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HOUSEHOLD CHEMICALS AS POSSIBLE CAUSES OF POISONING AND ENVIRONMENTAL POLLUTION

ABSTRACT: Nowadays, in order to maintain cleanliness in our houses, as well as to maintain personal hygiene, numerous chemical agents are used every day. Dishwashing detergents are used the most, followed by laundry detergents, various soaps and hair shampoos, and not infrequently descaling agents, for cleaning ovens, unclogging drainage and sewage pipes, neutralizing unpleasant odours, etc. Although their number is growing day by day, most people do not realize the consequences, or at least not enough, and especially not about their potentially toxic effects. In fact, a great deal of the population do not consider household chemicals a particular problem, which is true, if they are used in the prescribed manner. However, the fact that these agents can cause harmful effects in humans and animals, and even participate in environmental pollution, is more than a sufficient reason to pay more attention to these agents, that is, to talk about them more and obtain more information for that matter. Particularly since there are authors who believe that some of the mentioned agents can even cause cancer, asthma or birth defects, i.e. infertility. Household chemicals can be divided in several ways, and one of the classifications is the one made according to the place of use. According to this division, the products we use every day at home can be roughly divided into those used for cleaning and maintaining hygiene in kitchens, used for the same purposes in bathrooms (including those used for personal hygiene), and the products used in rooms and on terraces (flower protection).

KEYWORDS: household chemicals, personal hygiene, detergents, soaps, hair shampoos, toxic effects, environmental pollution

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INTRODUCTION

Nowadays, a large number of chemicals are used in communal hygiene, human and veterinary medicine, as well as in agriculture, all over the world. It is safe to say that there is almost no branch of human activity where these tools have not found their application. The largest number of these chemicals are pesticides, i.e. biocides, which are used to destroy microorganisms (disinfection), insects (disinsection) and harmful rodents (de-ratization), both in rooms where people live and where animals are kept, and in the fields, to protect plants from the same pests (Ćupić, 2012).

To be more precise, due to the wide and often irrational or even application which is not in accordance with the Instructions, more and more attention is paid to these products. The first reason is that they can have a harmful effect, that is, cause certain unwanted or toxic effects, both in humans and in the environment (Ćupić et al., 2002; 2018; Baird, 1999; Crosby, 1998; Đarmati et al., 2007; Hodolić et al., 2009).

A certain number of chemicals (pesticides, biocides and other substances) are also used for cleaning, i.e. maintaining hygiene in our houses, i.e. apartments, or for maintaining personal hygiene. These are various detergents, products for removing limescale, for cleaning ovens, mixed in soaps, hair shampoos or toothpastes, as well as those for neutralizing unpleasant odours, unclogging drainage pipes and others. They may also contain substances harmful to people and the environment. That is why it is very important to be more careful about what is brought into apartments or houses and stored or used in them. The goal of this work is to draw attention to these products, i.e. to warn people about possible harmful effects. This becomes even more important, if it is taken into account that people spend over 70% of their time in houses, and especially in apartments (and higher floors) (Pejčić, 2016; Plavšić, 2009; Helmenstine; Belobaba, 2011; Milutinović, 2011; Pejčić, 2011; Pejčić, 2012).

It has been proved that they are only thought about, unfortunately, when an accident happens. In fact, most people do not consider household chemicals to be a particular problem, which is, of course, true, if they are used in the prescribed manner. Namely, surveys have shown that only 3% of the population carefully read the composition of purchased chemicals. Perhaps this is one of the reasons why these chemicals are not talked about enough. However, it should be pointed out that in recent times more and more attention has been paid to the various chemicals that surround us, and therefore also to those found in the house, and there are more and more of them. This is all the more so, because there are more and more people who believe that these products can cause cancer, asthma, infertility or birth defects. Hardly a day goes by that some “new” product for maintaining hygiene at home or for personal hygiene is not advertised on television. Since they can (as already said) have a harmful effect, they should be treated sensibly, that is, with a certain amount of attention. This implies that when using various chemicals in the house, at least the necessary products of personal protection, gloves ought to be worn. In addition, when talking about these products and their possible harmful effects, it

should be pointed out that of all the household members, children represent the most vulnerable category. This applies especially to children up to four years of age, because they are still not able to understand all the dangers and they are very curious and want to know every part of the house. That is why it is quite a responsibility for the elderly not to be careless when using various chemicals and to handle them properly. This implies not only the correct use, but also a whole series of measures related to the storage of chemicals in the house. It would be best if they were kept (if possible) under lock and key, i.e. out of the sight and reach of children, because unfortunately poisoning of children happens almost every day. Cases of drinking dishwashing detergent, swallowing washing powder, bleach, or products used after shaving have been recorded. Unfortunately, these poisonings are increasing and it can be said that they make up a high percentage of the total number of poisonings in people in general (Pejčić, 2016; Plavšić, 2009).

All the listed chemicals, potential causes of poisoning, can be roughly divided into those that are used to maintain hygiene in houses, and those that we use to maintain personal hygiene.

Products intended for maintaining hygiene in houses could be divided in several categories, one of them being – according to the place of use. Hence, the chemicals are divided as follows:

a) *maintaining hygiene in kitchens* (detergents for hand washing dishes, machine washing dishes, cleaning ovens or grills, products for beautifying or caring for crockery and cutlery (shine), unclogging drainage pipes from sinks, products for removing limescale from taps and sinks, for cleaning, sterilization and maintenance of surfaces, etc.

b) *maintaining hygiene in bathrooms* (soaps, shampoos, balms, foams, descalers from taps, sinks and bathtubs, laundry detergents, stain removal from laundry and other items, air fresheners, toothpaste, mouth disinfectants), nail and hair polish, hair dyes, shaving and aftershave products and products for unclogging drainage pipes from sinks and bathtubs or sewage pipes, etc.),

c) *maintaining hygiene in the rooms* (floor cleaners – parquet, laminate, for cleaning stains from furniture and polishing furniture, cleaning and washing carpets, armchairs or mattresses), as well as those used for the care and maintenance of flowers.

Quite expectedly, personal hygiene products and cosmetics are also kept in the bathrooms (Pejčić, 2016; Plavšić, 2009).

AGENTS FOR MAINTAINING HYGIENE IN KITCHEN

Dishwashing detergents

After each meal, which is done several times during the day, dirty dishes and utensils should be washed (by hand or by machine). Pots and pans are a major problem, especially if burnt during the food preparation. For this purpose,

numerous products are advertised on television every day, where their effectiveness in removing dirty deposits from dishes is emphasized to the maximum. In other words, all the problems with dirty dishes will be solved if one buys one of these products, which certainly is not the case. Namely, it has to be well understood that the more effective a product is, usually the more toxic it is and more dangerous for the person who washes the dishes. It would be best if washing could only be done with clean water, but this is unfortunately only possible in a limited number of cases. Washing greasy and burnt, and sometimes unpleasantly smelling pots or pans cannot be effectively washed with water alone, but various chemicals must be used, i.e. detergents. Our ancestors used sand for these purposes once upon a time. There is no need to return to these (traditional) ways of washing, but we need to find out what kind of danger new modern washing agents bring us (TigerDoor, 2023; Pejčić, 2016; Plavšić, 2009).

Therefore, in accordance with the degree of soiling, various chemical agents are used for manual washing. When washing in a dishwasher, people will use it according to the advice, i.e. the instructions for use. One simply needs to put all the necessary detergents and other agents, such as those for shine and others that improve the washing efficiency, i.e. prevent the accumulation of limescale, and after that turn on the machine. This is an advantage over hand washing (Pejčić, 2016; Plavšić, 2009).

Detergents from the group of nonionic surfactants, or detergents, are most often used for washing dishes. In addition to the disinfecting effect, they are also used because they dissolve, i.e. they dissolve fats or other organic substances and in this way it is easier to remove impurities from dishes or other objects. In products used for manual dishwashing, in addition to nonionic surfactants, there are also anionic surfactants, and they may also contain preservatives (methylisothiazolinone or phenoxyethanol, i.e. paraben), and the monoterpenes citronellol and limonene (Plavšić, 2009; Vapa, 2016; Samardžić, 2020).

These products or surfactants, in their pure state, *cause severe eye irritation and are very toxic to aquatic life with long-term consequences* (Sl. glasnik RS, 2010). However, it can be found in the literature that the above-mentioned preservatives (methylisothiazolinone or phenoxyethanol) also have toxic effects. Thus, for methylisothiazolinone it is stated *that it can cause allergic reactions in humans*, while *for phenoxyethanol there are data that it is a potential carcinogen* (Sl. glasnik RS, 2010). Furthermore, the tests have shown that anionic surfactants in zebrafish can cause serious histological degenerative and necrotic changes in the gills, and a change in behaviour (hyperactivity) has been observed (Samardžić, 2020).

Detergents used for household cleaning are toxic to aquatic organisms at concentrations of 0.07 mg/L to 35.4 mg/L. Anionic surfactants and bleaching agents have toxic effects at concentrations of 0.0025 ± 300 mg/L to 0.3 ± 200 mg/L and 5 ± 9 mg/L to 4.6 ± 226 mg/L (Ankley and Burkhard, 1992).

Bearing in mind that the mentioned substances are found in the products in a concentration of less than 10%, i.e. 5%, and that they are diluted several

times immediately before application, then it is unlikely that in such a state they will have a harmful effect, both on people and on the environment. In addition, as such, they can be discharged into the sewer without restriction. It could be said that their only problem is that they create foam. In a technical sense, creating foam is not a problem, because it helps to remove impurities. However, it should be pointed out that these agents (due to the formation of foam) are potentially dangerous if swallowed. There were even cases of suffocation of children with foam, which rose from the stomach to the mouth after swallowing. Although one should think about these things and always prevent children from coming into contact with such products, one should know that in such cases silicone compounds can be used, which have the power to break the foam (Vapa, 2016; Plavšić, 2009).

For heavily soiled dishes, other chemical agents can be used, such as: hydroxides of alkali metals, quaternary ammonium compounds, sodium salt of ethylene-diamino-tetraacetic acid, i.e. ethylene diamino tetra acetate (EDTA), then various detergents, and often agents for disinfection. Alkaline hydroxides are known to be *corrosive substances*, *EDTA is harmful if swallowed and causes eye irritation*, *quaternary ammonium amines are corrosive and very toxic to organisms living in water and detergents with the property of irritating or irritating the eyes, very often they are toxic to organisms that live in water and have a long-term harmful effect in water* (*Sl. glasnik RS*, 2010). Therefore, the final product is usually corrosive, and in the best case it is toxic to aquatic organisms. These dangerous properties certainly cannot be easily ignored. Therefore, when washing and using these products, it is mandatory to wear prescribed personal protective equipment. Better to say, without using suitable gloves (for example, made of nitrile or butyl rubber) it is better not to do anything, and it is not out of place to wear a suitable apron and even glasses to protect the eyes. If used unprofessionally, these agents can cause burns to the skin or eyes, and swallowing is a particular problem. If something bad happens to you or your child, it is necessary to provide first aid, which consists in the application of means or drugs to relieve burns, redness and pain (anti-inflammatory drugs, analgesics) (Samardžić, 2020; Vapa, 2016; Plavšić, 2009).

Means for machine washing are similar to those used for hand washing dishes, but as a rule they also contain disinfectants. They can be found in circulation in the form of powder, solution or balls. For these purposes, numerous agents are used, which may contain oxygen-based bleaches, then non-ionic detergents, polycarboxylates and phosphonates, enzymes (subtilisin, amylase), which help the action of nonionic detergents, and agents for shine, as well as disinfection (for example sodium hypochlorite). *All of them cause skin and eye irritation, and can act as sensitizers* (*Sl. glasnik RS*, 2010).

Nowadays, there are numerous products that are used to sterilize dishes. For example, triclosan or 2,4,4-trichloro-2-hydroxydiphenyl ether is often used for these purposes (especially in Western countries). Such preparations, in addition to disinfectants, as a rule also contain some bases (for example, potassium hydroxide, sodium carbonate, etc.), and various other additives, if at the same

time they serve for washing (for example, nonionic surfactants, disodium meta-silicate and/or tetrasodium EDTA). Most certainly, the worst component is a base, but active chlorine is not completely negligible either. There will certainly be more to say about this with products for disinfection in bathrooms. *Such products, i.e. preparations that contain them, in contact with the skin, can cause mild burns, with a burning sensation or pain, and later infections are common. If they get into the eyes, they can cause damage to the cornea. In the case of inhalation of chlorine, symptoms such as coughing and shortness of breath may occur, which may persist for a day or two after exposure. Swallowing such substances is very dangerous and severe damage to the upper parts of the digestive system is possible, even with the occurrence of bleeding. In addition, these agents are dangerous for aquatic organisms with long-term consequences. In any case, after swallowing such a chemical, a doctor's help must be sought (Sl. glasnik RS, 2010; Majnhen; Pettersson i sar., 2000; Samardžić, 2020).*

In recent years, considerable attention has been focused on detergents that are widely used in daily personal hygiene and household products, as well as in various industrial processes. As a result, large quantities of products are usually discharged into wastewater treatment plants or directly into the aquatic environment in areas where there is no way to treat wastewater (Profepa, 2002; Mei-Hui, 2008).

Means for cleaning and washing ovens and grills

Furthermore, oven and (to a lesser extent) grill cleaning agents are used in kitchens. Although a high temperature can be used for these purposes, today quite strong cleaning agents, which contain mainly mixtures of strong bases (for example, sodium hydroxide) and surfactants (mostly non-ionic) are used most often. *All of them are classified as substances that cause severe skin burns and eye damage (Sl. glasnik RS, 2010; Samardžić, 2020).*

They are available in the market, usually in the form of a spray, because they are easier to apply to all parts of the oven. During this work, hands, eyes and respiratory tract should be protected equally. Although their application creates a stable foam, they still irritate the respiratory tract, so coughing is not uncommon. Although we can say with high probability that there is no danger of swallowing a chemical from a spray bottle, nothing is ever ruled out. *In any case, with careless and improper handling, these agents can cause very painful burns on the skin with the appearance of vesicles, and due to possible splashing in the eyes, even vision can be lost.* Since housewives most often do not have masks or any other equipment to protect the respiratory tract, it is recommended to ensure good ventilation of the room during the application and that the application lasts as short as possible. In any case, when applying, one must wear gloves (for example, surgical ones) and (if possible) some glasses, in order to protect themselves against possible splashing of the agent in the eyes. These types of products are very dangerous and must be stored very carefully, away from children. Therefore, such changes require mandatory

treatment. *If these agents are swallowed (which is unlikely), severe damage to the mucous membranes of the oral cavity and esophagus is possible. Bleeding cannot be ruled out, but esophageal ruptures are unlikely. There is also a possibility of damage to internal organs, such as the kidneys and liver.* Poisoning caused by the ingestion of alkali (with this warning label) is very serious, and the treatment usually takes a long time (*Sl. glasnik RS*, 2010; Samardžić, 2020; Plavšić, 2009; *Sl. glasnik RS*, 2009–2023).

Disinfectants

In addition to the dishes and the oven, every housewife strives to keep her kitchen as a whole spotlessly clean from dirt and all living organisms, especially bacteria and mold. This especially applies to surfaces where food is kept, that is, where food is eaten. A large number of disinfectants can be used for these purposes, out of which those based on active chlorine should be mentioned in particular. In addition to preparations containing sodium hypochlorite, trichloroisocyanuric acid and representatives of cationic detergents, such as quaternary ammonium compounds (cetrimonium bromide), are often used. Sometimes there are ready-made solutions for use (1% solution of some quaternary ammonium compound). Given that the other two are much more related to application in bathrooms than in the kitchen, here we will only talk about trichloroisocyanuric acid. It is known to be very widely used as an effective disinfectant, and it is available in the market in its pure state, in the form of a solution or in solid form (tablets). It is very dangerous in its pure form. *In contact with flammable material, it can cause a fire, it is harmful if swallowed, in contact with acids it releases poisonous chlorine gas, it leads to strong irritation of the eyes and respiratory organs, and it is very toxic to organisms living in water, with long-term consequences.* You should not be too afraid because of all the abovementioned, because it is found in preparations in low concentrations, in which many dangerous properties are lost and most often remains this one (*in contact with acids it releases poisonous chlorine gas, it is irritating to the eyes and mucous membranes of the respiratory organs, and is toxic to aquatic organisms with long-term harmful consequences*). Since it is difficult to find in the household in its pure state, it is unlikely to cause the effects mentioned above. In any case, protective gloves and possibly goggles should be worn when applying this flat surface disinfectant. Swallowing, in the worst case in children, can cause irritation of mucous membranes and vomiting (*Sl. glasnik RS*, 2010; Plavšić, 2009; Samardžić, 2020; *Bezbednosni list*, 2006).

Descaling agents

In the kitchens (as well as in the bathrooms), various chemicals are used to remove scale, which forms primarily on faucets and sinks. Since it creates the impression that the mentioned items are dirty, housewives try to restore

their shine by using certain chemical agents. Nowadays, there are a large number of preparations on the market (most often in the form of sprays) that are used to remove limescale. These agents usually contain some acid (for example, phosphoric, orthophosphoric, sulfamic), surfactants (anionic and/or nonionic detergents), and other substances, such as glutaraldehyde (for disinfection) or quaternary ammonium compounds. Some of the components, such as *glutaraldehyde or glutaral*, are quite toxic in their pure state (*toxic if swallowed, causes severe skin burns, can cause allergic reactions on the skin, toxic if inhaled and very toxic to aquatic organisms*). However, its concentration in preparations is usually low and amounts to about 0.3%. At this concentration, glutaraldehyde loses most of its dangerous properties (*Sl. glasnik RS*, 2010; Plavšić, 2009; Samardžić, 2020).

Phosphoric acid is also available in traffic in concentrations below 15%, which are not dangerous. Out of several dangerous properties, only the property of irritation remains. Surfactants are also found in concentrations below 10%, *where they are ecotoxic and irritating to the eyes*. In the end, the products containing the mentioned substances could be classified as *those that irritate the eyes, respiratory organs and skin, and possibly have a harmful effect on organisms in the water with long-term consequences*. This means that we can use them with minimal precautions. However, when applying them, it is recommended to wear protective gloves and goggles. Bearing in mind that they are available in the form of a spray, it is assumed that there are few opportunities for them to be swallowed, except perhaps by children. In any case, care should be taken not to inhale aerosol particles, as they could cause irritation of the mucous membranes in the respiratory tract. These tools should be kept out of sight and reach of children (*Sl. glasnik RS*, 2010; Plavšić, 2009; Samardžić, 2020).

Means for unclogging drainage pipes

Drainage pipes are also a significant problem in homes, both in kitchens and in bathrooms. Sink, washstand and bathtub pipes are most often blocked, and the cases of blocked drainage pipes and toilet bowls are not rare. Nowadays, unfortunately, we often witness that individual tenants behave carelessly and irresponsibly, stuffing (throwing) everything into the unspecified drainage pipes, which then need to be unclogged. In the apartments above the place where the blockage occurred, waste water and feces often appear. In such situations, a person tries in every possible way to make clogged pipes passable. Some first try to look at and clean the siphon with the hope that this will eliminate the problem, but the pipes can also get clogged under the siphon. In addition to mechanical means (vacuum tires, hot water, cables or blowing under high pressure), various chemicals can also be used to unclog pipes (Samardžić, 2020; Pejčić, 2016).

There are two basic possibilities, to apply products that act quickly and strongly or those that act gently and slowly. Corrosive chemicals are used for the first purpose, and biological agents in the form of enzymatic cleaners for

the second. The latter will not be discussed here, because they are almost not on the market, and besides, they are not toxicologically significant. Therefore, we will talk about strong corrosive agents, which of all common household agents are among the most aggressive and therefore toxicologically significant. As such, they can cause numerous problems (Pejčić, 2016; Plavšić, 2009).

Strong bases or strong acids are most often used for these purposes. As for the acids, some housewives most often use technical sulfuric acid, as well as hydrochloric acid. As bases, a mixture of sodium hydroxide and sodium hypochlorite is usually used. By applying this mixture, the hydrolysis and oxidation of impurities in the drainage pipes takes place at the same time. All of these agents work quite effectively, but it should be taken into consideration that they (primarily acids) can cause great damage to drainage pipes. In fact, after the application of these agents, especially if it is frequent, cracks can appear on the drainage pipes, and as a result, flooding and leaking sewage to the neighbours below. This was especially a problem in apartments with old lead pipes. In medical terms, these agents are much more dangerous than those used to clean ovens and grills. It is safe to say that all the consequences that can be caused by oven cleaners can also be caused by these, only the symptoms are even more pronounced. These agents are very poisonous, and *after swallowing they irritate the mucous membrane, causing pain in the mouth, throat and stomach, with diarrhea and bleeding. Moreover, in contact with the skin, they cause burns and wounds, which are difficult to heal. After inhalation of vapours and gases, they act as irritants, causing coughing and difficulty breathing, dizziness and headache* (Pejčić, 2016).

Products for washing and cleaning floors and kitchen furniture

To maintain hygiene in kitchens, products for washing and cleaning floors are also used. Namely, the floors should be washed regularly, because during the cooking process, not only the products of the vapours reach the floor, but also various parts of the food. For washing floors, mostly mild products are used, i.e. detergents, practically without any danger signs or warning labels. If this work is done while kneeling and holding a wet cloth soaked in a detergent solution in the hand, then it is necessary to use gloves. However, today there is also special equipment for washing floors, which makes it possible to avoid having to come into contact with the detergent with bare hands. Even if you touch it, there would be no health consequences, which certainly does not mean that it is recommended to work without protective gloves. In addition, it should be noted that swallowing such detergents, which produce weak and unstable foams, should not be a problem. *Only nausea and possibly vomiting can be expected* (Pejčić, 2016; Plavšić, 2009).

However, it should be noted that today on the market you can find so-called universal products, used for washing floors, regardless of whether they are made of glass, ceramic, wood or metal. They usually contain less than 5% of anionic detergents and the same amount of nonionic detergents, and acids

(benzenesulfonic acid), secondary alkyl alcohols, ethoxylated sulfates and sodium salt. Even though they are diluted 1:10 immediately before application, it is characteristic for them to *cause severe skin irritation and severe eye damage* (Sl. glasnik RS, 2010; Pejčić, 2016; Plavšić, 2009).

Kitchen furniture should also be maintained, primarily by dusting or removing greasy stains or disinfecting. Since the kitchen furniture today is made of chipboard or mediapan, their outer surfaces are covered with resistant varnishes. Therefore, no dangerous chemicals are needed to maintain their cleanliness. Mild detergent for occasional washing or even plain water is sufficient. In addition, the above-mentioned material is already protected against various insects during industrial production, so you should not use anti-fungal or weevil agents. For this reason, there is no fear of chemicals when maintaining kitchen furniture (Pejčić, 2016; Plavšić, 2009).

External parasites, i.e. insects, such as ants, flies and spiders remain in the kitchens. Although these parasites are practically not dangerous and do not transmit infectious diseases, people do not like to see them in their apartments, so they often use various pesticides, i.e. biocides, to control them. For these purposes, preparations based on pyrethroids (for example, permethrin) are most often used in various forms, most often in the form of powder and spray. It is characteristic of these agents that they are *harmful if they are swallowed, that they can cause allergic reactions on the skin, that they are harmful if they are inhaled, and that they are very toxic to aquatic life with long-term consequences* (Sl. glasnik RS, 2010; Plavšić, 2009).

PRODUCTS FOR MAINTENANCE OF HYGIENE IN THE BATHROOM

In addition to the fact that the hygiene and beauty of the body is maintained in the bathroom, there is traditionally a washing machine in them, and therefore also detergents, as well as other means, which are used for washing, i.e. maintaining personal hygiene. It is safe to say that the bathroom, of all places in the apartment, contains the largest number of various chemicals. When it comes to maintaining the hygiene of the human body, it is logical that for these purposes, dangerous agents, which harm the human body, must not be used. These are primarily various soaps, foams, shampoos, aftershave lotions, hairspray, nail polish, nail polish removers, etc. Furthermore, part of the products from the kitchen are used here, such as disinfectants, products for dissolving or dissolving limescale or products for cleaning drainage pipes, thus it is not necessary to mention them again (Pejčić, 2016; Plavšić, 2009).

Products for maintaining personal hygiene

Washing and body care products must have some special properties. First of all, they must not cause any harmful effects, i.e. have a harmful effect on the

human organism or the animals organisms, because the bathroom is usually used for washing pets, i.e. dogs. The main ingredients of solid soaps, gels or sprays are surfactants (salts of fatty acids such as lauric acid, then alkyl sulfonates, various ethoxylated long-chain amines, amides such as cocoamide, etc.). One of the well-known soaps, which is currently on our market, has a rather complex composition and in a certain mass proportion contains: sodium lauryl isethionate, stearic acid, sodium palmitate, methyl propionate, lauric acid, sodium isethionate, sodium -stearate, glycerin, propylene glycol, sodium chloride, tetrasodium EDTA, zinc oxide, butyl-phenyl and limonene. The basic role of soap, i.e. the substances contained in it, is to dissolve and bind impurities, thereby enabling their dispersion in water. Mostly, these products are risk-free or represent a very small or low risk to health (Pejčić, 2016; Plavšić, 2009).

As mentioned, in addition to the basic soaps, there are also a large number of substances that help or facilitate their action (for example, glycerin), then those that additionally disinfect the skin (various disinfectants), protect the skin epithelium, etc. None of the listed agents or ingredients can be harmful to human health, even though it will only come into contact with the skin and mucous membranes or it will be swallowed, for example. In sensitive people, *it can happen that, for example, some shampoo causes a slight irritation of the eye mucosa, but this is a very short-term effect, which disappears very quickly after the end of exposure.* It is really rare that someone has been poisoned by soap or hair shampoo, regardless of the strength, although nowadays, in addition to mild shampoos, there are shampoos on the market that are used, for example, to remove dandruff. They can *certainly cause stronger irritation of the mucous membrane of the eyes* (Pejčić, 2016; Plavšić, 2009).

Therefore, when it comes to such products and their composition, certain questions are always asked. There was a lot of controversy about the disinfectant triclosan. This disinfectant is widely used, and in a home it can be found in detergents, deodorants, toothpastes, various other cosmetic preparations, etc. It has already been discussed. Therefore, as a pure substance, it is considered harmful to human health and is ecotoxic, *i.e. it causes skin irritation, leads to severe irritation of the mucous membrane of the eyes, and is very toxic to aquatic life with long-term consequences.* However, it is applied in very low concentrations, thus some of the mentioned harmful effects are lost. Therefore, in disinfectants, in which it is present in a concentration of 1%, the only property of weak ecotoxicity is retained (*harmful to aquatic organisms and can cause long-term adverse effects in the aquatic environment*). In the concentrations in which it is found in soaps, shampoos and similar products, it no longer has any harmful effects on human health or the environment, and as such it is widely used as a completely harmless ingredient in cosmetic preparations (Pejčić, 2016; Plavšić, 2009).

However, data appeared in the literature that it is structurally similar to dangerous dioxins. Special attention was paid to its harmful effects on hormone synthesis after long-term exposure. Some studies have shown that it is very easily deposited in fat, that is, adipose tissue, which can cause numerous disorders in the long term, such as diseases of the liver, kidneys, brain, sexual

organs, etc. Naturally, after such information, people began to fear such a substance and began to avoid preparations containing triclosan. However, none of the aforementioned claims have ever been officially confirmed. Its main property is chemical instability and decomposition with the release of active chlorine. That is why it is used as a disinfectant because it releases chlorine, which has an antibacterial effect. Hence, how should people behave and should they always accept the claims of scientists a priori? That is why one should be very careful when analyzing scientific works. This especially applies to those papers in which data on the harmful effects of certain chemicals are presented. In addition, in our country, triclosan is on the list of classified and marked substances. According to the same list, this substance in its pure state irritates the skin and mucous membranes, and is very toxic to aquatic life with long-term consequences (*Sl. glasnik RS*, 2010; Plavšić, 2009).

In addition to soap and shampoo, toothpastes are often used to maintain personal hygiene, i.e. hygiene of the oral cavity. Depending on the manufacturer and purpose, they may contain numerous substances. For example, on the box of one of the pastes used on our market, it can be seen that it contains 1.1% sodium salt of fluorophosphate. The second, on the other hand, has a more complex composition and contains a certain mass proportion: sorbitol, glycerin, sodium lauryl sulfate, xanthan gum, sodium fluoride, magnesium sulfate, disodium phosphate, zinc sulfate, sodium sulfate, sodium benzoate, eugenol and limonene. It is particularly emphasized that the amount of sodium fluoride is 1450 ppm. Therefore, both of these pastes contain sodium fluoride, i.e. fluoride, which is added to prevent caries. For the same purpose, sometimes fluoride salts are added to drinking water. In our country, sodium fluoride is on the list of classified and marked substances. According to the same list, *this substance is toxic if swallowed, and leads to irritation of the skin and mucous membranes of the eyes* (*Sl. glasnik RS*, 2010).

However, it should be noted that nowadays there are many people in the world who are against this toothpaste ingredient, because, as already stated, fluoride is a very toxic substance. Suffice to say that it was used as a means of destroying rodents, and there is information that the Nazis used it to sterilize prisoners in the camps, as well as to turn them into “obedient slaves”, i. e. to kill the will to live in them. In addition, fluorine is a key ingredient in some drugs used to treat depression, and it is also found in the nerve agent sarin. It should not be especially mentioned that it is also present in a well-known group of antimicrobial drugs, which are called fluoroquinolones (TransformacijaS-vijesti, 2013; Marinković, 2012; Čupić et al., 2019).

For a nice smell and facial care, men use certain lotions after shaving. In one of them, which is on our market, there is a whole range of ingredients. These are: alcohol, citral, citronellol, coumarin, geraniol, castor oil, limonene, linalool, glycerin, ethylhexylmethoxyricinamate, ethylhexylsalicylate, propylene glycol, benzyl alcohol and benzyl salicylate. Although most of these ingredients are mild in nature, i.e. of natural origin, it is not excluded that they can *cause irritation or* (in a small percentage) *an allergic reaction in people with sensitive skin*. In addition, some of them, such as limonene, are on the list of classified and labeled

substances. According to the same list, this substance *causes skin irritation and sensitization, and is very toxic to aquatic life*. Although not on the list, geraniol also *causes skin and eye irritation* (Sl. glasnik RS, 2010; Pejčič, 2016).

Furthermore, women use varnish for the care and beauty of their nails, which they occasionally have to remove using organic solvents, such as acetone. Acetone is known to *belong to easily flammable liquids, it leads to strong eye irritation, and it can cause drowsiness and fainting*. In this regard, one should be careful not to get acetone on their hands during use, and of course, when applying it to their nails, they should keep their hands as far away from their nose as possible, with slower breathing. In addition, care should be taken not to swallow it, and accordingly, it should be kept away from children. Other chemicals, such as various cosmetics, can be found in the bathroom. Although regular control and supervision of these preparations is carried out, some attention (especially when it comes to children) is always welcome (Sl. glasnik RS, 2010; Plavšič, 2009; Pejčič, 2016).

Due to the ability to cause a whitening effect, oxidants can also be used for other purposes, primarily for a more beautiful face. As for the hair, they use bleaches similar to those used for linen and are not harmless. Thus, one such product (powder) consists of a mixture of potassium persulfate, ammonium persulfate, sodium persulfate and disodium metasilicate. All these substances are oxidants, with a corrosive effect. Products containing them are classified as *corrosive and oxidizing chemicals with the following hazard notices: can cause or encourage fire, is harmful if swallowed, causes severe burns, as well as allergic skin reactions, eye damage, can cause irritation respiratory organs, if inhaled it can cause allergic reactions, asthma or breathing problems* (Sl. glasnik RS, 2010; Plavšič, 2009; Pejčič, 2016).

Based on these data, it can be concluded that these substances are not harmless. Although their toxicity is reduced by dissolving them in water, immediately before treatment, it should be noted that the bleaching solution will have similar properties to the previously mentioned preparation. Therefore, the question arises whether such products can be kept in the house at all. When it comes to children, this preparation presents a similar danger, as a tool for machine washing dishes.

Teeth whitening is done mostly in dental offices and there have almost never been complaints from citizens about the consequences. In Western countries (and there is information here as well), tooth whitening pastes can be bought over the counter, so teeth whitening is done at home on your own, regardless of the fact that there may be minor damage to the gums. In any case, if you buy this product, you should take care of possible ingestion (which is the only way of exposure), so the same product must be kept out of the reach of children. If the child gets to this product and swallows it, it will probably *vomit and have a burning sensation or even pain in the mouth and esophagus, a few days after the incident* (Sl. glasnik RS, 2010; Plavšič, 2009).

In conclusion, it can be said that personal hygiene products (primarily soaps and shampoos) do not represent a health problem. Some even claim that they do not have to stay away from children, because children should be treated

with the same or similar products. Contact with the skin and mucous membrane of the eyes will generally not cause any consequences, and in case of swallowing, the only thing that can happen is the formation of foam in the digestive tract. However, it should be said that (depending on the type and composition) some shampoos, i.e. soaps, can (at least for a short time) *irritate the mucous membrane of the eyes*. Bearing all this in mind, it can be concluded that children should definitely not be allowed to swallow such products, and if a child happens to swallow a piece of soap, there is no need to panic (Pejčić, 2016; Plavšić, 2009).

Neutralization of unpleasant odours

These agents are mostly used in bathrooms, because quite unpleasant odours can spread from the toilet bowl. In addition, deodorants are also used in other rooms in a home, even in cars. However, when it comes to the bathroom, deodorant manufacturers have gone one step further. Numerous products have been made in various forms, the main purpose of which is to neutralize unpleasant odours from the toilet bowl. In addition, they usually also contain disinfectants, surfactants, agents for dissolving limescale and other additives, which enable the gradual release of active substances, such as various solvents. Odours are usually harmless and do not have a significant impact on the health of people who spend a long time in the bathroom (Pejčić, 2016; Plavšić, 2009).

Most of the active components of the mentioned agents are found in relatively low concentrations, so no harmful effects should be expected. In addition, they are in the toilet bowl, so the water dilutes them and carries them away. One of the more well-known agents, which is found on our market, and is used for the purpose of neutralizing unpleasant odours from the toilet bowl, consists of >30% anionic detergents, 5–15% nonionic surfactants, disinfectants, descaling agents and perfumes (coumarin, limonene). Cheaper disinfectants certainly include formaldehyde and glutaraldehyde, which can also be found in hair shampoos. Both of these substances are toxic and are on the list of classified and labeled substances. According to the same list, formaldehyde *is toxic in contact with the skin, if swallowed and inhaled, causes severe burns and eye damage, skin sensitization, and is a carcinogen*. As for glutaraldehyde, it is stated that *it is toxic if inhaled, in contact with the skin, if swallowed, that it can cause allergic reactions, both in contact with the skin and after inhalation, and that it is toxic to the living world in water*. Phenol is also mentioned, but according to the data we have, it is not used in deodorants for toilet bowls. However, the above-mentioned substances are found in preparations in rather low concentrations, where their dangerous properties are lost (*Sl. glasnik RS*, 2010; Pejčić, 2016; *Sl. Glasnik RS*, 2009–2023).

Chemicals for dissolving scale have already been discussed before and they do not have any significant effects, because all dangerous properties are lost at the concentrations in which they are found in such preparations. However, on the boxes of some of the products used for air freshening, i.e. deodorization in bathrooms and which are placed on the wall, it is written *that*

they are highly flammable and that they have a harmful effect on aquatic life with long-term consequences. That is why substances to prevent ignition are added to them (Plavšić, 2009; Pejčić, 2016).

One of the agents that certainly deserves attention is dichlorobenzene, which (in the context of detergents and deodorants) is used as a disinfectant. Namely, for a while there was a lot of controversy about dichlorobenzene, which evaporates from solid deodorants or substances such as dimethyl-methylphosphonate. Back in the 1960s, information appeared that this compound is carcinogenic. This problem is best illustrated by the example of different forms of dichlorobenzene (o-, m- and p-), which in the end (even though it is the same compound) still have different toxicological properties. Some authors believe that this compound evaporates relatively poorly from solid substances, and that the accusations of endangering human health do not correspond to the real truth. On the other hand, there are those “scientists” who (based on tests performed on animals, but not on humans) warn that this compound can cause liver and kidney cancer. However, the official data of the EU Commission should be trusted, and as far as can be seen, it has not paid special attention to these substances so far. Otherwise, dichlorobenzene is on the list of classified and labeled substances in the form of 1,2-dichlorobenzene (o-dichlorobenzene) and 1,4-dichlorobenzene (p-dichlorobenzene). According to the same list, 1,2-dichlorobenzene *is harmful if swallowed, causes severe eye and skin irritation, and causes irritation of the respiratory organs.* On the other hand, 1,4-dichlorobenzene states that this form *also causes severe eye irritation,* but (unlike 1,2-dichlorobenzene) *is highly toxic to aquatic life with long-term effects and is suspected to cause until the appearance of cancer* (Sl. glasnik RS, 2010; Plavšić, 2009; Pejčić, 2016).

Bearing in mind all of the above, we believe that this last statement should not be an inhibiting factor for further use of deodorant, both in the bathroom or other rooms in the apartment, and on the body itself. In other words, it can be concluded that those who claim that we should not stay for a long time in the bathroom or toilet, where deodorants are used, are not right. However, most authors believe that (in order to maintain personal hygiene) the body should be washed more and various deodorants should be used less to cover up unpleasant odours (Pejčić, 2016; Plavšić, 2009).

Laundry detergents

The washing machine is most often found in the bathroom and it plays an important role in the life of every average citizen. Nowadays, laundry is washed more and more often, because machine washing is, first of all, simple and fast. Better to say, machine washing has become indispensable today, thus housewives very rarely and only in certain situations (for example, when it comes to sensitive fabrics) decide to wash by hand. Needless to say, machine washing requires detergents, and today they are very complex mixtures of different substances, some of which are harmless, and some of which are dangerous

for human health or the environment (Pejčić, 2016; Plavšić, 2009; Smulders, 2002).

What is good is the fact that today there is a real competition between manufacturers to put on the market the least harmful products. This is not always possible, because detergents, in addition to harmless enzymes, must also contain various surfactants and bases, but in quantities that do not pose a danger to human health. They also adapt to environmental protection requirements, and recently, for example, they are increasingly removing phosphates from detergents, which are not harmful to human health or the environment. These were normally added to prevent the formation of limescale. However, it was shown that phosphates, as a nutrient, stimulate the growth of some simple organisms (algae) in all waters in which they are found. The creation of algae is an ecological problem that resulted in certain chemical changes, i.e. a decrease in the amount of oxygen in the waters where they were formed, and thus all other disturbances in the aquatic ecosystem. This was the reason that phosphates were for a time banned for use in detergents, both for laundry and dishwashers. Only in the so-called washing powders of the fourth generation, which contained zeolite and organic polycarboxylates, this problem was solved, which means that the goal of preventing the formation of scale in machines and the formation of algae in aquatic ecosystems was simultaneously achieved (Pejčić, 2016; Pfenndt, 2009; Plavšić, 2009; Nowack, 2003).

Detergents for machine washing in the market are mainly in the form of powder or liquid, and they contain substances, which generally *have an irritating effect on the mucous membrane of the eyes*. Other properties are not worrisome, because manufacturers try to keep the concentrations of dangerous substances below those at which harmful effects can occur (Plavšić, 2009; *Sl. glasnik RS*, 2010).

One of the products on our market in liquid form, intended for washing and softening laundry, contains the following substances: anionic detergents (5–15%), nonionic detergents (less than 5%), and soap. polycarboxylates, phosphonates, enzymes, butyl-phenyl-methyl-propionate, citronellol, geraniol, methylisothiazolinone, etc. Some of them have already been discussed, with the products used for machine dishwashing. Furthermore, the label of this product states that it *causes serious eye irritation* (Pejčić, 2016; Plavšić, 2009; *Sl. glasnik RS*, 2010).

In addition, when it comes to the quality of these products, it should also be mentioned that there are many who claim that the products of the same name in the West and in our country (one can say the whole region) are not of the same composition or quality, in other words that they are sent to us as waste or trash. In any case, when applying detergents, i.e. putting them in the machine, it is not out of place to put on protective gloves. Regardless of all the advertisements about the effectiveness of certain detergents, unfortunately we have witnessed that not all stains can be removed from clothes by machine washing, but some other products must be used. Suits and dresses are usually dry-cleaned, but even in this way not all stains can be removed from clothes (Plavšić, 2009).

There are basically two approaches to stain removal. One is to *bleach the clothes* and the other is to use appropriate *organic solvents*.

Bleaching is an older method of cleaning, regardless of how the job was done. In the old days, people exposed their clothes to the sun, and in that way they dried, disinfected and bleached them at the same time. Today, this is done with chemicals, predominantly with oxidants. Most often, agents based on sodium chlorite, sodium percarbonate, hydrogen peroxide, peracetic acid and similar chemicals are used. Oxidants carry out oxidation of the colours on the fabric and in this way their properties are lost, i.e. the colours on the canvas fade. They are suitable for many colours insoluble in organic solvents (Pejčić, 2016; Plavšić, 2009).

For hygienic and cosmetic purposes, hydrogen peroxide is used in diluted form (3%, 6% and 12%) as an antiseptic. Notably, hydrogen peroxide is on the list of classified substances and has been assigned danger notification marks, which shows that this substance *can cause a fire or explosion, that it is a strong oxidizing agent, that it is harmful if swallowed, causes severe skin burns and eye damage, and is harmful if inhaled*. All this points to the fact that hydrogen peroxide is not a harmless chemical. However, in concentrations below 5%, a large number of the mentioned effects are lost (remains harmful if swallowed, irritation of the mucous membrane of the eyes). However, preparations containing hydrogen peroxide should be handled carefully and gloves made of nitrile or butyl rubber must be used (*Sl. glasnik RS*, 2010; Pejčić, 2016; Plavšić, 2009).

Other oxidants are similar in their toxic properties. Thus, sodium percarbonate in its pure state acts *as an oxidant and is harmful, i.e. in contact with flammable material it can cause a fire, it is harmful if swallowed, causes skin irritation and leads to strong eye irritation*, but it is used in significantly higher concentrations. rather than hydrogen peroxide (*Sl. glasnik RS*, 2010; Pejčić, 2016; Plavšić, 2009).

Peracetic acid is used for disinfection and is on the list of classified substances. According to the same, this acid *is inflammable in liquid or vapor form, heating can lead to fire, is harmful if swallowed or inhaled, is harmful in contact with the skin, causes severe skin burns and eye damage and is very toxic to aquatic life with long-term effects*. In the concentrations in which it is used, it remains capable of causing *irritation of the skin, mucous membranes of the eyes and respiratory organs* (Pejčić, 2016; Plavšić, 2009; *Sl. glasnik RS*, 2010).

Therefore, all these oxidants, in the concentrations in which they are applied, in the worst case are harmful after ingestion, and all of them irritate the eyes and the skin. It is actually not as dangerous as it might appear to be, but they should still be kept away from children. *After swallowing, burning or pain in the upper part of the digestive tract can be expected, along with nausea and vomiting. In higher concentrations at the place of spraying, they can cause depigmentation of the skin, and also cause minor or major damage to the eye mucosa (tears, redness, burning or even pain)*. If there is contact with the skin or eyes, the usual decontamination should be carried out (rinsing with a large amount of water), and only then seek medical help (Plavšić, 2009; *Sl. glasnik RS*, 2010).

As for spots or stains, especially greasy ones, it is better to remove them with chemicals, i.e. organic solvents. Nowadays, there are numerous products

that are intended for dry cleaning, that is, that are used in dry cleaning. In fact, all those stains for which there is no guarantee that they will be removed in the usual washing process, they must first be treated with these products. Similar products are used in the household, but not all of them are used professionally. There are currently several (more or less effective) stain removers on the market. These are: detergents in the form of liquids, pastes or gels, then gasoline for cleaning, ethyl alcohol, ultra-gel for cleaning, Venish. One of the Venish preparations, which is on the market, contains 5-15% bleach, less than 5% surfactant, polycarboxylates, limonene; citral; hexyl cinnamal and benzyl salicylate (Pejčić, 2016; Plavšić, 2009).

In the beginning, even at home, light petroleum derivatives, i.e. ordinary gasoline, were used as cleaning agents. As a cheap chemical, it was bought in large quantities and a person could pour gasoline into a certain container and then soak their suit in it in order to remove greasy stains. However, gasoline is very inflammable, and its vapours with air form explosive mixtures and there have been disastrous experiences. In addition, it should be stored due to elevated benzene concentrations, especially when it comes to motor gasoline. Regardless of all the above, gasoline is still used for these purposes (because it dissolves fat well), that is, it is an integral part of many cleaning products. However, it should be emphasized that it is no longer pure gasoline, but (as already said) cleaning gasoline (Pejčić, 2016; Plavšić, 2009).

Various halogen solvents are also used for this purpose. Already at the beginning of their application, it was shown that they have certain advantages in relation to gasoline. In addition to having quite satisfactory efficiency in cleaning clothes, they were neither explosive nor inflammable, which was certainly a big advantage. However, some of these agents (carbon tetrachloride, trichlorethylene) have been withdrawn from further use due to their acute and chronic toxic effects (*primarily mutagenicity and carcinogenicity*). Practically only perchlorethylene is left, which is usually mixed with some petroleum derivative (for example, gasoline). However, this compound is also classified as *causing skin irritation and skin sensitization, causing eye irritation, can cause drowsiness and unconsciousness, is suspected of causing cancer, and is toxic to aquatic life with long-term consequences* (Sl. glasnik RS, 2010).

Furhermore, various other inert materials or gases can be added to such preparations, when it comes to spray packages. One such agent is silica gel soaked in a mixture of organic solvents. This mixture is spread on the stain and left to dry. The organic solvent will dissolve the impurity and transfer it to the silica gel by capillary forces. When the solvent evaporates, simply remove the sand-like material with a brush, leaving a stain-free fabric underneath. Naturally, it is important how dangerous such products are for human health. Assuming that gasoline does not contain benzene and that *perchlorethylene is a Category 3 carcinogen*, various milder effects may occur. In contact with the skin, such an agent will probably *cause drying and cracking of the skin* after prolonged contact, which in turn means discomfort. Inhaling vapours in an unventilated room could cause *dizziness and drowsiness, and even fainting*. Swallowing a liquid preparation is a rather inconvenient event, but it is un-

likely. *There is a burning sensation in the upper part of the digestive system, followed by nausea, which will then lead to vomiting.* The problem is not vomiting in itself, but the fact that during this reflex act, the vomited contents can be inhaled into the lungs. At the very least, the person will cough and have difficulty breathing until his condition stabilizes. In some cases, *pulmonary edema may occur, followed by difficulty breathing and suffocation.* If a child drinks a few sips of such a liquid preparation, it should immediately seek the advice of a doctor, that is, it should be taken to the nearest hospital. That is why these products must be kept out of the reach of children. In order to prevent such conditions, it would be best to take the clothes to dry cleaning and then there is nothing to fear (Plavšić, 2009; *Sl. glasnik RS*, 2010).

In addition to all the above-mentioned products, we should also *mention fabric softeners.* Housewives often use them, because our clothes smell nicer and are softer. Although they contain several substances, they are all found in extremely low concentrations. Among them all, the most present ones are those that penetrate the fiber structure and thus soften the fabric. Various aqueous suspensions of soap or oil (for example, olive oil), quaternary alkoxy ammonium salts, dimethyl-ammonium-chloride, phosphoric acid esters, fatty alcohols, anionic surfactants, and more recently chemicals containing silicon (for example, polydimethylsiloxanes). The worst of these agents are quaternary ammonium salts, anionic surfactants and silicon derivatives. As a rule, they have the following danger notices in their pure state: *it is irritating to eyes and skin.* However, their dangerous properties are lost already at concentrations below 20%. In addition, it was determined that their concentration in the water during the last wash of laundry is only 0.5%, so it is practically pointless to discuss any dangers of these agents. When more than 95% of the water is removed from the machine by centrifugation, then the remaining 5 kg of laundry contains extremely small amounts of fabric softener. It was calculated to keep them in such concentrations, i.e. so that some 2–5 µg of the agent remain per cm² of fabric. Finally, it should be said that on the surface of the fabric, which is in contact with the child's skin, there are amounts of substances in nanograms. Those are really small amounts. Theoretically, even such small nanogram amounts *can cause irritation and redness of the skin, as well as allergic reactions,* in highly sensitive individuals. However, that is really unlikely. That is why people should not be afraid to use fabric softeners. However, it is not bad to be careful, and in the first three months of life, instead of fabric softener, you should iron the goods (Pejčić, 2016; Plavšić, 2009; *Sl. glasnik RS*, 2010).

HYGIENE MAINTENANCE IN OTHER ROOMS IN THE APARTMENT

The rooms in question are the living room, the bedroom and rooms such as the storage room or pantry, which practically represent rooms with a lower risk. Normally, no chemicals should be found in those rooms. However, some of them are occasionally used. Naturally, this does not apply to the pantry, where

absolutely no chemicals are to be found. In case they must be applied (for example, due to the eradication of mold, insects, painting and varnishing), all foods, spices and additives must be removed beforehand. Therefore, due to the potential risk to the health of household members, the aforementioned products, as well as paints and varnishes, thinners, and carpet cleaners, polishers and stain removers, should not be kept in the pantries (Pejčić, 2016; Plavšić, 2009).

In order to maintain hygiene and cleanliness in the rooms, i.e. wishes that they also look clean and shiny, various chemicals are used. It is an imperative that this kind of application should take place without any possibility of causing any damage to people's health. Sometimes it is not the case, thus something should be said about this situation as well. Nowadays, furniture made of chip-board is usually bought, because it is much cheaper than furniture made of pure wood. However, while it is new, it can cause problems, as *formaldehyde is released*. The amounts of formaldehyde released are quite small, which means that they are not able (except for hypersensitive people) to cause serious adverse effects. However, it should be borne in mind that according to the Rulebook on Classification and Labeling of Substances, *formaldehyde is toxic in contact with the skin, if swallowed and inhaled, causes severe burns and eye damage, skin sensitization, and is a carcinogen* (Pejčić, 2016; Plavšić, 2009; *Sl. glasnik RS*, 2010).

In the rooms, special care must also be taken of the wood, which is used to make floors, furniture and is often found on the walls. Nowadays, such wood is already protected against various pests (for example, aphids or fungi) before being sold, so there should be no problems concerning this issue. Previously, the parquet floors were cleaned (scrubbed) with wire wool, and smeared with various means for polishing, i.e. getting a shine. Nowadays, after installation, everyone plans the parquet, and then varnishes it, which is of course a good mechanical, chemical and biological protection. For polishing parquet or furniture, chemicals are used, most often in the form of a paste, in which the main components are solid petroleum derivatives (mainly waxes) and certain gasoline-based solvents (Pejčić, 2016; Plavšić, 2009).

For better properties, manufacturers add other solvents (for example, esters or ketones for a better combination of components and a better smell), and special additives such as polymers. Most of them are inert substances, such as paraffin, but they can also contain gasoline, thus inhaling vapours can cause *drowsiness and dizziness or even a headache*, and if it gets on the skin, it causes it to dry out. *Swallowing the pasty preparation can cause nausea, and maybe even vomiting, but without other serious consequences*. That is why it is necessary for the person who cleans the parquet in this way to use gloves (for example, made of butyl rubber or PVC) and to ensure good ventilation in the room. Furthermore, these tools should definitely be kept out of the sight and reach of children (*Sl. glasnik RS*, 2010; Plavšić, 2009).

Furniture care preparations are far more demanding. They must contain almost nothing dangerous and must be made of very high-quality materials. In addition, it is useful that they also contain substances, such as disinfectants, in order to suppress bacteria or fungi on the furniture. However, among them

there are some products almost similar to parquet maintenance products, but for example, instead of paraffin, they contain higher quality ingredients, such as beeswax. Disinfectants are added in quantities that cannot possibly harm human health. Nowadays, as a rule, these preparations are sold in the form of a spray, but there are also some in the form of a cream for spreading on wood. Although they are almost completely inert to human skin, it is still recommended to use PVC gloves during their application. Therefore, no harmful effects of these chemicals should be expected, and of course they should be kept out of the reach of children (Pejčić, 2016; Plavšić, 2009).

Products for the maintenance and care of flowers, and products for controlling ectoparasites in pets

Many housewives are flower lovers, so they grow various types of flowers in their apartments or terraces. In order for the flowers to look as beautiful as possible, not only the daily work around them is enough, but also various chemicals must be used for this purpose, i.e. products for plant protection, and among them most often insecticides, that is, fungicides. These agents can pose a danger to householders, not only during application, but also afterwards if (for the purpose of making the solution) they are poured into smaller containers, which are not properly washed or marked later. It should be pointed out that poisoning by these products is quite common in the house, even happening more often than in the field. Children are the most vulnerable category of all household members. According to statistics, home poisoning is most often caused by insecticides, which can also harm pets. Namely, certain insecticides are also used as antiectoparasitics in dogs, cats and birds. Poisoning in the mentioned pets can occur due to an overdose of a substance or accidental ingestion. In addition, there are other, deliberate poisonings who put certain chemicals in various baits, primarily dinitro-ortho-cresol or creosan. According to the Rulebook on the Classification, Packaging, Labeling, and Advertising of Chemicals in accordance with the Globally Harmonized System, creosan *is fatal if swallowed, in contact with the skin and if inhaled, has a corrosive effect, can cause eye damage, can cause allergic reactions to skin, causes skin irritation, is suspected of causing genetic defects, and is highly toxic to aquatic life with long-term consequences*. In addition, there is a risk of explosion if heated indoors (Čupić, 2013; Plavšić, 2009; *Sl. glasnik RS*, 2010).

CONCLUSIONS

Nowadays, many chemical agents are used to maintain hygiene in homes, as well as personal hygiene.

Although these agents are potentially toxic, especially to children, most people do not think about them at all, let alone their toxic effects.

However, even in diluted form, these agents can cause irritation of the skin and mucous membranes (eyes), and the most severe forms are those that occur after ingestion.

It is believed that the most severe forms of poisoning can be caused by descaling agents, oven cleaners, bleaches and organic solvents.

If they are used in the prescribed manner, possible poisoning with these agents is really reduced to a minimum.

Buy only checked and registered products, with a proper and approved declaration (label). Preparations without a declaration or with an illegible declaration should be advertised immediately.

Never pour chemicals from their original packaging into beer, wine or similar bottles. Previous experiences show that numerous poisonings have occurred in this way (due to forgetfulness).

Always use protective equipment (apron, gloves, goggles and face mask) when applying these agents, and at least protective gloves.

Never throw the remains of dangerous chemicals or their empty packaging into the environment after use, especially into streams, rivers or lakes.

Dangerous chemicals in the house should be kept in places inaccessible to children, if possible under lock and key.

In all accidental cases, arising after exposure to a dangerous chemical, water should be applied immediately, either for rinsing or for drinking. Water will not lead to normalization of the condition in all cases, but it will certainly reduce the damage. Therefore, when working with these tools, it must always be available.

In more severe cases, medical help should be sought.

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ОРИГИНАЛНИ ЧЛАНАК

КУЋНЕ ХЕМИКАЛИЈЕ КАО МОГУЋИ УЗРОЧНИЦИ ТРОВАЊА И ЗАГАЂЕЊА ЖИВОТНЕ СРЕДИНЕ

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РЕЗИМЕ: Данас се свакодневно у циљу одржавања чистоће у нашим кућама, као и за одржавање личне хигијене, користе бројна хемијска средства. Највише се користе детерџенти за прање судова, потом и детерџенти за прање веша, разни сапуни и шампони за косу, а неретко и средства за скидање каменца, за чишћење

рерни, отпушавање одводних и канализационих цеви, неутралисање непријатних мириса и др. Иако њихов број из дана у дан расте, већина људи и не размишља о њима, или бар не у довољној мери, а посебно не о њиховим потенцијално токсичним ефектима. У ствари, добар део популације и не сматра да су кућне хемикалије, неки посебан проблем, што наравно и јесте тачно, уколико се користе на прописан начин. Међутим, чињеница да ова средства могу изазвати штетне ефекте код људи и животиња, па чак учествовати и у загађењу животне средине, више су него довољни разлози да се овим средствима поклони више пажње, односно да се о њима више прича и више зна. Поготово из разлога што постоје и они аутори, који сматрају да нека од наведених средстава могу изазвати чак и карцином, астму или пак неке урођене мане, односно неплодност. Кућне хемикалије се могу поделити на више начина, а једна од класификација је она, која је направљена према месту коришћења. Према овој подели, средства којима се свакодневно служимо у кућама, могу се грубо поделити на она која се користе за чишћење и одржавање хигијене у кухињама, затим на она која се користе у исте сврхе у купатилима (укључујући и она која се користе за личну хигијену), те на средства, која се користе у собама и на терасама (заштита цвећа).

КЉУЧНЕ РЕЧИ: кућне хемикалије, лична хигијена, детерџенти, сапуни, шампони за косу, токсични ефекти, загађење животне средине