Table 5

Limitations of the existing models.

Substrates	Model Type	Limitations
Benzene, toluene, ethylbenzene and o-xylene (BTEX) [10]	SKIP model	Category 1
Benzene, toluene and phenol [6]	SKIP model	Category 1
Phenol, chlorophenol and sodium glutamate (SG) [40]	Empirical kinetic model	Category 3. The utilization profile of SG is not modelled and SG concentration is correlated using a polynomial function.
Phenol and sodium salicylate [43]	Competitive and uncompetitive model	Categories 1 and 3
Naphthalene, phenanthrene and pyrene [8]	Multisubstrate form of the Monod model	Category 2. Biomass simulation results are presented without experimental measurements.
Toluene and phenol [4]	SKIP model	Category 2
Phenol and p-cresol [44]	SKIP model	Category 2
Toluene and trichloroethylene (TCE) [45]	Competitive inhibition	Category 3. The kinetic model was not able to predict the TCE removal in the absence of toluene or at very low toluene concentrations.
Phenol and toluene [41]	SKIP model	Category 3
Binary and complex mixtures of polycyclic aromatic hydrocarbons (PAHs) [46]	Multisubstrate biodegradation kinetic models: accounting or not accounting for competitive inhibition	Category 3. Neither of the two multisubstrate models was clearly optimal in the present study.
Pentachlorophenol and Tween 20 [47]	Contois model with substrate interaction effects	Category 3. Finding a single set of kinetic parameters that predicted all dual substrate tests was not achieved.
Benzene, toluene, and p-xylene [48]	Competitive inhibition	Category 2
Glucose and 2,4-dichlorophenoxyacetate [49]	Monod model accounting for inhibition by alternative substrates	Category 2
Glucose and aniline [50]	SKIP model	Category 2
Phenol and 4-chlorophenol [51]	Empirical kinetic model	The duration of the lag period is based on a fitted curve of the initial substrate concentration vs the lag period duration, for only a narrow substrate concentration range.

The most common limitations identified have been grouped in three main categories. Category 1 : The lag period is not modelled and the models are used to predict only the post lag-phase data; Category 2 : There is no comparison of the model's prediction against an independent experiment; Category 3 : The model predictions do not fit accurately the experimental results and it is not possible to predict a variety of multisubstrate experiments using a single set of parameters.