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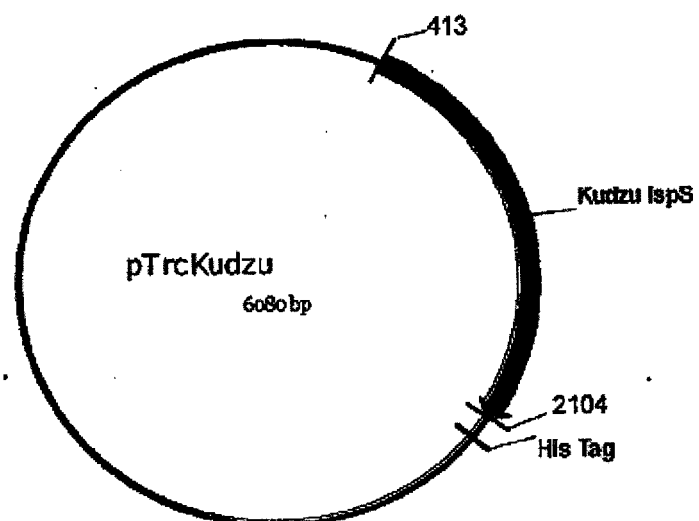
Figure 2

Figure 3A

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Figure 3B

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Figure 3C

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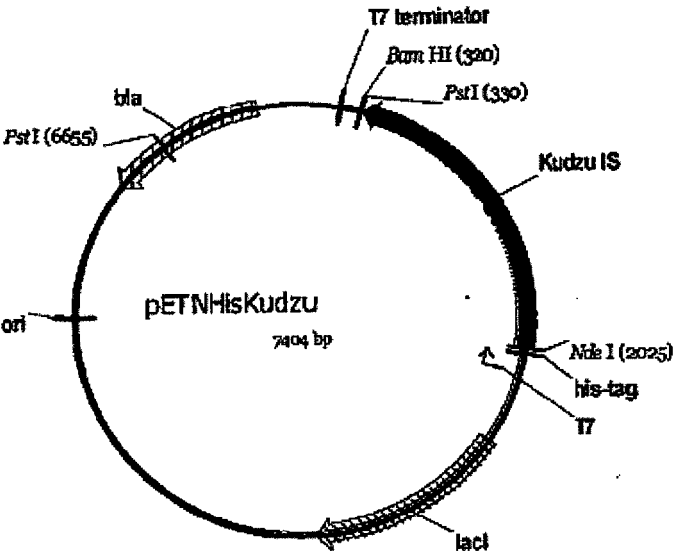


Figure 5A

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Figure 5B

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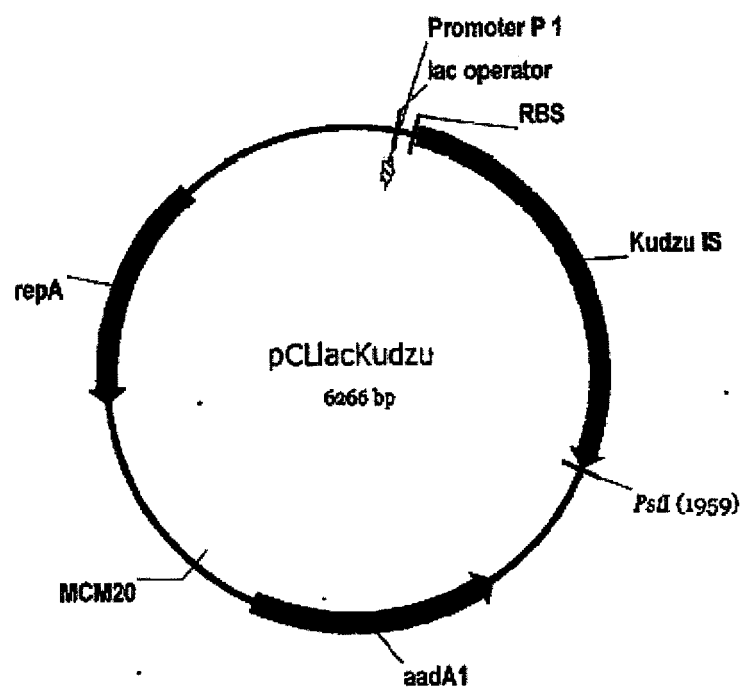
Figure 6

Figure 7A

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Figure 7B

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Figure 7C

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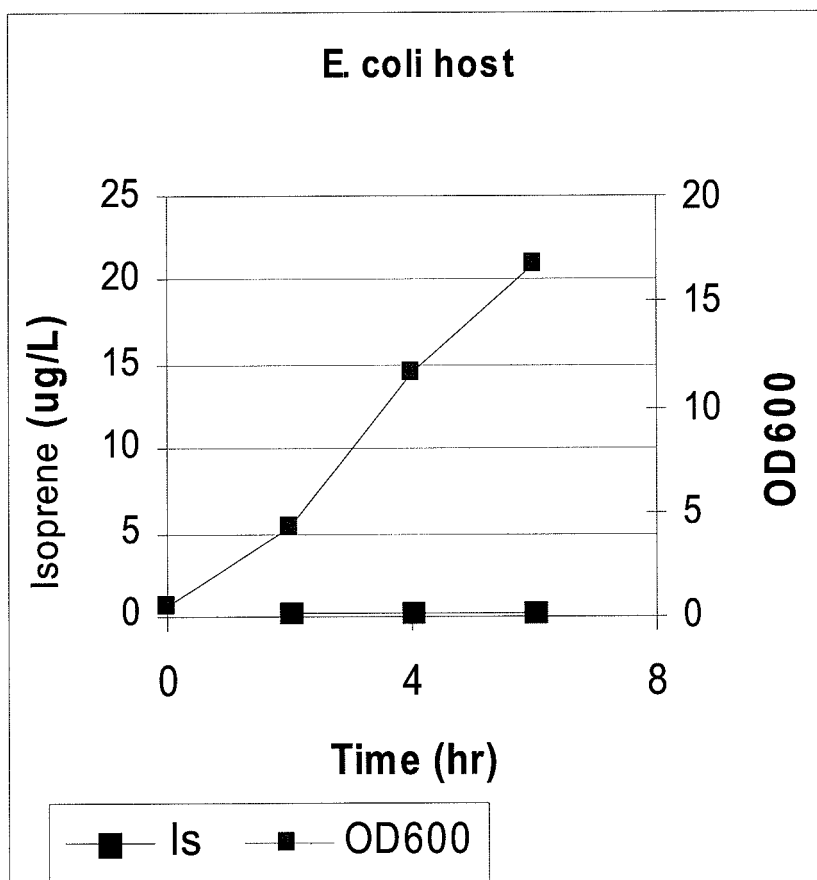
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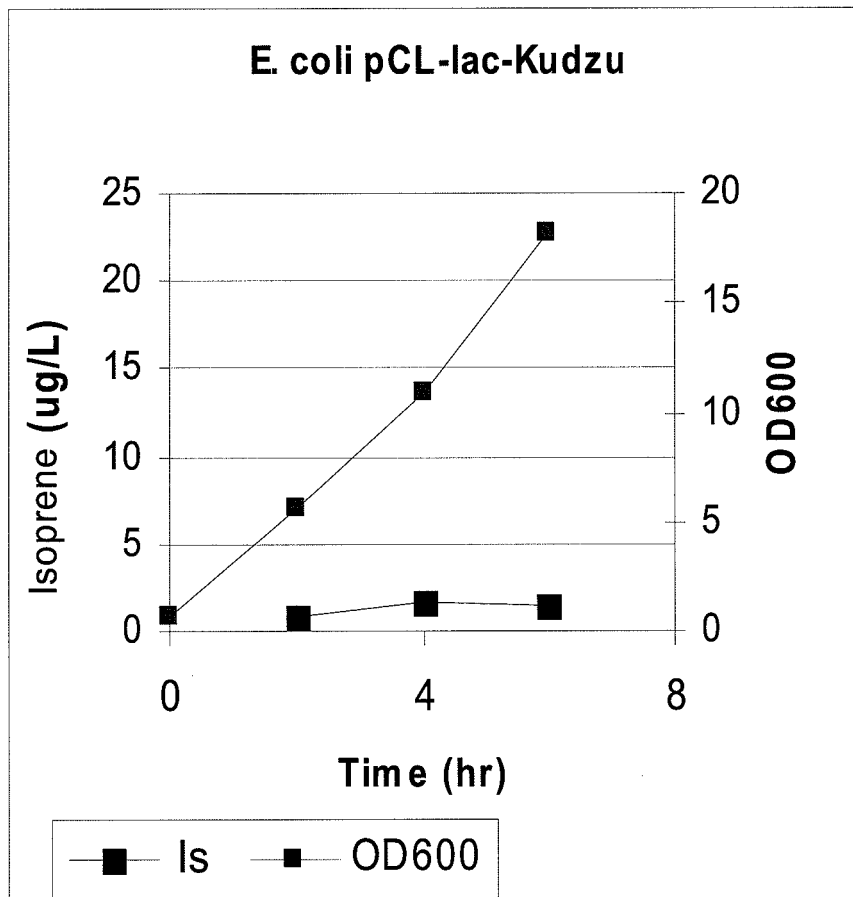
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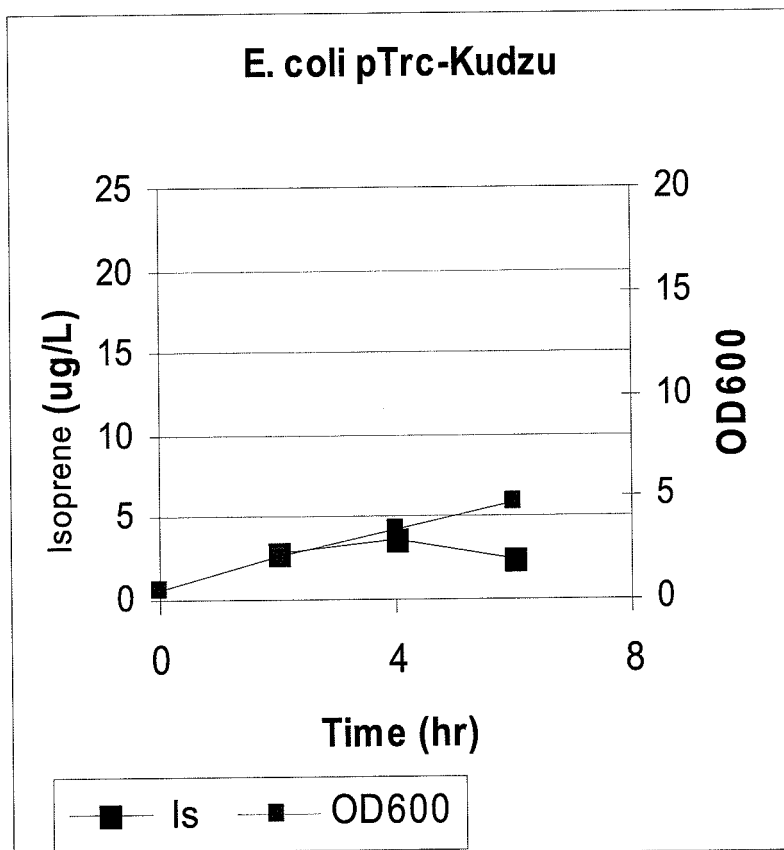
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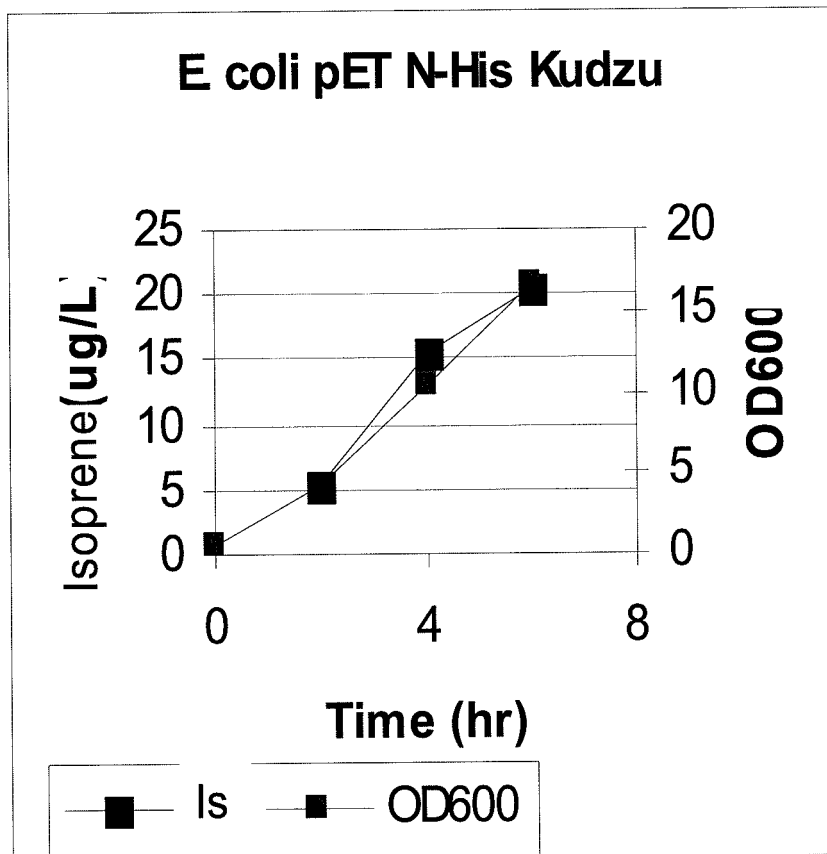
Figure 8D

Figure 9A

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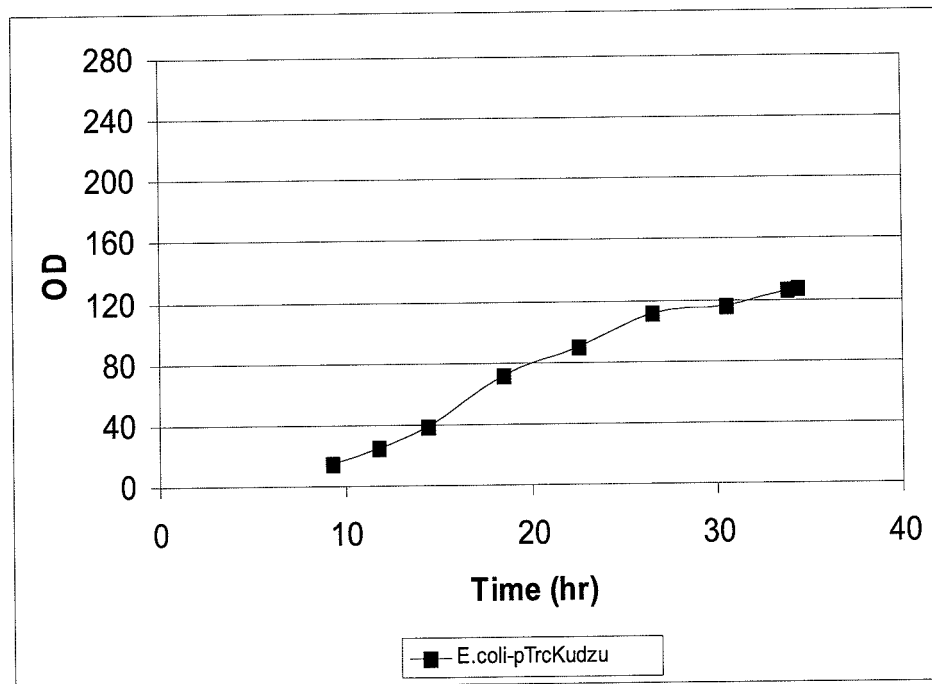


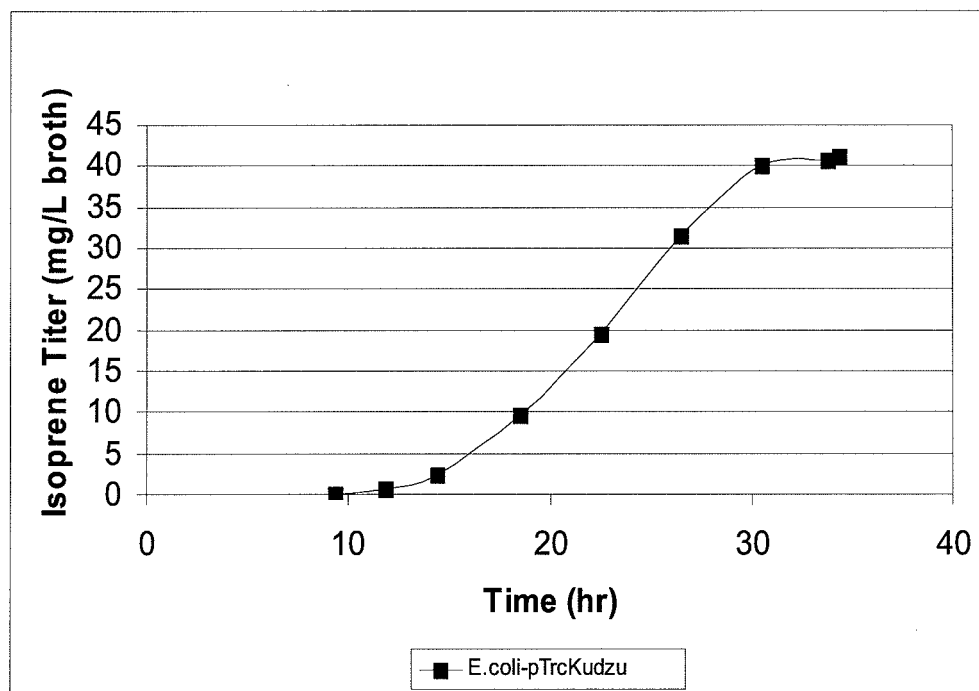
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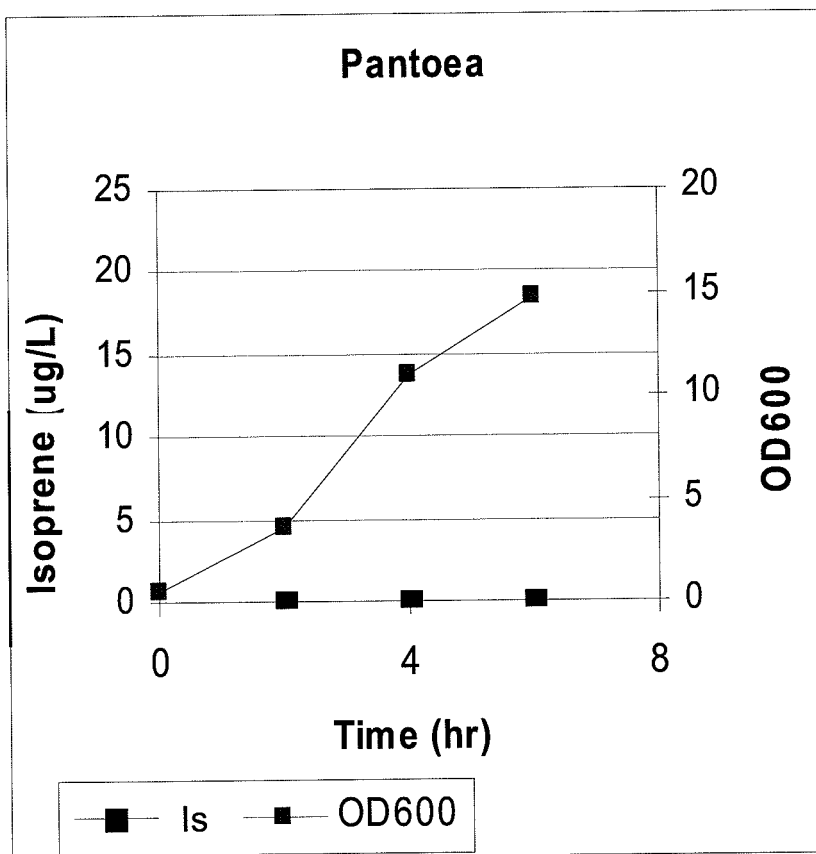
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Figure 10B

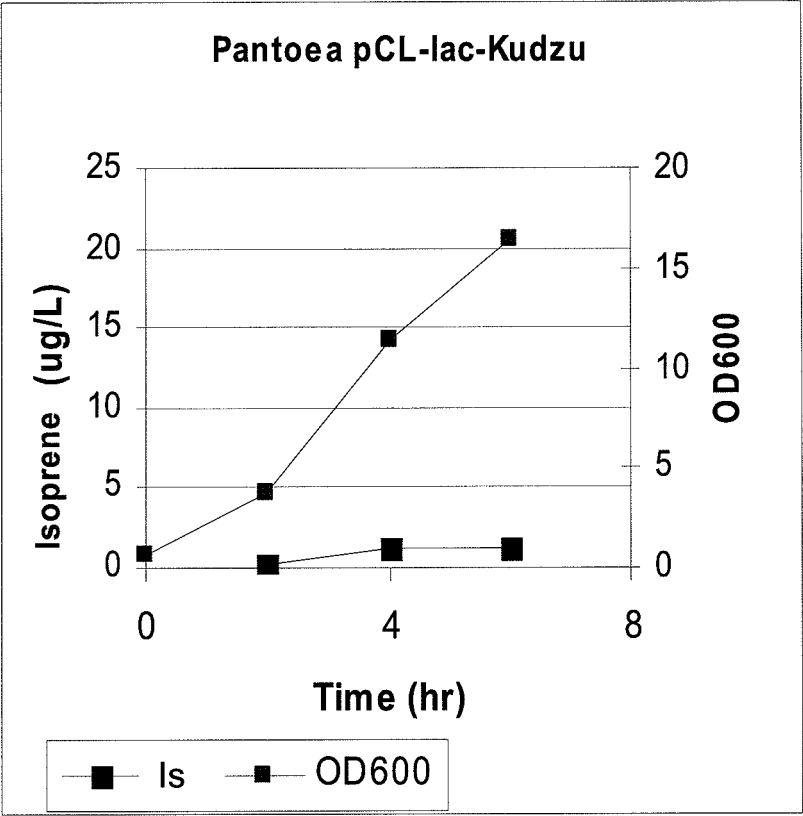


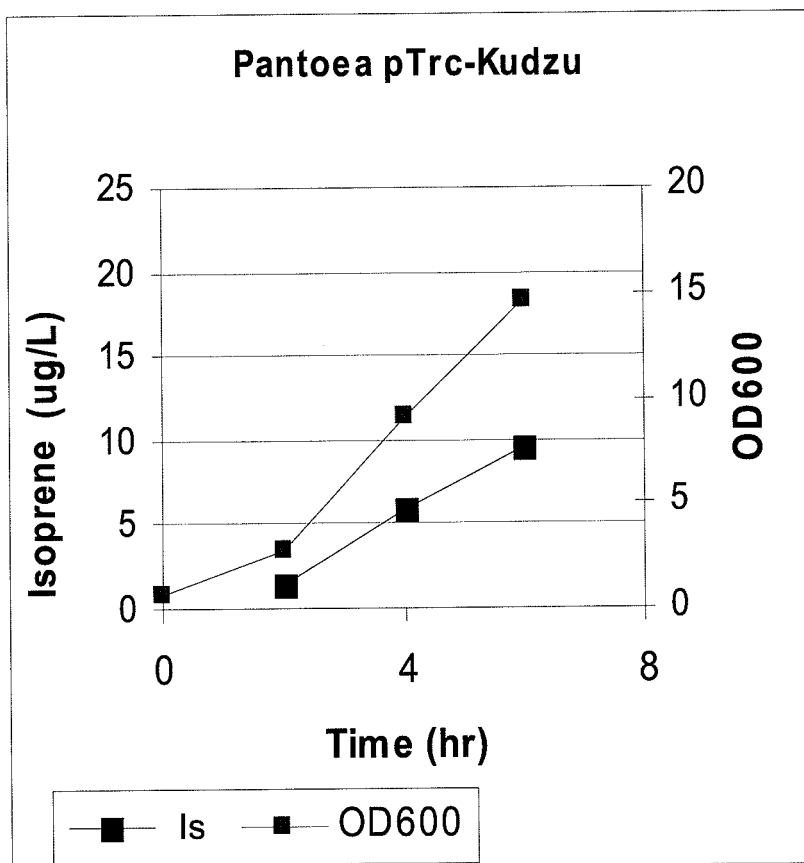
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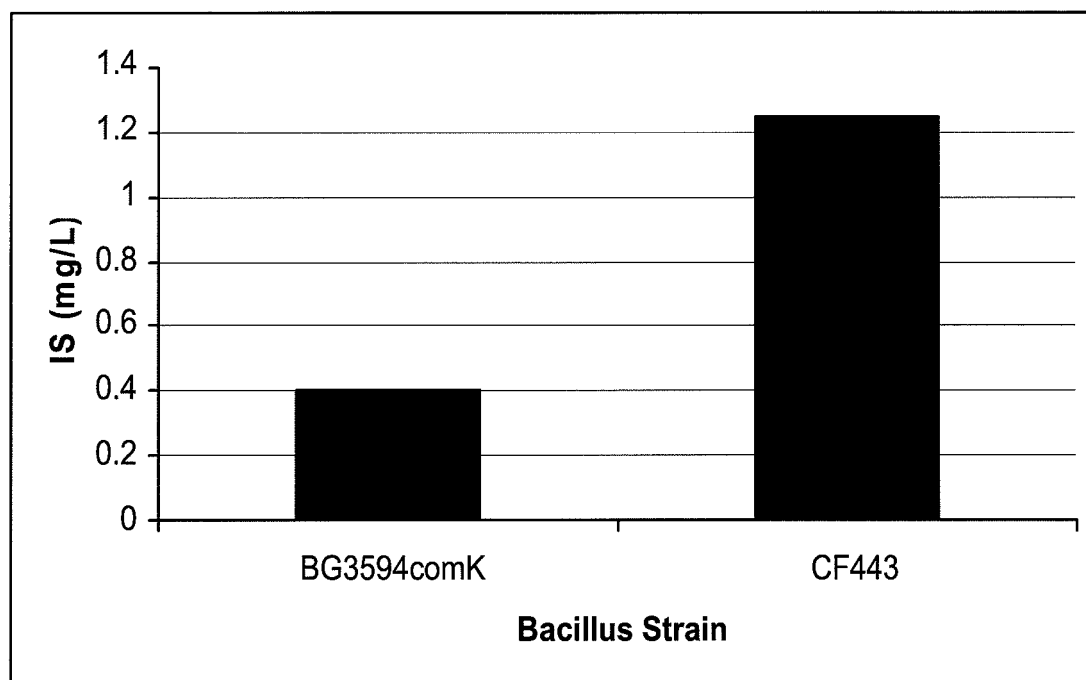
Figure 11

Figure 12A

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t a g g a g g c t t a c t t g t c t g c t t t c t t c a t t a g a a t c a a t c c t t t t t a a a g t c a a t a t t a c t g t
a a c a t a a a t a t a t a t t t t a a a a t a t c c c a c t t t a t c c a a t t t t c g t t t g t t g a a c t a a t g g g t
g c t t t a g t t g a a g a t a a a g a c c a c a t t a a a a a t g t g g t c t t t t g t g t t t t t t a a a g g a t t t
g a g c g t a c g c g a a a a a t c c t t t t c t t t c t t a t c t t g a t a a t a a g g g t a a c t a t t g c c g g t
t g t c c a t t c a t g g c t g a a c t c t g c t t c c t c t g t t g a c a t g a c a c a c a t c a t c t c a a t a t c c g a a
t a g g g c c c a t c a g t c t g a c g a c c a a g a g a g c c a t a a a c a c c a a t a g c c t t a a c a t c a t c c c c a t
a t t t a t c c a a t a t t c g t t c c t t a a t t t c a t g a a c a a t c t t c a t t c t t t c t t c t a g t c a t t a t
t a t t g g t c c a t t c a c t a t t t c t c a t t c c c t t t t c a g a t a a t t t t a g a t t t g c t t t t c t a a a t a a g
a a t a t t t g g a g a g c a c c g t t c t t a t t c a g c t a t t a a t a a c t c g t c t t c c t a a g c a t c c t t c a a t
c c t t t t a a t a a c a a t t a t a g c a t c t a a t c t t c a a c a a a c t g g c c c g t t t g t t g a a c t a c t c t t t
a a t a a a a t a a t t t t t c c g t t c c c a a t t c c a c a t t g c a a t a a t a g a a a a t c c a t c t t c a t c g g c t
t t t t c g t c a t c a t c t g t a t g a a t c a a a t c g c c t t c t t c t g t g t c a t c a a g g t t a a t t t t t t a t
g t a t t t c t t t t a a c a a a c c a c c a t a g g a g a t t a a c c t t t t a c g g t g t a a a c c t t c c t c c a a a t c
a g a c a a a c g t t t c a a a t t c t t t t c t t c a t c a t c g g t c a t a a a a t c c g t a t c c t t t a c a g g a t a t
t t t g c a g t t t c g t c a a t t g c c g a t t g t a t a t c c g a t t t a t a t t t a t t t t t c g g t c g a a t c a t t t
g a a c t t t t a c a t t t g g a t c a t a g t c t a a t t t c a t t g c c t t t t t c c a a a a t t g a a t c c a t t g t t t

Figure 12C

ttgattcacgtagttttctgttattctaaaataagttgggtccacacataccattacatgcatg
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gattttttattaattttttttatattgcatcattcggcgaaatccttgagccatatctgtcaaact
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actattaggacacataatattaaaagaaaccccatctatttagttatttgttttagtcacttat
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(SEQ ID NO:57)

Figure 13

ATGTGTGCAACCTCCTCCCAGTTTACTCAGATTACCGAGCATAATTCTCGACGATCTGCTAACT
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GCTCGAGGAGAAGGCGACCAAACCTCGAGGAGGAGGTGCGATGTATGATCAACAGAGTTGACACC
CAACCCCTGTCTTTGCTGGAGCTGATCGACGATGTGCAGCGGTTGGGTTTGACTTATAAATTCTG
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TGATCTTCACGCTACCGCTCTCTCTTTCCGACTTCTTCGACAACACGGCTTCGAGGTGTCGCAG
GACGTCTTCGAGAGATTTAAGGACAAGGAGGGAGGATTTAGCGGCGAGCTGAAGGGAGACGTTT
AGGCTCTTCTCTCCTTGACGAGGCGTCCTACCTGGGATTTCGAGGGAGAGAACCCTCCTGGAGGA
AGCTCGTACATTTTCCATCACTCACCTTAAGAATAACCTTAAGGAGGGAATTAACACCAAGGTG
GCCGAGCAGGTTTCTCAGGCCCTGGAGCTCCCCTACCACCAACGGCTCCATAGACTGGAGGCTC
GTTGGTTCTGGACAAATATGAGCCAAAGGAGCCTCATCATCAGTTGCTGTTGGAGTTGGCCAA
GCTGGACTTCAATATGGTTTCAGACGCTGCACCAAAGGAGTTGCAGGACCTGTCTCGATGGTGG
ACCGAGATGGGATTGGCCTCGAAGCTGGATTTTGTCCGTGACCGACTTATGGAGGTCTATTTTT
GGGCCCTTGGAATGGCGCCTGACCCCAAGTTTCGGAGAGTGCCGGAAGGCGGTGACGAAGATGTT
CGGTCTTGTGACTATCATCGACGACGTCTACGATGTCTACGGCACACTCGACGAGTTGCAGCTG
TTCACTGACGCCGTGAGCGATGGGATGTGAACGCCATTAATACTCTCCCTGACTATATGAAGC
TGTGCTTCTGGCTCTGTACAACACTGTCAACGATACCTCGTACTCTATCCTCAAGGAGAAGGG
ACACAACAATCTCTCCTACTTGACCAAATCCTGGCGAGAAGTGTGCAAGGCTTTTCTGCAGGAG
GCTAAATGGTCCAATAACAAGATCATTCCTGCTTTTCTAAATACCTGGAAAATGCCTCGGTGT
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CCCAAGGCCTTCATGGAGATCGCCGTGAACATGGCTCGAGTTCCCATTTGTACTTACCAGTACG
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CTTCCCTATCAACCAATTGATGTACGTGTAA
(SEQ ID NO:8)

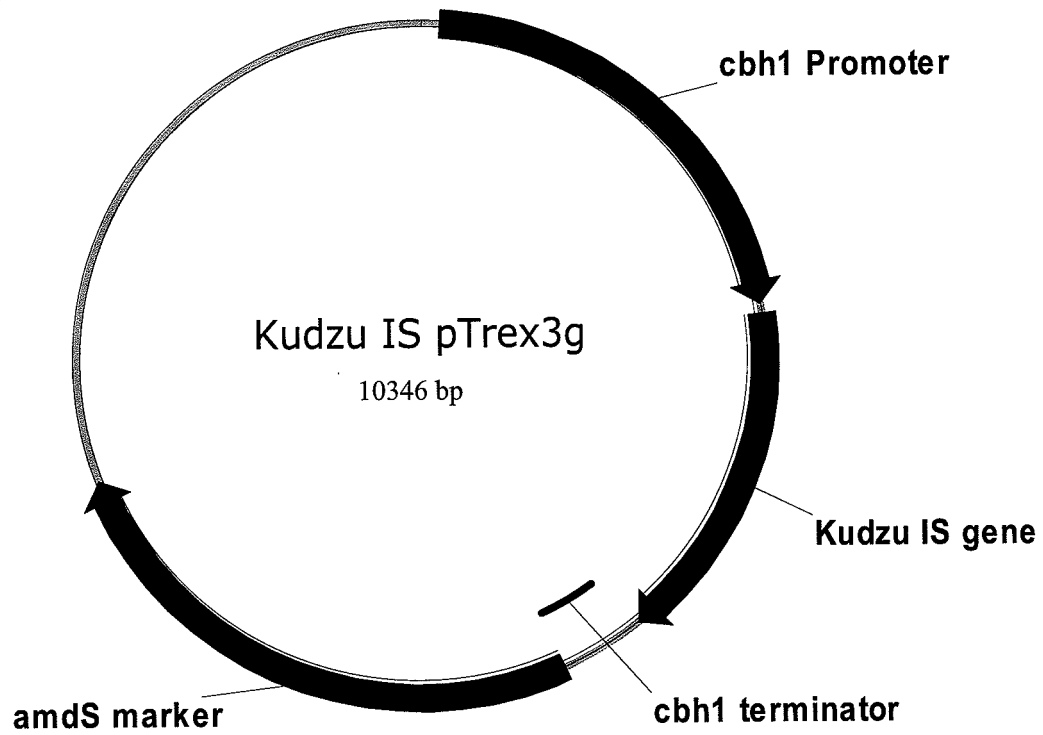
Figure 14

Figure 15A

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1  TCGACCGGTG AGAAGAACAG CATCGGGACA AGGGAAGGAA GAACAAAGAC AAAGAAAACA
61  AAAGAAAACA ATTGAAAACA AAACAAAACA ATTTTCATTC CTTCTCTTAT CATTCCCTTT
121 CTTTTCTTTT CTCTCATTTA ACGCACTCCA TCGTATCCGT ATTCTCTTCA TTTTCTCTCT
181 TTCTCTATAT CCATTTCTTT CTCTCTAGGT GTGTCTCTC TCTCTCTTCA ATTTCTCTAC
241 TCCGCAITTC AACGCATCCT TCCCAACACC TCCCATTTCC TCCTTACGGC CCGATAGCGA
301 TCGTCTTTCC CTCGCTATCA CTCGCTACCG GCCCTCCTC TGCACCGTAA CCTCCTACGT
361 ATTTACCATA TCATAAAGTT TTTTCCGACG CTTATCGCTG ACCCCCTGTC GCCCTCCTAT
421 TGGCTTCCGG ATTATCTTCT TGTCCATAAG GTGATCCATG CTTCTCTGAAG ATTCCTCGAAA
481 TGTGTCCACT TTGGCGGGGA ATCATTCCAT CCCTTCTTT CTCTCTCGCT TTCCTCATT
541 GGCGCTCCCC TTCCGCGTCT CATTTGTCTT CCGCTCCGTT TTTGCTTTGC CGATGTTACT
601 TGGGGAGAGG TGGGATAATC CTTTCGCAA AACTCGGTTT GACGCTCCC ATGGTATATA
661 TAGTGGGTGG TGGACAGGTG CTTTCGCTTT TCTTTAAGCA AGAGAATCCC ATTTGCTTGA
721 CTATCACGAA TTCACATACA TTATGAAGAT CACCGCTGTC ATTGCCCTTT TATTCTCACT
781 TGCTGCTGCC TCACCTATTC CAGTTGCCGA TCCTGGTGTG GTTTCAGTTA GCAAGTCATA
841 TGCTGATTTT CTTCTGTGTT ACCAAAGTTG GAACACTTTT GCTAATCCTG ATAGACCCAA
901 CCTTAAGAAG AGAATGATA CACCTGCAAG TGGATATCAA GTTGAAGGAG TCGTAATTTT
961 GTCACGTCAC GGTGTTAGGG CCCCTACAAA AATGACTCAA ACCATGCGTG ATGTCACTCC
1021 TAATACATGG CCAGAATGGC CCGTTAAATT AGGATATATT ACACCAAGAG GTGAACACTT
1081 GATATCACTT ATGGGCGGTT TTTACCGTCA AAAATTCCAG CAACAAGGAA TCCTTTCTCA
1141 GGGCTCCTGT CTTACTCCTA ACTCCATATA TGCTGGGCT GACGTCGATC AGCGTACTTT
1201 AAAAAGTGGT GAAGCATTC TTTGCTGGTT TTTTCATCCC GTTAAAGCTG GAACCTGCTC
1261 CCAACAAAAT CTTGAGAAAG CTGATCCTCT TTTTCATCCC GTTAAAGCTG GAACCTGCTC
1321 TATGGATAAA ACTCAAGTTC AACAGCTGT TGAAGAGGAG GCACAACTC CTATAGATAA
1381 TTTGAATCAA CATTACATCC CCTTTTTAGC TTTAATGAAT ACAACATTAA ATTTTAGTAC
1441 TTCTGCCTGG TGCCAAAAC ACTCTCTGA TAAATCCTGT GACCTAGGTT TATCCATGCC
1501 TTCTAAATG TCCATAAAG ATAATGGTAA CAAGGTCGCA TTGGATGGAG CTATTGGTCT
1561 ATCCTCTACT TTGGCCGAGA TTTTCTTCT TGAATATGCT CAAGGTCATG CTAAAGCTGC
1621 TTGGGGTAAC ATCCACTCAG AGCAAGAGTG GGCTTCCTTG CTAAAGTTGC ATAATGTTCA
1681 ATTCGATTTG ATGGCCCGAA CACCTTATAT TGCTCGACAT AAGGTTACTC CTTTATTGCA
1741 AGCTATATCA AATGCCCTTA ATCCCAACGC CACTGAATCA AAAGTTCCAG ATATTTTACC
1801 TGATAACAAA ATATTGTTCA TTGCAGGTCA TGACACAAAT ATTGCTAATA TAGCCGGCAT
1861 GTTAAATATG CGTTGGACAT TACCAGGTCA ACCAGATAAT ACTCCTCCAG GTGGTSCCCT
1921 AGTATTTGAA CGTCTTGCTG ATAAAAGTGG AAAACAATAT GTTCTGTAT CTATGGTTTA
1981 TCAACACTTA GAACAACCTC GATCACAGAC TCCCTTTCT CTAAATCAGC CTGCCGGATC
2041 TGTTCAACTT AAAATTCCAG GTTGCAATGA TCAAACAGCC GAGGGTTACT GTCCCTCTTC
2101 CACTTTTACA AGAGTTGTTT CCCAATCTGT TGAACCTGGA TGCCAACTTC AATAATGAGG
2161 ATCCAAGTAA GGGAAATGAGA ATGTGATCCA CTTTAAATTC CTAATGAATA CATGCCTATA
2221 GTTCTTTTCT TTTGTTCTTT ATGTCTGTTT TCGATGGTAC GCGCGTTGTC AATCTCAGTT
2281 TGTGTGCTTG GTTGACAGTT GGTTCATCAT CTGTTTCAAT CATGAATCTT TTACCAATTC
2341 ACCACACGTT TATACCATC TCTCATAGAA TCTTCATCAA ACCATCTCGG GGTAGAGTG
2401 GAAAGAAAGT CTTGTTCTTT TATTTCCTTT TTTCCATCTT CAAGGCTTTT CTTTCTTCC
2461 TCCTCCTCGT TCATCTTGAG GTTTGACGTG TCTGTTTAGA ATTTTGAGCT GTTGACAGAT
2521 CTTATTTTTT GTTTTGCGAA AACGAAGCGC TTTACTCTCT TCATCAGTTG GACGATTGTA
2581 CCTTGAAAA CCAACTACTT TTGCATGTTT TGTATAGAAA TCAATGATAT TAGAATCCCA
2641 TCCTTTAATT TCTTTCAAAG TAGTTGAGCT ATAGTTAAGT GTAAGGGCCC TACTGCGAAA
2701 GCATTTGCCA AGGATGTTTT CATTAATCAA GAACGAAAGT TAGGGGATCG AAGACGATCA
2761 GATACCGTCG TAGTCTTAAC CATAAACPAT GCGACTAGG GATCGGGCAA TGTTCATTT
2821 ATCGACTTGC TCGGCACCTT ACGAGAAATC AAAGTCTTTG GGTCCGGGG GGAGTATGGT
2881 CGCAAGGCTG AAAGTTAAAG GAATTGACGG AAGGGCAGCA CAATGGAGTG GAGCCTGCGG
2941 CTTAATTTGA CTCAACACGG GGAACTCAC CAGGTCCAGA CATAGTAAGG ATTGACAGAT
3001 TGAGAGCTCT TTCTTGATTC TATGGGTGGT GGTGCATGGC CGTTCTTAGT TGTGGAGTG
3061 ATTTGTCTGC TTAATTGCGA TAACGAACGA GACCTTAACC TGCTAAATAG CTGATCAGC
3121 CATTTTGGCT GATCATTAGC TTCTTAGAGG GACTATTGGC ATAAAGCCAA TGGAAAGTTG
3181 AGGCAATAAC AGGTCTGTGA TGCCCTTAGA TGTTCTGGGC CGCACGCGCG CTACACTGAC
3241 GGAGCCAACG AGTTGAAAAA AATCTTTTGA TTTTATATCC TTGGCCGGAA GGTCTGGGTA
3301 ATCTTTGTTAA ACTCCGTCGT GCTGGGGATA GAGCATTGCA ATTATTGCGG CCGCTCCTCA
3361 ATTCGATGTT GCAGATTTTA CAAGTTTTTA AAATGTATTT CATTATTAAT TTTTATATGC
3421 CTAAATAAAA AGCCATAGTT TAATCTATAG ATAACTTTTT TTCCAGTGCA CTAACGGAGC

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Figure 15B

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3481 TTACATTCCC ATACAAAAC TCGTAGTTAA AGCTAAGGAA AAGTTAATAT CATGTTAATT
3541 AAATACGCTA TTTACAAATA GACATTGAAC TCATTTATAT CGTTGAATAT GAATAACCAA
3601 TTTTCAGCGAA TTTTAAACAA ACATCGTTCA CCTCGTTTAA GGATATCTTG TGTATGGGGT
3661 GTTGACTTGC TTTATCGAAT AATTACCGTA CCTGTAATTG GCTTGCTGGA TATAGCGGTA
3721 GTCTAATATC TAGCAAAAAT CTTTGGGGTG AAAAGGCTTG CAATTTTCACG ACACCGAACT
3781 ATTTGYCATT TTTTAATAAG GAAGTTTCC ATAAATTCCT GTAATTCCTG GTTGATCTAA
3841 TTGAAAAGAG TAGTTTTCGA TCACGATGAG GAGGGCTTTT GTAGAAAGAA ATACGAACGA
3901 AACGAAAATC AGCGTTGCCA TCGCTTGGGA CAAAGCTCCC TTACCTGAAG AGTCGAATTT
3961 TATTGATGAA CTTATAACTT CCAAGCATGC AAACCAAAAG GGAGAACAAG TAATCCAAGT
4021 AGACACGGGA ATTGGATTCT TGGATCACAT GTATCATGCA CTGGCTAAAC ATGCAGGCTG
4081 GAGCTTACGA CTTTACTCAA GAGGTGATTT AATCATCGAT GATCATCACA CTGCAGAAGA
4141 TACTGCTATT GCACITGGTA TTGCATTCAA GCAGGCTATG GGTAACTTTG CCGGCGTTAA
4201 AAGATTGGGA CATGCTTATT GTCCACTTGA CGAAGCTCTT TCTAGAAGCG TAGTTGACTT
4261 GTCGGGACGG CCTATGCTG TTATCGATT GGGATTAAAG CGTGAAAAGG TTGGGGAATT
4321 GTCCGTGTAA ATGATCCCTC ACTTACTATA TTCTTTTTCG GTAGCAGCTG GAATTACTTT
4381 GCATGTTACC TGCTTATATG GTAGTAATGA CCATCATCGT GCTGAAAGCG CTTTAAATC
4441 TCTGGCTGTT GCCATGCGCG CGGCTACTAG TCTTACTGGA AGTCTGAAG TCCCAAGCAC
4501 GAAGGGAGTG TTGTAAGGAT GAATTGGATT ATGTCAGGAA AAGAACGACA ATTTTGCATC
4561 CAAATTGTCT AAATTTTAGA GTTGCTTGA AACAATAGAA CCTTACTTGC TTTATAATTA
4621 CGTTAATTAG AAGCGTTATC TCGTGAAGGA ATATAGTACG TAGCCGTATA AATTGAATTG
4681 AATGTTTCAGC TTATAGAATA GAGACACTTT GCTGTTCAAT GCGTCGTCAC TTACCATACT
4741 CACTTTATTA TACGACTTTA AGTATAAACT CCGCGGTTAT GGTAAAATTA ATGATGCACA
4801 AACGTCCGAT TCCATATGGG TACACTACAA TTAAATACTT TTAAGCTGAT CCCCCACACA
4861 CCATAGCTTC AAAATGTTTC TACTCCTTTT TTACTCTTCC AGATTTTCTC GGACTCCGCG
4921 CATCGCCGTA CCACCTTCAA ACACCCAAGC ACAGCATACT AAATTTTCCC TCTTCTTCC
4981 TCTAGGGTGT CGTTAATTAC CCGTACTAAA GGTFTGGAAA AGAAAAAGA GACCGCCTCG
5041 TTTCTTTTTC TTCGTGAAA AAGGCAATAA AAATTTTAT CACGTTTCTT TTTCTTAAA
5101 TTTTTTTTTT TAGTTTTTTT CTCTTTCAGT GACCTCCATT GATATTTAAG TTAATAAACG
5161 GTCTTCAATT TCTCAAGTTT CAGTTTCATT TTTCTTGTTC TATTACAAC TTTTTTACTT
5221 CTTGTTTCAAT AGAAAGAAAG CATAGCAATC TAATCTAAGG GCGGTGTTGA CAATTAATCA
5281 TCGGCATAGT ATATCGGCAT AGTATAATAC GACAAGGTGA GGAACATAAC CATGGCCAAG
5341 TTGACCACTG CCGTTCCGGT GCTCACCGCG CGCGACGCTG CCGGAGCGGT CGAGTTCTCG
5401 ACCGACCGGC TCGGTTCTC CCGGGACTTC GTGGAGGACG ACTTCGCCGG TGTGGTCCGG
5461 GACGACGTGA CCCTGTTTAT CAGCGCGGTC CAGGACCAGG TGGTGCCGGA CAACACCCTG
5521 GCCTGGGTGT GGGTGCGCGG CCTGGACGAG CTGTACGCCG AGTGGTCCGA GGTGCTGTCC
5581 ACGAACTTCC GGGACGCCTC CCGGCCGGCC ATGACCGAGA TCGGCGAGCA GCCGTGGGGG
5641 CGGGAGTTCC CCCTGCCGGA CCGGCCGGC AACTGCGTGC ACTTCGTGGC CGAGGAGCAG
5701 GACTGACACG TCCGACGGCG GCCCACGGGT CCCAGGCCTC GGAGATCCGT CCCCCTTTTC
5761 CTTTGTGAT ATCATGTAT TAGTTATGTC ACGCTTACAT TCACGCCCTC CCCCCACATC
5821 CGCTCTAACC GAAAAGGAAG GAGTTAGACA ACCTGAAGTC TAGGTCCCTA TTTATTTTTT
5881 TATAGTTATG TTAGTATTAA GAACGTTATT TATATTCAA ATTTTCTTT TTTTCTGTA
5941 CAGACGCGAG CTTCCAGTA AATGTGCCAT CTCGTAGGCA GAAAACGGT CCCCCGTAGG
6001 GTCTCTCTCT TGGCCTCCTT TCTAGGTCCG GCTGATTGCT CTTGAAGCTC TCTAGGGGGG
6061 CTCACACCAT AGGCAGATAA CGTTCCCCAC CGGCTCGCCT CGTAAGCGCA CAAGGACTGC
6121 TCCCAAAGAT CCTAGGCGGG ATTTTGCCGA TTTCCGCCCTA AAGGAACCGG AACACGTAGA
6181 AAGCCAGTCC GCAGAAACGG TGCTGACCCC GGATGAATGT CAGCTACTGG GCTATCTGGA
6241 CAAGGGAAAA CGCAAGCGCA AAGAGAAAGC AGGTAGCTTG CAGTGGGCTT ACATGGCGAT
6301 AGCTAGACTG GCGGTTTFTA TGGACAGCAA GCGAACCGGA ATTGCCAGCT GGGGCGCCCT
6361 CTGGTAAGGT TGGGAAGCCC TGCAAAGTAA ACTGGATGGC TTTCTTGCCG CCAAGGATCT
6421 GATGGCGCAG GGGATCAAGA TCTGATCAAG AGACAGGATG AGGATCGTTT CGCATGATTG
6481 AACAAGATGG ATTGCACGCA GGTTCCTCCG CCGCTTGGGT GGAGAGGCTA TTCGGCTATG
6541 ACTGGGCAAA ACAGACAATC GGCTGCTCTG ATGCCGCGGT GTTCGGGCTG TCAGCGCAGG
6601 GCGCGCCGGT TCTTTTTGTC AAGACCGACC TGTCCGGTGC CCTGAATGAA CTGCAGGACG
6661 AGGCAGCGCG GCTATCGTGG CTGGCCACGA CCGGCGTTCC TTGCGCAGCT GTGCTCGACG
6721 TTGTCACTGA AGCGGGAAGG GACTGGCTGC TATTGGGCGA AGTCCGGGG CAGGATCTCC
6781 TGTCACTCTG CTTTCTCTCT GCCGAGAAAG TATCCATCAT GGCTGATGCA ATGCGGCGGC
6841 TGCATACGCT TGTCCGGCT ACCTGCCCAT TCGACCACCA AGCGAAACAT CGCATCGAGC
6901 GAGCACGTAC TCGGATGGAA GCGGCTCTTG TCGATCAGGA TGATCTGGAC GAAGAGCATC
6961 AGGGGCTCGC GCCAGCCGAA CTGTTCCGCA GGCTCAAGGC GCGCATGCCC GACGCGCAGG

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Figure 15C

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7021 ATCTCGTCGT GATCCATGGC GATGCCTGCT TGCCGAATAT CATGGTGGAA AATGGCCGCT
7081 TTTCTGGATT CAACGACTGT GGCGGCTGG GTGTGGCGGA CCGCTATCAG GACATAGCGT
7141 TGGATACCCG TGATATTGCT GAAGAGCTTG GCGGCGAATG GGCTGACCGC TTCCTCGTGC
7201 TTTACGGTAT CGCCGCTCCC GATTCGCAGC GCATCGCCTT CTATCGCCTT CTTGACGAGT
7261 TCTTCTGAAT TGAAAAAGGT ACCAAGTTTA CTCATATATA CTTTAGATTG ATTTAAAACT
7321 TCATTTTAA TTTAAAGGA TCTAGGTGAA GATCCTTTT GATAATCTCA TGACCAAAT
7381 CCGTTAACGT GAGTTTTCGT TCCACTGAGC GTCAGACCCC GTAGAAAAGA TCAAAGGATC
7441 TTCTTGAGAT CCTTTTTTTC TGCGCGTAAT CTGCTGCTTG CAAACAAAAA AACCACCGCT
7501 ACCAGCGGTG GTTTGTTTGC CGGATCAAGA GCTACCAACT CTTTTTCCGA AGGTAACCTG
7561 CTTCAAGCAG GCGCAGATAC CAAATACTGT CTTCTAGTG TAGCCGTAGT TAGGCCACCA
7621 CTTCAAGAAC TCTGTAGCAC CGCCTACATA CCTCGCTCTG CTAATCCTGT TACCACTGGC
7681 TGCTGCCAGT GCGGATAAGT CGTGTCTTAC CGGTTGGAC TCAAGACGAT AGTTACCGGA
7741 TAAGGCGCAG CGGTCGGGCT GAACGGGGG TTCGTGCACA CAGCCCAGCT TGGAGCGAAC
7801 GACCTACACC GAACTGAGAT ACCTACAGCG TGAGCATTGA GAAAGCGCCA CGCTTCCGA
7861 AGGGAGAAAG GCGGACAGGT ATCCGGTAAG CGGCAGGGTC GGAACAGGAG AGCGCACGAG
7921 GGAGCTTCCA GGGGGAAACG CCTGGTATCT TTATAGTCCT GTCGGGTTTC GCCACCTCTG
7981 ACTTGAGCGT CGATTTTGT GATGCTCGTC AGGGGGGCGG AGCCTATGGA AAAACGCCAG
8041 CAACGCGGCC TTTTACGGT TCCTGGCCTT TTGCTGGCCT TTGCTCACA TGTTCCTTCC
8101 TCGGTTATCC CCTGATTCTG TGGATAACCG TATTACCGCC TTGAGTGAG CTGATACCGC
8161 TCGCCGCAGC CGAACGACCG AGCGCAGCGA G
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(SEQ ID NO:11)

Figure 16

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1  GAATTCAAAA CAAATGTGT GCAACCTCCT CCCAGTTTAC TCAGATTACC GAGCATAATT
61  CTGACGATC TGCTAACTAC CAGCCGAACC TTTGGAACTT TGAGTTTCTC CAGTCTCTCG
121 AAAATGACCT GAAGGTGGAA AAGCTCGAGG AGAAGGCGAC CAAACTCGAG GAGGAGGTGC
181 GATGTATGAT CAACAGAGTT GACACCCAAC CCCTGTCITT GCTGGAGCTG ATCGACGATG
241 TGCAGCGGTT GGGTTTGA CTATAAATCG AGAAGGACAT TATCAAGGCA CTGGAGACAC
301 TTGTGCTCCT CGACGAGAAC AAGAAGAAC AGTCTGATCT TCACGCTACC GCTCTCTCTT
361 TCGACTTCT TCGACACAC GGTTCGAGG TGTCGCAGGA CGTCTTCGAG AGATTTAAGG
421 ACAAGGAGGG AGGATTTAGC GCGAGCTGA AGGGAGACGT TCAGGGTCTT CTCTCCTTGT
481 ACGAGGCGTC CTACCTGGGA TTCGAGGGAG AGAACCTCCT GGAGGAAGCT CGTACATTTT
541 CCATCACTCA CCTTAAGAAT AACCTTAAGG AGGGAATTAA CACCAAGGTG GCCGAGCAGG
601 FTTCTCAGCG CCTGGAGCTC CCCTACCACC AACGGCTCCA TAGACTGGAG GCTCGTTGGT
661 TCCTGGACAA ATATGAGCCA AAGGAGCCTC ATCATCAGTT GCTGTTGGAG TTGGCCAAGC
721 TGGACTTCAA TATGGTTTCA ACCTGTCACC AAAAGGAGTT GCAGGACCTG TCTCGATGGT
781 GGACCGAGAT GGGATTGGCC TCGAAGCTGG ATTTTGTCCG TGACCGACTT ATGGAGGTCT
841 ATTTTGGGC CCTTGAATG GCGCCTGACC CCCAGTTCCG AGAGTCCCGG AAGGCGGTGA
901 CGAAGATGTT CGGTCTTGTG ACTATCATCG ACCACGTCTA CGATGTCTAC GGCACACTCG
961 ACGAGTTGCA GCTGTTCACT GACGCGTCTG AGCGATGGGA TGTGAACGCC ATTAATACTC
1021 TCCCTGACTA TATGAAGCTG TGCTTCCTGG CTCTGTACAA CACTGTCAAC GATACCTCGT
1081 ACTCTATCCT CAAGGAGAAG GGACACAACA ATCTCTCCTA CTGACCAA TCCTGGCGAG
1141 AACTGTGCAA GGCTTTTCTG CAGGAGGCTA AATGGTCCAA TAACAAGATC ATTCTGCTT
1201 TTTCTAAATA CCTGAAAAT GCCTCGGTGT CGAGCTCTGG CGTCGCCCTT CTGGCCCCTT
1261 CCTACTTCTC CGTCTGCCAG CAGCAGGAGG ATATTTCOGA TCATGCTCTT AGATCGCTGA
1321 CCGATTTTCA CGGCCTCGTG CGATCTTCCT GCGTGATTTT TCGGTTGTGT AATGACCTTG
1381 CGACCTCTGC TGCTGAGCTG GAACGAGGCG AGACTACAA TTCCATTATT TCTTACATGC
1441 ACGAAAACGA TGAACATCT GAAGAACAGG CTAGAGAGGA ACTGCGAAAG TTGATCGACG
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1561 TCATGGAGAT CGCCGTGAAC ATGGCTCGAG TTCCCATTTG TACTTACCAG TACGGTGACG
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(SEQ ID NO:12)

Figure 17

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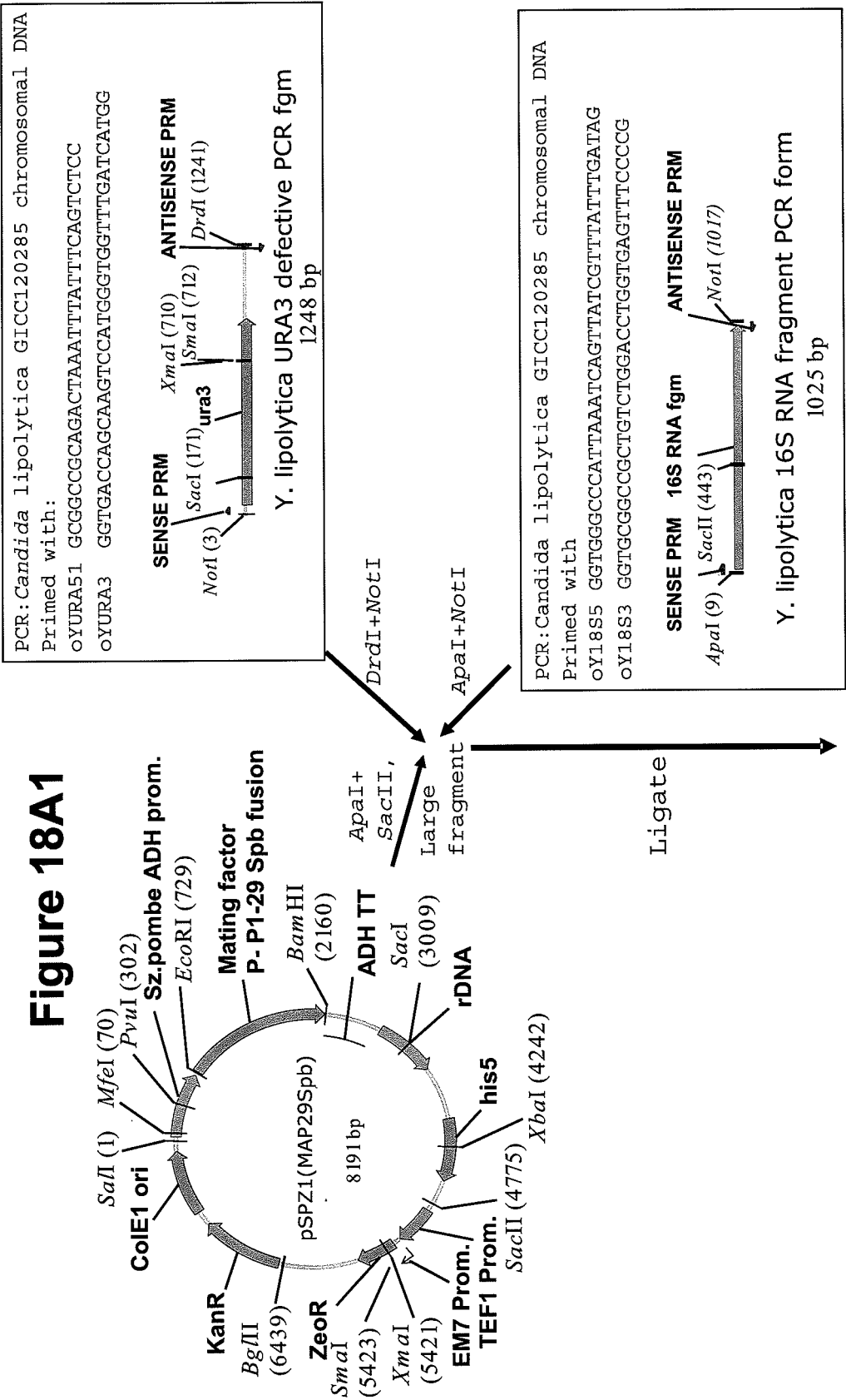
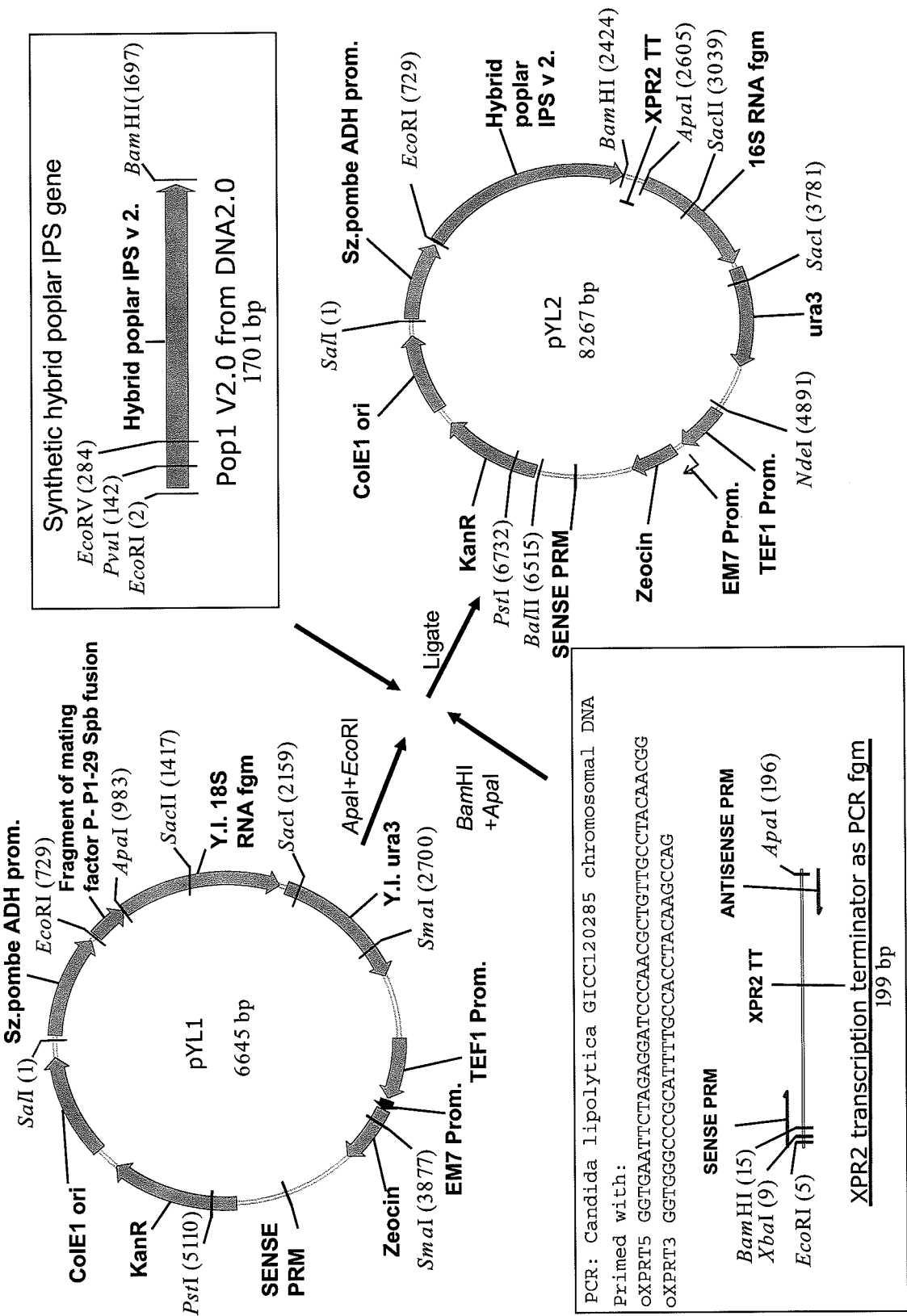


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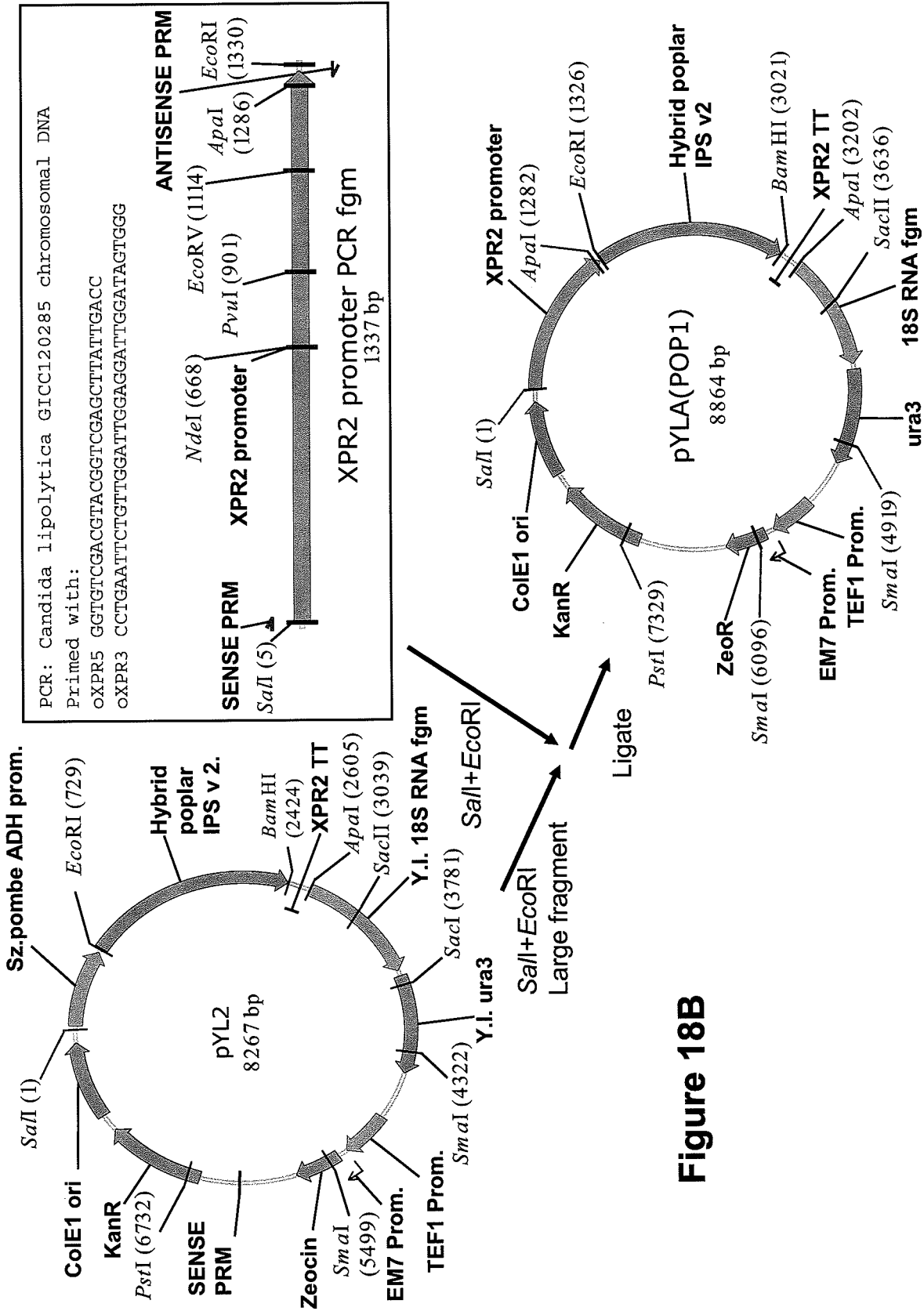


Figure 18B

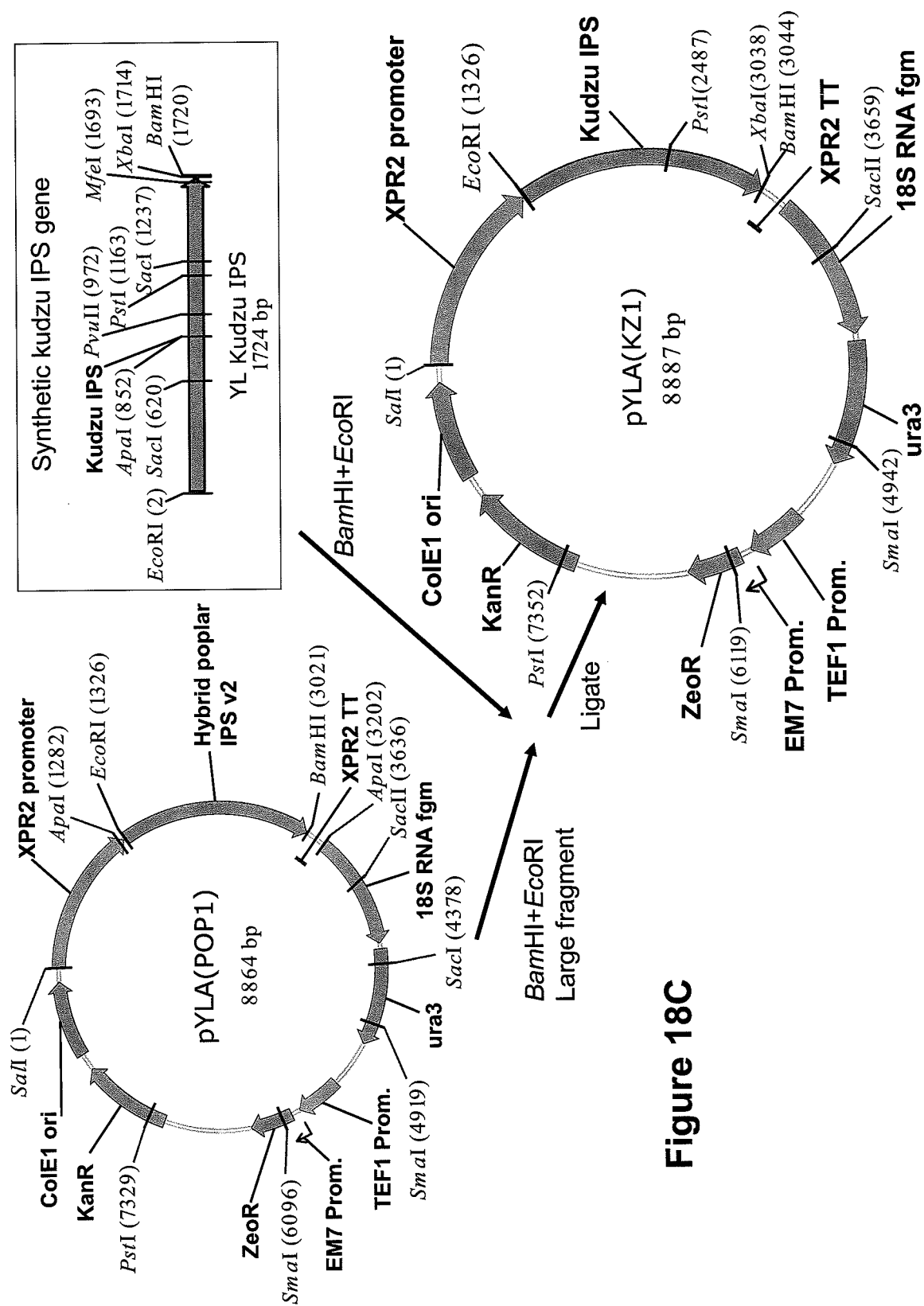
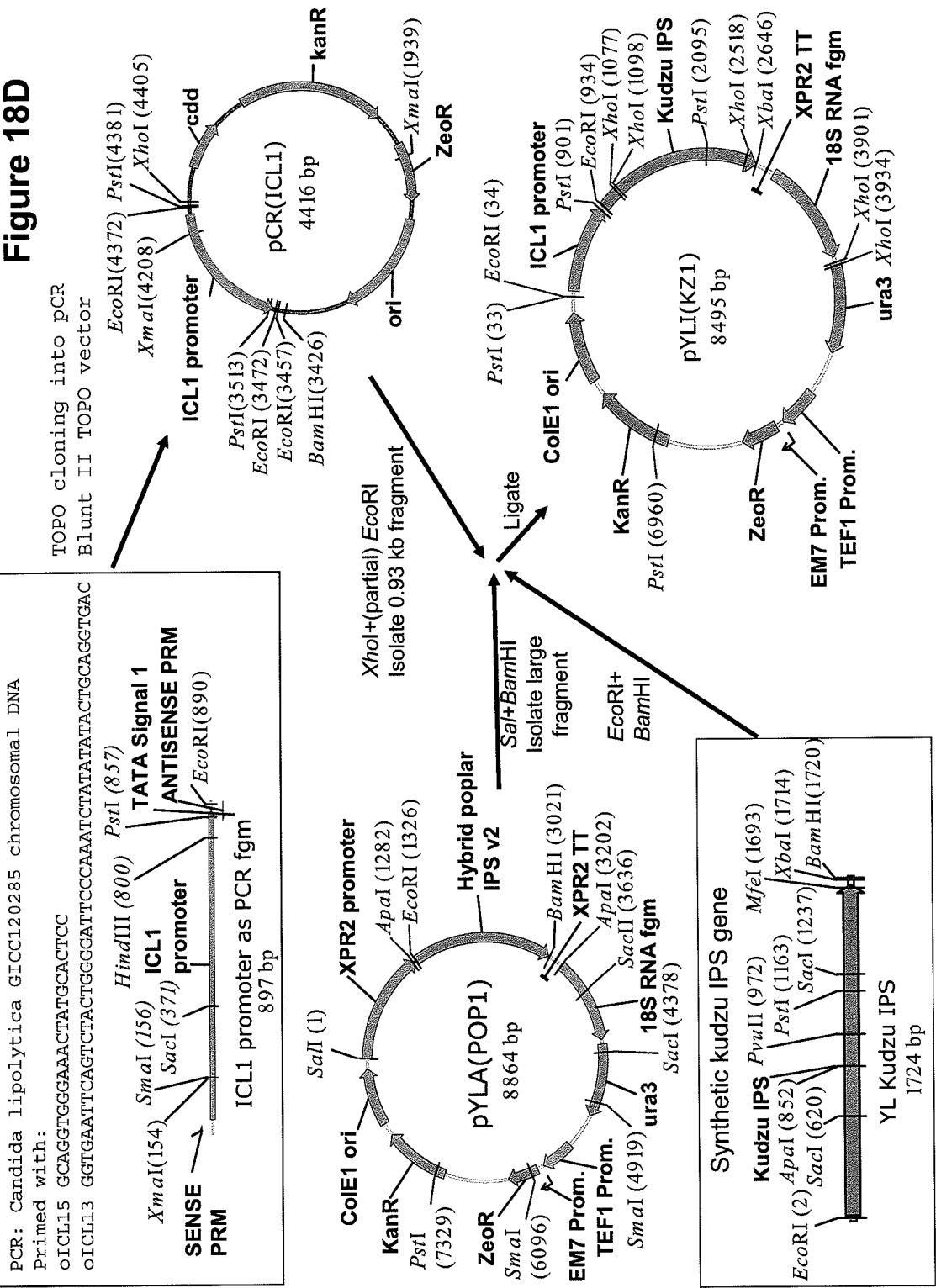
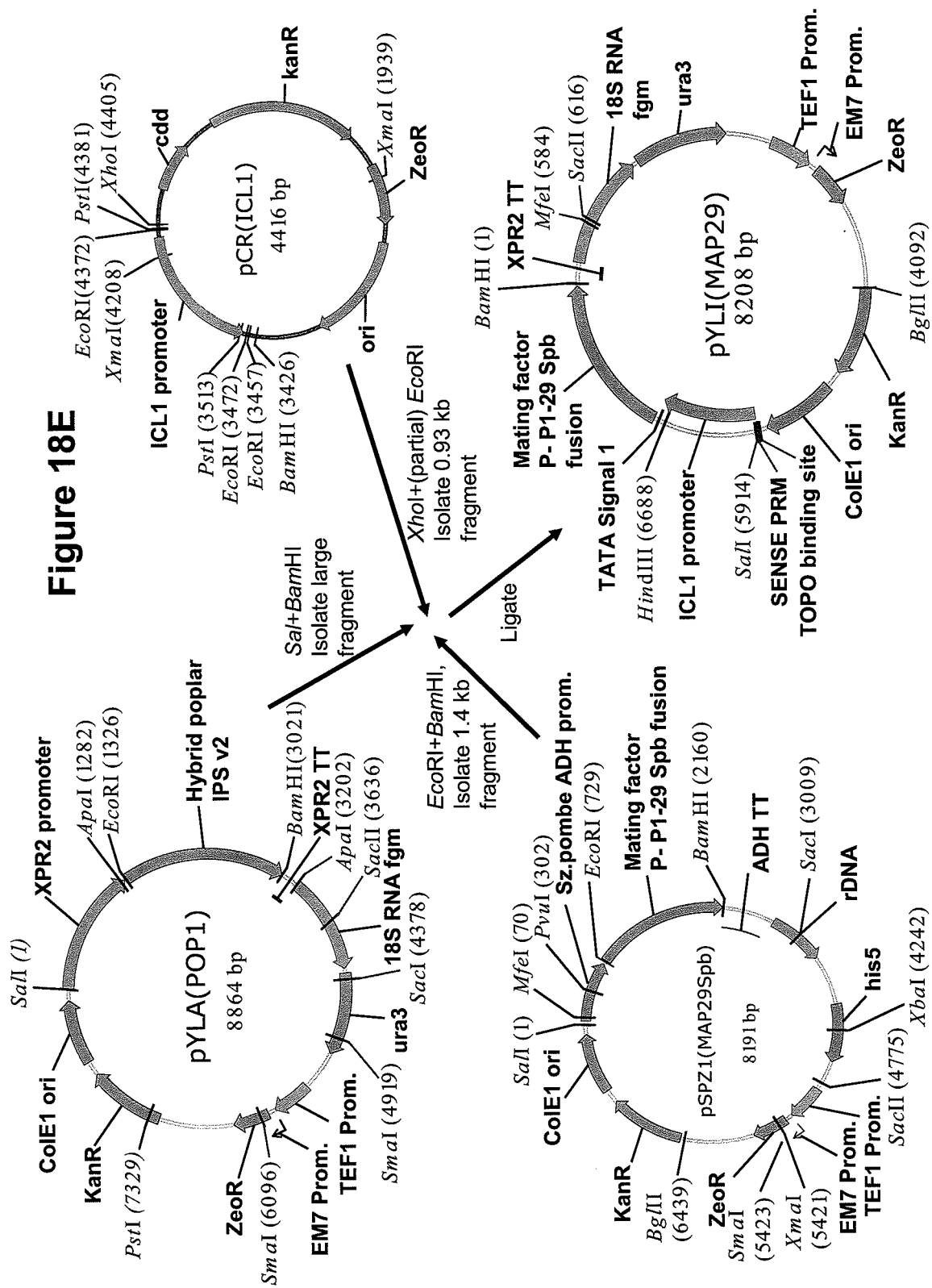


Figure 18C

Figure 18D





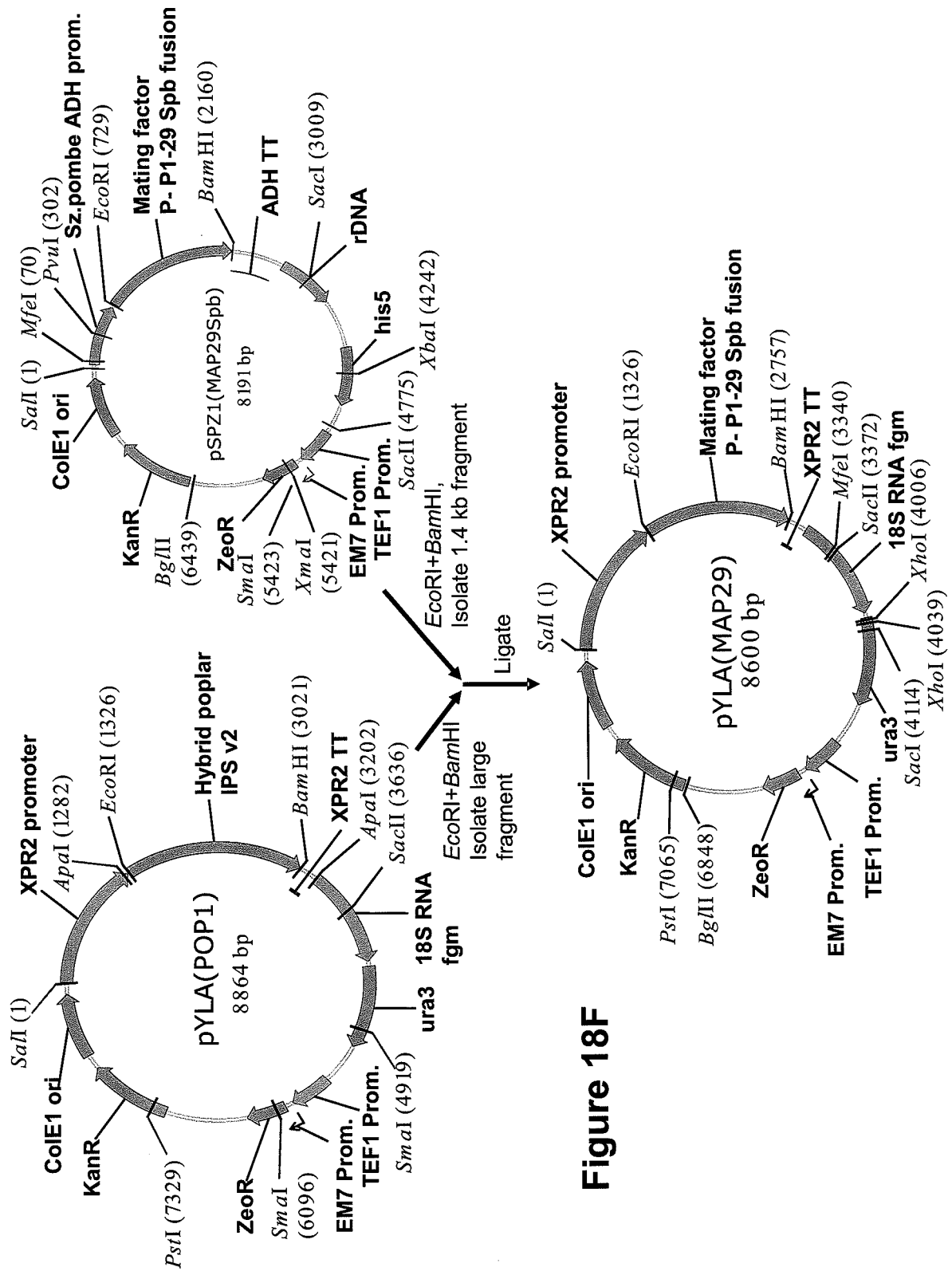


Figure 18F

Figure 19A

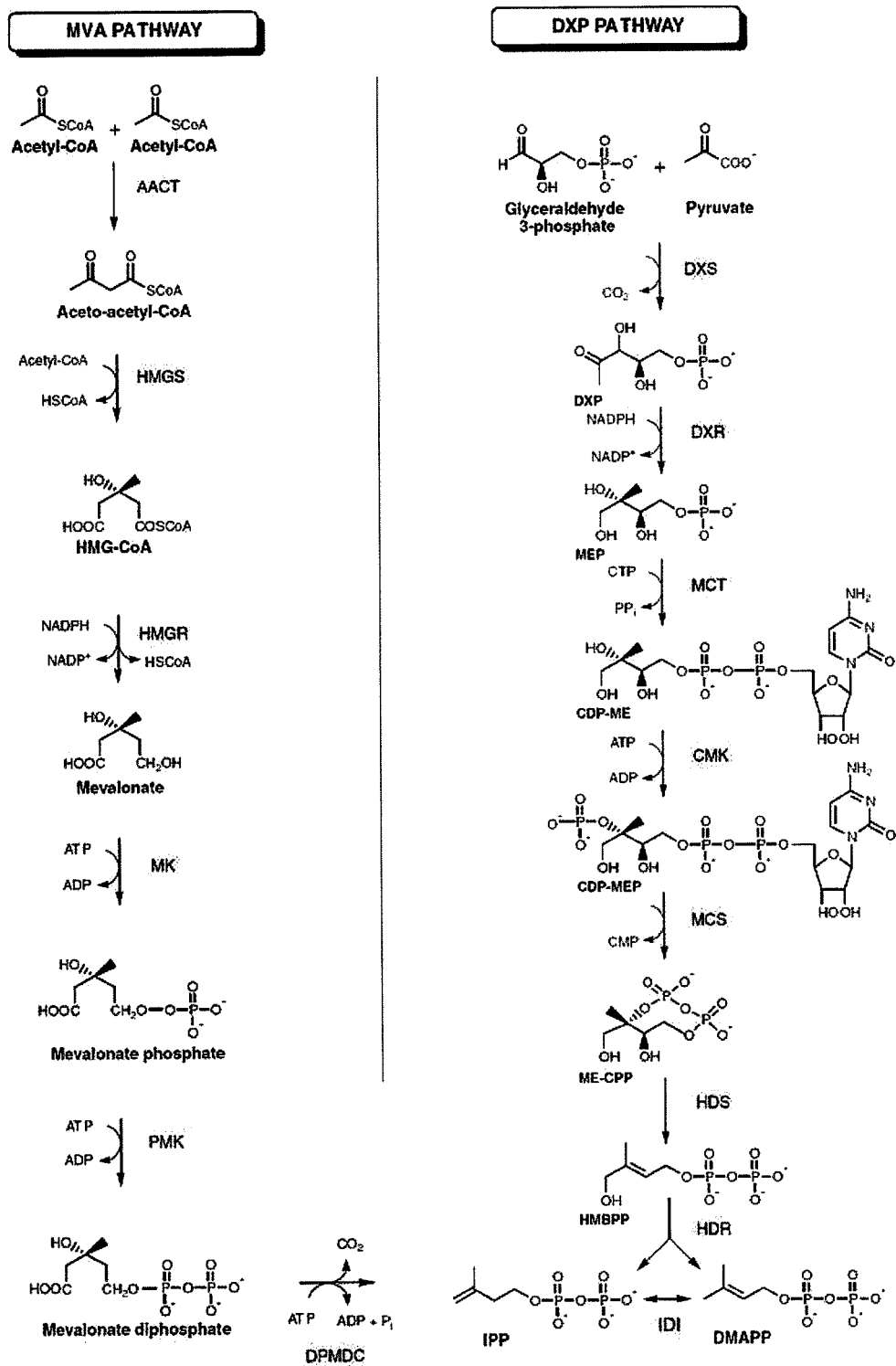


Figure 19B

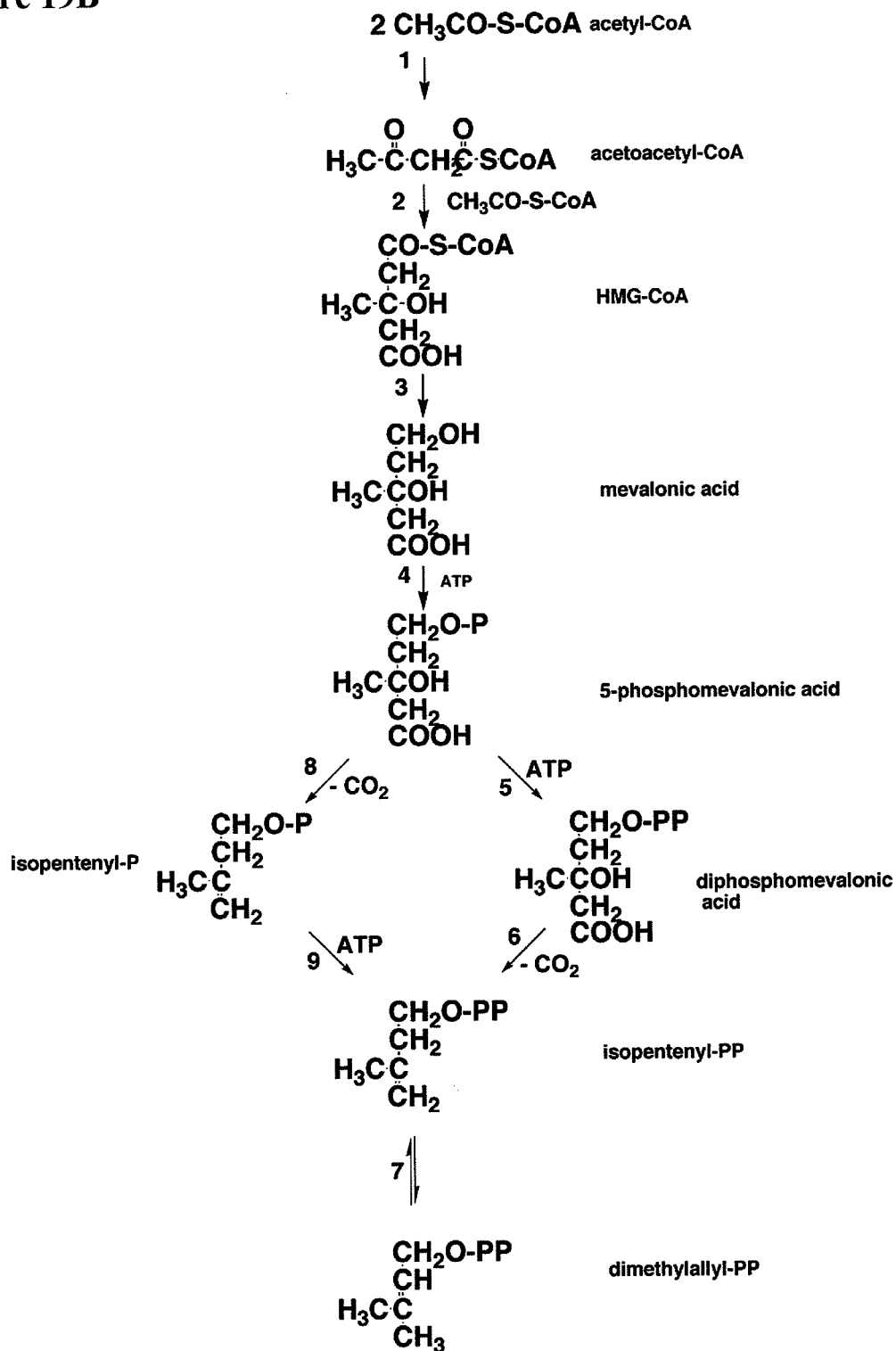


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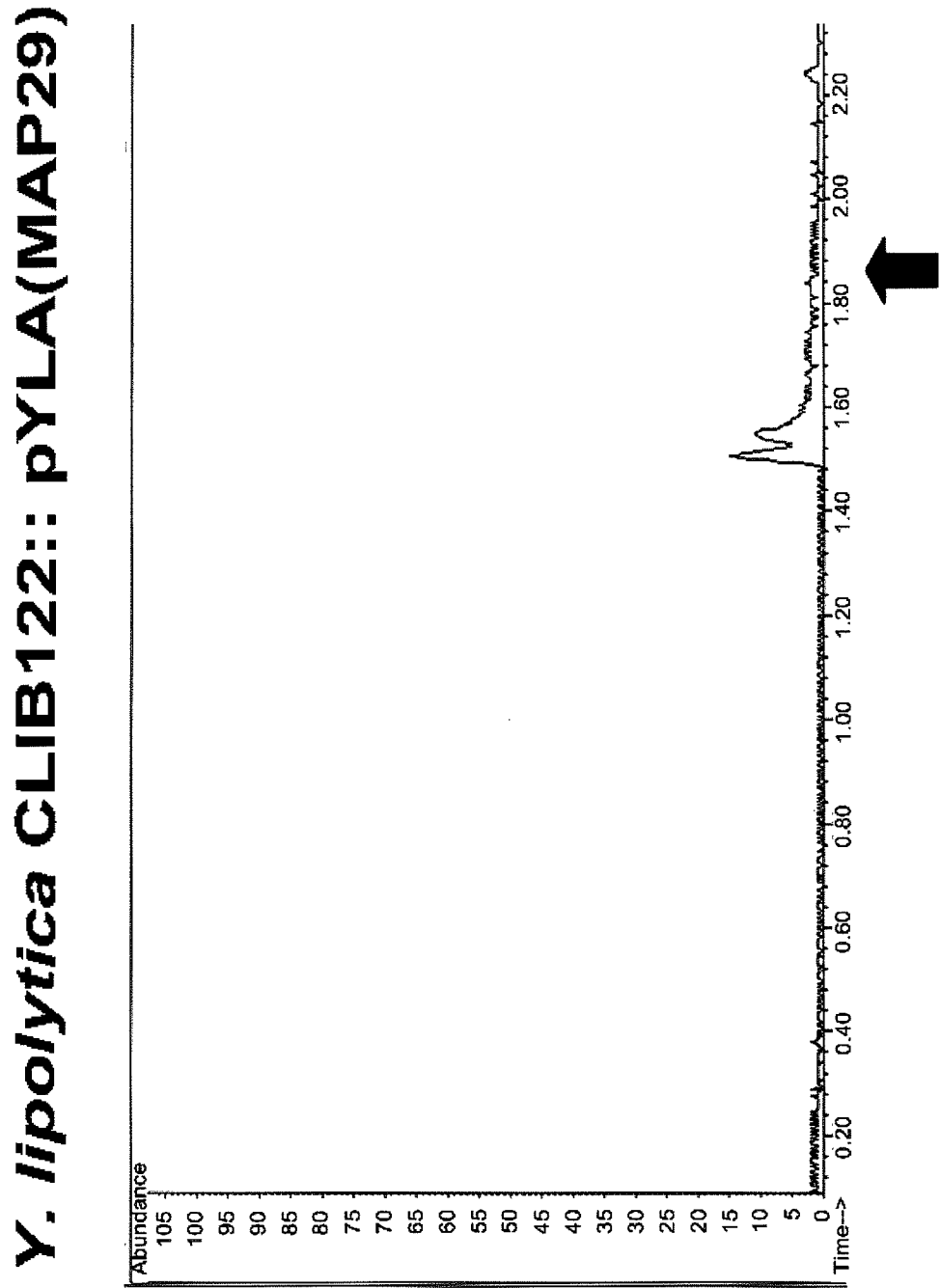


Figure 20B

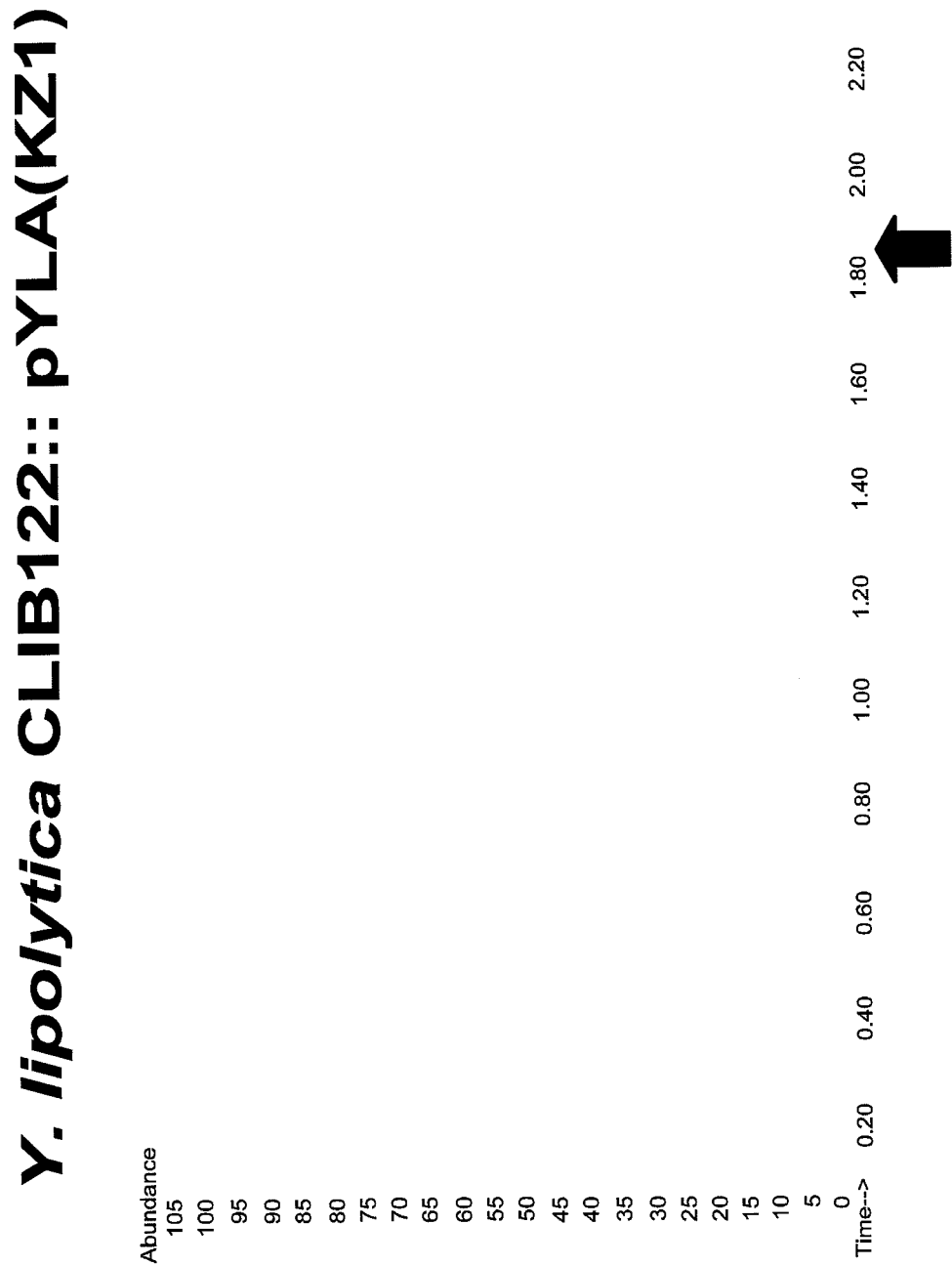


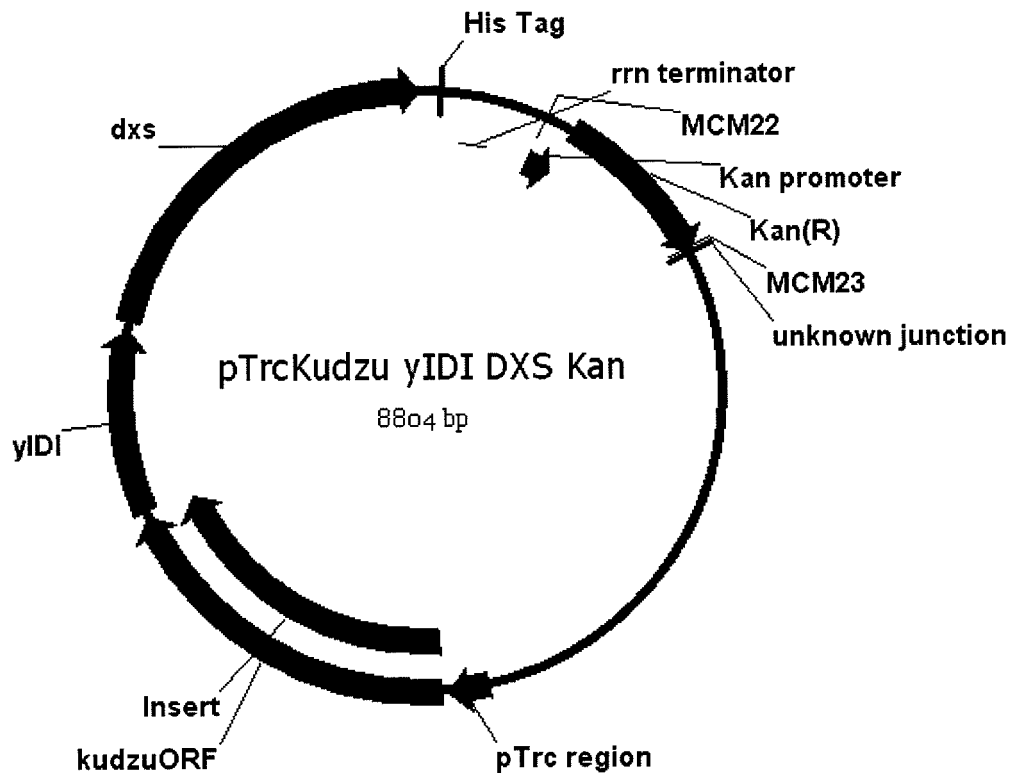
Figure 21

Figure 22A

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Figure 22B

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Figure 22D

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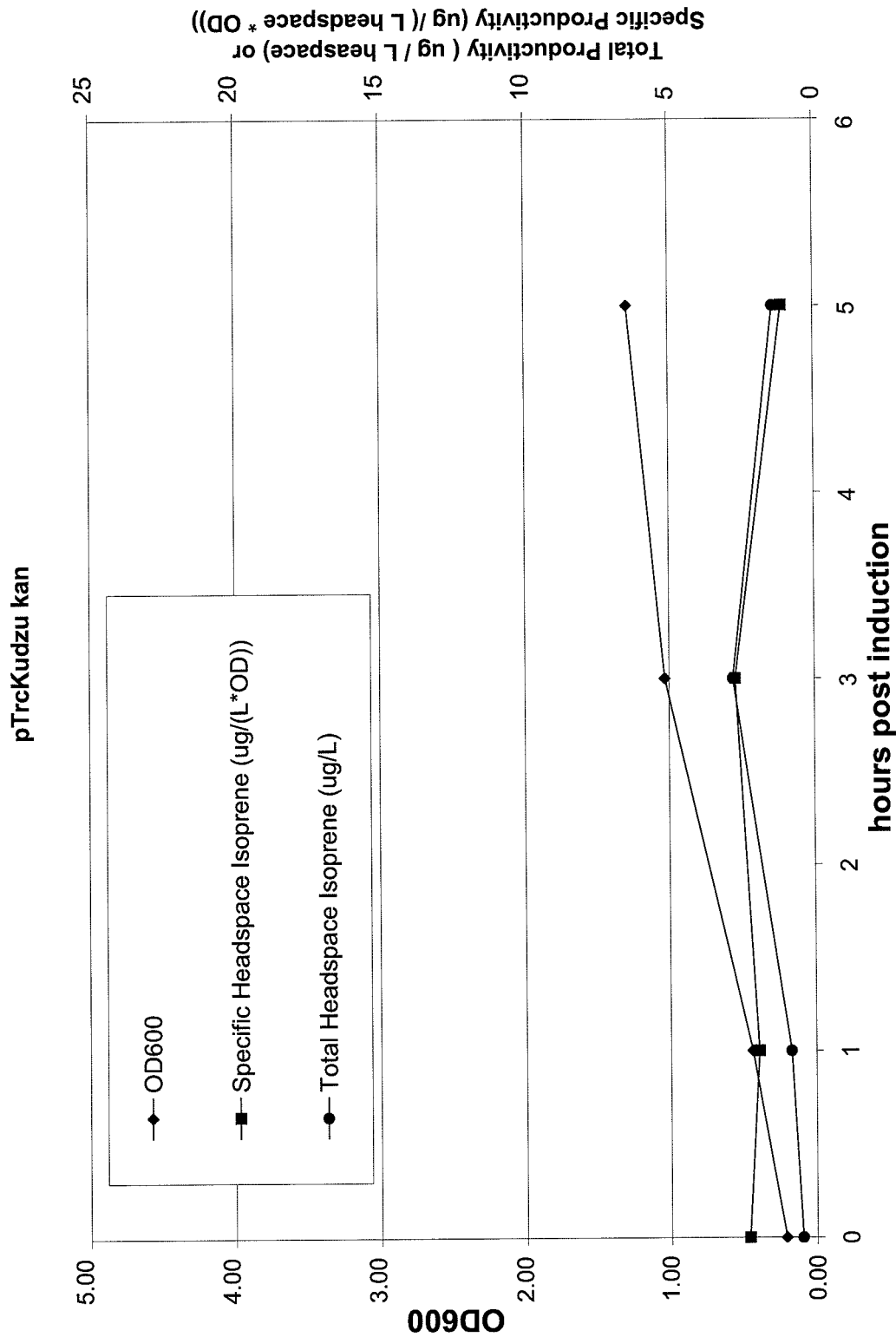


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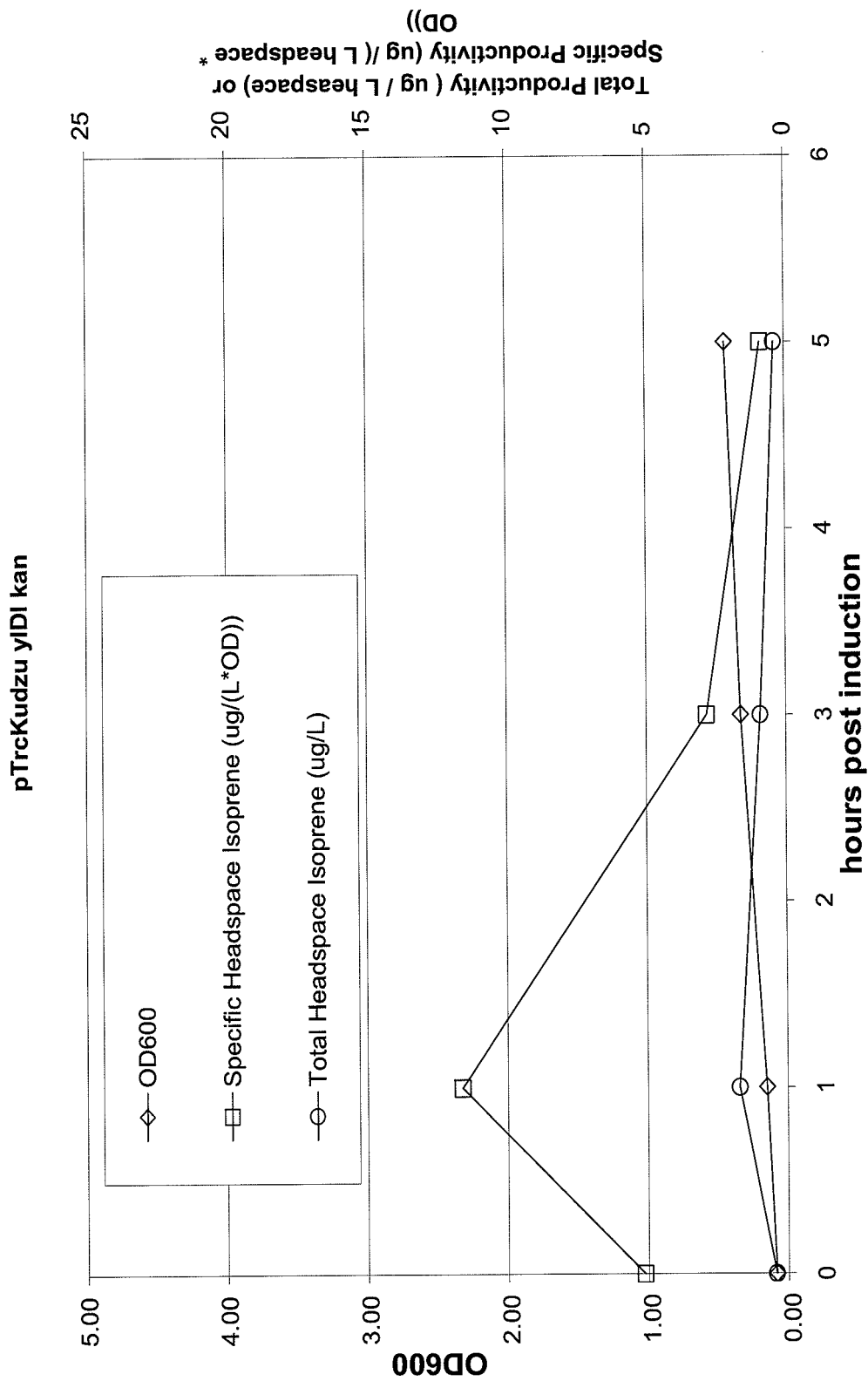


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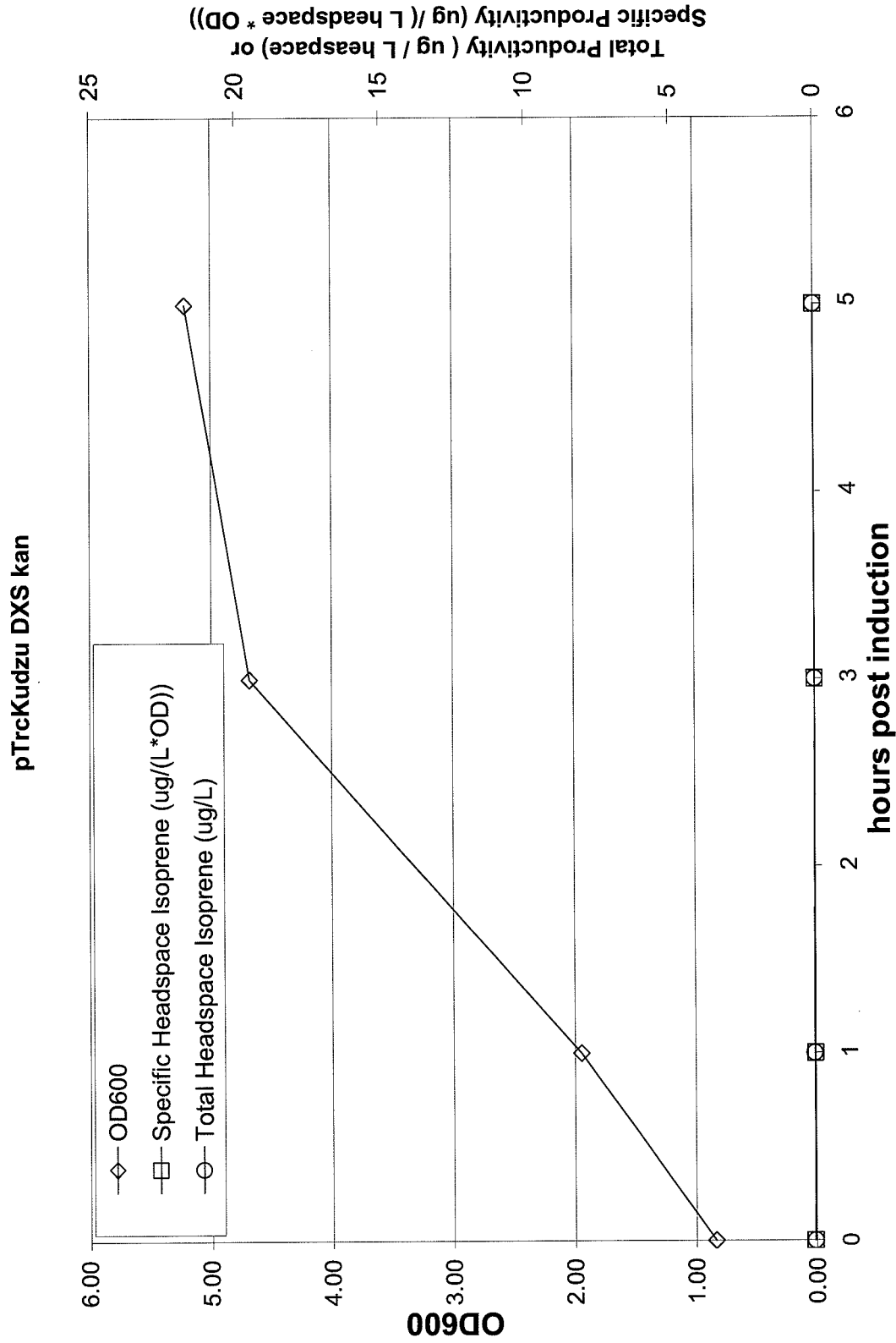


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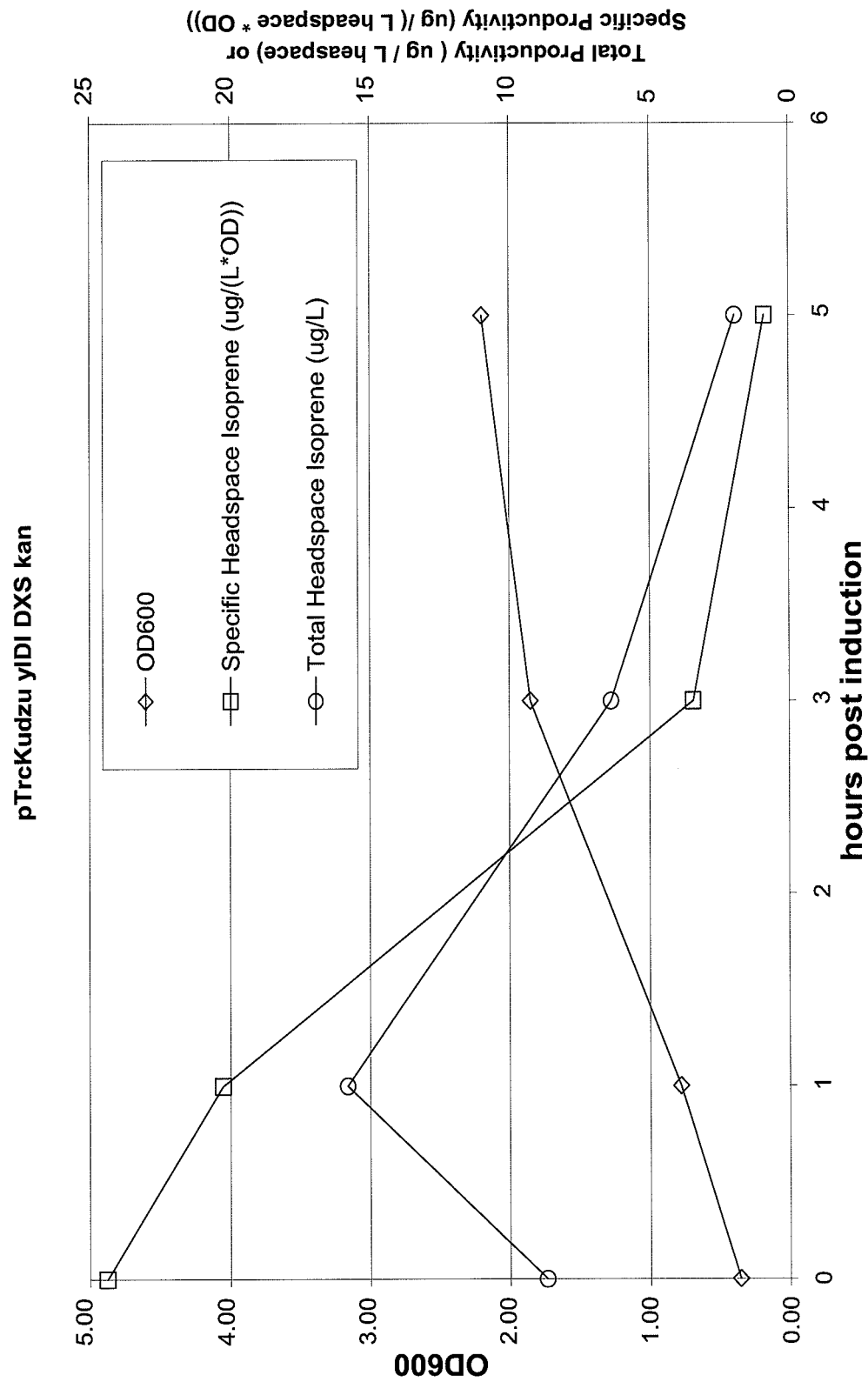


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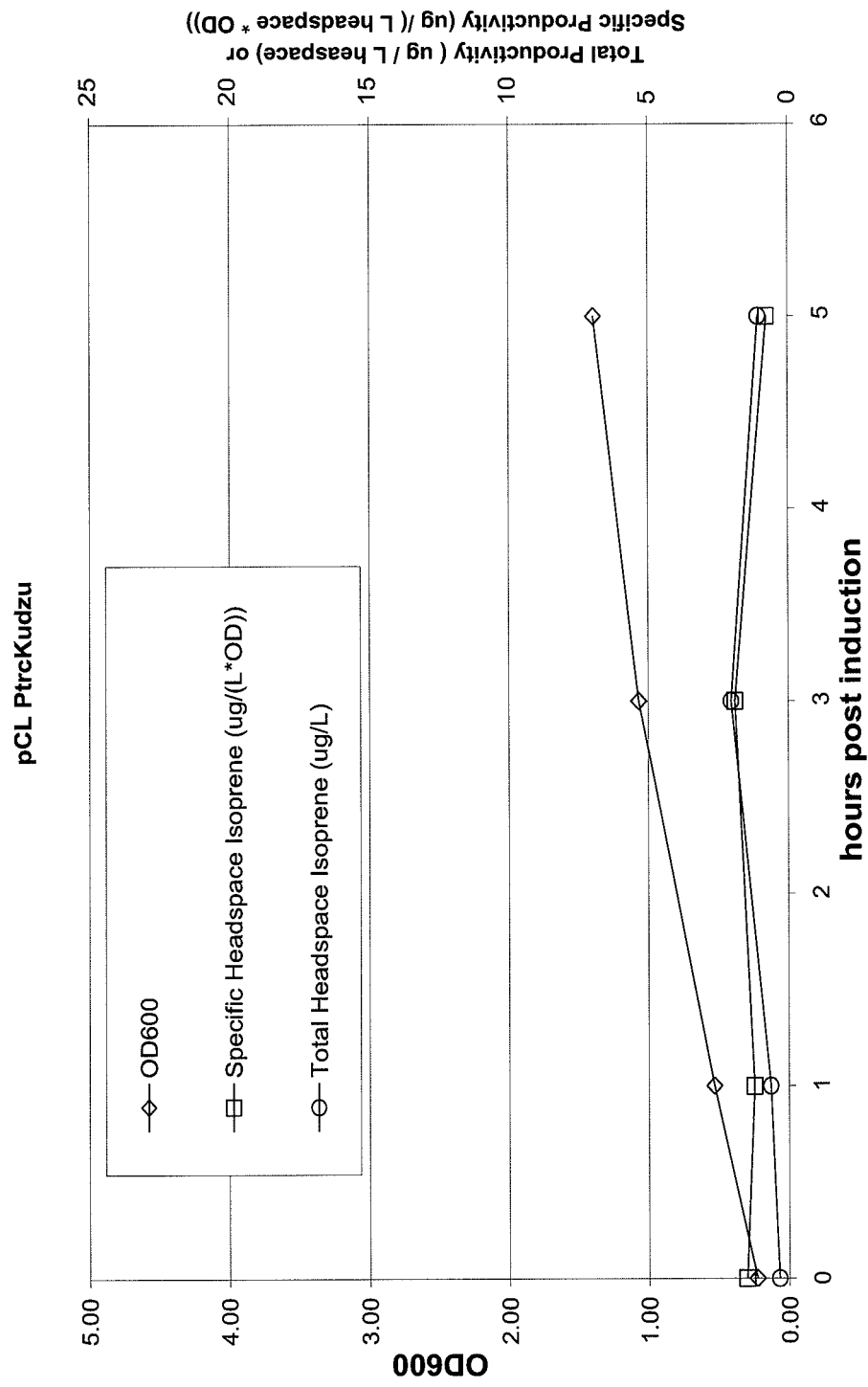


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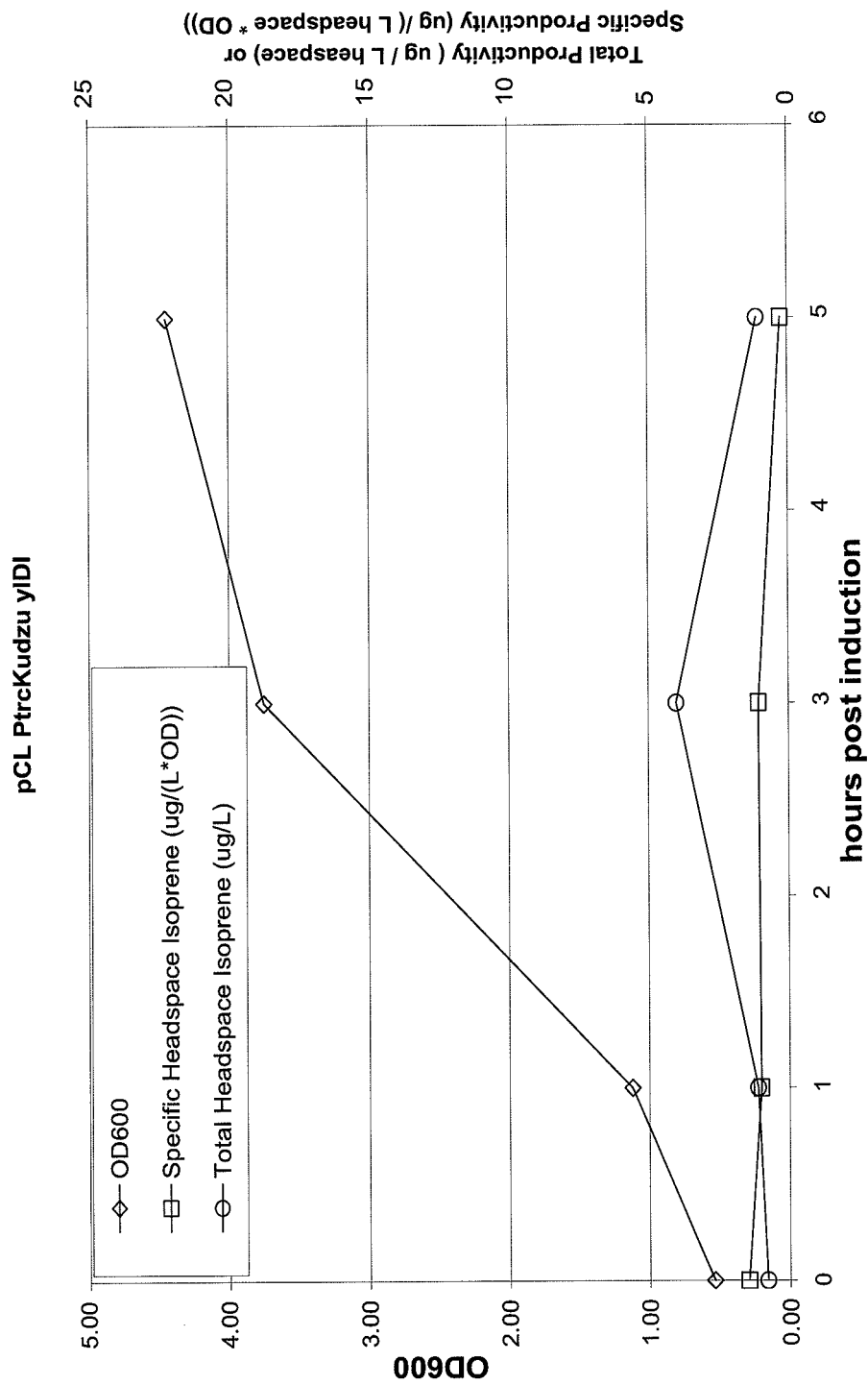


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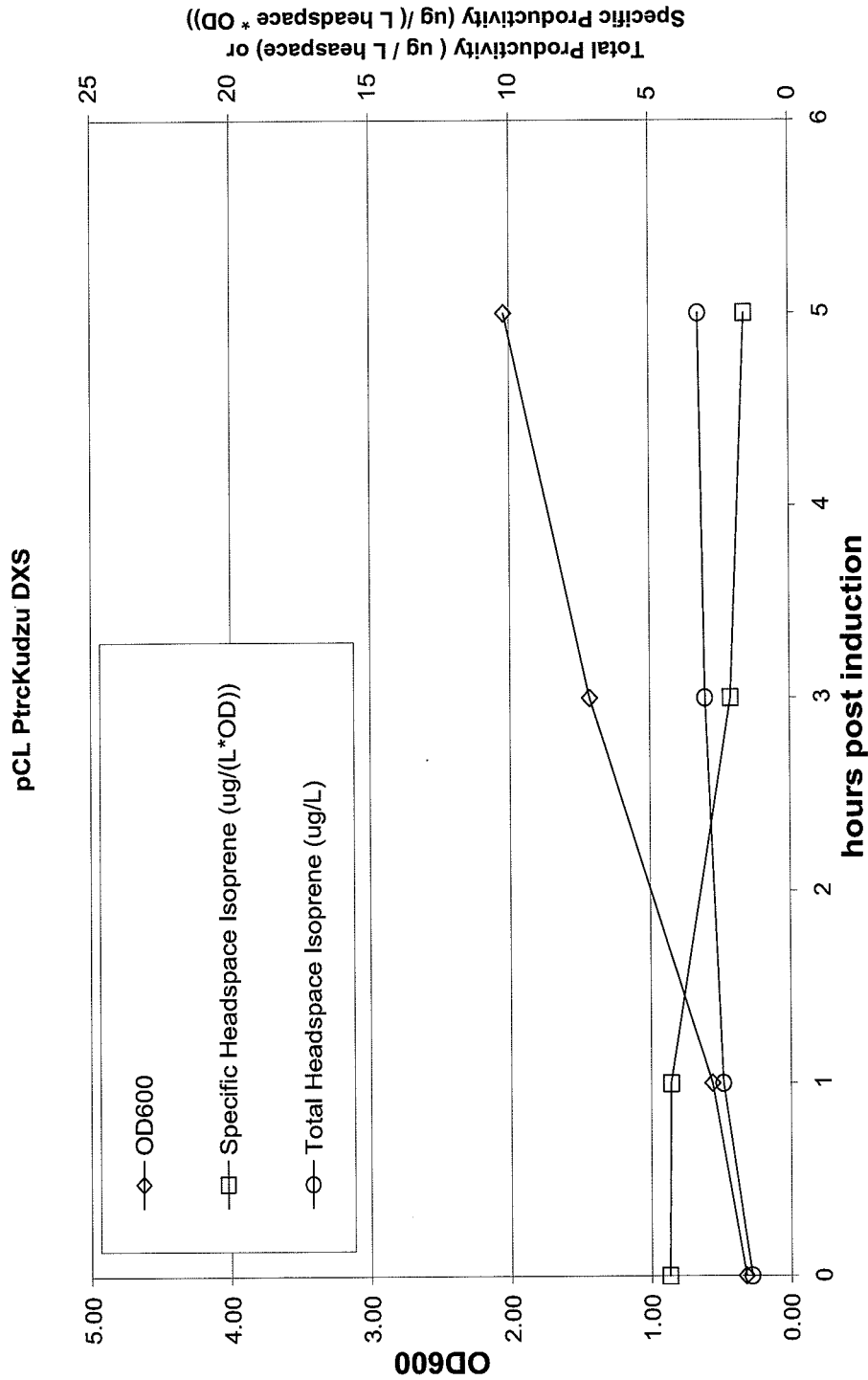


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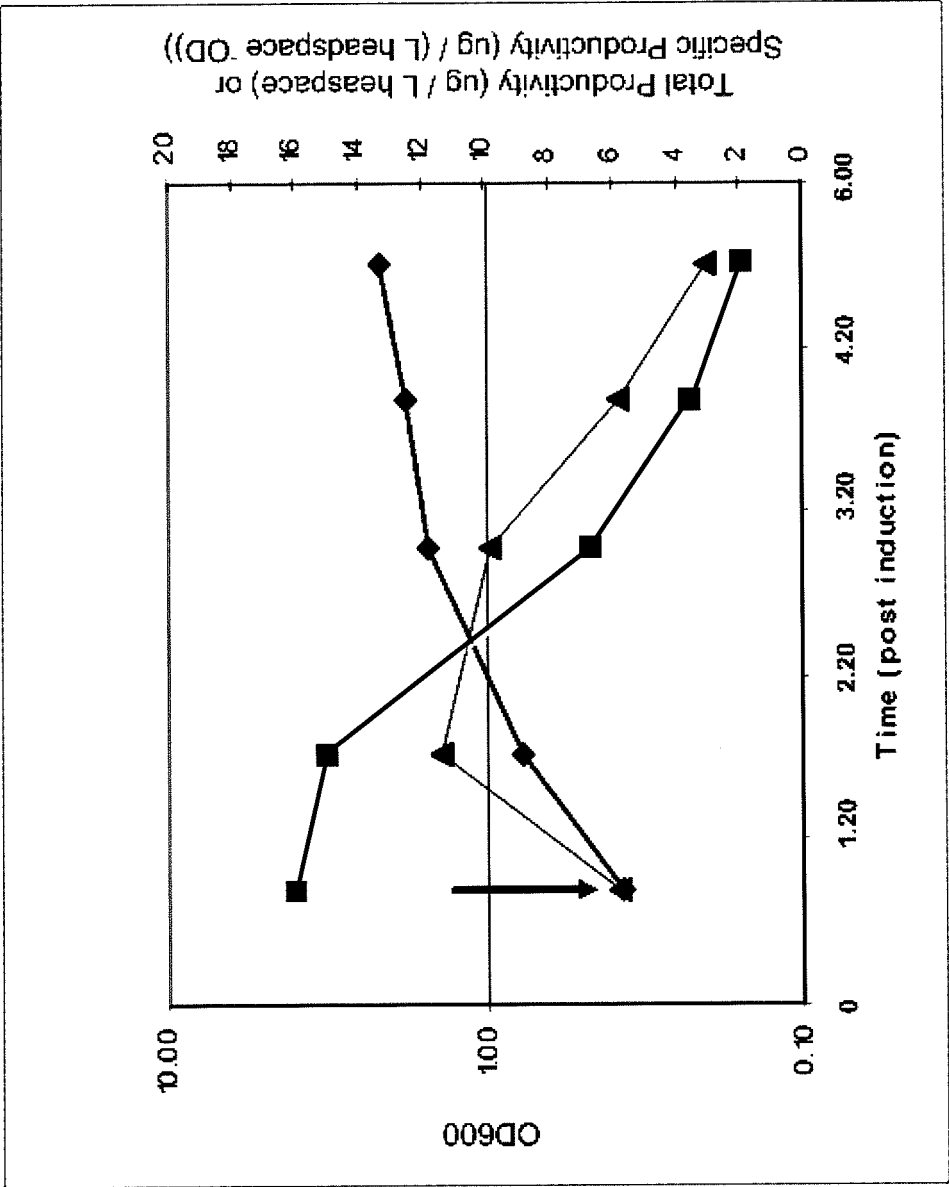


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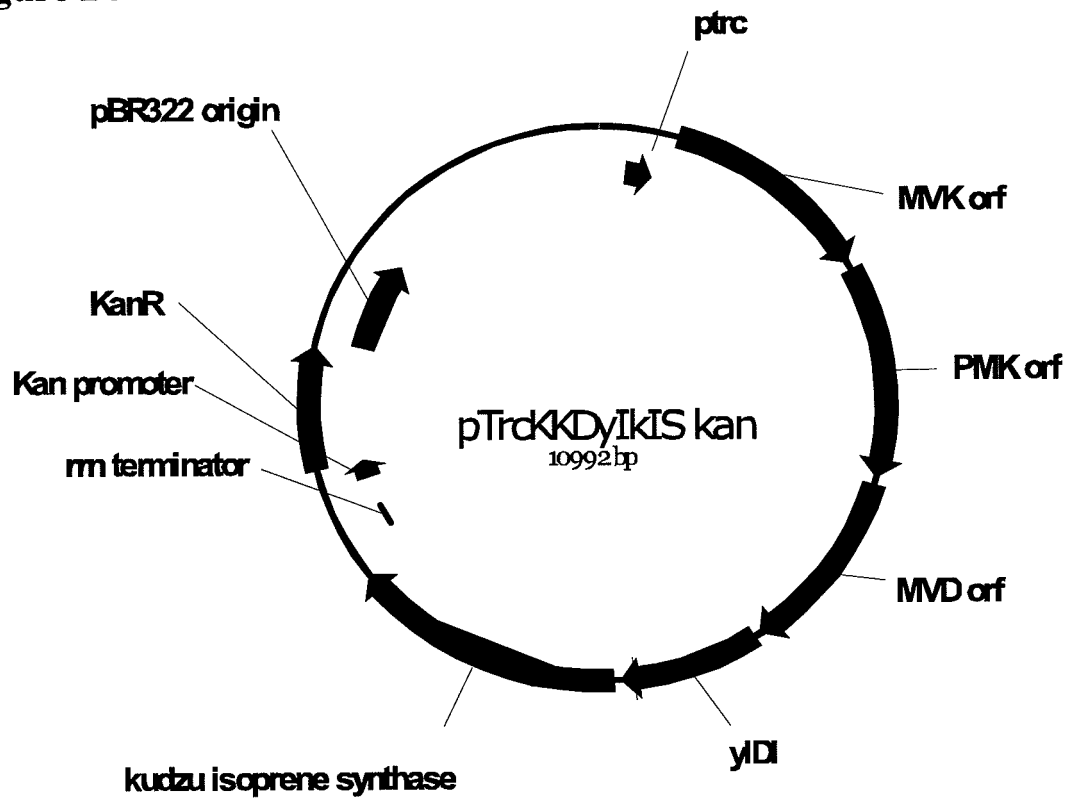


Figure 25A

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Figure 25B

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Figure 25C

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Figure 25D

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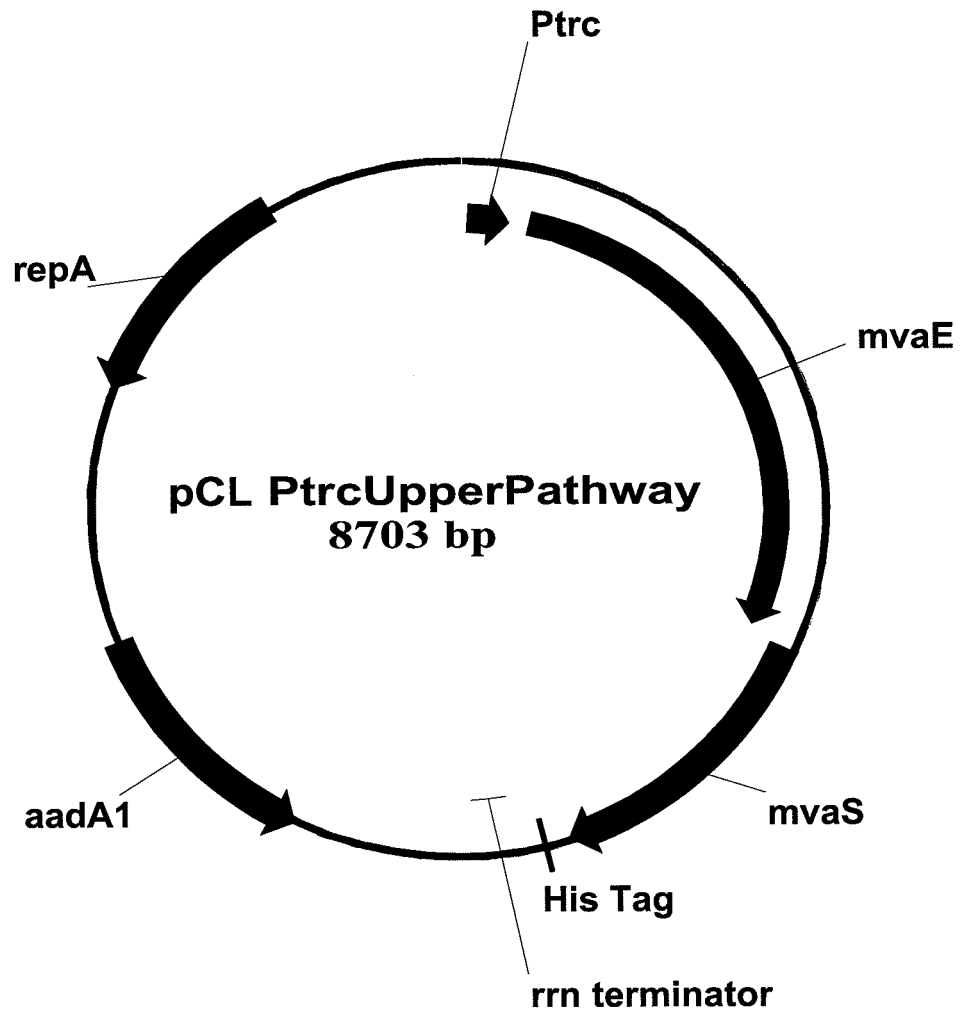
Figure 26

Figure 27A

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Figure 27B

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Figure 27C

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Figure 27D

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Figure 28

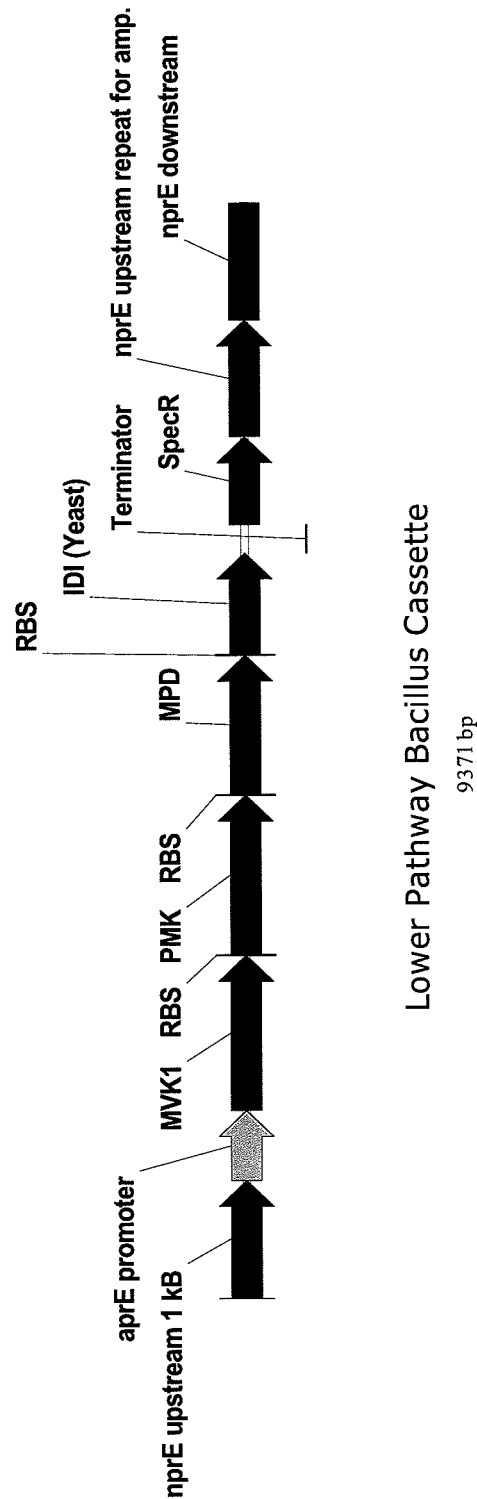


Figure 29A

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Figure 29B

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Figure 29C

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Figure 29D

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Figure 30

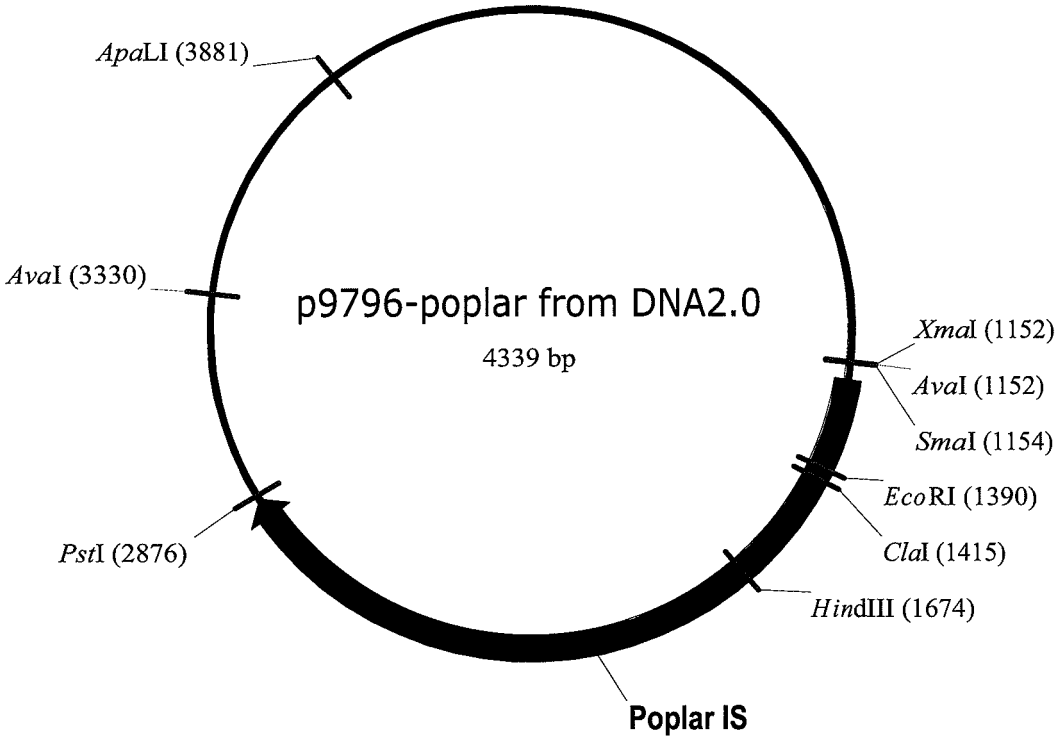


Figure 31A

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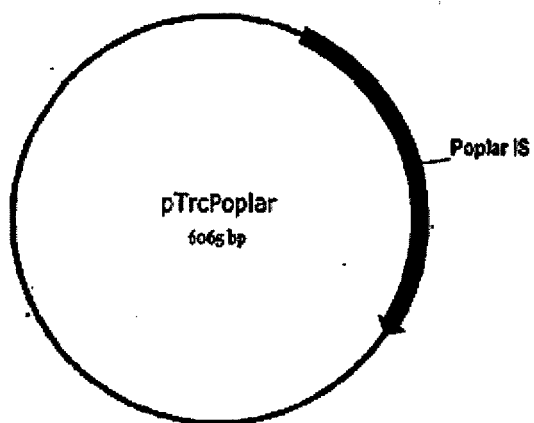
Figure 32

Figure 33A

5' -

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Figure 33B

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Figure 33C

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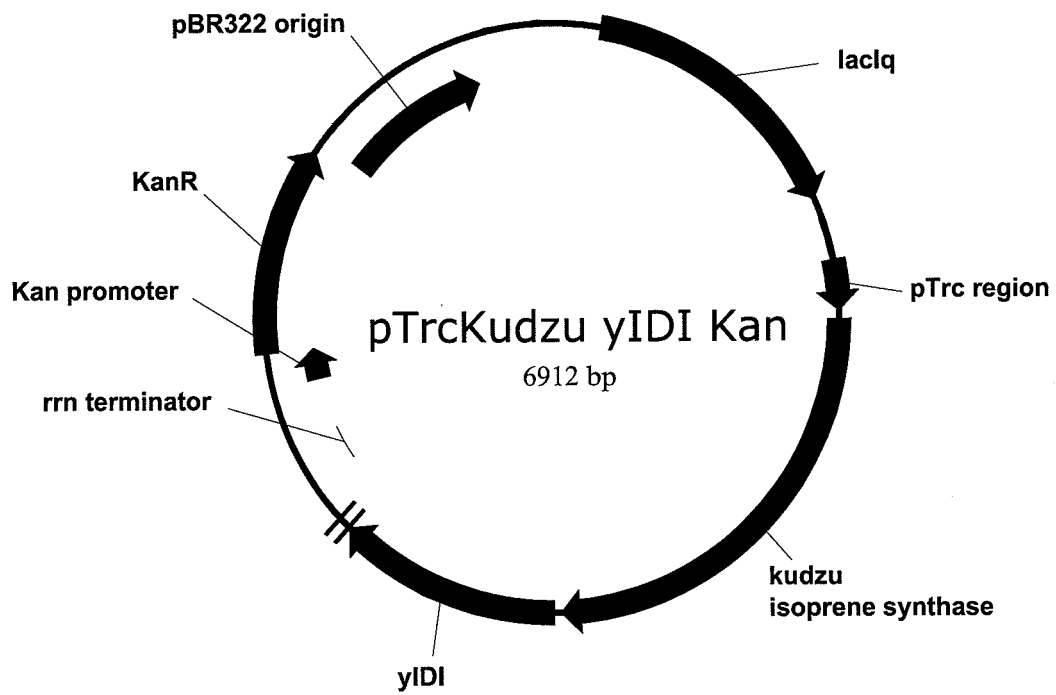
Figure 34

Figure 35A

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Figure 35B

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Figure 35C

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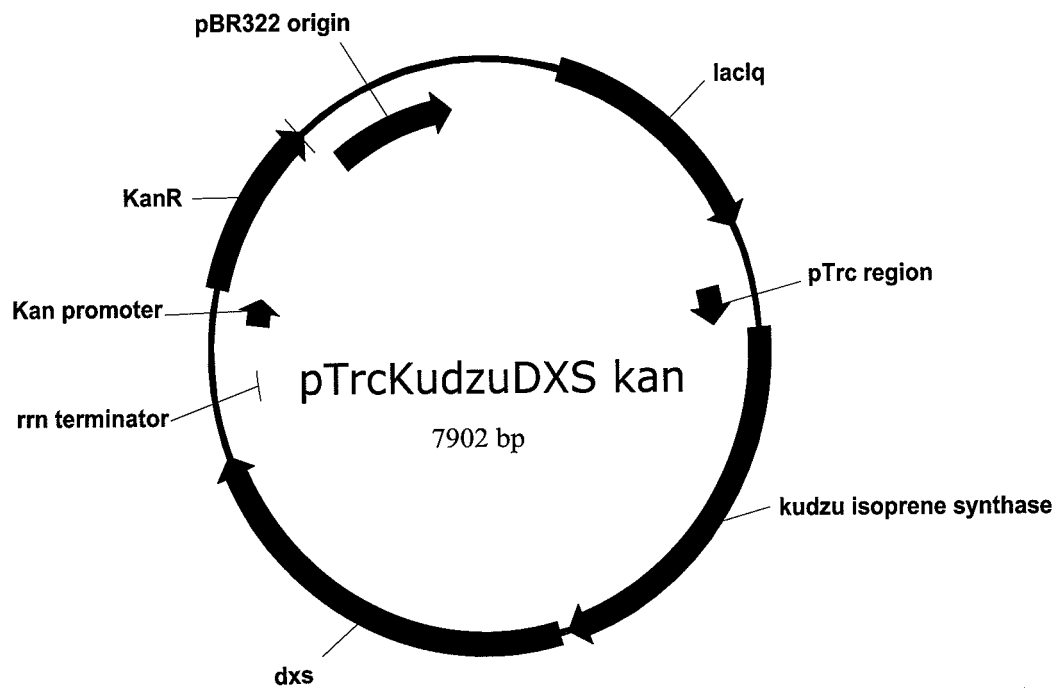
Figure 36

Figure 37A

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Figure 37B

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Figure 37C

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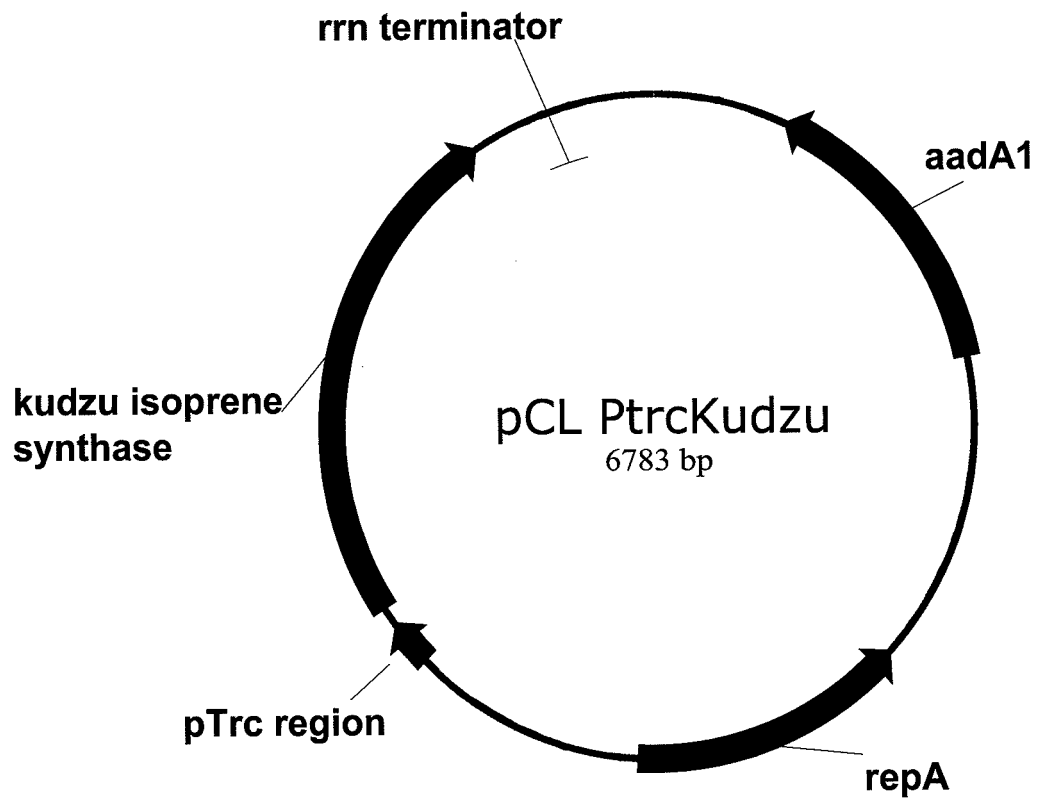
Figure 38

Figure 39A

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Figure 39B

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Figure 39C

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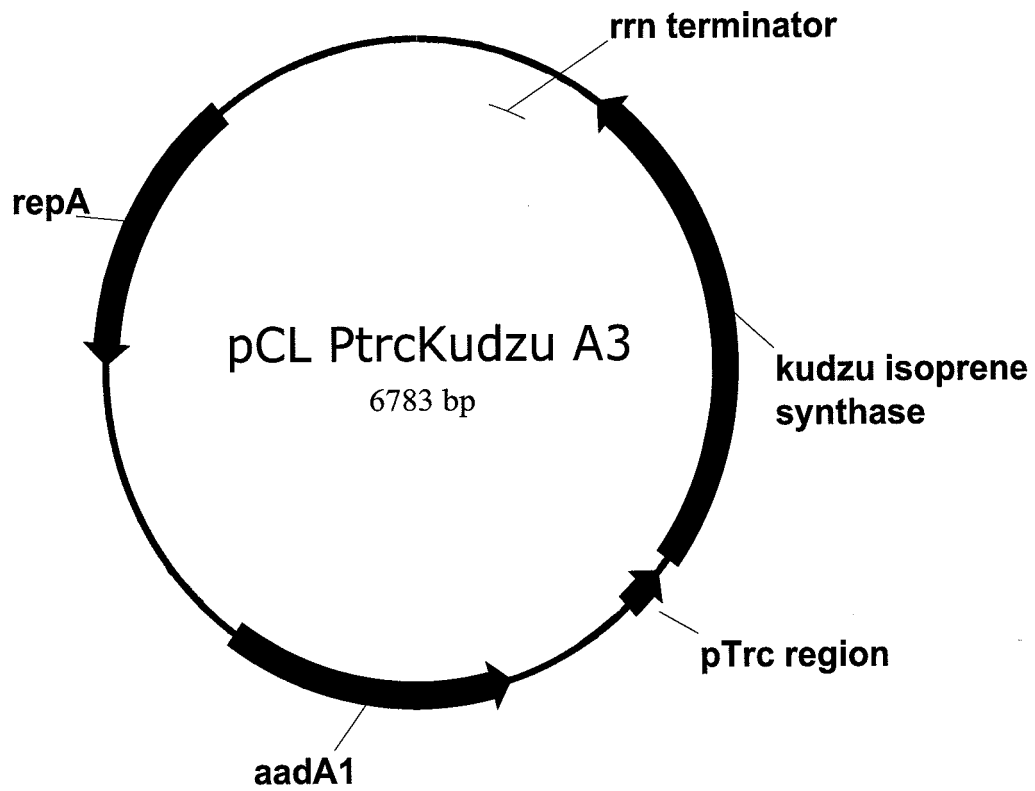
Figure 40

Figure 41A

5' -

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Figure 41B

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Figure 41C

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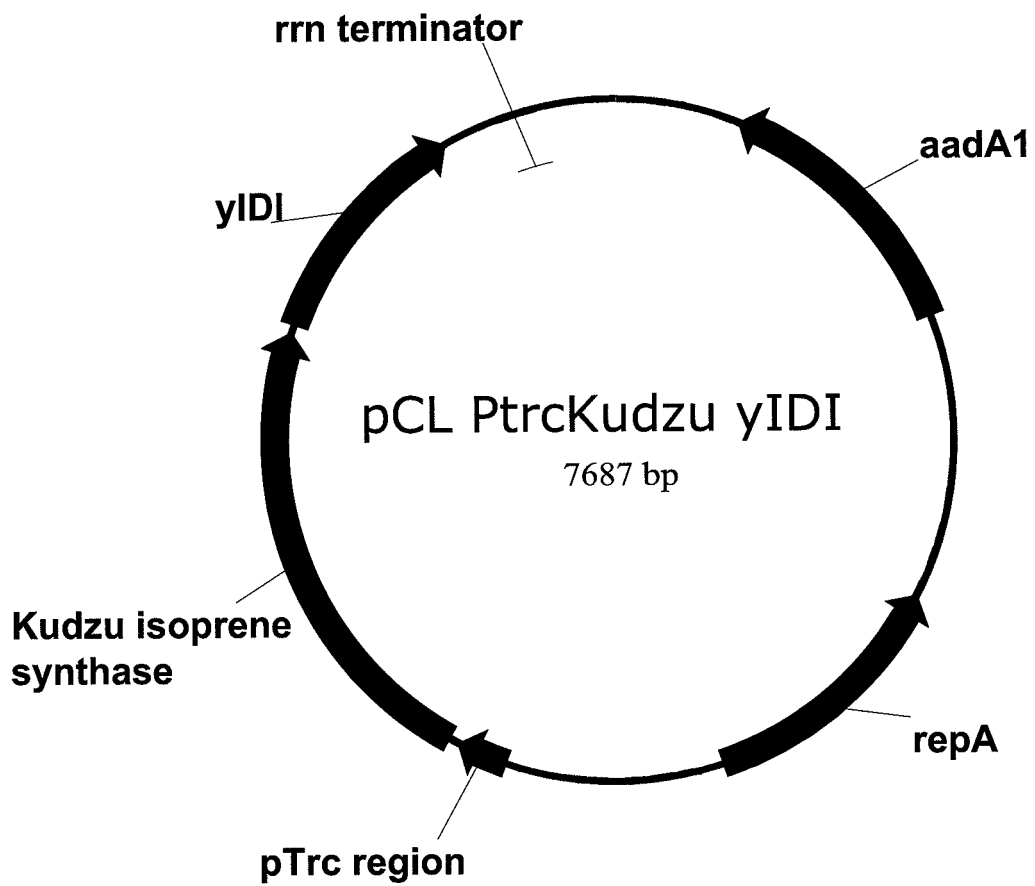
Figure 42

Figure 43A

5' -

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Figure 43B

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Figure 43C

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Figure 44

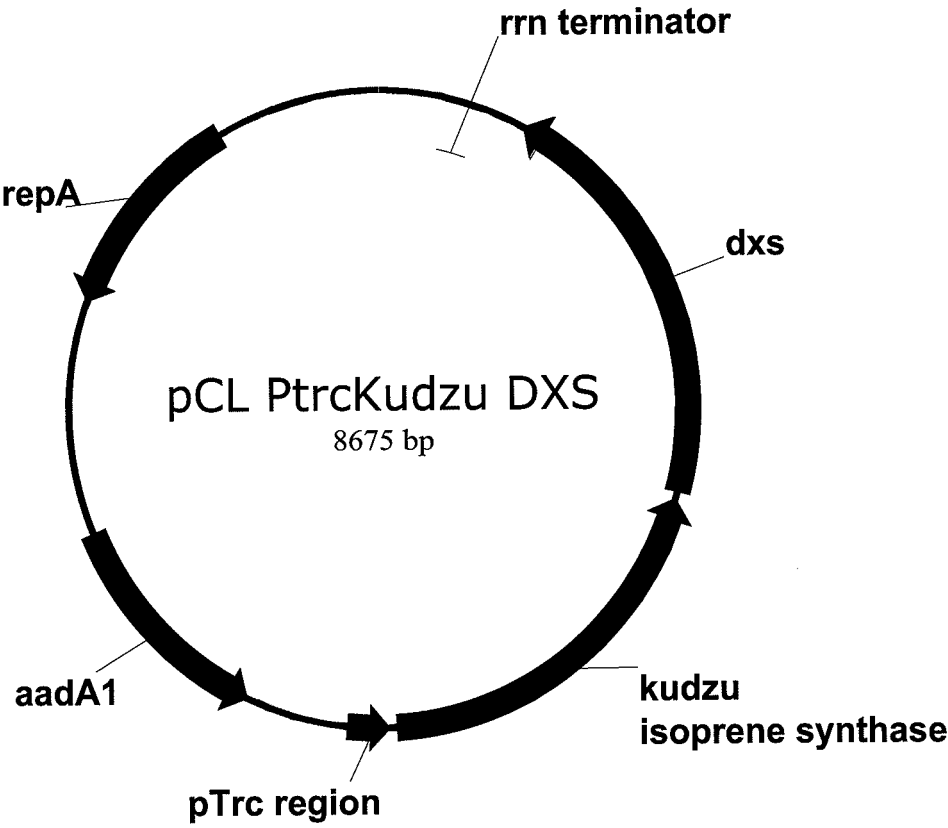


Figure 45A

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Figure 45B

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Figure 45C

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Figure 45D

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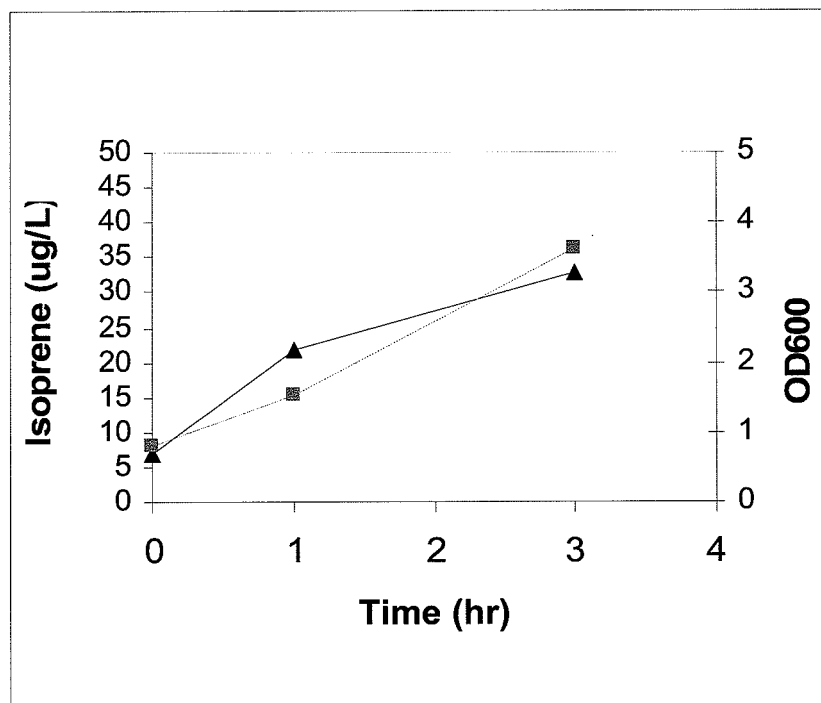
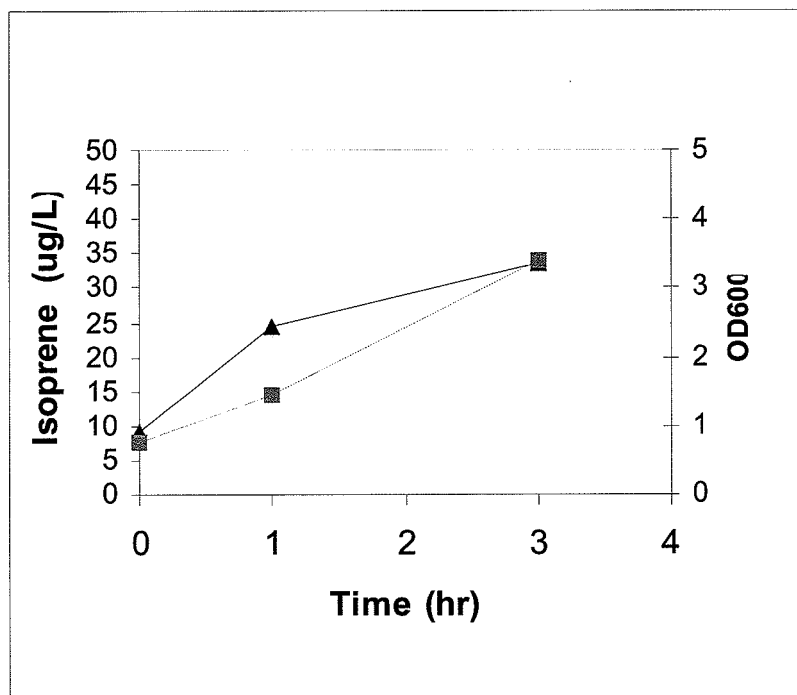
Figure 46A**Figure 46B**

Figure 46C

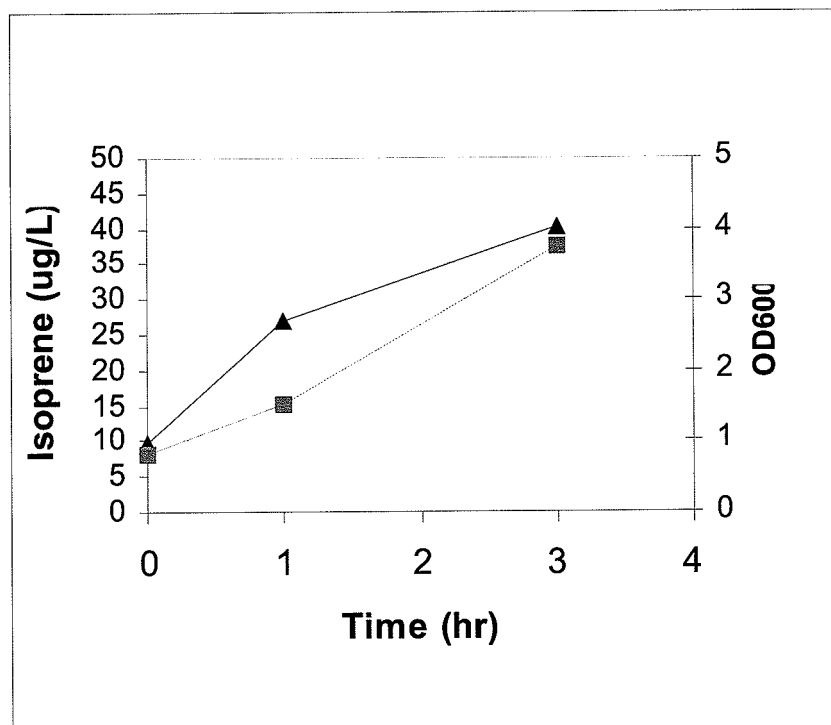


Figure 46D

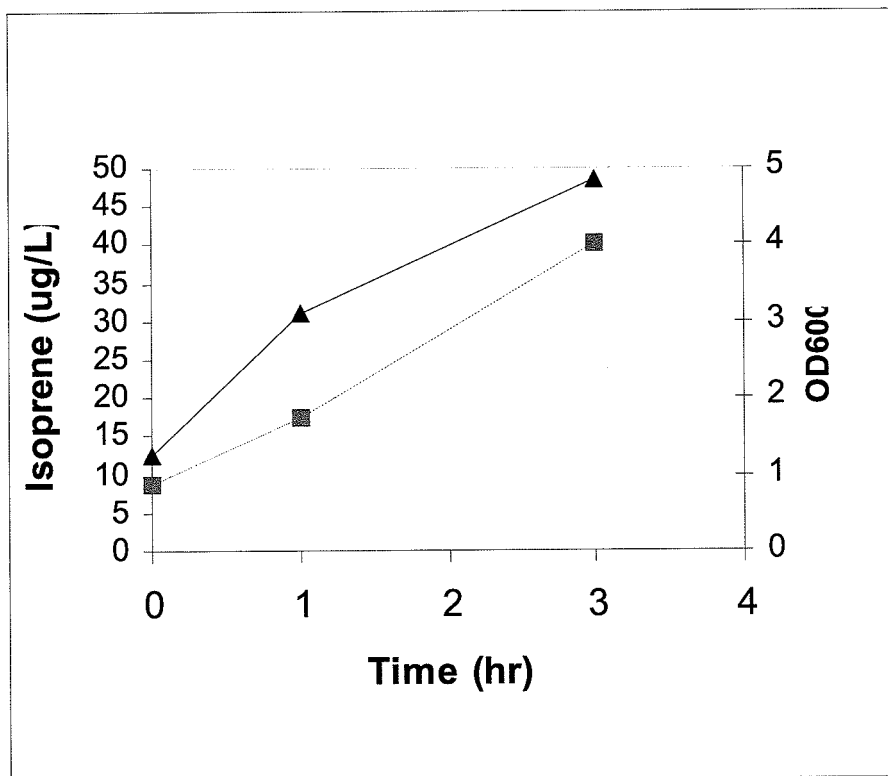


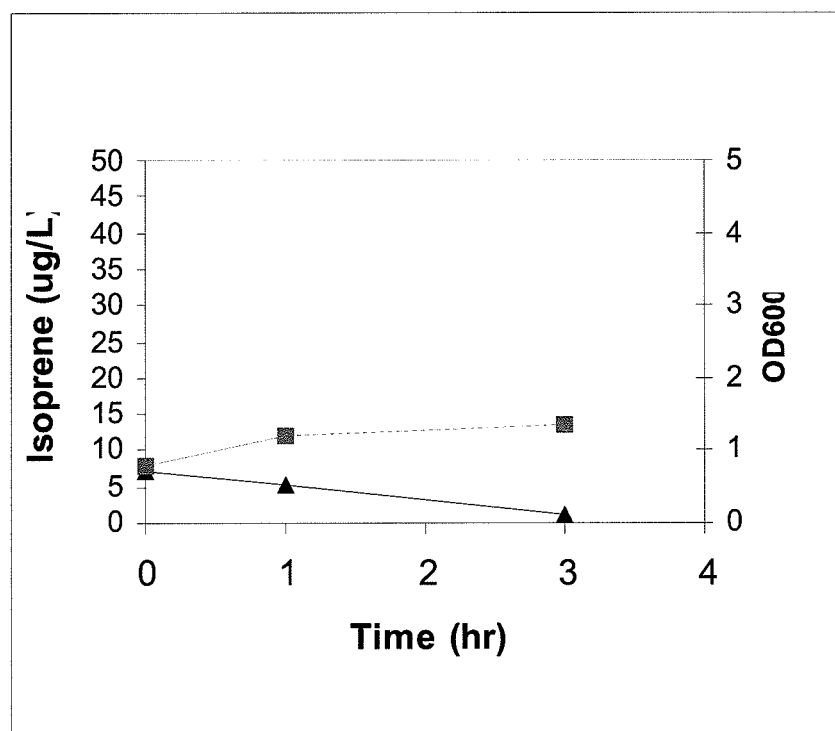
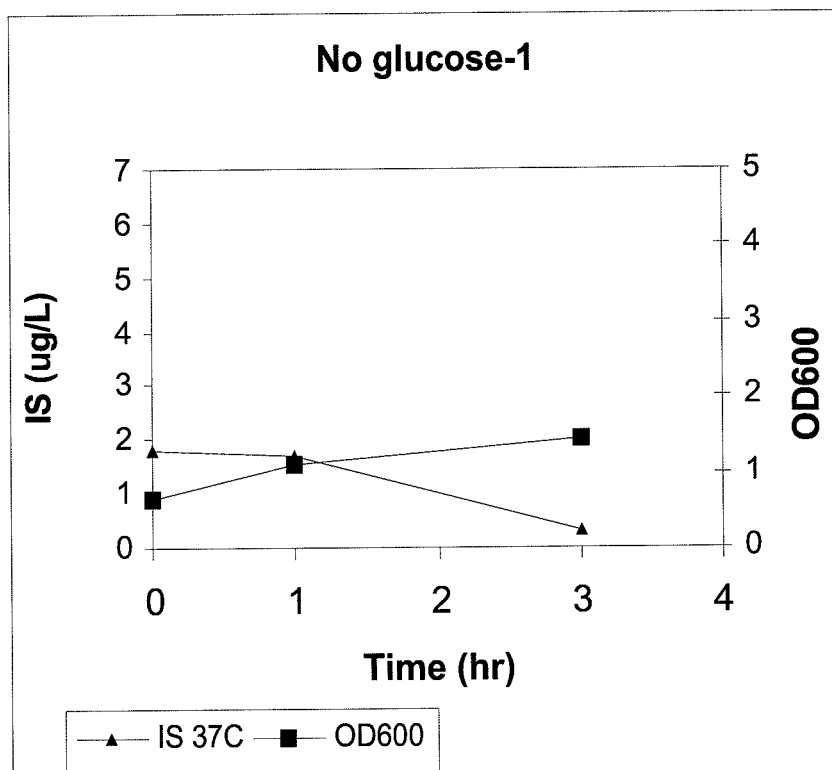
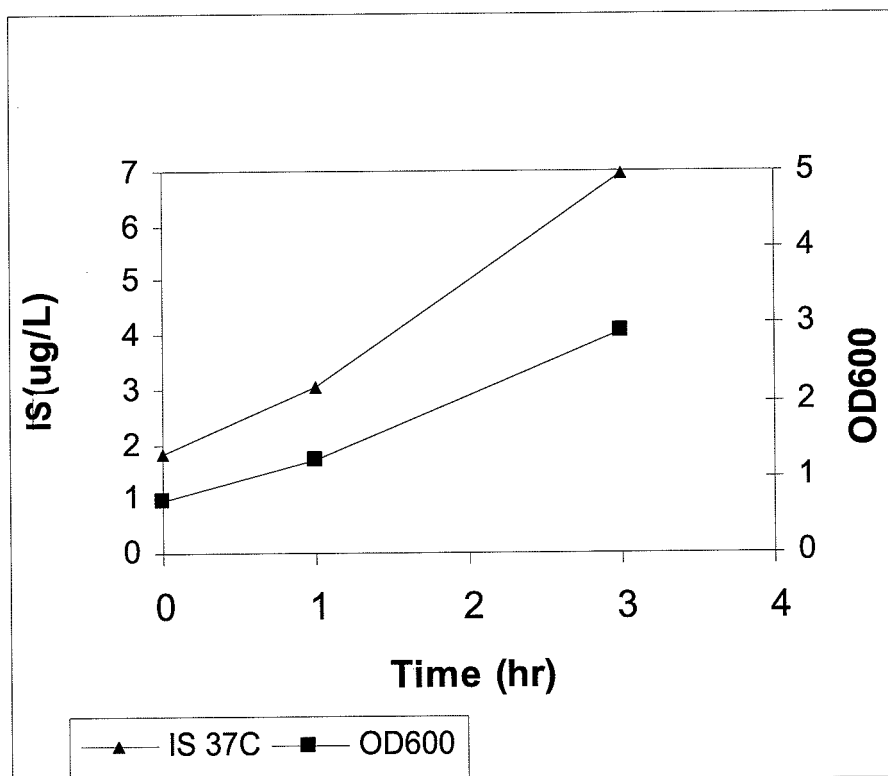
Figure 46E

Figure 47A**Figure 47B****Figure 47C**

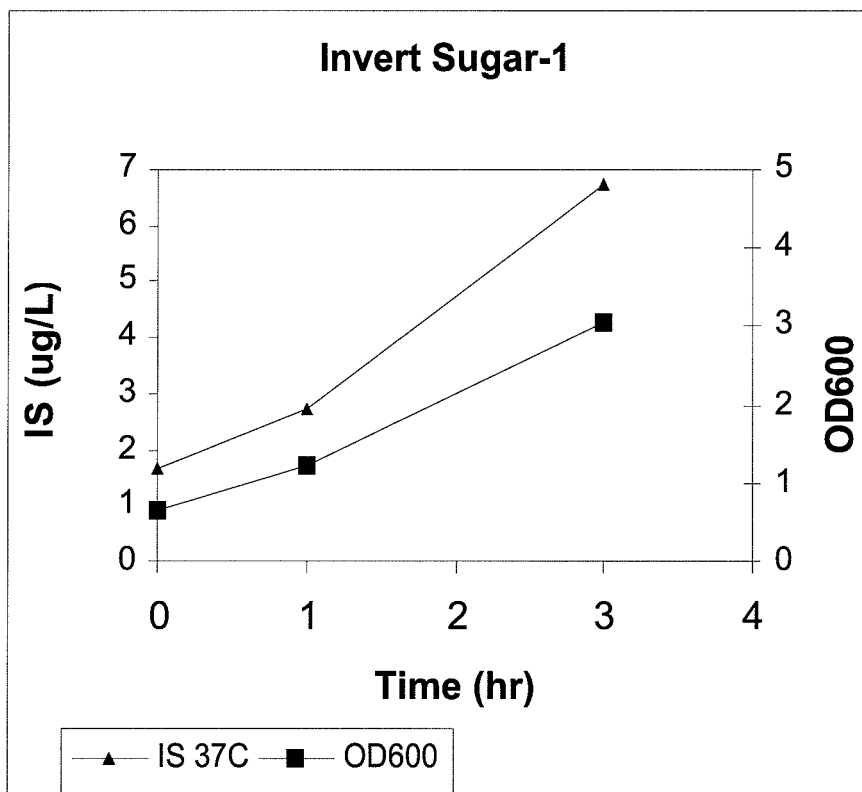
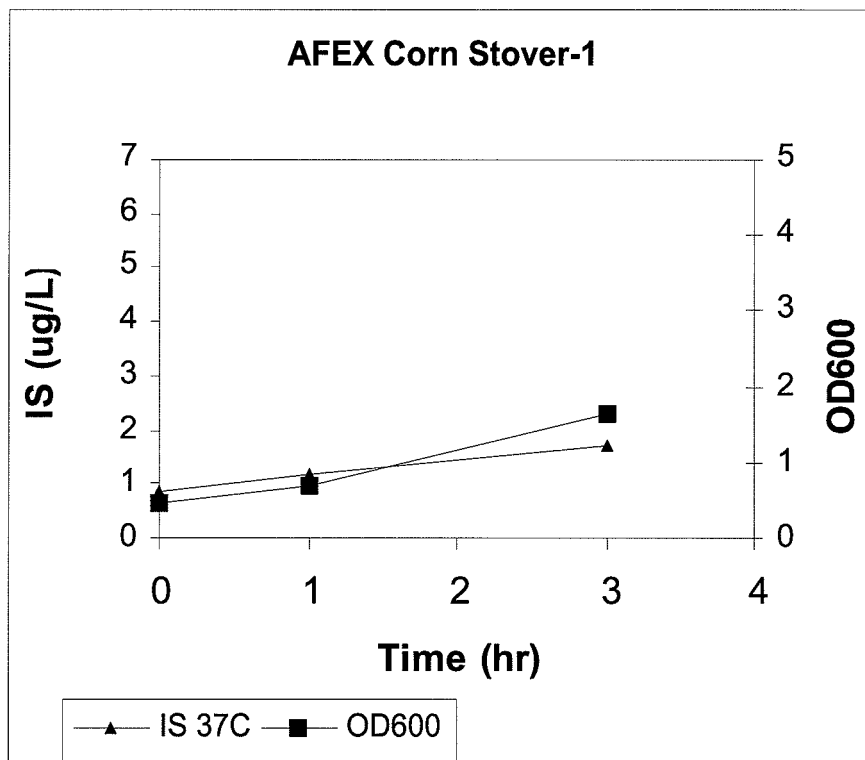
**Figure 47D**

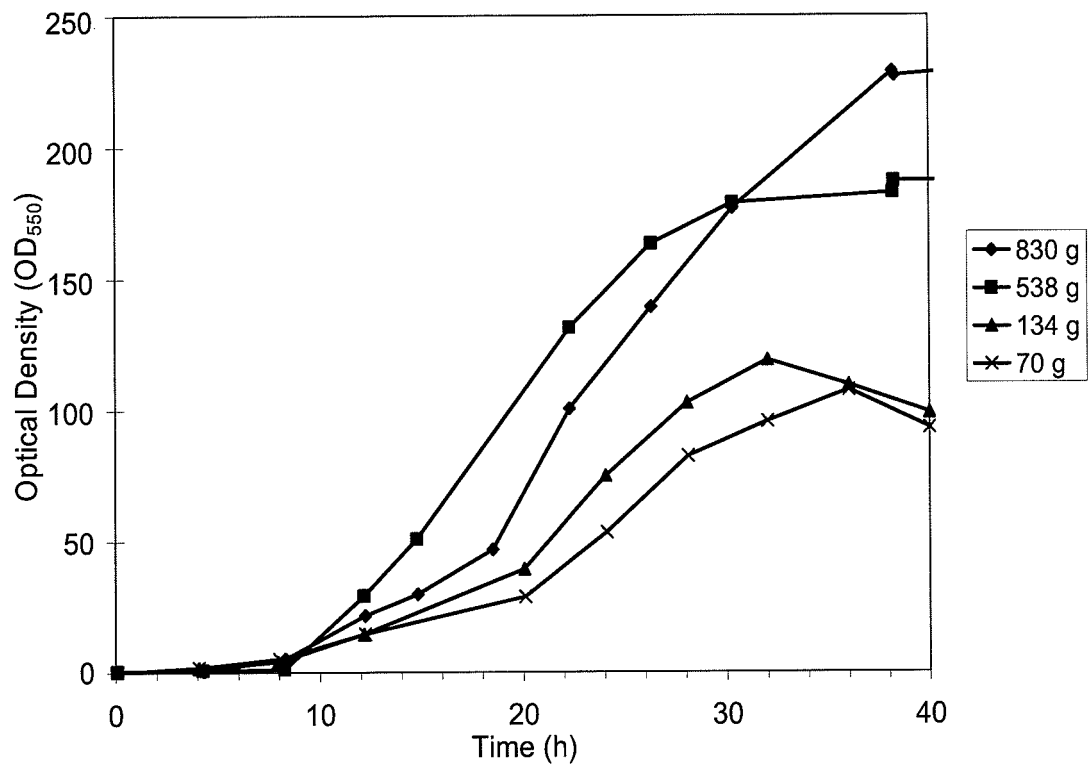
Figure 48A

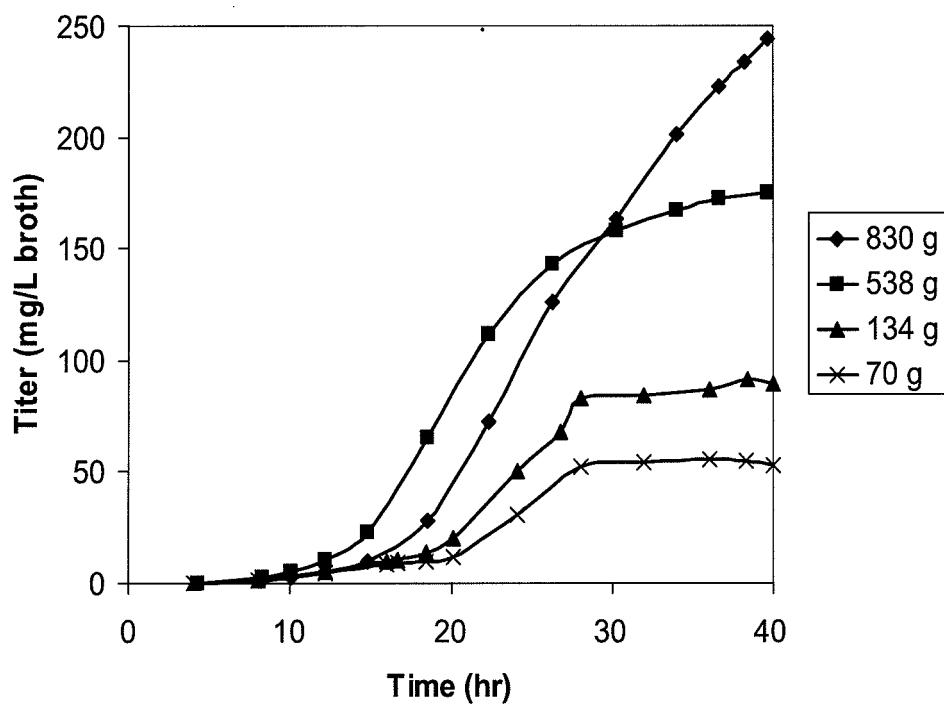
Figure 48B

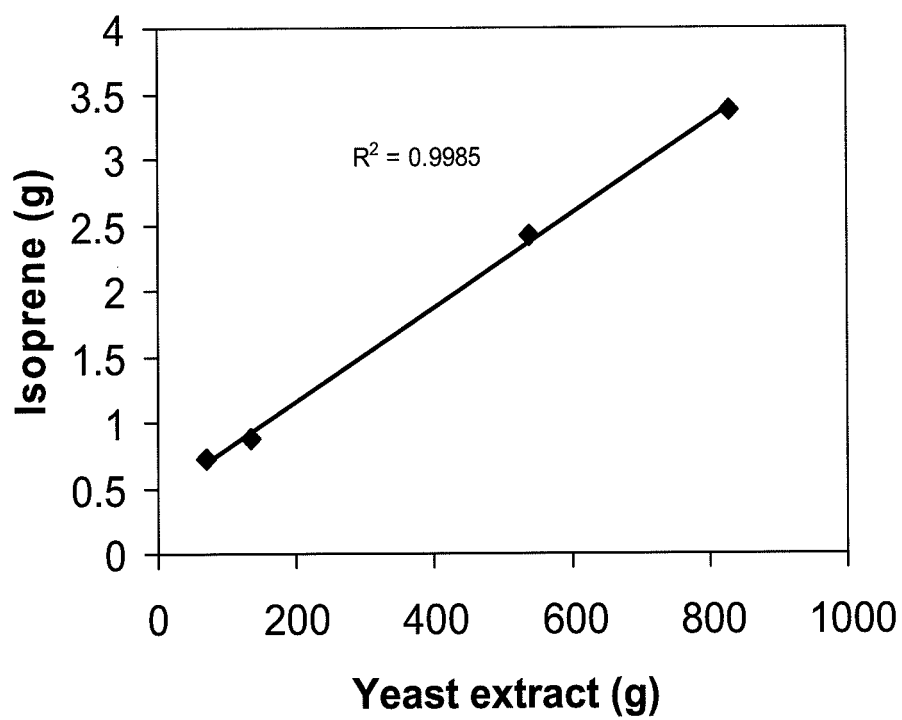
Figure 48C

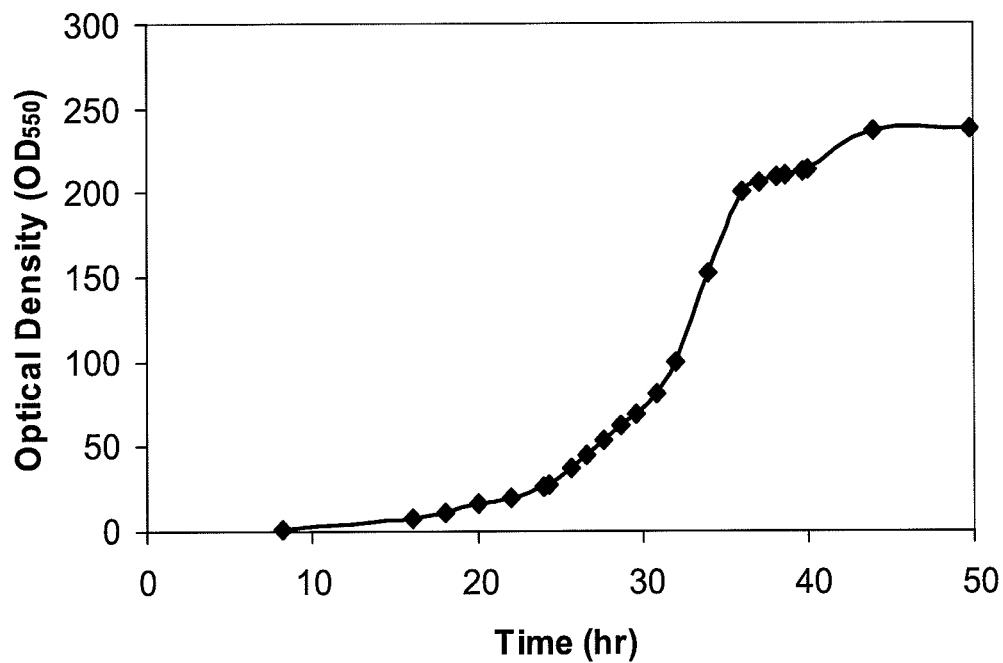
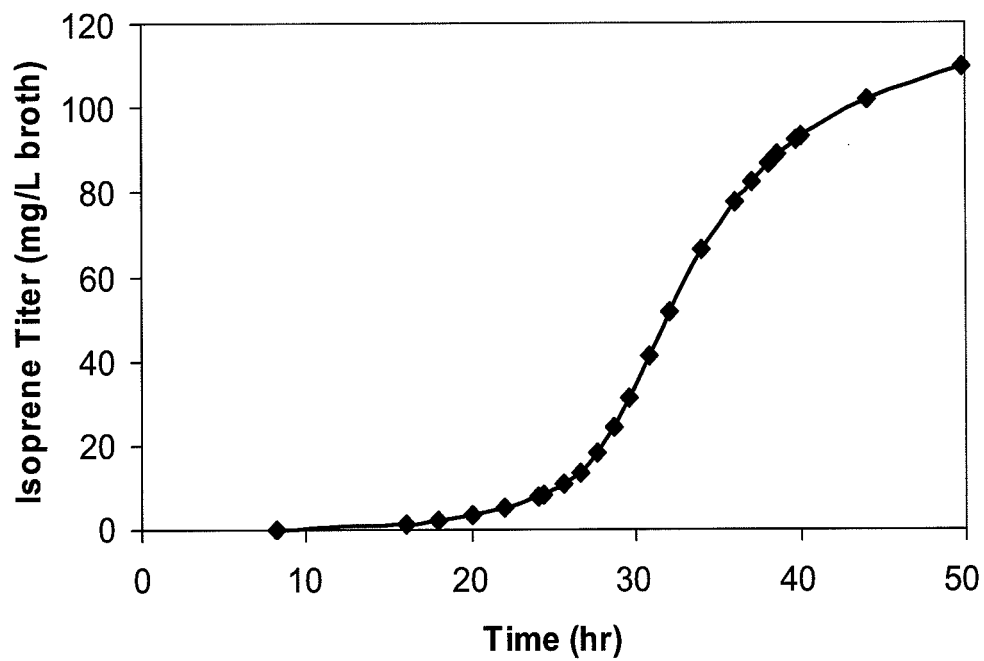
Figure 49A**Figure 49B**

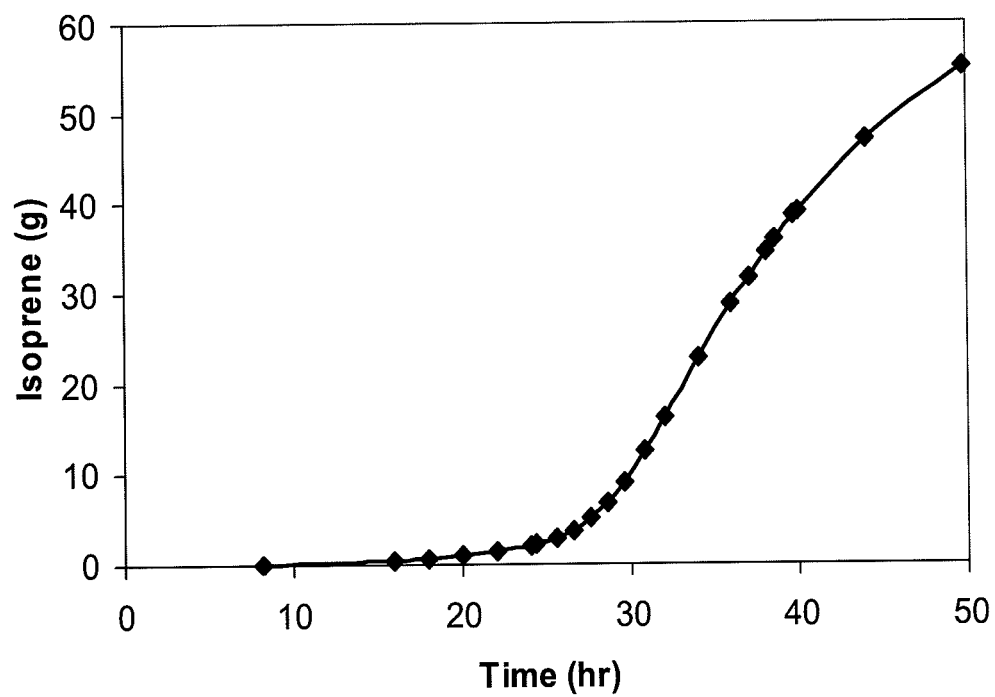
Figure 49C

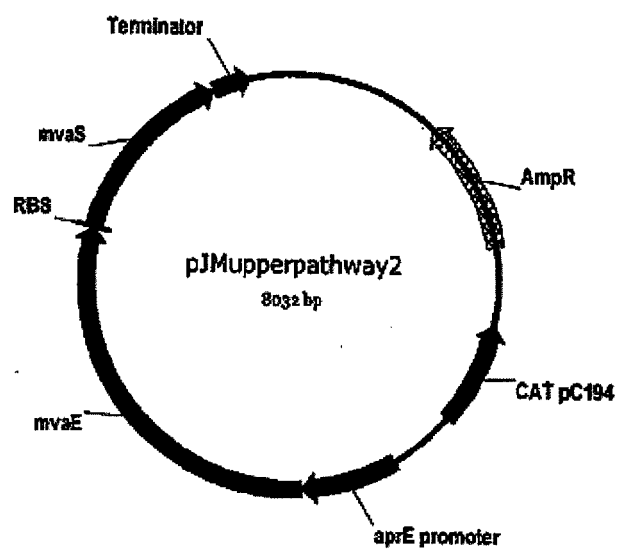
Figure 50

Figure 51A

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Figure 51B

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Figure 51C

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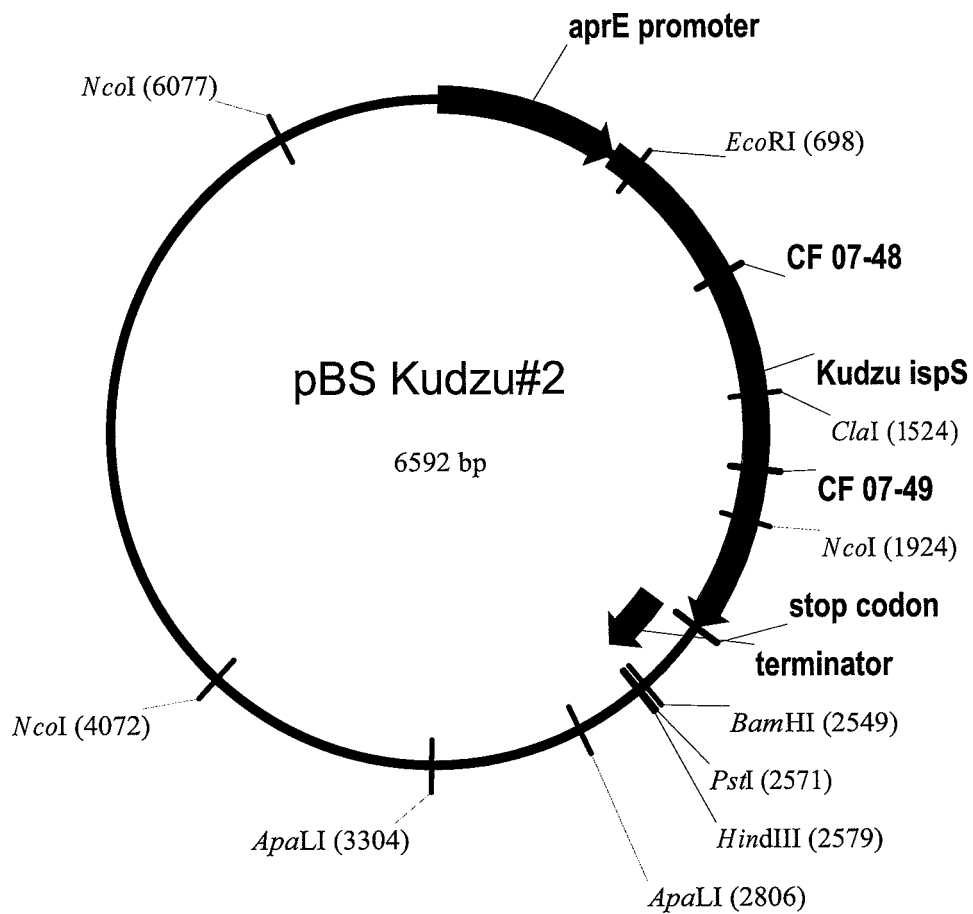
Figure 52

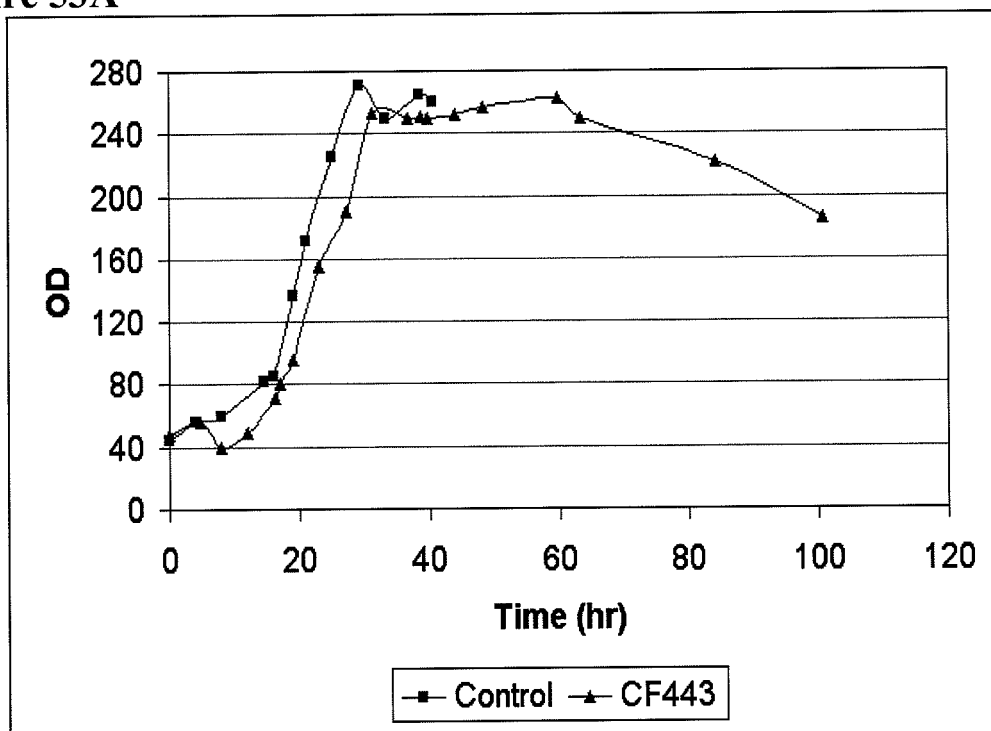
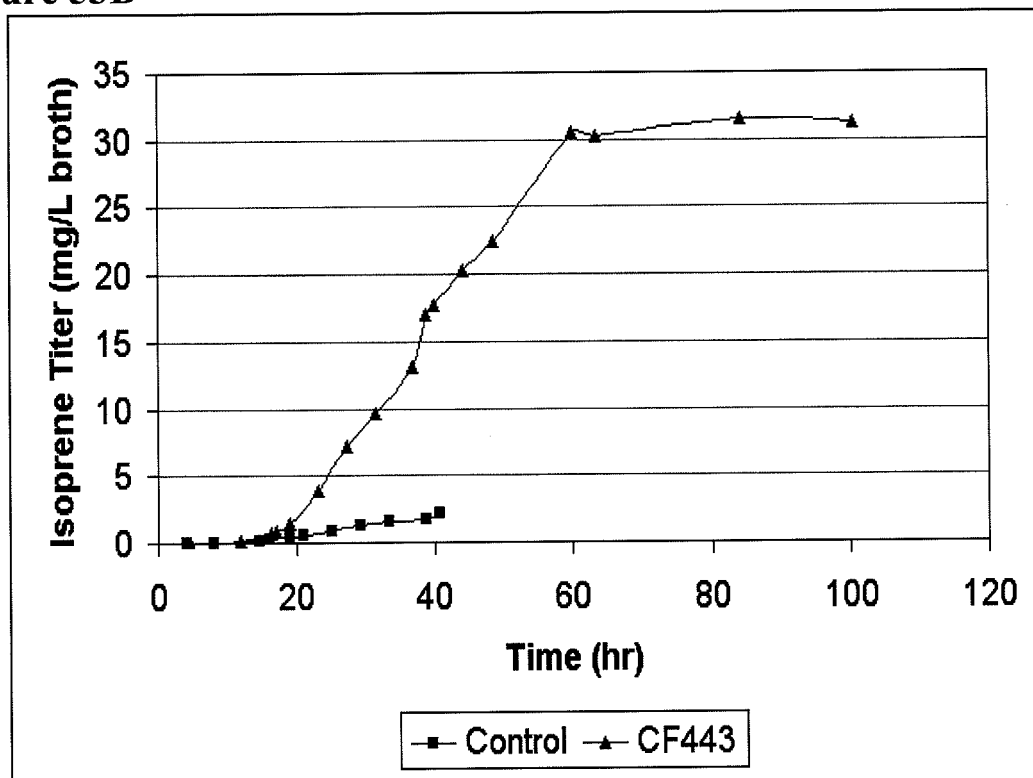
Figure 53A**Figure 53B**

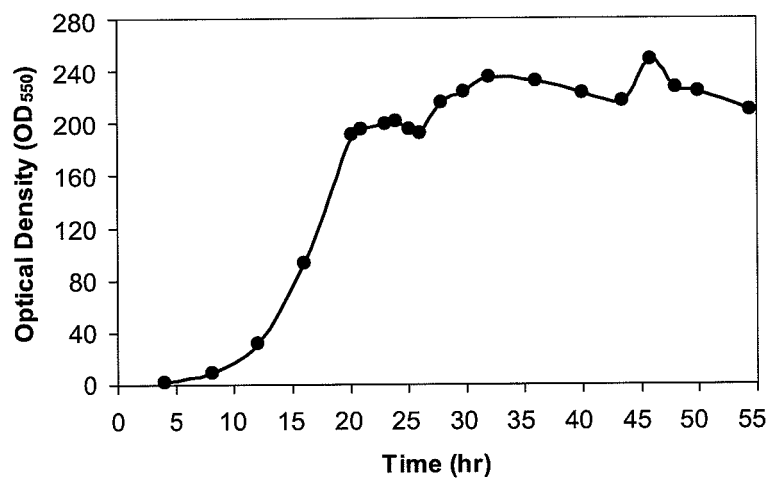
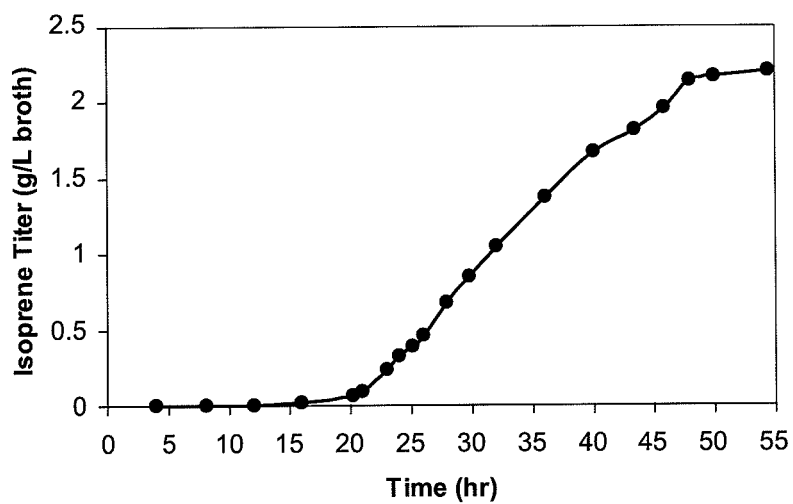
Figure 54**Figure 55**

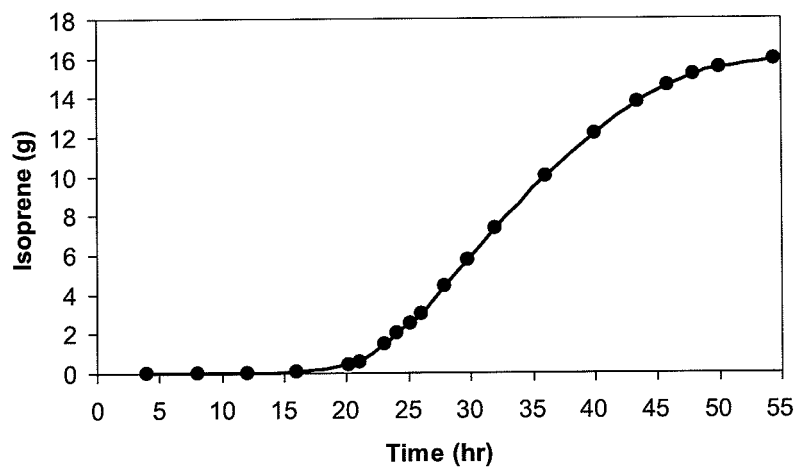
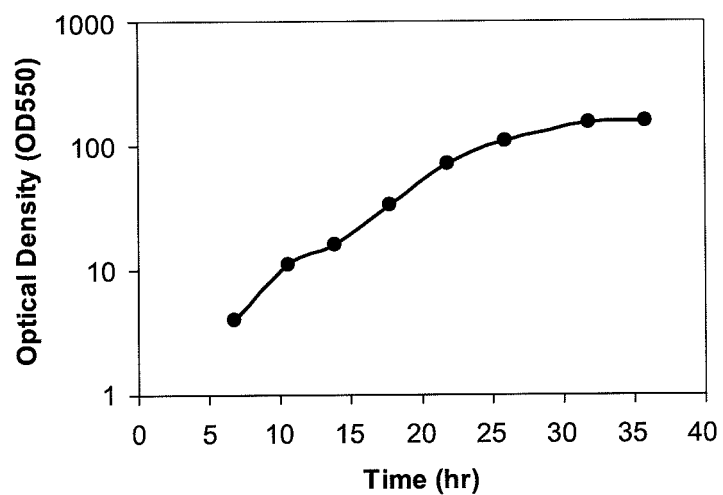
Figure 56**Figure 57**

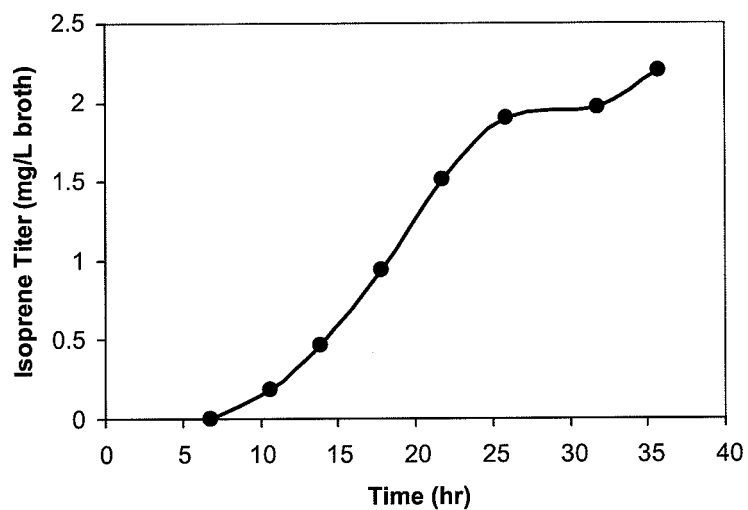
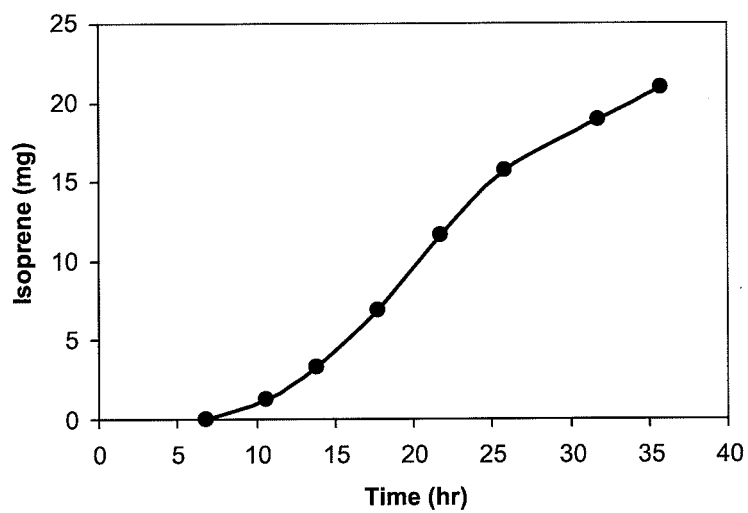
Figure 58**Figure 59**

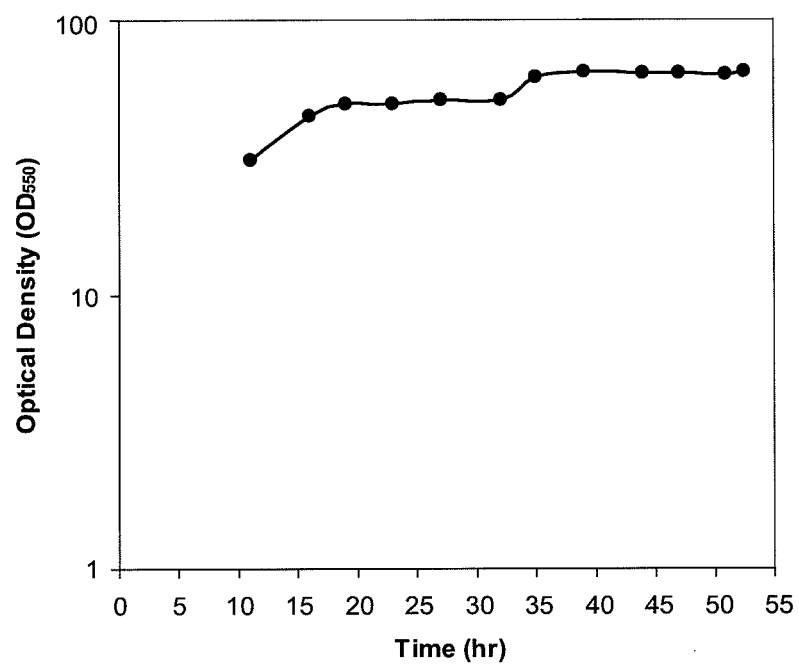
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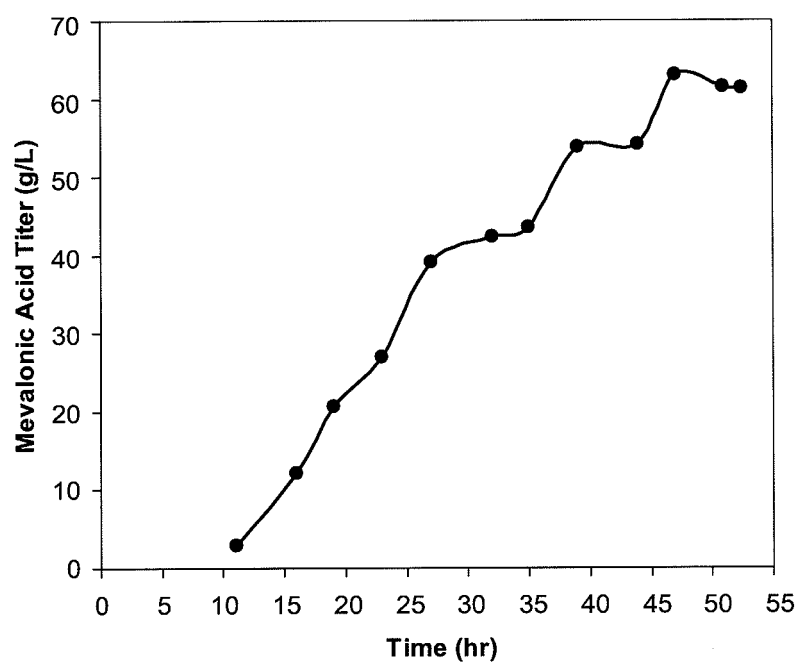
Figure 60B

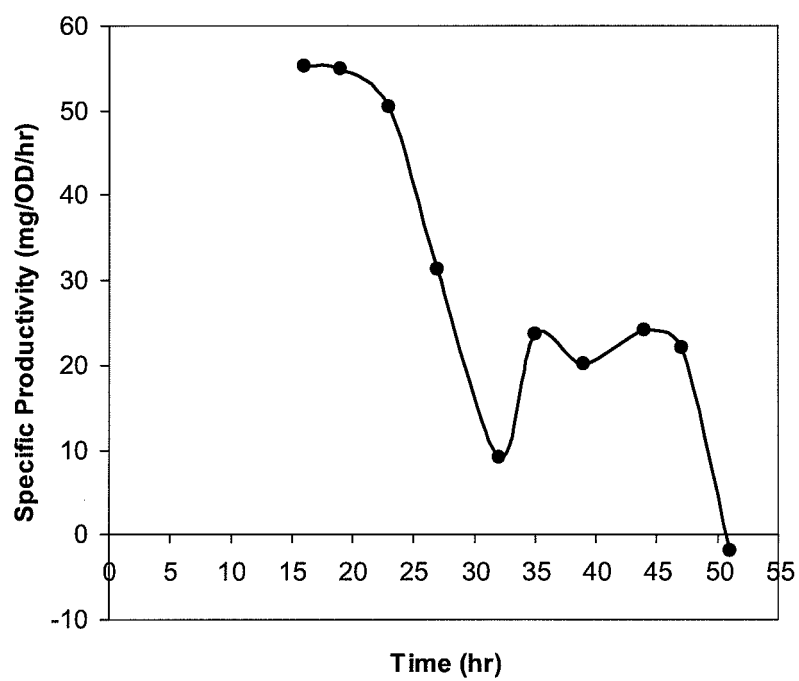
Figure 60C

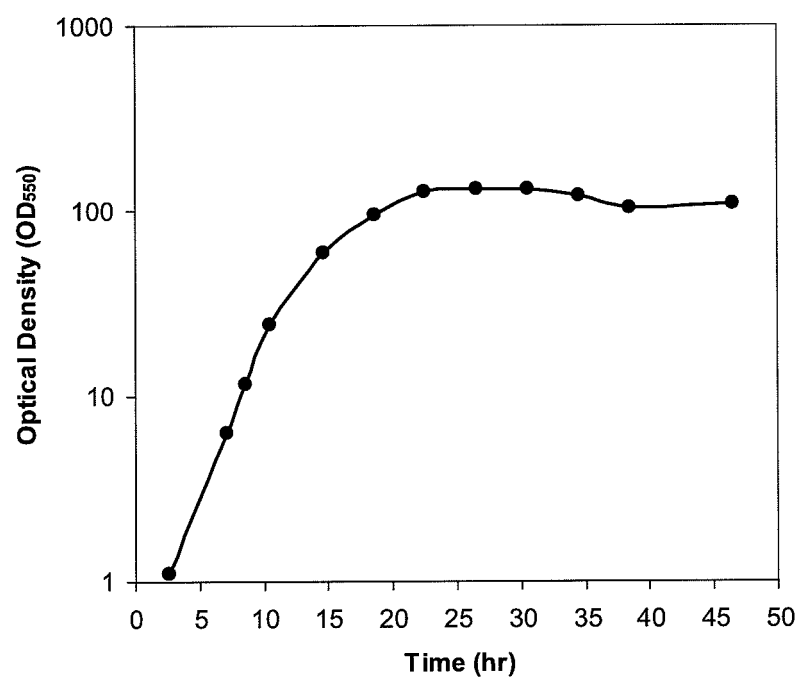
Figure 61A

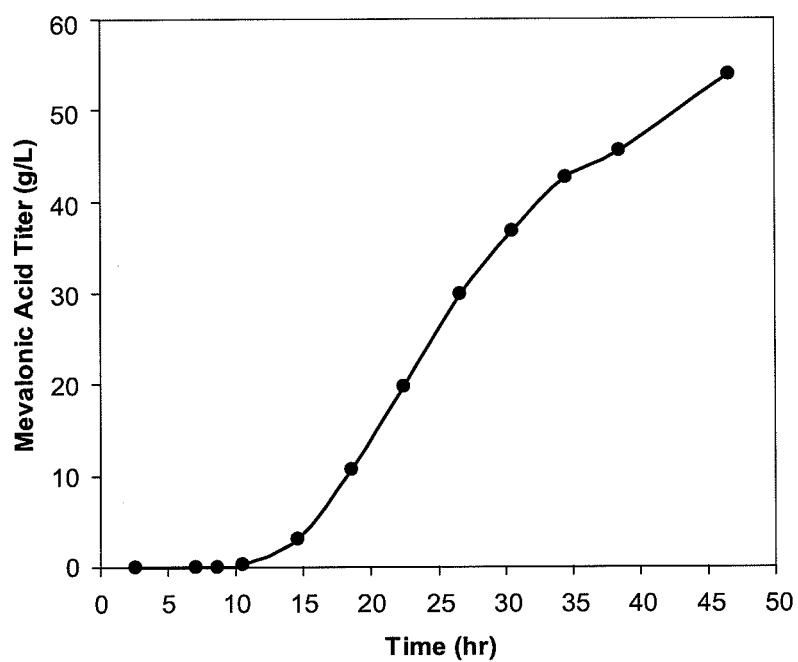
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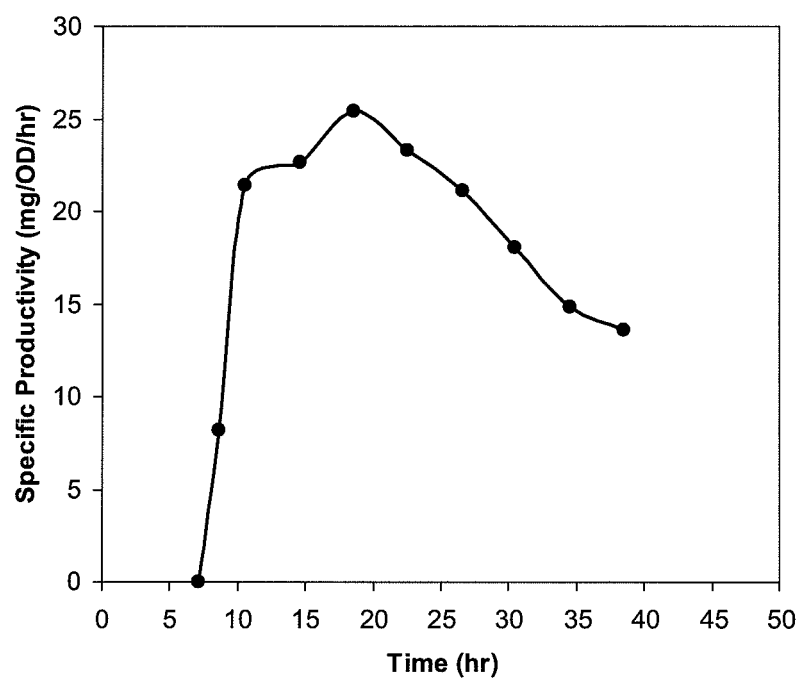
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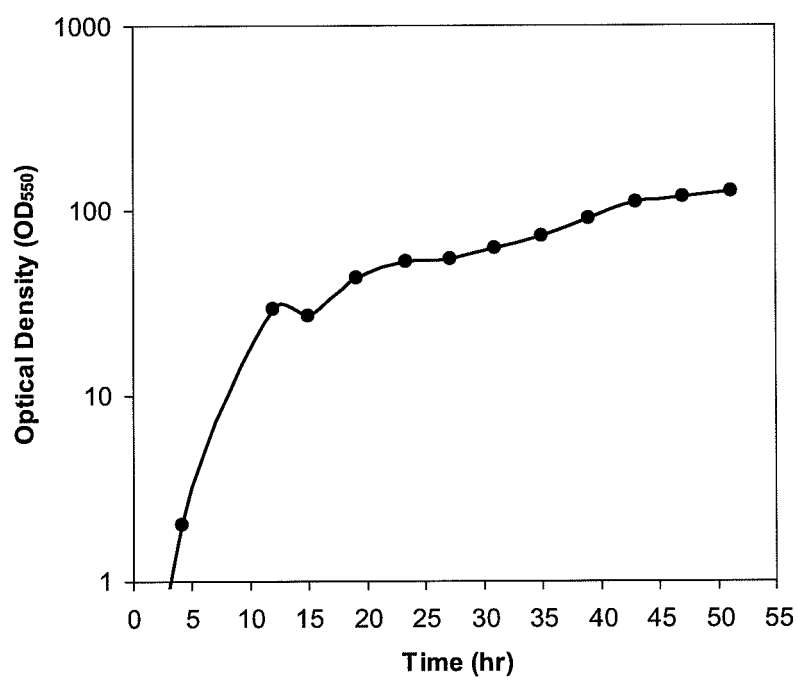
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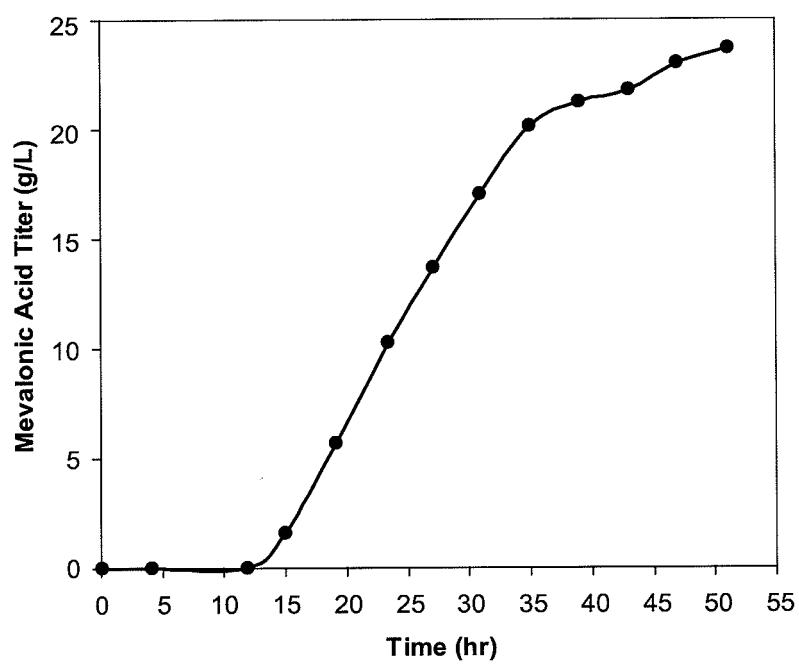
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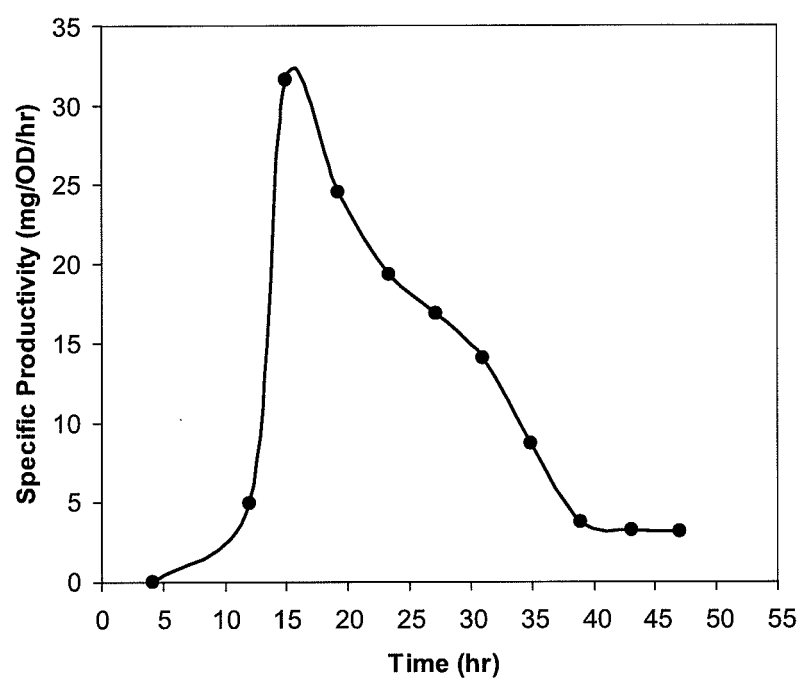
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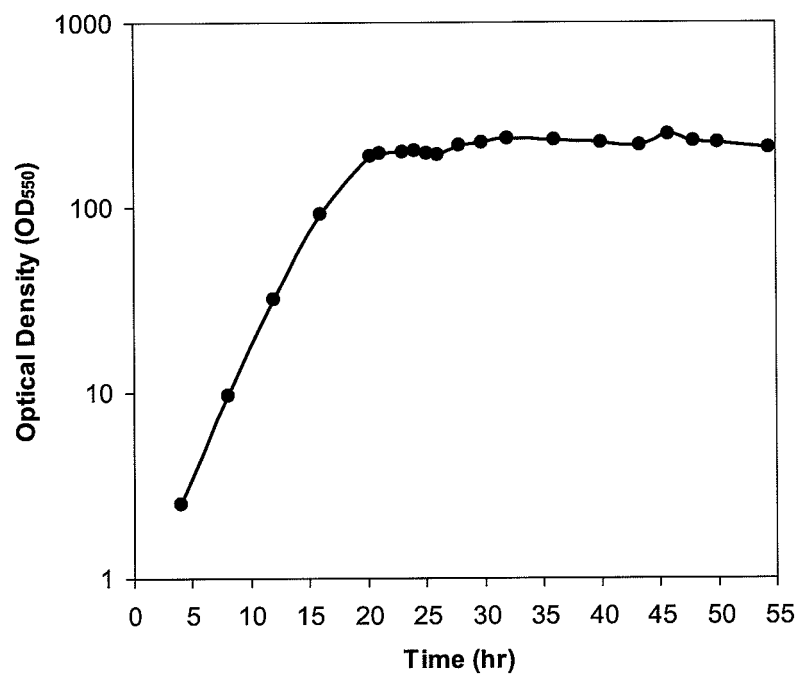
Figure 63A

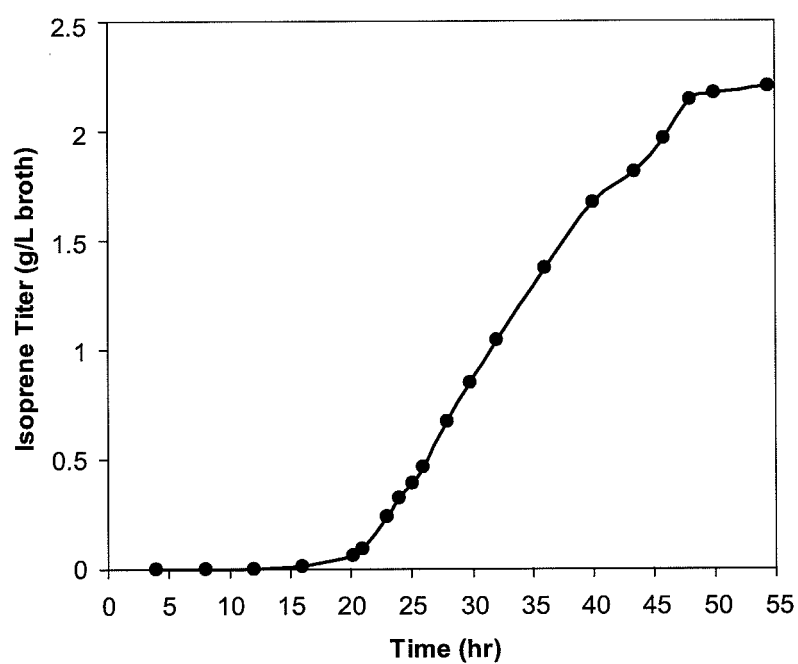
Figure 63B

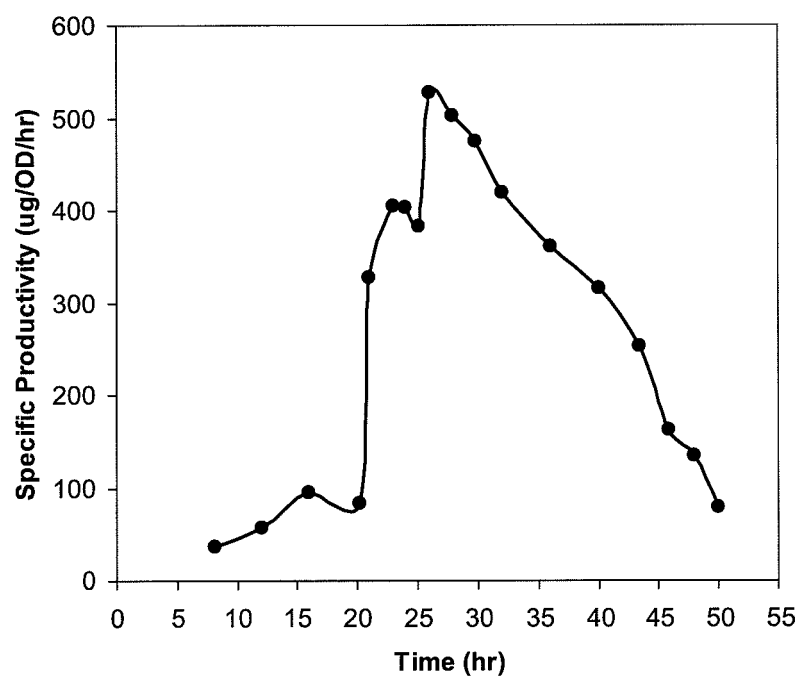
Figure 63C

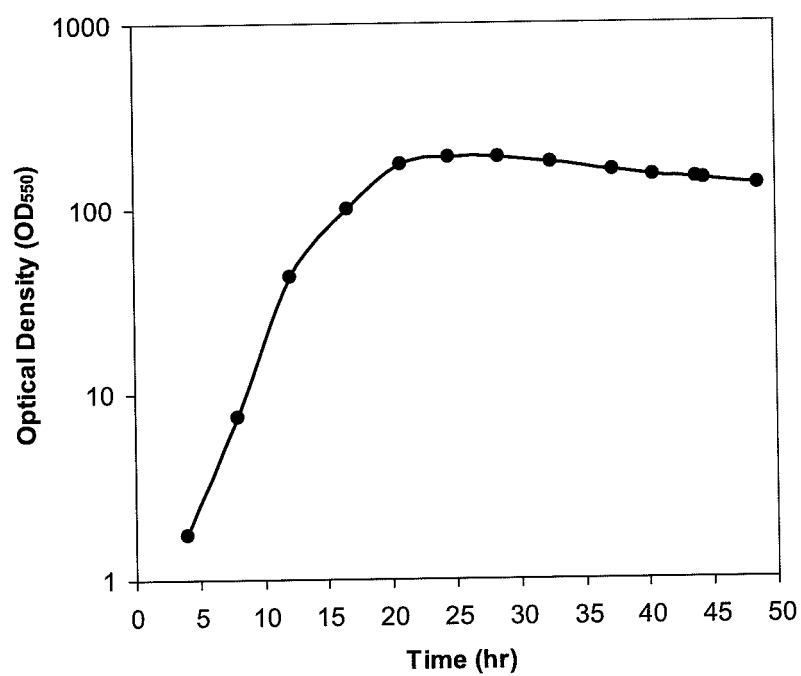
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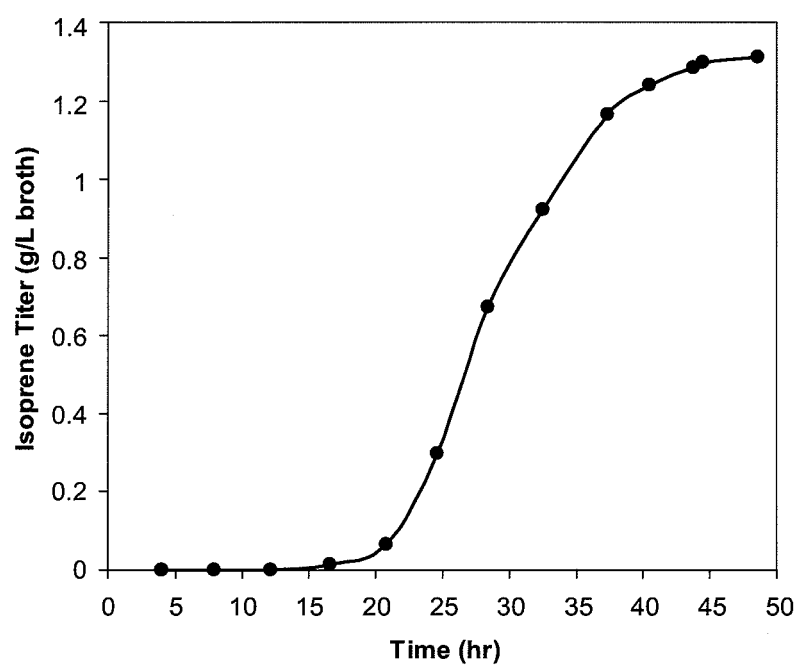
Figure 64B

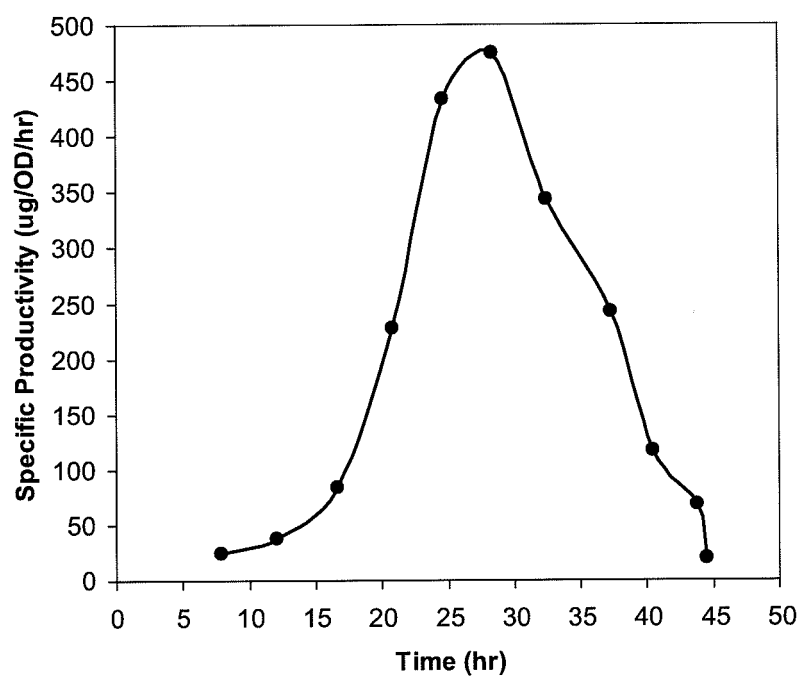
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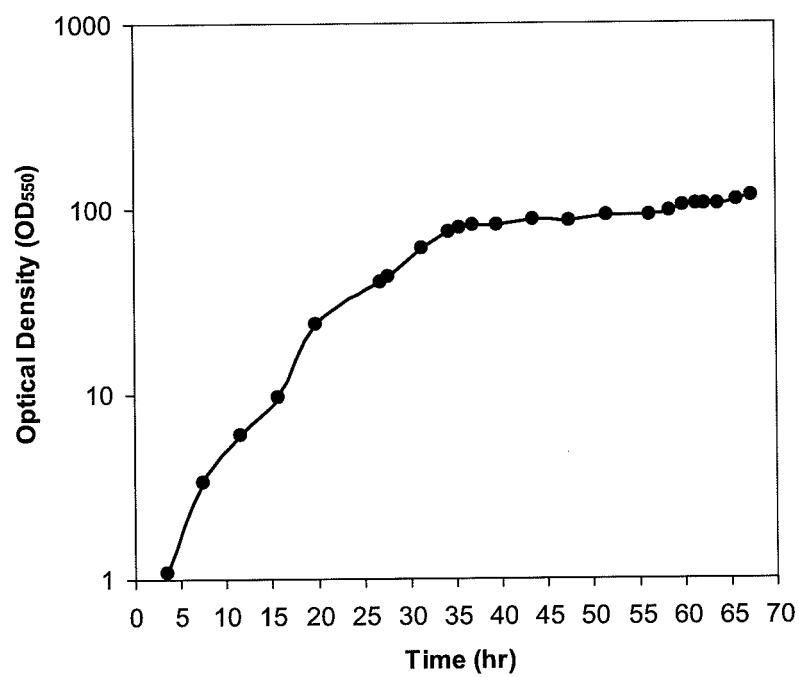
Figure 65A

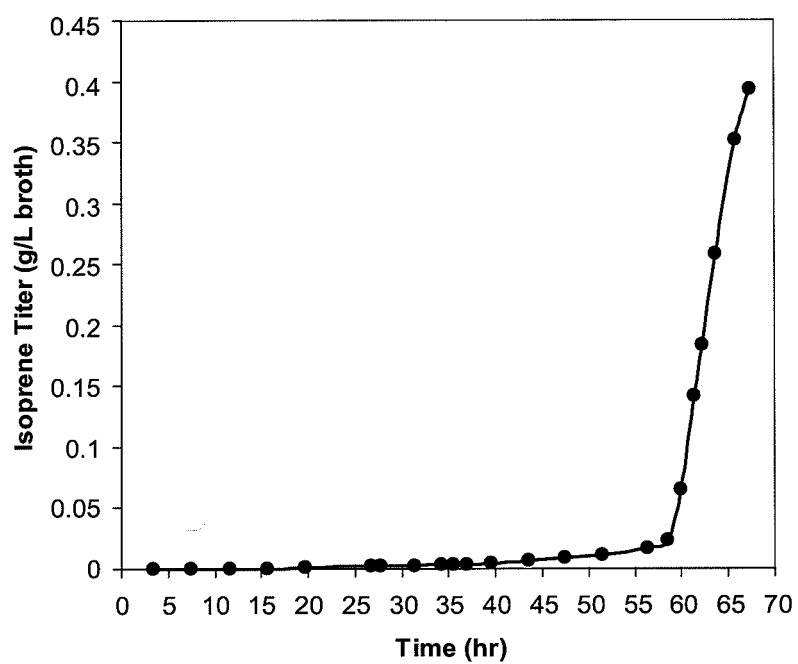
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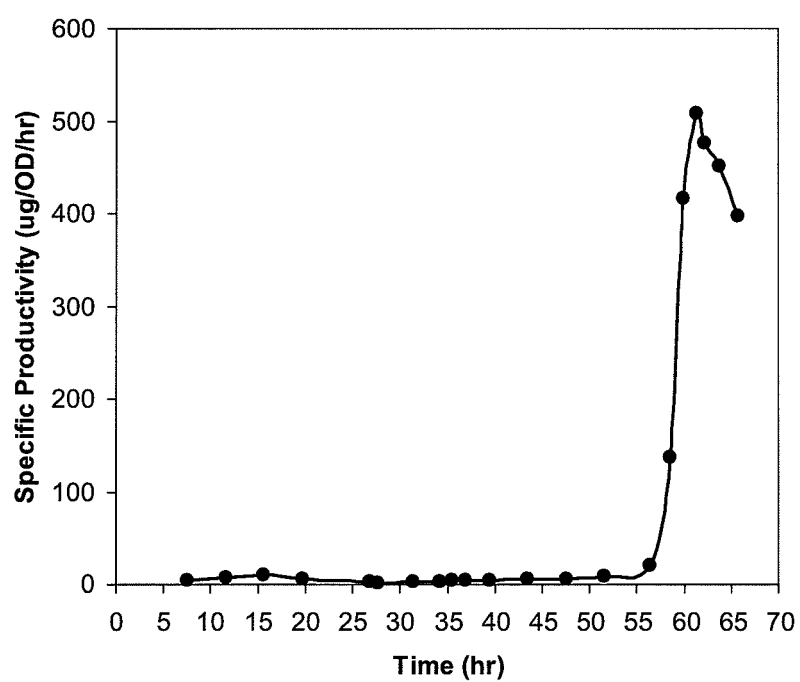
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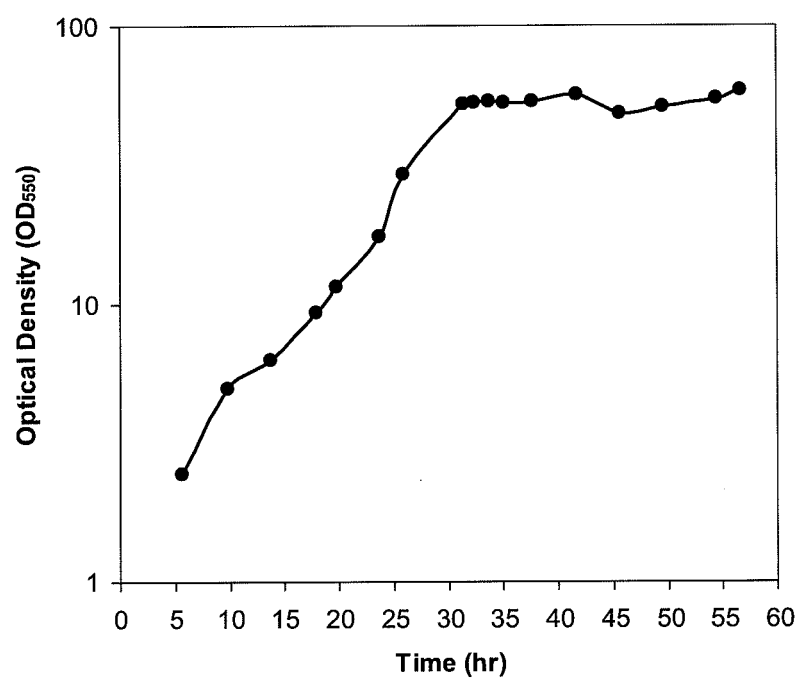
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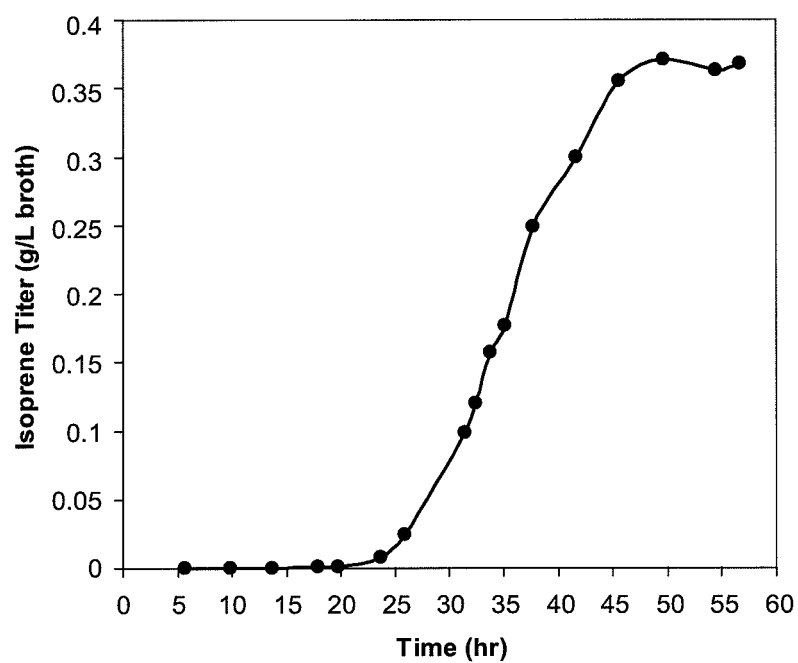
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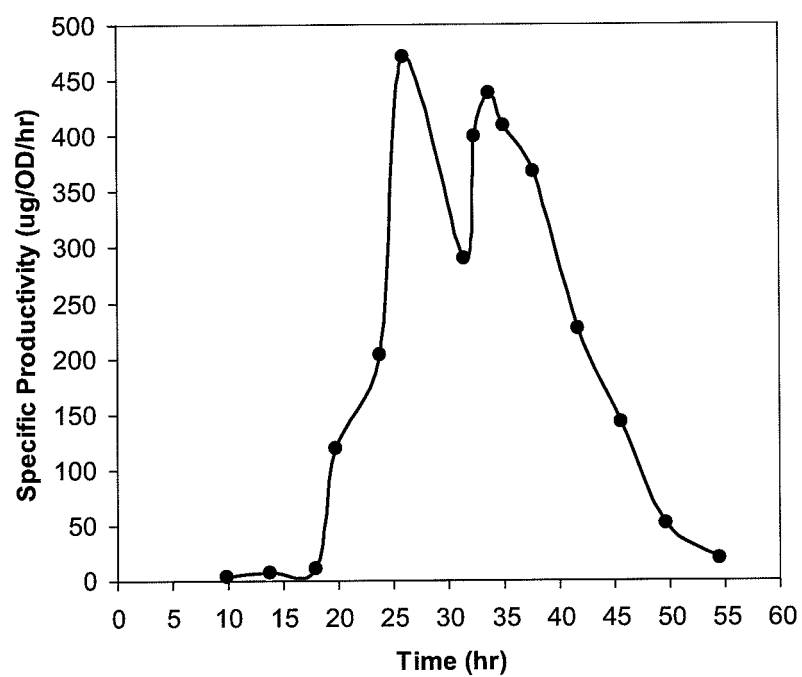
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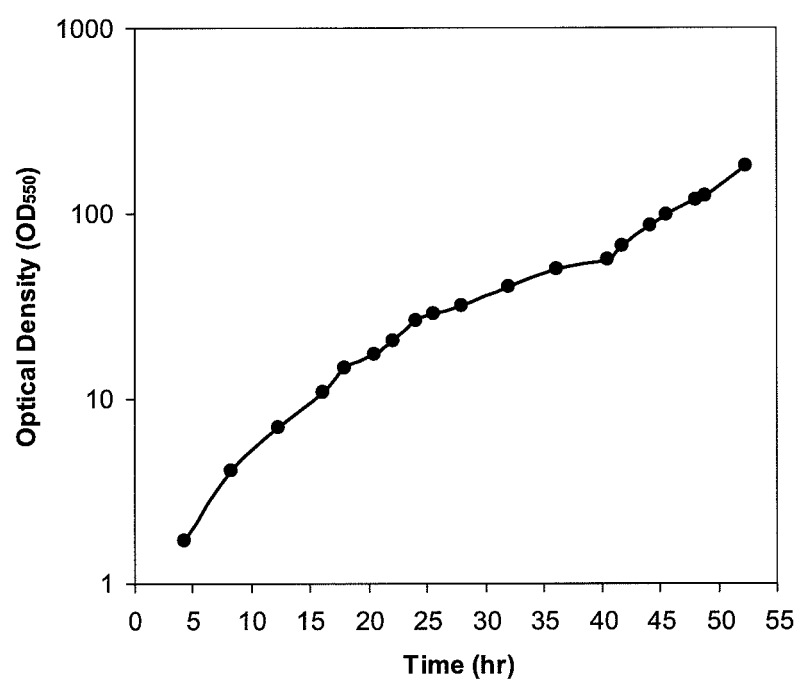
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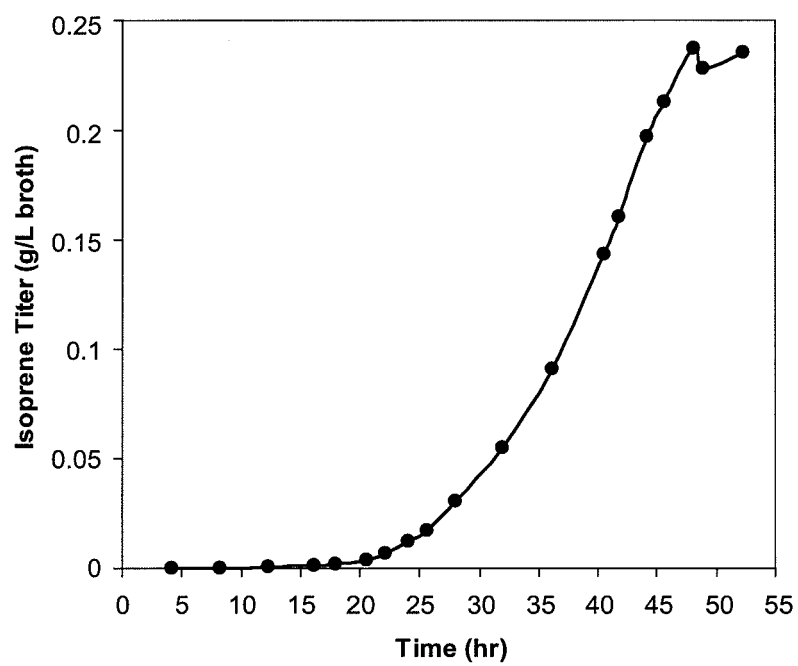
Figure 67B

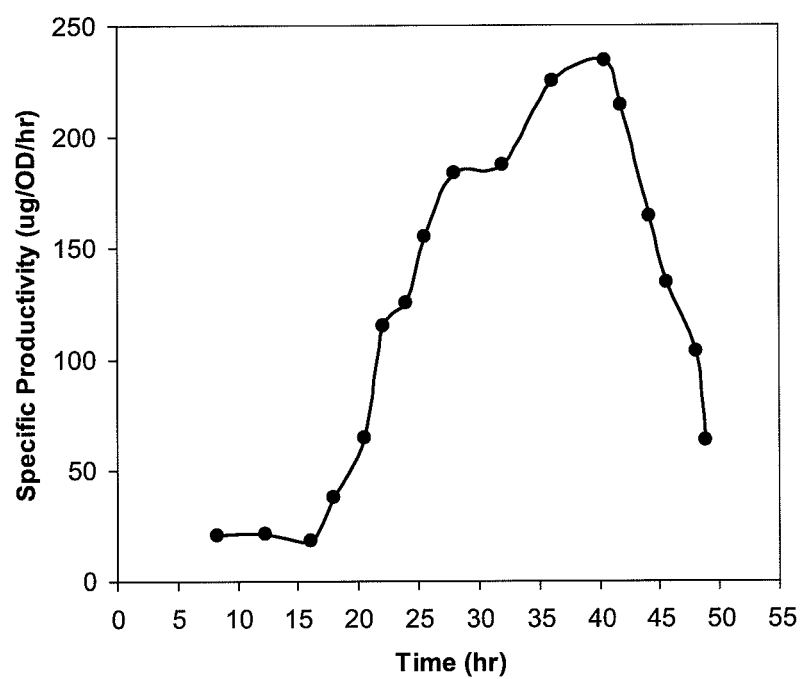
Figure 67C

Figure 68

Isoprene in air at 40°C
Isoprene in 21%O2/79%N2
Isoprene in 17%O2/83%N2
Isoprene in 16%O2/84%N2
Isoprene in 15%O2/85%N2
Isoprene in 14%O2/86%N2
Isoprene in 13%O2/87%N2
Isoprene in 12%O2/88% N2
Isoprene in 11%O2/89%N2
Isoprene in 10%O2/90%N2
Isoprene in 9%O2/91%N2
Isoprene in 8%O2/92%N2
Isoprene in 7%O2/93%N2
Isoprene in 6%O2/94%N2

Figure 69

4% water and Air		
4%H ₂ O/21%O ₂ /75%N ₂		
4%H ₂ O/17%O ₂ /79%N ₂		
4%H ₂ O/16%O ₂ /80%N ₂		
4%H ₂ O/15%O ₂ /81%N ₂		
4%H ₂ O/14%O ₂ /82%N ₂		
4%H ₂ O/13%O ₂ /83%N ₂		
4%H ₂ O/12%O ₂ /84%N ₂		
4%H ₂ O/11%O ₂ /85%N ₂		
4%H ₂ O/10%O ₂ /86%N ₂		
4%H ₂ O/9%O ₂ /87%N ₂		
4%H ₂ O/8%O ₂ /88%N ₂		
4%H ₂ O/7%O ₂ /89%N ₂		
4%H ₂ O/6%O ₂ /90%N ₂		

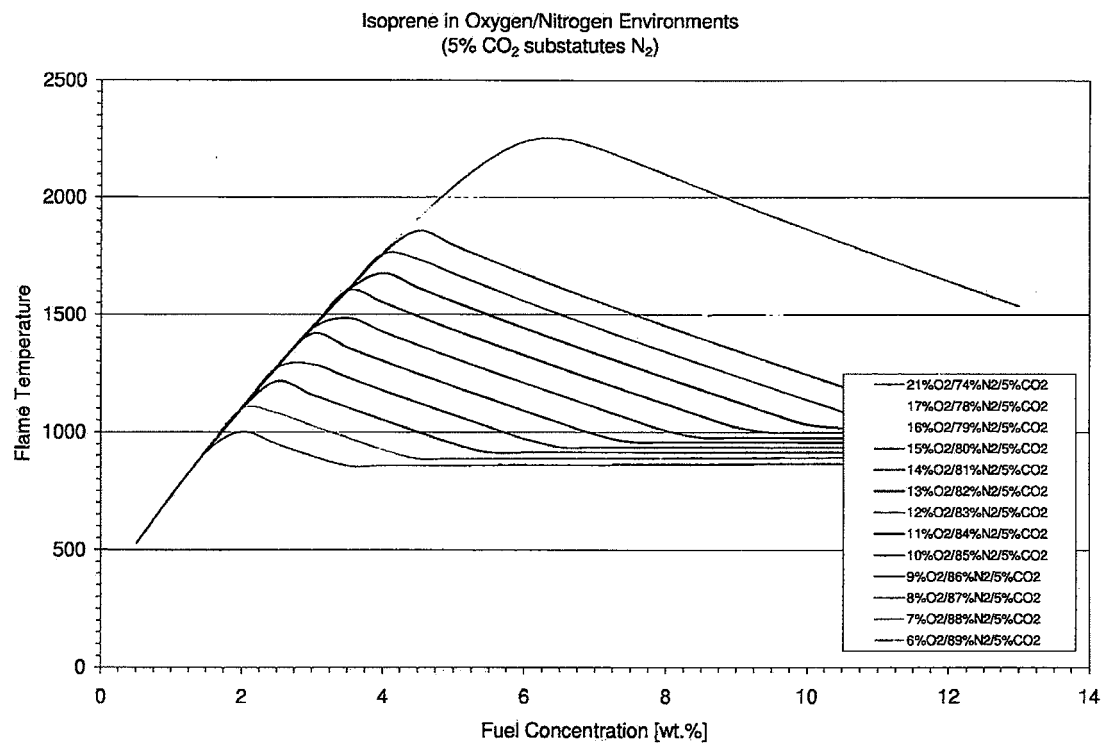
Figure 70

Figure 71

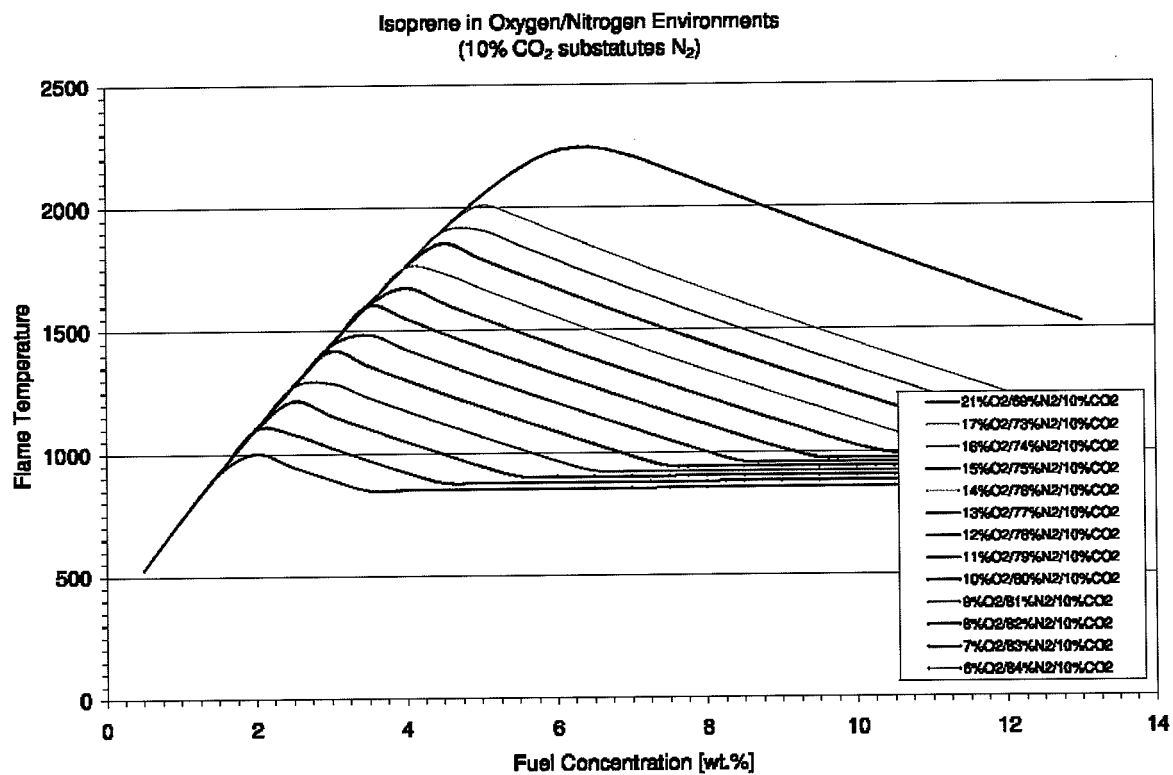


Figure 72

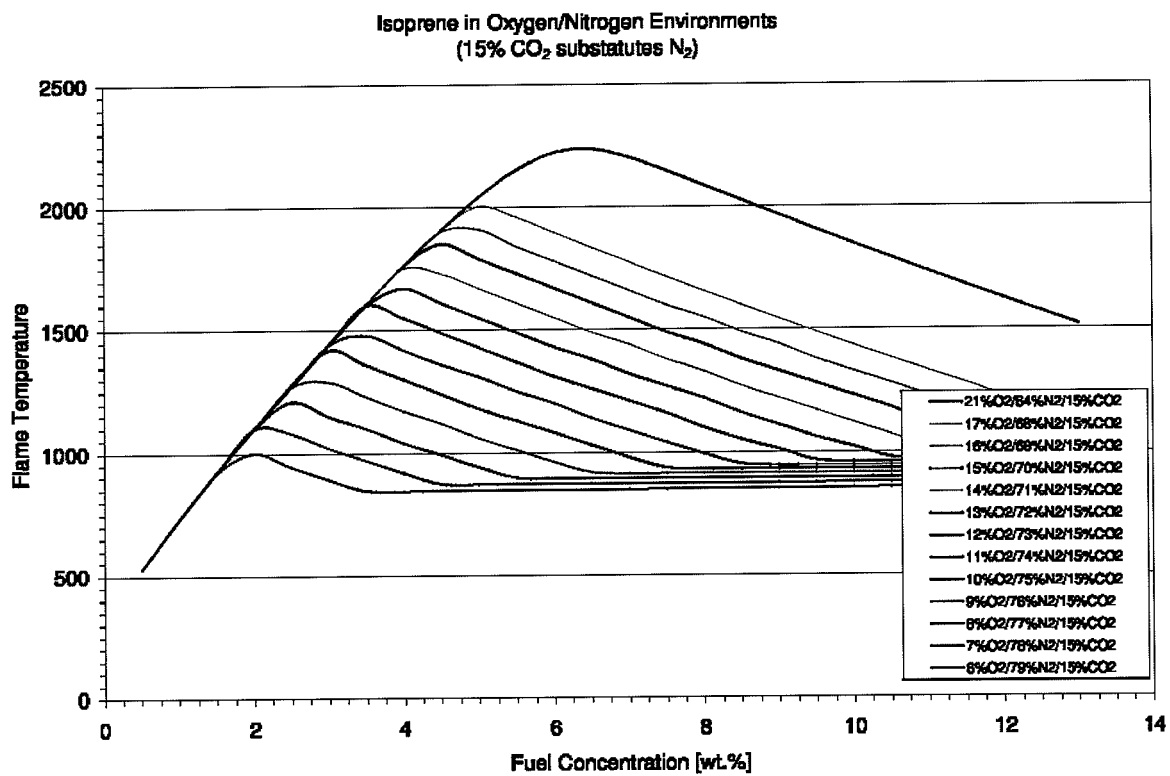


Figure 73

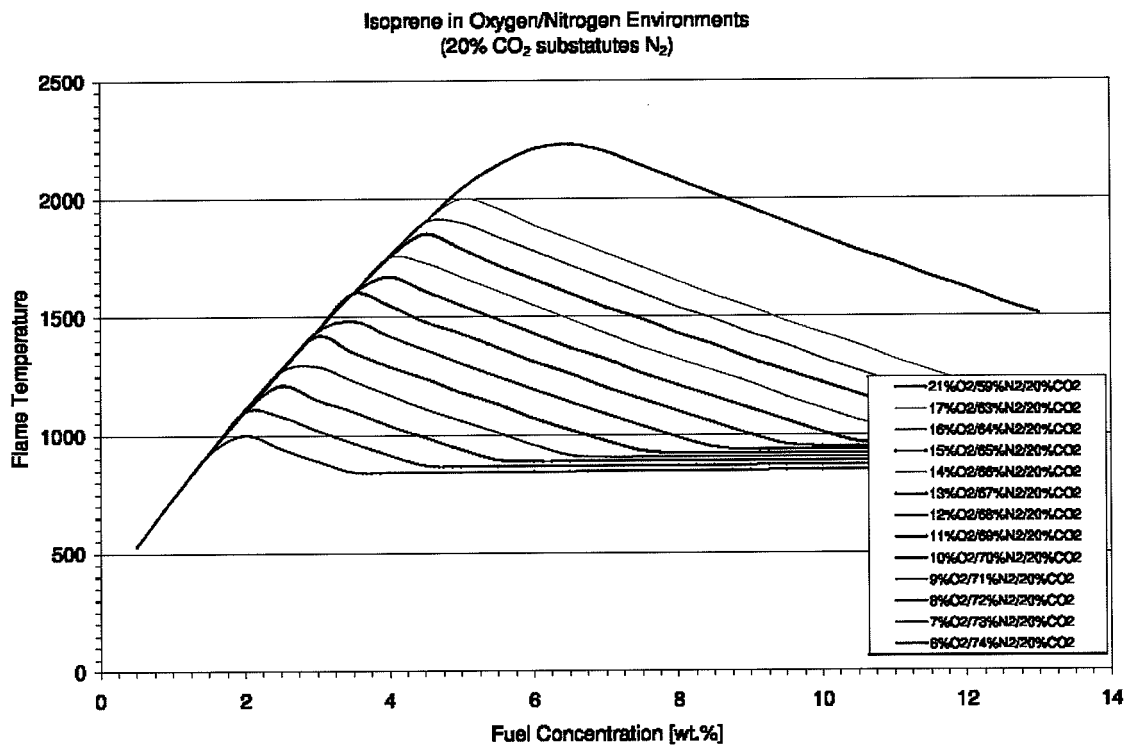


Figure 74

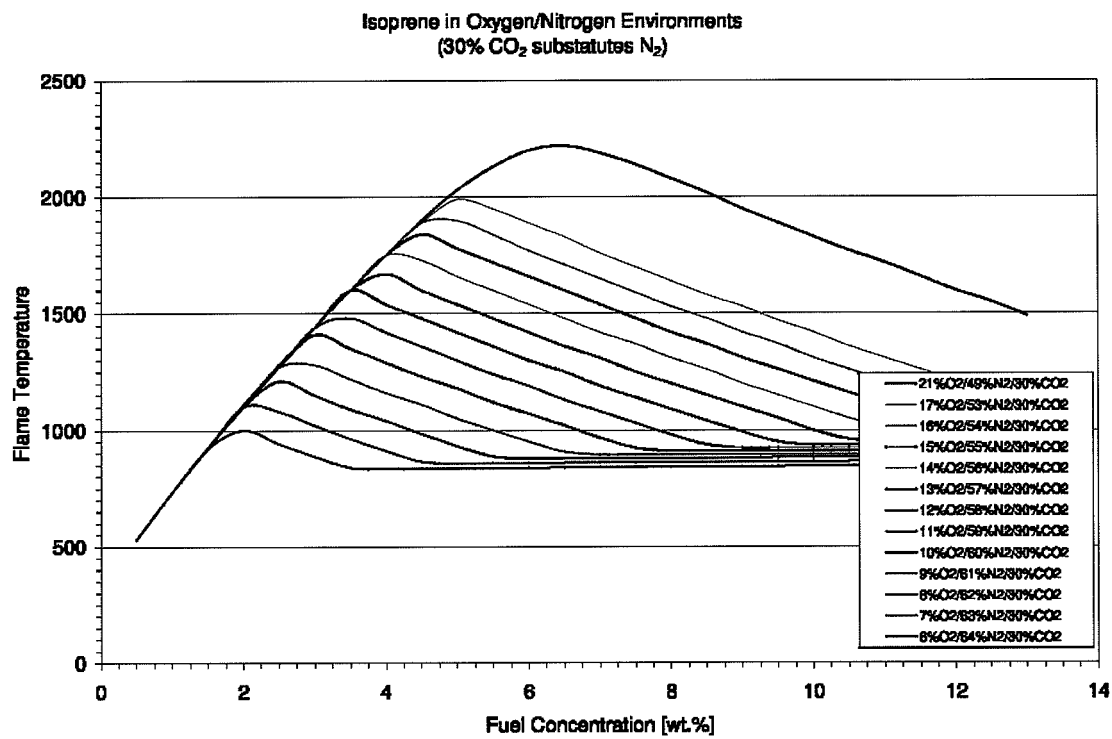


Figure 75A

Concentration at Deflagration																	
Fuel Makeup		Oxidizer Makeup			Molar Concentration based on 100g of sample										Volumetric Concentrations based on ideal gas law		
Fuel Conc. (wt.%)	Oxidizer Conc. (wt.%)	Isoprene (wt.%)	H ₂ O (wt.%)	O ₂ (wt.%)	N ₂ (wt.%)	Isoprene (mole)	H ₂ O (mole)	O ₂ (mole)	N ₂ (mole)	Total (mole)	Isoprene (vol.%)	O ₂ (vol.%)	N ₂ (vol.%)	H ₂ O (vol.%)			
3.10	96.90	100	0	12	88	4.56	0.00	36.34	304.54	345.44	1.32	10.52	88.16	0.00			
3.10	96.90	100	0	13	87	4.56	0.00	39.37	301.08	345.01	1.32	11.41	87.27	0.00			
3.10	96.90	100	0	14	86	4.56	0.00	42.39	297.62	344.57	1.32	12.30	86.37	0.00			
3.10	96.90	100	0	15	85	4.56	0.00	45.42	294.16	344.14	1.32	13.20	85.48	0.00			
3.10	96.90	100	0	16	84	4.56	0.00	48.45	290.70	343.71	1.33	14.10	84.58	0.00			
3.10	96.90	100	0	17	83	4.56	0.00	51.48	287.24	343.28	1.33	15.00	83.68	0.00			
3.10	96.90	100	0	21	79	4.56	0.00	63.59	273.40	341.55	1.33	18.62	80.05	0.00			
3.50	96.50	100	0	11.1	88.9	5.15	0.00	33.47	306.39	345.01	1.49	9.70	88.81	0.00			
4.40	95.60	100	0	12	88	6.47	0.00	35.85	300.46	342.78	1.89	10.46	87.65	0.00			
5.50	94.50	100	0	13	87	8.09	0.00	38.39	293.63	340.10	2.38	11.29	86.33	0.00			
6.60	93.40	100	0	14	86	9.71	0.00	40.86	286.87	337.44	2.88	12.11	85.01	0.00			
7.60	92.40	100	0	15	85	11.18	0.00	43.31	280.50	334.99	3.34	12.93	83.73	0.00			
8.50	91.50	100	0	16	84	12.50	0.00	45.75	274.50	332.75	3.76	13.75	82.49	0.00			
9.60	90.40	100	0	17	83	14.12	0.00	48.03	267.97	330.11	4.28	14.55	81.18	0.00			
13.50	86.50	100	0	21	79	19.85	0.00	56.77	244.05	320.67	6.19	17.70	76.11	0.00			

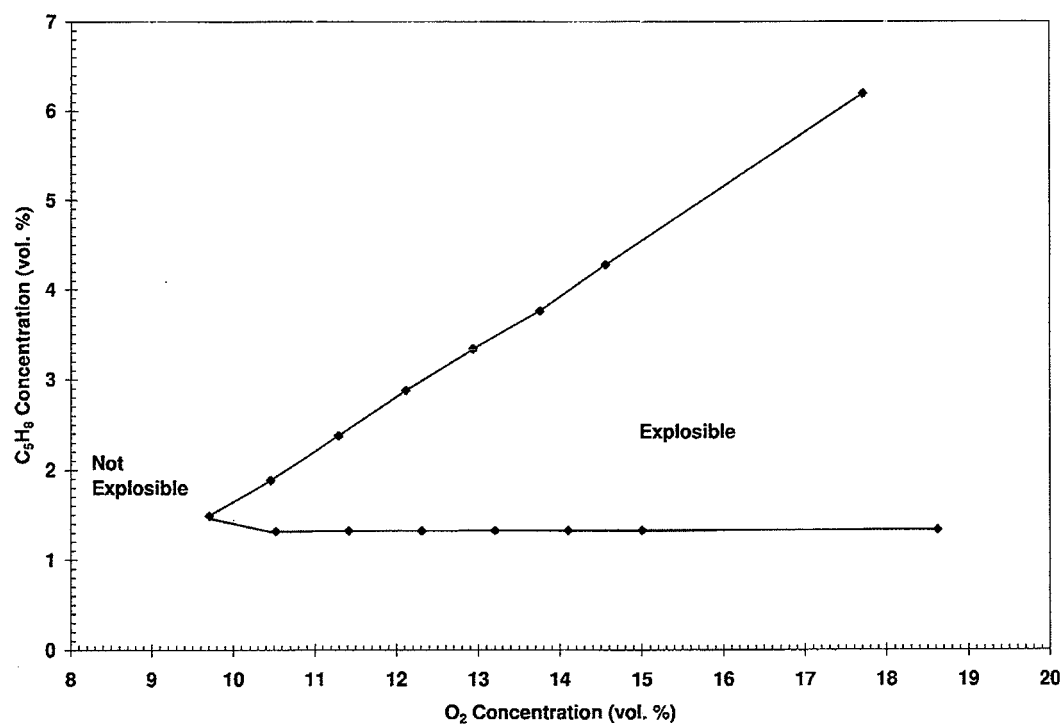
Figure 75B

Figure 76A

Concentration at Deflagration															
		Fuel Makeup	Oxidizer Makeup				Molar Concentration based on 100g of sample					Volumetric Concentrations based on ideal gas law			
Fuel Conc.	Oxidizer Conc.	Isoprene (wt. %)	H ₂ O (wt. %)	O ₂ (wt. %)	N ₂ (wt. %)	Isoprene (mole)	H ₂ O (mole)	O ₂ (mole)	N ₂ (mole)	Total (mole)	Isoprene (vol. %)	O ₂ (vol. %)	N ₂ (vol. %)	H ₂ O (vol. %)	
3.252	96.748	100	4	12	84	4.78	21.50	36.28	290.24	352.81	1.36	10.28	82.27	6.09	
3.274	96.726	100	4	13	83	4.81	21.49	39.29	286.72	352.33	1.37	11.15	81.38	6.10	
3.290	96.710	100	4	14	82	4.84	21.49	42.31	283.22	351.86	1.38	12.02	80.49	6.11	
3.288	96.712	100	4	15	81	4.84	21.49	45.33	279.77	351.43	1.38	12.90	79.61	6.12	
3.286	96.714	100	4	16	80	4.83	21.49	48.36	276.33	351.01	1.38	13.78	78.72	6.12	
3.284	96.716	100	4	17	79	4.83	21.49	51.38	272.88	350.58	1.38	14.66	77.84	6.13	
3.276	96.724	100	4	21	75	4.82	21.49	63.48	259.08	348.87	1.38	18.19	74.26	6.16	
3.500	96.500	100	4	11.5	84.5	5.15	21.44	34.68	291.22	352.49	1.46	9.84	82.62	6.08	
4.200	95.800	100	4	12	84	6.18	21.29	35.93	287.40	350.79	1.76	10.24	81.93	6.07	
5.300	94.700	100	4	13	83	7.79	21.04	38.47	280.72	348.03	2.24	11.05	80.66	6.05	
6.400	93.600	100	4	14	82	9.41	20.80	40.95	274.11	345.28	2.73	11.86	79.39	6.02	
7.400	92.600	100	4	15	81	10.88	20.58	43.41	267.88	342.74	3.18	12.66	78.16	6.00	
8.500	91.500	100	4	16	80	12.50	20.33	45.75	261.43	340.01	3.68	13.46	76.89	5.98	
9.400	90.600	100	4	17	79	13.82	20.13	48.13	255.62	337.71	4.09	14.25	75.69	5.96	
13.300	86.700	100	4	21	75	19.56	19.27	56.90	232.23	327.95	5.96	17.35	70.81	5.87	

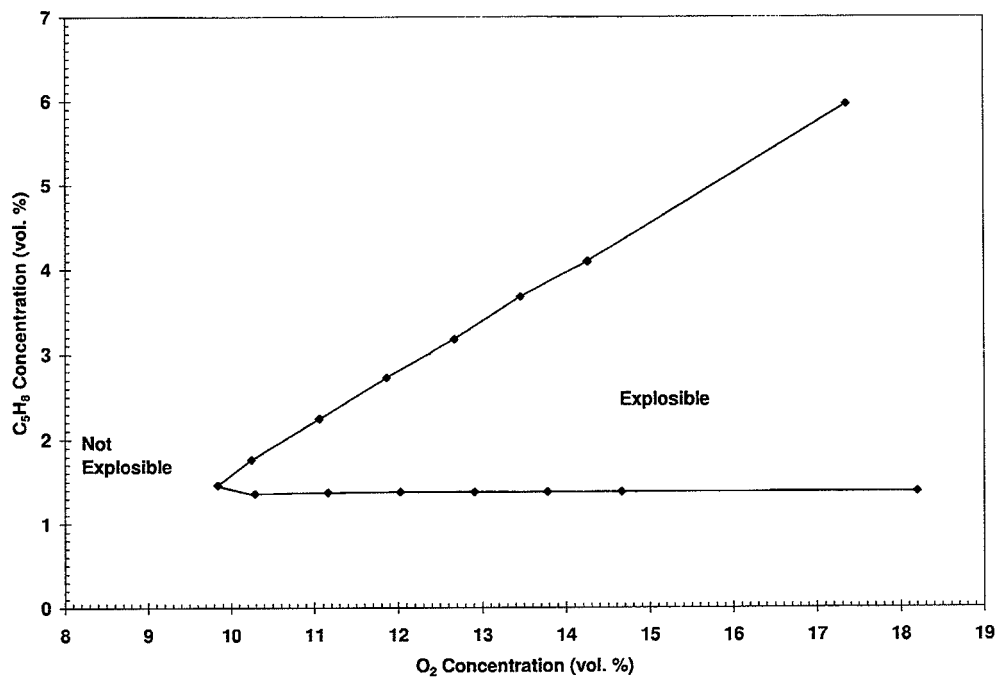
Figure 76B

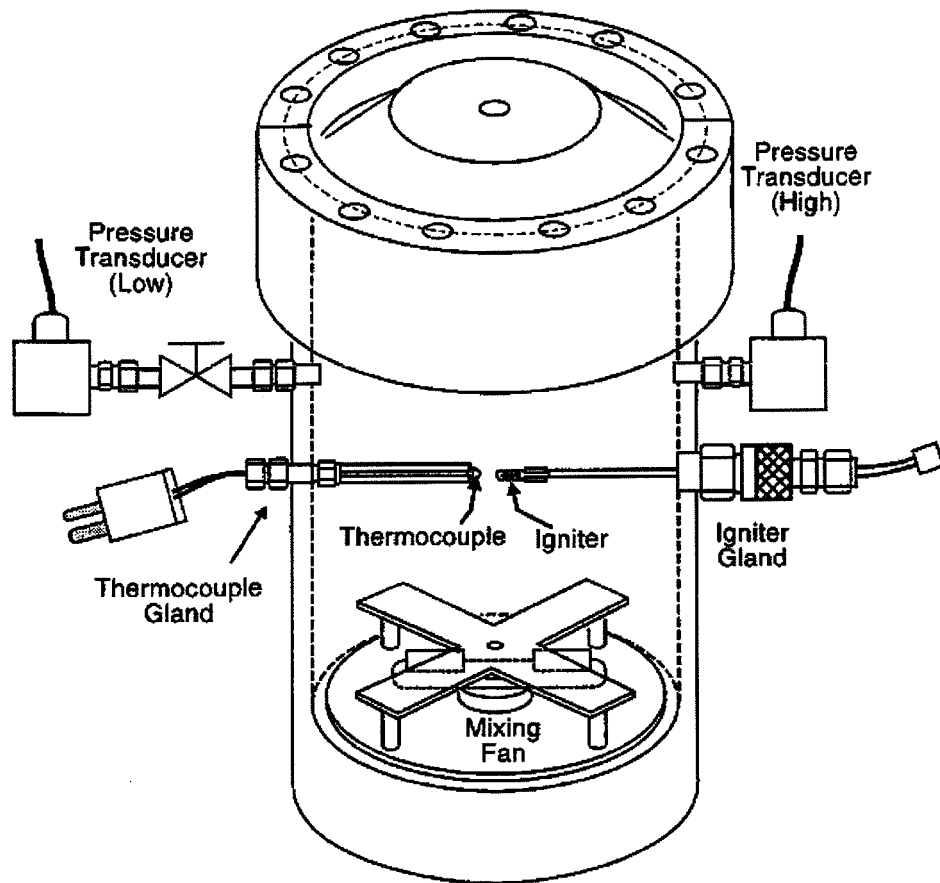
Figure 77

Figure 78A

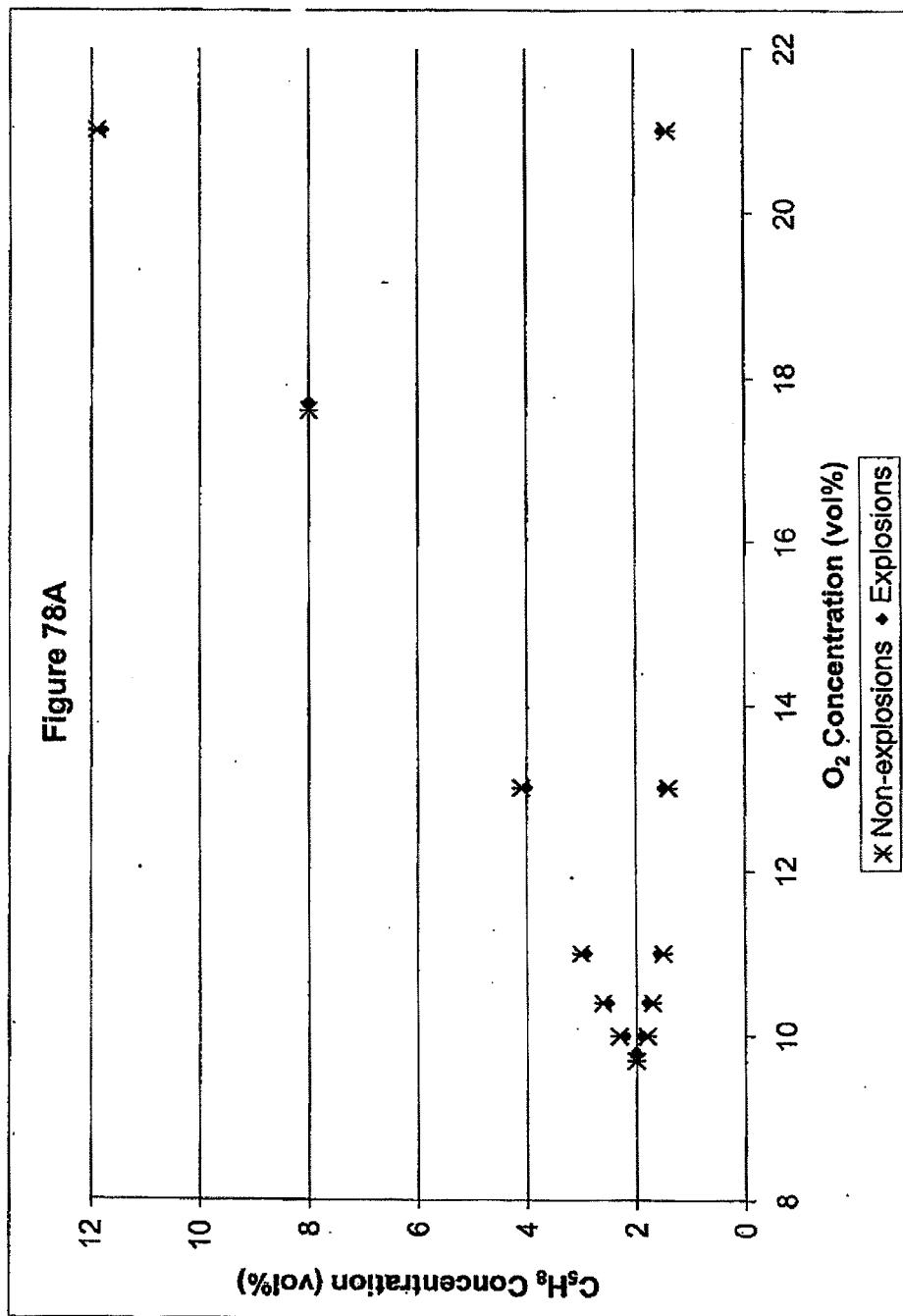


Figure 78B

Explosions		Non-explosions	
O₂ Concentra tion	C₅H₈ Concentra tion	O₂ Concentra tion	C₅H₈ Concentra tion
(vol. %)	(vol. %)	(vol. %)	(vol. %)
21.0	1.5	21.0	1.4
13.0	1.5	13.0	1.4
11.0	1.6	11.0	1.5
10.4	1.8	10.4	1.7
10.0	1.9	10.0	1.8
9.8	2	9.7	2
10.0	2.2	10.0	2.3
10.4	2.5	10.4	2.6
11.0	2.9	11.0	3.0
13.0	4.0	13.0	4.1
17.7	8.0	17.6	8.0
21.0	11.8	21.0	11.9

Figure 78C

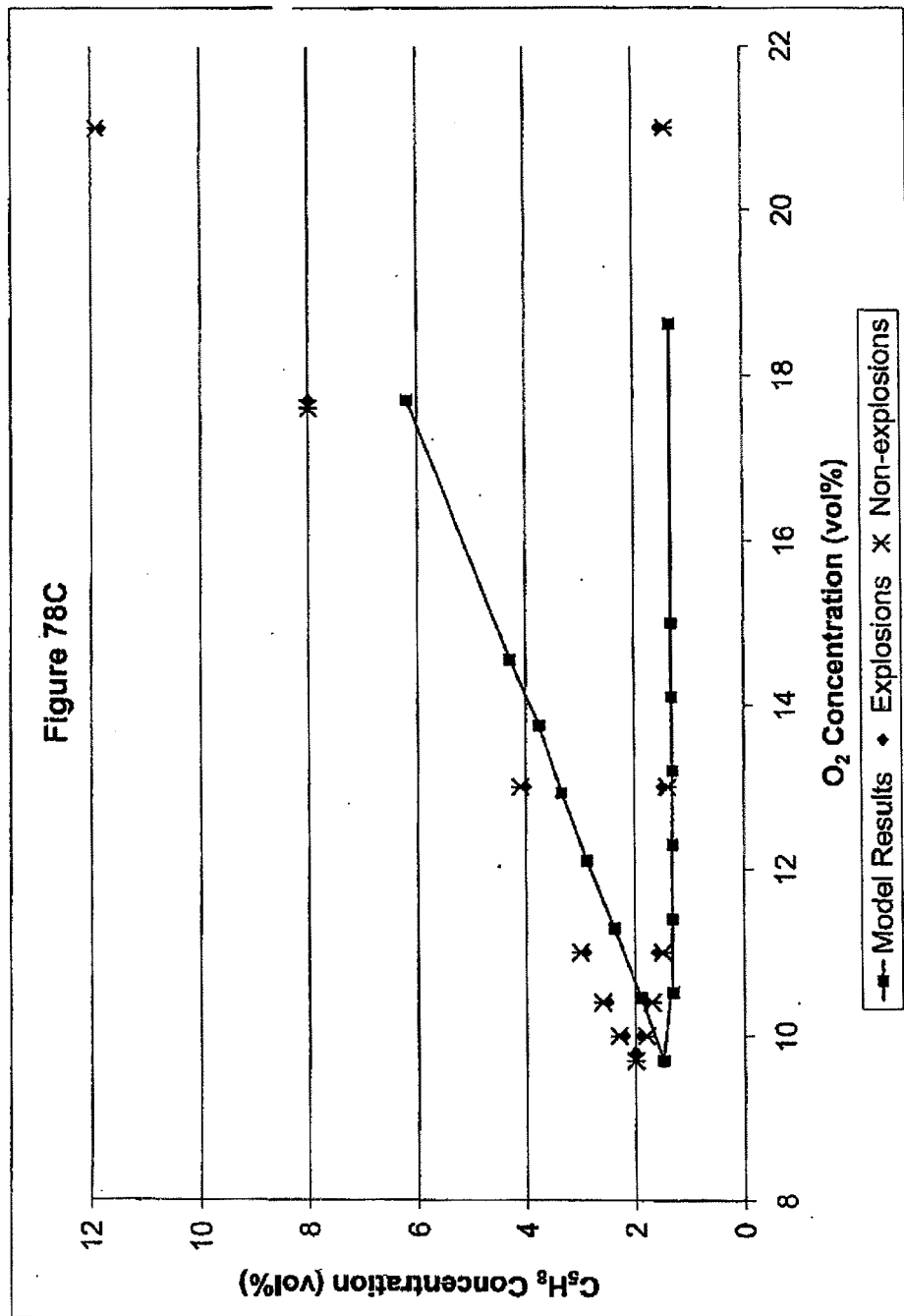


Figure 79A

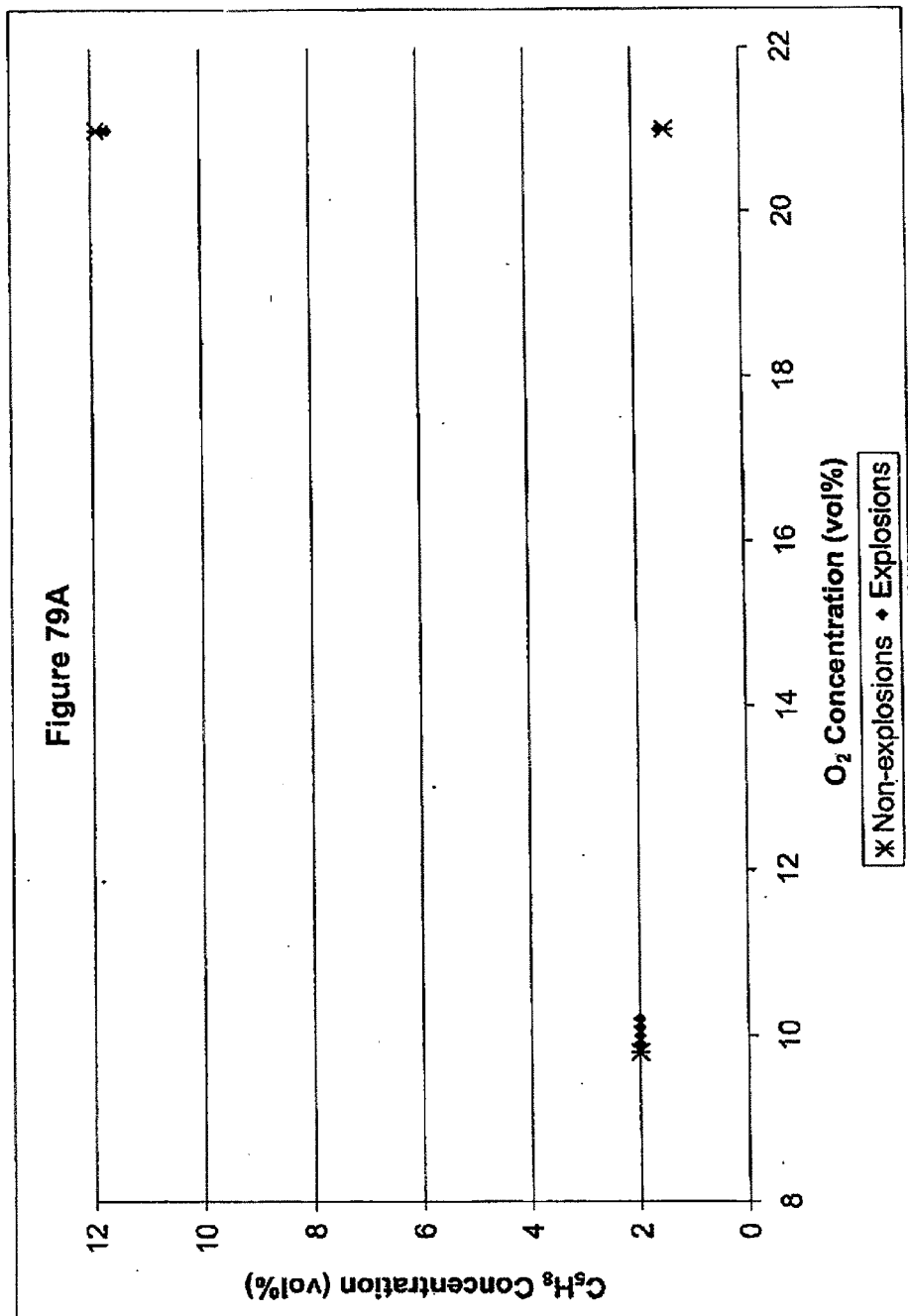


Figure 79B

Explosions		Non-explosions	
O2 Concentra tion	C5H8 Concentra tion	O2 Concentra tion	C5H8 Concentra tion
(vol. %)	(vol. %)	(vol. %)	(vol. %)
21.0	11.7	21.0	11.9
21.0	11.8	21.0	11.9
21.0	11.8	21.0	11.9
21.0	1.5	21.0	1.4
21.0	1.5	21.0	1.4
10.2	2.0	21.0	1.4
10.1	2.0	9.8	2.0
10.0	2.0	9.8	2.0
9.9	2.0	9.8	2.0

Figure 79C

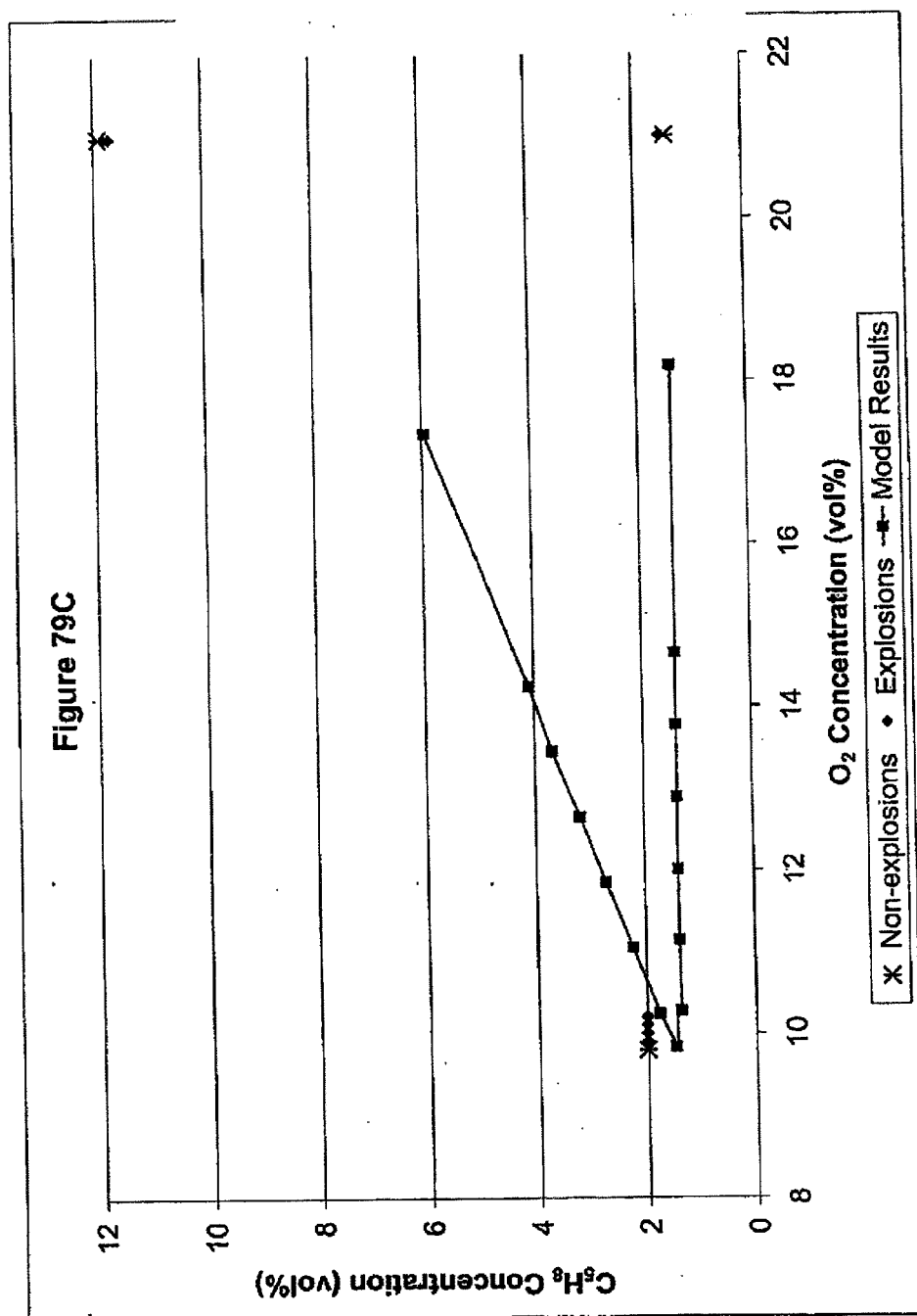


Figure 80A**TEST SERIES 1**

Test	Data File Name	Temp °C	Initial Pressure bara	Partial Pressures			Concentrations			Result	Pex bara
				C ₅ H ₈ mbar	N ₂ mbar	O ₂ mbar	C ₅ H ₈ vol. %	N ₂ vol. %	O ₂ vol. %		
1	T11120700	40	1.012	12	787	213	1.2	77.8	21.0	Non-Explosion	1.05
2	T11120701	40	1.016	16	787	213	1.6	77.5	21.0	Explosion	5.5
3	T11120702	40	1.015	14	788	213	1.4	77.6	21.0	Non-Explosion	<1.02
4	T11120703	40	1.014	15	786	213	1.5	77.5	21.0	Non-Explosion	<1.02
5	T11120704	40	1.014	15	786	213	1.5	77.5	21.0	Explosion	4.31
6	T11120705	40	1.017	18	785	214	1.8	77.2	21.0	Explosion	5.47
7	T11120706	40	1.014	15	786	213	1.5	77.5	21.0	Explosion	4.51
8	T11120707	40	1.014	14	787	213	1.4	77.6	21.0	Non-Explosion	<1.02
9	T11120708	40	1.014	14	787	213	1.4	77.6	21.0	Non-Explosion	1.05
10	T11120709	40	1.015	102	700	213	10.0	69.0	21.0	Explosion	1.45
11	T11120710	40	1.014	102	699	213	10.1	68.9	21.0	Explosion	1.39
12	T11120711	40	1.014	106	695	213	10.5	68.5	21.0	Explosion	1.34
13	T11120712	40	1.014	113	688	213	11.1	67.9	21.0	Explosion	1.29
14	T11120713	40	1.014	122	679	213	12.0	67.0	21.0	Non-Explosion	<1.02
15	T11120714	40	1.014	117	684	213	11.5	67.5	21.0	Explosion	1.32
16	T11120715	40	1.014	120	681	213	11.8	67.2	21.0	Non-Explosion	1.08
17	T11130700	40	1.014	120	681	213	11.8	67.2	21.0	Explosion	1.09
18	T11130701	40	1.014	121	680	213	11.9	67.1	21.0	Non-Explosion	1.07
19	T11130702	40	1.015	121	681	213	11.9	67.1	21.0	Non-Explosion	1.06
20	T11130703	40	1.015	121	681	213	11.9	67.1	21.0	Non-Explosion	1.07
21	T11130704	40	1.015	30	853	132	3.0	84.0	13.0	Explosion	1.61
22	T11130705	40	1.014	36	846	132	3.6	83.4	13.0	Explosion	1.28
23	T11130706	40	1.014	39	843	132	3.8	83.1	13.0	Explosion	1.12
24	T11130707	40	1.015	41	842	132	4.0	83.0	13.0	Explosion	1.09
25	T11130708	40	1.014	42	840	132	4.1	82.8	13.0	Non-Explosion	1.06
26	T11130709	40	1.015	42	841	132	4.1	82.9	13.0	Non-Explosion	1.06
27	T11130710	40	1.014	42	840	132	4.1	82.8	13.0	Non-Explosion	1.05
28	T11130711	40	1.014	15	867	132	1.5	85.5	13.0	Non-Explosion	1.03
29	T11130712	40	1.014	16	866	132	1.6	85.4	13.0	Explosion	4.81
30	T11130713	40	1.014	15	867	132	1.5	85.5	13.0	Explosion	4
31	T11130714	40	1.014	14	868	132	1.4	85.6	13.0	Non-Explosion	1.03
32	T11130715	40	1.014	14	868	132	1.4	85.6	13.0	Non-Explosion	<1.02
33	T11130716	40	1.014	14	868	132	1.4	85.6	13.0	Non-Explosion	1.03
34	T11130717	40	1.015	20	883	112	2.0	87.0	11.0	Explosion	1.7
35	T11130718	40	1.014	28	874	112	2.8	86.2	11.0	Non-Explosion	1.08
36	T11130719	40	1.014	28	874	112	2.8	86.2	11.0	Non-Explosion	1.08
37	T11130720	40	1.014	28	874	112	2.8	86.2	11.0	Explosion	1.13
38	T11130721	40	1.015	29	874	112	2.9	86.1	11.0	Non-Explosion	1.08
39	T11130722	40	1.014	29	873	112	2.9	86.1	11.0	Explosion	1.1

Figure 80B

Test	Data File Name	Temp °C	Initial Pressure bara	Partial Pressures			Concentrations			Result	Pex bara
				C ₅ H ₈ mbar	N ₂ mbar	O ₂ mbar	C ₅ H ₈ vol. %	N ₂ vol. %	O ₂ vol. %		
40	T11130723	40	1.014	30	872	112	3.0	86.0	11.0	Non-Explosion	1.08
41	T11130724	40	1.014	30	872	112	3.0	86.0	11.0	Non-Explosion	1.05
42	T11130725	40	1.014	30	872	112	3.0	86.0	11.0	Non-Explosion	1.05
43	T11130726	40	1.014	15	887	112	1.5	87.5	11.0	Non-Explosion	<1.02
44	T11130727	40	1.014	15	887	112	1.5	87.5	11.0	Non-Explosion	<1.02
45	T11140700	40	1.014	16	886	112	1.6	87.4	11.0	Non-Explosion	<1.02
46	T11140701	40	1.014	17	885	112	1.7	87.3	11.0	Explosion	1.81
47	T11140702	40	1.014	16	886	112	1.6	87.4	11.0	Explosion	1.54
48	T11140703	40	1.014	15	887	112	1.5	87.5	11.0	Non-Explosion	<1.02
49	T11140704	40	1.015	20	899	96	2.0	88.6	9.5	Non-Explosion	1.05
50	T11140705	40	1.014	20	898	96	2.0	88.6	9.5	Non-Explosion	1.05
51	T11140706	40	1.014	23	890	101	2.3	87.8	10.0	Non-Explosion	1.05
52	T11140707	40	1.015	23	886	106	2.3	87.3	10.4	Explosion	1.19
53	T11140708	40	1.014	25	884	105	2.5	87.2	10.4	Explosion	1.09
54	T11140709	40	1.014	26	883	105	2.6	87.1	10.4	Non-Explosion	1.05
55	T11140710	40	1.014	26	883	105	2.6	87.1	10.4	Non-Explosion	1.06
56	T11140711	40	1.014	26	883	105	2.6	87.1	10.4	Non-Explosion	1.07
57	T11140712	40	1.014	20	889	105	2.0	87.7	10.4	Explosion	1.21
58	T11140713	40	1.014	17	892	105	1.7	88.0	10.4	Non-Explosion	1.04
59	T11140714	40	1.014	18	891	105	1.8	87.9	10.4	Explosion	1.21
60	T11140715	40	1.014	17	892	105	1.7	88.0	10.4	Non-Explosion	1.03
61	T11140716	40	1.014	17	892	105	1.7	88.0	10.4	Non-Explosion	1.03
62	T11140717	40	1.014	21	890	103	2.1	87.8	10.2	Explosion	1.1
63	T11140718	40	1.014	21	891	102	2.1	87.9	10.1	Explosion	1.09
64	T11140719	40	1.014	21	892	101	2.1	88.0	10.0	Explosion	1.09
65	T11140720	40	1.014	22	891	101	2.2	87.9	10.0	Explosion	1.1
66	T11140721	40	1.014	23	890	101	2.3	87.8	10.0	Non-Explosion	1.06
67	T11140722	40	1.014	23	890	101	2.3	87.8	10.0	Non-Explosion	1.08
68	T11140723	40	1.014	19	894	101	1.9	88.2	10.0	Explosion	1.12
69	T11140724	40	1.014	18	895	101	1.8	88.3	10.0	Non-Explosion	1.06
70	T11140725	40	1.014	18	895	101	1.8	88.3	10.0	Non-Explosion	1.03
71	T11140726	40	1.014	18	895	101	1.8	88.3	10.0	Non-Explosion	1.04
72	T11140727	40	1.014	20	895	99	2.0	88.3	9.8	Non-Explosion	1.08
73	T11140728	40	1.014	20	895	99	2.0	88.3	9.8	Explosion	1.1
74	T11140729	40	1.014	20	896	98	2.0	88.4	9.7	Non-Explosion	1.06
75	T11140730	40	1.014	20	896	98	2.0	88.4	9.7	Non-Explosion	1.08
76	T11140731	40	1.014	20	896	98	2.0	88.4	9.7	Non-Explosion	1.07
77	T11140732	40	1.014	81	761	172	8.0	75.0	17.0	Non-Explosion	1.04
78	T11140733	40	1.014	81	750	183	8.0	74.0	18.0	Explosion	1.3
79	T11140734	40	1.014	81	754	179	8.0	74.4	17.7	Explosion	1.24
80	T11140735	40	1.014	81	757	176	8.0	74.7	17.4	Non-Explosion	1.03
81	T11140736	40	1.014	81	755	178	8.0	74.5	17.6	Non-Explosion	1.05
82	T11140737	40	1.014	81	755	178	8.0	74.5	17.6	Non-Explosion	1.03
83	T11140738	40	1.014	81	755	178	8.0	74.5	17.6	Non-Explosion	1.03

Figure 81**TEST SERIES 2**

Test	Data File Name	Temp °C	Initial Pressure bara	Partial Pressures				Concentrations				Result	Pex bara
				H ₂ O mbar	C ₅ H ₈ mbar	N ₂ mbar	O ₂ mbar	H ₂ O vol. %	C ₅ H ₈ vol. %	N ₂ vol. %	O ₂ vol. %		
1	T11150700	40	1.014	41	119	641	213	4.0	11.7	63.2	21.0	Explosion	1.33
2	T11150701	40	1.014	40	121	640	213	3.9	11.9	63.1	21.0	Non-explosion	1.07
3	T11150702	40	1.014	41	120	640	213	4.0	11.8	63.1	21.0	Explosion	1.09
4	T11150703	40	1.014	40	121	640	213	3.9	11.9	63.1	21.0	Non-explosion	1.06
5	T11150704	40	1.014	40	120	641	213	3.9	11.8	63.2	21.0	Explosion	1.09
6	T11150705	40	1.014	40	121	640	213	3.9	11.9	63.1	21.0	Non-explosion	1.08
7	T11150706	40	1.014	40	15	746	213	3.9	1.5	73.6	21.0	Explosion	4.68
8	T11150707	40	1.014	41	15	745	213	4.0	1.5	73.5	21.0	Explosion	5.27
9	T11150708	40	1.014	41	14	746	213	4.0	1.4	73.6	21.0	Non-explosion	1.03
10	T11150709	40	1.014	42	14	745	213	4.1	1.4	73.5	21.0	Non-explosion	1.03
11	T11160700	40	1.014	41	14	746	213	4.0	1.4	73.6	21.0	Non-explosion	1.03
12	T11160701	40	1.014	41	20	850	103	4.0	2.0	83.8	10.2	Explosion	1.11
13	T11160702	40	1.014	41	20	851	102	4.0	2.0	83.9	10.1	Explosion	1.11
14	T11160703	40	1.014	41	20	852	101	4.0	2.0	84.0	10.0	Explosion	1.09
15	T11160704	40	1.014	41	20	853	100	4.0	2.0	84.1	9.9	Explosion	1.09
16	T11160705	40	1.014	41	20	854	99	4.0	2.0	84.2	9.8	Non-explosion	1.07
17	T11160706	40	1.014	40	20	855	99	3.9	2.0	84.3	9.8	Non-explosion	1.06
18	T11160707	40	1.014	41	20	854	99	4.0	2.0	84.2	9.8	Non-explosion	1.08

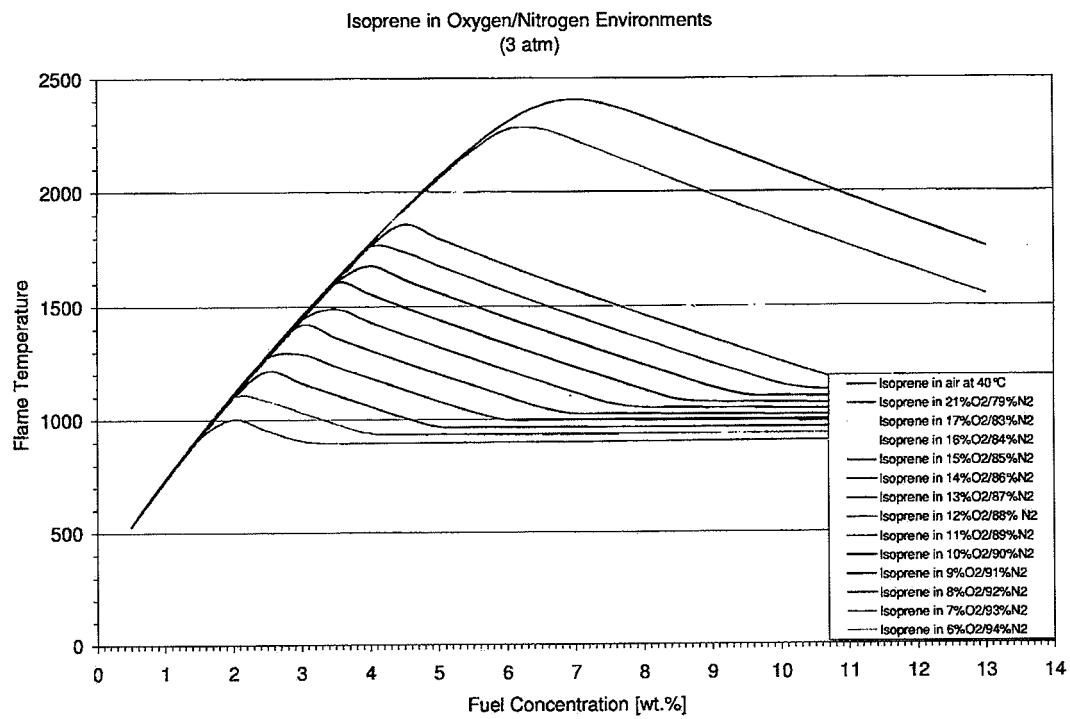
Figure 82

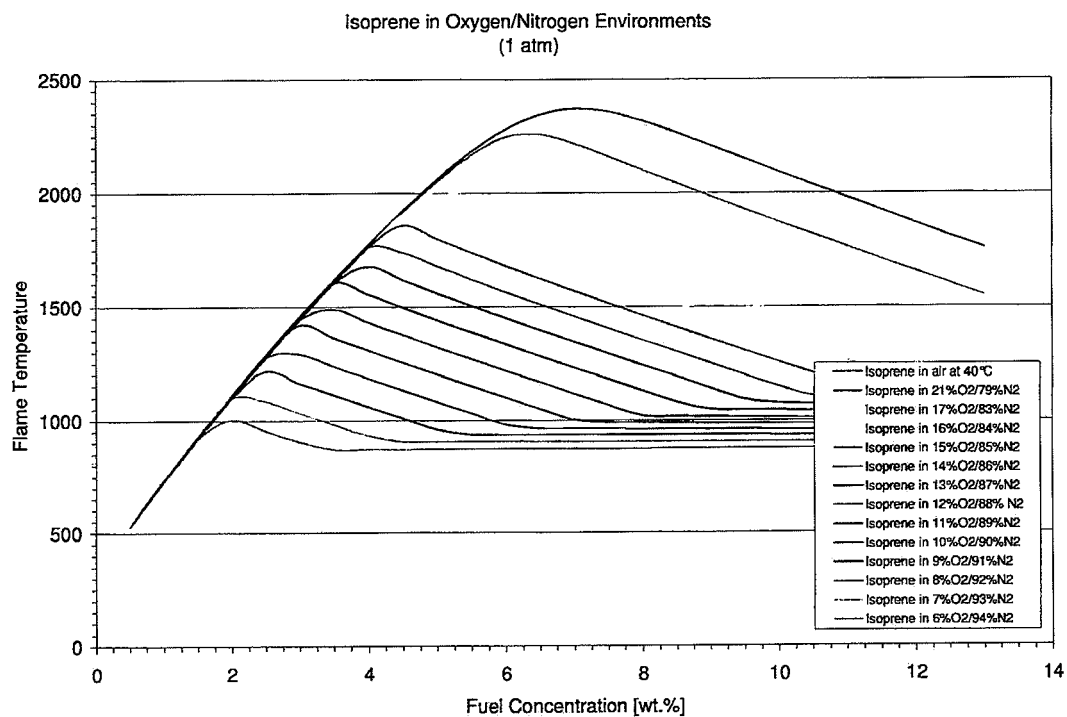
Figure 83

Figure 84

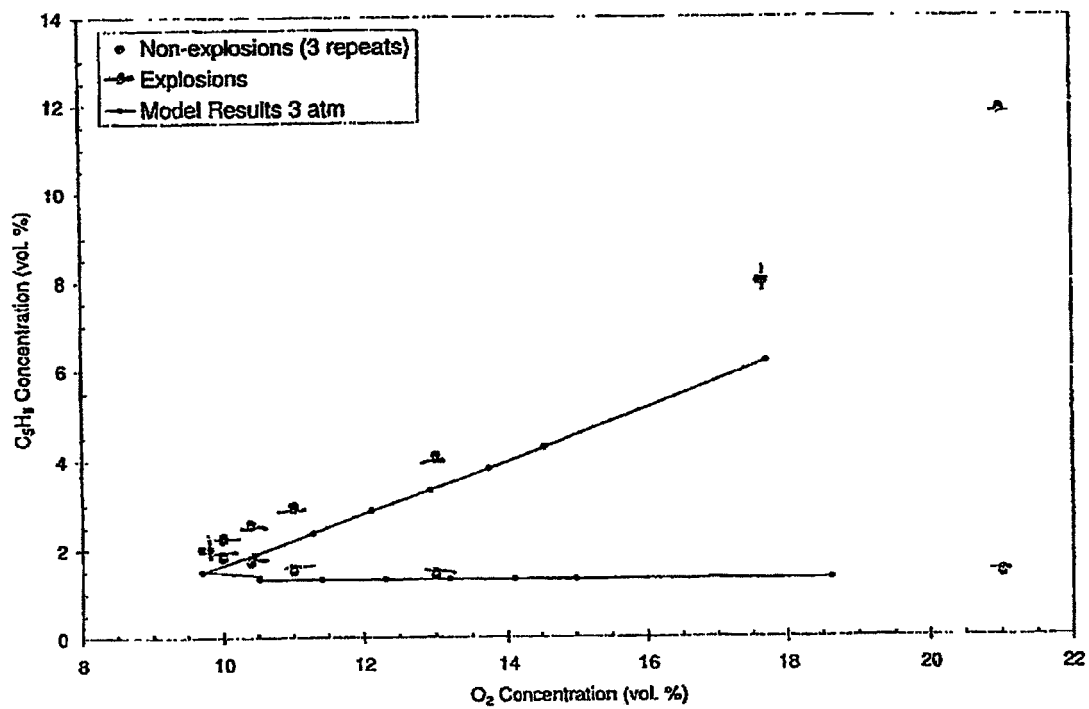


Figure 85

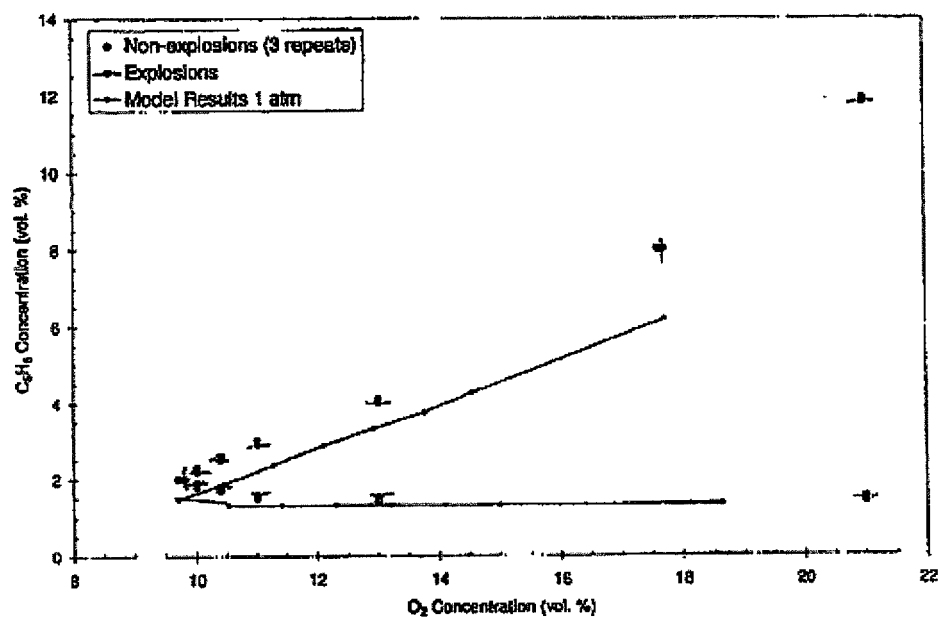
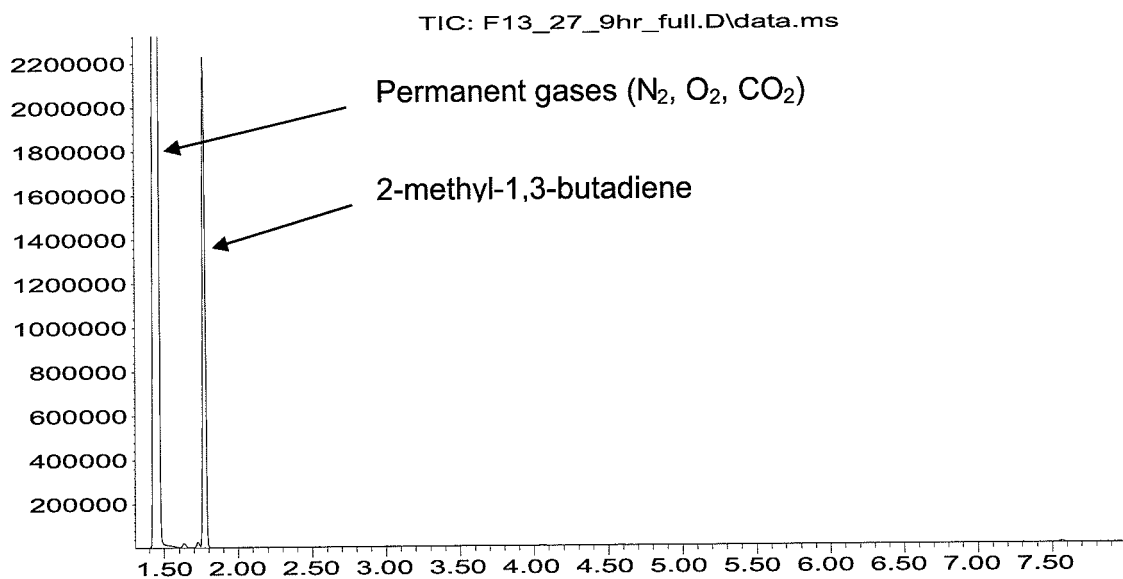


Figure 86A

Abundance

**Figure 86B**

Abundance

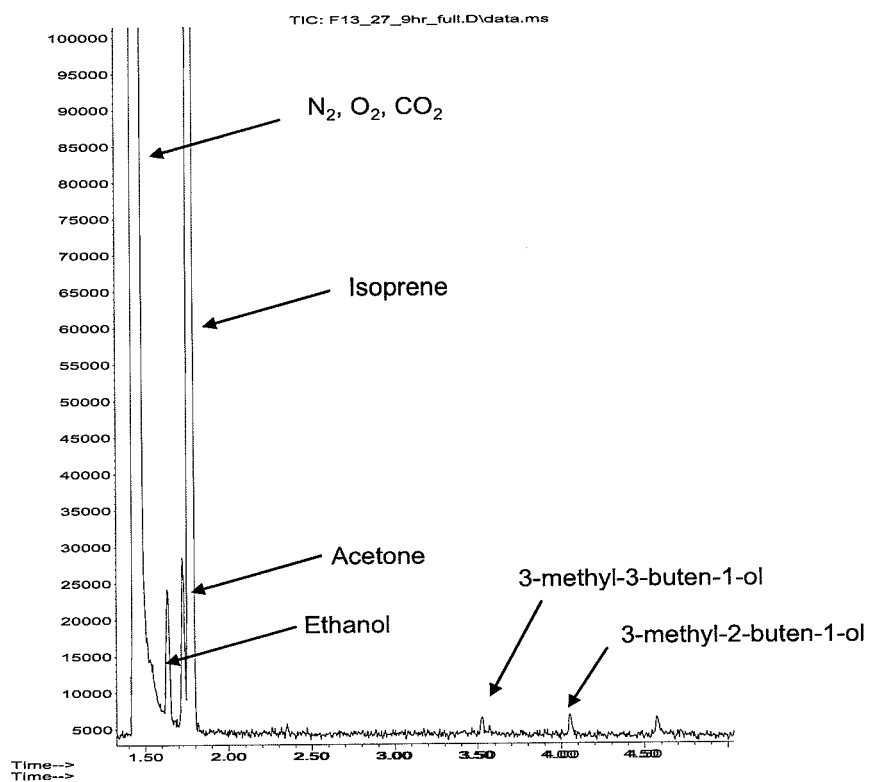


Figure 87A

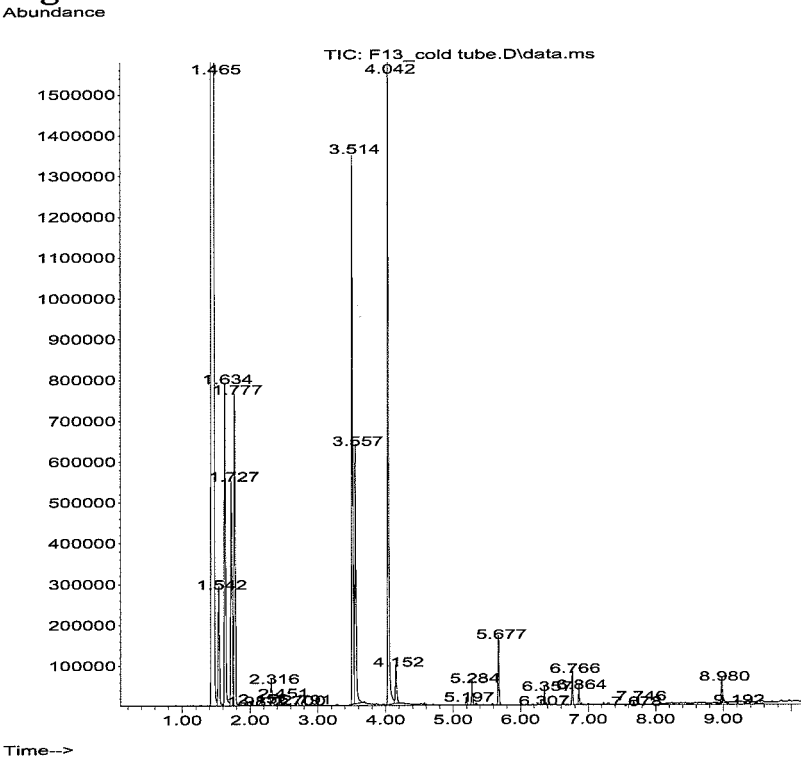
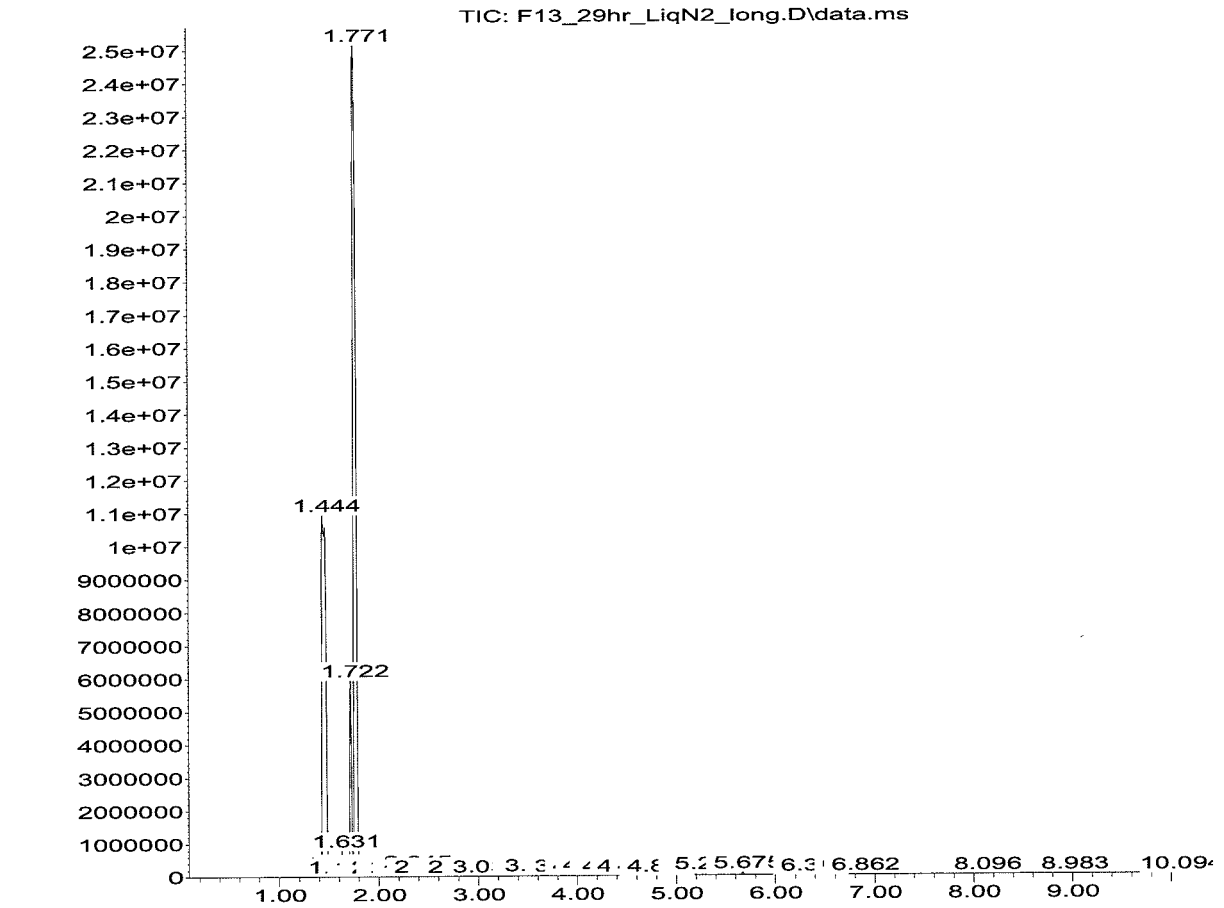


Figure 87B

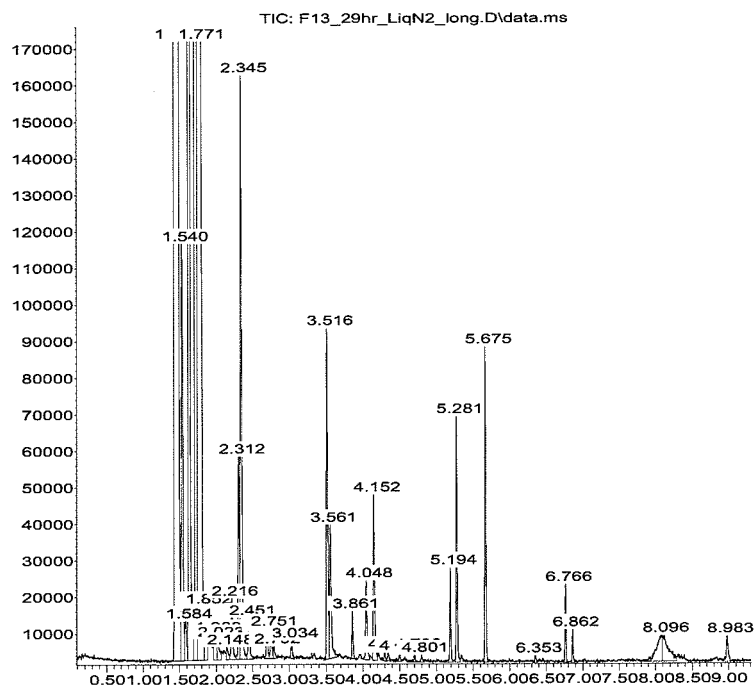
Abundance



Time-->

Figure 87C

Abundance

**Figure 87D**

Abundance

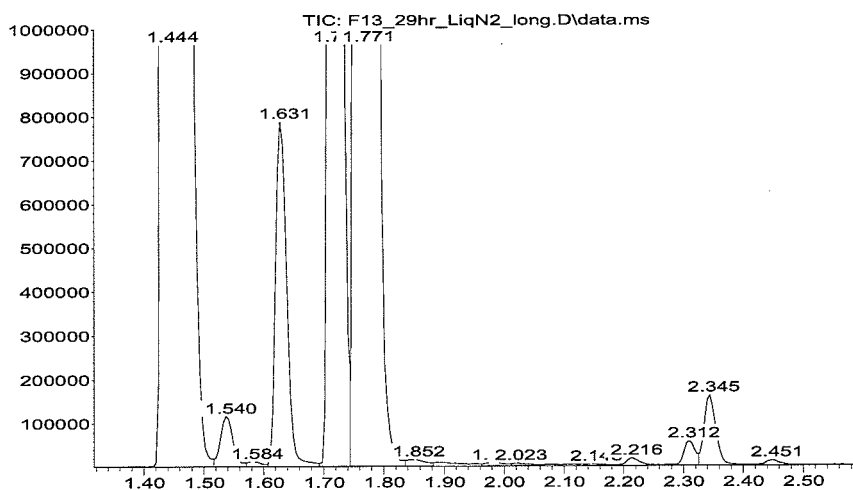
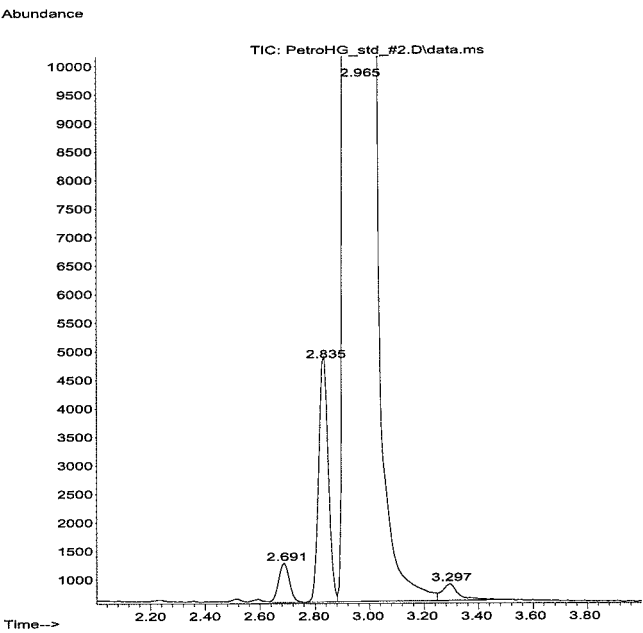
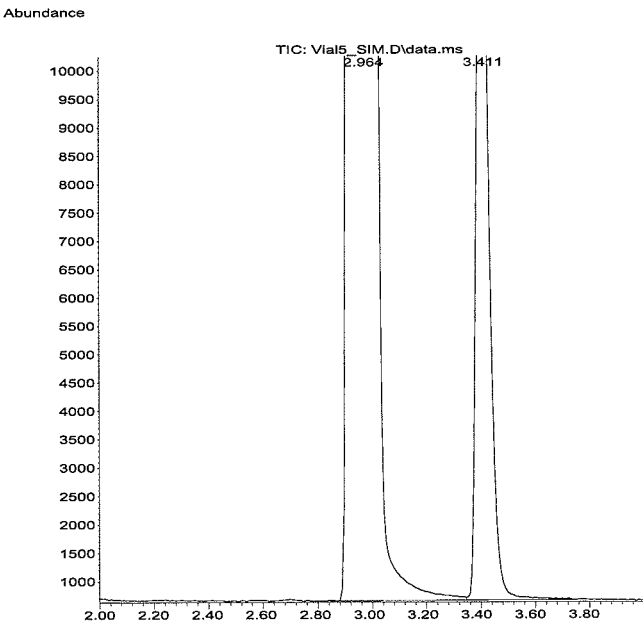


Figure 88A



2-methyl-1,3-butadiene standard

Figure 88B



2-methyl-1,3-butadiene from recombinant *E. coli*

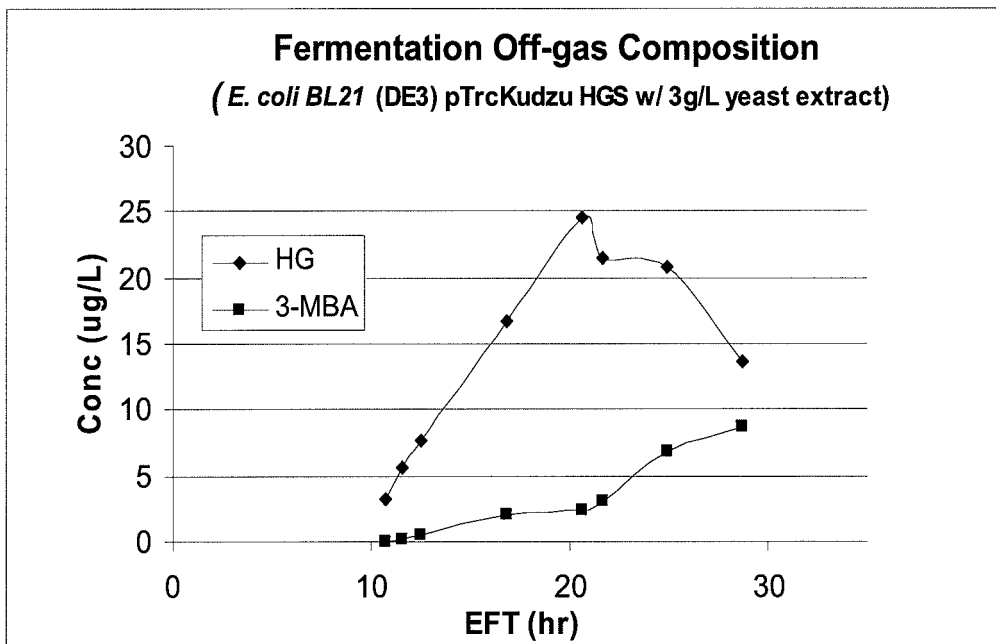
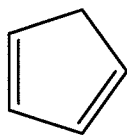
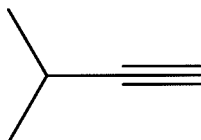
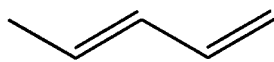
Figure 89

Figure 90

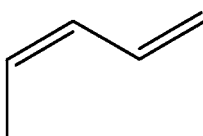
cyclopentadiene



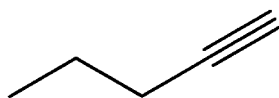
"isopryne" = 3-Me-1-butyne



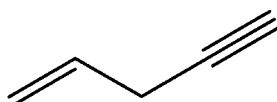
trans-piperylene



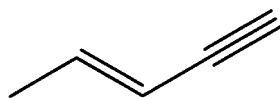
cis-piperylene



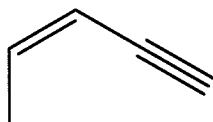
1-pentyne



pent-4-ene-1-yne



trans-pent-3-ene-1-yne



cis-pent-3-ene-1-yne

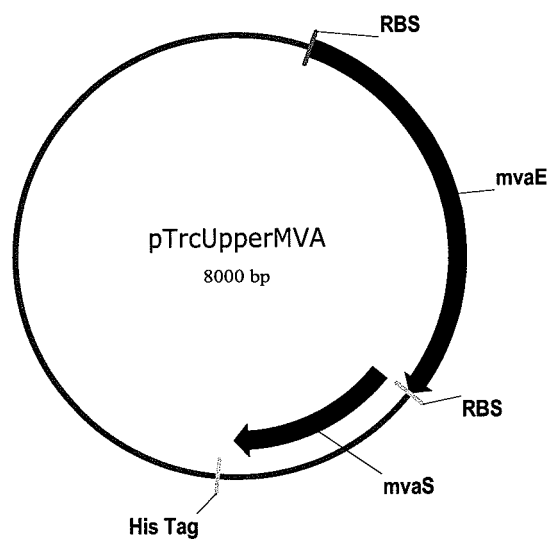
Figure 91

Figure 92A

1-

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Figure 92B

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Figure 92C

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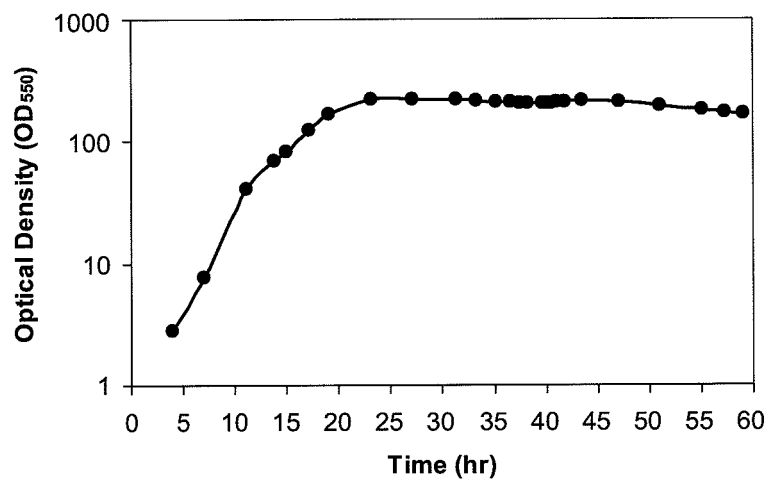
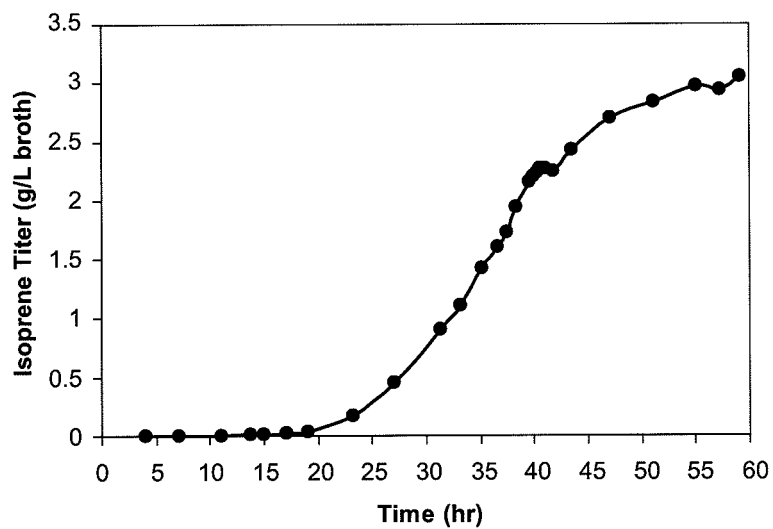
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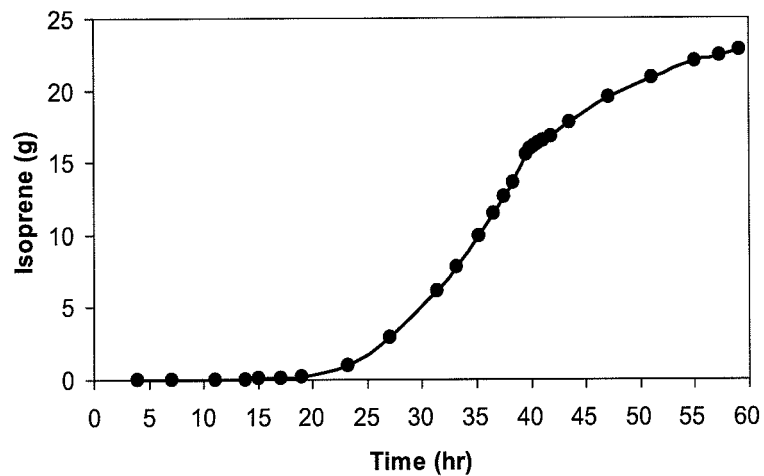
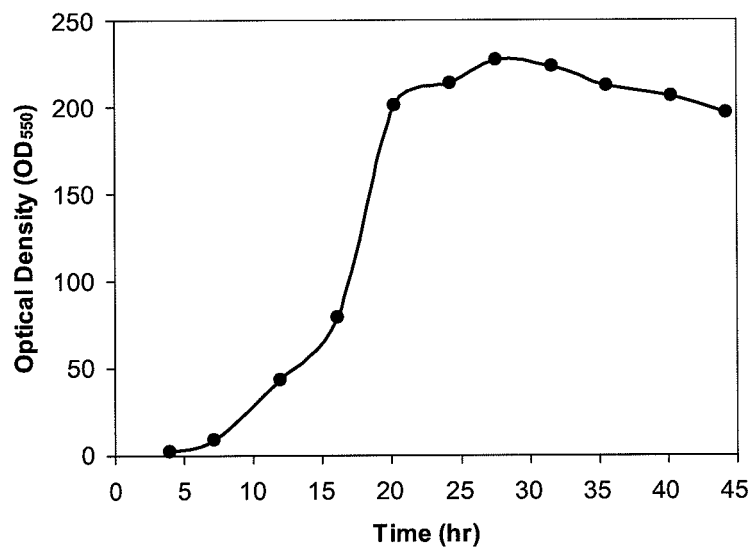
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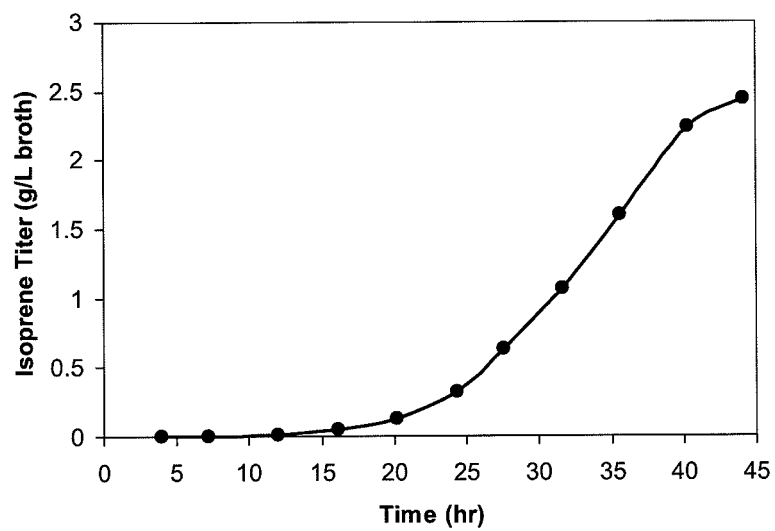
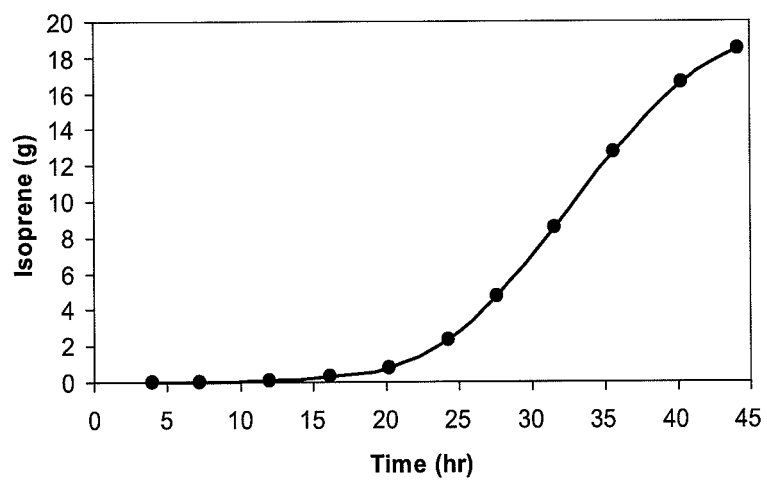
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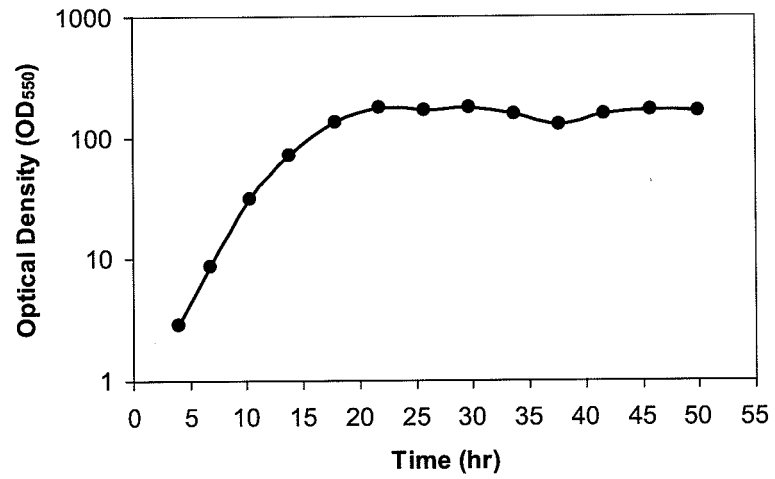
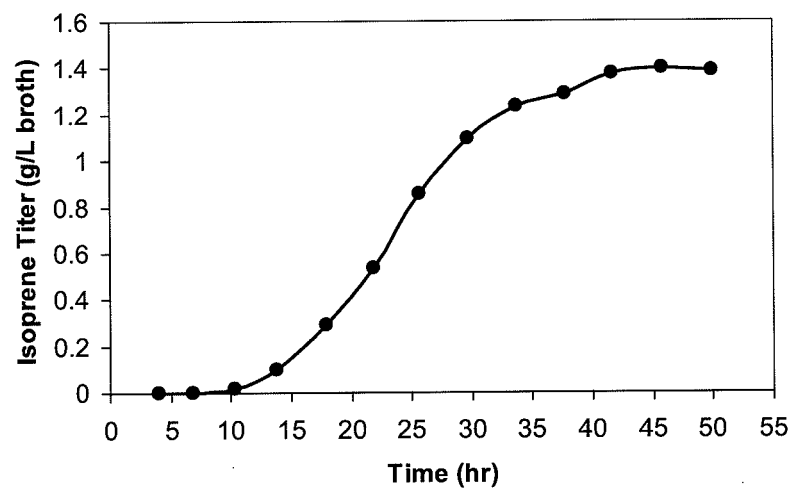
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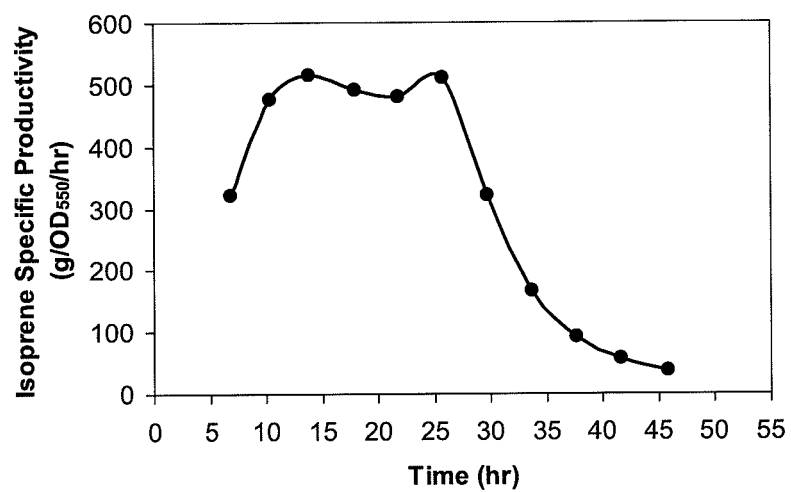
Figure 101

Figure 102

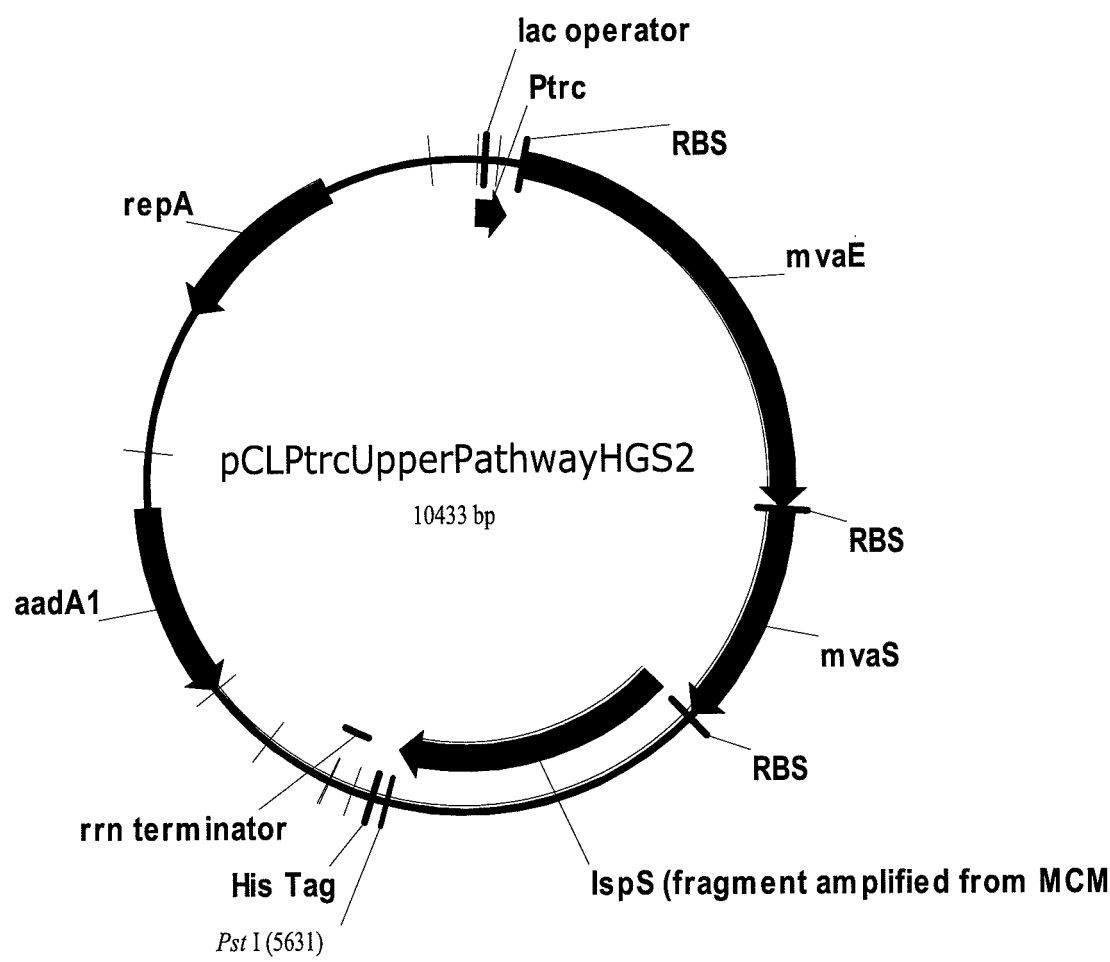


Figure 103A

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Figure 103B

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Figure 103C

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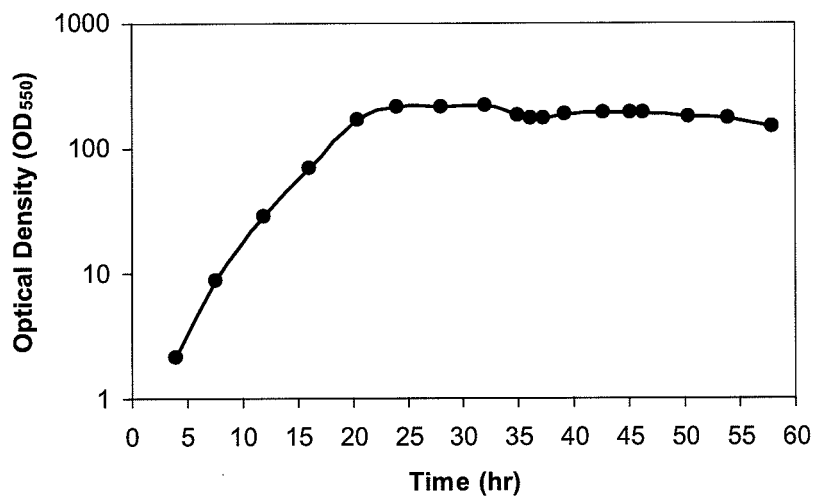
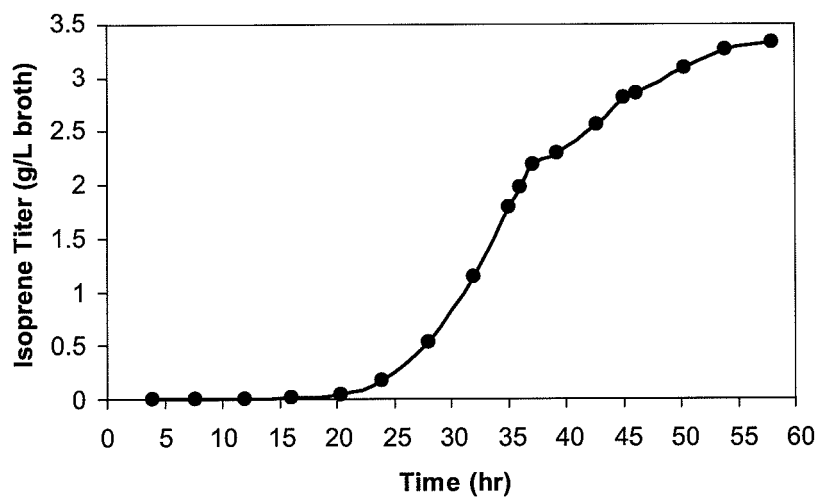
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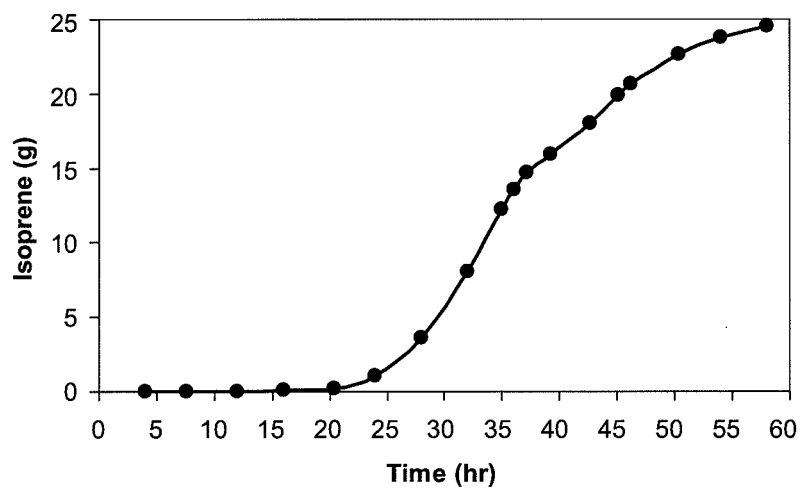
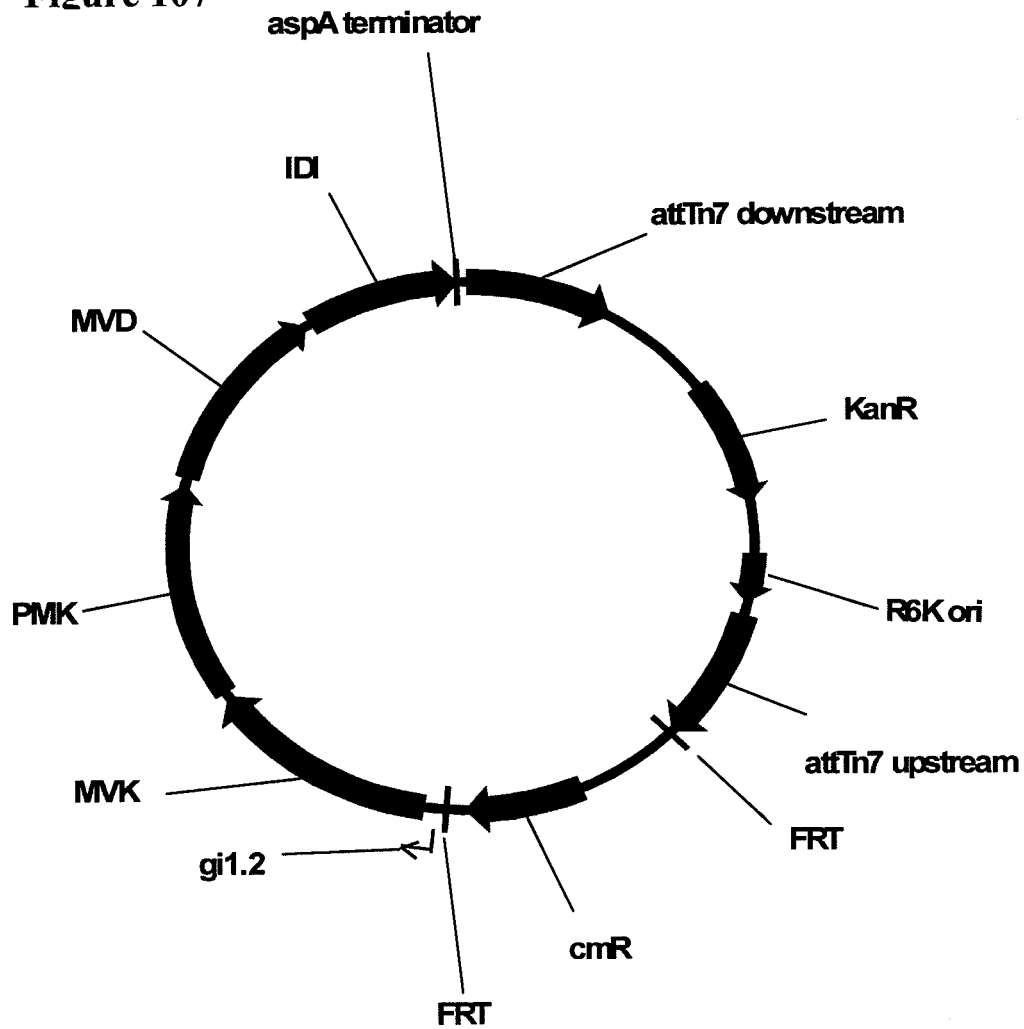
Figure 106

Figure 107

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Figure 108A

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Figure 108B

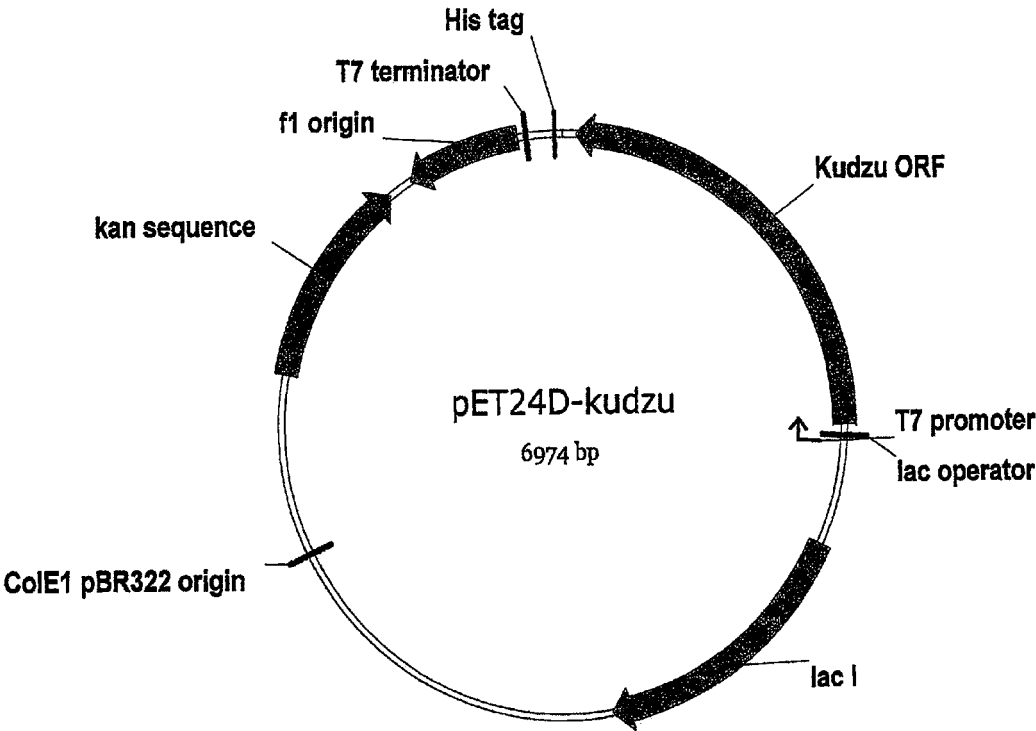
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Figure 108C

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Figure 109



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FIGURE 110B

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Figure 111A

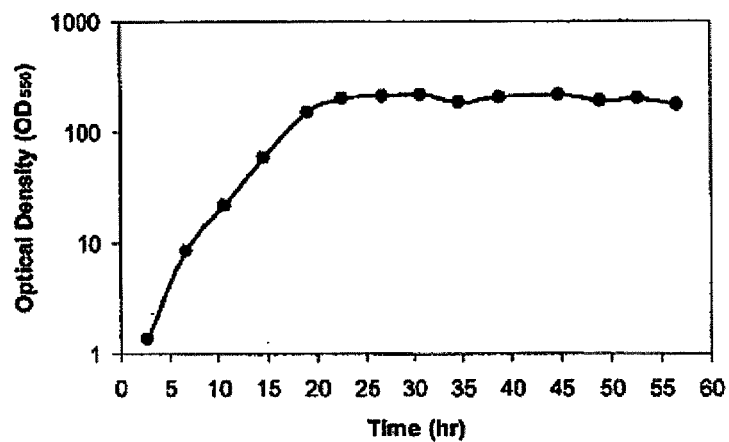


Figure 111B

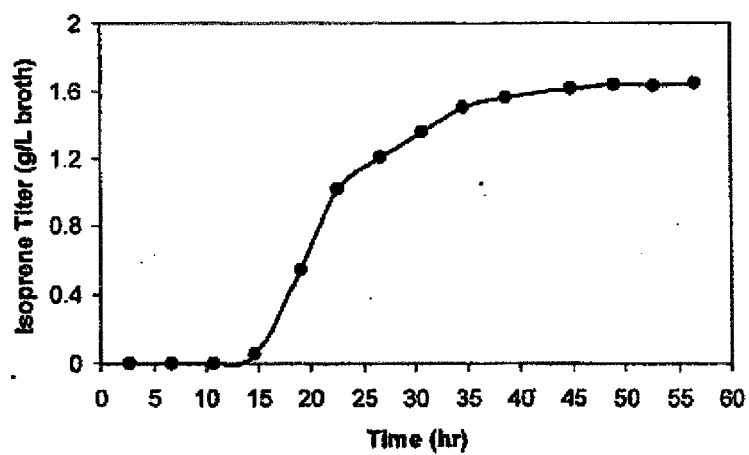


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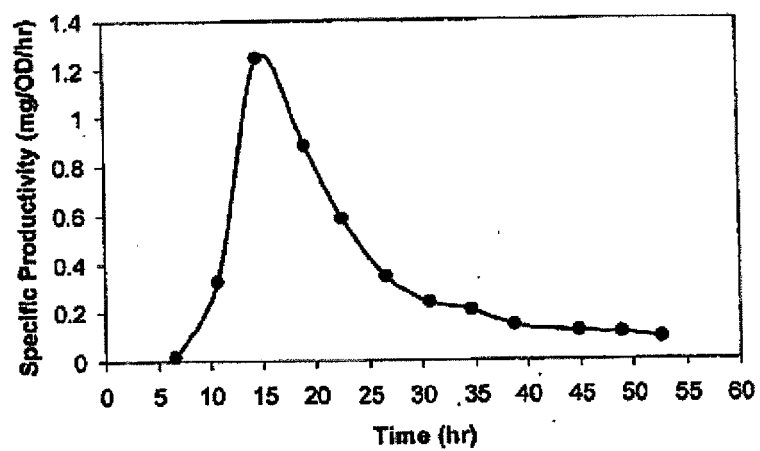


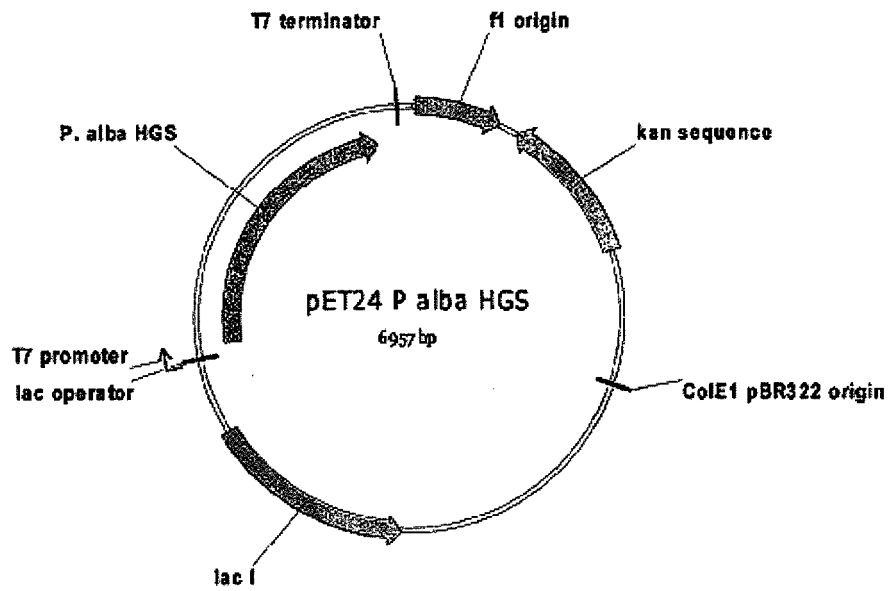
Figure 112

Figure 113A

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Figure 113B

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Figure 114

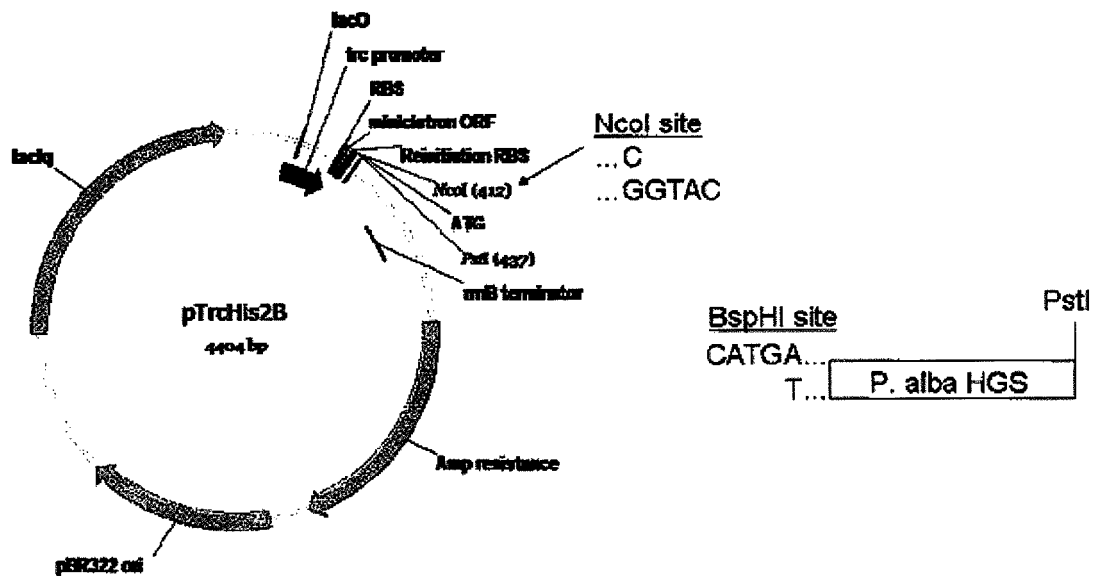


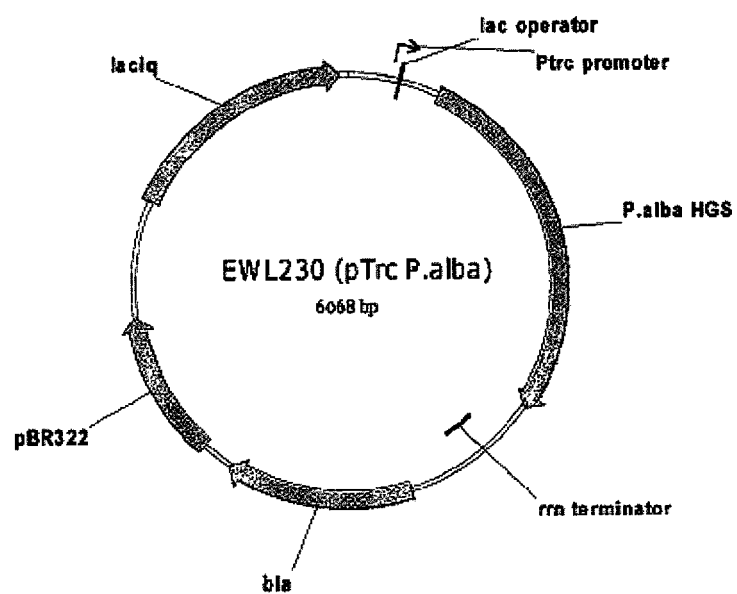
Figure 115

Figure 116A

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Figure 116B

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Figure 117

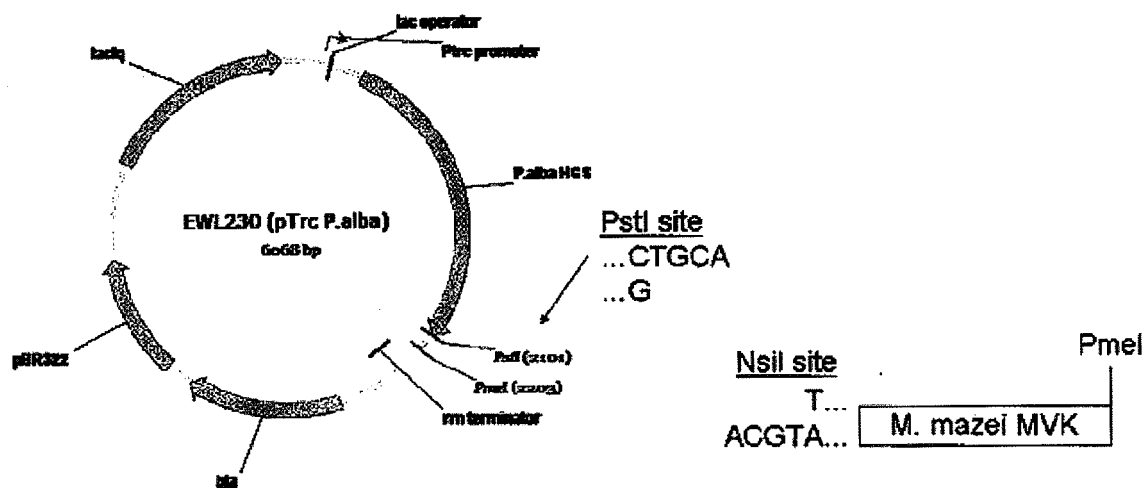


Figure 118

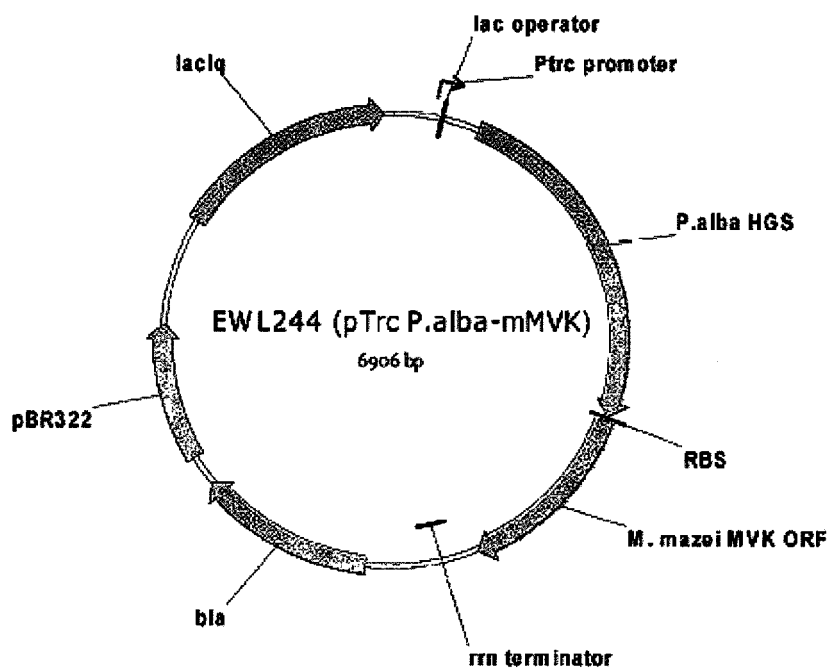


Figure 119A

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Figure 119B

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Figure 120

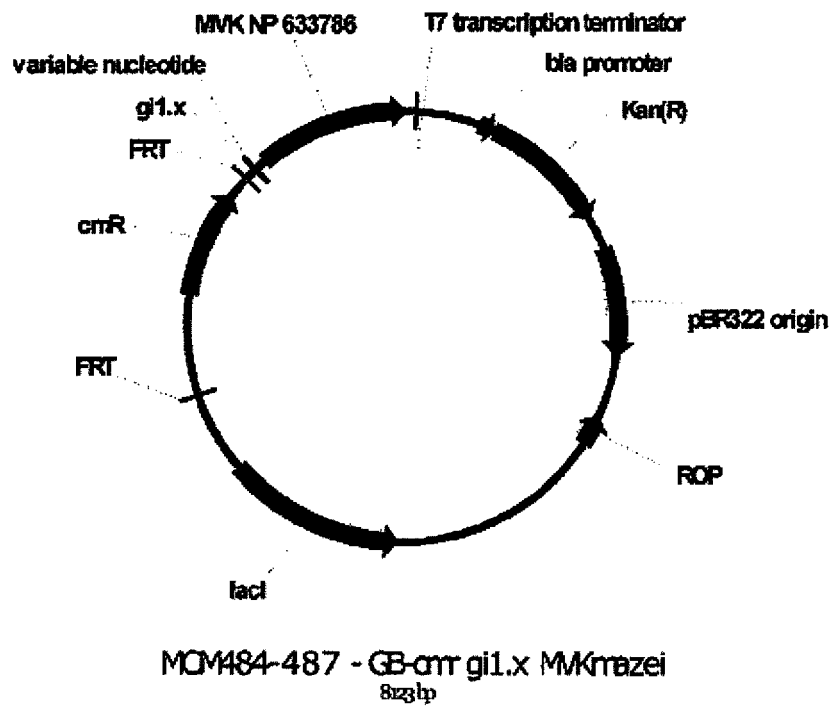


Figure 121A

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[illegible]

Figure 121C

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(SEQ ID NO:105)

Figure 122A

1-

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Figure 122B

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Figure 122C

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(SEQ ID NO:106)

Figure 123A

1-

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[illegible]

Figure 123C

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(SEQ ID NO:107)

Figure 124A

1-

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Figure 124C

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Figure 125A

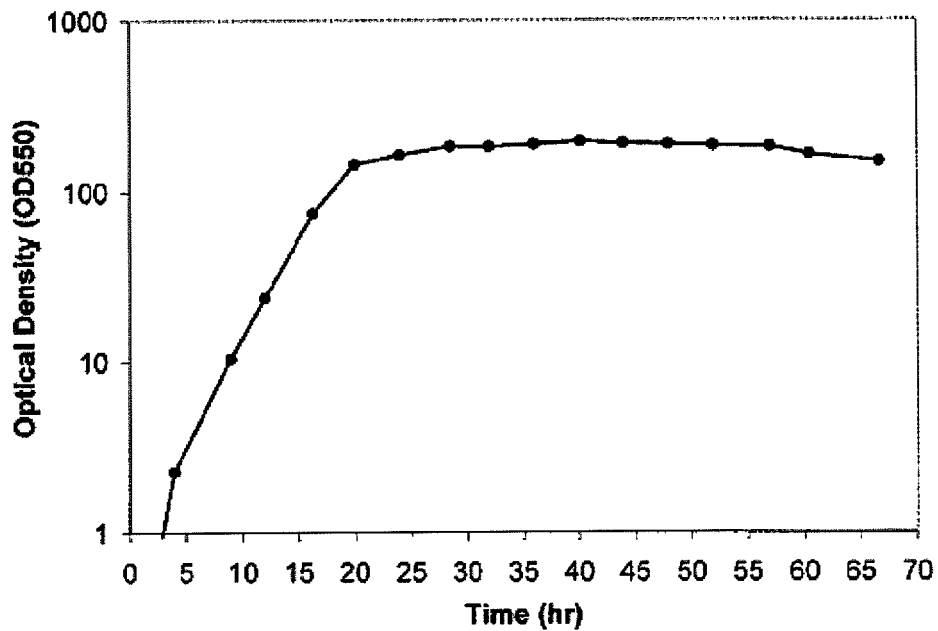


Figure 125B

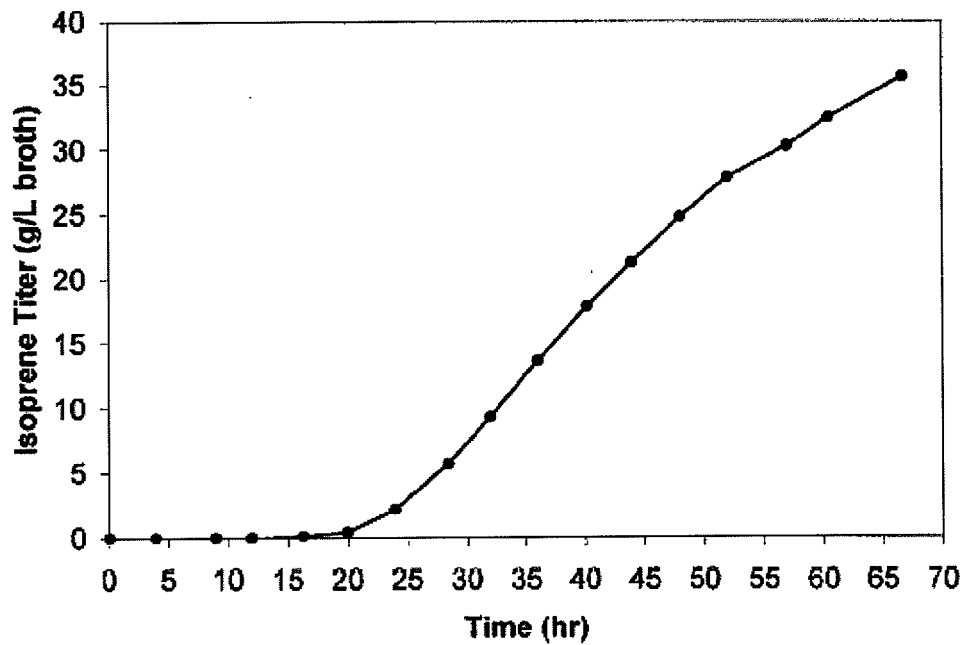


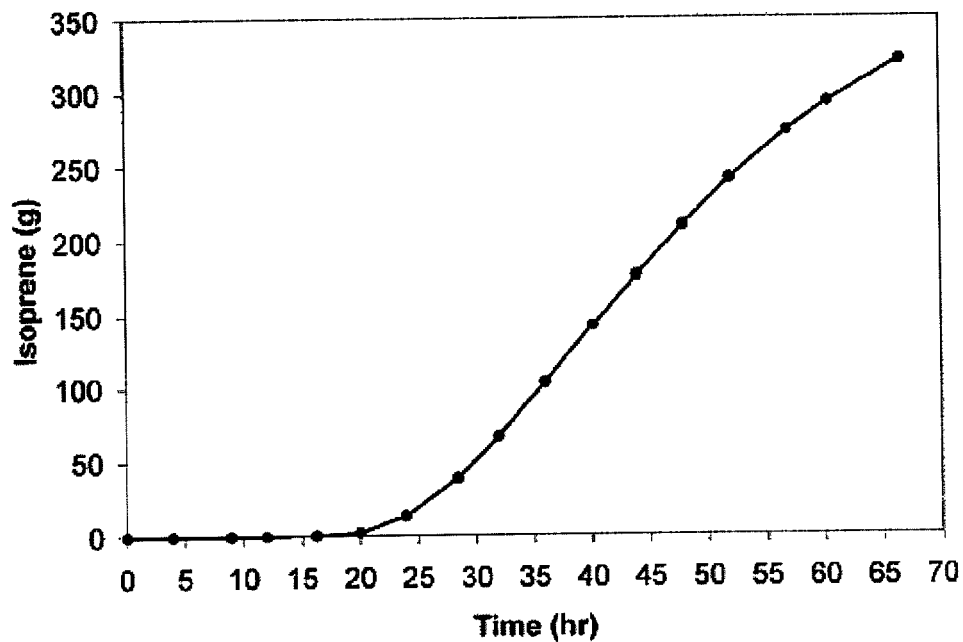
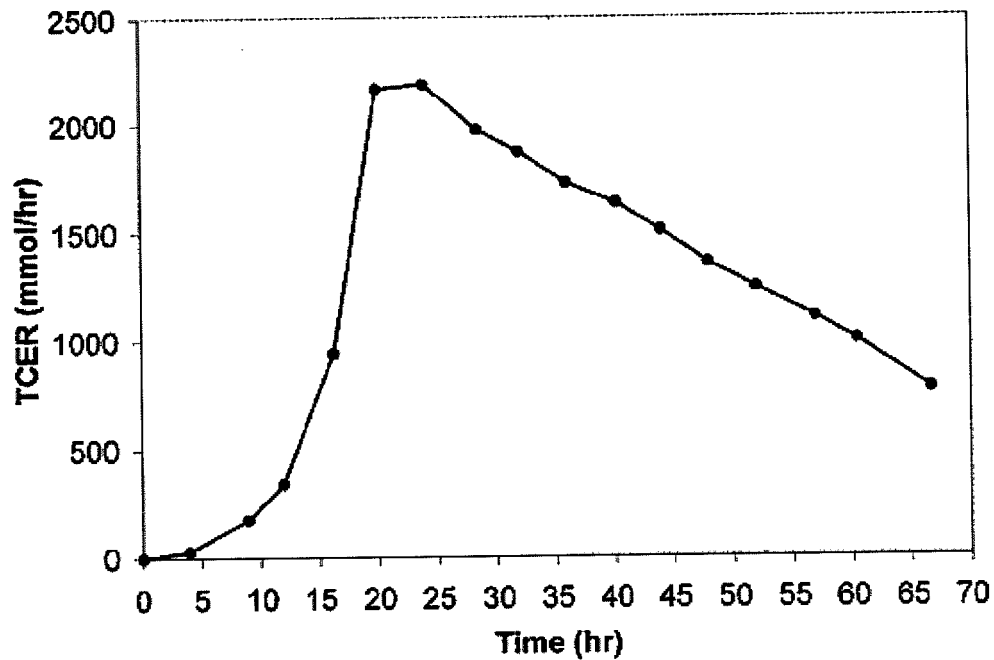
Figure 125C**Figure 125D**

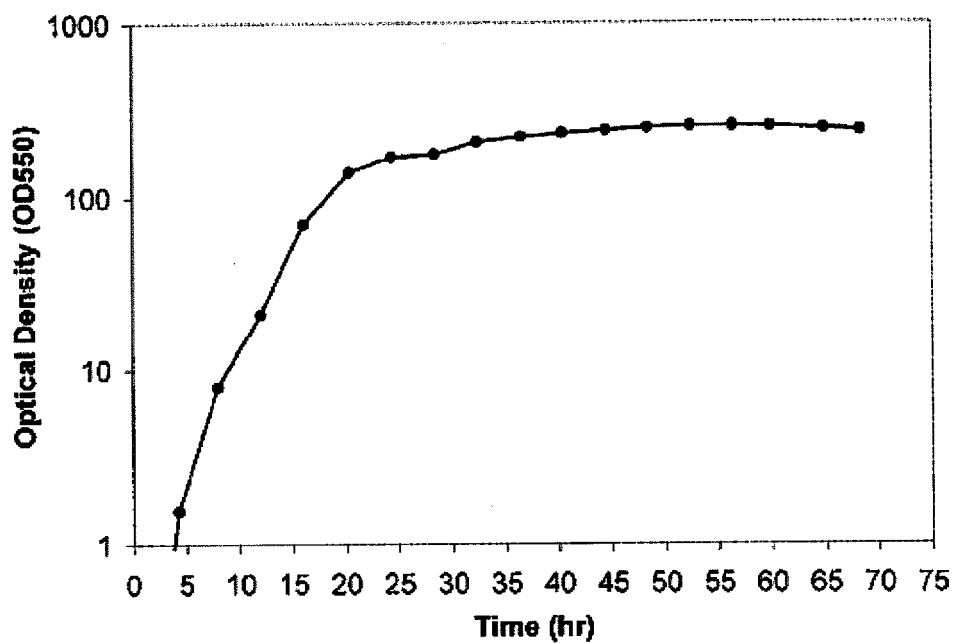
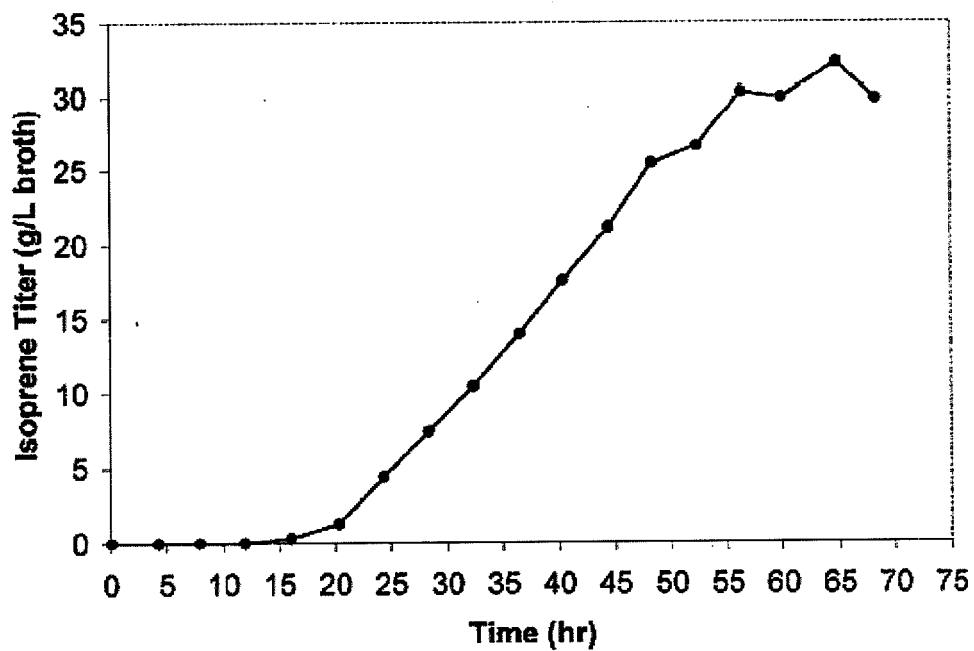
Figure 126A**Figure 126B**

Figure 126C

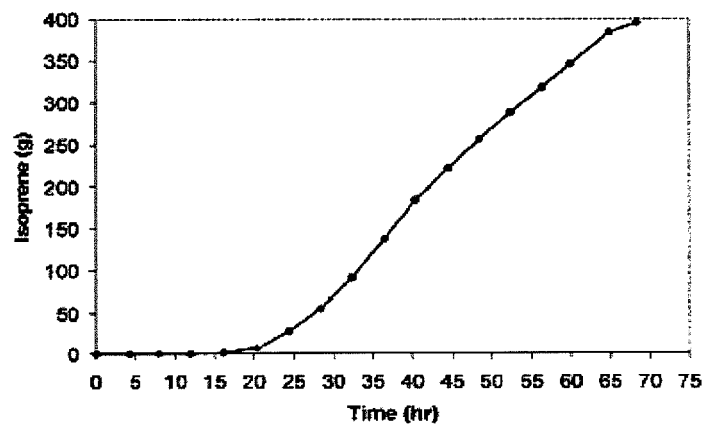


Figure 126D

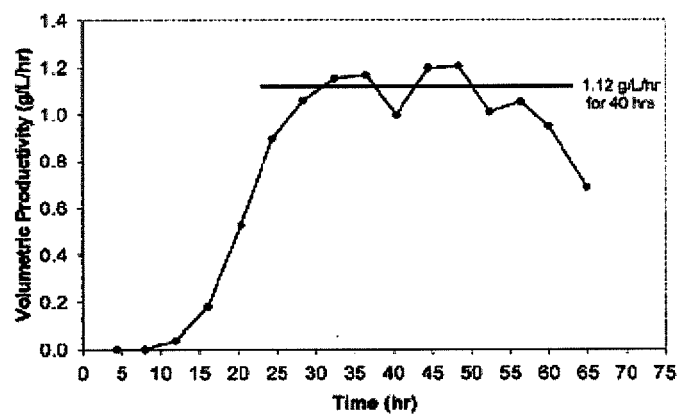


Figure 126E

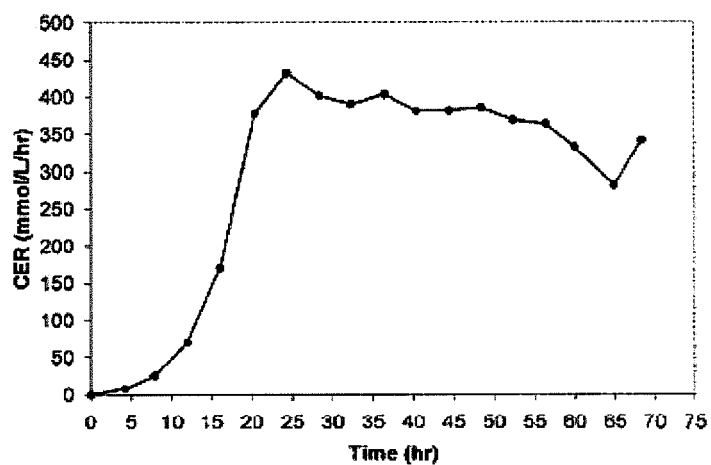


Figure 127A

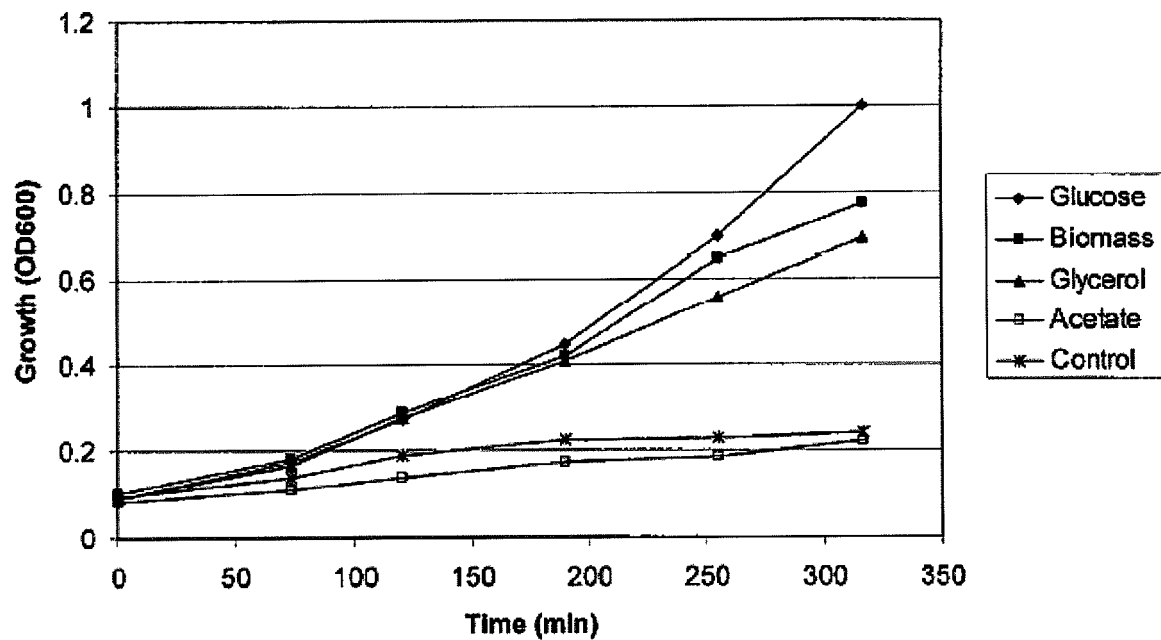


Figure 127B

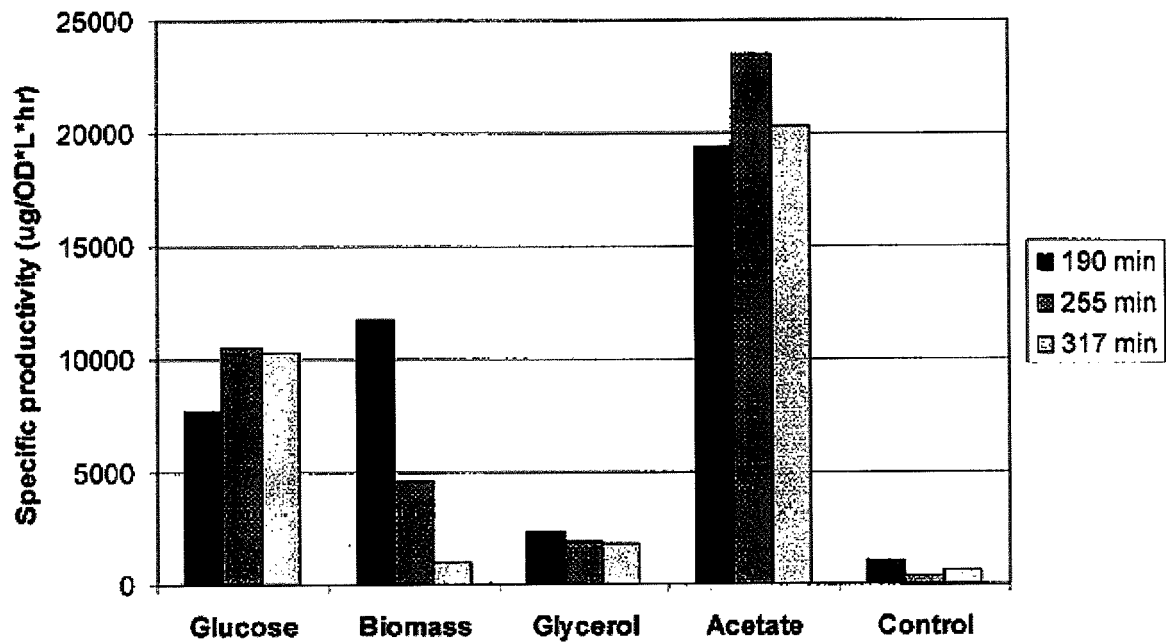


Figure 127C

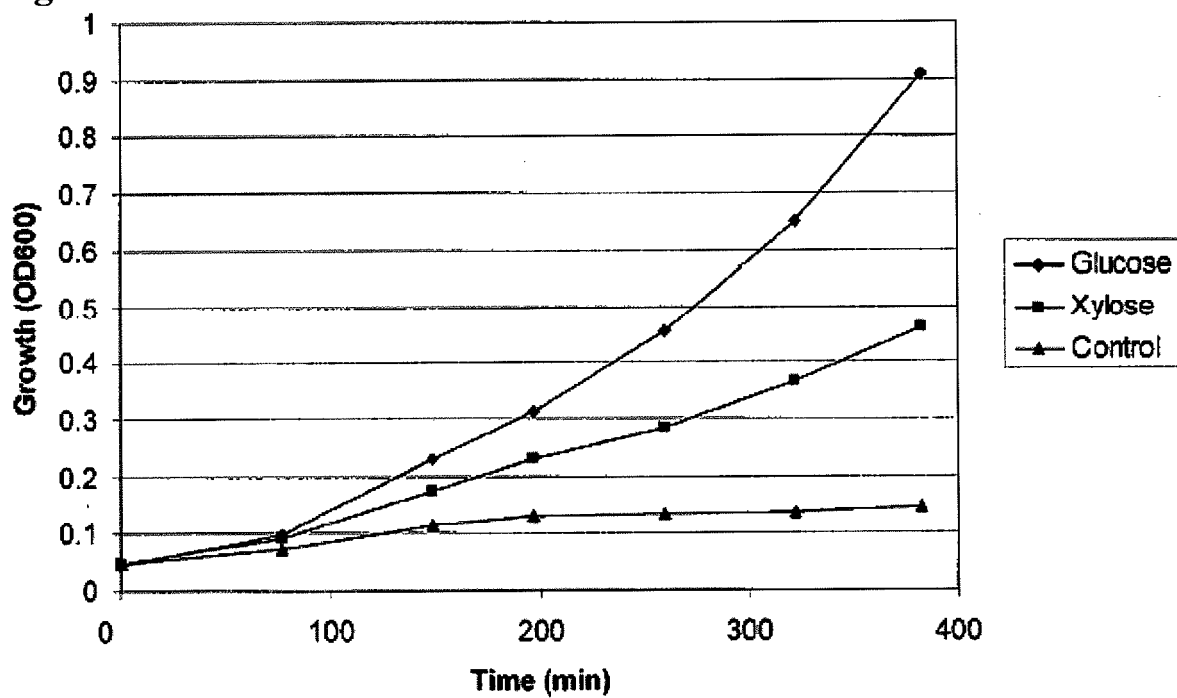


Figure 127D

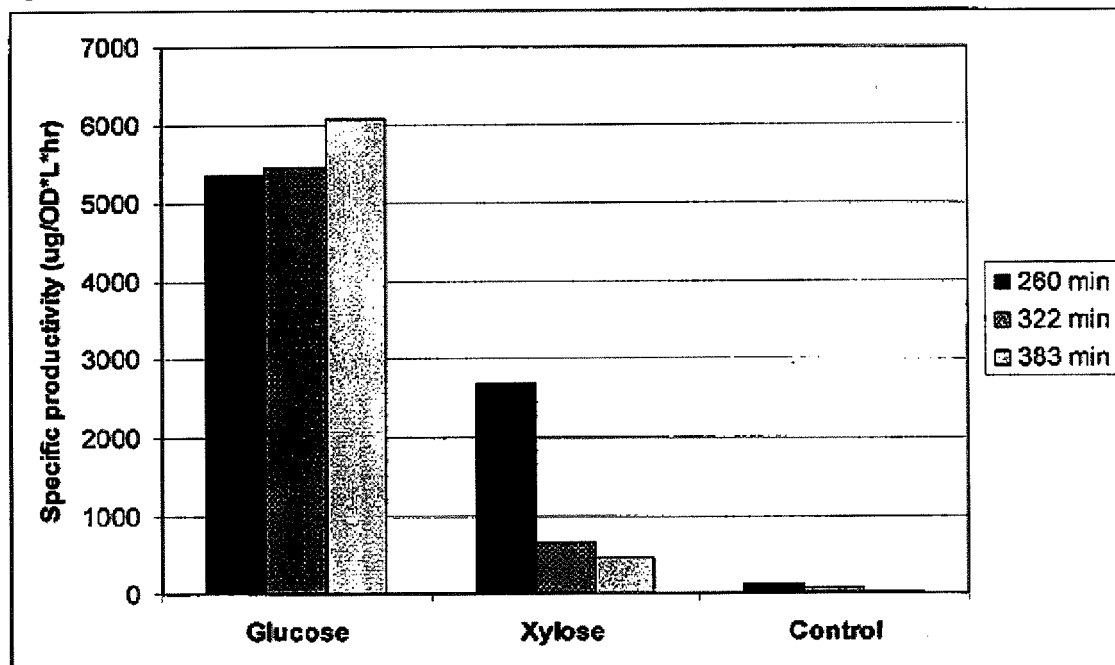


Figure 128A

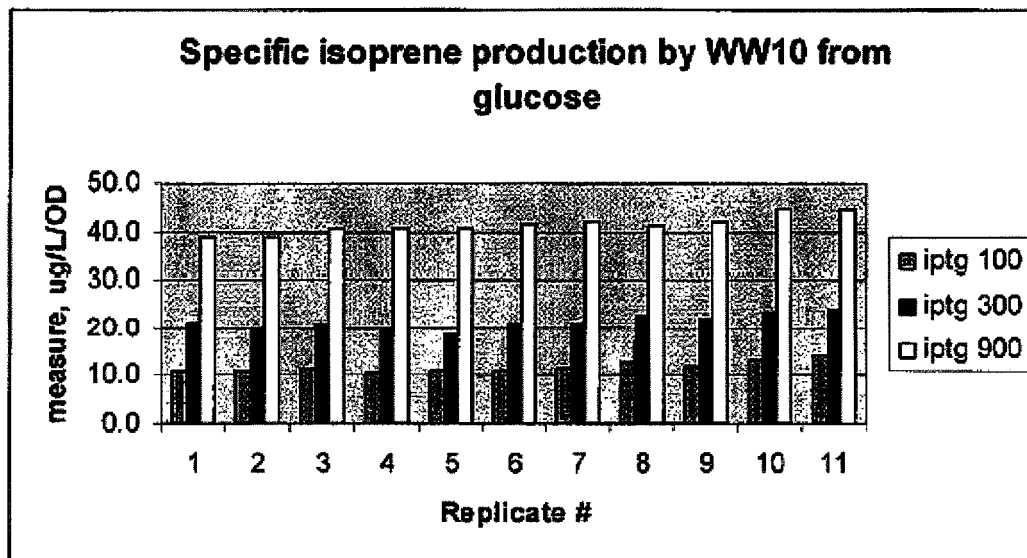


Figure 128B

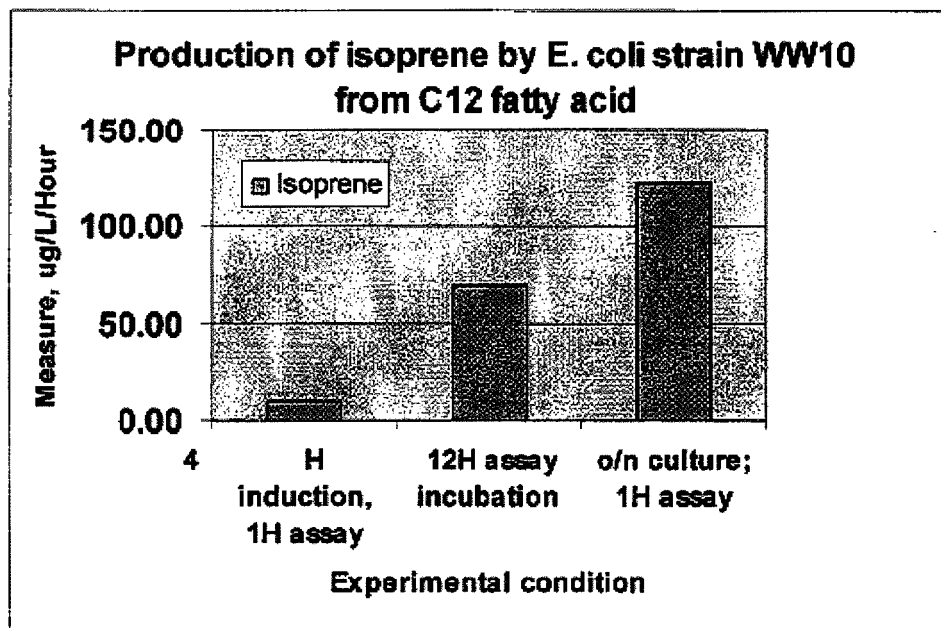


Figure 130

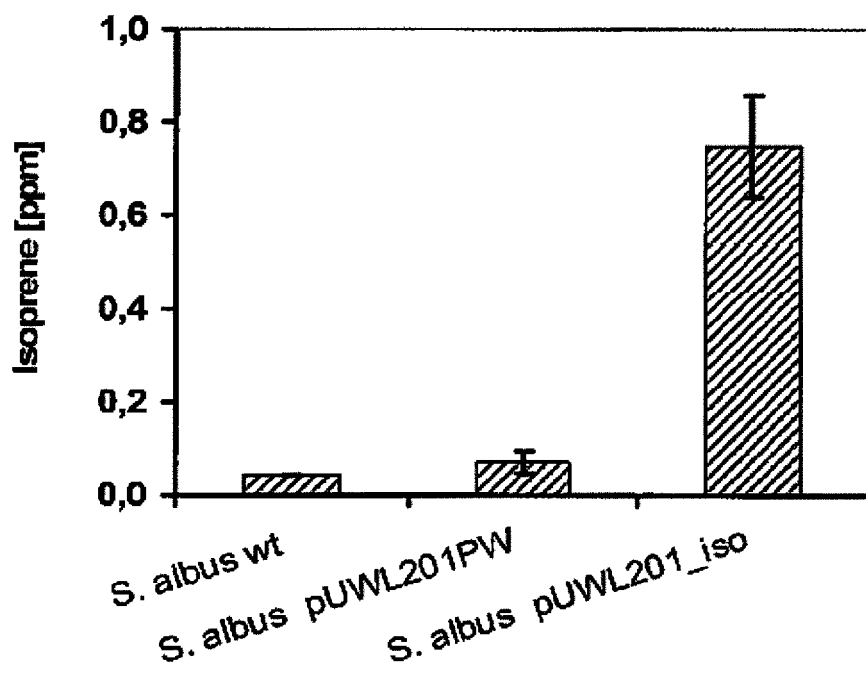


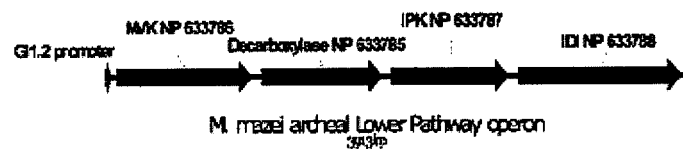
Figure 131A

Figure 131B

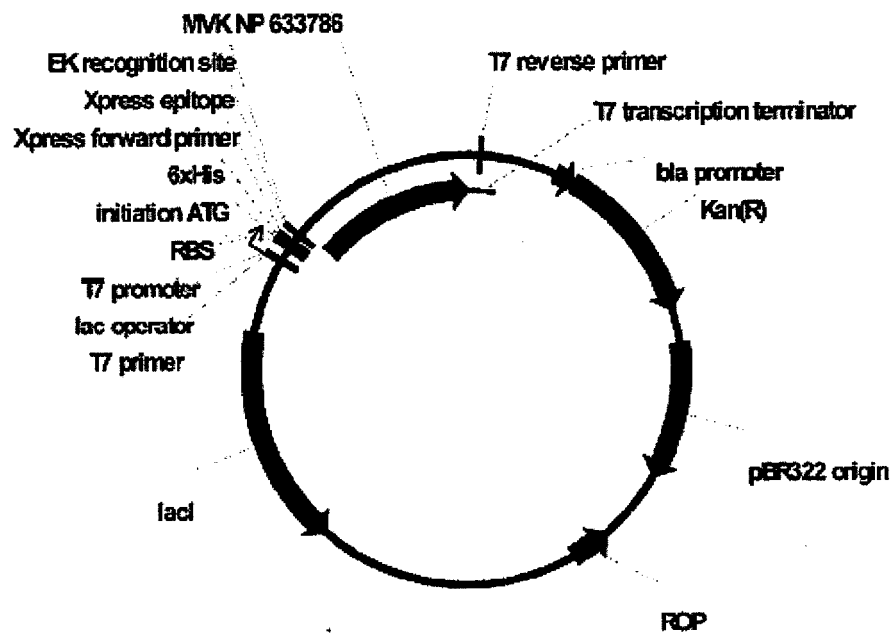
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Figure 131C

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(SEQ ID NO:127)

Figure 132A



MCM376 - MMK from *M. mazei* archeal Lowerin pET200D
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Figure 132B

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Figure 132C

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Figure 133A

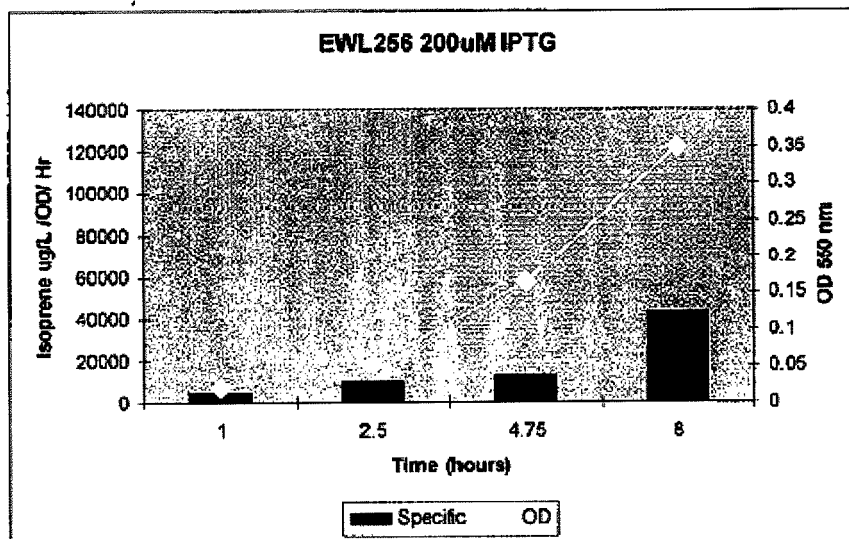


Figure 133B

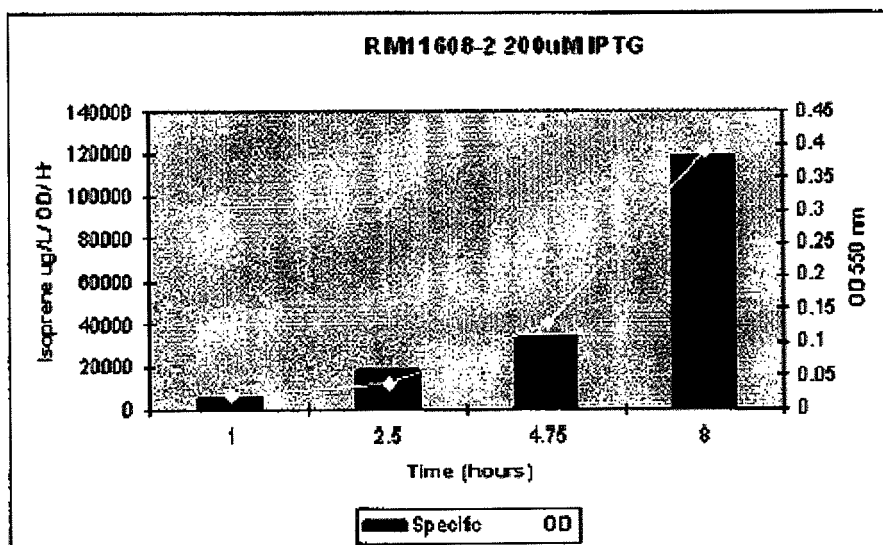


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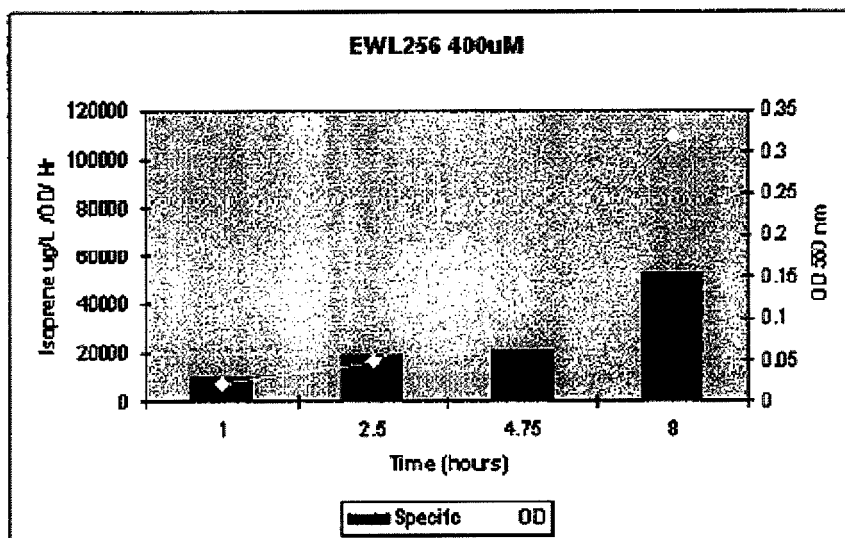


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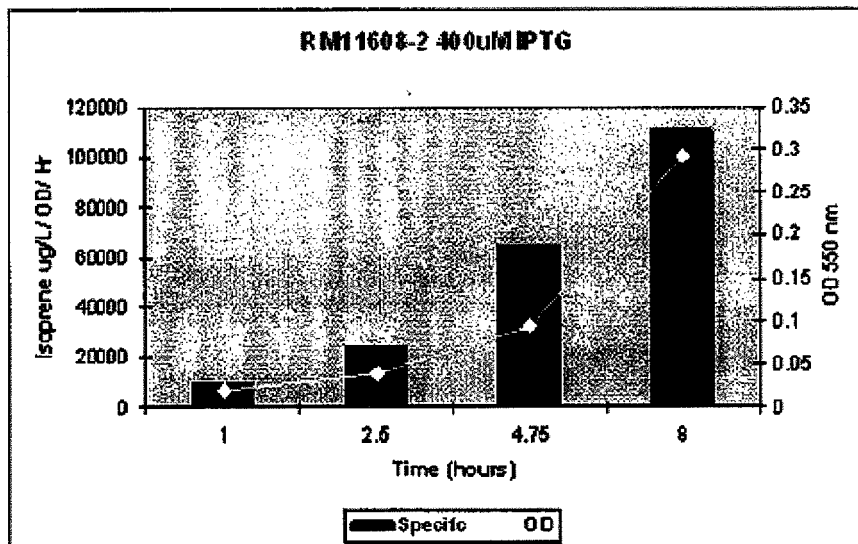
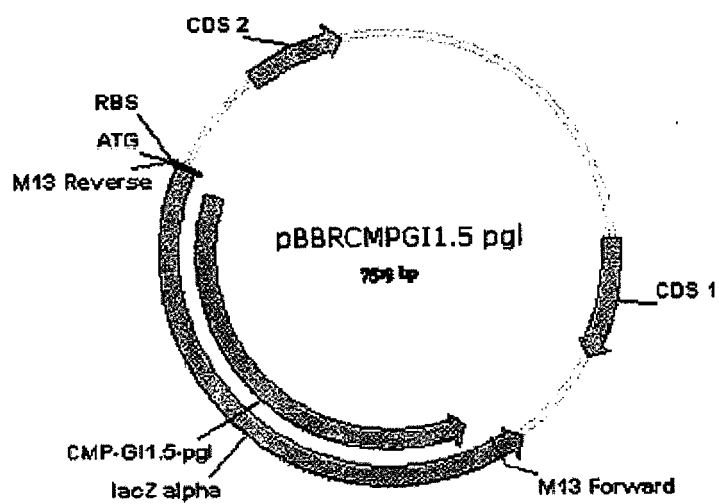


Figure 134

CDS 2: Gentamycin resistance gene; CDS1: E. coli replication protein.

Figure 135A

1-

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Figure 135B

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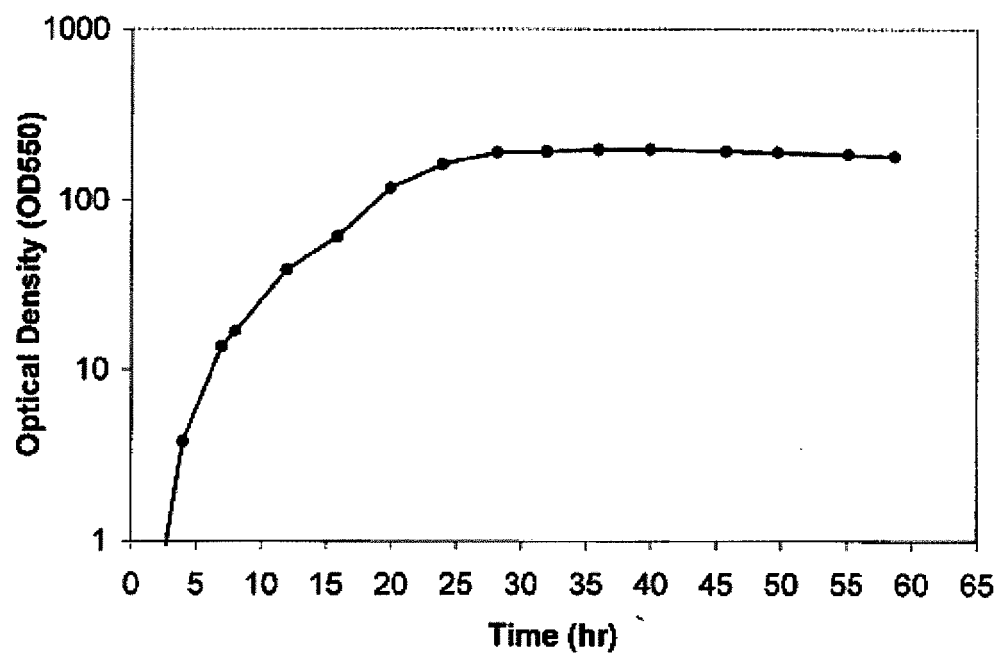
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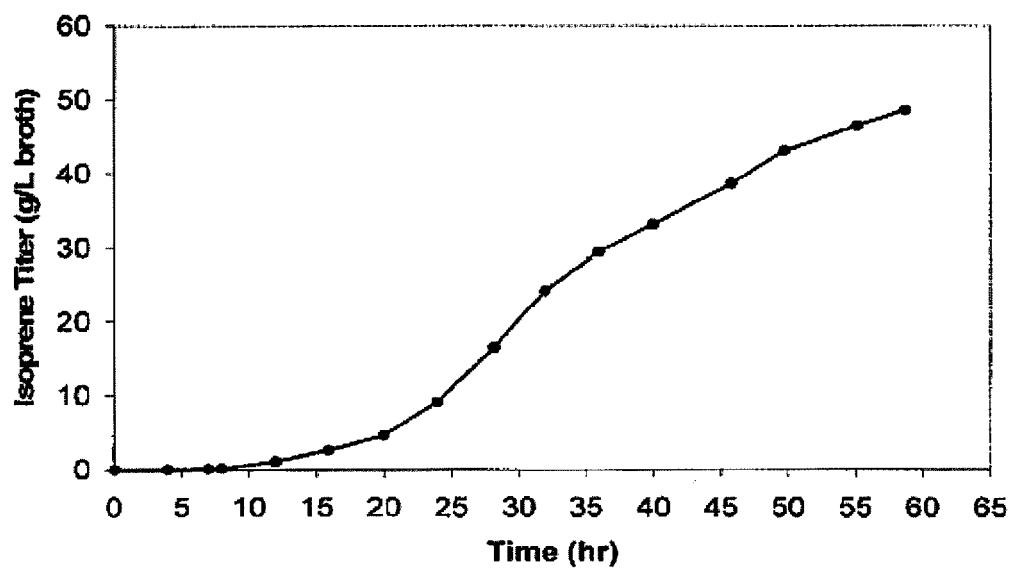
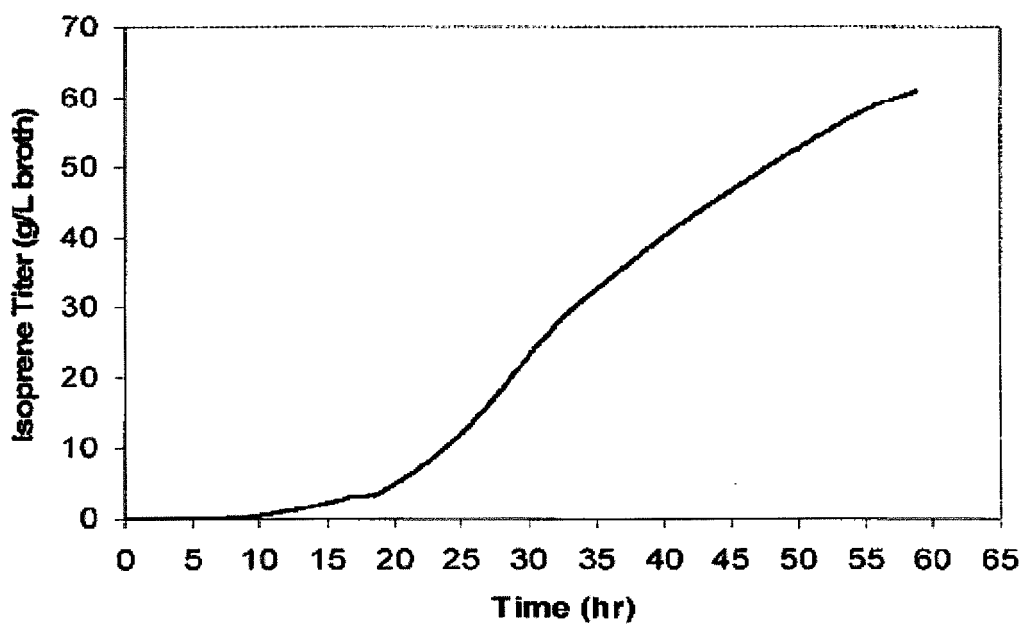
Figure 136B**Figure 136C**

Figure 136D

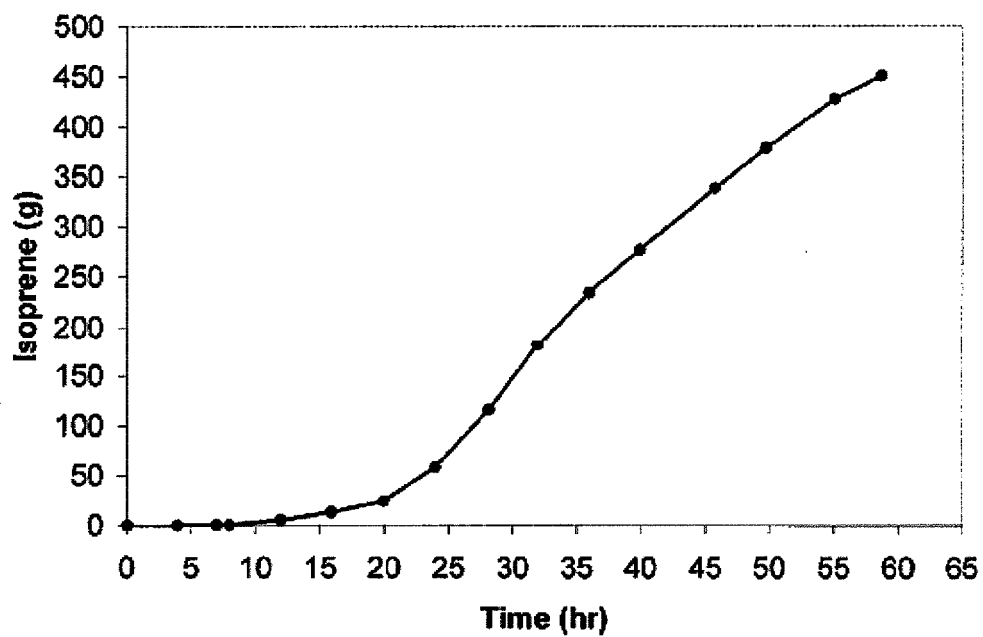


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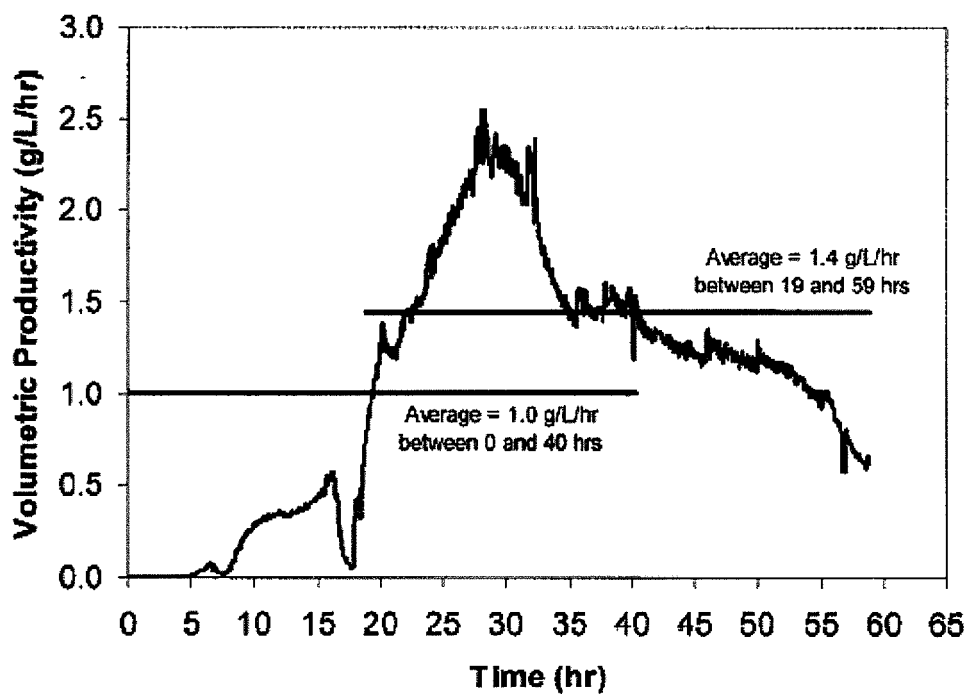


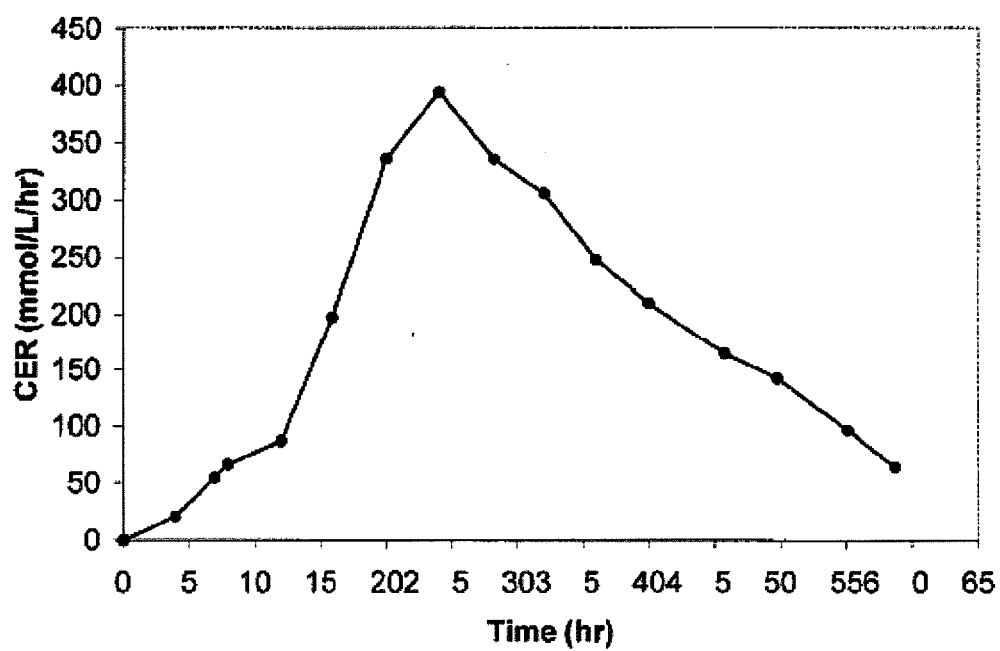
Figure 136F

Figure 137A

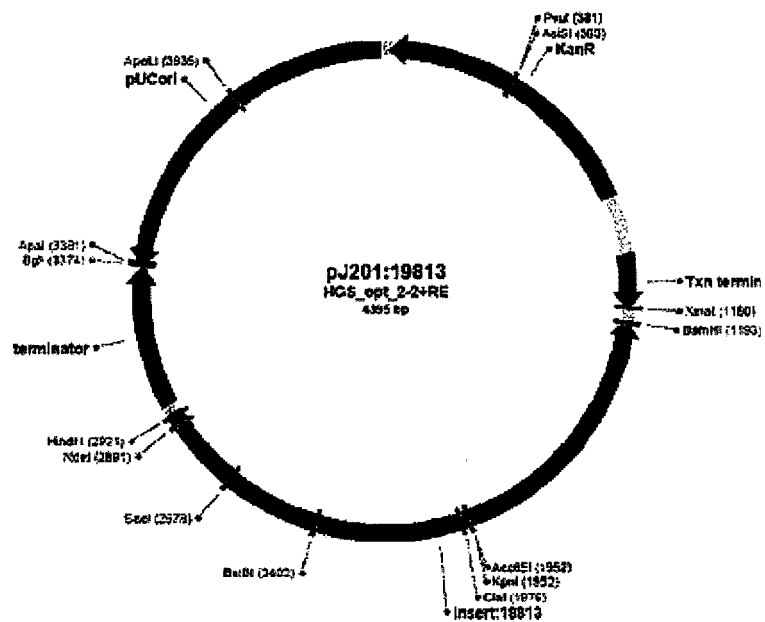


Figure 137B

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Figure 137C

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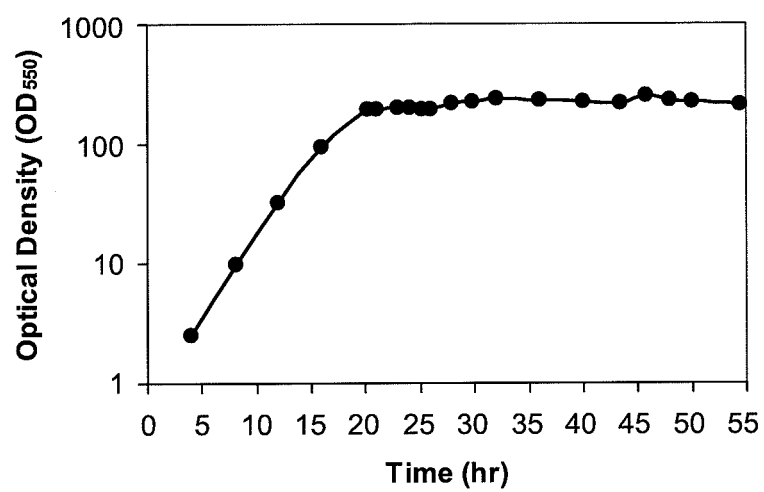
Figure 138

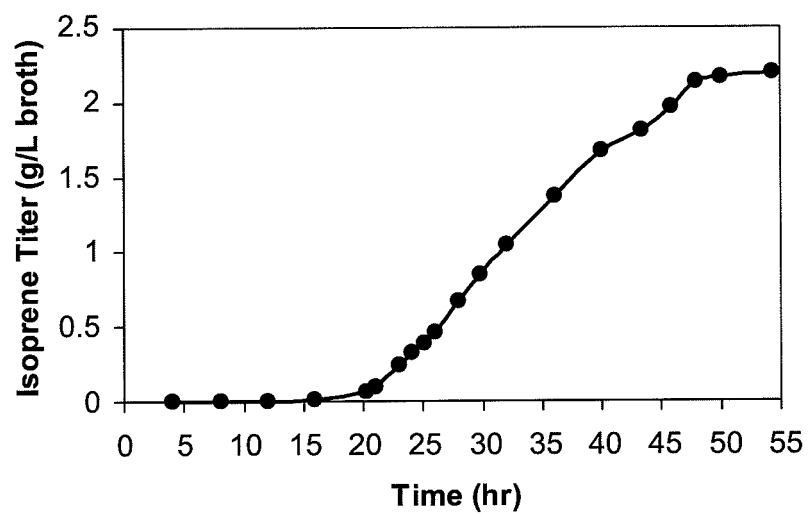
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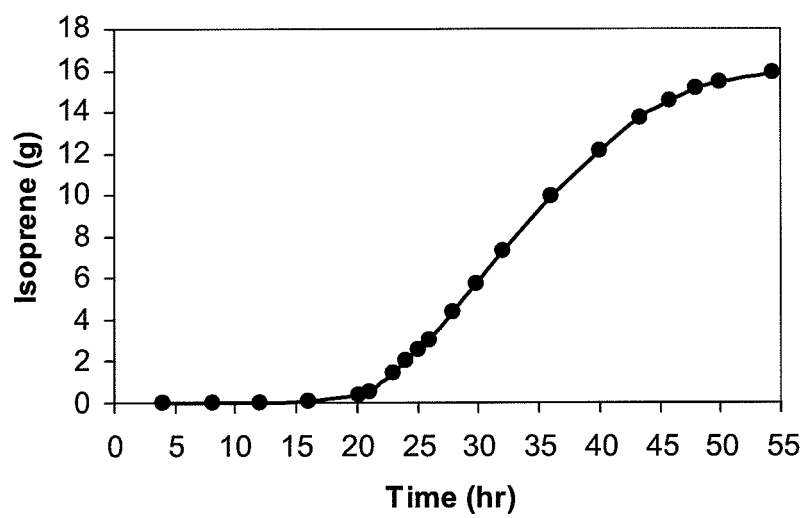
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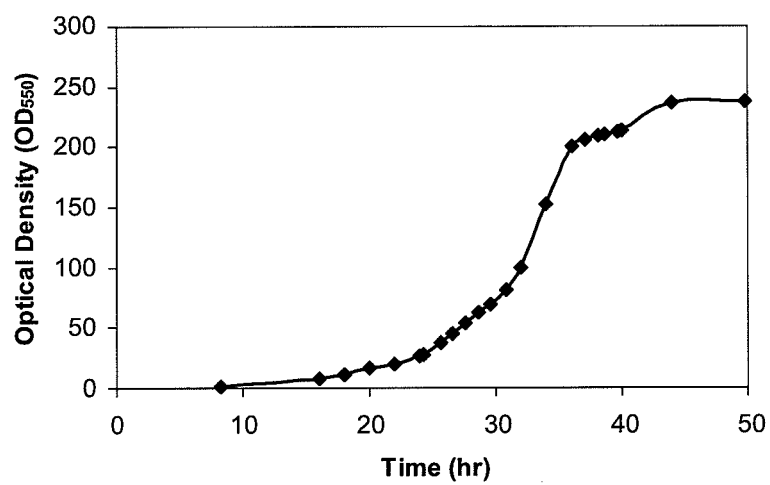
Figure 141

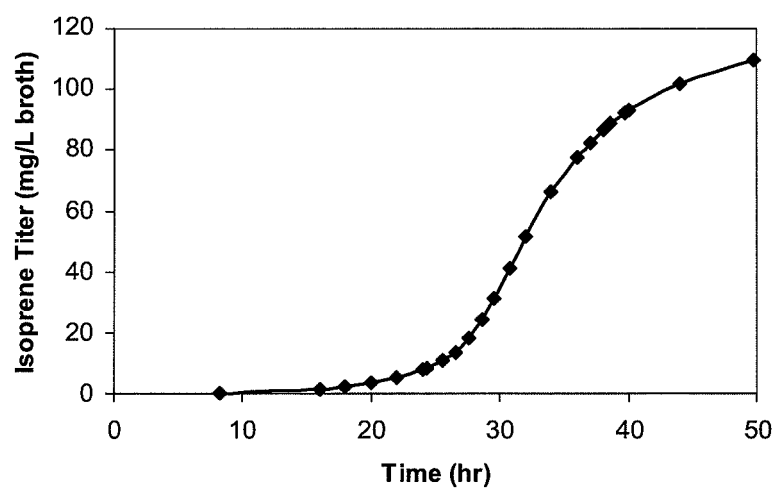
Figure 142

Figure 143