

Water and wastewater treatment – Homework 11

Water resources quality and treatment

The Tables below show the water composition of 5 raw waters used for drinking water production. Assess the water quality in terms of the Swiss drinking water regulations and try to identify the possible water resources. What kind of treatment would you use to produce drinking water from these resources?

Water type 1 (see also homework 1)

Parameter	Measured value
Temperature	7-12°C
pH	6.4-7.1
DOC	1-5 mg/L
UV (254 nm)	1.3-19.5 m ⁻¹
Calcium	122 mg/L
Magnesium	3.5 mg/L
Nitrate as NO ₃ ⁻	25 mg/L
Atrazine	150 ng/L
Tetrachlorethylene	20 µg/L
Trichlorethylene	15 µg/L
Bromide	20 µg/L
Turbidity FTU	0.2 - 150

Discussion of water quality for water type 1:

T:

pH:

DOC:

UV:

Calcium and Magnesium:

Nitrate:

Atrazine:

Tetrachloroethylene, trichloroethylene:

Bromide:

Turbidity:

Based on the results above, what is the water resource?

Sketch treatment scheme for water type 1:

Water type 2 (see also homework 1)

Parameter	Measured value
Temperature	11.4°C
pH	7.1
DOC	4 mg/L
Total Hardness °F	39
Calcium Hardness °F	35
Magnesium Hardness °F	3.9
Oxygen	0 mg/L
Nitrate as N	< 0.01 mg/L
Nitrite as N	0.02 mg/L
Ammonium as N	1.2 mg/L
Iron	6.6 mg/L
Manganese	0.22 mg/L

Discussion of water quality for water type 2:

T:

pH:

DOC:

Hardness:

Oxygen:

Nitrogen species:

Iron, manganese:

Based on the results above, what is the water resource?

Sketch treatment scheme for water type 2:

Water type 3

Parameter	Measured value
Temperature	11 - 25 °C
pH	7.5 - 8.4
Turbidity FTU	2.3-60
DOC	7.9 - 20 mg/L
Taste and odor	intense
Total Hardness German °H	15 - 20
Carbonate Hardness German °H	9 - 12
Oxygen	7 - 17 mg/L
Chloride	30 - 160 mg/L
Bromide	0.05 - 0.2 mg/L
Iron	0.05-0.47 mg/L
Manganese	0.06-0.21 mg/L

Discussion of water quality for water type 3:

T:

pH:

DOC:

Taste and odor:

Oxygen:

Chloride:

Bromide:

Iron and manganese:

Based on the results above, what is the water resource?

Sketch treatment scheme for water type 3:

Water type 4

Parameter	Measured value
Temperature	4 - 8 °C
pH	7.8
DOC	1.2 mg/L
Calcium hardness	1.2 mM
Total hardness	1.5 mM
Carbonate hardness French °H	9 - 12
Oxygen saturation	60 - 98 %
Chloride	3 mg/L
EDTA	1 - 3 µg/L

Discussion of water quality for water type 4:

T:

pH:

DOC:

Oxygen:

Chloride:

EDTA:

Based on the results above, what is the water resource?

Sketch treatment scheme for water type 4:

Water type 5

Parameter	Measured value
Chloride mg/L	6.30
<i>Enterococci</i> /100 mL	25-300
<i>Escherichia coli</i> /100mL	42-200
Fluoride mg/L	0.05
Taste and odor	-
Total Hardness °F	28.40
Nitrate mg/L	20.90
pH	7.14
Oxygen mg/L	9.35
Oxygen saturation %	87.20
Turbidity FTU	0.2-10
Temperature °C	10-15

Discussion of water quality for water type 5:

Chloride:

Enterococci:

Escherichia coli:

Fluoride:

Total hardness:

Nitrate:

pH:

Oxygen:

Turbidity:

Temperature:

Based on the results above, what is the water resource?

Sketch treatment scheme for water type 5: