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INVESTIGATION OF THE CHIMERIC COMPOSITION OF IMPORTED ENERGY DRINKS

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Abstract

The article analyzes the labeling of energy drinks in accordance with the requirements of regulatory and technical documentation. The norms of content of recipe components providing optimal tonic effect, availability of information on the package about temperature conditions and shelf life, about recommendations for consumption and daily consumption rate are studied.

Keywords: *Energy drinks, tonic drinks, classification, safety, use, normative and technical documentation, producers, consumers*

Introduction

Currently, there is a certain “fashion” for the use of energy drinks (EN), the turnover of which occupies a significant part of the Russian market. The main consumers of EN are young people who use them as drinks for rest, relaxation, and performance enhancement. Despite the growing growth of EN production, it should be noted that the legislative framework and the level of control over their quality and safety are imperfect, which may serve as a risk factor for the emergence of relevant diseases. There is currently no unified classification and definition of EN.

Domestic producers of EN produce this type of products according to GOST 28188–89 “Non-alcoholic beverages.

General technical conditions”. This standard applied to liquid soft drinks and to finished concentrates of soft drinks to be realized in retail trade network. A. V. Oreschenko

and A. D. Durnev proposed to refer EN to the subgroup of products of adaptogenic action, i.e. to drinks that ensure the functioning of the body in conditions of increased intellectual and physical stress. Specialists of Quesf UTS identify them as functional drinks based on vegetable raw materials. According to other foreign sources, EN is an independent group of functional drinks. In 2007 national standards GOST R52844–2007 “Non-alcoholic tonic drinks” and GOST R52845–2007 “Low-alcoholic tonic drinks” were approved and put into effect. These normative documents define non-alcoholic and low-alcoholic EN, non-alcoholic and low-alcoholic tonic drinks, which allowed to classify EN by appearance, degree of saturation with carbon dioxide, as well as depending on the method of processing. Non-alcoholic energy drinks – non-alcoholic tonic drinks with a mass fraction of dry substances not less than

10%; non-alcoholic tonic drinks – non-alcoholic drinks of special purpose containing caffeine and/or other tonic components in an amount sufficient to provide a tonic effect on the human body. Low-alcoholic energy drinks – low-alcoholic tonic drinks with a mass fraction of sugar not less than 10%; low-alcoholic tonic drinks – special purpose drinks containing caffeine and/or other tonic components in an amount sufficient to provide a tonic effect on the human body.

The above GOSTs provide a classification of non-alcoholic and low-alcoholic tonic drinks, which also applies to energy drinks. Non-alcoholic and low-alcoholic EN by appearance are subdivided into types: – transparent; – turbid.

Non-alcoholic and low-alcoholic EN by the degree of saturation with carbon dioxide

are subdivided into types: – non-carbonated; – carbonated.

Non-alcoholic and low-alcoholic ENs are subdivided depending on the method of processing:

- to unpasteurized;
- pasteurized;
- beverages with preservatives;
- preservative-free beverages;
- cold bottled beverages; – hot bottled beverages; – aseptic bottled beverages.

According to GOST R52844–2007 by physical and chemical parameters non-alcoholic EN should meet the requirements specified in Table 1.

The recommended levels of content of some components in non-alcoholic EN, providing optimal tonic effect, are presented in Table 1.

Table 1.

Component	Content, mg/cm ³ beverage
Caffeine	25–35
Substrates and stimulators of energy metabolism:	
taurine	300–400
L- carnitine	80–120
glucuronolactone	150–240
Vitamins and vitamin-like substances:	
vitamin B ₃	6–8
vitamin B ₅	1–2
vitamin B ₆	1–2
vitamin B ₁₂	0.001–0.002
inositol	10–25

The recommended levels of content of some substrates and stimulants of energy metabolism in low-alcohol EN according to

GOST R52845–2007 are presented in Table 2.

Table 2. *Recommended levels of some substrates and stimulants of energy metabolism in low-alcohol ENs*

Component	Content, mg/cm ³ beverage
Taurine	300–400
L-carnitine	80–120
Glucuronolactone	150–240

Objects and methods of research

In the present work, studies have been carried out to examine the labeling of ENs for compliance with the requirements of the above standards.

The objects of the study are selected EN sold in Kemerovo. The assortment and manufacturers of products are presented in Table 3.

Table 3. *The range of EN sold on the Kemerovo market*

Research object (trade name)	Manufacturer
EN group: non-alcoholic	
Red Bull, Bullit	Red Bull GmbH, Fuschl am See, Austria
Pitbull	Poland, Koszalin 75–211
Burn	Coca-Cola HBC Eurasia LLC, Novoaleksandrovka village, Azov district, Rostov region.
Flash	“Baltika-Pikra, Krasnoyarsk
Adrenaline Rush, Adrenaline Nature	Megapack Domodedovo Branch, Domodedovo, Moscow Region
MD Guarana, XXI power Guarana	ART Modern Scientific Technologies LLC, Golikovo Solnechnogorsk District, Moscow Region
Tornado, Tornado ice	Production Company LLC “Leader”, Malakhovka village, Lyubertsy district, Moscow region
Spring Energy	Individual Entrepreneur Tsirikhidze O.O., Omsk
Super Max	Aqua-Vita LLC, Yurga, Kemerovo region.
EN group: low-alcohol	
Strike sky, Strike dark, Scorpion	LLC “Distillery “OSHA”, Rakitinka village Omsk District, Omsk Region
Super JaguarOriginal Light, Jaguar Gold, Black Russian	United Bottling Group LLC, Tver
Jaguar Aktive, Red Devil	Megapack LLC, Vidnoye Leninsky District, Moscow Region

It follows from the data of Table 3 that the widest range of products is represented by OOO United Bottling Group (Tver) and OOO Osha Distillery (v. Rakitinka, Omsk district, Omsk region). An individual entrepreneur (Spring Energy drink) was registered among Russian manufacturers. The well-known international trademarks Red Bull and Bullit are represented on the market of the Russian Federation by the Austrian company Red Bull GmbH.

The inscription is a mandatory requirement of the technical documentation for the EN:

– for non-alcoholic EN: “Not recommended for persons under 18 years of age, elderly and elderly, hypertensive patients, with cardiac disorders, increased nervous excitability, severe atherosclerosis, insomniacs, pregnant and lactating women”;

– for low-alcohol EN: “Not recommended for persons under 18 years of age, older and elderly people suffering from insomnia, pregnant and lactating women, patients with hypertension, cardiac disorders, increased nervous excitability, diseases of the central nervous system, kidneys, liver and other digestive organs”.

The range of prevention of non-recommended use of low-alcohol EN is much broader than that of non-alcoholic EN.

This can be explained by the fact that ENs are stimulants, alcohol in this case is an axiolytic. It is likely that their combination may be unsafe for health. Stimulant effects mask the degree of intoxication and prevent adequate perception of the amount of alcohol consumed (Paken P., 2010).

The next important condition for product labeling is the availability of information on the quantitative content of tonic components and recommendations for limiting daily consumption (in packaging units) in accordance with the content of biologically active substances and the values of upper permissible levels of daily consumption.

The technical documentation provides recommended levels of content of some components that provide an optimal tonic effect. As tonic ingredients it is allowed to use caffeine and/or plant extracts (guarana, mate, ginseng, lemongrass, eleutherococcus), minerals, vitamins and vitamin-like substances, substrates and stimulators of energy metabolism (GOST

R52844-2007. 2008; GOST R52845-2007. 2008). In the production of non-alcoholic EN, easily digestible carbohydrates are also introduced into the formulation.

The conducted marketing research showed that young people pay attention primarily to the content of caffeine and other tonic substances. Therefore, the next step of

the research was to study the content norms of some components that provide optimal tonic effect, substrates and stimulators of energy metabolism of EN, as well as the presence of information on the packages about temperature conditions and shelf life, undesirable consumption and daily norm (Tables 4 and 5).

Table 4. Content of tonic substances in non-alcoholic ENs

Recommended level Non-alcoholic EN	Ingredients. mg/100 cm ³								
	caffeine	taurine	L-Carnitine	Glucuronolactone	Vitamin B ₃	Vitamin B ₅	Vitamin B ₆	Inositol	vitamin B12
	25-35	300-400	80-120	150-240	6-8	1-2	1-2	0.010-0.025	0.001-0.002
Red Bull	30	340	-	240	8	2	1.7	+	0.002
Bullit	30	240	-	-	7.2	2	0.8	-	0.0004
Burn	No more than 350	+	-	+	5.8	1.1	0.6	At least 0.010	0.00028
Flash	27	120	-	-	6.0	1.5	0.6	-	-
Adrenaline Rush	No more than 30	399	100	-	-	-	0.8	0.0217	0.0004
Adrenaline Nature	No more than 30	-	-	-	-	-	-	-	-
MD Guarana	40	+	-	-	+	-	-	-	+
XXI power guarana.	20	-	-	-	-	+	0.9	-	-
Tornado	No more than 15	17	-	-	3.4	1.4	0.3	-	-
Tornado ice	No more than 14	No more than 120	-	-	-	-	-	-	-
Spring Energy	No more than 30	-	-	-	6.0	2.4	0.6	-	-
SUPER MAX	30	+	-	+	+	+	+	-	+

Note: “+” indicates the presence of the ingredient in the beverage; “-” indicates the absence of the ingredient in the beverage

Table 5. Content of some substances in low-alcohol Ens

Advisable level Low-alcohol EN	Ingredients					
	caffeine, mg/100 cm ³	taurine, mg/100 cm ³	L-Carnitine, mg/100 cm ³	Glucuronolactone, mg/100 cm ³	Volume fraction of ethyl alcohol, %	Mass Fraction sugars, %
	0.151-0.400	30-400	80-120	150-240	1.2-9.0	At least 10
Strike Sky	30	240	-	-	8.0	11.5
Strike Dark	30	240	-	-	8.0	11.5

Advisable level Low-alcohol EN	Ingredients					
	caffeine, mg/100 cm ³	taurine, mg/100 cm ³	L-Car- nitine, mg/100 cm ³	Glucurono- lactone, mg/100 cm ³	Volume fraction of ethyl alco- hol,%	Mass Frac- tion sugars,%
	0.151–0.400	30–400	80–120	150–240	1.2–9.0	At least 10
Jaguar Light	30	–	–	–	5.5	11.5
Jaguar Active	30	40	–	–	7.0	11.5
Jaguar Gold	30	30	–	–	7.0	11.4
Red Devil	30	30	–	–	9.0	11.0
Черный русский	30	–	–	–	7.0	8.5
Scorpion	30	30	–	–	8.0	12.1

Note: “–” represents the absence of an ingredient in a beverage

Results and their discussion

There was a certain difficulty in studying the annotation in Russian, which indicates the labeling of Pitbull EN, as all the information on the package is in English and there is no violation of the law “On Protection of Consumer Rights” (Federal Law No. 2300-1 of February 7, 1992) and non-compliance with the requirements of GOST R51074-2003 “Food Products”. (Federal Law No. 2300–1 of February 7, 1992) and non-compliance with the requirements of GOST R51074-2003 “Food products. Information for the consumer” (GOST R51074-2003. 2005). In this case it is impossible to identify Pitbull EN.

The information presented in the tables shows that low-alcoholic EN and non-alcoholic EN are produced in accordance with the requirements of GOST R52845-2007 and GOST R52844-2007 standards respectively (exceptions are the drinks produced according to TU9185-020-40227765 – Burn, TU9185-001-17998155 – Adrenaline Rush, TU9197-12818934223-07 – MD Guarana, TU9185-090-1893422304 – XXI power Guarana).

The results of the conducted research show that information for persons who are not recommended to consume EN is absent on the packages of MD Guarana and XXI power Guarana. Information on the recommended daily consumption rate is not indicated on the labeling of the following ENs: XXI power Guarana, Tornado, Tornado ice and Spring Energy. There is no information about temperature conditions and shelf life on the package of MD Guarana EN. Further we studied the quantita-

tive content of caffeine, which in EN Tornado, Tornado ice, Spring Energy was below the minimum threshold, stated in the standard recommended level, by 10–11 mg per 100 cm³, in the drink Burn, on the contrary, exceeds 10 times the maximum threshold.

The information from the packaging of Red Bull EN is of interest. In the trade network this EN is sold in different volumes: 0.250, 0.355 and 0.473 cm³. When labeling the manufacturer indicates the content of caffeine – 0.03% in 100 cm³, which is 30 mg per 100 cm³ regardless of the package volume, thus guaranteeing the norm of this tonic substance and the same effect from the consumption of 0.250, 0.355, and 0.473 cm EN. 3

Taurine is present in Tornado EN, Tornado ice. Its content is below the minimum recommended level.

The inscription on the label indicates that these drinks are energy drinks. At the same time, the content of tonic substances does not meet the standards given in GOST: caffeine – 25–35 mg/100 cm³, taurine – 300–400 mg/100 cm³.

In this regard, it is recommended that enterprises producing EN include no more than two tonic components in the composition of non-alcoholic EN, and no more than one tonic component in the composition of low-alcoholic EN (. Federal Law No. 102-FZ of July 19, 2005).

Adrenaline Rush drink contains three tonic ingredients: caffeine, guarana extract and ginseng extract.

In addition to natural caffeine, Adrenaline Nature EN contains Siberian ginseng extract, concentrated orange extract, natural flavoring “Guarana extract”. Their quantitative content is not specified. It should be noted that the above composition duplicates other information on the package: “Adrenaline Nature is produced using natural tonic ingredients: natural caffeine from coffee beans, guarana extract from the banks of the Amazon River”.

Consequently, the manufacture of Adrenaline Rush and Adrenaline Nature ENs is in violation and does not comply with the recommendations reflected in the regulation “On strengthening the supervision of beverages containing tonic ingredients” from 19.01.2005 г. № 2 (Federal Law No. 102-FZ of July 19, 2005). The study of vitamin composition labeling showed that no vitamins are used in the manufacture of Tornado ice EN. MD Guarana and Super Max packages do not contain the quantitative content of vitamins.

The study of labeling on consumer packaging has served as a basis to conclude that not all manufacturers in the production of EN using tonic ingredients are guided by the standards of GOST R52844-2007 and GOST R52845-2007.

In addition, the packaging of some beverages contains information that may mislead the consumer. For example, the package of Red Bull EN contains the following inscription: “Increases efficiency, concentration and reaction speed, alertness. Raises mood. Improves metabolism. This information can be considered as advertising, not confirmed by the prescription composition and expert opinion of the Ministry of Health of the Russian Federation.

On the package of MD Guarana EN the type and number of documentation (TU9197-128-18934223-07), according to which the production is carried out, are indicated. Analyzing the class, subclass and group of products (the first four digits of the number of technical specifications), we can conclude that this drink according to the AllRussian classifier should belong to the class – products of food industry, subclass – products of tea, salt, tobacco and tobacco powder industry and production of food

concentrates, group – dry products for baby food, dietary and therapeutic and preventive nutrition and wastes of their production.

Some labels (e.g. EN XXI power Guarana) have spelling errors, which also undermine the image and reputation of EN companies.

According to E.S. Severin, E. Coleman, R. Murray, D. Grenner, etc., taurine and caffeine have multidirectional effects, which causes imbalance of human cellular systems. And such popular components of EN as taurine and glucuronolactone are synthesized in the human body in sufficient quantity and do not require additional administration. L-carnitine transports long carbon radical fatty acids across the mitochondrial membrane. ENs do not contain fatty acids in their formulation, so there is no need to use L-carnitine. Thus, the combination of the above-mentioned biologically active substances as components providing optimal tonic effect in the composition of EN is irrational.

The results of the conducted research allow us to make the following recommendations.

1 Update GOST R52844–2007 “Non-alcoholic tonic drinks. General technical conditions” and GOST R52845–2007 “Low-alcohol tonic drinks. General technical conditions”:

- use caffeine, vitamins and vitamin-like substances as components that provide a tonic effect;
- exclude taurine and glucuronolactone from the composition of EN, as these substances are synthesized in the human body in sufficient quantities;
- consider the use of Lcarnitine inappropriate, as this component does not have a tonic effect;
- take the volume of the packaging unit as 200 cm³.

2. In GOST R52844–2007 exclude Table A.1 of the Annex “Recommended levels of content of some components in non-alcoholic tonic drinks that provide optimal tonic effect”. To introduce “Mandatory requirements for the content of some components in non-alcoholic tonic drinks”, which are safe for life and health of consumers (Table 6) (Poznyakovsky, V.M., 2009).

Table 6. *Mandatory requirements for the content of certain components in non-alcoholic tonic drinks*

Component	Content, mg/100 cm ³ of beverage	Daily Value Consumption, mg
Caffeine	150*	300
Vitamins and vitamin-like substances:		
Niacin (vitamin PP)	1–60*	15–20
pantothenic acid (vitamin B ₅)	Not regulated	0.25–5.0
pyridoxine (vitamin B ₆)	0.1–6.0*	2–3
cyanocobalamin (vitamin B ₁₂)	0.00015–0.009*	0.003
Inositol	25–1500*	500–1000

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