



Dipartimento di Chimica Università di Pavia

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Partita IVA 00462870189

Pavia, 22 July 2024

Spett.le
Acque Minerali Val Menaggio S.r.l.
Piazza del Popolo 1, Como

Chemical and chemical-physical analyses on samples of natural mineral water named **CHIARELLA** collected in Plesio (Como), Italy, on April 16, 2024.

Limpid, colourless and odourless water				APAT IRSA-CNR 2003
Temperature of air	°C	13.9		
Water temperature at source	°C	10.6		2100 APAT IRSA-CNR 2003
pH at source		7.5		2060 APAT IRSA-CNR 2003
Specific conductance at 20°C	µS/cm	349		2030 APAT IRSA-CNR 2003
Total dissolved solids at 180°C	mg/L	235		2090 APAT IRSA-CNR 2003
Oxidability with permanganate (Kubel)	O ₂	mg/L	0.3	UNI EN ISO 8467:1997
Free carbon dioxide	CO ₂	mg/L	15	4010 APAT IRSA-CNR 2003
Silica	SiO ₂	mg/L	4.2	S.M. 3120 B (a)
Hydrogencarbonate	HCO ₃ ⁻	mg/L	258	2010 APAT IRSA-CNR 2003
Chloride	Cl ⁻	mg/L	0.7	4020 APAT IRSA-CNR 2003
Sulphate	SO ₄ ²⁻	mg/L	6.3	4020 APAT IRSA-CNR 2003
Sodium	Na ⁺	mg/L	0.90	S.M. 3120 (a)
Potassium	K ⁺	mg/L	0.28	S.M. 3120 (a)
Calcium	Ca ²⁺	mg/L	42.5	S.M. 3120 B, 3500-Ca B (a)
Magnesium	Mg ²⁺	mg/L	27.0	S.M. 3120 B, 3500-Mg B (a)
Iron (dissolved)	Fe	mg/L	< 0.01	S.M. 3125 B, 3120 B (a)
Ammonium	NH ₄ ⁺	mg/L	< 0.05	4030 A2 APAT IRSA-CNR 2003
Phosphorus (total)	P	mg/L	< 0.05	4110 APAT IRSA-CNR 2003
Sulfide (total)	H ₂ S	mg/L	< 0.01	4160 APAT IRSA-CNR 2003; S.M. 4500S ² -D (a)
Strontium	Sr ²⁺	mg/L	< 0.01	S.M. 3125 B, 3120 B (a)
Lithium	Li ⁺	mg/L	< 0.01	S.M. 3125 B, 3120 B (a)
Aluminium	Al	mg/L	< 0.01	S.M. 3125 B (a)
Bromide	Br ⁻	mg/L	< 0.1	4020 APAT IRSA-CNR 2003
Iodide	I ⁻	mg/L	< 0.05	S.M. 3125 B, (a)
Antimonium	Sb	mg/L	< 0.0012	S.M. 3125 B (a) (b)
Arsenic	As	mg/L	0.003	S.M. 3125 B (a) (b)
Barium	Ba	mg/L	< 0.1	S.M. 3125 B, 3120 B (a) (b)
Boron	B	mg/L	< 0.5	S.M. 3125 B, 3120 B (a) (b)
Cadmium	Cd	mg/L	< 0.0003	S.M. 3125 B (a) (b)
Chromium	Cr	mg/L	< 0.005	S.M. 3125 B (a) (b)
Copper	Cu	mg/L	< 0.1	S.M. 3125 B (a) (b)
Cyanide (total)	CN ⁻	mg/L	< 0.001	S.M. 4500-CN ⁻ E (a) (b)
Fluoride	F ⁻	mg/L	< 0.1	4100 APAT IRSA-CNR 2003 (b)
Lead	Pb	mg/L	< 0.001	S.M. 3125 B (a) (b)
Manganese	Mn	mg/L	< 0.01	S.M. 3125 B, 3120 B (a) (b)
Mercury	Hg	mg/L	< 0.0002	S.M. 3125 B (a) (b)
Nickel	Ni	mg/L	< 0.002	S.M. 3125 B (a) (b)

Nitrate	NO ₃ ⁻	mg/L	4.6	4020 APAT IRSA-CNR 2003 (b)
Nitrite	NO ₂ ⁻	mg/L	< 0.002	4050 APAT IRSA-CNR 2003 (b)
Selenium	Se	mg/L	< 0.001	S.M. 3125 B (a) (b)
Anionic surfactants (as LAS)		µg/L	< 50	5170 APAT IRSA-CNR 2003 (c)
Oil, grease, dissolved, hydrocarbons, emulsion		µg/L	< 10	5160 APAT IRSA-CNR 2003 (c) [UW1]
Benzene		µg/L	< 0.5	EPA 5030C 2003; EPA8260D 2018 (c)
Benzo(a)pyrene		µg/L	< 0.003	5080 APAT IRSA-CNR 2003 (c)
Benzo(b)fluoranthene		µg/L	< 0.006	5080 APAT IRSA-CNR 2003 (c)
Benzo(k)fluoranthene		µg/L	< 0.006	5080 APAT IRSA-CNR 2003 (c)
Benzo(ghi)perylene		µg/L	< 0.006	5080 APAT IRSA-CNR 2003 (c)
Dibenzo(a,h)anthracene		µg/L	< 0.006	5080 APAT IRSA-CNR 2003 (c)
Indeno(1,2,3-cd)pyrene		µg/L	< 0.006	5080 APAT IRSA-CNR 2003 (c)
Others polynuclear aromatic hydrocarbons		µg/L	< 0.006	5080 APAT IRSA-CNR 2003 (c)
Pesticides (Insecticides, herbicides, fungicides, nematocides, acaricides, algicides, rodenticides, metabolites and by-products), individual compound		µg/L	< 0.05	ISS.CBA.049.Rev.00(c); 5060 APAT IRSA-CNR 2003(c); EPA 3535A 2007(c), EPA 8321B 2007(c)
Aldrin, Dieldrin, Eptachlor, Eptachlor epoxide (individual compound)		µg/L	< 0.01	5060 APAT IRSA-CNR 2003, EPA 3535A 2007 (c);
Polychlorinated biphenyls (individual congener)		µg/L	< 0.05	EPA-8082 2007, EPA-3535A 2007 (c)
Chloroform		µg/L	< 0.5	EPA 5030C 2003; EPA8260D 2018 (c)
Chlorodibromomethane		µg/L	< 0.5	EPA 5030C 2003; EPA8260D 2018 (c)
Dichlorobromomethane		µg/L	< 0.5	EPA 5030C 2003; EPA8260D 2018 (c)
Bromoform		µg/L	< 0.5	EPA 5030C 2003; EPA8260D 2018 (c)
Trichloroethylene,		µg/L	< 0.1	EPA 5030C 2003; EPA8260D 2018 (c)
Tetrachloroethylene		µg/L	< 0.1	EPA 5030C 2003; EPA8260D 2018 (c)
1,2-dichloroethane		µg/L	< 0.1	EPA 5030C 2003; EPA8260D 2018 (c)
Halogenated compounds not included in pesticides and polychlorinated biphenyls lists (individual compound)		µg/L	< 0.1	EPA 5030C 2003; EPA8260D 2018 (c)
Total hardness	CaCO ₃	mg/L	217	S.M. 2340 B (a)

(a) Reference: "Standard Methods for the Examination of Water and Wastewater" - APHA Editor, 22nd Edition.

(b) Performance characteristics for the analysis of the constituents in Annex I-Decreto del Ministero della Salute 10/2/2015.

(c) Methods detection limits as in Annex II-Decreto del Ministero della Salute 10/2/2015.

Evaluation (Italian D.Lgs 176/2011): low mineral water.

Prof. Antonella Profumo

