

Utilising Chemical Compounds of Biodegradation Modeling Process

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Abstract

The biodegradation kinetics of BTEX (Benzene, Toluene, Ethylbenzene, and Xylenes) compounds by *Pseudomonas putida* was studied. The degradation of BTEX compounds was monitored over time, and the kinetic parameters were determined. The results showed that the degradation of BTEX compounds followed a first-order kinetic model. The half-life of BTEX compounds was found to be 1.5 days. The maximum degradation rate was 0.67 day⁻¹. The results of this study can be used to design bioremediation systems for BTEX-contaminated sites.

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if mai i he ce fe ici f he ea ch ace, he e he m e ible a ame e e ec ide ed. e a ame e ' e i i e al ai a ible i aga hical dial g e. I de e ic he ea ch ace a d he ce bai fa c ege ce, he i ial a ge f ki e ic a ame e e e de mi ed ba ed hei eal mic bil gical mea i g. D ig he ea ch f gl bal im m f he bjec i e f ci , he a ge fki e ic a ame e e e ema icall ede ed a d ed ced, he e he be e al a ed al e e y e e ed [6].

O ic b a e ca be de e mi ed b, aki g he de i a i e f he A de e ai e al e . y, i ca be dem a ed ha he b a ec ce ai , i.e. he ci ic al b a ec ce ai c e di g he ac al, ca be calc la ed b E. I addi i , he i e i f b a e i hibi i ca be mea ed b he , al e a d b, he y ai be ee a ai a di hibi i c y a . e . / y ai a de e mi ed b, i g al e e e edi . ea h ha e e ed ha he cell ield y le e a i g i ca l l e ha he he BTEX bi deg adable y m d a imila y c ce ai . I he e i die e ed i he lie a e, he ki e ic a d ichi me ic a ame e e e bai ed c ide i g he a d f he he e a ame e al e e e ed e e ime al da a f he mi e f b a e b a lig c m le m del . I SKIP m del ide i cai , he i f y mai y bai ed d i g he ide i cai ced e f M d a d A de m del a e e ed a i ial a ame e ge [7]. I he d f bi deg ada i ki e ic f BTEX mi e, he mai di c l a y d he gl bal mi m f bjec i e f ci d i g he e y ime al da a i g ced e. i fac ca be e lai ed b, he big mbe fe ima ed a ame e . A al i g he bai ed OF y eid ef each m del SKIP, c m e i i e i hibi i , c m e i i e i hibi i a d c m e i i e l i hibi i i a ible de e mi e he m del ha be de c i be he e e ime al da a f m he BTEX bi deg ada i ce . SKIP m del e e e ed he e e ime al da a be e f, e lig i ami im m al e f bjec i e f ci . e e al ai f 24 a ame e al e f he m del e ed ed cie l, highe c m ai ale . M e e [8], he di c l i ide i y cai ced e a e beca e he ki e ic a ame e y a e li e al c ela ed. He ce, he age f he i f mai f m mic bial y h i l g y die hel e ic he ea ch each a ame e a y ge he e l bi l gical mea i g f l al e a e c ide ed. F m e e ci e m del ' di cimi ai i i e ce a y bai e fe e ime al da a i h e e i i .

ichi me ic a ame e e ima ed i hi k a e imila h e f db, he a h ha ha ei e iga ed he bi deg ada i f BTEX (Table 2) y hich e he eliabili fme i ed ab e ced e [9]. e al e f e i l de e mi ed y i i gle b a e bi deg ada i ce a e da a y i ial g e d i g he ide i cai ced e he m lile b a e bi deg ada i ki e ic a m delled. e l K al e i dica ed ha he c l e had highe a i y le e ha he he c m d e lig i highe eci c g y h y a e a d ield c e cie . I a e i ed ha M d m del edic e y ell y he bi deg ada i ki e ic i gle ic b a e, mai l a y l c ce ai . e e al a ed c a al e f M d m del y a e e i f ma i e a d ca be ed f he a c li all a ame e ' ide y i cai ced e. I f he al e f Ki e y high, he A de m del i im li ed M d f m. B a lig y he A de m del, i a e i ed ha he ma im m eci c g y h a e i highe l e e (he e e ime al da a i dica e i ha bee c med fa e), he ea he le e ha bee ili ed l e a d e led i l e al e. I addi i , he e ima ed K al e l e e gge highe c l e a i y l e e. e im lai e l bai ed i h A d m del y ge he i h he e e ime al da a e e e he deg ada i f i di id al ic b a e. e OF e id e bai ed b a lig PSO gl bal ea ch me h da e h a ell. B h m del ha y e each ed imila OF al e f be e e, e h l be e e a d le e c m d . e OF f l e e b a lig M d a d A d y e m del e e e al 0.010 a d 0.0024, e y eci el, I i ial b a ec ce ai ab e 40 mg L-1 fa he adj me y bai ed b A de ' m del; he ef e he m del lie m e i f mai ab y he y em. e i ial b a ec ce ai ab e he ci ic al e.

e ad a age f SKIP m del i ha i make ible he a i cai f he i e aci be ee BTEX b a e de he e e ce f lji a ame e . I Table 1, he lbe, I e, I e i e aci e a ame e ' al e h ha be e e, l e e l e e c m d e e li le e ec fi hibi i e h lbe e y e bi deg ada i .

$$(2(-) - 5(ic) - 6(a)5(g)8(e)$$

e e e ime al e l f m he lie a e e e ed i h ki d e mi i f he a h . e da a i di id al bi deg ada i c m d e e ba ed he f l l i g i i al c di i . e da a mi e b a e bi deg ada i ce e e ba ed he f l l i g i i al c di i . I ca e he e he i ial bi ma c ce ai al a a ailable, i a e ima ed b, PSO me h d, ge he i h he m del a ame e . I ca be iced, y ha e al ai f X0 d i g he ide i cai ced e m be d e i h ca i beca e he em e e i e e i i e he cha ge f i i al c di i . y e em f di a y di e e iale ai f each ki e ic m del a me y icall y l ed. y

e e ima ed a ame e al e f M d a d A de m del a e e e ed i Table 1. e ea ch f be a ame e al e a e ic ed, a d he i ial a ge fki e ic a ame e e e de mi ed ba ed hei eal mic bil gical mea i g ake f m he lie a e. S cha ach hel ed eme d l he PSO ea ch me h d d he gl bal im m a e fe i e ai y . I ca be ee ha ki e ic a d

f a ame e e ima i h gh dec m i i f he bjec i e
f c i . e ba i f hi me h d l g i a bdi i i f a gl bal
ea ch ace he e e -b - e l cal ea che a e e f med. , he