SEQUENCE LISTING

<110> Codexis, Inc.
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<120> KETOREDUCTASE-MEDIATED STEREOSELECTIVE ROUTE TO ALPHA CHLOROALCOHOLS

<130> CX2-012USP2

<160> 80

<170> PatentIn version 3.5

<210> 1
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon optimized sequence of ketoreductase from Novosphingobium aromaticivorans

<400> 1
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ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg ccccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggccgtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggcct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 2
<211> 263
<212> PRT
<213> Novosphingobium aromaticivorans

<400> 2

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Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1               5                  10                  15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
            20                  25                  30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
        35                  40                  45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255
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Asp Gly Gly Phe Ser Gln Val
260

<210> 3
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

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accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgcgggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 4
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 4

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp

35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Ala Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 5
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

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accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcactggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgcgggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgctgatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

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agccaggtct ga 792

<210> 6
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 6

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

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Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Ala Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Leu Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
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<210> 7
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

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ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatcgtg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

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agccaggtct ga 792

<210> 8
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 8

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Val Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly

115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 9
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

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ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttgaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

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agccaggtct ga 792

<210> 10
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 10

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Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1               5                  10                  15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
            20                  25                  30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
        35                  40                  45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Leu Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160
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Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
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<210> 11
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 11

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accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg      180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc      240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg      300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc      360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac      420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag      480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac      540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctggg ctcgatcatg      600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa      660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat      720

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agccaggtct ga 792

<210> 12
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 12

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala

195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 13
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

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ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

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gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 14
<211> 263
<212> PRT
<213> Artificial Sequence

<220>

<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 14

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Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1               5                  10                  15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
            20                  25                  30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
        35                  40                  45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240
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Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 15
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 15
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ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgctgatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 16
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 16

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

```
Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
        35                  40                  45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Leu Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
```

<210> 17

<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 17
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcggtg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 18
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 18

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

```
Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Phe Gly Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
```

<210> 19
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 19
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcgttg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 20
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 20

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Val Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 21
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 21
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttccatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 22
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 22

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe His Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 23
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 23
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcggt gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 24
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 24

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Gly Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 25
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 25
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg ctggtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 26
<211> 263
<212> PRT

<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 26

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Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1               5                  10                  15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
            20                  25                  30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
        35                  40                  45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Leu Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220
```

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 27
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 27
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg tgggtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 28
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 28

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Trp Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 29
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 29
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg cgggtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 30
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 30

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala

50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Arg Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 31
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 31
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg aaggtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 32
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 32

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Lys Val Thr Lys Phe Glu
85 90 95

```
Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
```

<210> 33
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 33
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagca cgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 34
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 34

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Thr

130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 35
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 35
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat tgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcggt gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 36
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 36

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Gly Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 37
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 37
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcgag atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 38
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 38

```
Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1               5                  10                  15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
            20                  25                  30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
        35                  40                  45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Glu Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
```

210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 39
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 39
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 40
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 40

```
Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1               5                  10                  15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
            20                  25                  30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
        35                  40                  45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255
```

Asp Gly Gly Phe Ser Gln Val
260

<210> 41
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 41
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg caatatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 42
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 42

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

```
Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Asn Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
```

<210> 43
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 43
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatt 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 44
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 44

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Ile Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 45
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 45
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc tgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgcgggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 46
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 46

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Ala Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 47
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 47
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgcgggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 48
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 48

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Ala Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

```
Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
```

<210> 49
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 49

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atgctgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg       60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc      120

accgacatgg cgccctcggc cgatgtcaaa ggcgcggacc attatctcca gcacgacgtg      180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc      240

gatgcgctgg tacacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg      300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc      360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac      420

ttctccagcg tcgcgggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag      480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac      540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg      600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccagac cgcgatggaa      660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat      720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc      780
```

agccaggtct ga 792

<210> 50
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 50

Met Leu Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Lys Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Ala Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Thr Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 51
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 51
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgcgggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 52
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 52

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Ala Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 53
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 53
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgca gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga ggttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgcgggtct gcgcggcgcg gcgttcaatg ctgcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgaacatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 54
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 54

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

```
Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
        35                  40                  45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Arg Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Ala Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Asn Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
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<210> 55
<211> 792

<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 55
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgcgggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cggtcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 56
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 56

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val

65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Ala Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Val Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 57
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 57
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgcgggtct gcgcggcgcg gcgttcaatg cggcctattg ctccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctagg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg gcgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 58
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 58

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Ala Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Ser Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Gly Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 59
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 59
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgtgggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 60
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 60

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Val Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys

145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 61
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 61
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgggcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 62
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 62

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Gly Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 63
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 63
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagct gcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 64
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 64

```
Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1               5                  10                  15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
            20                  25                  30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
        35                  40                  45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Cys
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
```

225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 65
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 65
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggctcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 66
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 66

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

```
Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
            20                  25                  30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
        35                  40                  45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ser Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
```

<210> 67
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 67
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcatc gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 68
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 68

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

```
Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ile Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
```

<210> 69
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 69

atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggctgg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 70
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 70

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

```
Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Trp Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
```

<210> 71
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 71

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atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg      60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc     120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg     180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc     240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg     300
```

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcccc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 72
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 72

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Pro Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 73
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 73
atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg 60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggccag atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 74
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 74

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

```
Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gln Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
                245                 250                 255

Asp Gly Gly Phe Ser Gln Val
            260
```

<210> 75
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 75

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atgccgcttg aaatgacgat tgctctcaac aatgtggtcg ccgtcgtcac cggcgcggcg       60

ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc      120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg      180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc      240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg      300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc      360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac      420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag      480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac      540

atccgcgtca actccgtgca tccgggcgtc atcgataccc cgatgctcgg ctcgatcatg      600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa      660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat      720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc      780

agccaggtct ga                                                          792
```

<210> 76

<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 76

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
1 5 10 15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Val Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260

<210> 77
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 77
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ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatg 600

gacaagtact tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

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agccaggtct ga 792

<210> 78
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 78

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val

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1               5                  10                  15

Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
            20                  25                  30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
        35                  40                  45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
    50                  55                  60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65                  70                  75                  80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
                85                  90                  95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
            100                 105                 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
        115                 120                 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
    130                 135                 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145                 150                 155                 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
                165                 170                 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
            180                 185                 190

Thr Pro Met Leu Gly Ser Ile Met Asp Lys Tyr Phe Glu Leu Gly Ala
        195                 200                 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
    210                 215                 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225                 230                 235                 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
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Asp Gly Gly Phe Ser Gln Val
260

<210> 79
<211> 792
<212> DNA
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 79
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ggaggcatcg gccgcgaact ggtcaaggcg atgaaggccg ccaacgccat cgtcatcgcc 120

accgacatgg cgccctcggc cgatgtcgaa ggcgcggacc attatctcca gcacgacgtg 180

acgagcgagg ccggctggaa ggcggtcgcg gcgctggccc aggaaaagta cgggcgcgtc 240

gatgcgctgg tgcacaacgc gggcatctcg atcgtcacga agttcgaaga cactccgctg 300

tccgatttcc accgcgtgaa cacggtcaac gtcgattcca tcatcatcgg tacgcaggtc 360

ctgctgccgc tgctcaagga aggcggcaag gcgcgcgcag ggggcgcctc ggtggtcaac 420

ttctccagcg tcgggggtct gcgcggcgcg gcgttcaatg cggcctattg caccagcaag 480

gcggcggtga agatgctctc gaagtgcctc ggcgcggaat tcgcggcgct cggctacaac 540

atccgcgtca actccgtgca tccgggcggc atcgataccc cgatgctcgg ctcgatcatt 600

gacaagtacg tcgaactcgg cgctgccccc tcgcgcgagg tggcccaggc cgcgatggaa 660

atgcgccacc cgatcggtcg catgggtcgc cctgccgaaa tgggcggcgg cgtggtctat 720

ctctgctccg acgcagcaag cttcgtcacc tgcacggaat tcgtgatgga cggcggcttc 780

agccaggtct ga 792

<210> 80
<211> 263
<212> PRT
<213> Artificial Sequence

<220>
<223> Variant of ketoreductase from Novosphingobium aromaticivorans

<400> 80

Met Pro Leu Glu Met Thr Ile Ala Leu Asn Asn Val Val Ala Val Val
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Thr Gly Ala Ala Gly Gly Ile Gly Arg Glu Leu Val Lys Ala Met Lys
20 25 30

Ala Ala Asn Ala Ile Val Ile Ala Thr Asp Met Ala Pro Ser Ala Asp
35 40 45

Val Glu Gly Ala Asp His Tyr Leu Gln His Asp Val Thr Ser Glu Ala
50 55 60

Gly Trp Lys Ala Val Ala Ala Leu Ala Gln Glu Lys Tyr Gly Arg Val
65 70 75 80

Asp Ala Leu Val His Asn Ala Gly Ile Ser Ile Val Thr Lys Phe Glu
85 90 95

Asp Thr Pro Leu Ser Asp Phe His Arg Val Asn Thr Val Asn Val Asp
100 105 110

Ser Ile Ile Ile Gly Thr Gln Val Leu Leu Pro Leu Leu Lys Glu Gly
115 120 125

Gly Lys Ala Arg Ala Gly Gly Ala Ser Val Val Asn Phe Ser Ser Val
130 135 140

Gly Gly Leu Arg Gly Ala Ala Phe Asn Ala Ala Tyr Cys Thr Ser Lys
145 150 155 160

Ala Ala Val Lys Met Leu Ser Lys Cys Leu Gly Ala Glu Phe Ala Ala
165 170 175

Leu Gly Tyr Asn Ile Arg Val Asn Ser Val His Pro Gly Gly Ile Asp
180 185 190

Thr Pro Met Leu Gly Ser Ile Ile Asp Lys Tyr Val Glu Leu Gly Ala
195 200 205

Ala Pro Ser Arg Glu Val Ala Gln Ala Ala Met Glu Met Arg His Pro
210 215 220

Ile Gly Arg Met Gly Arg Pro Ala Glu Met Gly Gly Gly Val Val Tyr
225 230 235 240

Leu Cys Ser Asp Ala Ala Ser Phe Val Thr Cys Thr Glu Phe Val Met
245 250 255

Asp Gly Gly Phe Ser Gln Val
260