|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S.No. | Source | Model Eq. | Dimension | Required parameters | State | Source dimension | Domain dimension | | | Processes | |
| Length | Width | Thickness | Chemical | Biological |
| 1 | Ham et al. (2004) |  | 2D | 5 | Steady | Point source | Infinite | Infinite | NA | Instantaneous Reaction | Zero oder reaction |
| 2 | Chu et al. (2005) |  | 2D | 6 | Steady | Line source | Infinite | Infinite | NA | Instantaneous Reaction | Double monod |
| 3 | Liedl et al. (2005) |  | 2D | 4 | Steady | Rectangular | Semi-infinite | NA | 0 - Aquifer Thickess | Instantaneous Reaction |  |
| 4 | Maier and Grathwohl (2006) |  | 2D | 4 | Steady |  | Semi-infinite | NA | 0 - Aquifer Thickess |  |  |
| 5 | Liedl et al (2011) |  | 3D | 8 | Steady | Planar source | Semi-infinite | Infinite | 0-Aquifer Thickness | Instantaneous Reaction |  |
| 6 | BIOSCREEN–AT – Karanovic et al. (2007) |  | 3D | 11 | Transient | Planar Source | Semi-infinite | Infinite | (Infinite)  from water table to relatively large depth | equilibrium sorption | first order reaction |

**Appendix: Notation**

|  |  |
| --- | --- |
| **Spatial quantities** | |
| x,y,z | Cartesian co-ordinates [L] |
|  |  |
| **Source geometry quantities** | |
| *M* and *W* | Source thickness and width [L] |
| *H* | Depth of source penetration [L] – BIOSCREEN- AT |
| *n* | Porosity [-] |
|  | Maximum plume length [L] |
| *LS* | width of the source zone [L] – Chu et al. (2005) |
|  |  |
|  |  |
| **Chemical reaction quantities** | |
| and | Initial reactant partner concentrations of electron donor and acceptor [ML-3] |
|  | Initial organic concentration [LT-3] ­– Chu et al. (2005) |
|  | Ambient oxygen concentration in the groundwater [LT-3] – Chu et al. (2005) |
|  | Threshold concentration [ML-3] ­ |
|  | Source decay coefficient  [ - ] – BIOSCREEN- AT |
|  | Utilization factor [ - ] |
| *FA* | Utilization factor [ - ] – Chu et al. (2005) |
|  | Decay factor [T-1] – BIOSCREEN- AT |
|  | Bio-utilization concentration [ML-3] |
|  |  |
| **Process quantities** | |
| and | Dispersivity in transverse horizontal and vertical directions [L] |
| *,* and | Dispersion coefficient/Retardation factor [LT-2] – BIOSCREEN- AT |
| *u* | Groundwater velocity [LT-1] |
|  | Groundwater velocity/Retardation factor [LT-1 ] – BIOSCREEN- AT |
| *Q* | Injection flow rate [L2T-1] |
| *q* | Specific discharge [LT-1] |
|  | Specific discharge in *x*-direction at *x* = 0 [LT-1] |
|  | Dispersion term of oxygen in the moving aqueous phase [L2T-1] – Chu et al. (2005) |
|  | Effective molecular diffusion coefficient of the oxygen [L2T-1] – Chu et al. (2005) |