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Recycling and segregation of used aluminium beverage cans according to the residents of Silesia voivodship

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Abstract

Aluminium is one of raw materials that can be practically continuously recycled. Thanks to the proper sorting of aluminium scrap it is possible to produce precisely the same products that it was made before. Selective waste collection and an extensive network of waste collection points have significant impact on the recovery level of used aluminium beverage cans. The purpose of the article was to analyse the results of surveys on aluminium segregation in Silesia voivodship. According to literature people are increasingly interested in environmental protection and what is happening with waste generated by them. But there is lack of information about people from different regions of Poland. From the research presented in the paper it can be concluded that people realize that used aluminium beverage cans become packaging waste which can be easily recycled so most of them segregate them in everyday life. This is the result of changes in the legislation on municipal waste and their segregation, as well as the element of environmental education.

1. Introduction

Metals and their alloys are valuable structural materials whose significant feature is the possibility of unrestricted processing. Recycling of metals from waste provides tangible economic and ecological benefits. It enhances the country's raw material independence, contributes to the job growth in procurement and processing (MORYSON G. 2009).

The development of non-ferrous metal recycling in Poland is unavoidable, which is influenced by increasing prices of natural resources which amounts are decreasing, growing industries and need to protect the natural environment (STULGIS G. 2013). Therefore, processing of aluminium scraps and its alloys is increasingly common practice observed on domestic and foreign raw materials market.

Aluminium is one of metals with very high technical importance. It is found in nature in many minerals and is the third (after oxygen and silicon) element in terms of participation in the earth's crust. Its main ore is the bauxite from which pure Al_2O_3 oxide is produced, then by electrolysis of dissolved oxide in molten cryolite (sodium fluorosilicate), metallurgical aluminium, which can be further refined, is obtained (DOBRZAŃSKI L. 2002, LITWIŃCZYK-KWAŚNICKA M., ET AL. 2012).

Aluminium is one of the raw materials that can be practically continuously recycled. Thanks to the proper sorting of aluminium scrap it is possible to produce precisely the same products that was made before. Therefore, a very important method of obtaining aluminium is its recycling from aluminium scrap (secondary aluminium).

The essential feature of the secondary aluminium production is a variety of aluminium waste, raw materials and a variety of furnaces used in this process. The size of the scrap, its oxide content and the degree of its contamination are used to select the best type of furnace. These factors also affect the choice of fluxes associated with the process, to maximize the recovery of aluminium. Selection of processing technology differs depending on the used installation (ZINTEGROWANE ZAPOBIEGANIE I OGRANICZANIE ZANIECZYSZCZEŃ 2001).

In the food sector, aluminium is often used in the production of beverage cans. In the world today more than 220 billion of cans are used (PUSTĘJOVSKÁ P., JURSOVÁ S. 2013, NÁPRSTKOVÁ N., CAIS J., SVIANTEK J. 2015), including 178 billion of aluminium cans, which can have many advantages. First of all, it is very light, easy to transport and store (does not break). It „fills the space” very well; its content occupies about 90% of the storage space. It allows for quick cooling of beverages and, therefore, energy saving. It is visually attrac-

tive and easy to print without the need for labels. From the point of view of environmental protection, as already mentioned, it is recyclable, entirely suitable for recovery (LESTYÁNSZKA ŠKŮRKOVÁ K., INGALDI M. 2014, INGALDI M., BORKOWSKI S. 2014). It should be emphasized that canned beverages are especially popular among young people.

Selective waste collection and an extensive network of waste collection points have significant impact on the recovery level of aluminium cans. The average global recovery is 70%, and Poland, despite the lack of a closed line for processing used beverage cans, remains in the world average. The percentage of recycled aluminium cans in Poland is growing year by year (INGALDI M., BORKOWSKI S. 2014, ŠVECOVÁ I., ET AL. 2017).

In Poland from 1st February 2015 new law on waste and its segregation has been in force. So slowly people are changing their attitude to waste segregation to pay less for waste collection, especially those who live detached houses. In literature there is a few articles about these changes, especially about changes in habits of residents from different regions of Poland and their statistics.

The purpose of the article was to analyse the results of surveys on aluminium segregation in Silesia voivodship. The respondents were expected to present their attitude towards environmental protection and recycling of waste, especially used aluminium beverage cans.

2. Methodology

The research on the purchase of aluminium canned drinks and segregation of used beverage cans were carried out among the population of the Silesian voivodship. The questionnaire was used in electronic version (online). For the purposes of this article, the responses from 16 March 2017 to 30 May 2017 were taken into consideration.

The survey covered nine questions on aluminium can segregation and environmental protection. In the first questions respondents were asked how important the environment protection was for them. They were also asked what the packaging recycling meant and why it was important according to them.

The next questions were directly related to used aluminium cans. The respondents were asked if they bought canned drinks and if yes, how often, then the respondents were asked to indicate why they did it. Subsequently, the respondents were asked whether they segregated used aluminium beverage cans and if they took them to the waste collective points. In the last question the respondents were asked to indicate why it was good to segregate used aluminium cans.

An additional element of the questionnaire was the respondents characteristics, including sex, age, education, place of living. This allows to tell who took part in the survey and, most of all, which research group is easier to be involved.

128 people participated in the survey. More women than men were involved in the research, although the predominance was not so great. The respondents were mainly young

people, most aged 31-40. None of the respondents was over 60. Perhaps the age structure was caused by the fact that the survey was in electronic form and was conducted over the Internet because it was easier to reach a wider research group.

People mainly with higher (45%) or secondary education (37%) participated in the questionnaire. This is reflected in the general education structure of young people. More and more people complete secondary education and choose to study. As for the structure of the place of living, it was very diverse. There was majority of respondents from cities with over 300 thousand inhabitants, but also other groups of the respondents were quite numerous.

3. Results and discussion

At the beginning of the survey, the respondents answered how important the environmental protection was for them (Fig. 1). 37% of respondents answered that very important, and 44% that important. It means that the respondents are interested in what is happening around them, especially when it comes to the natural environment. They realize that their lives, their future depends on this environment. The economy of raw materials and materials depends on the natural resources of the earth, without which no production activity is possible. Perhaps this is due to the fact that in the press, on television, on the Internet pieces of information on that subject are constantly published. There are various campaigns for the protection of the environment, segregation of waste, cleaning the neighbourhood.

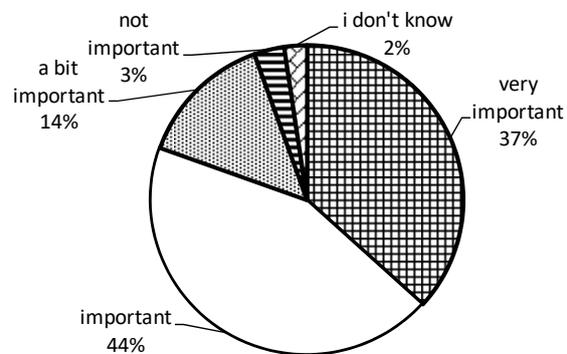


Fig. 1. How important is for you the environment protection?

In the second question, people were asked what packaging recycling means for them (Fig. 2). In case of this question they could choose more than one answer. They could also choose „other” and write their own answer. But no one chose it, what is more, often in case of other similar questions respondents often skipped it because they did not want to provide any individual answer. Probably the respondents either rush to complete the survey because they do not want to spend too much time with it. It is also possible that this is due to the fact that nowadays many people may not want to make effort or may be lazy. They do not like to perform additional actions, which, in this case, is to give their own answer.

75% of respondents indicated that recycling of packaging meant recovery of already used materials, and 63% that ability to reuse waste. Therefore, the respondents note that the aluminium from which the beverage cans are made is a material that can be repeatedly reused. Environmental arguments only came in third place (57% of responses for environmental protection) but it should be noted, still with lots of votes.

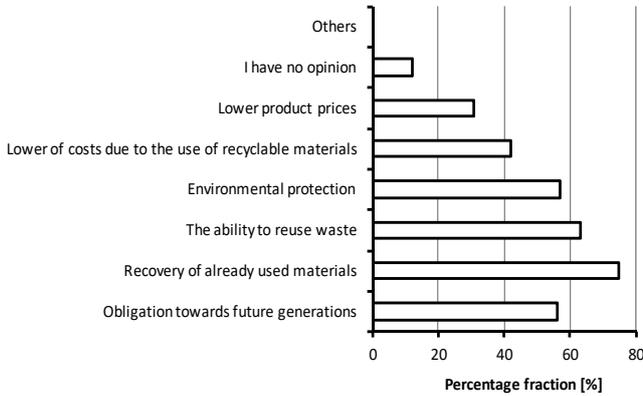


Fig. 2. What is for to you recycling of packaging?

In the next question the respondents were asked why the recycling of packaging was so important (Fig. 3). Again they could choose more than one answer. The most often chosen answer (86%) was the improvement of the environment. Interesting situation, taking into account the results of the previous question, because in this case answers about savings on the use of raw material (72%) and use of secondary raw materials (59%) easier were chosen the most often. However, in the case of this question, they were also often highlighted. So it can be assumed that both issues are important to the respondents that they are correlated according to them.

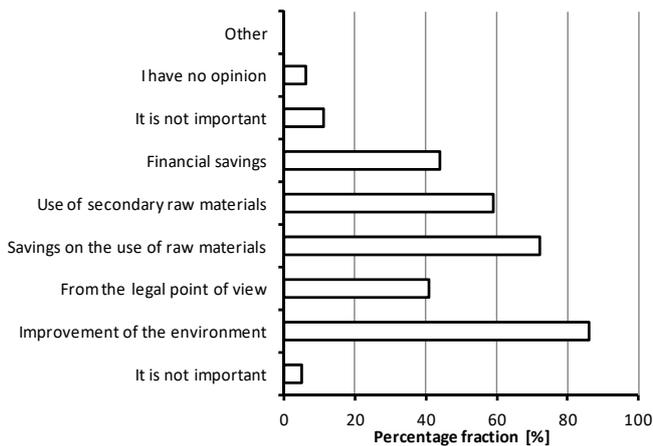


Fig. 3. Why is the recycling of packaging important?

Next, the respondents were supposed to say if they bought aluminium canned drinks (Fig. 4) and in case of „yes”, how often (Fig. 5). 96% of the respondents answered yes. The structure of shopping is very diverse. The purchase a few times a week was declared by 23% of the respondents, once a week by 36% and once a month by 20%. These are people

who can be considered as those who make regular purchases of aluminium canned drinks.

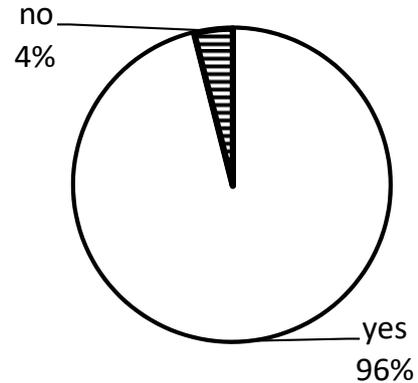


Fig. 4. Do you buy aluminium canned drinks?

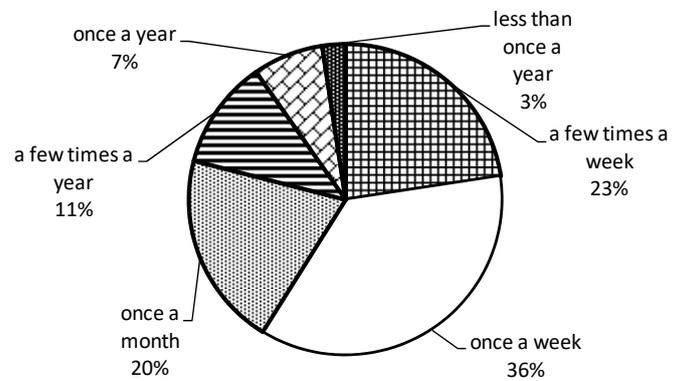


Fig. 5. If yes, how often?

Respondents who purchase the aluminium canned drinks were supposed to say why they chose this kind of packaging (Fig. 6). Again they could choose more than one answer. 8% of respondents answered „other” without giving own reason. 72% of respondents claimed that such packaging was not able to be broken. 69% considered such packaging as light to be taken, why 63% as easier to pack. So, for respondents, the first thought about the choice of aluminium cans is related to its usable features. Aluminium is a light, unbreakable material and the aluminium beverage can fit in any bag.

The answer related to environmental protection was often overlooked. Only 33% of the respondents said they bought aluminium canned drinks, since the aluminium cans could later be recycled. Despite assurances that for the respondents environmental protection issue is important or very important, when it comes to purchased goods, such as drinks in aluminium cans, customers take into account different principles than ecological issues.

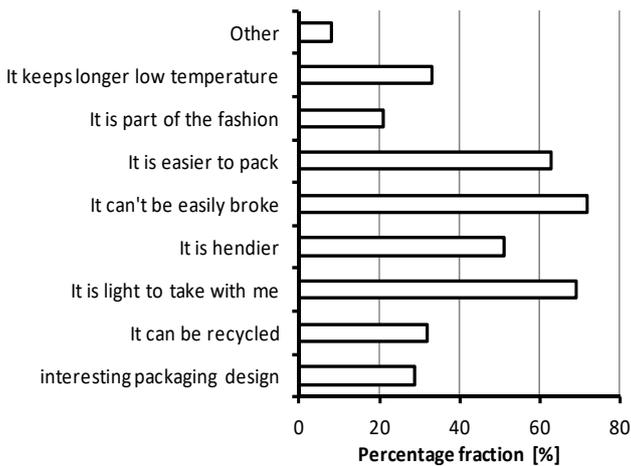


Fig. 6. Why do you buy aluminium canned drinks?

The respondents were also ask if they segregated used aluminium cans (Fig. 7) and if later they took them to the waste collective points (Fig. 8). 9% of respondents said that they always segregated it, 51% that often. However, this result is no longer reflected in taking used cans to the waste collective points. 74% of respondents did not do it, often only 4%.

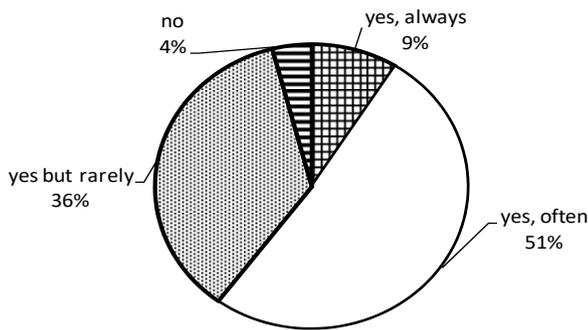


Fig. 7. Do you segregate aluminium cans?

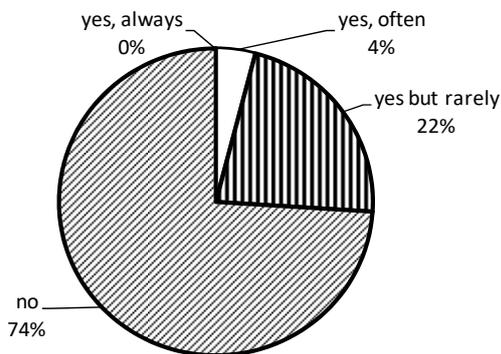


Fig. 8. Do you take used beverage cans to the waste collective points?

The segregation of aluminium cans as well as other waste has been enforced by Polish and European law. Residents

pay less for garbage disposal, when this garbage is sorted so they are more willing to do it.

People often segregate aluminium beverage cans but later they leave them close to mixed garbage containers or throw them to the appropriate containers for segregated waste. If it comes to containers for segregated waste, the used aluminium beverage cans should be thrown into yellow containers that are marked as containers for plastic. Unfortunately, people often do not know which container to choose so they leave cans close to different containers, which later are taken by people who collect metal waste to take them to the waste collective points in return for some money. These are mostly people who have financial problems, most of them do not work, without access to the Internet, sometimes even homeless, so they had little chance of taking part in the research.

Last question concerned reasons of the used beverage cans segregation (Fig. 9). Again it was possible to choose more than one answer. 78% of the respondents said that it was good for the natural environment. According to 63% of the respondents, segregations of used cans reduces the amount of mixed waste, and 59% of them said that if not separated they are the threat to the environment, so a reference to the natural environment.

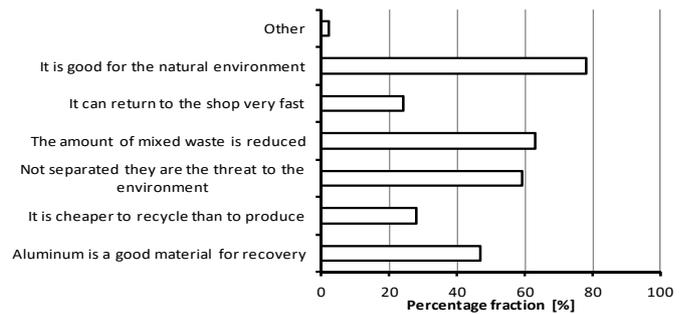


Fig. 9. Why is it good to segregate used beverage cans?

Not everyone knows that it is cheaper to recycle aluminium then to produce it from ore (28% answers) and that aluminium can turns back to the shop already after 60 days (24%). And these are the characteristics of aluminium cans or aluminium scrap, which are often mentioned in the literature as the most positive and which are not quite known to the respondents.

4. Summary and conclusion

According to the results of the research presented in the articles:

1. The environmental protection is very important or important for the respondents. They can help environment by waste segregation. They know waste can be used as secondary raw materials.
2. Many people decide to buy drinks in aluminium cans and a large percentage do it very often. They think that such cans are lighter than glass containers, they do not break, they are easier to pack into a bag and to be taken to school or work. They are popular especially among young people.

3. People segregate beverage aluminium cans but don't take them to the waste collective points. They know this is good for natural environment.

It can be concluded that people realize that used aluminium beverage cans become packaging waste that can be easily recycled. This is the result of changes in the legislation on municipal waste and their segregation, as well as the element of environmental education programmes. Therefore, people are eager to segregate empty aluminium cans, but do not take them to waste collectives points, they just leave the close to the waste containers or throw them to the appropriate containers for segregated waste.

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二手铝饮料罐的回收利用

關鍵詞

铝
二手饮料罐
回收
隔离
环保

摘要

铝是可以实际连续再循环的原料之一。由于铝废料的正确分选，可以精确地生产出与之相同的产品。选择性废物收集和广泛的废物收集点网络对二手铝饮料罐的回收水平有重要影响。文章的目的是分析西里西亚省铝质隔离调查结果。可以得出结论，人们意识到，二手铝饮料罐成为易于回收的包装废物。这是由于城市废物及其隔离立法的变化以及环境教育的内容。
