

# ***WATER QUALITY IN AQUACULTURE***

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## EXAMPLES OF MAXIMUM ALLOWABLE CONCENTRATIONS OF SELECTED WATER QUALITY VARIABLES FOR DIFFERENT USES

Use Variable	Drinking water					Fisheries and aquatic life		
	WHO <sub>1</sub>	EU	Canada	USA	Russia <sub>2</sub>	EU	Canada <sub>1</sub>	Russia
Colour (TCU)	15	20 mg l <sup>-1</sup> Pt-Co	15	15	20			
Total dissolved solids (mg l <sup>-1</sup> )	1,000		500	500	1,000			
Total suspended solids (mg l <sup>-1</sup> )						25	inc. of 10 or 10% <sub>3</sub>	
Turbidity (NTU)	5	4 JTU	5	0.5-1.0				
pH	< 8.0 <sub>4</sub>	6.5 <sub>1</sub> -8.5 <sub>1</sub>	6.5-8.5	6.5-8.5	6.0-9.0	6.0-9.0	6.5-9.0	
Dissolved oxygen (mg l <sup>-1</sup> )					4.0	5.0-9.0	5.0-9.5	4.0 <sub>5</sub> -6.0
Ammoniacal nitrogen					2.0	0.005-	1.37-2.2 <sub>6,7</sub>	0.05

(mg l-1)						0.025		
Ammonium (mg l-1)		0,5			2.0	0.04-1.0		0.5
Nitrate as N (mg l-1)			10.0	10.0				
Nitrate (mg l-1)	50	50			45			40
Nitrite as N (mg l-1)			1.0	1.0				
Nitrite (mg l-1)	3(P)	0.1			3.0	0.01-0.03	0.06	0.08
Phosphorus (mg l-1)		5.0						
BOD (mg l-1 O2)					3.0	3.0-6.0		3
Sodium (mg l-1)	200	150						120
Chloride (mg l-1)	250	251	250	250	350			300
Chlorine (mg l-1)	5						0.002	
Sulphate (mg l-1)	250	250	500	250	500			100
Sulphide (mg l-1)			0.05					
Fluoride (mg l-1)	1.5	1.5	1.5	2.0	< 1.5			0.75
Boron (mg l-1)	0.3	1.01	5.0		0.3			
Cyanide (mg l-1)	0.07	0.05	0.2	0.2 (PP)	0.07		0.005	0.05
<i>Trace elements</i>								
Aluminium (mg l-1)	0.2	0.2			0.5		0.005-0.17	
Arsenic (mg l-1)	0.01 (P)	0.05	0.05	0.05	0.01		0.05	
Barium (mg l-1)	0.7	0.11	1.0	2.0	0.7			
Cadmium (mg l-1)	0.003	0.005	0.005	0.005	0.003		0.0002-0.00188	0.005
Chromium (mg l-1)	0.05 (P)	0.05	0.05	0.1	0.05		0.02-0.002	0.02-0.005
Cobalt (mg l-1)					0.1			0.01
Copper (mg l-1)	2(P)	0.11-3.01	1.0	1	2.0	0.005-0.1128'9	0.002-0.0048	0.001
Iron (mg l-1)	0.3	0.2	0.3	0.3	0.3		0.3	0.1
Lead (mg l-1)	0.01	0.05	0.05	0.015	0.01		0.001-0.0078	0.1
Manganese (mg l-1)	0.5(P)	0.05	0.05	0.05	0.5			0.01
Mercury (mg l-1)	0.001	0.001	0.001	0.002	0.001		0.0001	0.00001
Nickel (mg l-1)	0.02	0.05			0.02		0.025-0.158	0.01
Selenium (mg l-1)	0.01	0.01	0.01	0.05	0.01		0.001	0.0016
Zinc(mg l-1)	3	0.11-5.01	5.0	5	5.0	0.03-2.08,10	0.03	0.01

products (mg l <sup>-1</sup> )		0.01			0.1			0.05
Total pesticides (µg l <sup>-1</sup> )		0.5	100					
Aldrin & dieldrin (µg l <sup>-1</sup> )	0.03		0.7				4 ng l <sup>-1</sup> dieldrin	
DDT (µg l <sup>-1</sup> )	2		30.0		2.0		1 ng l <sup>-1</sup>	
Lindane (µg l <sup>-1</sup> )	2		4.0	0.2	2.0			
Methoxychlor (µg l <sup>-1</sup> )	20		100	40				
Benzene (µg l <sup>-1</sup> )	10			5			300	
Pentachlorophenol (µg l <sup>-1</sup> )	9(P)			10	10			
Phenols (µg l <sup>-1</sup> )		0.5	2		1.0		1.0	1.0
Detergents (mg l <sup>-1</sup> )		0.2		0.5 <sub>12</sub>	0.5			0.1
<i>Microbiological variables</i>								
Faecal coliforms ( <i>E. coli</i> ) (No. per 100 ml)	0	0	0		0			
Total coliforms (No. per 100 ml)	0		10 <sub>13</sub>	1	0.3			

WHO World Health Organization EU European Union  
 BOD Biochemical oxygen demand TCU True colour units  
 NTU Nephelometric turbidity units  
 (P) Provisional value (PP) Proposed value

# NITRATE AND NITRITE

- Nitrite concentrations in freshwaters are usually very low, and rarely higher than 1 mg l<sup>-1</sup> NO<sub>2</sub>-N.
- High nitrite concentrations are generally indicative of industrial effluents and are often associated with unsatisfactory microbiological quality of water.

# NITRATE AND NITRITE

- Determination of nitrate plus nitrite in surface waters gives a general indication of the nutrient status and level of organic pollution.
- These species are included in most basic water quality surveys and multipurpose or background monitoring programmes, and are specifically included in programmes monitoring the impact of organic or relevant industrial inputs.

# NITRATE AND NITRITE

- As a result of the potential health risk of high levels of nitrate, it is also measured in drinking water sources. However, as little nitrate is removed during the normal processes for drinking water treatment, the treated drinking water should also be analysed when nitrate concentrations are high in the source water.

# ORGANIC NITROGEN

- Organic nitrogen consists mainly of protein substances and the product of their biochemical transformations.
- Organic nitrogen is naturally subject to the seasonal fluctuations of the biological community because it is mainly formed in water by phytoplankton and bacteria, and cycled within the food chain. Increased concentrations of organic nitrogen could indicate pollution of a water body.

# ORGANIC NITROGEN

- Organic nitrogen is usually determined using the Kjeldahl method which gives total ammonia nitrogen plus total organic nitrogen (Kjeldahl N).
- The difference between the total nitrogen and the inorganic forms gives the total organic nitrogen content.