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THEORETICAL ANALYSIS OF THE CLASSIFICATION OF IMPORTED ENERGY DRINKS ACCORDING TO THE COMMODITY NOMENCLATURE OF FOREIGN ECONOMIC ACTIVITY

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Annotation
This article analyzes the compliance of energy drink labels with the requirements of regulatory and technical documents. It examines the content of recipe components that provide optimal tonic effects, the availability of information regarding temperature regimes and shelf life, as well as recommendations for consumption and daily intake.

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Introduction. Currently, a certain "substance" has formed for the consumption of energy drinks (ED), which occupy a significant portion of the global market. Despite the increasing production volume of ED, the legislative framework and the level of oversight regarding their quality and safety remain inadequate, which can serve as a risk factor for the emergence of related illnesses. Local producers of ED manufacture these products by GOST 28188-89 "Non-Alcoholic Beverages. General Characteristics." This standard applies to liquid soft drinks and prepared concentrates of soft drinks sold in retail chains. A.V. Oreshchenko and A.D. Durnev suggest classifying ED as part of the lower group of adaptogenic products, which are beverages that ensure the body's functioning under conditions of enhanced intellectual and physical activity. Experts identify them as functional beverages based on plant raw materials. According to other foreign sources, ED is considered an independent group of functional beverages. In 2007, the national standards GOST R 52844-2007 "Non-Alcoholic Energy (Tonic) Beverages" and GOST R 52845-2007 "Low-Alcohol Energy (Tonic) Beverages" were approved and came into effect. These regulatory documents provide definitions for non-alcoholic and low-alcohol ED, as well as non-alcoholic and low-alcohol tonic beverages, creating the possibility for their classification based on appearance, the level of carbonation, and the processing method. Non-alcoholic energy drinks are defined as tonic beverages with a mass fraction of dry substances of at least 10%; non-alcoholic tonic drinks are specially formulated non-alcoholic beverages containing sufficient amounts of caffeine or other tonic components to have a tonic effect on the human body. Low-alcohol energy drinks contain at least 10% mass fraction of sugar; low-alcohol tonic drinks are specially formulated beverages that contain sufficient amounts of caffeine or

other tonic components to exert a tonic effect on the human body. The aforementioned GOST standards provide a classification for non-alcoholic and low-alcohol tonic beverages, which also applies to energy drinks. Non-alcoholic and low-alcohol energy drinks are categorized based on their appearance into the following types:[1]

- Clear
- Cloudy

They are also classified according to the level of carbonation into:

- Non-carbonated
- Carbonated

Non-alcoholic and low-alcohol energy drinks are classified according to the processing method into the following types:

- Non-pasteurized
- Pasteurized
- Beverages made using concentrates
- Non-concentrated beverages
- Cold-filled beverages
- Hot-filled beverages
- Aseptic beverages

According to the data on physical and chemical indicators in GOST R 52844-2007, non-alcoholic energy drinks must meet the requirements specified in Table 1. The recommended levels of certain components in non-alcoholic, low-alcohol, and sports energy drinks that have hazardous effects are presented in

Results of chemical analysis of energy drinks obtained by modern liquid chromatography method

Table 1

Recommended level of non-alcoholic energy drinks.	**Ingredients, mg/100 sm^3**								
	caffeine	**taurine**	**L-carnitine**	**glucuronolactone**	**vitamin B_3**	**vitamin B_5**	**vitamin B_6**	**inositol**	**vitamin B_{12}**
	25–35	300–400	80–120	150–240	6–8	1–2	1–2	0,010–0,025	0,001–0,002
Red Bull	300,17	340	–	240	8	2	1,7	+	0,002
Bullit	378,97	240	–	–	7,2	2	0,8	–	0,0004
Burn	Not more 350	345	–	+	5,8	1,1	0,6	Not less 0,010	0,00028
Flash	217,45	320,67	–	–	6,0	1,5	0,6	–	–
Flash UP	221,56	310,78							
Adrenaline Rush	Not more 287	399	100	–	–	–	0,8	0,0217	0,0004
Adrenaline Nature	Not more 304	386	–	–	–	–	–	–	–
MD Guarana	400	403	–	–	+	–	–	–	+
XXI power Guarana	367	287	–	–	–	+	0,9	–	–
Tornado	Not more 340	117	–	–	3,4	1,4	0,3	–	–

Tornado ice	Not more 384	Not more 120	–	–	–	–	–	–	–
Spring Energy	Not more 301	112	–	–	6,0	2,4	0,6	–	–
SUPER MAX	303	354	–	+	+	+	+	–	+

Content of certain substances in low-alcohol energy drinks

Table 2

low-alcohol energy drinks	Ingredients					
	Caffeine, mg/100sm³	**Taurine mg/100sm³**	**L-carnitine mg/100sm³**	**Glucuronolactone mg/100sm³**	**volume fraction of ethyl alcohol, %.**	**mass fraction of sugars, %.**
	0,151–0,400	30–400	80–120	150–240	1,2–9,0	Not less 10
Strike Sky	298,37	240	–	–	8,0	11,5
Strike Dark	464,56	240	–	–	8,0	11,5
Jaguar Light	436,97	–	–	–	5,5	11,5
Jaguar Active	398.71	400	–	–	7,0	11,5
Jaguar Gold	432,18	300	–	–	7,0	11,4
Red Devil	376,23	300	–	–	9,0	11,0
Черный русский	345,60	–	–	–	7,0	8,5
Scorpion	246,87	30 0	–	–	8,0	12,1

Use of modern liquid chromatography to determine the recommended and detected levels of caffeine and taurine as hazardous chemicals in non-alcoholic energy drinks.

Table 3

Names of non-alcoholic energy drinks	**Recommended amount and ingredients, mg/100 sm³.**								
	caffeine	**taurine**	**L-carnitine**	**glucuronolactone**	**vitamin B3**	**vitamin B5**	**vitamin B6**	**inositol**	**vitamin B12**
	Daily Intake Amount 25–35	**Daily Consumption Amount 300-400**	**80–120**	**150–240**	**6–8**	**1–2**	**1–2**	**0,010–0,025**	**0,001–0,002**
Obtained results and indicators, mg/100 sm³									
Jaguar-2	314 ,3	333,54	–	240	8	2	1,7	+	0,002
Bullit	228,24	240,68	–	–	7,2	2	0,8	–	0,0004
Burn	350 ,12	327,89	–	+	5,8	1,1	0,6	0,010	0,00028
Mfnester energy	329,77	413,412	–	–	6,0	1,5	0,6	–	–
Levropamp	525,87	399 ,67	100	–	–	–	0,8	0,0217	0,0004
Merylend Muscle machive Tumorang	857,52	107,58	–	–	–	–	–	–	–
MD Guarana	240 ,91	+	–	–	+	–	–	–	+

Materials and Methods: The analysis of energy drinks was conducted using modern liquid chromatography with an elution mode and a diode array detector (DAD). Acetonitrile and buffer solution were used as the mobile phase. Spectral data were studied in the spectral range of 200 to 400 nm at pH 2.92 with the following conditions: 4% acetonitrile: 90% buffer for 0-6 minutes, 10% acetonitrile: 90% buffer for 6-9 minutes, 20% acetonitrile: 80% buffer for 9-15 minutes, and 4% acetonitrile: 96% buffer for 15-20 minutes.

Injection volume: 10 µL

Mobile phase flow rate: 0.75 mL/min

Column:Eclipse XDB-C18, 5.0 µm, 4.6 x 250 mm

Detector wavelength settings:272, 292, 254, 297, 360 nm

The data in the table indicate the presence of mandatory requirements in the technical documents for energy drinks as follows:

- For non-alcoholic energy drinks "Not recommended for individuals under 18 years of age, the elderly, those with hypertension, heart diseases, increased nervous agitation, atherosclerosis, insomnia, pregnant and breastfeeding women."[3]

- For low-alcohol energy drinks: "Not recommended for individuals under 18 years of age, the elderly, those suffering from insomnia, pregnant and breastfeeding women, patients with hypertension, heart diseases, increased nervous agitation, diseases of the central nervous system, as well as those with kidney, liver, and other digestive organ issues. The range of contraindications for low-alcohol energy drinks is significantly broader compared to non-alcoholic ones. This can be explained by the fact that energy drinks contain stimulants, while alcohol acts as a depressant in this case. The combination of these substances may pose health risks [4]. The effects of stimulants can mask the level of intoxication, hindering the perception of the amount of alcohol consumed. Another important requirement for product labelling is the presence of information about the quantitative composition of tonic components and recommendations for daily consumption limits based on the values of biologically active substances and the maximum allowable daily intake. Technical documents include recommended levels for certain components that provide optimal tonic effects. Caffeine and/or plant extracts (such as guarana, mate, ginseng, lemongrass, and Eleutherococcus), minerals, vitamins, and vitamin-like substances, substrates, and stimulators of energy metabolism can be used as tonic substances. Easily digestible carbohydrates are also included in the formulation of non-alcoholic energy drinks. Marketing research shows that young people primarily pay attention to the composition of caffeine and other tonics. Therefore, the next phase of the research focused on studying the optimal tonic effects of energy metabolism, the composition of certain ingredients that provide substrates and stimulants, as well as the availability of information regarding temperature regimes, shelf life, consumption, and daily intake on the packaging.[5] (Tables 1 and 2)

Recommended TIF TN Code Numbers for Classifying non-alcoholic beverages as energy and tonic drinks

Table 4

T/P	Product name	Test element	Solubility property	Taurine content, mg/L	Taurine content, mg/L.	TIF TN codes (Harmonized System codes)
				Daily intake: 30-400 mg	Daily intake: 0.25-0.400 mg	
1	Caffeine	Jaguar-2	Solubility in water is limited, freely soluble in hot water, and sparingly soluble.	333,54	314,3	2202999901
2	Caffeine	Bullit	Solubility in water is limited, freely soluble in hot water, sparingly soluble.	240,68	228,24	2202999902

3	Caffeine	Burn	Solubility in water is limited, freely soluble in hot water, and sparingly soluble.	327,89	350,12	2202999903
4	Caffeine	Monster Energy	Solubility in water is limited, freely soluble in hot water, and sparingly soluble.	413,412	329,77	2202999904
5	Caffeine	Levropamp	Solubility in water is limited, freely soluble in hot water, and sparingly soluble.	399,67	525,87	2202999905
6	Caffeine, taurine, guarana	Maryland Muscle machine Tumorang	Freely soluble in hot water	107,58	857,52	2202999906
7	Caffeine, guarana, taurin	MD Guarana	Freely soluble in hot water	333,54	314,3	2202999907

Results and Discussion. The data presented in the tables and the results of the conducted research indicate that information about guarana is absent on the packaging for individuals for whom the consumption of energy drinks is not recommended. Information about the recommended daily energy intake is not provided; the energy content was below the minimum threshold specified in the standard, which is 10-11 mg per 100 sm³. Conversely, the Burn drink exceeds the maximum threshold by ten times. The data obtained from the packaging of Red Bull energy drinks is interesting. This energy drink is sold in various volumes in retail: 0.250, 0.355, and 0.473 sm³. During labelling, the manufacturer indicates a caffeine content of 0.03% per 100 sm³, which translates to 30 mg per 100 cm³, thus ensuring the speed and uniform effect of this tonic drink, regardless of the consumed volume of 0.250, 0.355, and 0.473 sm³. The Tornado energy drink contains ice and taurine. Its content is below the recommended minimum level. The labelling indicates that these drinks are energy drinks. However, the composition of tonic substances does not comply with the standards set by GOST: caffeine – 25-35 mg/100 sm³, taurine – 300-400 mg/100 sm³. Therefore, it is recommended that enterprises producing energy drinks include more than two tonic components in non-alcoholic energy drinks and more than one tonic component in low-alcohol energy drinks [8]. The Adrenalin Rush drink contains three tonic substances: caffeine, guarana extract, and ginseng extract. In addition to natural caffeine, the Adrenalin Nature energy drink includes Siberian ginseng extract, concentrated orange extract, and natural flavouring "Guarana extract." However, their quantitative composition is not specified. It should be noted that the aforementioned composition echoes other information on the packaging: "Adrenalin Nature is prepared using natural tonic substances: natural caffeine from coffee beans and guarana extract from the banks of the Amazon River."Thus, there are violations in the production of Adrenalin Rush and Adrenalin Nature energy drinks, reflecting the recommendations in the "Regulation on Strengthening Control of Beverages Containing Tonic Components." The study of the vitamin composition on the label indicates that vitamins are not used in the production of Tornado energy drinks [10]. The packaging of MD Guarana and Super Max does not contain information about vitamin content. Analyzing the labels on the packaging leads to the conclusion that all producers do not comply with the GOST R 52844-2007 and GOST R 52845-2007 standards in energy drink production. Additionally, some packaging contains information that may mislead consumers. For example, the packaging of the Red Bull energy drink states: "Increases performance, concentration, and reaction speed; improves alertness, mood, and metabolism." This information can be considered unverified advertising according to the recipe composition and the expert opinion of the Ministry of Health of the Russian Federation. Some labels (for instance, the Guarana energy drink) contain spelling errors, which also undermines the image and reputation of

the energy drink-producing companies. According to E. S. Severin, E. Coleman, R. Murray, D. Grenner, and others, taurine and caffeine have multifaceted effects, causing imbalances in human cellular systems. Popular components of energy drinks, such as taurine and glucuronolactone, are synthesized in sufficient quantities in the human body and do not require additional supplementation. L-carnitine transports long-chain fatty acids across the mitochondrial membrane. Energy drinks do not contain fatty acids in their formulations, thus there is no need to use L-carnitine. Therefore, the combination of the aforementioned biologically active substances in the composition of energy drinks as potentially harmful components is alogical.[11]

The results of the research allow for the following recommendations:

1. According to GOST R 52844-2007 "Non-Alcoholic Energy Drinks. General Specifications" and GOST 52845-2007 "Low-Alcohol Energy Drinks. General Specifications":

- Use caffeine, vitamins, and vitamin-like substances as tonic components.
- Eliminate taurine and glucuronolactone from the composition of energy drinks, as these substances are synthesized in sufficient quantities in the human body.
- Reconsider the use of L-carnitine, as this component does not have a tonic effect.
- The packaging volume should be set at 200 sm^3.

2. In GOST R 52844-2007, refer to "Recommended Levels of Certain Components with Acceptable Hazardous Effects in Non-Alcoholic Beverages," Table 1.

3. Introduce mandatory requirements for the composition of certain components in "Non-Alcoholic Tonic Beverages" that are safe for consumers' lives and health, as outlined in Table 4.

Conclusion. Based on the data, we can conclude that caffeine and taurine contained in energy drinks, are more than chemically dangerous substances. Excessive consumption of alcoholic energy drinks has very negative effects of coffeine in the sedative effects of alcohol. This increases the risk of alcohol poisoning. It is one of the urgent topics of today to fight from all sides against things that harm health, weaken the mind, and destroy people and future generations.

References:

1. Широкий спектр маркетинговых исследований [Электронный ресурс]. – URL: http://www.businessanalytica.ru (обращение 15.10.2011).
2. Позняковский В.М., Киселев В.М., Шмидт В.В. Ассортимент функциональных напитков на рынке республики // Пиво и напитки. – 2009. – № 5. – С. 15–
3. Ичимликларнинг технологик ва ижтимоий аҳамиятга эга истеъмол хоссаларининг шаклланиши: назарий ва амалий жиҳатлар: монография] // Т.Ф. Киселева; Кемерово технологик институти озиқ-овқат саноати. – Кемерово, 2006. – 271 с.
4. Функциональные напитки и специальные напитки. П. Пакуин; //перевод с английского – Санкт-Петербург: Профессия, 2010. – 496 с.
5. ГОСТ Р 52844-2007. Безалкогольные тонизирующие напитки. Общие спецификации. // – Технический отчет. 09-01-01. – Москва: Стандартинформ, 2008. – 11 с.
6. ГОСТ Р 52845-2007. Слабоалкогольные тонизирующие напитки. Общие спецификации. // – Технический отчет. 09-01-09. – Москва: Стандартинформ, 2008. – 12 с.
7. Федеральный закон № 2300-1 от 7 февраля 1992 года "О защите прав потребителей".
8. ГОСТ Р 51074-2003. Пищевые продукты. Информация для потребителя. // Общие требования. – Технический отчет. 2005-07-01. – Москва: Стандартинформ, 2006. – 30 с.
9. Изменения в Федеральный закон № 102-ФЗ от 19 июля 2005 года "О государственном регулировании производства и оборота этилового спирта, алкогольной и спиртосодержащей продукции" и признание некоторых статей Федерального закона "О государственном регулировании производства и оборота этилового спирта" недействительными.
10. Каримкулов М.К, Раджабова Л.Р. Определение кофеина и оценки качества контрафактных товаров методом жидкостной хроматографии. // Universum: Технические

науки. Электрон. научн. журн. Часть.1 - Москва, Изд. «МЦНО» 2020. № 8 (77). -С. 10-20. (02.00.00; №1).

11. Каримкулов М.К, Раджабова Л.Р Эффектывние методы анализа химеческого состава энергетических, безалкогольных напитков.” Анализ структурно-механических свойств местного сорта зерна. //Вестник НУУз. Мирзо Улуғбек номидаги Ўзбекистон Миллий Университети илмий журнали. 2021 йил № 3 (1). - Тошкент, 262-268 бет. (02.00.00; №1).