We have obtained regression equations describing the process of reformate extraction:

1) $y = 0{,}0008x^2 - 0{,}0027x + 81{,}061$ $R^2 = 1$ (1)
2) $y = 0{,}0579x^3 - 1{,}1657x^2 + 1{,}5219x + 95{,}86$ $R^2 = 0{,}9989$ (2)
3) $y = -0{,}4262x^2 + 5{,}3547x + 82{,}564$ $R^2 = 0{,}9979$ (3)

$$R_{cp} = \frac{\sum R_n}{n} = \frac{1+0{,}9989+0{,}9979}{3} = 0{,}9989 \quad (4)$$

The coefficient of correlation between the degree of extraction of aromatic hydrocarbons and their content in the extract is equal to 0.9989, which means that there is a close connection between the selected optimization parameters.

In accordance with the obtained regression equation, conditions for the extraction of aromatic hydrocarbons from reformate have been selected:

1) solvent temperature 138-140 ° C;
2) the water content in the solvent, 4% wt .;
3) the weight ratio of solvent to feed - 6: 1

The degree of extraction of aromatic hydrocarbons in these conditions is more than 90% by weight to feed, which is 30% more than the actual performance at the operating enterprise JSC "Naftan" at lower multiplicity of solvent to raw materials and process temperature.

Conclusion: statistical model, which allows increasing the degree of extraction of aromatic hydrocarbons from reformate and significantly reduces energy costs of the process, has been proposed and validated.

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## MOTIVATIONAL INFLUENCE ON PROFESSIONAL WORK IN HAZARDOUS WORKING CONDITIONS – AN INDICATOR OF SAFETY CULTURE

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*The results of the analysis of motivational influences attracting workers in hazardous occupations and influencing the formation of safety culture are presented.*

It is well known that one of the most effective ways to achieve life safety is the development and formation of personal safety culture through the educational process. However, at the present stage of social development in the formation of spontaneous search system of youth values, orienting professional choice of young people, there is a problem of inefficiency of the Institute of Education. Consequently, it results in the emergence of personal dissatisfaction in the course of work in the area of specialization, which is reflected in the outcome of labor and the security level generated by the process.

In addition, the problem of formation of valuable attitude to health at work is being exacerbated. In Belarus, about 30% of the total number of workers are forced to work in harsh environments, including chemical and petrochemical industry - 53%, ferrous metallurgy - 51%, electricity - 49%, forestry - 47%, textiles - 43% [ 1, p.17]. Poor working conditions are the cause of the high level of temporary disability of employees. Workers, engaged in work in harmful and (or) dangerous working conditions, are entitled to a retirement pension for work in special working conditions, salaries at a higher rate, free provision of therapeutic and preventive nutrition, milk or equivalent foodstuffs, paid breaks on working conditions, shorter working hours, additional leave and other compensations. Not surprisingly, the current system of compensation for work in harmful and (or) dangerous conditions stimulates the excessive length of work in such conditions and disregard of the principle of the protection of employees' time, which exacerbates the problem of preserving and strengthening the health of workers.

Researches on labor based on the choice of profession and place of work in particular are numerous, but the narrow perspective of employment in hazardous conditions is covered insufficiently or analyzed in the mass of workers.

The relevance of this study is determined by the need to perform the analysis of formation of culture of health and safety and the identification of motivational influences that attract and retain workers in hazardous industries.

The research of motives of employment in jobs in unfavorable working conditions was carried out by surveying the workers of the Belarusian refineries and the subsequent statistical processing of the questionnaires. The representative group consisted of working men whose professional activity is directly related to the influence of harmful factors (chemicals, noise pollution, the severity of the factor intensity of labor and neuro-emotional stress). The sample population consisted of 100 people. The largest group of workers among the respondents is made up of workers aged 30-49 - 43% and up to 29 years - 40% of workers. Workers aged 50-59 account for 12%. The smallest group (5%) among the respondents is made up of workers over 60. 5% of people have secondary education; 61% have specialized secondary education; 4% have incomplete higher education; 30% of respondents have higher education. 87% of employees among the respondents work on the categories of benefits provided by List № 1 (67%) and List № 2 (20% of respondents). 13% of employees work on a common basis but have additional payments for harmful working conditions, longer leave and others. 58% of respondents developed special seniority, length of service in harmful conditions up to 10 years. 11% of employees have professional experience of 11 to 15 years. 31% of workers have been working in hazardous conditions for more than 15 years.

Analysis of motivational influences of employment in harmful, dangerous and difficult jobs, according to the survey of employees at the refinery (respondents could indicate up to three motives), made possible the ranking of motives and incentives attracting and retaining workers in hazardous industries in order of importance:

1. Work in the area of specialization (20.3% of responses);
2. The possibility to retire on a hazard pension (13.4% of responses);
3. High salary (12.6% of responses);
4. Someone must do this job (8.1% of the total number of responses);
5. Much longer leave (6.9% of responses);
6. High category, opportunities for professional growth (6.9% of responses);
7. Shortened working hours (5.7% of responses);
8. The provision of good places for children - kindergarten, summer camps (5.7% of responses);
9. The opportunity to obtain housing (4,5% of total answers);
10. The provision of vouchers to sanatoriums, rest homes (4.5% of the total number of responses);
11. The proximity to the place of residence (3.3% of the total number of responses);
12. Good social conditions at work (2% of the total number of responses);
13. No matter where to work (2% of the total number of responses).

It should be noted that early retirement on hazard is one of the most significant motives on average for the entire sample, as well as and for each age group. However, the older the worker, the higher the value of this factor compared to the others. In the age group up to 29 this factor was noted by 15% of respondents, and in the older age group above 50 - by 47%. Extra long leave is more significant for the average working age group of 30-49 years (18.6%). For young and old employees the importance of this factor is relatively less important (15% and 17.6%, respectively). In the moral aspect the significance of the material component of the transition from the current system of benefits for working in adverse conditions cannot be compared with the loss of a person's health. Therefore, in the learning process in educational institutions it is necessary to focus on the formation of valuable attitude to health of all subjects of the pedagogical process.

The value of such factors as high salary is about the same (25-28%) for age groups older than 30 years and in the hierarchy of motivational influences is in third place. The exception is a group under the age of 29: this alternative was indicated by 37.5% of this group. In this age group the priority motives are the opportunity for professional growth and high category (25% of respondents). Good social conditions in the workplace do not affect the choice of place of work, as it was mentioned by 5% of respondents only.

Column «Other» was chosen only by 4.1% of total responses. The respondents offered the following factors: a good team and superiors; graduate placement; in the 1970-80s, they did not mind shift work; lack of choice, alternative work in the city with well-developed oil processing facilities.

For workers with higher education early retirement and professional growth (36.7% and 30%, respectively) are more important than for those with specialized secondary education (32.8% and 13.1%, respectively). For those with higher, incomplete higher and specialized secondary education the opportunity to work in the area of specialization (50%) and high salary (more than 30%) are equally important.

The first place in the hierarchy of motives belongs to work in the area of specialization. Therefore, special attention should be given to professional selection of the company and improvement of teaching work in

educational institutions, namely, the assimilation of knowledge about hazardous factors of the main types of future professional activity, conditions of career choices for safety and health. In addition, the development of skills to relate individual characteristics with the requirements of professions to comply with health and safety should be considered. The future employee must clearly understand the nature of performed work in the chosen industry, the presence of harmful and dangerous production factors, the possibility of accidents, the frequency of accidents and occupational diseases, and as a result, the culture of health and safety will become the necessary imperative, personally meaningful characteristic for specialists.

After the analysis of motivational influences of employment in hazardous conditions, it was found that the benefits, estimated as socially protecting employees (early retirement, extended leave, additional payments for harmful working conditions) do not carry out their mission, and often reproduce employment in hazardous working conditions. This fact clearly allows to identify the existence of the deficit of safety culture, the lack of value orientations and valuable attitude to health, which requires the development of new pedagogical approaches and mechanisms for creating health and safety culture, acquiring and developing health-motivation of workers employed in hazardous occupations.

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## THE ANALYSIS OF SIMULTANEOUS SOLUBILITY OF NAPHTHALENE IN ALCOHOLS AND HYDROCARBONS

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*The present study considers simultaneous solubility of naphthalene in alcohols and hydrocarbons , together with critically selected literature data. The prediction of simultaneous solubilities of naphthalene in alcohols and hydrocarbons is of great importance in refineries and petrochemical plants in the design, control and optimization of products and processes.*

Naphthalene is produced commercially from either coal tar or petroleum. Naphthalene has long been produced by the destructive distillation of high-temperature coal tars, called carbonization or coking. Coal tar was the traditional source of naphthalene until the late 1950s when it was in short supply, and the generation of naphthalene from petroleum by dealkylation of aromatics-rich fractions from reforming and catalytic cracking became commercially viable. In 1960, the first petroleum–naphthalene plant was brought on stream in the USA and, by the late 1960s, petroleum-derived naphthalene accounted for over 40% of total US naphthalene production. The availability of large quantities of ortho-xylene during the 1970s undercut the position of naphthalene as the prime raw material for phthalic anhydride. In 1971, 45% of phthalic anhydride capacity in the USA was based on naphthalene, as compared with only 29% in 1979 and 17% in 1990. The last dehydroalkylation plant for petroleum naphthalene was shut down late in 1991 [1]. World production of naphthalene in 1987 was around one million tonnes; about onefourth came from western Europe (210 thousand tonnes), one-fifth each from Japan (175 thousand tonnes) and eastern Europe (180 thousand tonnes) and one-eighth from the USA (107 thousand tonnes). In 2000, over 90% of naphthalene in the USA was produced from coal tar; most naphthalene in western Europe was produced from coal tar; and all naphthalene produced in Japan was from coal tar [2]. The main use for naphthalene worldwide is the production of phthalic anhydride by vapour-phase catalytic oxidation, particularly in Japan and the USA, where this accounted for 73% and 60% of naphthalene demand, respectively, in 1999. Phthalic anhydride is used as an intermediate for polyvinyl chloride plasticizers, such as di (2-ethylhexyl) phthalate. Naphthalene is also used in the manufacture of a wide variety of intermediates for the dye industry; in the manufacture of synthetic resins, celluloid, lampblack and smokeless powder; and in the manufacture of hydronaphthalenes (Tetralin (tetrahydronaphthalene), Decalin (decahydronaphthalene)) which are used as solvents, in lubricants and in motor fuels [1-3]. Naphthalene sulfonates represent a growing outlet for naphthalene. The products are used as wetting agents and dispersants in paints and coatings and in a variety of pesticides and cleaner formulations. Naphthalene is also a starting material for the manufacture of 1-naphthyl-N-methylcarbamate (carbaryl), an insecticide, and several other organic compounds and intermediates [1-2]. The use of naphthalene as a moth-repellent and insecticide is