

### National Water Quality Standards For Malaysia

PARAMETER	UNIT	CLASS				
		I	IIA/IIB	III#	IV	V
Al	mg/l	NATURAL LEVELS OR ABSENT	-	(0.06)	0.5	LEVEL ABOVE IV
As	mg/l		0.05	0.4 (0.05)	0.1	
Ba	mg/l		1	-	-	
Cd	mg/l		0.01	0.01* (0.001)	0.01	
Cr (IV)	mg/l		0.05	1.4 (0.05)	0.1	
Cr (III)	mg/l		-	2.5	-	
Cu	mg/l		0.02	-	-	
Hardness	mg/l		250	-	-	
Ca	mg/l		-	-	-	
Mg	mg/l		-	-	-	
Na	mg/l		-	-	3 SAR	
K	mg/l		-	-	-	
Fe	mg/l		1	1	1 (Leaf) 5 (Others)	
Pd	mg/l		0.05	0.02* (0.01)	5	
Mn	mg/l		0.1	0.1	0.2	
Hg	mg/l		0.001	0.004 (0.0001)	0.002	
Ni	mg/l		0.05	0.9*	0.2	
Se	mg/l		0.01	0.25 (0.04)	0.02	
Ag	mg/l		0.05	0.0002	-	
Sn	mg/l		-	0.004	-	
U	mg/l	-	-	-		
Zn	mg/l	5	0.4*	2		
B	mg/l	1	(3.4)	0.8		
Cl	mg/l	200	-	80		
Cl <sub>2</sub>	mg/l	-	(0.02)	-		
CN	mg/l	0.02	0.06 (0.02)	-		
F	mg/l	1.5	10	1		

NO <sub>2</sub>	mg/l	0.4	0.4 (0.03)	1
NO <sub>3</sub>	mg/l	7	-	5
P	mg/l	0.2	0.1	-
Silica	mg/l	50	-	-
SO <sub>4</sub>	mg/l	250	-	-
S	mg/l	0.05	(0.001)	-
CO <sub>2</sub>	mg/l	-	-	-
Gross- $\alpha$	Bg/l	0.01	-	-
Gross- $\beta$	Bg/l	1	-	-
Ra-226	Bg/l	< 0.1	-	-
Sr-90	Bg/l	< 1	-	-
CCE	$\mu$ g/l	500	-	-
MBAS/BAS	$\mu$ g/l	500	5000 (200)	-
O&G (Mineral)	$\mu$ g/l	40 ; N	N	-
O&G (Emulsified Edible)	$\mu$ g/l	7000 ; N	N	-
PCB	$\mu$ g/l	0.1	6 (0.05)	-
Phenol	$\mu$ g/l	10	-	-
Aldrin/Dieldrin	$\mu$ g/l	0.02	0.2 (0.01)	-
BHC	$\mu$ g/l	2	9 (0.1)	-
Chlordane	$\mu$ g/l	0.08	2 (0.02)	-
t-DDT	$\mu$ g/l	0.1	(1)	-
Endosulfan	$\mu$ g/l	10	-	-
Heptachlor/Epoxide	$\mu$ g/l	0.05	0.9 (0.06)	-
Lindane	$\mu$ g/l	2	3 (0.4)	-
2,4-D	$\mu$ g/l	70	450	-
2,4,5-T	$\mu$ g/l	10	160	-
2,4,5-TP	$\mu$ g/l	4	850	-
Paraquat	$\mu$ g/l	10	1800	-

#### Notes

\* = At hardness 50 mg/l CaCO<sub>3</sub>

# = Maximum (unbracketed) and 24-hour average (bracketed) concentrations

N = Free from visible film sheen, discolouration and deposits

Source :  
EQR2006

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PARAMETER	UNIT	CLASS					
		I	IIA	IIB	III	IV	V
Ammoniacal Nitrogen	mg/l	0.1	0.3	0.3	0.9	2.7	> 2.7
Biochemical Oxygen Demand	mg/l	1	3	3	6	12	> 12
Chemical Oxygen Demand	mg/l	10	25	25	50	100	> 100
Dissolved Oxygen	mg/l	7	5 - 7	5 - 7	3 - 5	< 3	< 1
pH	-	6.5 - 8.5	6 - 9	6 - 9	5 - 9	5 - 9	-
Colour	TCU	15	150	150	-	-	-
Electrical Conductivity*	µS/cm	1000	1000	-	-	6000	-
Floatables	-	N	N	N	-	-	-
Odour	-	N	N	N	-	-	-
Salinity	%	0.5	1	-	-	2	-
Taste	-	N	N	N	-	-	-
Total Dissolved Solid	mg/l	500	1000	-	-	4000	-
Total Suspended Solid	mg/l	25	50	50	150	300	300
Temperature	°C	-	Normal + 2 °C	-	Normal + 2 °C	-	-
Turbidity	NTU	5	50	50	-	-	-
Faecal Coliform**	count/100 ml	10	100	400	5000 (20000) <sup>a</sup>	5000 (20000) <sup>a</sup>	-
Total Coliform	count/100 ml	100	5000	5000	50000	50000	> 50000

### Notes

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## DOE Water Quality Index Classification

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PARAMETER	UNIT	CLASS				
		I	II	III	IV	V
Ammoniacal Nitrogen	mg/l	< 0.1	0.1 - 0.3	0.3 - 0.9	0.9 - 2.7	> 2.7
Biochemical Oxygen Demand	mg/l	< 1	1 - 3	3 - 6	6 - 12	> 12
Chemical Oxygen Demand	mg/l	< 10	10 - 25	25 - 50	50 - 100	> 100
Dissolved Oxygen	mg/l	> 7	5 - 7	3 - 5	1 - 3	< 1
pH	-	> 7	6 - 7	5 - 6	< 5	> 5
Total Suspended Solid	mg/l	< 25	25 - 50	50 - 150	150 - 300	> 300
Water Quality Index (WQI)	-	< 92.7	76.5 - 92.7	51.9 - 76.5	31.0 - 51.9	> 31.0

### Water Classes And Uses

CLASS	USES
Class I	Conservation of natural environment. Water Supply I - Practically no treatment necessary. Fishery I - Very sensitive aquatic species.
Class IIA	Water Supply II - Conventional treatment. Fishery II - Sensitive aquatic species.
Class IIB	Recreational use body contact.
Class III	Water Supply III - Extensive treatment required. Fishery III - Common, of economic value and tolerant species; livestock drinking.
Class IV	Irrigation
Class V	None of the above.

Source : EQR2006

### DOE Water Quality Classification Based On Water Quality Index

SUB INDEX & WATER QUALITY INDEX	INDEX RANGE		
	CLEAN	SLIGHTLY POLLUTED	POLLUTED
Biochemical Oxygen Demand(BOD)	91 - 100	80 - 90	0 - 79
Ammoniacal Nitrogen(NH <sub>3</sub> -N)	92 - 100	71 - 91	0 - 70
Suspended Solids(SS)	76 - 100	70 - 75	0 - 69
Water Quality Index(WQI)	81 - 100	60 - 80	0 - 59

Source : EQR2006

## WQI FORMJLAAND CALCULATION

### FORMULA

$$WQI = (0.22 * SIDO) + (0.19 * SIBOD) + (0.16 * SICOD) + (0.15 * SIAN) + (0.16 * SISS) + (0.12 * SipH)$$

where;

SIDO = SubIndex DO (% saturation)

SIBOD = SubIndex BOD

SICOD = SubIndex COD

SIAN = SubIndex NH<sub>3</sub>-N

SISS = SubIndex SS

SipH = SubIndex pH

$$0 \leq WQI \leq 100$$

### BEST FIT EQUATIONS FOR THE ESTIMATION OF VARIOUS SUBINDEX VALIES

SubIndex for DO (In % saturation)

$$\begin{aligned} SIDO &= 0 && \text{for } x \leq 8 \\ SIDO &= 100 && \text{for } x \leq 92 \\ SIDO &= -0.395 + 0.030x^2 - 0.00020x^3 && \text{for } 8 < x < 92 \end{aligned}$$

SubIndex for BOD

$$\begin{aligned} SIDOD &= 100.4 - 4.23x && \text{for } x \leq 5 \\ SIDOD &= 108 * \exp(-0.055x) - 0.1x && \text{for } x > 5 \end{aligned}$$

SubIndex for COD

$$\begin{aligned} SICOD &= -1.33x + 99.1 && \text{for } x \leq 20 \\ SICOD &= 103 * \exp(-0.0157x) - 0.04x && \text{for } x > 20 \end{aligned}$$

SubIndex for NH<sub>3</sub>-N

$$\begin{aligned} SIAN &= 100.5 - 105x && \text{for } x \leq 0.3 \\ SIAN &= 94 * \exp(-0.573x) - 5 * |x - 2| && \text{for } 0.3 < x < 4 \\ SIAN &= 0 && \text{for } x \geq 4 \end{aligned}$$

SubIndex for SS

$$\begin{aligned} SISS &= 97.5 * \exp(-0.00676x) + 0.05x && \text{for } x \leq 100 \\ SISS &= 71 * \exp(-0.0061x) + 0.015x && \text{for } 100 < x < 1000 \\ SISS &= 0 && \text{for } x \geq 1000 \end{aligned}$$

SubIndex for pH

$$\begin{aligned} SipH &= 17.02 - 17.2x + 5.02x^2 && \text{for } x < 5.5 \\ SipH &= -242 + 95.5x - 6.67x^2 && \text{for } 5.5 \leq x < 7 \\ SipH &= -181 + 82.4x - 6.05x^2 && \text{for } 7 \leq x < 8.75 \end{aligned}$$

$$\text{SlpH} = 536 - 77.0x + 2.76x^2$$

for  $x \geq 8.75$

Note:

\*means multiply with