**Effect of Temperature on Effluent Quality in a Biological Wastewater Treatment Process**

**Supplementary Data:**

The effluent quality in terms of composite and state variables for various temperature coefficients with changing kinetic parameters for temperatures 280C and 300C are presented in the tables below.

Table 1: Effluent quality considering effect of temperature coefficient on maximum heterotrophic growth rate at 280C

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect of µH at 28°C** | | | | | | | | | | |
| **Temp. coeff. →** | **0.5** | **0.8** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **Variable↓** | **Composite Variables** | | | | | | | | | |
| **Net EQI** | 143.61 | 144.04 | 144.18 | 145.39 | 146.55 | 147.70 | 148.89 | 150.14 | 151.32 | 152.56 |
| **TSS** | 14.19 | 14.19 | 14.19 | 14.18 | 14.18 | 14.18 | 14.18 | 14.18 | 14.18 | 14.18 |
| **cBOD5** | 2.15 | 2.15 | 2.16 | 2.17 | 2.18 | 2.20 | 2.21 | 2.22 | 2.24 | 2.25 |
| **COD** | 44.61 | 44.62 | 44.63 | 44.68 | 44.74 | 44.79 | 44.85 | 44.90 | 44.95 | 45.01 |
| **Ammonia** | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 |
| **TKN** | 2.279 | 2.278 | 2.278 | 2.278 | 2.277 | 2.277 | 2.276 | 2.275 | 2.275 | 2.274 |
| **TN** | 9.253 | 9.259 | 9.257 | 9.268 | 9.274 | 9.281 | 9.290 | 9.301 | 9.309 | 9.319 |
| **State Variables** | | | | | | | | | | |
| **SI** | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| **SS** | 0.0267 | 0.0428 | 0.0535 | 0.107 | 0.161 | 0.216 | 0.27 | 0.325 | 0.38 | 0.436 |
| **XI** | 4.16 | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 |
| **XS** | 0.178 | 0.178 | 0.178 | 0.178 | 0.178 | 0.178 | 0.178 | 0.178 | 0.178 | 0.177 |
| **XBH** | 8.33 | 8.33 | 8.33 | 8.33 | 8.33 | 8.33 | 8.33 | 8.33 | 8.33 | 8.33 |
| **XBA** | 0.132 | 0.132 | 0.132 | 0.132 | 0.132 | 0.132 | 0.132 | 0.132 | 0.132 | 0.132 |
| **XU** | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 |
| **SO** | 1.12 | 1.12 | 1.12 | 1.12 | 1.12 | 1.12 | 1.12 | 1.12 | 1.12 | 1.12 |
| **SNH** | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 |
| **SNO** | 6.97 | 6.98 | 6.98 | 6.99 | 7.00 | 7.00 | 7.01 | 7.03 | 7.03 | 7.04 |
| **SND** | 0.453 | 0.452 | 0.452 | 0.452 | 0.452 | 0.452 | 0.452 | 0.452 | 0.452 | 0.452 |
| **XND** | 0.0124 | 0.0124 | 0.0124 | 0.0124 | 0.0124 | 0.0124 | 0.0124 | 0.0124 | 0.0124 | 0.0124 |
| **SALK** | 4.822 | 4.821 | 4.822 | 4.820 | 4.820 | 4.820 | 4.819 | 4.818 | 4.817 | 4.817 |

Table 2: Effluent quality considering effect of temperature coefficient on maximum autotrophic growth rate at 280C

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect of µA at 28°C** | | | | | | | | | | | |
| **Temp. coeff. →** | **0.05** | **0.08** | **0.1** | **0.12** | **0.15** | **0.18** | **0.2** | **0.22** | **0.25** | **0.28** | **0.3** |
| **Variable↓** | **Composite Variables** | | | | | | | | | |  |
| **Net EQI** | 149.60 | 153.20 | 154.90 | 156.10 | 157.10 | 156.90 | 156.10 | 155.10 | 152.70 | 149.20 | 146.60 |
| **TSS** | 14.19 | 14.92 | 14.19 | 14.18 | 14.19 | 14.19 | 14.19 | 14.18 | 14.19 | 14.18 | 14.18 |
| **cBOD5** | 2.18 | 2.18 | 2.18 | 2.18 | 2.18 | 2.18 | 2.18 | 2.18 | 2.18 | 2.18 | 2.18 |
| **COD** | 44.74 | 44.74 | 44.74 | 44.74 | 44.74 | 44.74 | 44.74 | 44.74 | 44.74 | 44.74 | 44.74 |
| **Ammonia** | 0.02 | 0.03 | 0.04 | 0.05 | 0.08 | 0.13 | 0.18 | 0.23 | 0.36 | 0.58 | 0.78 |
| **TKN** | 1.52 | 1.53 | 1.54 | 1.55 | 1.58 | 1.63 | 1.67 | 1.73 | 1.86 | 2.07 | 2.28 |
| **TN** | 8.67 | 8.87 | 8.97 | 9.05 | 9.13 | 9.17 | 9.18 | 9.18 | 9.18 | 9.21 | 9.27 |
| **State Variables** | | | | | | | | | | | |
| **SI** | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 |
| **SS** | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 |
| **XI** | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 |
| **XS** | 0.18 | 0.18 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 | 0.18 | 0.18 | 0.18 | 0.18 |
| **XBH** | 8.34 | 8.34 | 8.34 | 8.34 | 8.34 | 8.34 | 8.34 | 8.34 | 8.33 | 8.33 | 8.33 |
| **XBA** | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| **XU** | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 | 1.77 |
| **SO** | 2.51 | 2.39 | 2.29 | 2.18 | 2.00 | 1.80 | 1.67 | 1.54 | 1.36 | 1.20 | 1.12 |
| **SNH** | 0.02 | 0.03 | 0.04 | 0.05 | 0.08 | 0.13 | 0.18 | 0.23 | 0.36 | 0.58 | 0.78 |
| **SNO** | 7.16 | 7.34 | 7.44 | 7.50 | 7.55 | 7.54 | 7.50 | 7.45 | 7.32 | 7.14 | 7.00 |
| **SND** | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 |
| **XND** | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **SALK** | 4.75 | 4.74 | 4.74 | 4.73 | 4.73 | 4.74 | 4.74 | 4.75 | 4.77 | 4.80 | 4.82 |

Table 3: Effluent quality considering effect of temperature coefficient on heterotrophic decay rate at 280C

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect of bH at 28°C** | | | | | | | | | | | | |
| **Temp. coeff. →** | **0.05** | **0.06** | **0.07** | **0.08** | **0.09** | **0.1** | **0.2** | **0.3** | **0.4** | **0.6** | **0.7** | **0.8** |
| **Variable↓** | **Composite Variables** | | | | | | | | | | | |
| **Net EQI** | 87.7 | 92.5 | 97.6 | 102 | 107 | 111 | 146 | 171 | 187 | 210 | 218 | 224 |
| **TSS** | 12.9 | 13.0 | 13.1 | 13.2 | 13.3 | 13.4 | 14.1 | 14.6 | 14.9 | 15.3 | 15.4 | 15.5 |
| **cBOD5** | 1.25 | 1.33 | 1.41 | 1.49 | 1.57 | 1.64 | 2.18 | 2.51 | 2.71 | 2.97 | 3.05 | 3.12 |
| **COD** | 42.7 | 42.8 | 42.9 | 43.1 | 43.3 | 43.4 | 44.7 | 45.5 | 46.0 | 46.7 | 46.9 | 47.1 |
| **Ammonia** | 1.30 | 1.24 | 1.18 | 1.12 | 1.07 | 1.03 | 0.78 | 0.67 | 0.62 | 0.57 | 0.55 | 0.54 |
| **TKN** | 3.90 | 3.56 | 3.30 | 3.11 | 2.96 | 2.84 | 2.28 | 2.11 | 2.04 | 1.98 | 1.96 | 1.95 |
| **TN** | 9.82 | 9.61 | 9.47 | 9.37 | 9.30 | 9.25 | 9.27 | 9.59 | 9.89 | 10.3 | 10.5 | 10.7 |
| **State Variables** | | | | | | | | | | | | |
| **SI** | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| **SS** | 0.67 | 0.55 | 0.46 | 0.40 | 0.36 | 0.32 | 0.16 | 0.11 | 0.09 | 0.07 | 0.06 | 0.05 |
| **XI** | 4.59 | 4.55 | 4.50 | 4.46 | 4.42 | 4.39 | 4.17 | 4.05 | 3.98 | 3.91 | 3.88 | 3.86 |
| **XS** | 0.51 | 0.42 | 0.37 | 0.33 | 0.30 | 0.28 | 0.18 | 0.14 | 0.12 | 0.09 | 0.09 | 0.08 |
| **XBH** | 3.70 | 4.22 | 4.71 | 5.13 | 5.53 | 5.87 | 8.33 | 9.77 | 10.60 | 11.70 | 12.10 | 12.30 |
| **XBA** | 0.16 | 0.16 | 0.15 | 0.15 | 0.15 | 0.15 | 0.13 | 0.12 | 0.12 | 0.11 | 0.11 | 0.11 |
| **XU** | 3.07 | 2.93 | 2.80 | 2.68 | 2.57 | 2.47 | 1.77 | 1.37 | 1.13 | 0.84 | 0.74 | 0.67 |
| **SO** | 0.57 | 0.61 | 0.64 | 0.68 | 0.72 | 0.75 | 1.12 | 1.45 | 1.69 | 2.05 | 2.18 | 2.28 |
| **SNH** | 1.30 | 1.24 | 1.18 | 1.12 | 1.07 | 1.03 | 0.78 | 0.67 | 0.62 | 0.57 | 0.55 | 0.54 |
| **SNO** | 5.92 | 6.05 | 6.17 | 6.26 | 6.34 | 6.41 | 7.00 | 7.49 | 7.85 | 8.40 | 8.59 | 8.75 |
| **SND** | 1.79 | 1.49 | 1.27 | 1.11 | 0.99 | 0.90 | 0.45 | 0.31 | 0.24 | 0.17 | 0.15 | 0.14 |
| **XND** | 0.04 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **SALK** | 4.93 | 4.92 | 4.91 | 4.90 | 4.88 | 4.88 | 4.80 | 4.75 | 4.71 | 4.65 | 4.63 | 4.62 |

Table 4: Effluent quality considering effect of temperature coefficient on autotrophic decay rate at 280C

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect of bA at 28°C** | | | | | | | | | | |
| **Temp. coeff. →** | **0.024** | **0.026** | **0.028** | **0.03** | **0.04** | **0.05** | **0.06** | **0.07** | **0.08** | **0.09** |
| **Variable↓** | **Composite Variables** | | | | | | | | | |
| **Net EQI** | 136.40 | 140.90 | 144.45 | 146.55 | 153.63 | 156.35 | 157.65 | 158.08 | 158.37 | 158.46 |
| **TSS** | 14.18 | 14.18 | 14.18 | 14.18 | 14.19 | 14.20 | 14.20 | 14.20 | 14.21 | 14.21 |
| **cBOD5** | 2.18 | 2.18 | 2.18 | 2.18 | 2.19 | 2.19 | 2.20 | 2.20 | 2.20 | 2.20 |
| **COD** | 44.73 | 44.73 | 44.74 | 44.74 | 44.75 | 44.76 | 44.77 | 44.77 | 44.78 | 44.79 |
| **Ammonia** | 1.76 | 1.29 | 0.95 | 0.78 | 0.33 | 0.20 | 0.14 | 0.11 | 0.09 | 0.08 |
| **TKN** | 3.26 | 2.79 | 2.45 | 2.28 | 1.82 | 1.70 | 1.63 | 1.61 | 1.59 | 1.58 |
| **TN** | 9.74 | 9.49 | 9.34 | 9.27 | 9.18 | 9.19 | 9.19 | 9.18 | 9.17 | 9.16 |
| **State Variables** | | | | | | | | | | |
| **SI** | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 |
| **SS** | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 |
| **XI** | 4.17 | 4.17 | 4.17 | 4.17 | 4.17 | 4.16 | 4.16 | 4.16 | 4.16 | 4.16 |
| **XS** | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 |
| **XBH** | 8.34 | 8.34 | 8.33 | 8.33 | 8.32 | 8.31 | 8.30 | 8.29 | 8.28 | 8.28 |
| **XBA** | 0.11 | 0.12 | 0.13 | 0.13 | 0.17 | 0.19 | 0.22 | 0.24 | 0.26 | 0.27 |
| **XU** | 1.77 | 1.77 | 1.77 | 1.77 | 1.76 | 1.76 | 1.76 | 1.75 | 1.75 | 1.75 |
| **SO** | 0.98 | 1.02 | 1.07 | 1.12 | 1.41 | 1.61 | 1.79 | 1.88 | 1.97 | 2.01 |
| **SNH** | 1.76 | 1.29 | 0.95 | 0.78 | 0.33 | 0.20 | 0.14 | 0.11 | 0.09 | 0.08 |
| **SNO** | 6.47 | 6.70 | 6.89 | 7.00 | 7.36 | 7.49 | 7.55 | 7.57 | 7.58 | 7.58 |
| **SND** | 0.46 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 |
| **XND** | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **SALK** | 4.93 | 4.88 | 4.84 | 4.82 | 4.76 | 4.74 | 4.73 | 4.73 | 4.73 | 4.73 |

Table 5: Effluent quality considering effect of temperature coefficient on maximum heterotrophic growth rate at 300C

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect of µH at 30°C** | | | | | | | | | | |
| **Temp. coeff. →** | **0.5** | **0.8** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **Variable↓** | **Composite Variables** | | | | | | | | | |
| **Net EQI** | 144.00 | 144.10 | 144.10 | 144.90 | 145.80 | 146.90 | 148.00 | 149.40 | 150.80 | 152.30 |
| **TSS** | 14.05 | 14.05 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.03 |
| **cBOD5** | 2.03 | 2.04 | 2.04 | 2.05 | 2.06 | 2.07 | 2.08 | 2.10 | 2.11 | 2.13 |
| **COD** | 44.32 | 44.33 | 44.32 | 44.36 | 44.40 | 44.45 | 44.50 | 44.56 | 44.62 | 44.69 |
| **Ammonia** | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 |
| **TKN** | 2.30 | 2.30 | 2.30 | 2.30 | 2.30 | 2.30 | 2.30 | 2.29 | 2.29 | 2.29 |
| **TN** | 9.58 | 9.58 | 9.58 | 9.59 | 9.59 | 9.60 | 9.61 | 9.62 | 9.64 | 9.64 |
| **State Variables** | | | | | | | | | | |
| **SI** | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| **SS** | 0.01 | 0.02 | 0.02 | 0.06 | 0.10 | 0.15 | 0.20 | 0.26 | 0.32 | 0.39 |
| **XI** | 4.21 | 4.21 | 4.21 | 4.21 | 4.21 | 4.21 | 4.21 | 4.21 | 4.21 | 4.21 |
| **XS** | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 |
| **XBH** | 7.92 | 7.92 | 7.92 | 7.92 | 7.92 | 7.92 | 7.92 | 7.92 | 7.92 | 7.91 |
| **XBA** | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 |
| **XU** | 1.91 | 1.91 | 1.90 | 1.90 | 1.90 | 1.90 | 1.90 | 1.90 | 1.90 | 1.90 |
| **SO** | 1.39 | 1.39 | 1.39 | 1.39 | 1.39 | 1.39 | 1.39 | 1.39 | 1.39 | 1.39 |
| **SNH** | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 | 0.84 |
| **SNO** | 7.28 | 7.28 | 7.29 | 7.29 | 7.30 | 7.31 | 7.32 | 7.33 | 7.34 | 7.35 |
| **SND** | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 |
| **XND** | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| **SALK** | 4.80 | 4.80 | 4.80 | 4.80 | 4.80 | 4.80 | 4.80 | 4.80 | 4.80 | 4.80 |

Table 6: Effluent quality considering effect of temperature coefficient on maximum autotrophic growth rate at 300C

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect of µA at 30°C** | | | | | | | | | | | |
| **Temp. coeff. →** | **0.05** | **0.08** | **0.1** | **0.12** | **0.15** | **0.18** | **0.2** | **0.22** | **0.25** | **0.28** | **0.3** |
| **Variable↓** | **Composite Variables** | | | | | | | | | |  |
| **Net EQI** | 144.2 | 148.7 | 151.4 | 153.8 | 156.6 | 158 | 158 | 157.3 | 154.6 | 150 | 145.8 |
| **TSS** | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 | 14.04 |
| **cBOD5** | 2.057 | 2.056 | 2.056 | 2.056 | 2.056 | 2.056 | 2.056 | 2.056 | 2.056 | 2.056 | 2.056 |
| **COD** | 44.4 | 44.4 | 44.4 | 44.4 | 44.4 | 44.4 | 44.4 | 44.4 | 44.4 | 44.4 | 44.4 |
| **Ammonia** | 0.00802 | 0.0160 | 0.023 | 0.0319 | 0.0515 | 0.0848 | 0.1201 | 0.1722 | 0.3032 | 0.5512 | 0.8401 |
| **TKN** | 1.468 | 1.474 | 1.48 | 1.488 | 1.506 | 1.539 | 1.574 | 1.626 | 1.757 | 2.006 | 2.296 |
| **TN** | 8.678 | 8.919 | 9.07 | 9.206 | 9.37 | 9.478 | 9.516 | 9.527 | 9.518 | 9.525 | 9.594 |
| **State Variables** | | | | | | | | | | | |
| **SI** | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| **SS** | 0.0974 | 0.096 | 0.096 | 0.0964 | 0.0962 | 0.0962 | 0.0962 | 0.0964 | 0.0968 | 0.0974 | 0.0980 |
| **XI** | 4.208 | 4.206 | 4.207 | 4.207 | 4.206 | 4.206 | 4.207 | 4.208 | 4.206 | 4.207 | 4.208 |
| **XS** | 0.1831 | 0.182 | 0.181 | 0.181 | 0.1806 | 0.1805 | 0.1806 | 0.1809 | 0.1817 | 0.183 | 0.1841 |
| **XBH** | 7.922 | 7.923 | 7.923 | 7.923 | 7.923 | 7.923 | 7.922 | 7.921 | 7.922 | 7.921 | 7.919 |
| **XBA** | 0.0898 | 0.089 | 0.089 | 0.0898 | 0.0899 | 0.0899 | 0.0898 | 0.0897 | 0.0895 | 0.0889 | 0.0881 |
| **XU** | 1.904 | 1.904 | 1.904 | 1.904 | 1.904 | 1.905 | 1.905 | 1.904 | 1.904 | 1.903 | 1.903 |
| **SO** | 2.996 | 2.946 | 2.891 | 2.813 | 2.652 | 2.438 | 2.27 | 2.088 | 1.802 | 1.534 | 1.386 |
| **SNH** | 0.0080 | 0.016 | 0.023 | 0.0319 | 0.0515 | 0.084 | 0.1201 | 0.1722 | 0.3032 | 0.5512 | 0.8401 |
| **SNO** | 7.21 | 7.445 | 7.59 | 7.718 | 7.864 | 7.94 | 7.943 | 7.901 | 7.761 | 7.519 | 7.298 |
| **SND** | 0.4396 | 0.437 | 0.436 | 0.4353 | 0.4342 | 0.433 | 0.4332 | 0.4333 | 0.4337 | 0.4348 | 0.4361 |
| **XND** | 0.0128 | 0.012 | 0.012 | 0.012 | 0.012 | 0.012 | 0.012 | 0.012 | 0.012 | 0.012 | 0.0129 |
| **SALK** | 4.75 | 4.734 | 4.724 | 4.715 | 4.706 | 4.703 | 4.705 | 4.712 | 4.731 | 4.767 | 4.803 |

Table 7: Effluent quality considering effect of temperature coefficient on heterotrophic decay rate at 300C

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect of bH at 30°C** | | | | | | | | | | | | |
| **Temp. coeff. →** | **0.05** | **0.06** | **0.07** | **0.08** | **0.09** | **0.1** | **0.2** | **0.3** | **0.4** | **0.6** | **0.7** | **0.8** |
| **Variable↓** | **Composite Variables** | | | | | | | | |  | | |
| **Net EQI** | 82.6 | 81.0 | 84.8 | 89.3 | 94.5 | 99.7 | 145. | 179.6 | 203.7 | 233 | 242.1 | 249 |
| **TSS** | 12.7 | 12.6 | 12.7 | 12.8 | 12.9 | 13.0 | 14.0 | 14.66 | 15.07 | 15.55 | 15.69 | 15.8 |
| **cBOD5** | 1.00 | 1.02 | 1.05 | 1.13 | 1.21 | 1.30 | 2.05 | 2.513 | 2.798 | 3.118 | 3.213 | 3.28 |
| **COD** | 42.3 | 42.1 | 42.1 | 42.3 | 42.4 | 42.6 | 44.4 | 45.53 | 46.26 | 47.09 | 47.35 | 47.5 |
| **Ammonia** | 1.30 | 1.32 | 1.29 | 1.24 | 1.19 | 1.15 | 0.84 | 0.718 | 0.659 | 0.604 | 0.589 | 0.57 |
| **TKN** | 5.05 | 4.44 | 3.97 | 3.62 | 3.35 | 3.13 | 2.29 | 2.105 | 2.039 | 1.996 | 1.988 | 1.98 |
| **TN** | 11.0 | 10.6 | 10.2 | 10.0 | 9.86 | 9.74 | 9.59 | 10.05 | 10.53 | 11.2 | 11.43 | 11.6 |
| **State Variables** | | | | | | | | | | | | |
| **SI** | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| **SS** | 0.74 | 0.56 | 0.44 | 0.36 | 0.30 | 0.25 | 0.09 | 0.059 | 0.043 | 0.029 | 0.026 | 0.02 |
| **XI** | 4.68 | 4.69 | 4.66 | 4.61 | 4.56 | 4.52 | 4.20 | 4.046 | 3.955 | 3.862 | 3.835 | 3.81 |
| **XS** | 1.35 | 0.75 | 0.55 | 0.44 | 0.38 | 0.34 | 0.18 | 0.132 | 0.106 | 0.080 | 0.073 | 0.06 |
| **XBH** | 2.05 | 2.63 | 3.15 | 3.65 | 4.12 | 4.56 | 7.91 | 9.86 | 11.06 | 12.39 | 12.79 | 13.0 |
| **XBA** | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.08 | 0.080 | 0.075 | 0.070 | 0.068 | 0.06 |
| **XU** | 3.38 | 3.36 | 3.25 | 3.12 | 2.99 | 2.86 | 1.90 | 1.355 | 1.024 | 0.661 | 0.554 | 0.47 |
| **SO** | 0.68 | 0.68 | 0.71 | 0.75 | 0.79 | 0.84 | 1.38 | 1.902 | 2.296 | 2.794 | 2.952 | 3.07 |
| **SNH** | 1.30 | 1.32 | 1.29 | 1.24 | 1.19 | 1.15 | 0.84 | 0.718 | 0.659 | 0.604 | 0.589 | 0.57 |
| **SNO** | 6.03 | 6.16 | 6.3 | 6.41 | 6.51 | 6.60 | 7.29 | 7.95 | 8.494 | 9.207 | 9.437 | 9.61 |
| **SND** | 2.99 | 2.35 | 1.90 | 1.57 | 1.33 | 1.14 | 0.43 | 0.258 | 0.183 | 0.118 | 0.102 | 0.09 |
| **XND** | 0.09599 | 0.05372 | 0.03952 | 0.03231 | 0.02784 | 0.02474 | 0.01293 | 0.009043 | 0.007032 | 0.005007 | 0.004439 | 0.00402 |
| **SALK** | 4.92 | 4.91 | 4.90 | 4.89 | 4.88 | 4.87 | 4.80 | 4.748 | 4.705 | 4.65 | 4.632 | 4.61 |

Table 8: Effluent quality considering effect of temperature coefficient on autotrophic decay rate at 300C

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Effect of bA at 30°C** | | | | | | | | | | |
| **Temp. coeff. →** | **0.024** | **0.026** | **0.028** | **0.03** | **0.04** | **0.05** | **0.06** | **0.07** | **0.08** | **0.09** |
| **Variable↓** | **Composite Variables** | | | | | | | | | |
| **Net EQI** | 117.9 | 132.8 | 140.8 | 145.8 | 156.2 | 158.7 | 158.9 | 158.5 | 157.9 | 157.5 |
| **Flow** | 18940 | 18940 | 18940 | 18940 | 18940 | 18940 | 18940 | 18940 | 18940 | 18940 |
| **TSS** | 14.03 | 14.03 | 14.04 | 14.04 | 14.05 | 14.05 | 14.06 | 14.06 | 14.07 | 14.07 |
| **cBOD5** | 2.052 | 2.053 | 2.055 | 2.056 | 2.061 | 2.065 | 2.07 | 2.074 | 2.078 | 2.081 |
| **COD** | 44.38 | 44.39 | 44.4 | 44.4 | 44.41 | 44.42 | 44.43 | 44.44 | 44.45 | 44.46 |
| **Ammonia** | 4.086 | 2.086 | 1.258 | 0.8401 | 0.2388 | 0.1217 | 0.0801 | 0.0604 | 0.0493 | 0.0423 |
| **TKN** | 5.556 | 3.547 | 2.715 | 2.296 | 1.693 | 1.577 | 1.536 | 1.517 | 1.507 | 1.501 |
| **TN** | 11.4 | 10.17 | 9.751 | 9.594 | 9.529 | 9.53 | 9.489 | 9.441 | 9.39 | 9.354 |
| **State Variables** | | | | | | | | | | |
| **SI** | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| **SS** | 0.1026 | 0.0998 | 0.0987 | 0.0980 | 0.0965 | 0.0961 | 0.0959 | 0.0959 | 0.0959 | 0.0959 |
| **XI** | 4.211 | 4.208 | 4.208 | 4.208 | 4.204 | 4.203 | 4.201 | 4.2 | 4.2 | 4.198 |
| **XS** | 0.1937 | 0.1881 | 0.1856 | 0.1841 | 0.1808 | 0.1797 | 0.1791 | 0.1787 | 0.1785 | 0.1782 |
| **XBH** | 7.915 | 7.92 | 7.921 | 7.919 | 7.909 | 7.895 | 7.883 | 7.871 | 7.862 | 7.852 |
| **XBA** | 0.0606 | 0.0715 | 0.0802 | 0.0881 | 0.1242 | 0.1574 | 0.188 | 0.2161 | 0.2415 | 0.2647 |
| **XU** | 1.899 | 1.902 | 1.902 | 1.903 | 1.897 | 1.892 | 1.887 | 1.883 | 1.877 | 1.875 |
| **SO** | 1.193 | 1.206 | 1.282 | 1.386 | 1.927 | 2.274 | 2.479 | 2.608 | 2.693 | 2.753 |
| **SNH** | 4.086 | 2.086 | 1.258 | 0.8401 | 0.2388 | 0.1217 | 0.0801 | 0.0604 | 0.0493 | 0.0423 |
| **SNO** | 5.84 | 6.62 | 7.036 | 7.298 | 7.836 | 7.953 | 7.953 | 7.923 | 7.882 | 7.853 |
| **SND** | 0.451 | 0.4418 | 0.438 | 0.4361 | 0.433 | 0.4324 | 0.4323 | 0.4323 | 0.4324 | 0.4323 |
| **XND** | 0.013 | 0.0131 | 0.01303 | 0.01293 | 0.01272 | 0.01263 | 0.01259 | 0.01256 | 0.01254 | 0.01252 |
| **SALK** | 5.139 | 4.94 | 4.852 | 4.803 | 4.722 | 4.705 | 4.702 | 4.703 | 4.704 | 4.707 |