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Mineral Water Assessment and Expert Opinion on Nutritional Value and potential Health Benefits

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Water source: K13 in Balatonöszöd (Hungary)

The mineral-rich groundwater originating from 130-meter depth in Balatonöszöd is fed by the famous Lake Balaton and filtered through volcanic rock. The soil in this region is known to contribute to the cultivation of Hungary's finest wines and its high mineral content has the potential to benefit human health. The water is particularly rich in trace minerals such as calcium, magnesium and sulphate (SO_4^{2-} mg/L). The formation of sulphates in this region is attributed to former volcanic activity and the dissolution of the minerals pyrite (FeS_2) and alunite ($\text{KAl}_3(\text{SO}_4)_2(\text{OH})_6$).

The benefits of sulphate to treat skin infections due to its anti-bacterial effects are known since ancient times. In fact, magnesium sulphate came into medical use at least as early as 1618 and it is now on the World Health Organization's List of Essential Medicines. Sulphate and its nutritional value are often underestimated although it is the 8th most common element in your body by mass. Sulphate, especially in form of amino acids (e.g. cystine & methionine), is essential for the proper functioning of the human body. It regulates cell development and repair, it is essential to form RNA and for the production of hormones and has detoxicating effects. Sulphate can bind toxins such as alcohol, nicotine, arsenic and cadmium and it is known to prevent cardiovascular disease. Sulphate also has a laxative effect preventing constiveness and therefore contributes to an improved digestion.

The water contains with 61.3 mg/L a high level of calcium (Ca) (6% of recommended daily intake - RDI) and with 16 mg/L a medium level of magnesium (Mg) (4% RDI) and therefore contributes to the replacement of essential minerals to the human body, to healthy bones and teeth, and the healthy function of muscles and heart.

The water source K13 is rich in trace minerals and in sulphur and therefore has a potential to contribute to human health.

References

World Health Organization – WHO (2017). *Guidelines for Drinking-Water Quality* (4th ed.). Geneva, Switzerland.

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European Union – EU (2009). *Directive 2009/54/EC on the exploitation and marketing of natural mineral waters*. Brussels, Belgium.

European Union – EU (2003). *Directive 2003/40/EC on establishing the list, concentration limits and labelling requirements for the constitution of natural mineral waters and the conditions for ozone-enriched air for the treatment of natural mineral and spring waters*. Brussels, Belgium.

Annex

Cations				Anions			
		mg/l	%			mg/l	%
Sodium	Na ⁺	52.6	33.4	Nitrite	NO ₂ ⁻	<0.02	0.00
Potassium	K ⁺	3.9	1.46	Nitrate	NO ₃ ⁻	<1	0.00
Lithium	Li ⁺	0.05	0.11	Chloride	Cl ⁻	5.4	2.23
Ammonium	NH ₄ ⁺	0.87	0.71	Bromide	Br ⁻	<0.1	0.00
Calcium	Ca ²⁺	61.3	44.67	Iodine	I ⁻	<0.1	0.00
Magnesium	Mg ²⁺	16	19.22	Fluorine	F ⁻	0.39	0.3
Iron	Fe ²⁺	0.523	0.41	Sulphate	SO ₄ ²⁻	33	5.03
Manganese	Mn ²⁺	0.061	0.03	Sulfide	S ⁻	<0.1	0.00
				Phosphate	PO ₄ ³⁻	0.36	0.17
				Hydrogen carbonate	HCO ₃ ⁻	384	92.27
Sum		135.3	100%			423.2	100%
pH	7.25						
Temperature	17.4	°C					
Total minerals	558.5	mg/l					

