance of sensor and measurement calibration concerning perspective methods some demands on maximal universality and possibility of results comparison in the World has been fulfilled. These approaches have been very positively evaluated in a framework of military and civil scientific community.

Relatively huge attention is always devoted even practical applications into the development of material engineering. In current time practical experimental works whose aim is finding of changes of isolative protective materials' breakthrough time are performed. Their main task is to find up the mutual relationship between multi applications of introduced decontamination mixtures on a surface of isolative protective garment within the CAF CCs. Organic solvents are their main components. Their destructive effects have been partially studied. Achieved results are not evaluated in a comprehensive way that is why there is no mention about them in this article.

Conclusion

Chances for development of the branch of specialists' protection are very many. This article has been focused on development of measurements concerning of CAF CCs specialists' isolative protection. It is possible to claim that the answer on the question mentioned above can be summarized into a very short statement of fact. It can be said that testing of protective properties of isolative materials used for specialists' protection is on its rise and I am convinced that in the future it brings the big number of very interesting and exercisable results not only for development of current isolative garments but also mainly for testing of perspective materials which are on the market at this time.

To be complete it is necessary to remind that the problems introduced in this article are only a partial area of interest from the whole spectrum of measurements falling into a category of Chemical,

*Corresponding author: Pavel OTŘÍŠAL, LTC Dipl. Eng., NBC Defence Institute of the University of Defence Brno, Czech Republic, E-mail: Pavel.Otrisal@seznam.cz

Received October 21, 2013; Accepted October 21, 2013; Published November 25, 2013

Citation: OTŘÍŠAL P, MELICHAŘÍK Z (2013) Some Challenges within a Branch of Study of Protective Properties of Barrier Materials in the Czech Armed Forces. J Def Manag 4: e123. doi:10.4172/2167-0374.1000e123

Copyright: © 2013 OTŘÍŠAL P, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Biological, Radiological and Nuclear Defence. About other challenges before which scientific and pedagogical community stand are going to be dealt in some of next editorials.

References

1. Štěpánek B, Otrisal P (2012) The Key Aspects of the Czech Republic Army Foreign Missions Effectiveness Increasing. In Proceedings of International Conference Tantamount in Diversity.
2. Otrisal P, Stanislav F (2012) Possibilities of the QCM Method Employment to Determination of Toxic Compound Concentration in Dependence of Barrier Materials Resistance. *Military Medical Science Letters* 81: 113-118.
3. Otrisal P, Stanislav F (2012) Resistance of IIR Barrier Materials against Selected Chlorinated Hydrocarbons. *AIMT: Advances in Military Technology* 7: 17-22.
4. Otrisal P, Stanislav F (2010) Globalization and its Impact on Individual Protective Equipment Development.
5. Otrisal P, Stanislav F (2011) Quartz Crystal Microbalance Detection Usage for Study of Permeation of Hydrocarbons in a Homological Line. *AIMT: Advances in Military Technology* 6: 21-32.
6. Stanislav F, Otrisal P, Vladimír O (2009) Possibilities of usage a piezoelectric detector to measure the breakthrough time of protective materials. Meeting the future challenges. *Defence Forces Technical Research Centre* 239-243.
7. Stanislav F, Otrisal P (2010) QCM Detection – the useful method for quick finding of relevant information concerning barrier protective materials of protective suits for unknown liquid TICs. In Conference Proceedings CBRNE Aspects in Defence against Terrorism Conference - Memorial Volume.
8. Otrisal P, Stanislav F (2012) Resistance of the Isolative Protective Garment Designated for Specialists Protection Against Selected Chlorinated Hydrocarbons. *Military Medical Science Letters*. 82: 25-26.
9. Stanislav F, Otrisal P (2012) Calibration Extension for Permeation Cell of PIEZOTEST Device. *AIMT: Advances in Military Technology* 7: 33-40.