

# Determination of Classes of Working Conditions of the Main Professional Groups of Workers in the Production of Synthetic Detergents

Shakhnoza Kurbanova<sup>1,\*</sup>, Nargiz Samigova<sup>1</sup>, Guzal Sherkuzieva<sup>1</sup>,  
Hosiyat Sadullayeva<sup>1</sup>, Dinora Khashirbaeva<sup>2</sup>

<sup>1</sup>Associate Professor at Tashkent Medical Academy, Republic of Uzbekistan

<sup>2</sup>Associate Professor at Tashkent Pharmaceutical Institute, Republic of Uzbekistan

**Abstract** The production of synthetic detergents remains a hygienic problem as the data on professional allergic pathology in workers. Considering the issue of health protection in connection with the production of powdery synthetic detergents it should be noted that the enterprises of synthetic detergents are permanent sources of man-caused pollution of the environment and first of all of the atmospheric air, the dust of detergent powder. The purpose of our research was to study the technological process and identify harmful and hazardous production factors in the production of synthetic detergents JSC "Asian Diamond Classic".

**Keywords** Hygiene, Labor protection, Production of synthetic detergents, Technological process, Working conditions, Professional groups of workers, Harmful factors, Labor severity, Labor process tension

## 1. Relevance

Synthetic detergents (SD) occupy the main share among household chemistry preparations. They have received wide application in the manufacture and a life. SD have a harsh detergent effect in both soft and hard water, they do not react with calcium and magnesium contained in hard water and do not form insoluble salts with them. SD can be used in mildly alkaline, neutral and acidic environments. Some of them have disinfectant properties. Solutions SD have a maximum effect at low temperatures. It allows to apply them at the washing of fabrics from silk, wool and chemical fibres. This advantage of SD is significant in conditions where boiling or using high temperature solutions is difficult. When used, for example, washing machines, machine washing of dishes in the catering system, washing equipment on dairy farms, in transport, etc.

Synthetic detergents include surfactants (alkyl sulphates, alkyl sulphonates, alkyl aryl sulphonates, etc.) and various chemical additives that give them specific properties: improving foam formation (alkyl alcoholamide) softness: tissues that remove static charges from them (NB wetting

agent, quaternary-substituted ammonium salt); preventing deposition of removed impurities on the tissue (carboxymethylcellulose (CMT)), increasing the washing power of surfactants (sodium tripolyphosphate and other phosphates), softening water (soda ash, tripolyphosphate). Trisodium phosphate, soda bicarbonate, etc.), which give the washing solution a pleasant odour, bleaching agents (sodium perborate or optical bleaching agents). For example, sodium silicate has an effect on the ability to retain impurities in hard water when added; CMT and reduces the process of metal corrosion. Sodium sulfate has a positive effect on non-ionic polyglycol esters. The addition of carbonates and silicates to detergents increases the suspension and stabilization of emulsions, as well as the pH of the solution.

Thus, the purpose of the study was to determine the classes of working conditions of the main professional groups of workers in the production of synthetic detergents.

## 2. Research Materials and Methods

Assessment of the severity and intensity of the working process was carried out according to Sanitary Rules and Regulations of Republic of Uzbekistan 0141-03 "Hygienic classification of working conditions by indicators of hazard factors of the working environment, severity and intensity of the working process", as well as "Methodological recommendations for assessing the intensity of the working process in the process of certification of jobs" at the

\* Corresponding author:

nargizsam@rambler.ru (Shakhnoza Kurbanova)

Published online at <http://journal.sapub.org/ajmms>

Copyright © 2020 The Author(s). Published by Scientific & Academic Publishing

This work is licensed under the Creative Commons Attribution International

License (CC BY). <http://creativecommons.org/licenses/by/4.0/>

production "ASIAN DIAMOND CLASSIC".

### 3. Discussion of Research Results

The main type of raw materials for the production of SDs are surface active substances (SAS), they are obtained from products of oil refining. Surfactants are polar compounds consisting of hydrophobic (contributing to the distribution of molecules in oils) and hydrophilic (causing the distribution of molecules in water) groups of molecules. The hydrophilic group includes carbonyl (CCO-), sulfate (-OSO<sub>3</sub>), sulfonate (SO<sub>3</sub>-) group, as well as accumulation of hydrophilic residues with groups - CH<sub>2</sub>-CH<sub>2</sub>-O-CH<sub>2</sub>-CH<sub>2</sub> - or groups containing nitrogen.

Synthetic surfactants are divided into anionic, cationic, amphoteric (ampholite) non-ionic, depending on their properties when dissolved in water and, accordingly, on the charge of the ion formed in solutions.

The technological process of production of synthetic detergents consists of the following successive stages: preparation of raw materials; preparation of the mixture; packing, marking and packaging of the finished product.

Preparation of raw materials: all raw materials before use in production should be analyzed for compliance with the requirements of current regulatory documents and quality certificates. The results of the analyses are used to assess the quality of the raw materials and are the initial data for calculating the quantity of each component in the preparation of the mixture according to the recipe. Components are pre-weighed on a technical scale and delivered to the workshop from the raw material warehouse with a forklift truck in the quantities required for a shift output. At the stage of mixture preparation, the calculated quantity of raw materials according to the recipe is loaded into the mixer in the following sequence: abrasive, surfactant, sodium tripolyphosphate, soda ash, disinfectant, dye, perfume fragrance and stirred for 30 minutes, then a sample is taken for analysis. The content of the mixer is released into the hopper of the finished product, sifted through a sieve mounted on the hopper, then delivered to the workshop for packaging in polymer containers.

Packaging of raw materials: the product is packed in polymeric packaging weighing 400 gr., 500 gr. by means of scales. Each individual polymer packaging label is attached to the appropriate range.

Polymeric packaging with the product is placed in a corrugated box, each package is placed in a group label indicating the name, date of manufacture, product properties and recommendations for use. The boxes are delivered to the finished product warehouse. Primary professions in the production of synthetic detergents shift supervisor, senior operator, blending operator, packaging operator, seamstress operator.

Head of shift work mode is single-shift, the working day is 7 hours, work category - 1 "B".

The shift manager oversees the overall production process. He supervises the working staff, controls the proper use of

the commodity material values, raw materials and packaging. Timekeeping observations have shown that 80% of working time is spent on basic work.

In the process of work, the content of which in the air of the working zone does not exceed MPC is exposed to chemical factors. Noise levels exceed the permissible values. Microclimate parameters correspond to normative values. Artificial lighting corresponds to normative values. Labor hardness by physical and static loads does not exceed allowable values, except for movement in space caused by technological process. The work intensity is characterized by the content and nature of the work to be performed, the perception of signals, the degree of complexity of the task, the degree of responsibility and significance of the error, the degree of risk for the safety of others. Working conditions of the given workplace are classified as class 3 of the degree of hazard and danger at work.

The operating mode of the senior operator is single-shift, the working day is 7 hours. Work category - 1 "B". The senior operator carries out general control of the production process at the cleaning agents production site. Manages the working staff at the cleaning agents production site. Supervises the consumption of raw materials and supplies. Timekeeping observations have shown that employment in the main work is 80% of working time. In the process of work is exposed to chemical factors whose content in the air of the working zone exceeds MPC. Noise levels do not exceed the permissible values. Microclimate parameters correspond to normative values. Artificial lighting corresponds to normative values. Work hardness corresponds to normative values. The work intensity is characterised by the content and nature of the work to be carried out, the perception of signals, the degree of complexity of the task, the duration of concentrated observation up to 75% of working time, the number of production facilities for simultaneous observation, the degree of responsibility and significance of the error, the degree of risk to one's own life and the safety of others. The working conditions of the given workplace belong to class 3 of the degree of hazard and harm at work.

Dosing operator - single-shift operation mode, working day is 7 hours. Operating category - 1 "B".

The technological process at the operator of dosing makes dosing of cleaners in 400 g. vials, after which, passes these vials to the packaging operator. Chronometric observations have shown that the employment of the main job is 80% of the working time. In the process of work is exposed to chemical factors whose content in the air of the working zone exceeds MPC. Noise levels do not exceed the permissible values. Microclimate parameters correspond to normative values. Artificial lighting corresponds to normative values. Labor hardness by physical and static loads does not exceed allowable values, except for movement in space caused by the technological process. Work intensity is characterized by the content and nature of the work performed, the degree of complexity of the task, the duration of concentrated observation up to 75% of working time, the number of

production facilities of simultaneous observation, the degree of responsibility and significance of error, the degree of risk to one's life monotony of loads. The working conditions of the given workplace belong to class 3 of the degree of hazard and harm at work.

The compositional mixing operator is a single-shift operation mode, the working day is 7 hours. Category of work - II "B".

Technological process - Prepares the raw material for dosing, after that it is put into the preparation reactor. Timekeeping observations showed that employment with the main work is 80% of the working time. In the process of work, the content of which in the air of the working zone exceeds MPC is exposed to chemical factors. Noise levels do not exceed admissible values. Microclimate parameters correspond to normative values. Artificial lighting corresponds to normative values.

Work hardness is caused by physical dynamic load, the weight of lifted and moved cargo by hand, stereotypical working movements, statistical load, periodically inconvenient, fixed up to 50% of working time, the inclination of the hull more than 100 per shift.

The intensity of work is characterized by the content and nature of the work to be performed, the degree of complexity of the task, the duration of concentrated observation up to 75% of working time, the number of production facilities for simultaneous observation, the degree of responsibility and significance of the error, and the degree of risk to one's own life. Working conditions at this workplace are classified as class 3 of the degree of harm and danger at work.

Packaging operator - single-shift operation mode, working day is 7 hours. Operating category - I "B".

Technological process - Does packing of 400 g. bottles of corrugated box, then makes their sealing by means of adhesive tape. After packing, it transfers the packed boxes to the warehouse. Timekeeping observations have shown that employment in the main job is 80% of working time. In the process of work is exposed to chemical factors, the content of which in the air of the working area does not exceed MPC. Noise levels do not exceed the permissible values. Microclimate parameters correspond to normative parameters. Artificial lighting corresponds to normative values. Labor hardness by physical and static loads does not exceed the allowable values, except for the working occasionally uncomfortable "standing" up to 80% of the working time, the inclination of the housing is more than 100 per shift.

Labor intensity is characterized by the duration of observation concentration up to 65 percent of working time, the degree of responsibility; and the significance of error, monotonicity of loads. Working conditions of the given workplace belong to class 3 of class 2 of the degree of harmfulness and danger of work.

Operator seamstress mode is single-shift, working day is 7 hours. Work category - I "B".

Technological process - gets polypropylene bags with finished products for firmware. After piercing, passes the

bags with finished products to the pallet stackers. Timekeeping observations have shown that 80% of the working time is spent on basic work. In the process of work is exposed to chemical factors, the content of which in the air of the working zone does not exceed MPC. Noise levels do not exceed the permissible values. Microclimate parameters correspond to normative parameters. Artificial lighting corresponds to normative values. Work hardness is characterized by the static load with the participation of body and leg muscles, periodically uncomfortable, fixed working posture up to 50% of working time, body inclinations over 100 per shift. Work intensity is characterized by the content of work performed, the degree of complexity of the task, the duration of concentrated observation up to 75% of working time, the degree of responsibility and significance of error, the degree of risk to one's own life, the monotony of loads. The working conditions of a given workstation are classified as class 3, hazard class 2.

## 4. Conclusions

Thus, working conditions of the main profession working in the production of synthetic detergents according to Sanitary Rules and Regulations of Republic of Uzbekistan 0141-03 "Hygienic classification of working conditions by indicators of the hazard of the production environment factors, the severity and intensity of the work process", belong to "harmful" 3rd class 2-3 degree.

---

## REFERENCES

- [1] Voloshenko O.I. Surface-active substances in the environment and human health (in Russian) / O.I. Voloshenko, I.V. Wise // Hygiene and sanitation. - 1988. - №11. - pp. 58-61.
- [2] Evtushenko G.Yu. Structure of working conditions at the workplaces which give the right for benefits and compensations according to the lists №№ 1,2 / G.Yu. Evtushenko // Medicine of labor and industrial ecology. - 1994. - №8. - pp. 32-35.
- [3] Izmerov N.F. Estimation of professional risk in labor medicine: principles, methods and criteria / N.F. Izmerov, E.I. Denisov // Bulletin of the Russian Academy of Medical Sciences. - 2004. - №2. - pp. 17-21.
- [4] Kalashnikov A.A. Working conditions and health condition of workers in production of synthetic detergents / A.A. Kalashnikov, Yu.N. Talakin, M.3. Nizharadze et al. (in Russian) // Labour hygiene and occupational diseases. - 1986. - №5. - pp. 50-51.
- [5] Kalashnikov A.A. Problems of labour hygiene in production of synthetic detergents (literature review) / A.A. Kalashnikov // Labour hygiene and occupational diseases. -1988. - №10. - pp. 37-39.
- [6] Kosarev V.V. Diagnostics of the industrial aerosol inhalation influence (in Russian) / V.V. Kosarev, A.V. Zhestkov, Yu.S.

- Lebedin // Pulnonologiya. - 2003. - №1. - pp. 21-24.
- [7] Mudriy I.V. Ecological and hygienic value of detergents at occurrence of emergency situations of chemical origin (review) / I.V. Wise // Hygiene and sanitation. - 2004. - №4. - pp. 18-21.
- [8] Abramzon A.A. Surface-active substances and detergents. - M., 1993. - p.270.
- [9] Voloshenko O.I. et al. Hygienic value of surfactants // Coll. of scientific works. Hygiene of the populated areas. - Kiev: Zdorovie, 1991. - Issue 30. - pp. 111-114.
- [10] Gubernskiy Yu.D. Actual issues of hygiene of the living environment // Hygienic science and practice at the turn of the XXI century. - M., 2001. - Volume 1. - pp.403-407.
- [11] Sidorin G.I., Frolova A.D., Lukovnikova L.V. and others. Experimental researches of influence of some components of the household chemistry preparations on an organism (in Russian) // Labor medicine and industrial ecology. - 1998. - №11. - pp.9-12.
- [12] Sidorin G.I., Frolova A.D., Lukovnikova L.V. and others. Modern synthetic detergents toxicity and danger // Toxicological and hygienic aspects of environment protection and population health. - Voronej, 1999. - pp.43-45.