

**Figure 1**

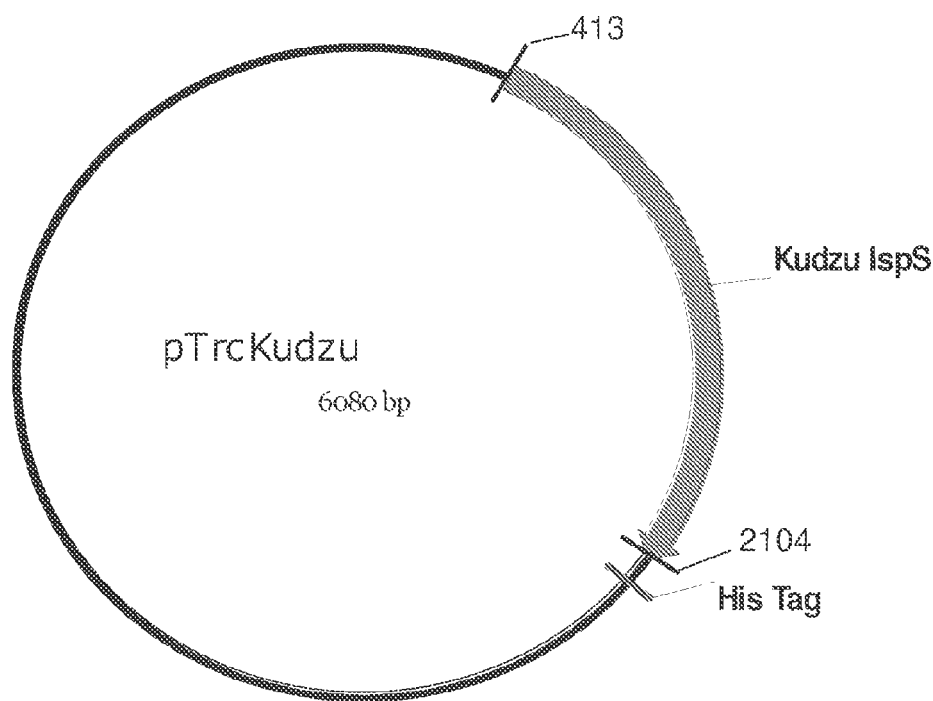
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(SEQ ID NO:1)

Figure 2



**Figure 3A**

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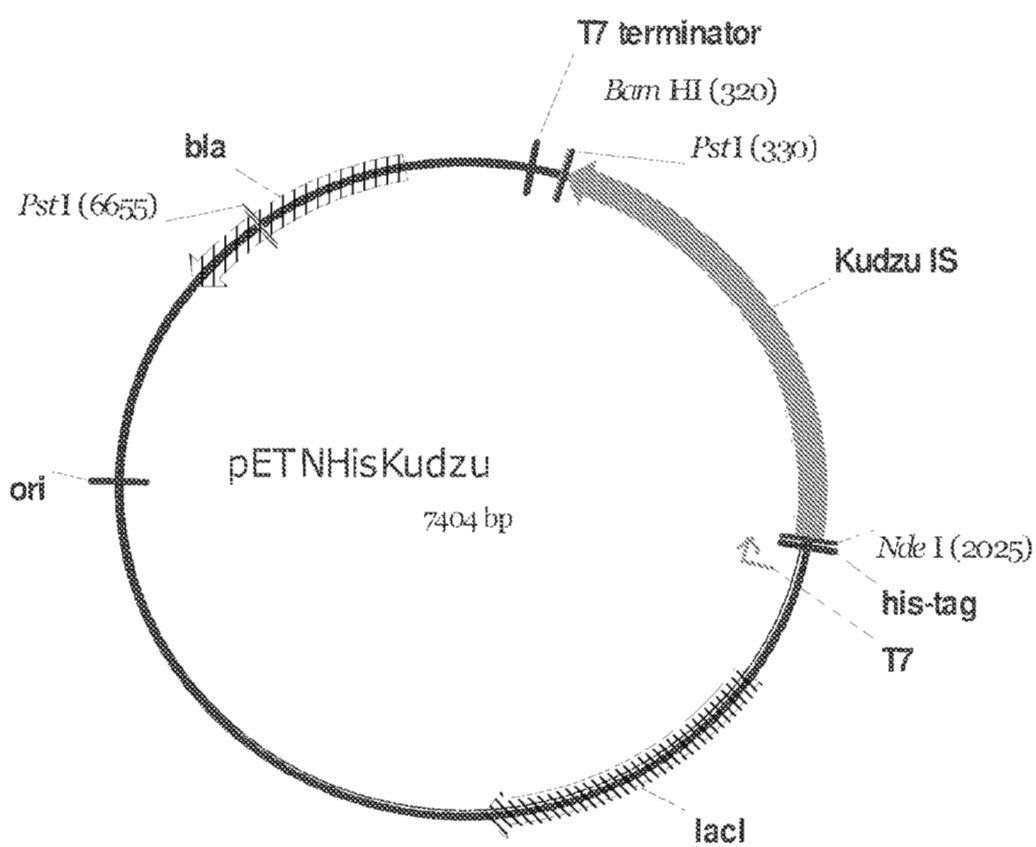
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**Figure 3C**

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Figure 4



**Figure 5A**

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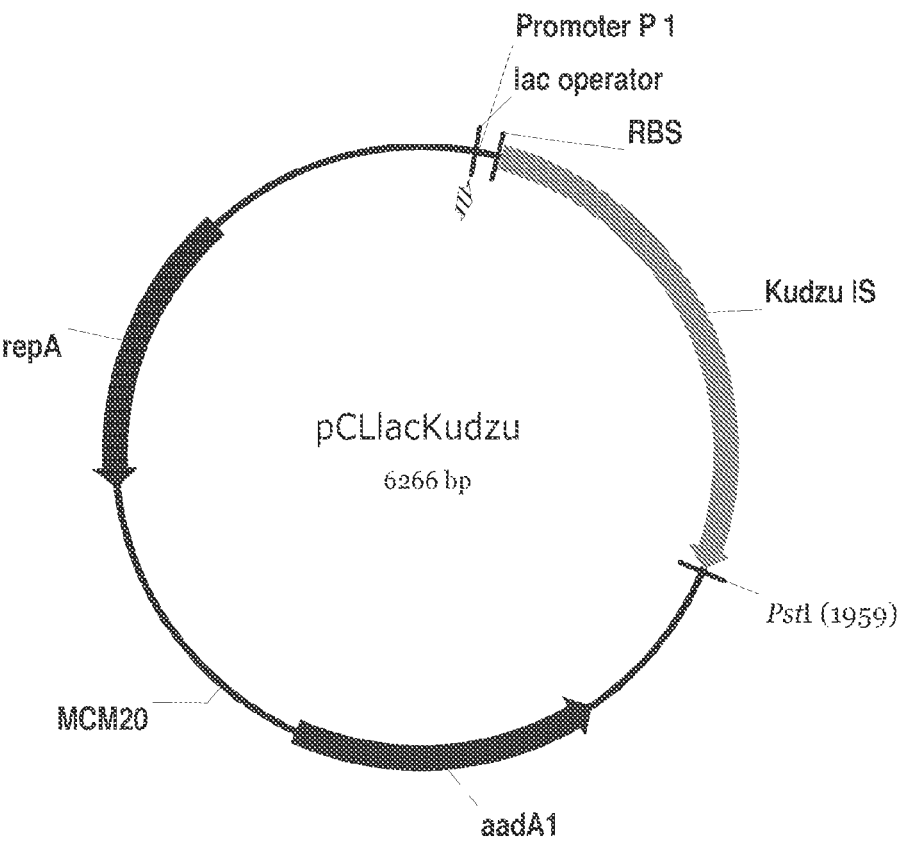
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**Figure 5C**

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(SEQ ID NO:5)

Figure 6



**Figure 7A**

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**Figure 7B**

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**Figure 7C**

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Figure 8A

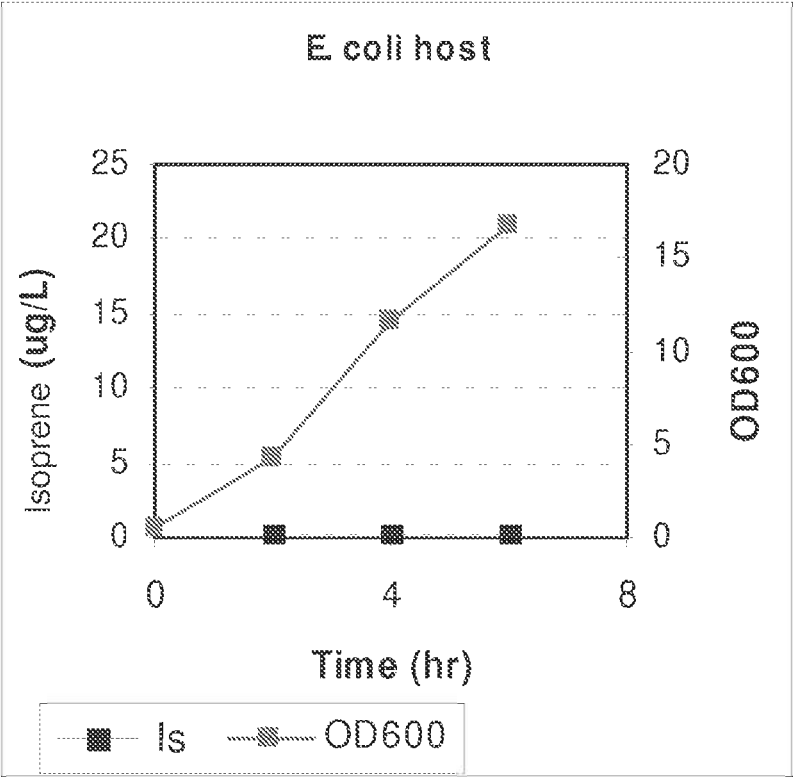
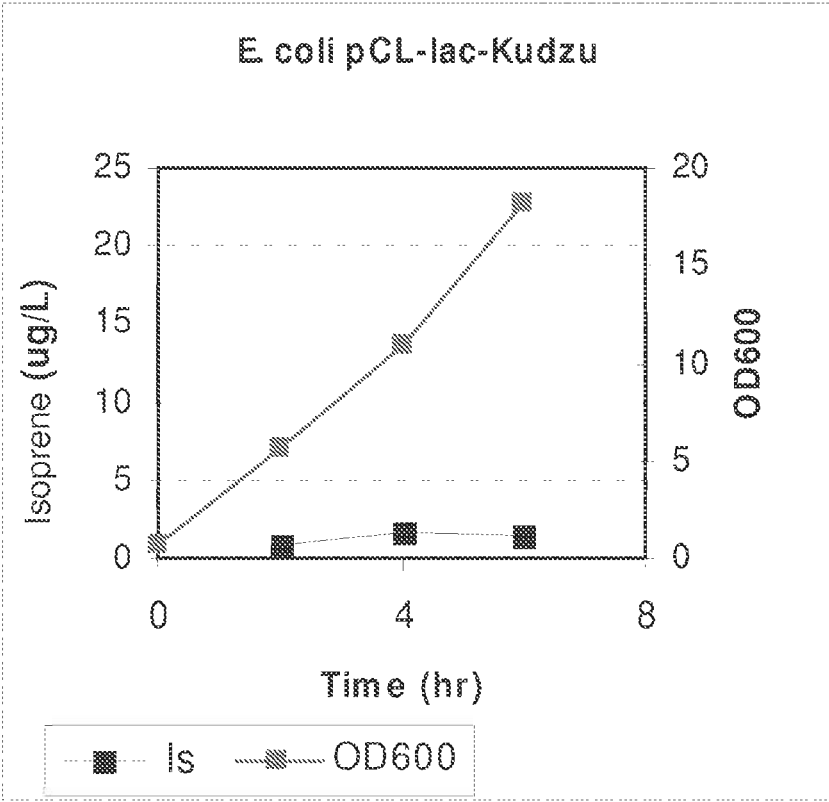


Figure 8B



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Figure 8C

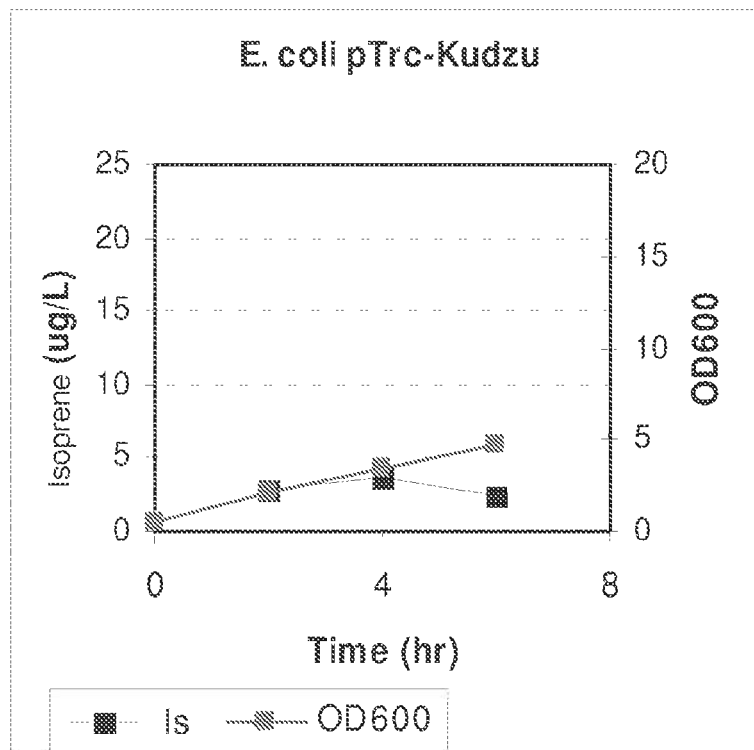
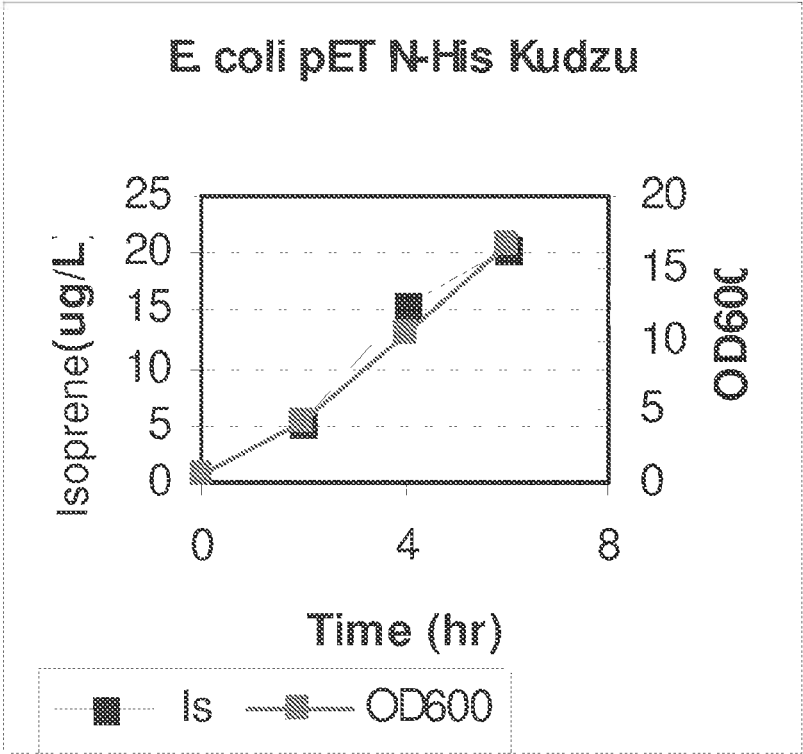


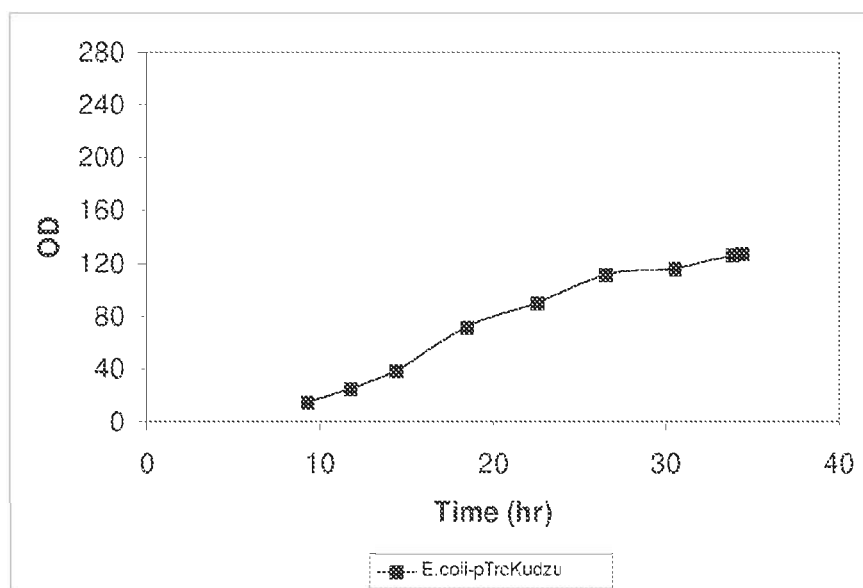
Figure 8D



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Figure 9

A.



B.

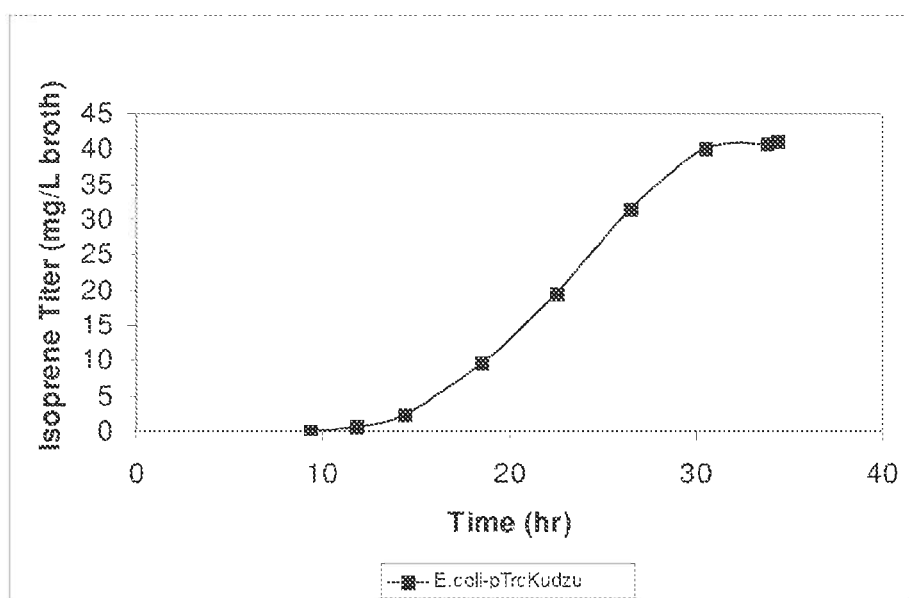


Figure 10A

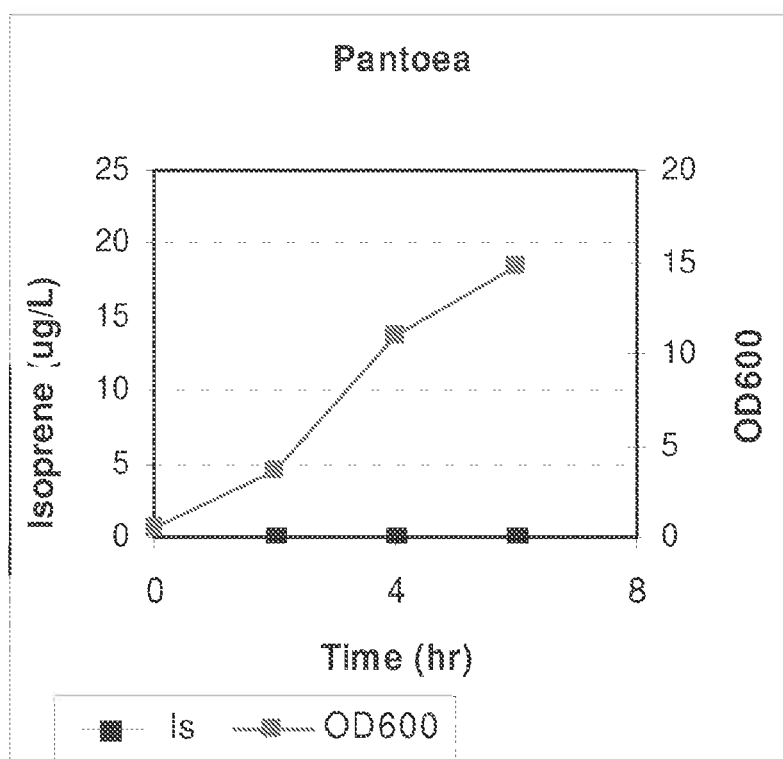


Figure 10B

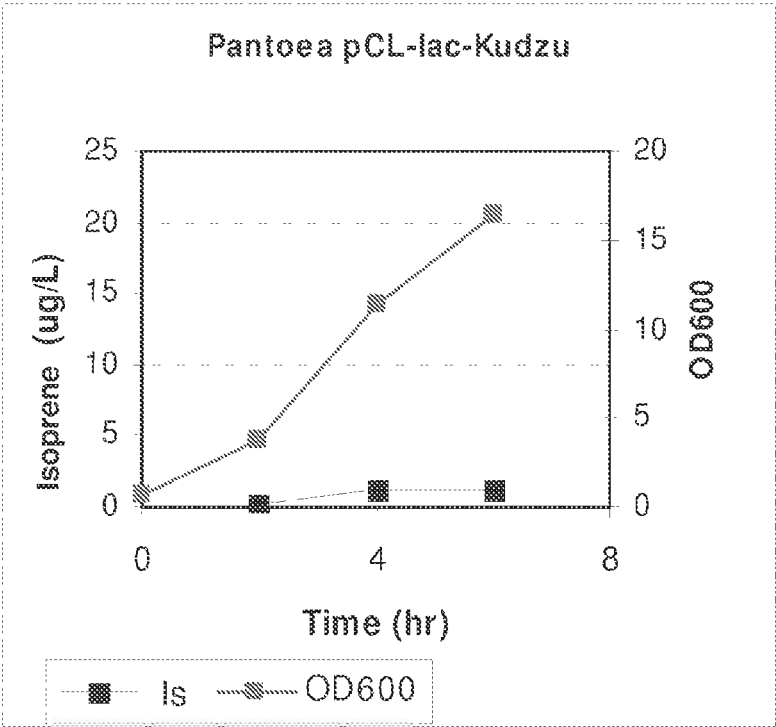


Figure 10C

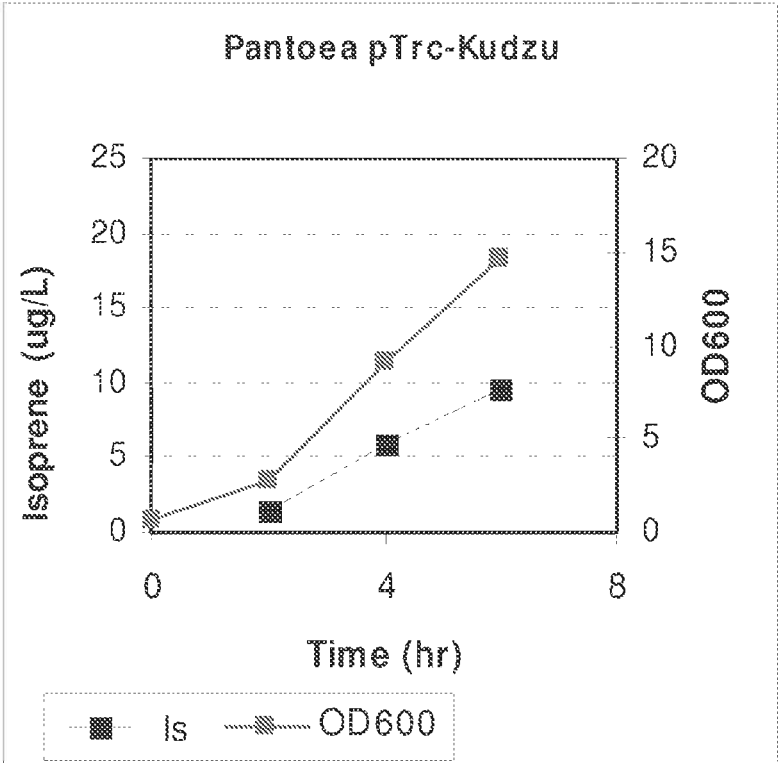
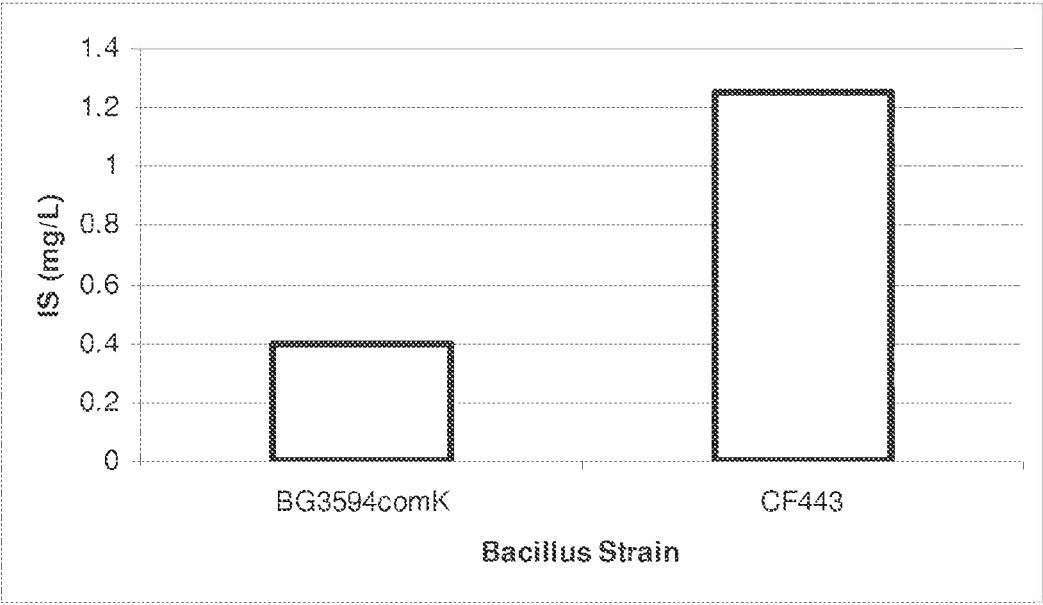


Figure 11



**Figure 12A**

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**Figure 12B**

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**Figure 12C**

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**Figure 13**

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CCATTATTTCTTACATGCACGAAAACGATGGAACATCTGAAGAACAGGCTAGAGAGGAACTGCG  
AAAGTTGATCGACGCCGAGTGGAGAAGATGAACAGAGAGCGGGTGTCCGACTCTACCTTGCTT  
CCCAAGGCCCTTCATGGAGATCGCCGTGAACATGGCTCGAGTTTCCCATTTGTACTTACCAGTACG  
GTGACGGCCTGGGTCTGTCGGACTACGCTACAGAGAACCGAATCAAGCTGCTGCTCATCGACCC  
CTTCCCTATCAACCAATTGATGIACGTGTAA

(SEQ ID NO:8)

Figure 14

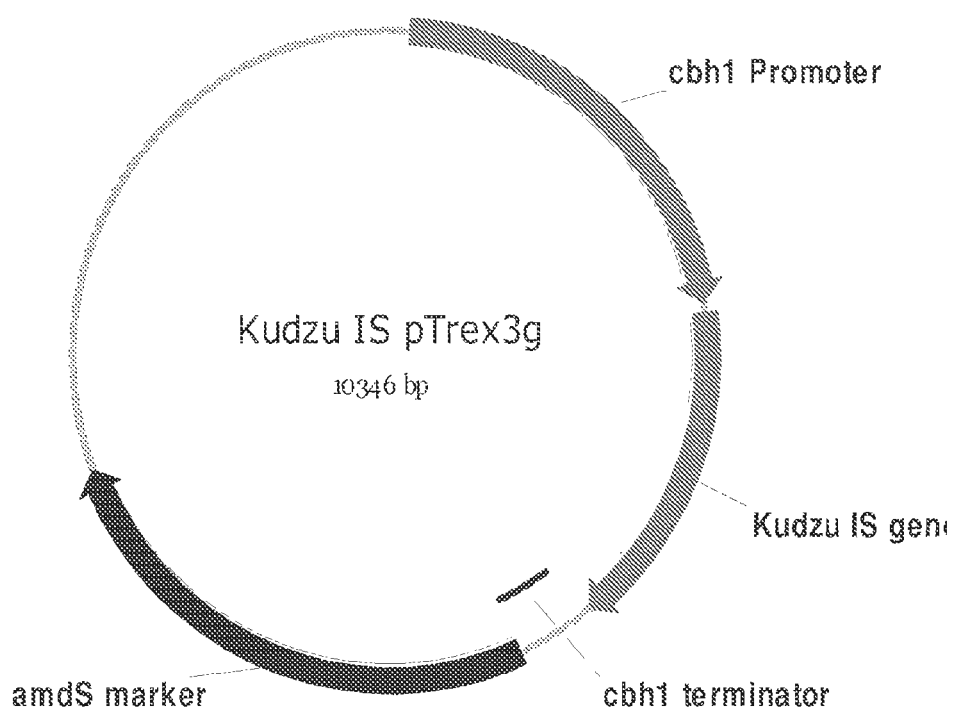


Figure 15A

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1  TCGACCGGGTG AGAAGAACAG CATCGGGACA AGGGAAGGAA GAACAAAGAC AAAGAAAACA
61  AAAGAAAGCA ATTCGAAAACA AAACAAAACA ATTTTCATTC CTTCCTTTAT CATTCCTTTT
121  CTTTTCTTTT CTCCTATTCA ACGCACTCCA TCGTATCCCT ATTCCCTCTA TTTTTCTCT
181  TTCTCTATAT CCATTTCCTT CTCCTTAGGT GTGTCCTCTC TCTCTCTTCA ATTCTCTTAC
241  TCCGCATTCC AACGCATCCY TCCCCCAACC TCCCAHTTCC TCCCTACGGC CCGATAGCGA
301  TCGTCTTTCC CTCGCTATCA CTCGCTACCG GCGCCCTCCTC TGCACCGTAA CCCTCTACGT
361  ATTTACCAIA TCAIAAAGIT TTTCCGACG CITAICGGTG ACCCCCTGTC GCCCTCCTAT
421  TGGCTTCGGG ATTATCTTCT TGTCCATAAG GTGATCCATG CTTCCTGAAG ATTCGCGAAA
481  TGTGTCCACT TTGGCGGGGA ATCATTCAT CCACCTTCCT CTCTCTCGCT TTCCCTATTC
541  GCGGCTCCCC TTCCGCTCT CATTTGGCTT CCGCTCCGTT TTTGCTTTCG CGATGTTACT
601  TGGGGAGAGG TCGGATAATC CTTCGGAAR AACTCGGTTT GACGCTCCG ATGGTATAAA
661  TAGTGGGIGG TGGACAGGIG CCTTCGGTIT TCTTTAAGCA AGAGAATCCC ATGTCTTTGA
721  CTAICACGAA TTCACATACA TTATGAACAT CACCGCTGTC ATTGCCCTTT TATTCTCACT
781  TCGTCTTCCG TCACCTATTC CAGTTGCGGA TCCITGGTGT GTTTCAGTTA GCAAGTCAIA
841  TCGTGAATTC CTTCGTGTTT ACCAAAGTTG GAACACTTTT GCTAATCCTG ATAGACCCAA
901  CCTTAAGAAG AGAAATGATA CACCTGCAAG TGGATAICAA GTTGAAAAAG TCGTAATTTT
961  GTCACCTCAC GGTGTTAGGG CCCCACAAA AATGACTCAA ACCATGCGTG ATGTCACTCC
1021  TAATACATGG CCAGAATGGC CCGTTAAAT AGGATATAT ACACCAAGAG GTGAACACTT
1081  GATATCACTT ATGGCGGGT TTTACCGTCA AAAATTCAG CAACAAGGAA TCCTTCTCA
1141  GGGCTCCTGT CCTACTCTA ACTCCATATA TGTCTGGGT GACSTCGATC AGCGTACTTT
1201  AAAAACCTGGT GAAGCAITCC TTGCTGGTTT GGCACCACAA TGTGGCTTGA CAATTCATCA
1261  CCAACAAAAT CTTCGAAAG CTGATCCTCT TTTTCAITCC GTTAAAGCTG GAACCTGCTC
1321  TATGGATAAA ACYCAAGTTC AACCAAGCTG TGAGAACGAG GCACAAACTC CTATAGATAA
1381  TTTGAATCAA CATTACATCC CCTTTTAGG TTTAAAGAT ACAACATTA ATTTTAGTAC
1441  TTTGCGCTGG TGCACAAAAC ACTCTGCTGA TAAATCCTGT GACSTAGSIT TATCATGCG
1501  TTTTAAATTG TCCATAAAAG ATAATGGTAA CAASGTCGCA TFGGATGSAG CTATTTGGTCT
1561  ATCTCTACTT TTGGCGGAGA TTTTCTTCT TGAATAIGCT CAAGGCAIGC CTCRAGCTGC
1621  TTGGGGTAAC ATCCACTCAG AGCAAGAGTG GGCITCCTTG CTAAAGTIGT ATAATGTTCA
1681  ATTGGATTTC ATGGCCCGAA CACCTTATAT TGCTCGACAT AACGGTACTC CTTTATTCGA
1741  AGCTATATCA AATGCCCTTA ATCCCAACGC CACTGAATCA AAACCTCCAG ATATTTCACC
1801  TGATAACAAA ATATCTTCA TTGCAGGTCA TGACACAAAT ATTGCTAATA TAGCGGGCAT
1861  GTTAAATAIG CGTJGGACAT TACCAGGTCA ACCAGATAAT ACTCCTCCAG GTGGTGGCCT
1921  AGTATTTGAA CGTCTTGCTG ATAAAAGTGG AAAACAATAT GTTCTGTAT CTATGTTTAA
1981  TCAACACTTA GAACAACCTC GATCAGAGAC TCCCTTTCT CTAAATCAGT CTGCGGATC
2041  TGTTCACCTT AAAATTCAG GTTGCAATGA TCAAAACAGCC GAGGGTACT GTCCCTTTTC
2101  CACTTTTACA AGAGTGTIT CCCAATCTGT TGAACCTGGA TGCCAACTTC AATAATGAGG
2161  ATCCAAGTAA GGGAAATGAGA ATGTGATCCA CTTTAAATTC CTAATGAATA CATGCCATA
2221  GTTCTTTTCT TTTGTTCTTT ATGTGTTTT TCGATGGTAC GCGCGTTGTC AATCTCAGT
2281  TTGTGTCTTG TTGCGAGCTT GGTTCGAAAT CTGTCTATCT CATGAATCTT TACCATTTT
2341  ACCACACGTT TATACCATTC TCCTATAGAA TCTTCAICAA ACCATCTCGG GGTAGAGTG
2401  GAAAGAAAGT CTGTGTTCTT TATTTCTTT TTTCCATCT CAAGGCTTTT CTTTCTTCC
2461  TCCCTCTCGT TCATCTTGAG GTTTGACGGT TCTGTETAGA ATTTGAGCT GTTCGAGCAT
2521  CTTATTTTTT GTTTTGGCAA AACGAAGCGC TTTACTCTCT TCATCAGTTC GACGATGTGA
2581  CCTTTGAAAA CCAACTACTT TTGCAITTTT TGTATAGAAA TCAATGATAT TAGAATCCCA
2641  TCCTTTAAAT TCTTTCAAAG TAGITGAGCT ATAGTTAAGT GTAAAGGGCC TACTGCGAAA
2701  GCATTTCGCA AGGATGTTTT CATTAATCAA GAACGAAAGT TAGGGGATCG AGACGATCA
2761  GATACCGTCC TAGTCTTAAC CATAAACIAT GCGGACTAGG GATCGGGCAA TGTTCATTT
2821  ATCGACTTTC TCGGCACTT ACGAGAAATC AAGTCTTTG GGTTCCGGGG GGAGTATGGT
2881  CGCAAGGCTG AAACETAAAG GAATTGACGG AAGGGCACCA CAATGGAGTG GAGCCTGCGG
2941  CTTAAATTTG CTCACACCGG GGAACCTCAC CAGGTCCACA CATAGTAAGG ATTGACAGAT
3001  TGAGAGCTCT TTCTTGATTC TATGGGIGGT GGTGCAITGC CGTCTTACT TGGTGGAGTG
3061  ATTTGCTTGC TTAATTCGGA TAACGAACGA GACCTTAACC TGTAAATAG CTGATCAGC
3121  CATTTTGGCT GATCATTAGG TCTTTAGAGG GACTAHTGGC ATAAAGCCAA TGGAGTTTG
3181  AGGCAATAAC AGGTCTGTGA TGCCCTTAGA TGTTCIGGGC CGCACGCGCG CTACACIGAC
3241  GAGGCCAAGC AGTTGAAAAA AATCTTTTGA TTTTATATCC TTGSCCGSAA GGCTCTGGTA
3301  ATCTTGTTAA ACTCCGTCGT CCTGGGGATA GAGCATTGCA ATTAATGGG CCGCTCCTCA
3361  ATTGCAITGT GCAGATTTTA CAGTTTITTA AAAIGTATTT CATTATTACT TTTATATGC
3421  CTAATAAAAA AGCCATAGTT TAATCTATAC ATAACTTTT TCCAGTGC AATAACGAGC

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Figure 15B

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3601 TTTACACGAA TTTTAAACAA ACATCGTICA CCTCGTTTAA GGATATCTTG TGTATGGGGT
3661 GTTGACTTGC TTATACGAAY AATPACCGTA CCGTAATTG GCTTGCCTGA TATAGCGGTA
3721 GTCTAATAAT TAGCAAAAAT CTTTGGGGTG AAAAGGCTTG CAATTTCAGG ACACCGAAGT
3781 ATTTGTCAIT TTTTAAATAG GAAGTTTTC ATAAATTCCT GATATTCTCG GTTGATCTAA
3841 TTGAAAAGAG TAGTTTTCGA TCACGATGAG GAGGGCTTTT GTAGAAAGAA ATACGAACGA
3901 AACGAAAATC AGCGTTGCCA TCGCTTIGGA CAAAGCTCCG TTACCTGAAG AGTCGAATIT
3961 TATTGATGAA CTTATAACTT CCAAGCAATG AAACCAAAAG GGAGACAAAG TAATCCAAAT
4021 AGACACGGGA ATFGGATTCY TGGATCACA GATCAAGCA CTGGCTAAAC ATGCAGGCTG
4081 GAGCTTACGA CTTTACTCAA GAGGIGATT AATCAICGAT GATCAICACA CTGCAGAAGA
4141 TACGTCTATT GCACITGGTA TTGCAITCAA GCAGGCTATG GGTAACTTIG CCGGGCTTAA
4201 AAGATTITGA CATGCTTATT GTCCACTTGA CGAAGCTCTT TCTAGAAGCG TAGTTGACTT
4261 GTCGGGACGG CCTATGCTG TTATCGATT GGGATTAAAG CCGTAAAGCG TTGGGGAAT
4321 GTCTGTGTA AATGATCCCT ACIIACIATA TTCTTTTTC GTAGCAGCTG GAATTAATIT
4381 GCACTTACC TCTTATATG GTAGTAATGA CCATCAICGT GCTGAAAGCG CTTTAAATC
4441 TCTGGCTGTT GCCATGCGCG GGGCTACTAG TCTTACTGGA AGTCTGAAG TCCCAGGCAC
4501 GAAGGGAGTG TTGTAAGAGT GAATIGGAT AITGCAGGAA AAGAACGACA ATTTTGCATC
4561 CAAATGTCT AAATTTTGA GTTGTCTGAA AACAATAGAA CCTTACTTGC TTTAATATTA
4621 CGTTAATTAG AAGGCTTATC TCGTGAAGGA ATATAGTACG TAGCCGTATA AATTGAATITG
4681 AATGTTACG TTATAGAATA GAGACACTTT GTGTTCATAT GGTCTGTCAC TTACCATACT
4741 CACTTTATTA TACGACTTAA AGTATAACCT CCGCGGTTAT GGTAAATTA ATGATGCACA
4801 AACGTCCGAT TCCATATGGG TACACTACAA TTAATATCTT TTAAGCTGAT CCCCACACAC
4861 CCAATAGCTTC AAAATGTTC TACTCTTTT TACTCTTTC AGATTTTCTC GGACTCCGCG
4921 CATCGCCGTA CCACCTTCAA ACACCCAAAG ACAGCATACT AAATTTTCCC TCTTTCTTCC
4981 TCTAGGGTGT CGTTAATTAC CCGTACTAAA GGTITGGAAA AGAAAAAGA GACCGCTCTG
5041 TTTCTTTTTC TTCTGCGAAA AAGGCAATAA AAATTTTAT CACGTTTCTT TTTC TTGAAA
5101 TTTTTTTTT TAGTTTTTT CTCTTTTCA GTCTTCCAT GATATTTAAG TTAATAAACG
5161 GTCTTCAAT TCTCAAGTIT CAGTTTCAIT TTTCTTGTG TATTACAACI TTTTACTT
5221 CTGTTCATT AGAAAGAAAG CATAGCAATC TAATCTAAGG GCGGTGTGTA CAATTAATCA
5281 TCGGCATAGT ATATCGGCAT AGTATAATAC GACAAGGTGA GGAACATAAC CATGGCCAAG
5341 TTGACCACTG CCGTTCCGGT GCTCACCGCG CCGGACGCTG CCGGAGCGGT CGAGTCTGG
5401 ACCGACCGCG TCGGGTCTC CCGGACCTC GTGGAGGAGG ACTTCGCGCG TGTGTCGCG
5461 GACGACGTA CCGTGTTCAT CAGCGCGCTC CAGGACCGAG TGGTGCCTGA CAACACCTG
5521 GCGTGGGTGT GGGTGCCTG CCGTGCCTG CCGTACCGCG AGTGGTGGG GGTCTGTCTC
5581 ACGAATCTCC GGGACGCTC CCGGCGCGCG ATGACCGAGA TCGGCGAGCA GCGGTGGGGG
5641 CCGGAGTTCG CCGTGCCTG CCGGCGCGCG AACTGCGTGC ACTTCCTGCG CGAGGAGCAG
5701 GACTGACAGG TCGGACGCG CCGGACGCGT CCGGAGGCTC GGAGATCCGT CCGCTTTTTC
5761 CTTTGTGAT ATCATCTAAT TAGTTATGTC ACCCTTACAT TCACGCTCTC CCGCCACATC
5821 CGCTCTAACC GAAAAGGAAG GAGTTAGACA ACCTGAAGTC TAGTCTCTA TTTATTTTTT
5881 TATAGTTATG TTAGTATTA GAACGTTAT TATATTTCAA ATTTTCTTT TTTTCTGTA
5941 CAGACGCGAG CTTCCAGTA AATGTGCTAT CTGTAAGCA GAAAACGCT CCGGCTTAGG
6001 GTCTCTCTCT TGGCTCTCT TCTAGGTGCG GCTGATTCCT CTTGAAGCTC TCTAGGGGGG
6061 CTCACACCAT AGGCAGATA CGTTCCTCAC CCGCTCGCTT CTTAAGCGCA CAAGGACTGC
6121 TCCCAAAGAT CCFAGCGCGG ATTTTGGCGA TTTGGGCTTA AAGGAACCGG AACACGTAGA
6181 AAGCCAGTCC GCAGAAACCG TCGTACCTCC GGATGAATGT CAGCTACTGG GCTATCTGTA
6241 CAAGGGAGAA CGCAAGCGCA AAGAGAAAGC AGGTAGCTTG CAGTGGGCTT ACATGGCGAT
6301 AGCTAGACTG GCGGTTTTTA TGGACAGCAA GCGAACCAGA ATTGCCAGCT GGGGCGCCCT
6361 CTGTAAGGT TGGGAAGCCC TGCAAAGTAA ACTGGATGGC TTTCTTGGCG CCAAGGACTC
6421 GATGGCGCAG GGGATCAAGA TCTGATCAAG AGACAGGATG AGGATCGTCT CCGATGATTG
6481 AACAGATGG ATTCACCGCA GGTCTCTCGG CCGCTTGGGT GGAGAGGCTA TTGGGCTATG
6541 ACTGGGACCA ACAGACAATC GGTGCTCTG ATGGCGCGCT GTTCGGCTG TCAGCGCAGG
6601 GCGCGCGGCT TCTTTTGTG AAGACCGACC TGTCCGCTGC CCGAATGAA CTGCAGGACG
6661 AGGACGCGCG CCTATCTCTG CTGGCCACCA CCGGCTTCTT TTGGCGAGCT GTCTGCGACG
6721 TTGTCACTGA AGCGGGAAGG GACTGGCTGC TATTTGGGCA AGTGGCGGGG CAGGATCTCC
6781 TGCTATCTGT CCTGCTCTT CCGGAGAAAG TATCCATCAT GGTGATGCA ATGCGCGCGC
6841 TGCATACGCT TGAATCGGCT ACCTCCCAI TCGACCAACA AGCGAAACAT CGCATGAGG
6901 GAGCACGTAC TCGGATGGAA CCGGCTCTTG TCGATCAGGA TGATCTGCAC GAAGAGCATC
6961 AGGGGCTCGC GCCAGCGGAA CTGTTCTCCA GGTCAAGGC GCGCATGCCG GACGCGGAGG

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Figure 15C

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7021 ATCTCGTCGT GATCCATGGC GATGCCGTGT TGC CGAATAT CATGGTGGAA AATGGCCGCT
7081 TTCTGGATT CAACGACTGT GGCCGGCTGG GTGIGGCGGA CCGCTATCAG GACATAGCGT
7141 TGGATACCCG TGATAITGCT GAAGAGCTTG GCGCGGAATG GGCIGACCGC TTCTCGTGC
7201 TTTACGGTAT CGCCGCTCCC GATTCGCGAGC GCATCGCCTT CTATCGCCTT CTTGACGAGT
7261 TCTTCTGAAT TGAAAAGGT ACCAAGTTTA CTCATAJATA CTTTAGATIG ATTTAAACT
7321 TCAITTTTAA ITTAAAAGGA TCTAGGTGAA GATCCITTTT GATAATCTCA TGACCAAAAT
7381 CCCITAACTG GAGITTTCTG TCCACTGAGC GTCAGACCCC GTAGAAAAGA TCAAAGGATC
7441 TTCTTGAGAT CCTTTTITTC TGCGCGIAAT CTGCTGCTTG CAAACAAAAA AACCACCGCT
7501 ACCAGCGGTG GTTTTITTTG CCGATCAAGA GCTACCAACT CTTTITTCGA AGGTAACTGG
7561 CTTGAGCAGA GCGCAGATAC CAAATACTGT CCTTCTAGTG TAGCCGTAGT TAGGCCACCA
7621 CTTCAAGAAC TCTGTAGCAC CGCTACATA CCTCGCTCTG CTAATCCTGT TACCAGTGGC
7681 TGTGCGCAGT GCGGATAAGT CGTGICTTAC CCGGTGGGAC TCAAGACGAT AGTACCGGA
7741 TAAGGCGCAG CGGTCCGGCT GAACGGGGGG TTCGTGCACA CAGCCCAGCT TCGAGCGAAC
7801 GACCTACACC GAAGTGAGAT ACCIACAGCG TGAGCATIGA GAAAGCGCCA CGCTTCCGA
7861 AGGGAGAAAG GCGGACAGGT ATCCGTAAG CCGCAGGGTC GGAACAGGAG AGCGCACGAG
7921 GGAGTTTCCA GGGGGAACG CCTGGTATCT TTATAGTCTT GTCCGGTTTC GCCACCTCTG
7981 ACTTGAGCGT CGATTTTGT GATGCTCGTC AGGGGGGCGG AGCCTATGGA AAAACGCCAG
8041 CAACCGCGCC ITTTIACGGT TCCTGGCCTT TTGCTGGCTT TTGCTCACA TGITCTTTC
8101 TCGGTIATCC CCTGATTCTG TGGATAACCG TATTACCGCC TTIGAGTGAG CTGATACCGC
8161 TCGCCGCGAG CGAACGACCG AGCGCAGCGA G
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(SEQ ID NO:11)

Figure 16

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1  GAATTC AAAA CAAAATGTGT GCAACCTCCT CCCAGITTAC TCAGATTACC GAGCATAATT
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121 AAAATGACCT GAAGGTGGAA AAGCTCGAGG AGAAGGGGAC CAAACTCGAG GAGGAGGTGC
181 GATGTATGAT CAACAGAGTT GACACCCAAC CCTGTCTTTT GCTGGAGCTG ATCGACGATG
241 TGCAGCGGTT GGGTTTGACT TATAAATTCG AGAAGGACAT TATCAAGGCA CTGGAGAACA
301 TTGTGCTCCT CGACGAGAAC AAGAAGAACA AGTGTGATCT TCACGCTACC GCCTCTCTTT
361 TCCGACTTCT TCGACAACAC GGTTCGAGG TGTGCGAGGA CGTCTCGAG AGATTTAAGG
421 ACAAGGAGGG AGGATTTAGC GCGGAGGTGA AGGGAGACCT TCAGGGCTCT CTTCTCTTGT
481 ACGAGGCGTC CTACCTGGGA TTGAGGGGAG AGAACCTCCT GGAGGAAGCT CGTACATTTT
541 CCATCACTCA CCTTAAGAAI AACCTTAAGG AGGGAATTA CACCAAGGTG GCGGAGCAGG
601 TTTCTCAGGC CCTGGAGCTC CCCTACCACC AACGGCTCCA TAGACTCGAG GCTCTGTTGT
661 TCCGGGACAA ATAIGAGCCA AAGGAGGCTC ATCATCAGTT GCTGTGGAG TTGGCCAAGC
721 TGGACTTCAA TATGGTTCAG ACGCTGCACC AAAAGGAGTT GCAGGACCTG TCTCGATGGT
781 GGACCGAGAT GGGATTGGCC TCGAAGCTGG ATTTTGTCCG TGACCGACTT ATGGAGGTCT
841 ATTTTGGGC CCTTGGAAATG GCGCCTGACC CCCAGTTCGG AGAGTCCCGG AAGGCGGTGA
901 CGAAGAATGT CGGTCTTGTG ACTATCATCG ACGACGCTA CGAIGTCTAC GGCACACTCG
961 ACGACTTGCA GCTGTCACT GACGCCCTCG AGCGATCGGA TGTCAACGCC ATTAAIACTC
1021 TCCCTGACIA TATGAAGCTG TGCTTCCTGG CTCTGIACAA CACTGTCAC GATACCTCGT
1081 ACTCTATCCT CAAGGAGAGG GGACACAACA ATCTCTCTTA CTGACCAA TCCTGGCGAG
1141 AACTGTGCAA GGCCTTTCTG CAGGAGGCTA AATGGTCCAA TAACAAGATC ATTCTGTCTT
1201 TTTCTAAATA CCTGGAAAAT GCTTCGGTGT CGAGCTCTGG CGTCGCCCTT CTGGGCCCTT
1261 CCTACTTCTC CGTCTGCCAG CAGCAGGAGG ATATTTCCGA TCAIGCTCTT AGATCGCTGA
1321 CCGATTTTCA CGGCCCTCGT CGAICTTCC1 GCGTGAITTI TCGGTGTGT AATGACCTTG
1381 CGACCTCTGC TGTGAGCTG GAACGAGGCG AGACTACAA TTCCATTAI TCITACATGC
1441 ACGAAAACGA TGGACATCT GAAGAACAGG CTAGAGAGGA ACTGCGAAG TTGATCGAGG
1501 CCGAGTGGAA GAAGATGAAC AGAGAGCGGG TGTCCGACTC TACCTGTCTT CCCAAGGCTT
1561 TCATGGAGAT CGCCGTGAAC ATGGCTCGAG TTCCCAATG TACTTACCAG TACGGTGAAC
1621 GCCTGGGTCT TCCGGACTAC GCTACAGASA ACCGAATCAA GCTGCTGCTT ATCGACCCCT
1681 TCCCTATCAA CCAATTGATC TACGTGTAAI AGCTAGAGG ATCC

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(SEQ ID NO:12)

Figure 17

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1  GAATTCACACA AAAATGTGCT CTGTTTCCAC TGASAACGTG TCCTTTACIG AGACTGAGAC
61  TGAAGCACGTG AGAAGCGGCC ACTACGGAAC CAACCTCCIGG GATTATGACT TTCGTCTGTC
121  TTCTGACACC GACGAGTCGA TCGAGGTITA TAAGGATAAG GCCAAGAAAC TTGAGGCCGA
181  GGTCCAGACGA GAGATTAAACA ACGASAAGGC CGAGTTCCIG ACCCTTCCTG AGCTGATCGA
241  CAACGTTCAA CGACITGGTC TTGGTACCG TTTCGAATCC GATATCCGAC GTGCAITGGA
301  TCGATTIGTC TCGTCCGGAG GTTTCGATGG TGTGACTAAG ACGTCGCTGC ACGCTACAGC
361  TCCTTCCCTC AGACTGTTCG GGCAGCAITG ATTTAGGTTT TCCGAGGAAG CCTTTTCTGG
421  TTTCAGGAT CAGAACGGAA ACTTTTIGGA GAATCTCAAG GAGGACACCA AGGCCATCCT
481  GTCGTGTAT GAGGCTCTGT TCCTGGCTCT TGAGGGCGAG AATAATCTGG ATGAGGCTCG
541  GGTTTTCGCT ATFTCCGACC TGAAGGAGTT GTCCGACGAA AAGATCGGAA AGGAACCTGGC
601  CGAGCAGGTC AACCATGCAC TTGAACCTCC CCTGCATCGA CGTACCCAGC GACTGGAGGC
661  CSTGTGGAGC ATCGAGGCGT ACAGAAAAA GGAGGATGCT AATCAGCTTC TGCTCGAAGT
721  CGCTAICCTC GACTATAACA TGATTACAGG CTGTACCGAG CGTGACTTGC GAGAGACAAG
781  CCGGTGGTGG CGACGGGTGG GACTGGCCAC GAAGCTCCAC TTTCGTAAG ATCGATTGAT
841  TGAGTCGTTC TACTGGGCAG TGGGTGTGGC CTITGAGCCT CAGTACTCCG ACTGCCGAAA
901  CTCGGTTGCA AAGATGTTTT CTTTGTGCAC TATCATCGAC GACATCTACG ATGTTCACGG
961  CACTCTCGAT GAACTCGAAC TCTTCACGGA CGCTGTGAG CGATGGGATG TGAATGCCAT
1021  TAAIGATCTG CCAGATTATA TGAAGTTGIG TTCTTGGCG CICTACAACA CAATTAATGA
1081  AATTGCCCTAC GACAACCTCA AGGACAAGGG AGAGAACATT CTGCCCTACC TTACTAAAGC
1141  CTGGGCCGAC CTGTGTAAAG CCTTTTIGCA GGAAGCCAAAG TGGCTCTATA ACARATCTAC
1201  TCCTACATTT GATGACTACT TCGGCAACGC TTGGAAGTCT TCCAGCGGCC CTCCTCAGTT
1261  GATCTTCGCT TACTTTGCAG TGGTCCAGAA CATCAAGAAA GAGGAGATTG AGAAGCTCCA
1321  GAAGTATCAC GACRATCTCT CCCGACCTTC GCACATCTTT CGACTGTGCA ATGACCTTGC
1381  CTCGCGATCC GCTGAGATTG CCGAGGAGA AACAGCCAA TCTGTGTCT GTTACATGGC
1441  TACAAAGGGC ATCTCCGAGG AGCTGGCTAC CGAGTCTGIG ATGAACCTGA TCGATGAAAC
1501  CTGTAAAGAAG ATGAACAAAG AGAAACGGG CGGTTCTCTG TTCGCCAAC CATTTGTTGA
1561  AACCGCGATC AATCTGGCTC GTCAGTCTCA TTGTACTTAC CATAACGGTG ACGCGCACAC
1621  TTCGCCGGAC GAATTGACCC GTAAGCGTGT GCITTCGGTG ATTACCGAGC CGATCTCTCC
1681  GTTCGAAAGA TAATAGGATC C
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(SEQ ID NO:13)

Figure 18A1

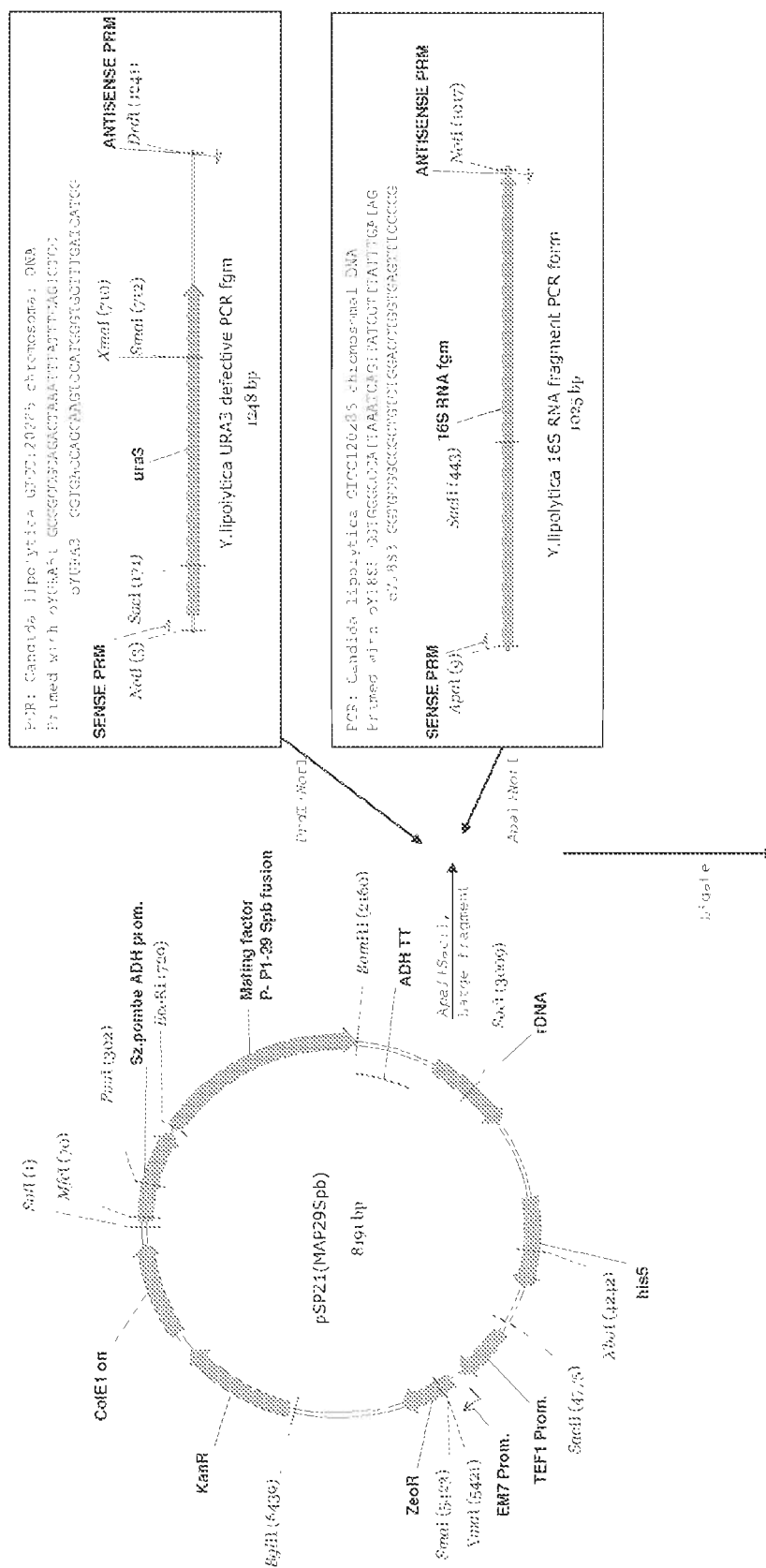


Figure 18A2

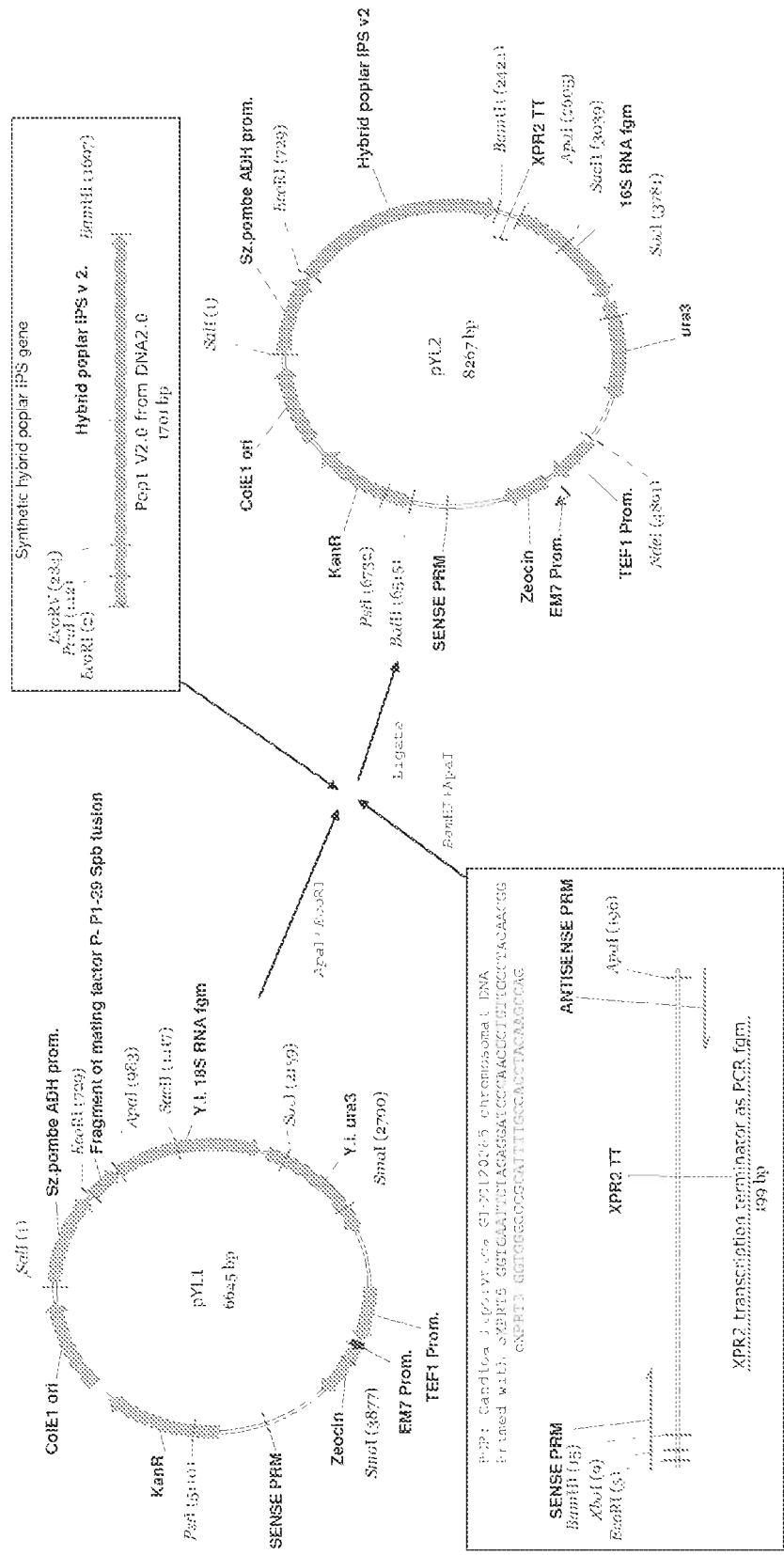


Figure 18B

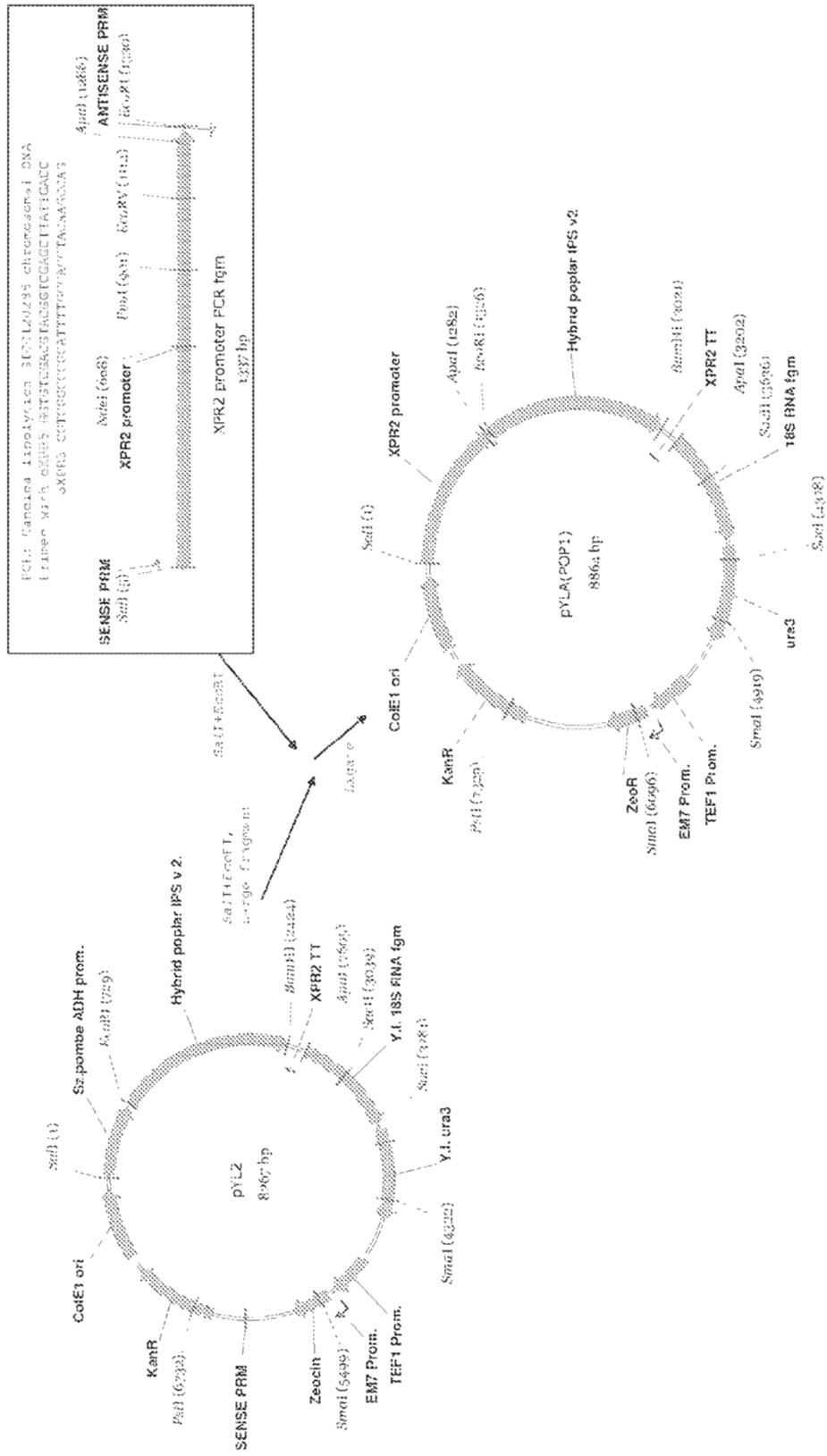
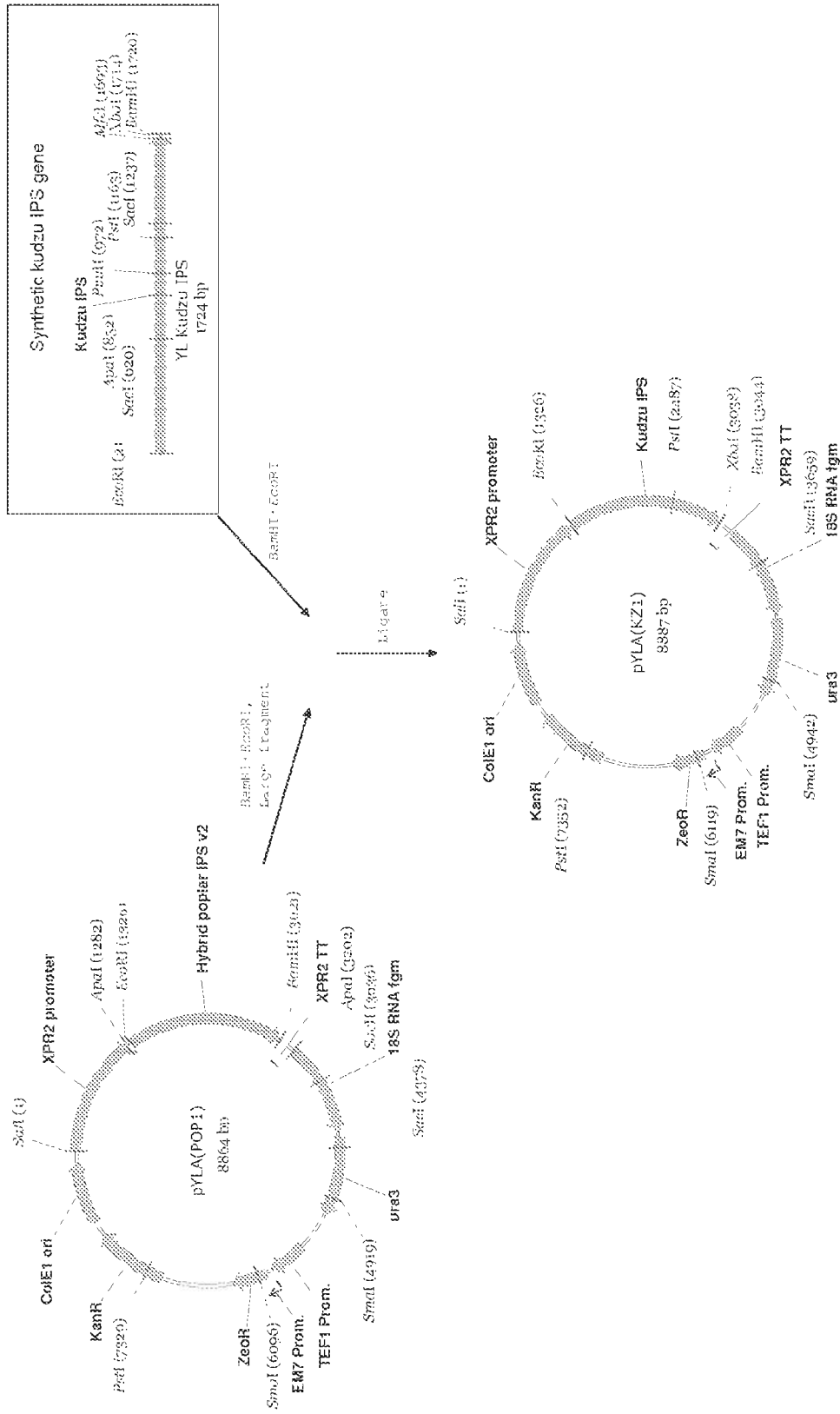


Figure 18C





The diagram illustrates the construction of a yeast expression vector. The process starts with two plasmids: pYLA(POP1) (8864 bp) and pCR(ICL1) (4416 bp). pYLA(POP1) contains the XPR2 promoter, ColE1 ori, KanR, ZeoR, EM7 Prom., TEF1 Prom., Smad (4019), ura3, and 18S RNA tgm. pCR(ICL1) contains the ICL1 promoter, XbaI (4308), PstI (4381), EcoRI (4372), PstI (3513), EcoRI (3479), EcoRI (3457), BamHI (3456), ori, ZeoR, XbaI (1939), and KanR. The process involves isolating a large fragment from pYLA(POP1) using SmaI and BamHI, and a 0.93 kb fragment from pCR(ICL1) using XbaI and EcoRI. These fragments are ligated into a mating factor P-P1-29 Spb fusion vector, which also contains XPR2 TT, XbaI (5384), SacII (5403), 18S RNA tgm, ura3, pYL(MAP29) (8208 bp), TATA Signal 1, XbaI (5483), ICL1 promoter, SmaI (5341), SENSE PRIM, TOPO binding site, ColE1 ori, EM7 Prom., TEF1 Prom., ZeoR, and KanR. The resulting vector is then transformed into yeast cells, and the expression of the 18S RNA tgm is monitored.

Figure 18F

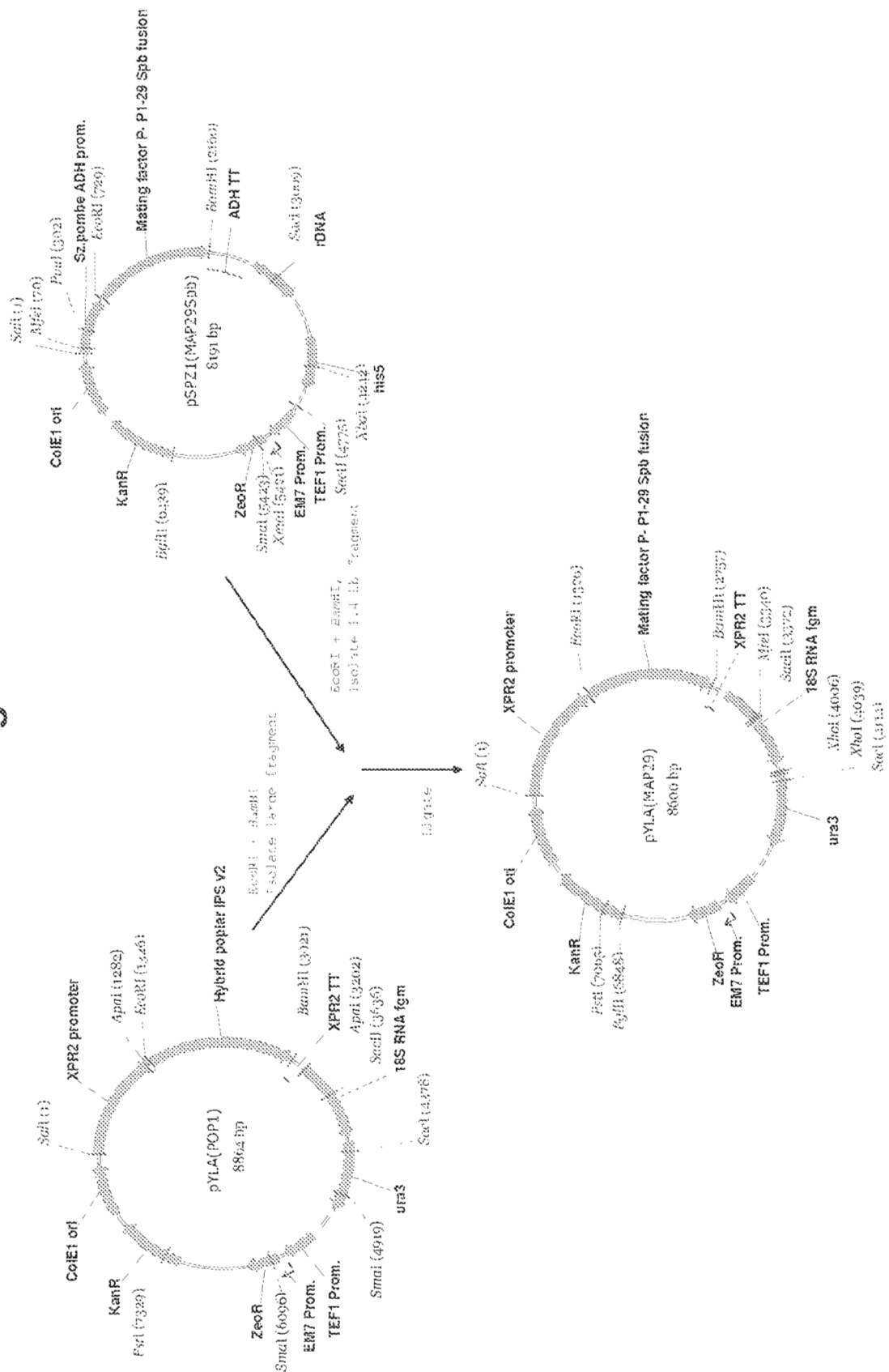


Figure 19A

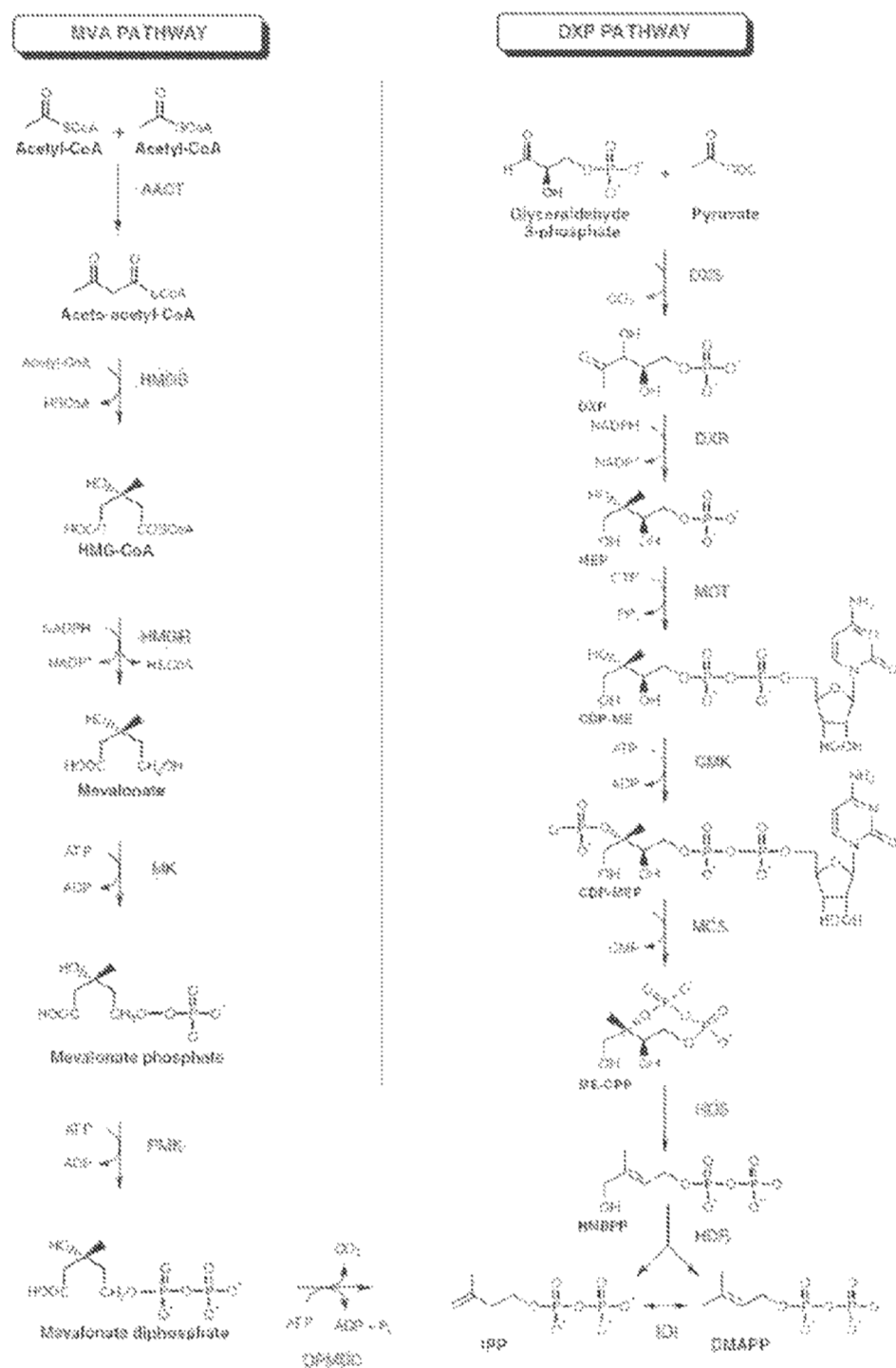


Figure 19B

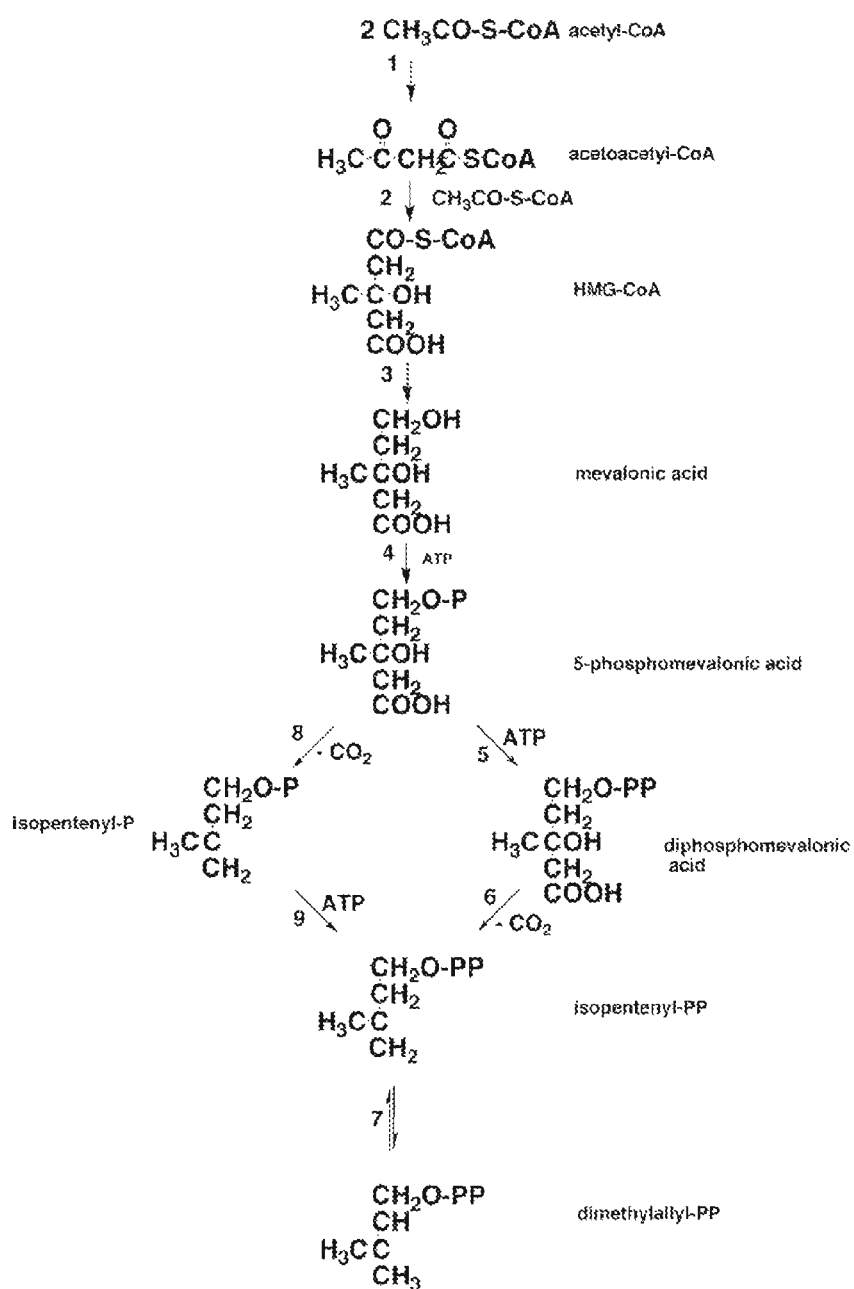


Figure 20

*Y. lipolytica* CLIB122:: pYLA(MAP29)      *Y. lipolytica* CLIB122:: pYLA(KZ1)

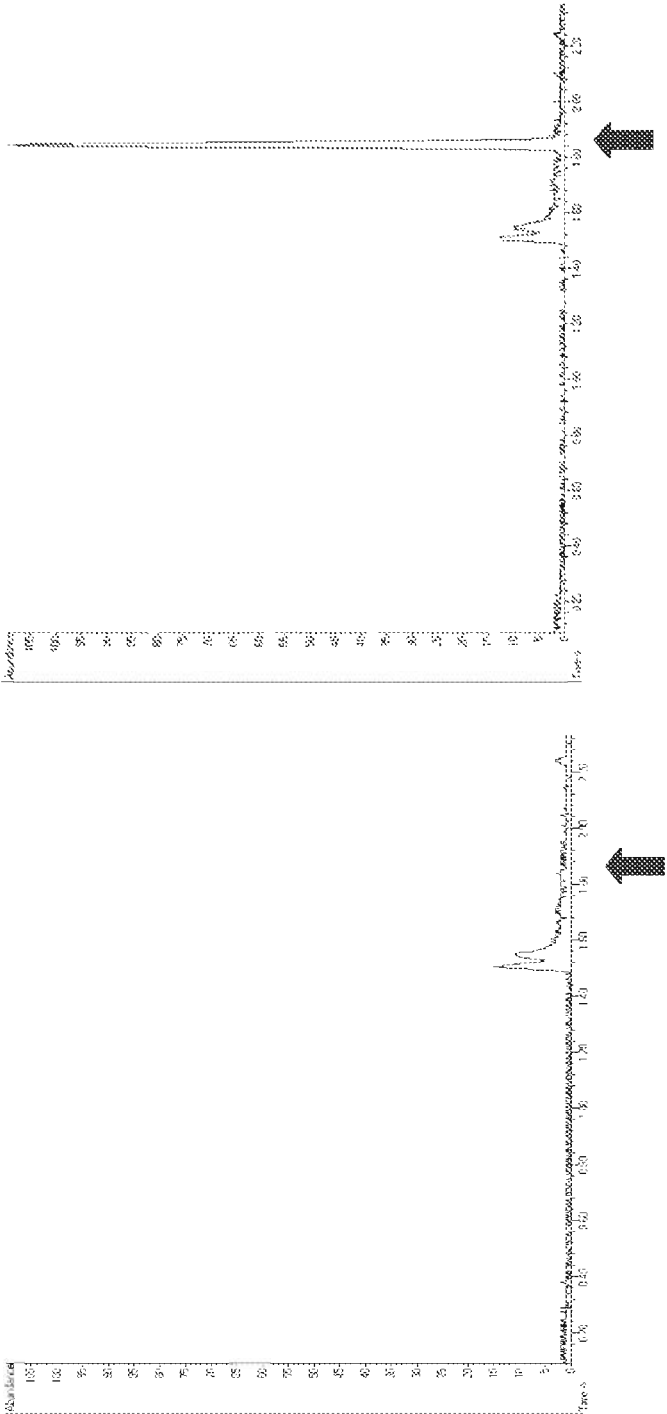
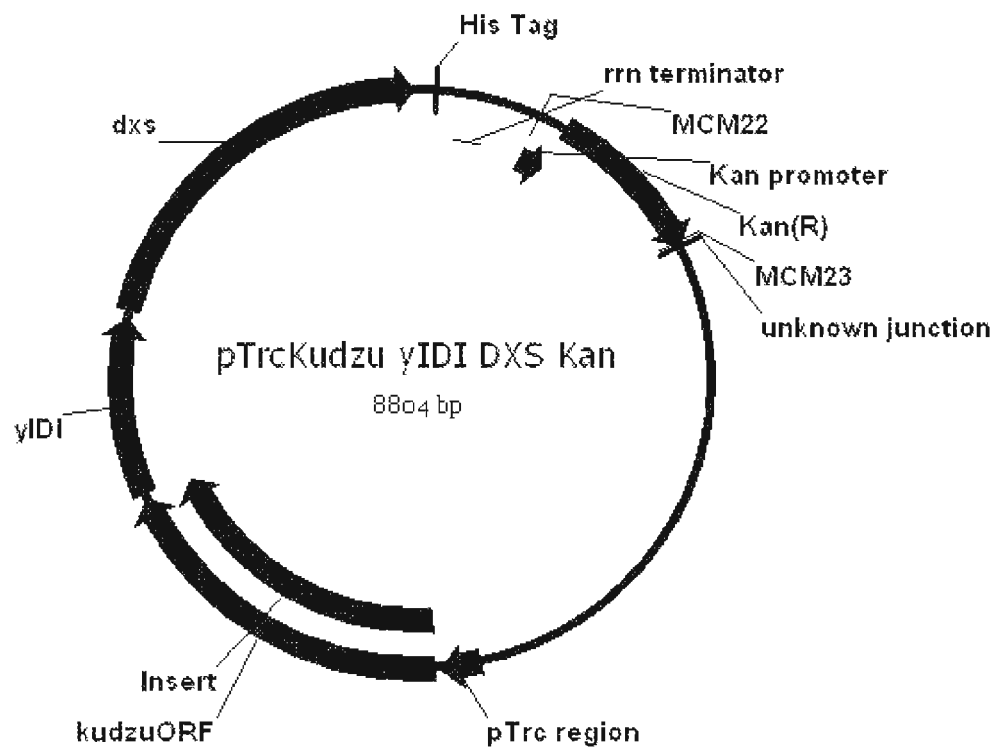


Figure 21



**Figure 22A**

1-

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**Figure 22B**

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**Figure 22C**

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**Figure 22D**

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Figure 23A

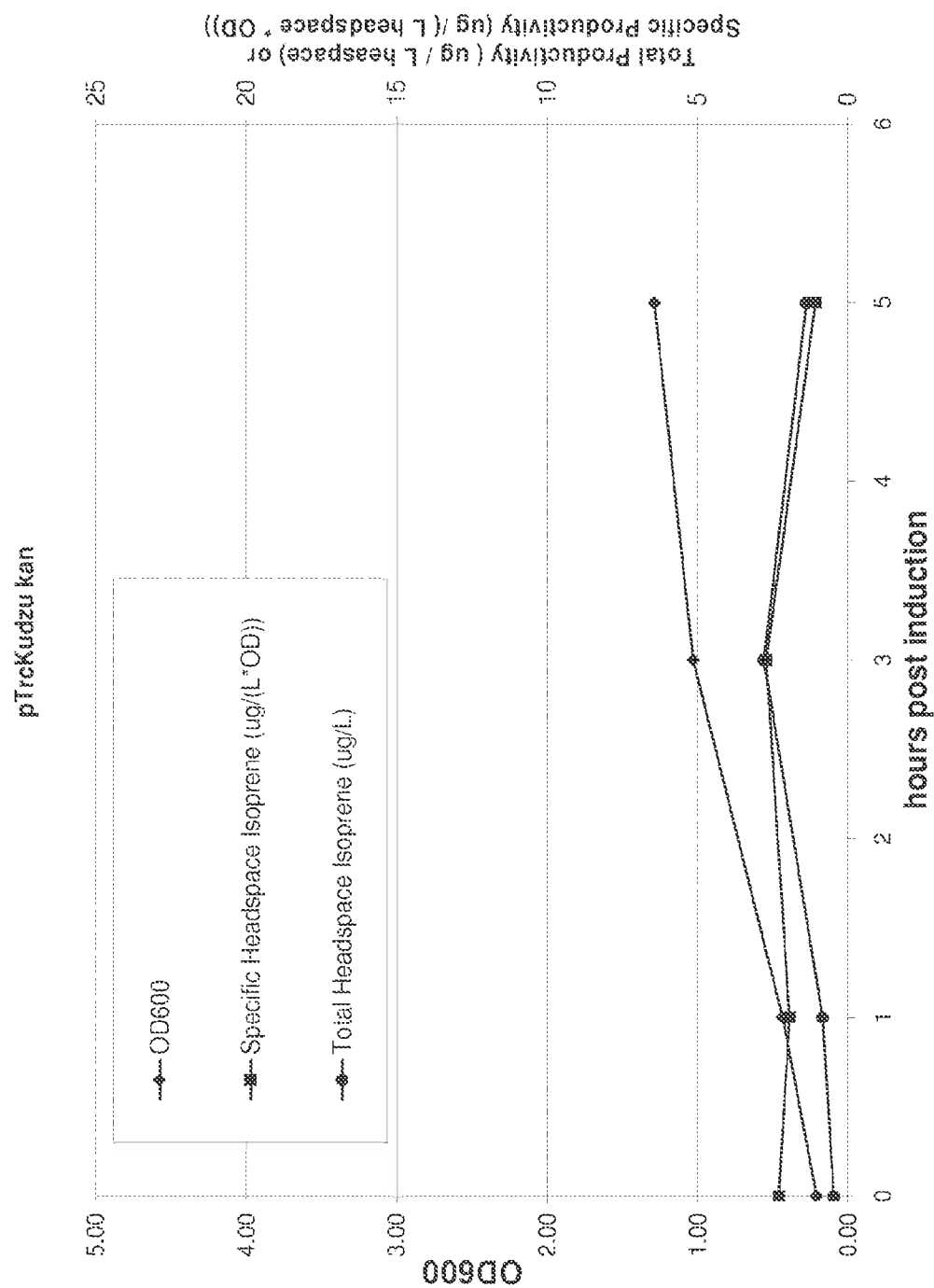


Figure 23B

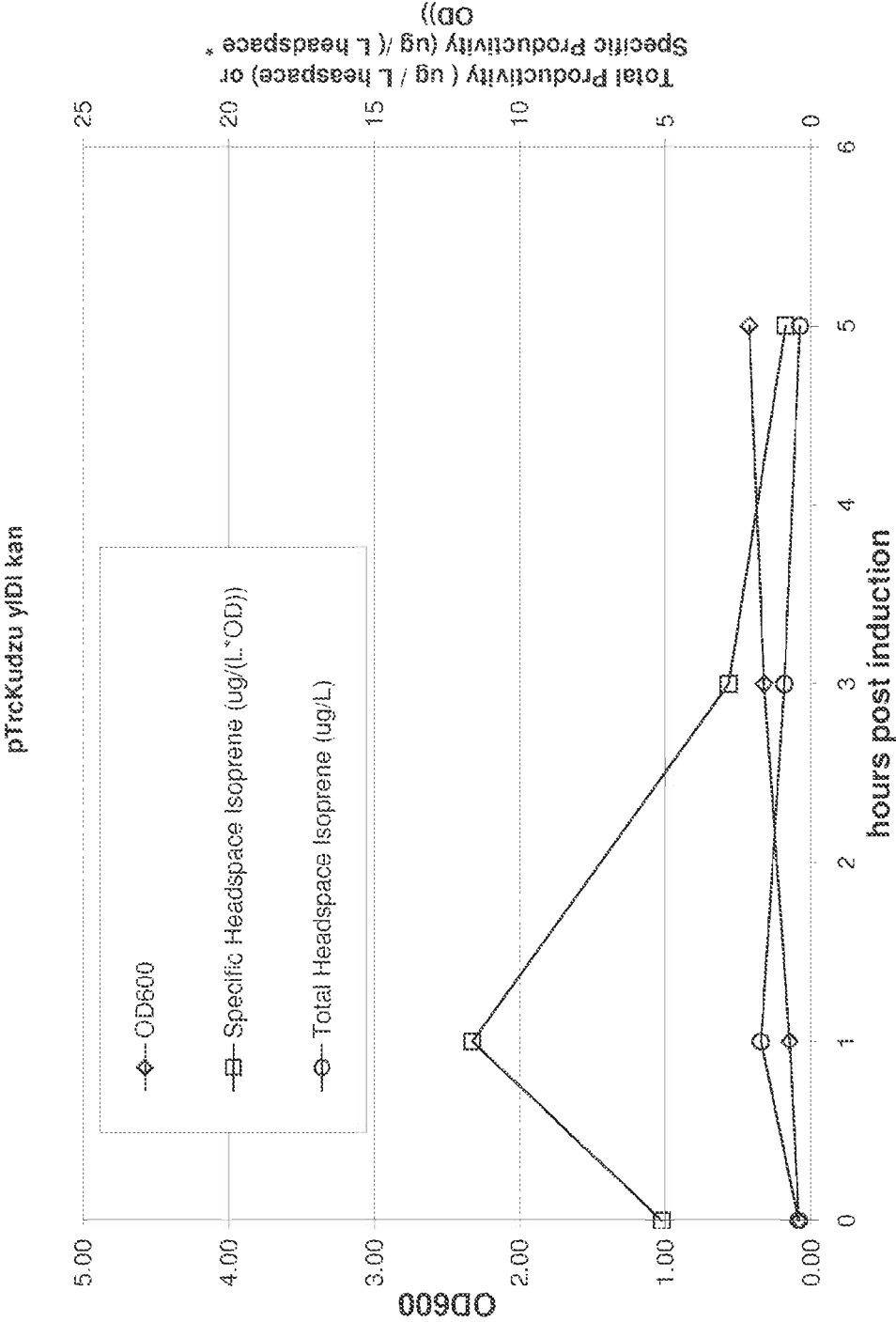


Figure 23C

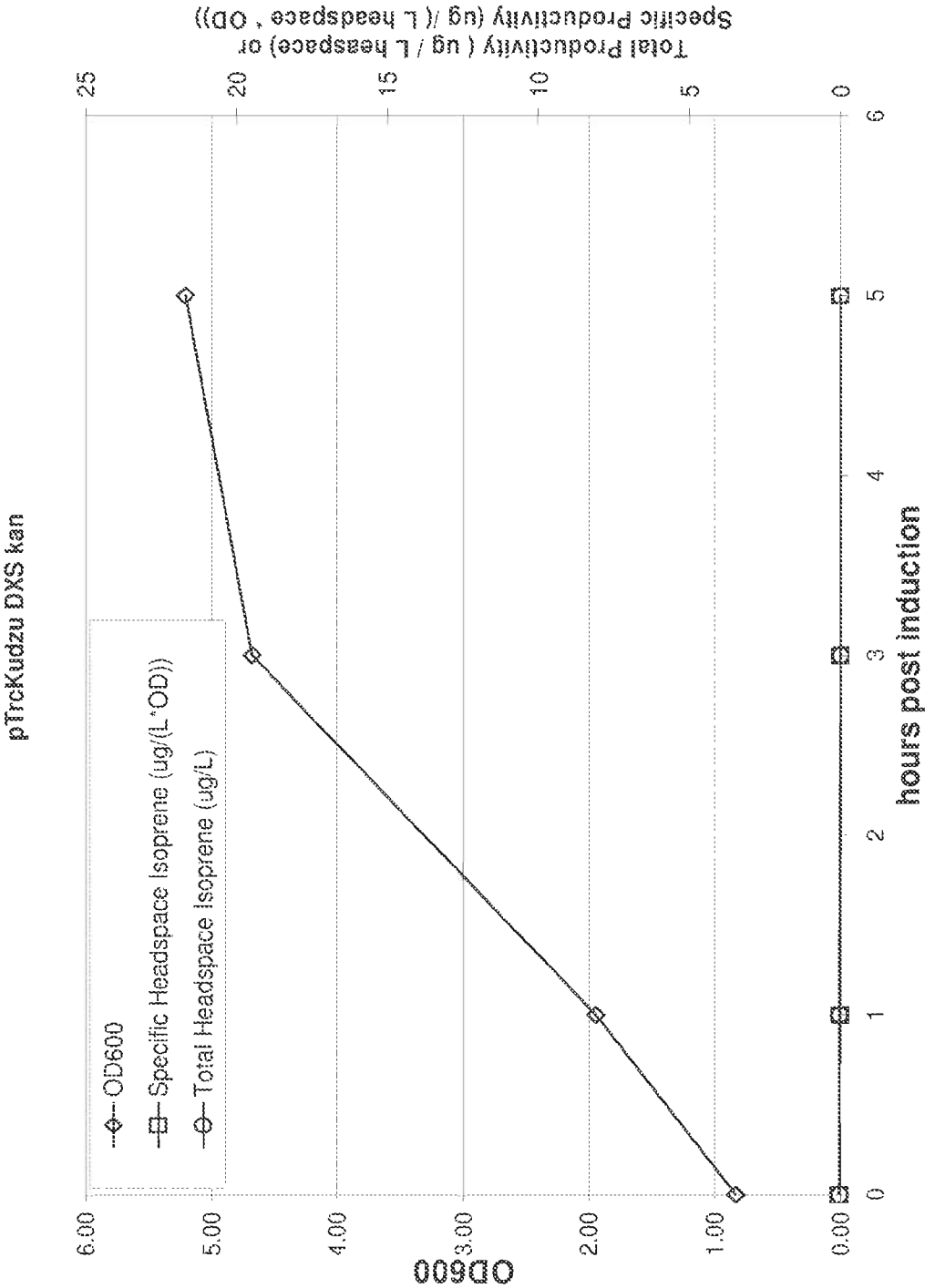


Figure 23D

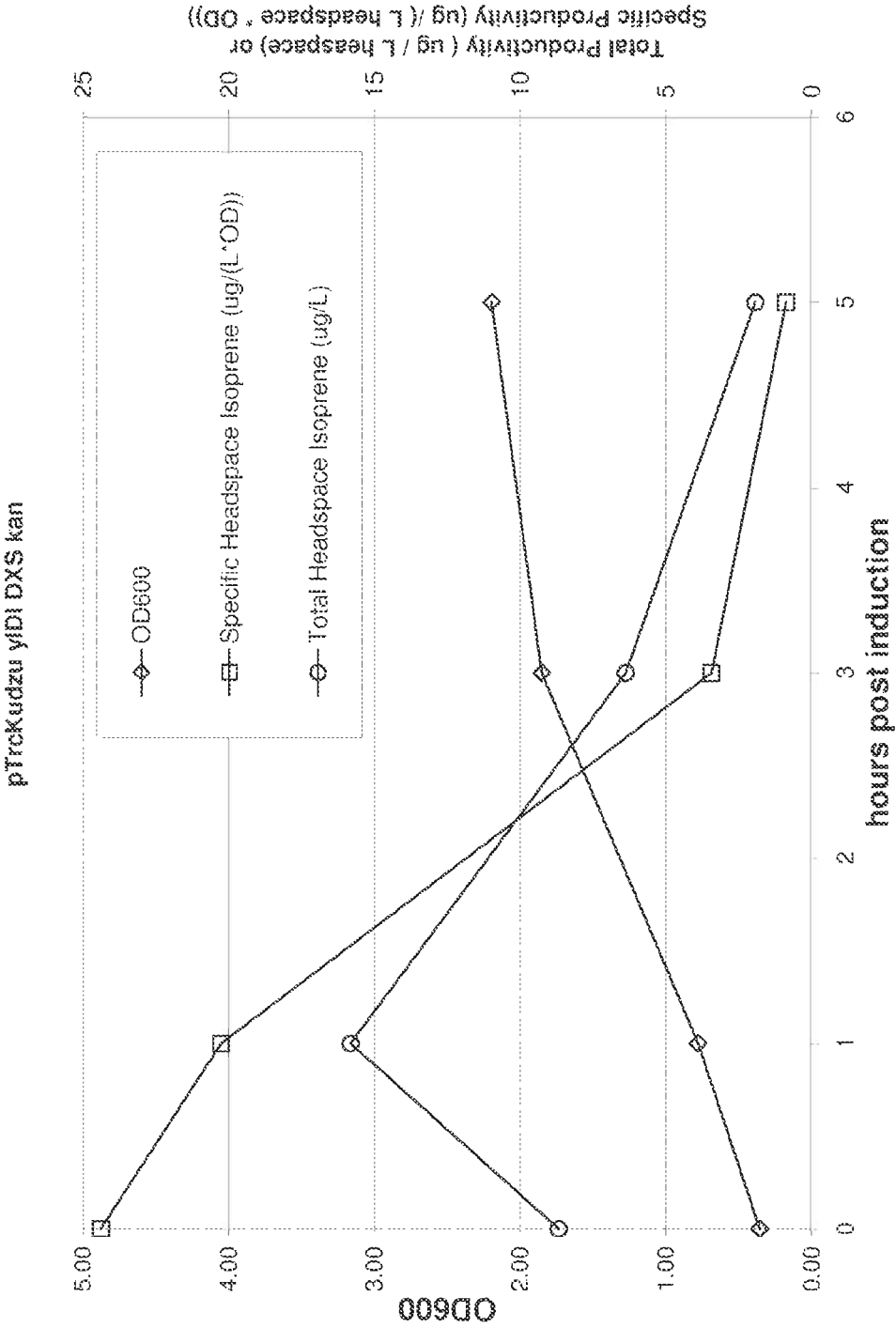


Figure 23E

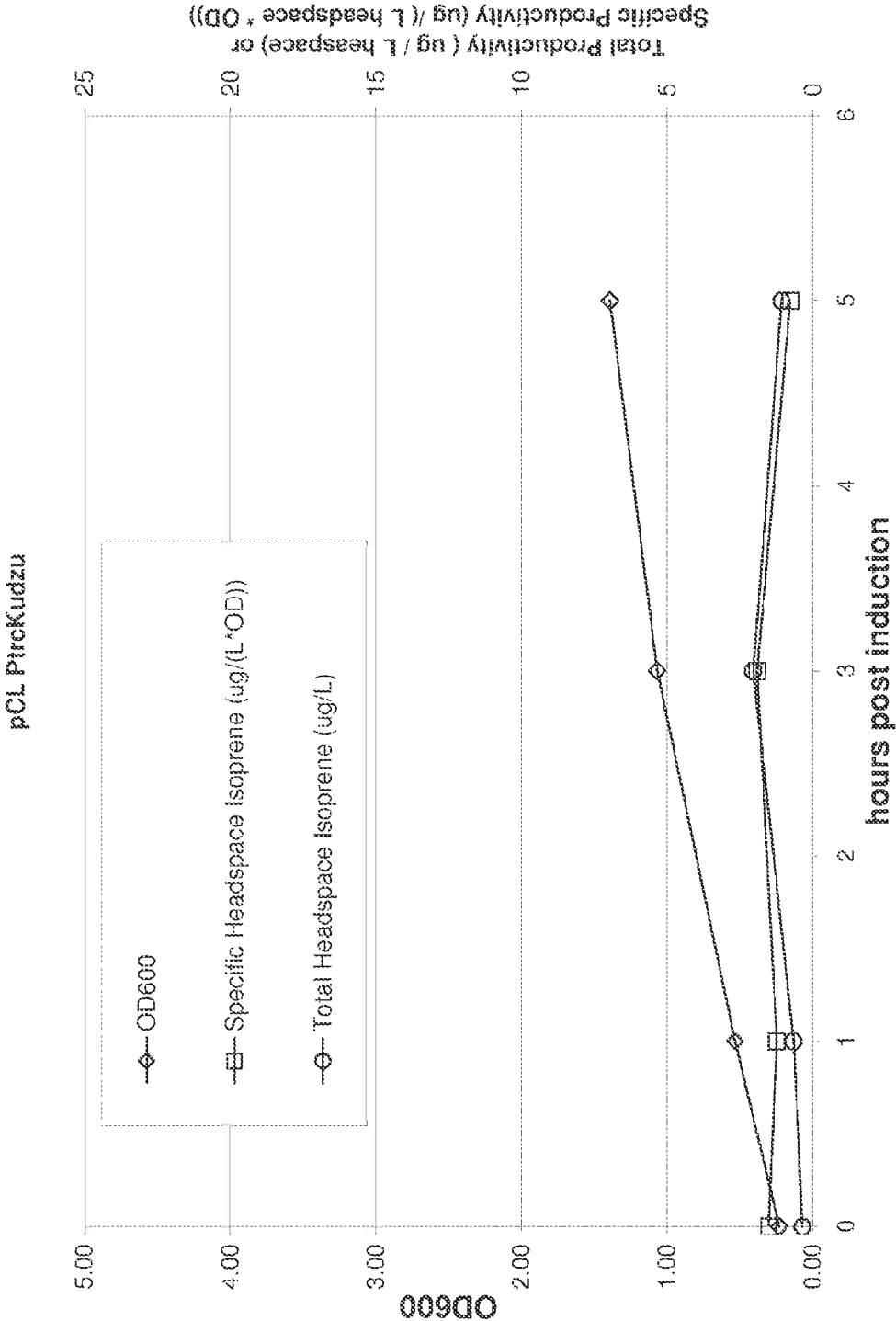


Figure 23F

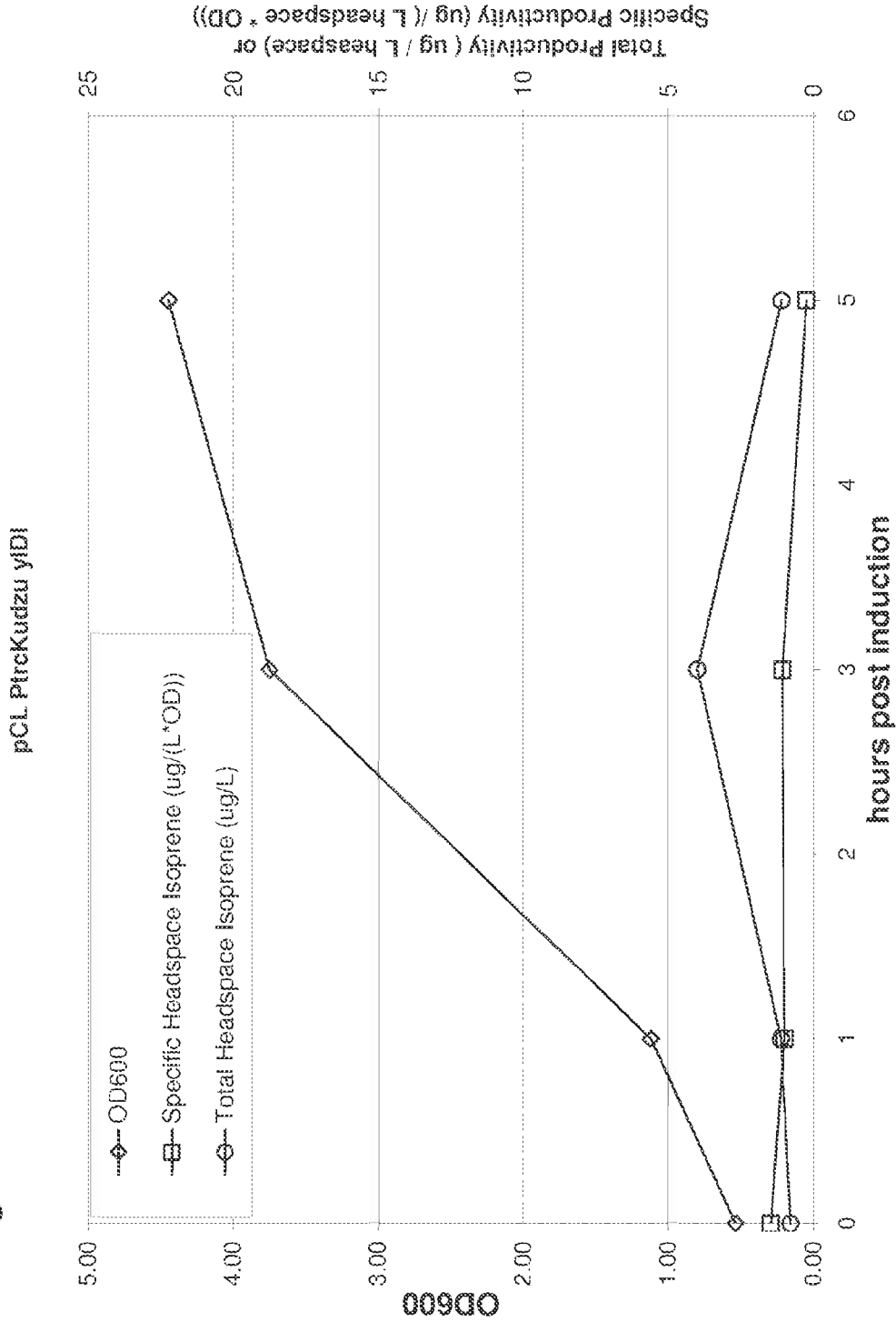


Figure 23G

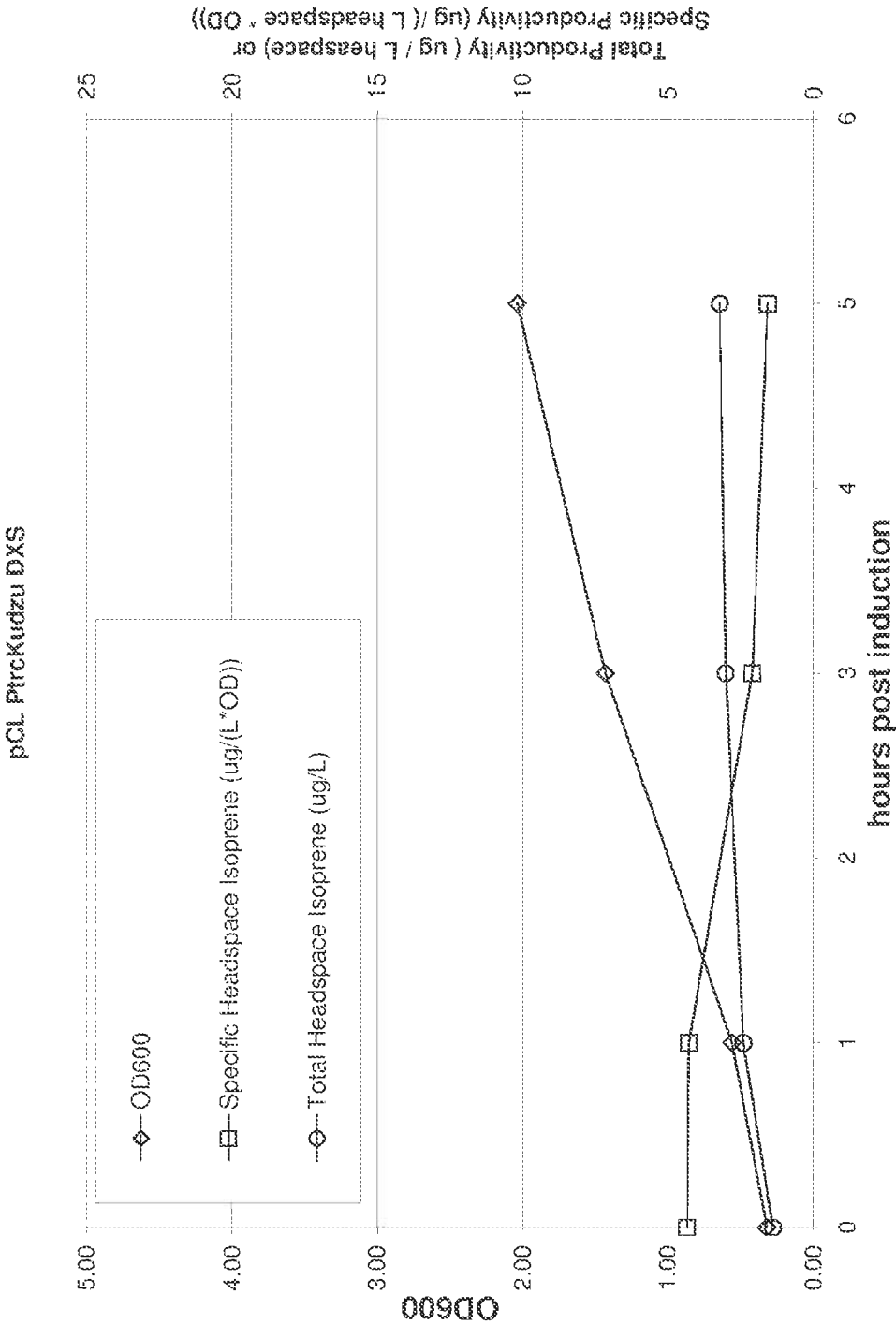


Figure 23H

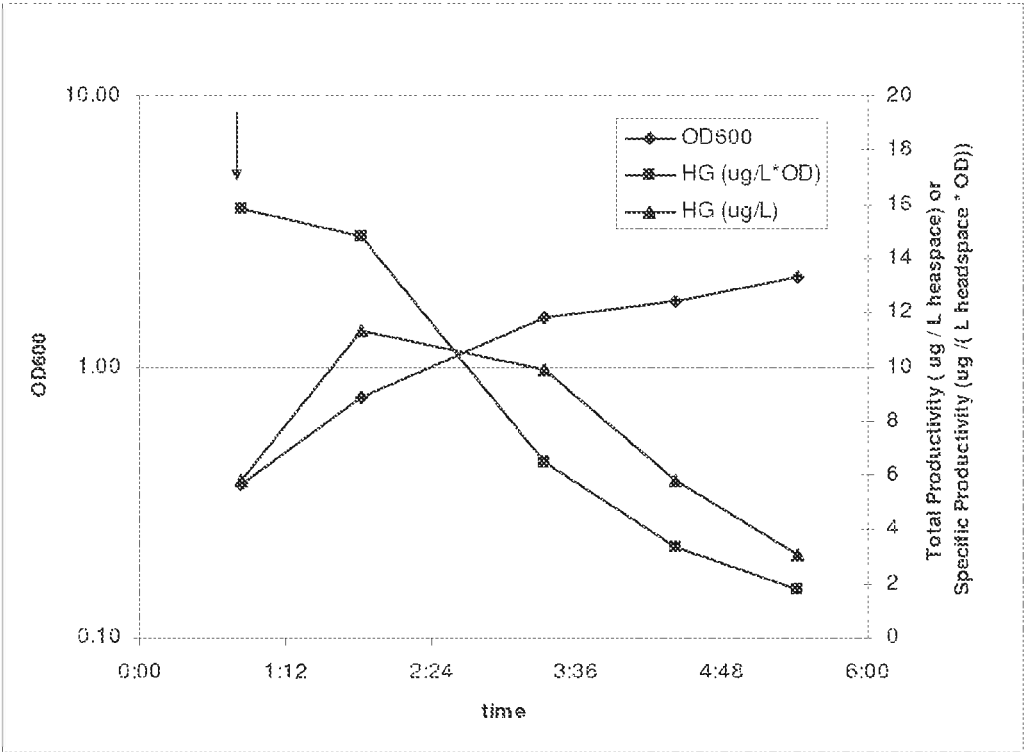
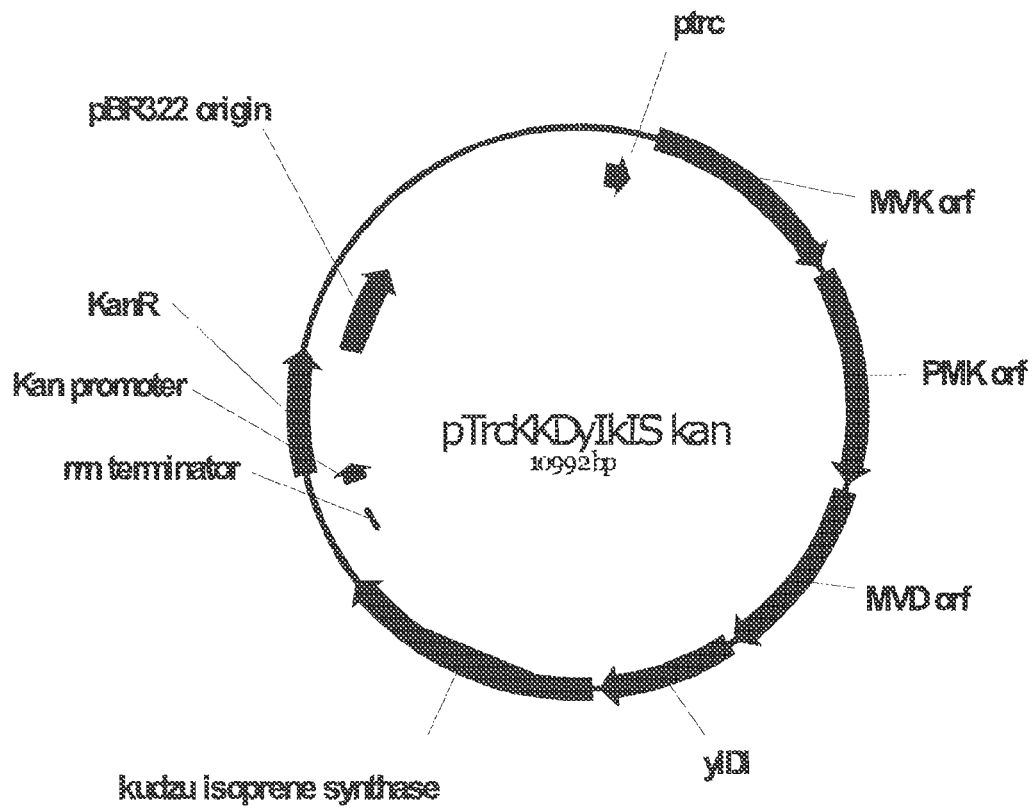


Figure 24



**Figure 25A**

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**Figure 25B**

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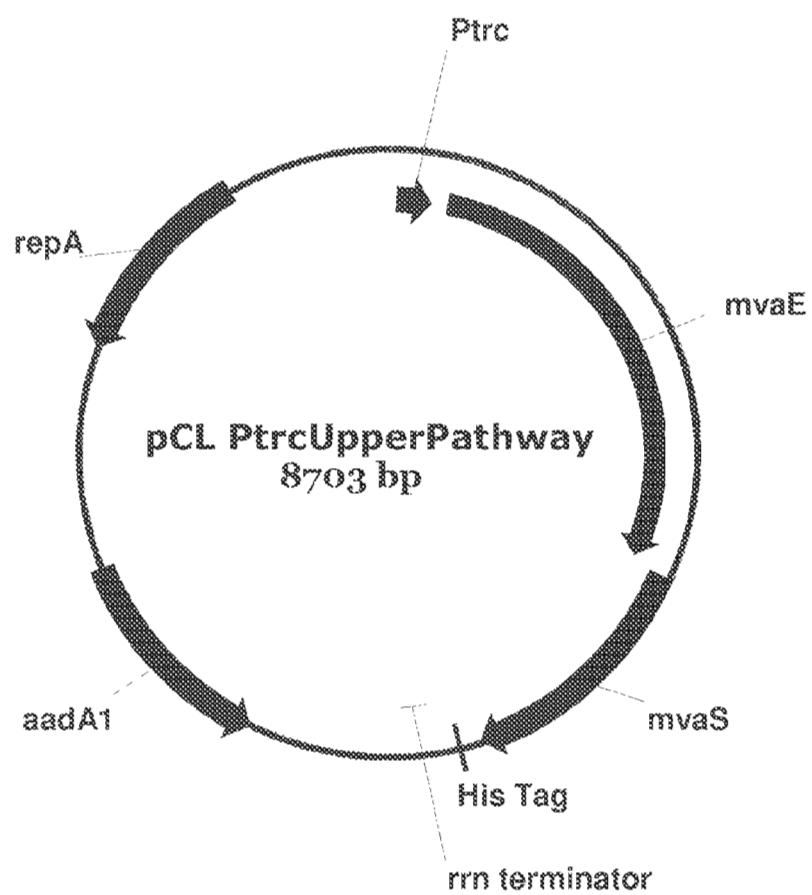
**Figure 25C**

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**Figure 25D**

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Figure 26



**Figure 27A**

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**Figure 27B**

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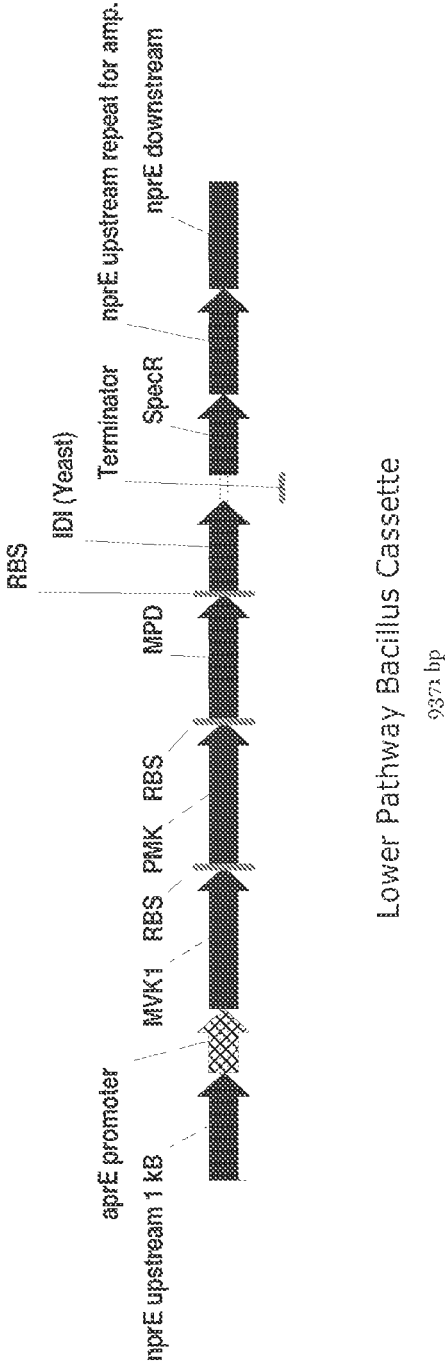
**Figure 27C**

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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**

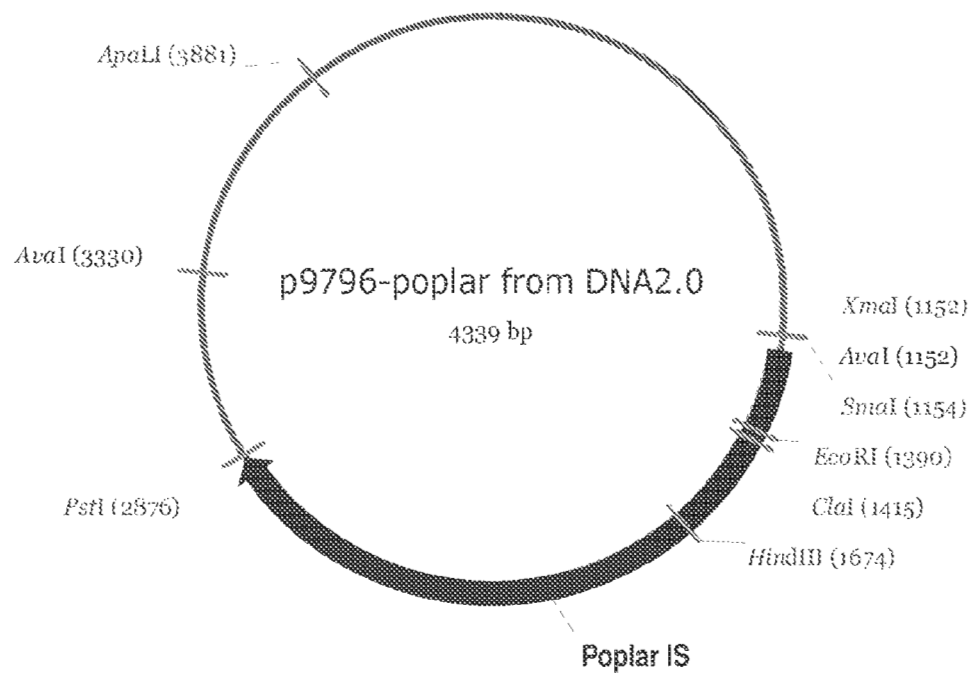
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**Figure 29D**

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Figure 30



**Figure 31A**

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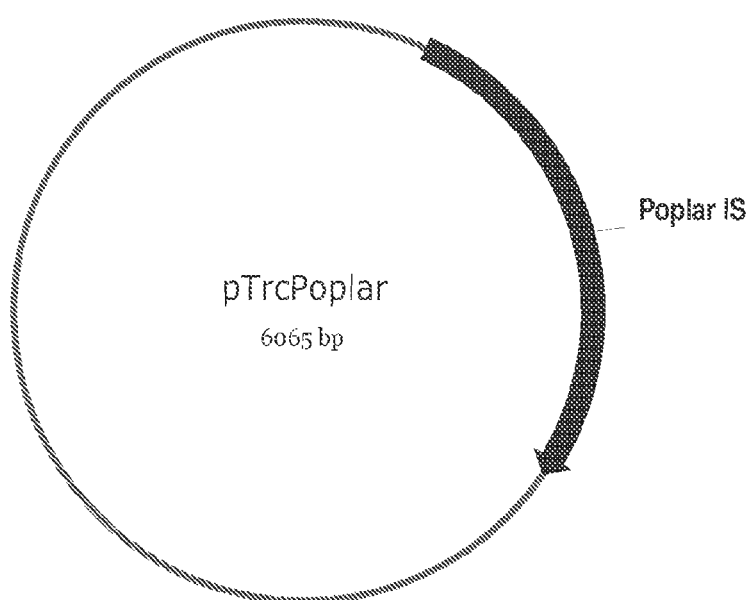
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**Figure 31B**

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(SEQ ID NO:48)

Figure 32



**Figure 33A**

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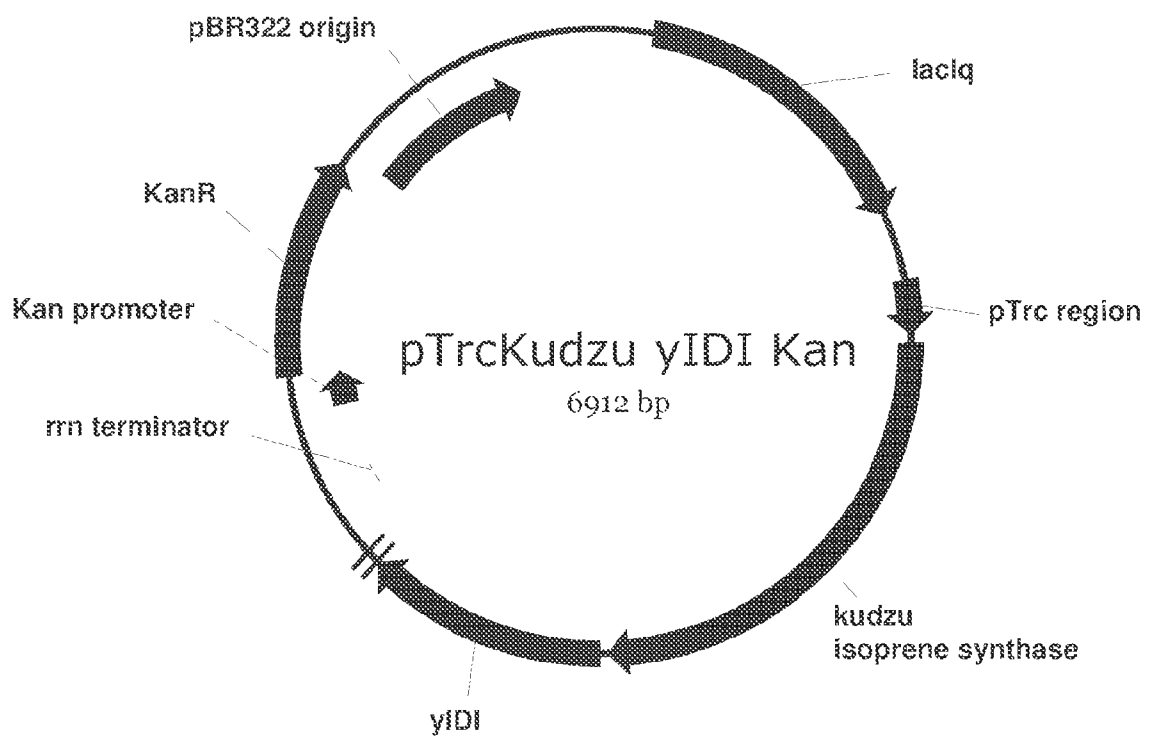
**Figure 33B**

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**Figure 33C**

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(SEQ ID NO:49)

Figure 34



**Figure 35A**

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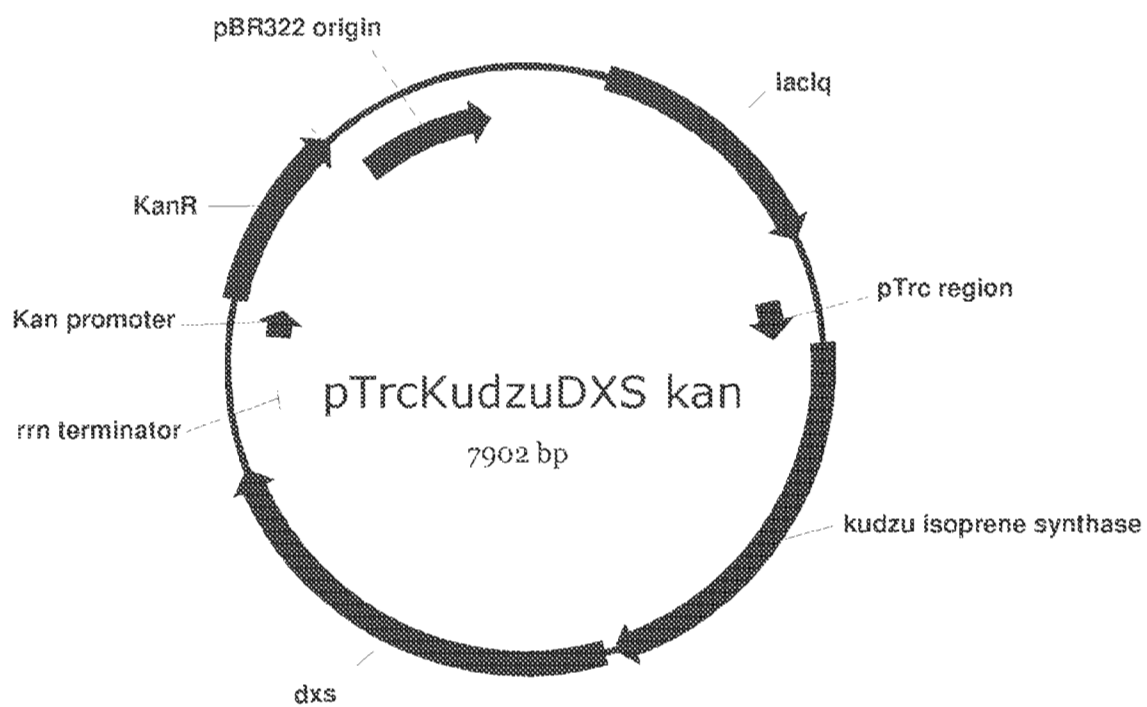
**Figure 35B**

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**Figure 35C**

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(SEQ ID NO:50)

Figure 36



**Figure 37A**

5'-

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**Figure 37B**

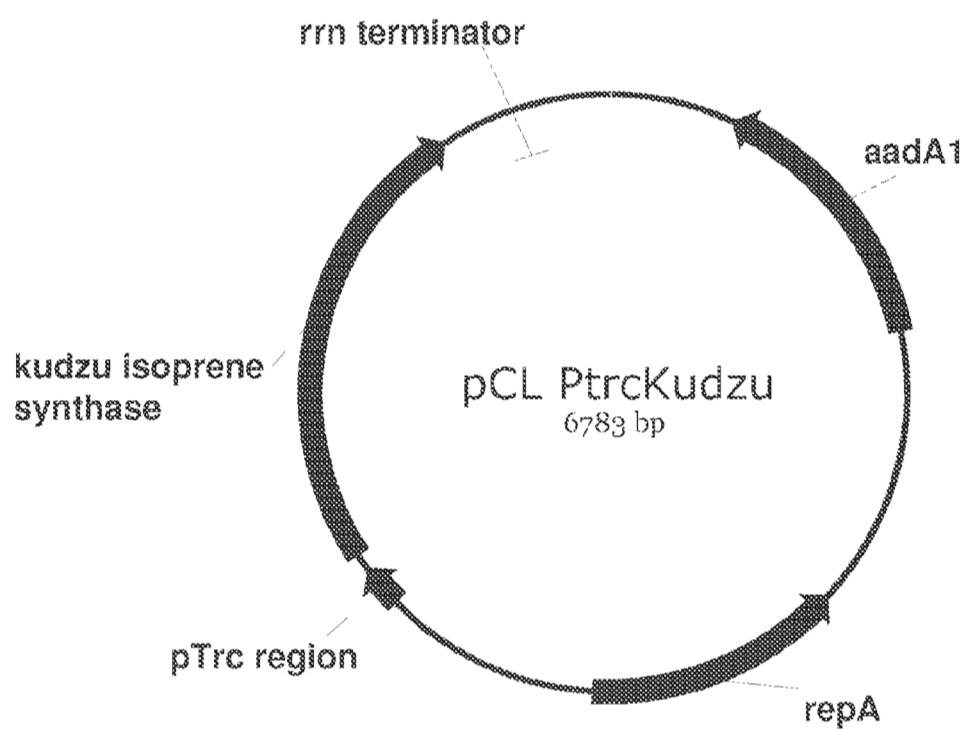
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**Figure 37C**

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Figure 38



**Figure 39A**

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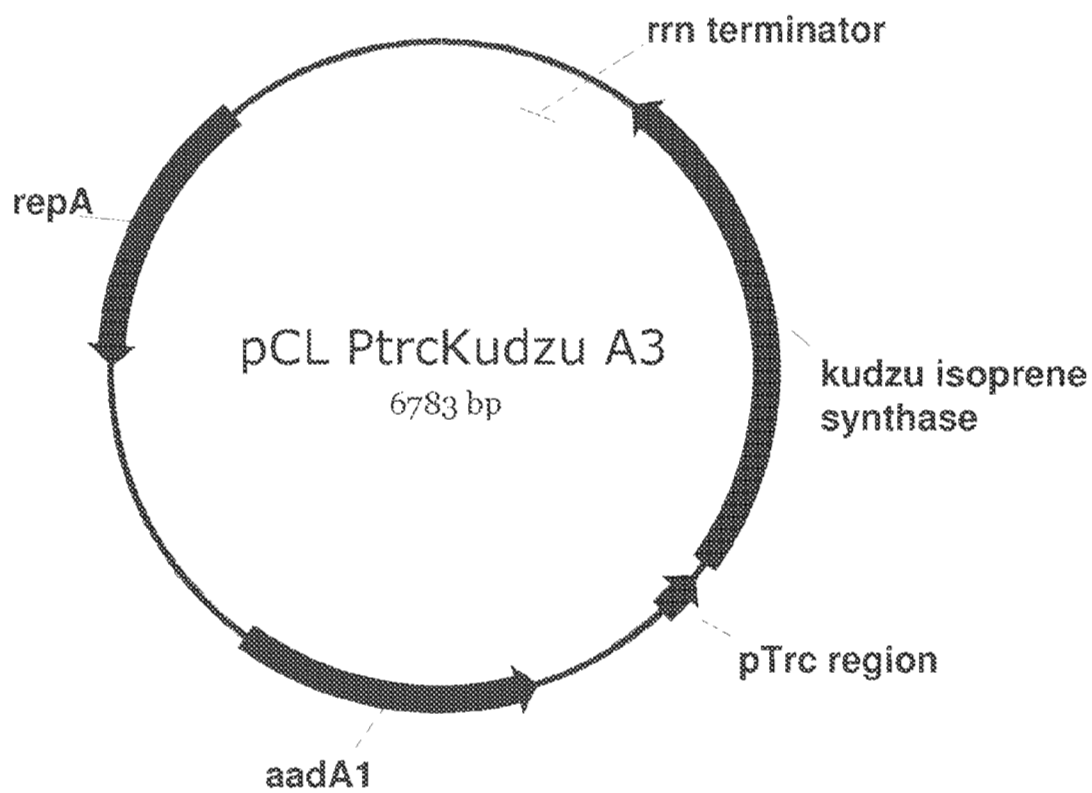
**Figure 39B**

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**Figure 39C**

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Figure 40



**Figure 41A**

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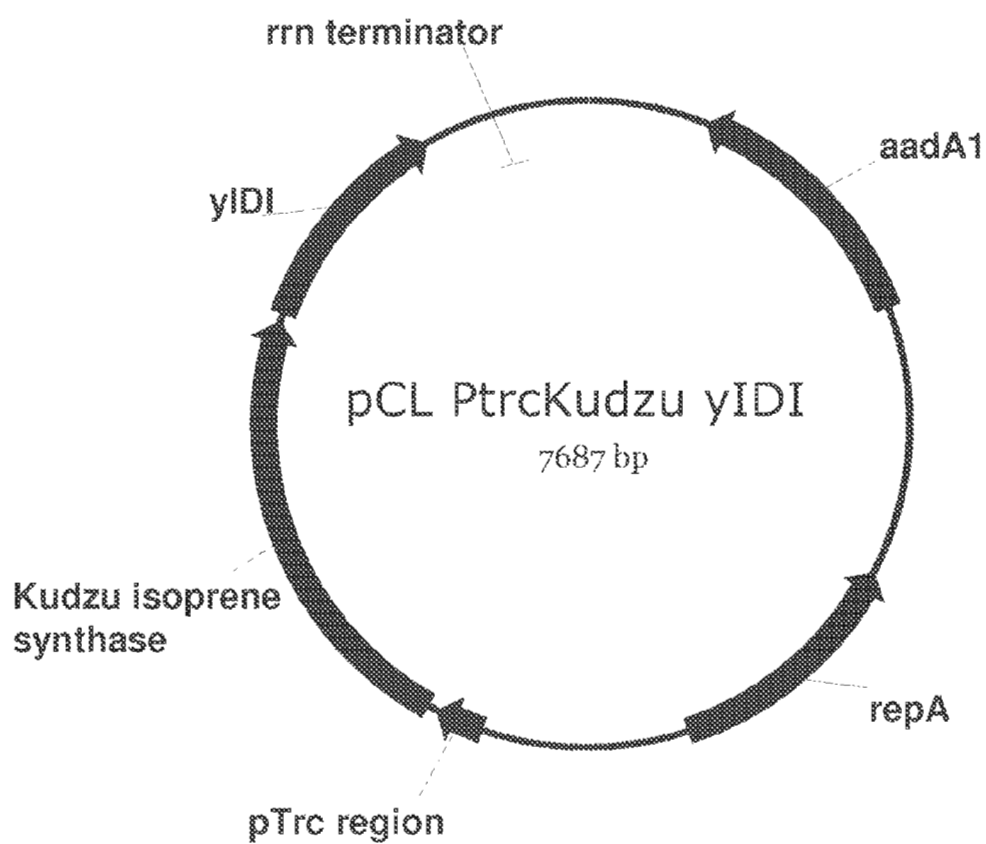
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**Figure 41C**

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Figure 42





**Figure 43B**

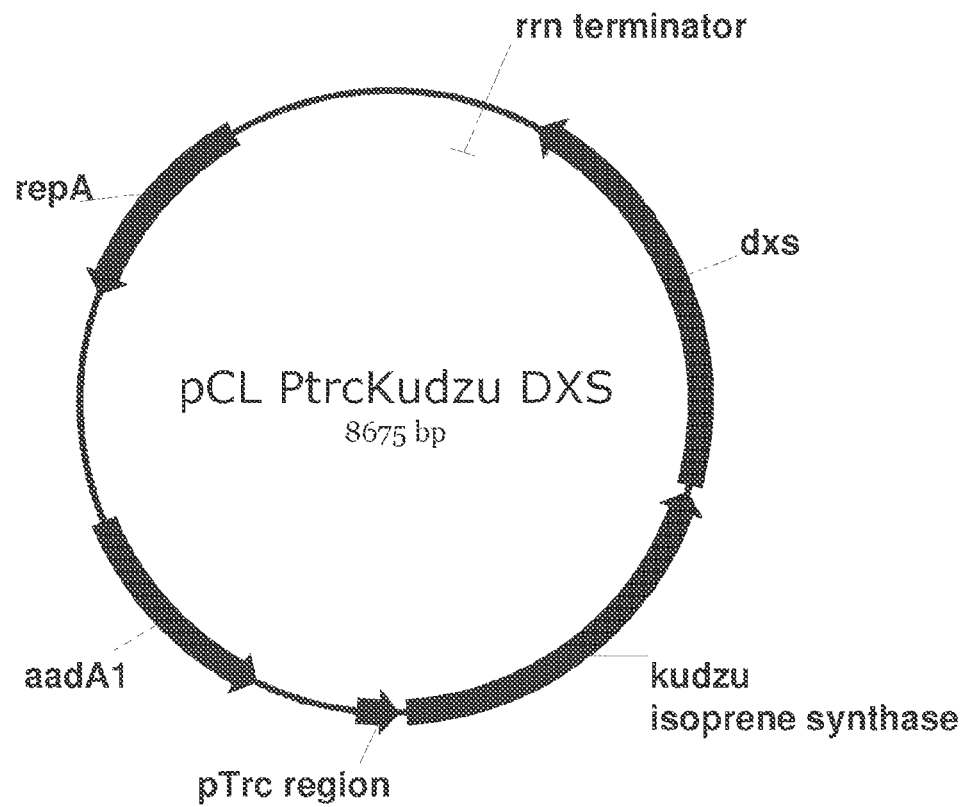
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**Figure 43C**

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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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(SEQ ID NO:55)

Figure 46A

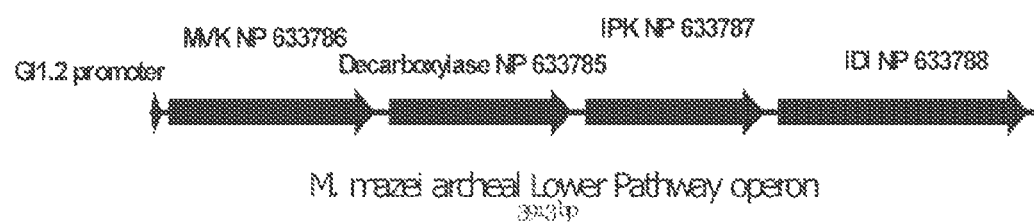


Figure 46B

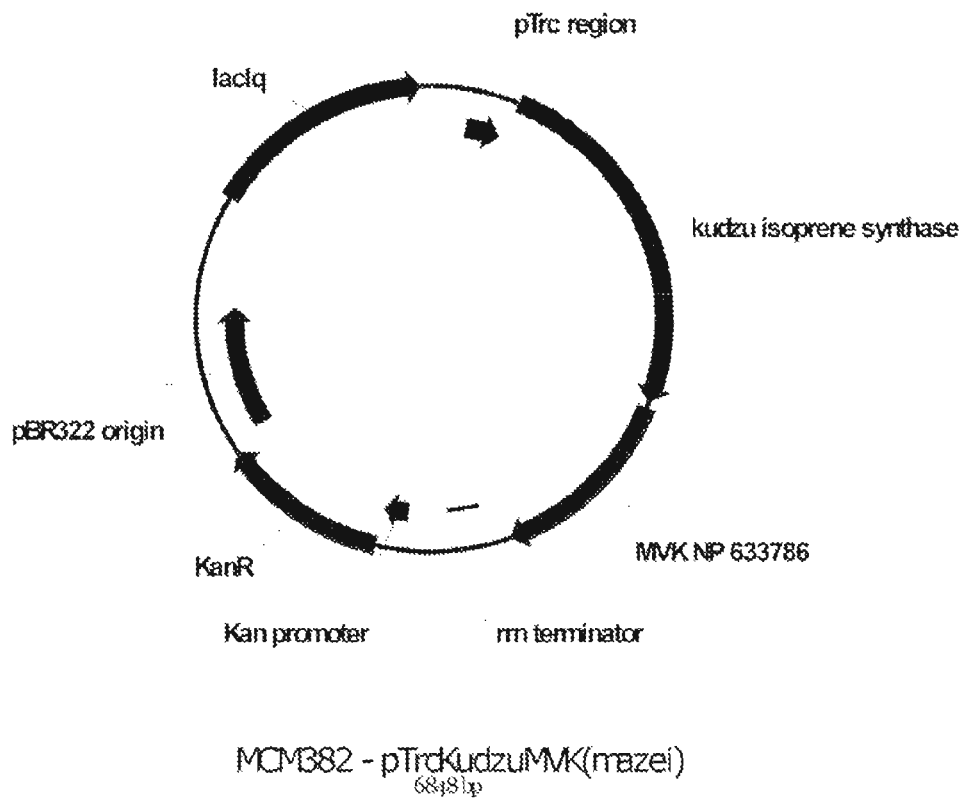
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**Figure 46C**

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(SEQ ID NO:102)

Figure 47A



**Figure 47B**

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**Figure 47C**

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Figure 48A

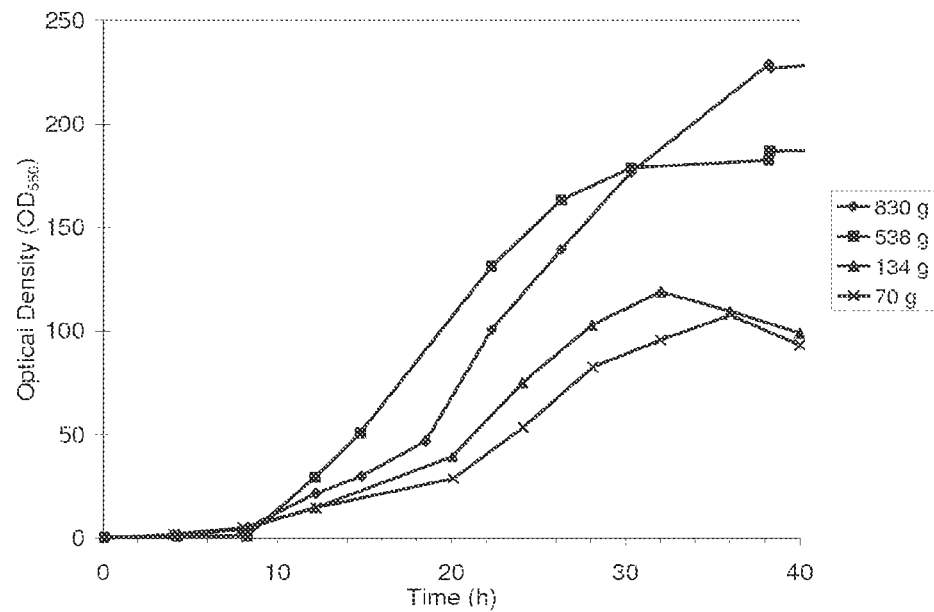
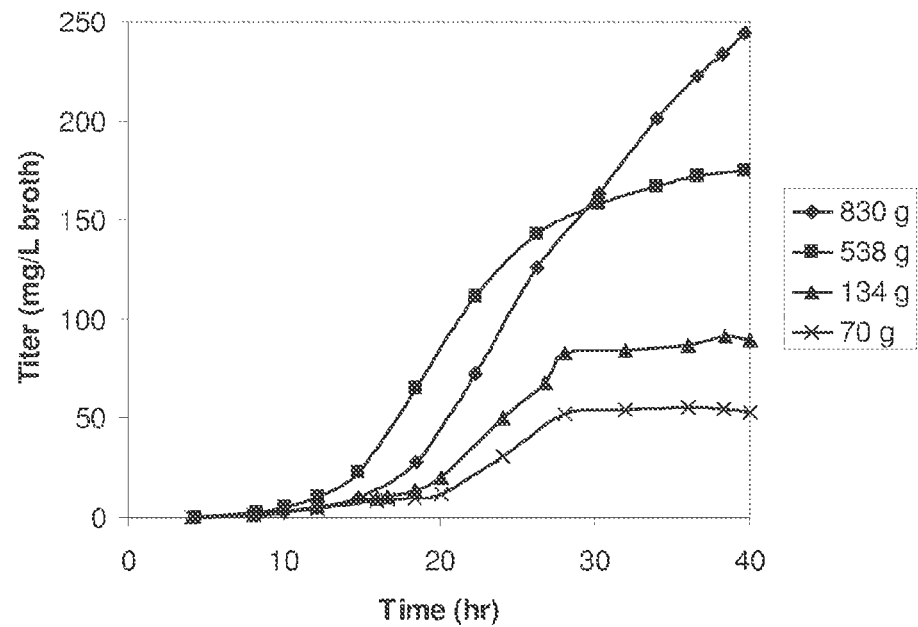


Figure 48B



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Figure 48C

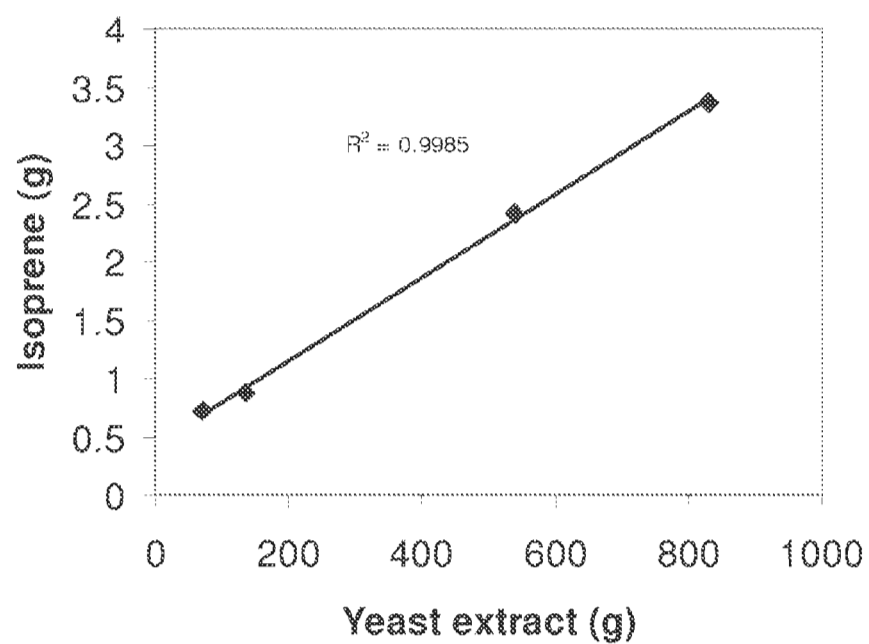


Figure 49A

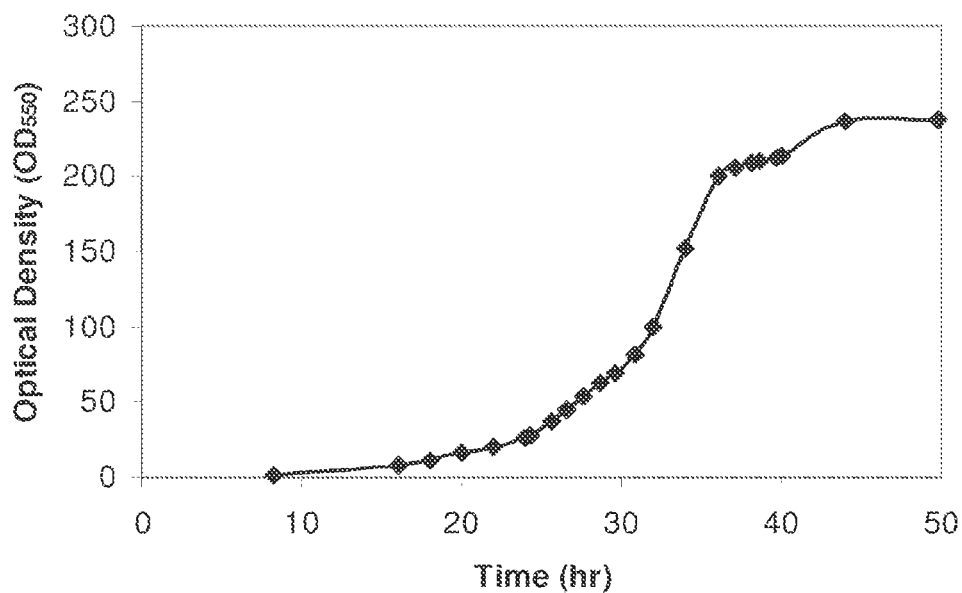
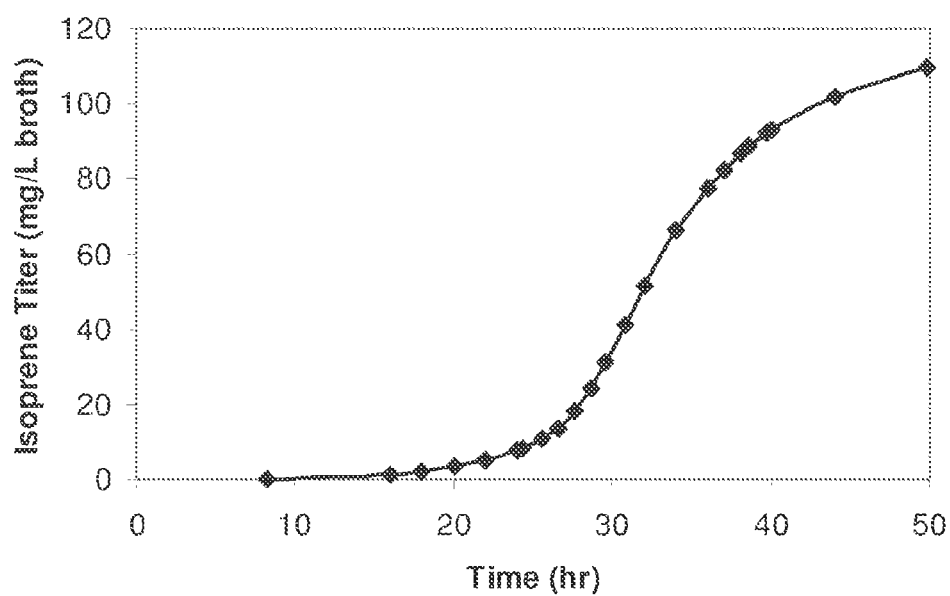


Figure 49B



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Figure 49C

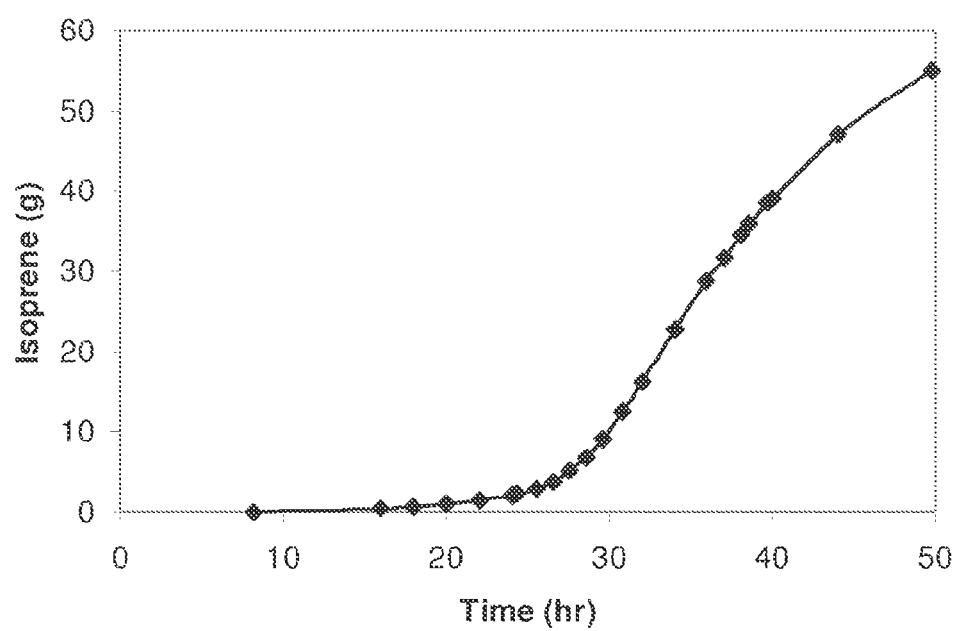
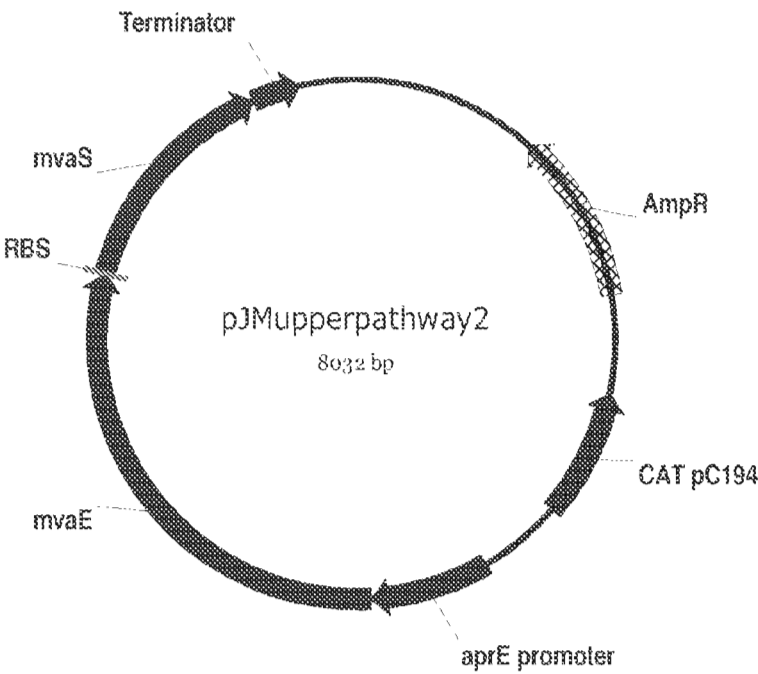


Figure 50



**Figure 51A**

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**Figure 51B**

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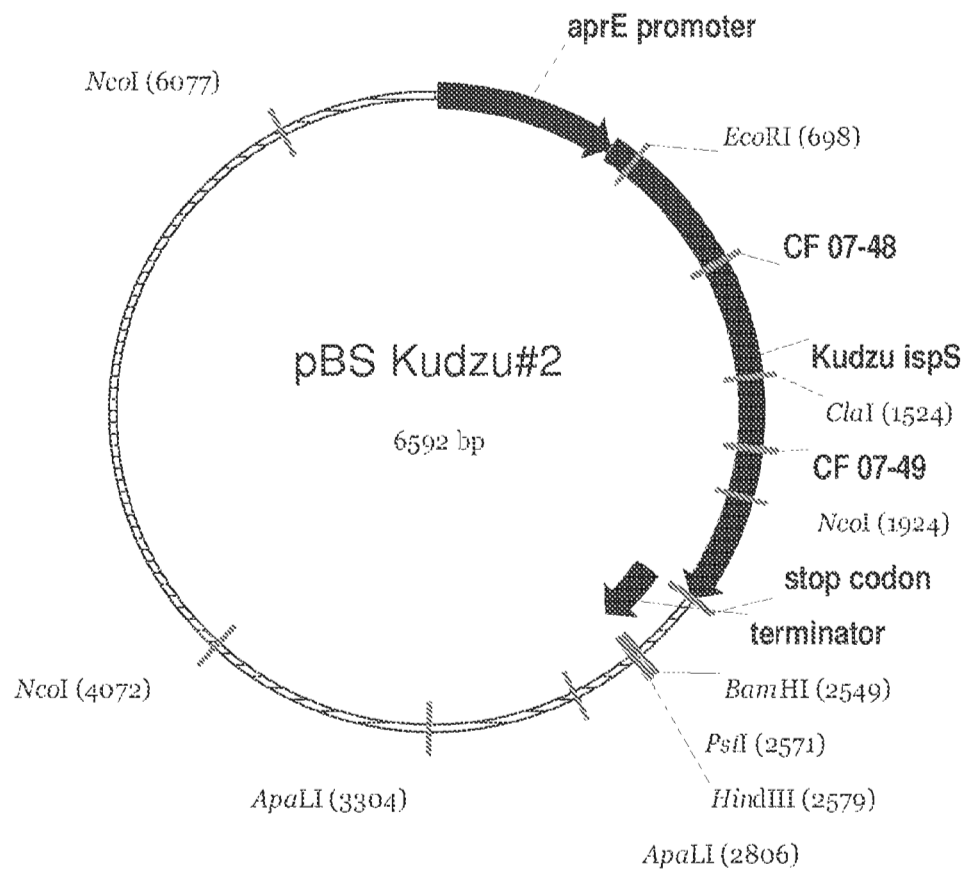
**Figure 51C**

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(SEQ ID NO:56)

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Figure 52



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Figure 53A

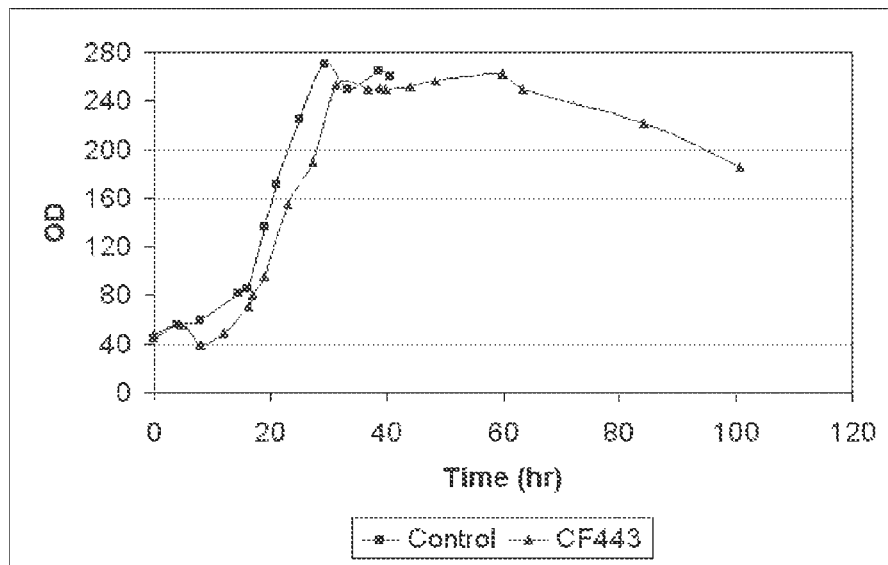
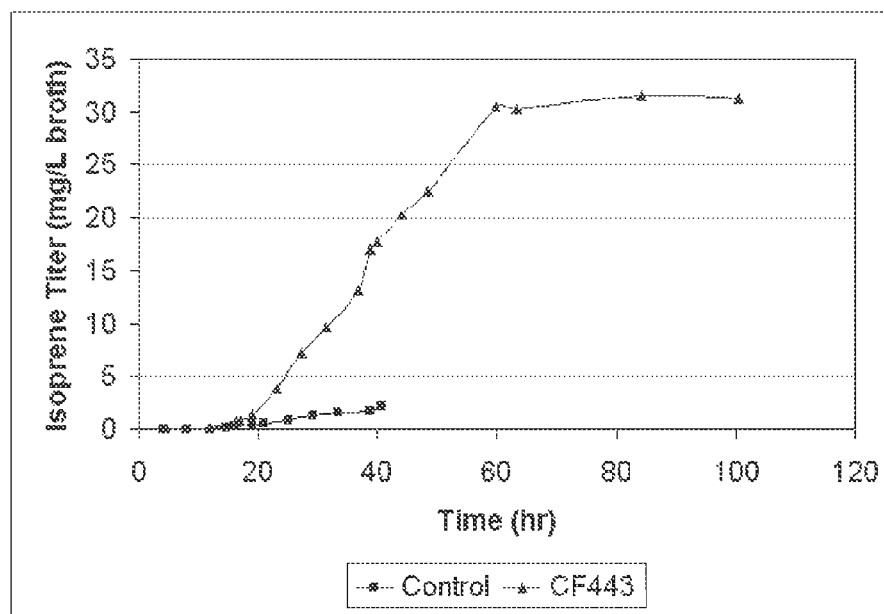


Figure 53B



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Figure 54

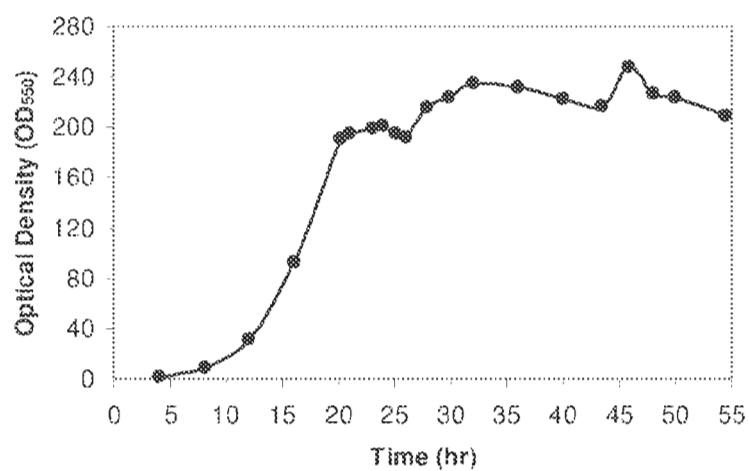


Figure 55

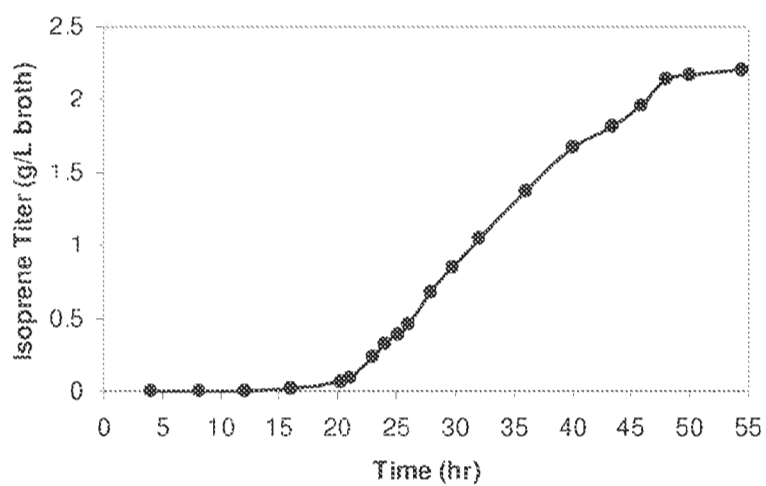


Figure 56

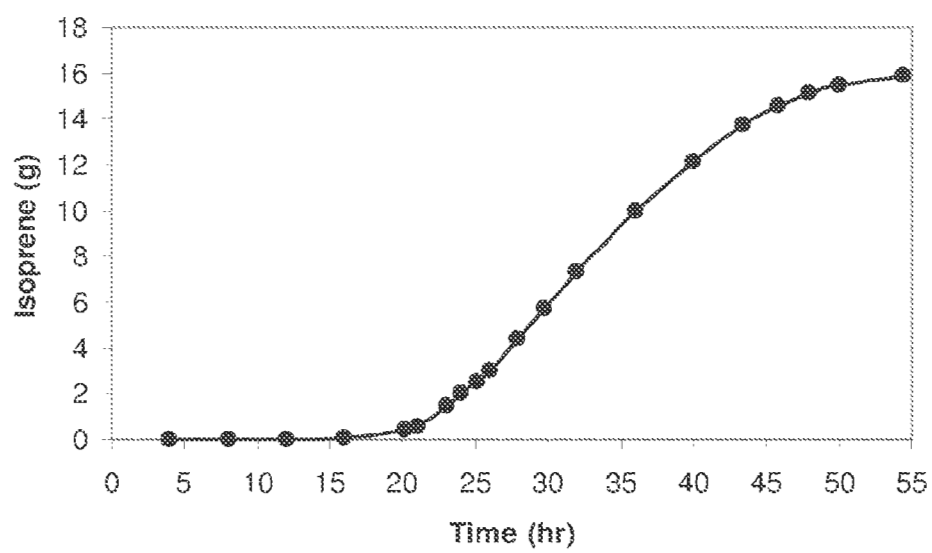
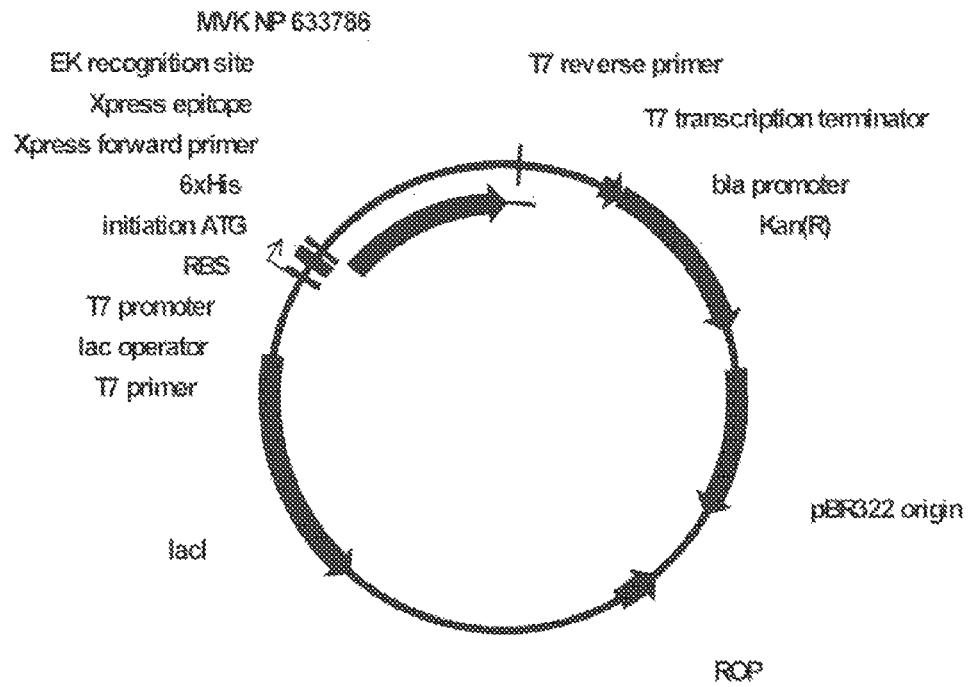


Figure 57A



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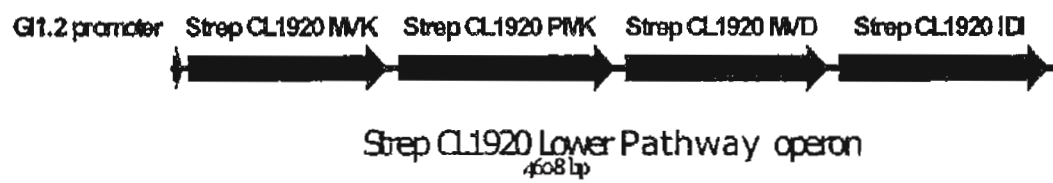


**Figure 57C**

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(SEQ ID NO:104)

Figure 58A



**Figure 58B**

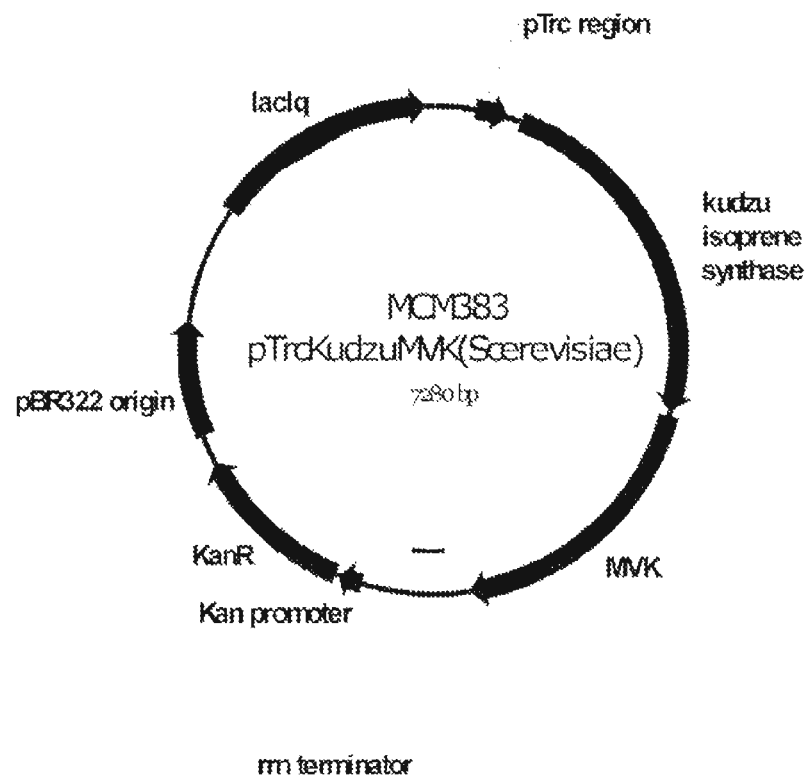
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(SEQ ID NO:105)

Figure 59A





## Figure 59C

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 (SEQ ID NO:106)

Figure 60

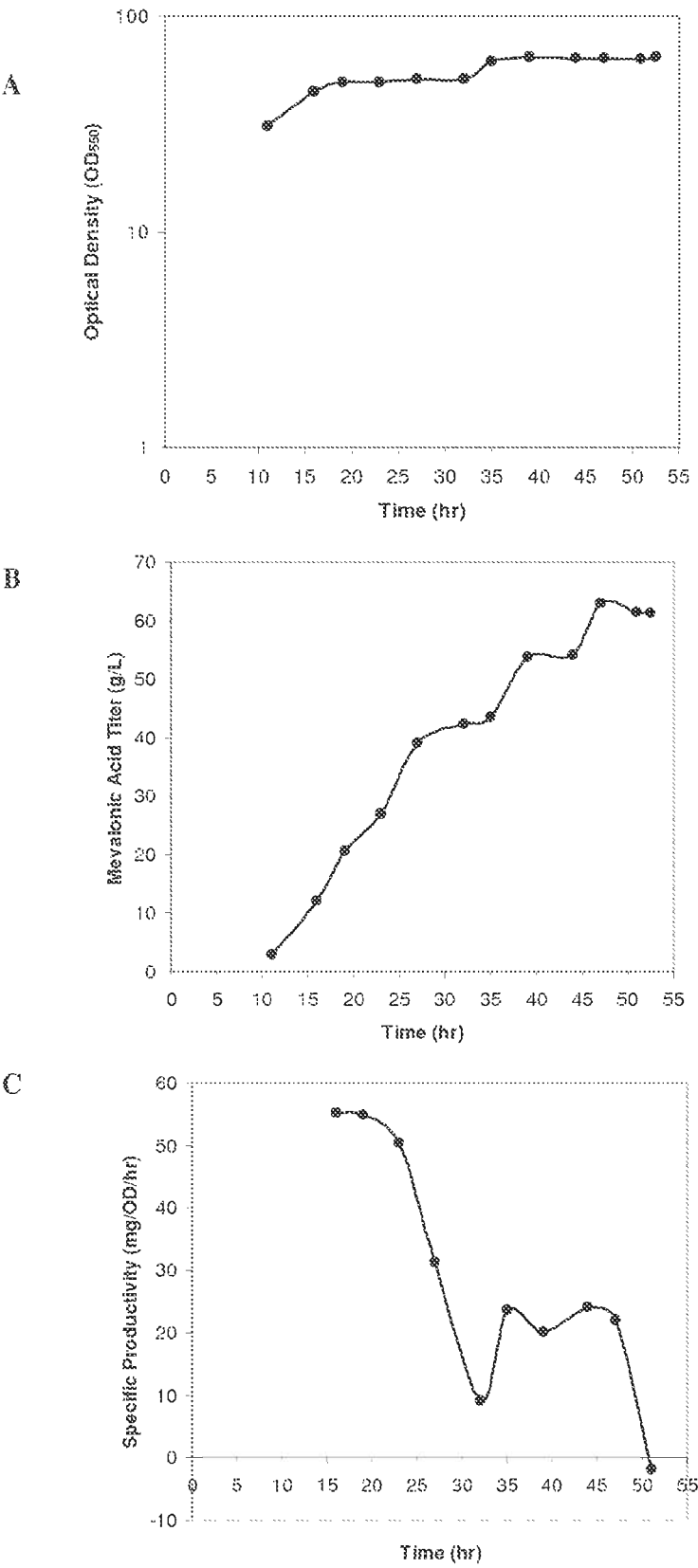


Figure 61

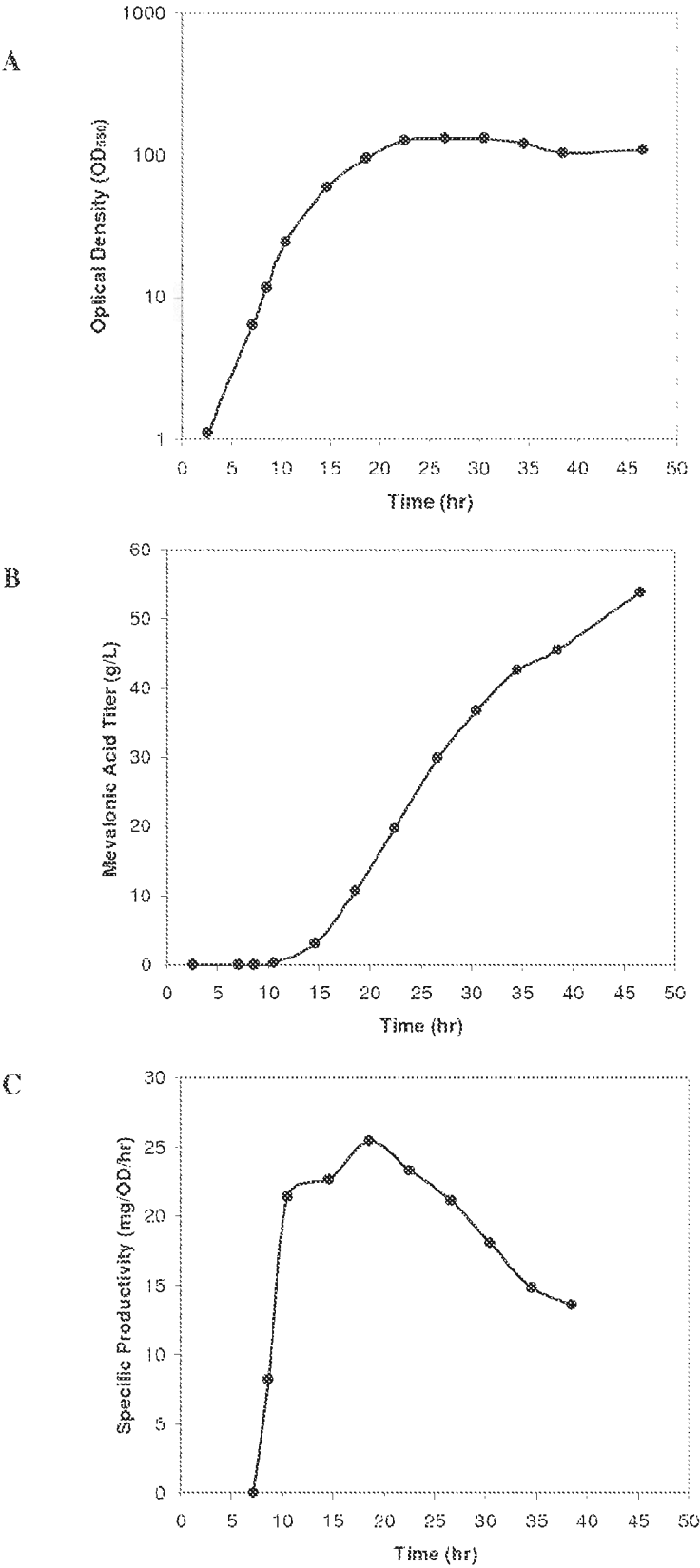


Figure 62

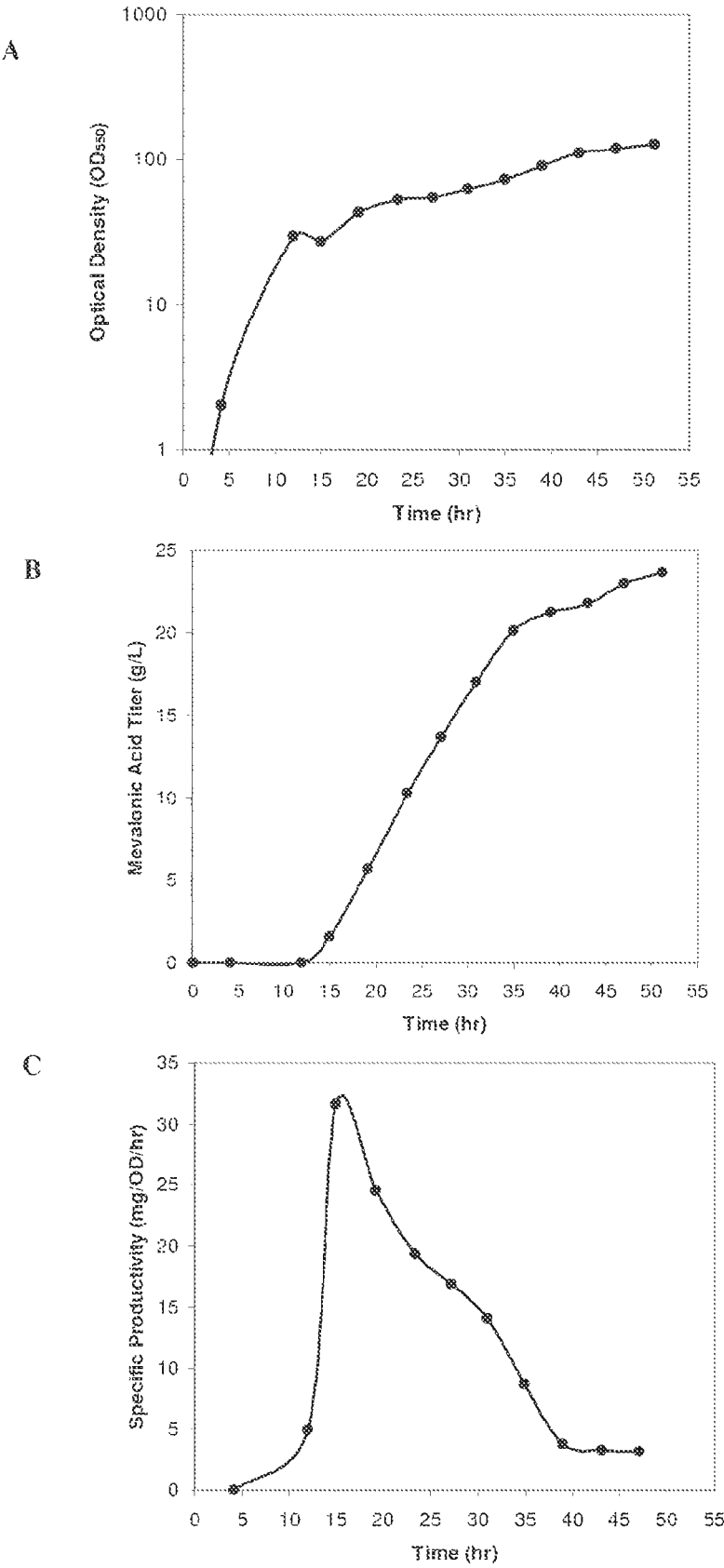


Figure 63

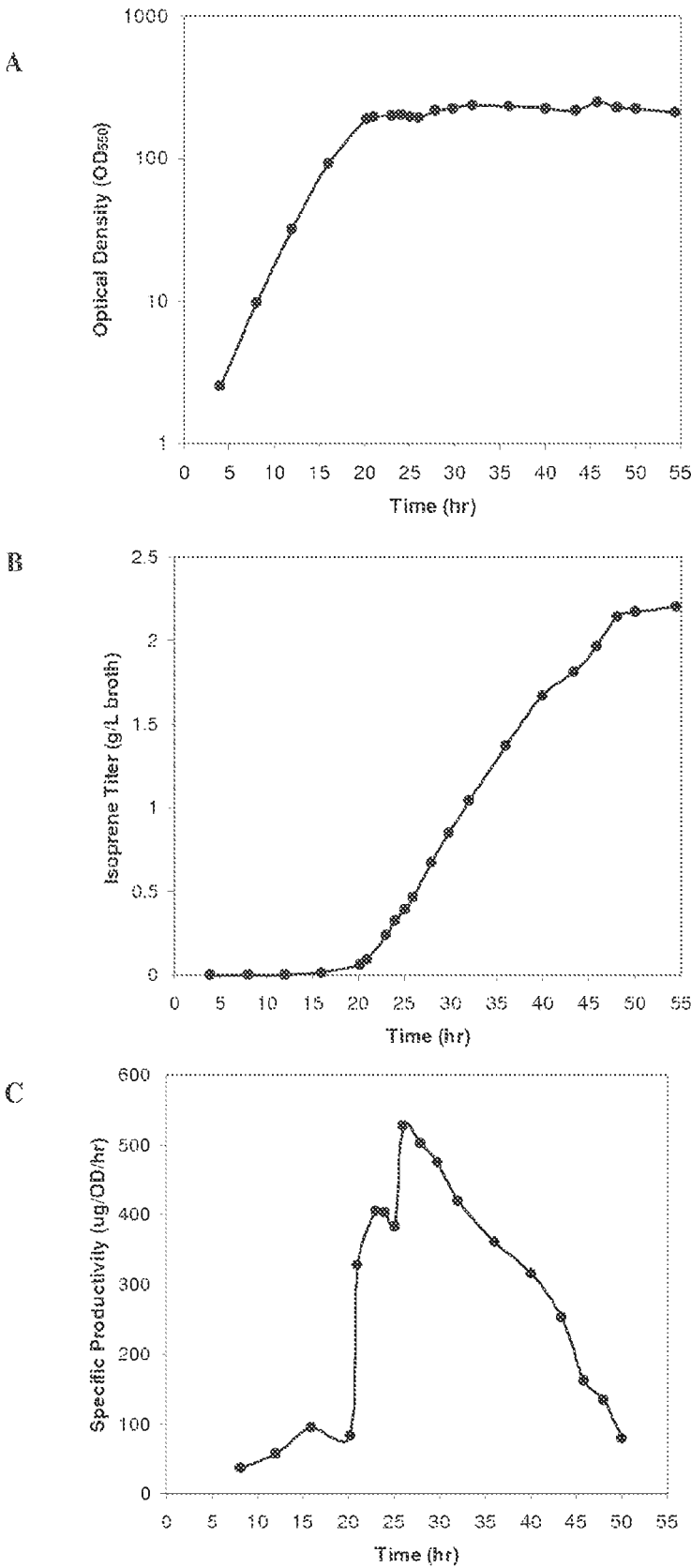


Figure 64

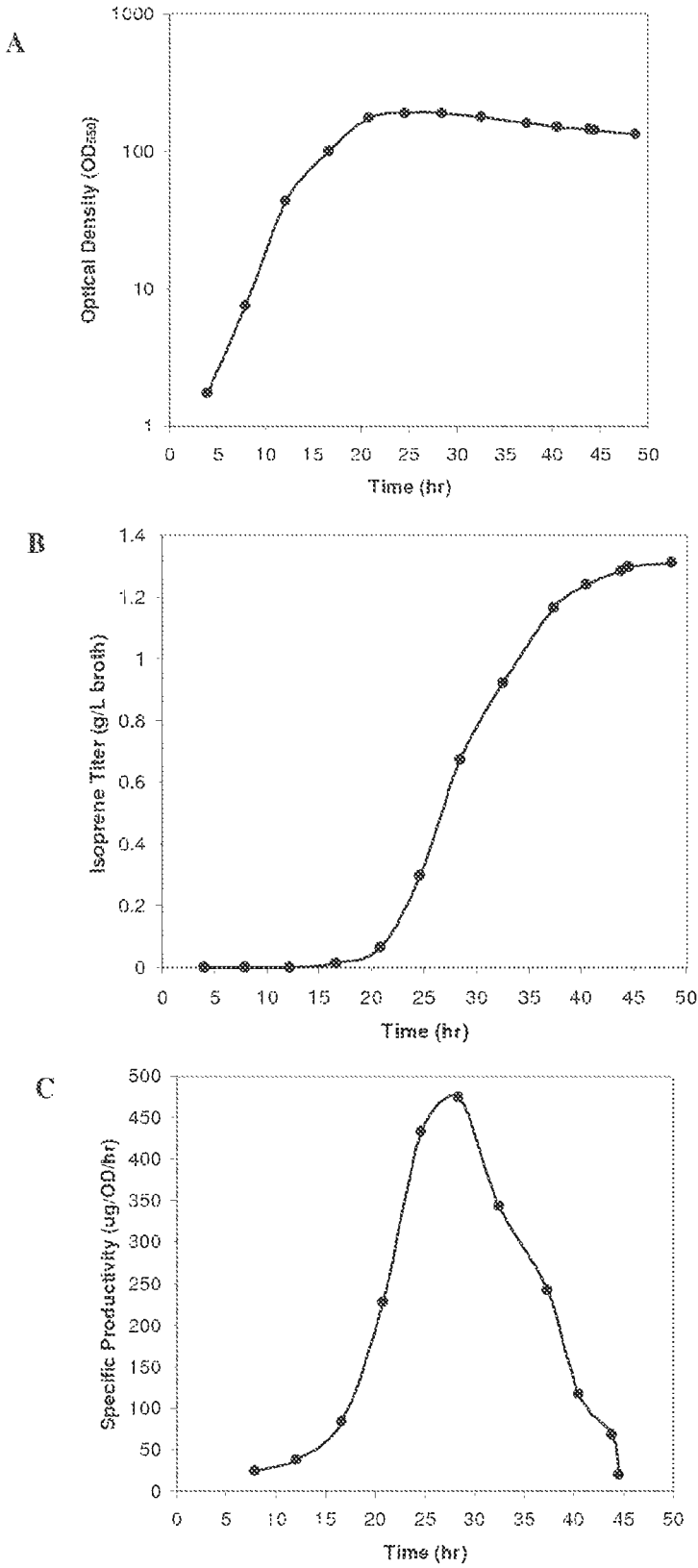


Figure 65

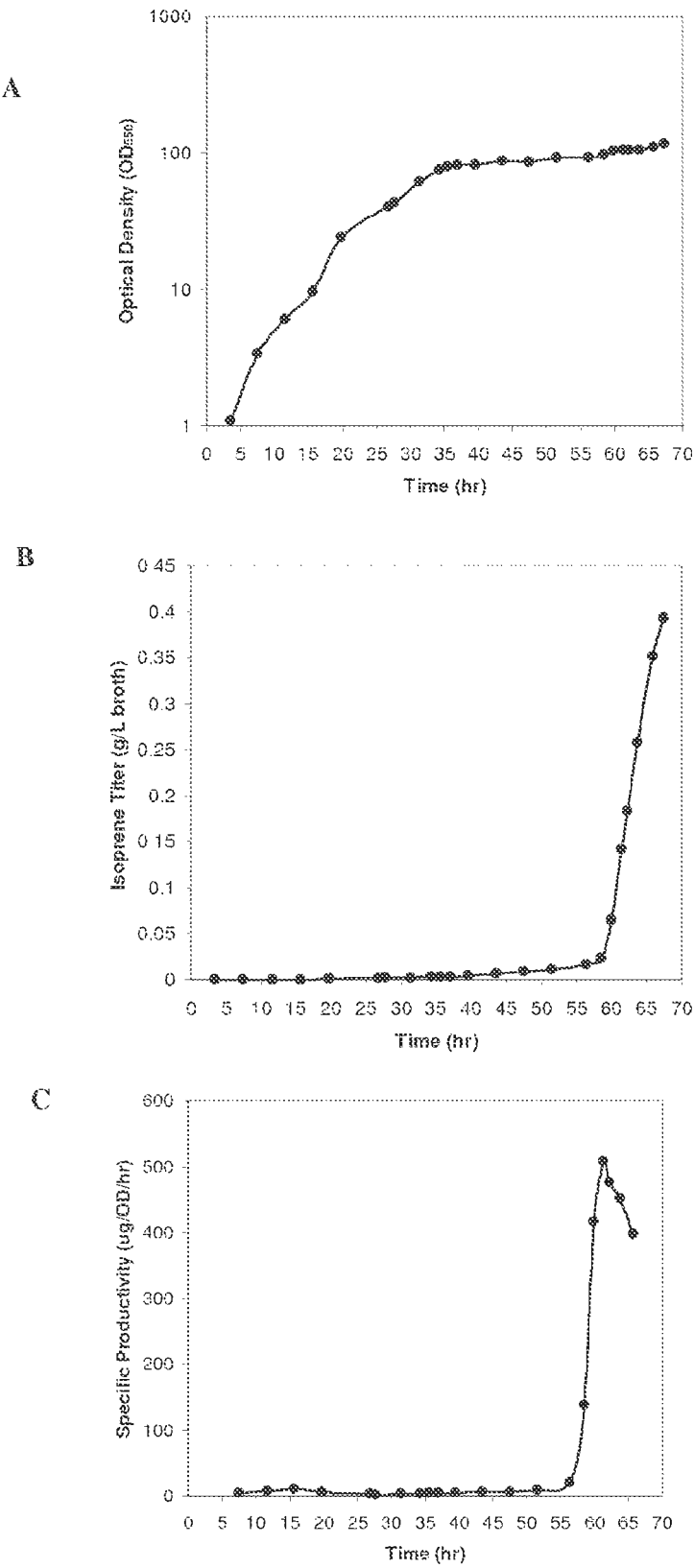


Figure 66

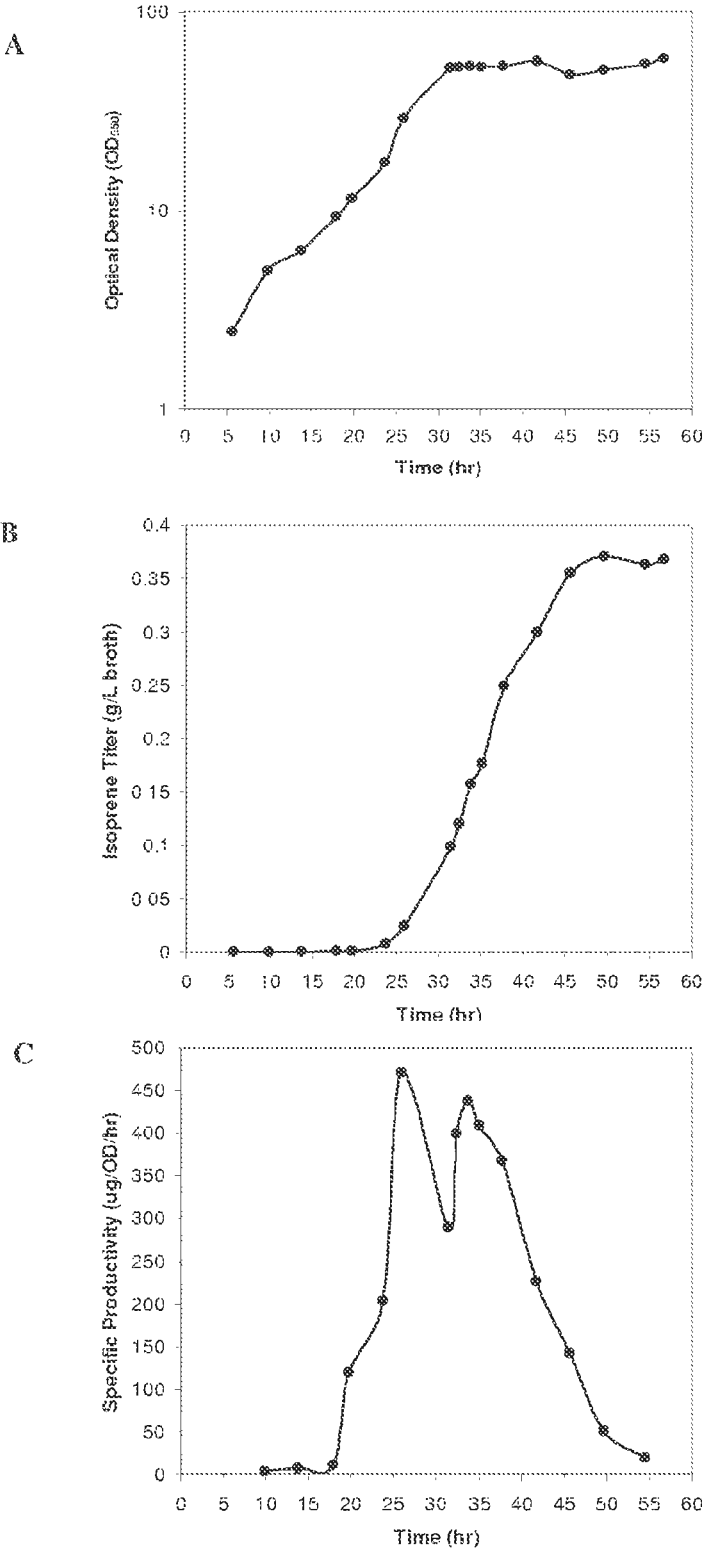


Figure 67

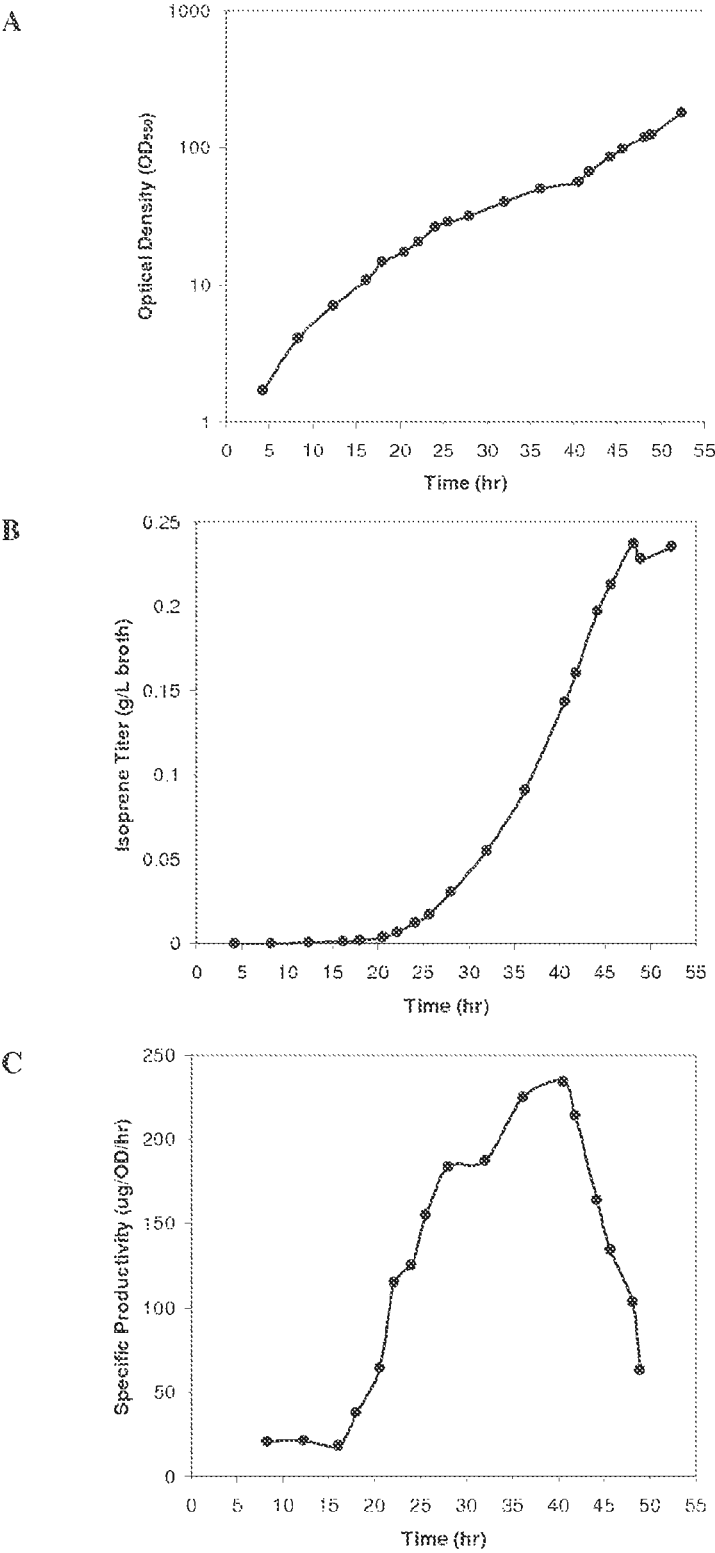
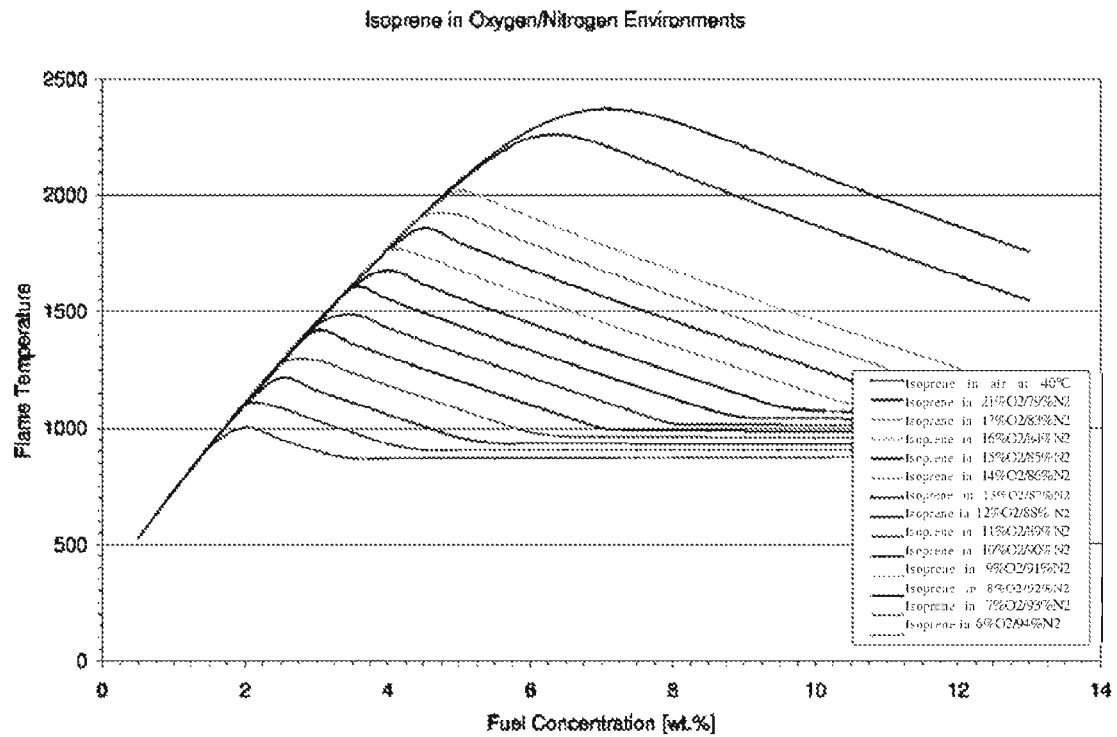
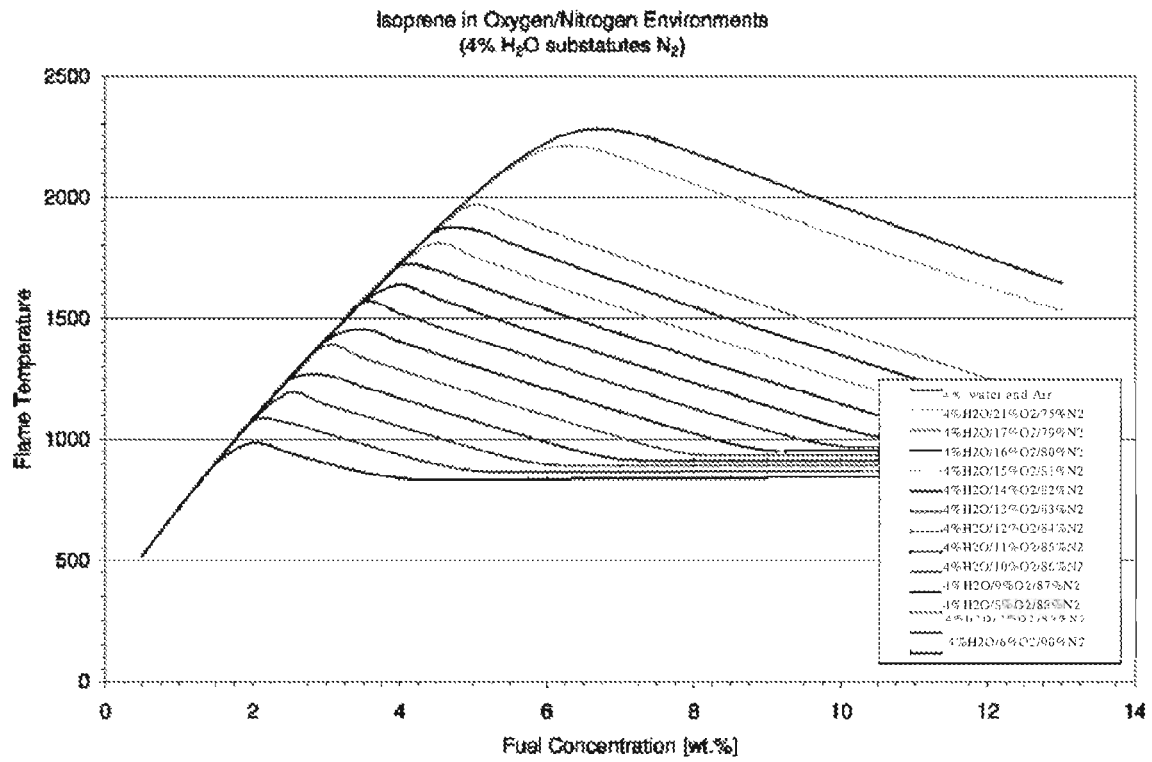


Figure 68



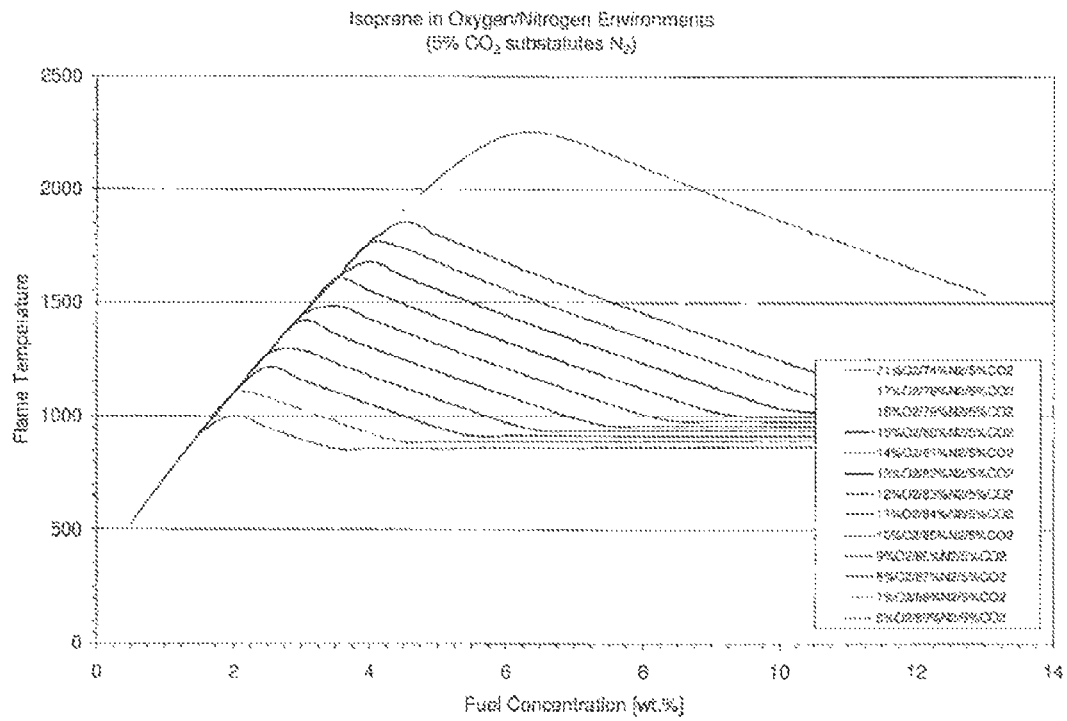
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Figure 69



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Figure 70



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Figure 71

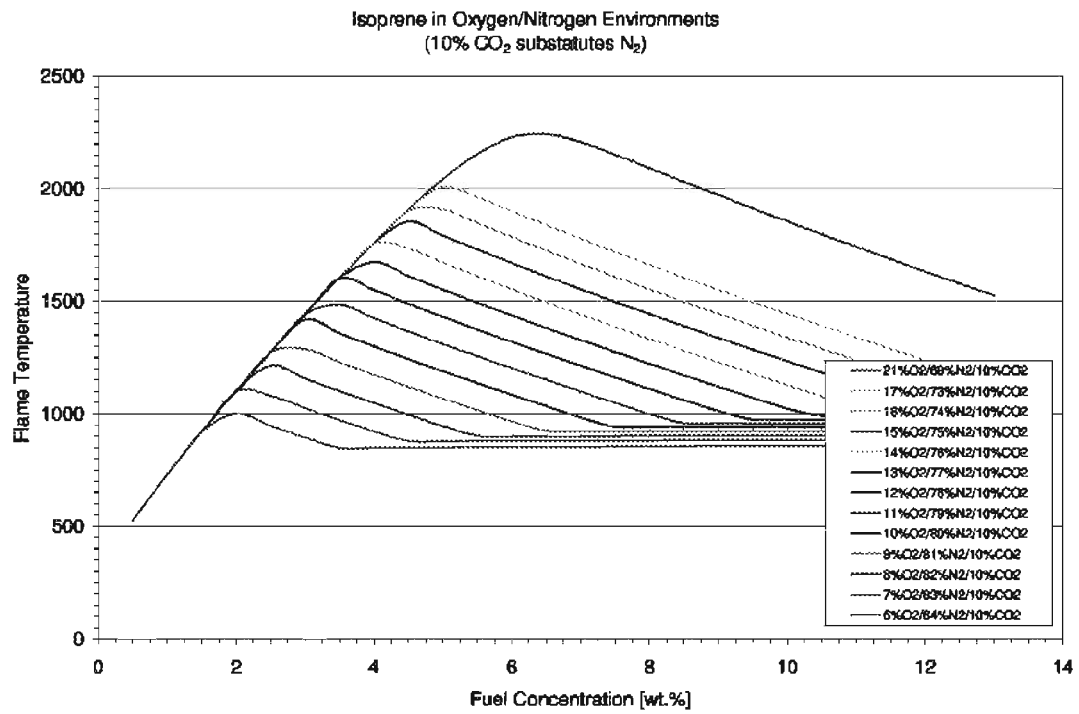
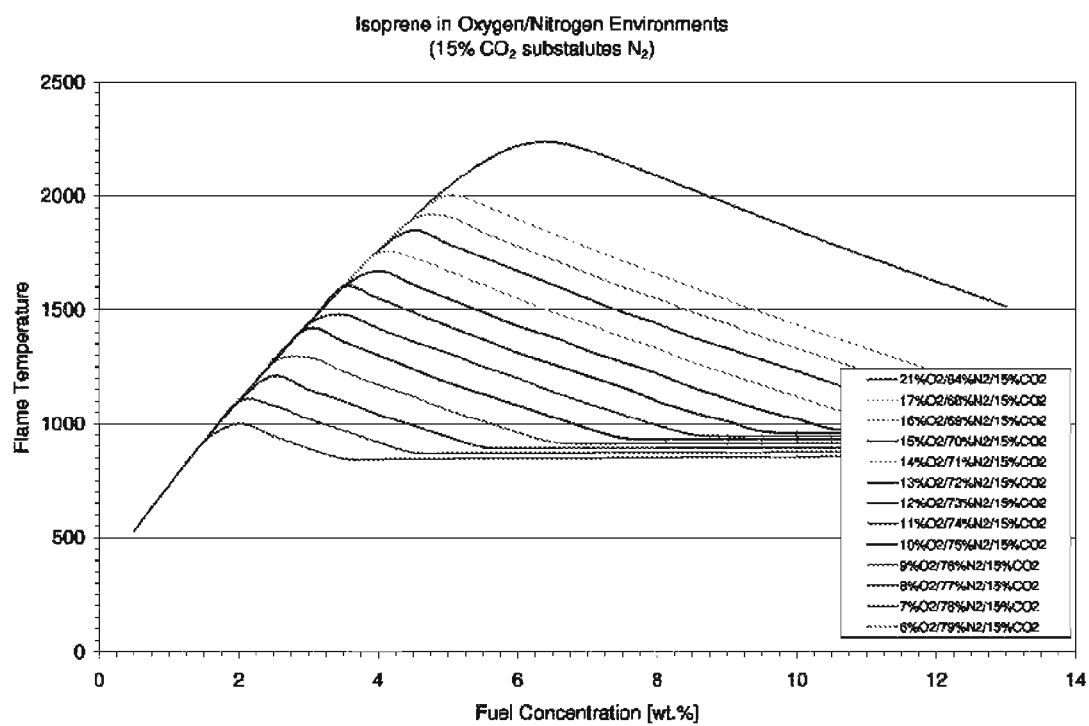


Figure 72



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Figure 73

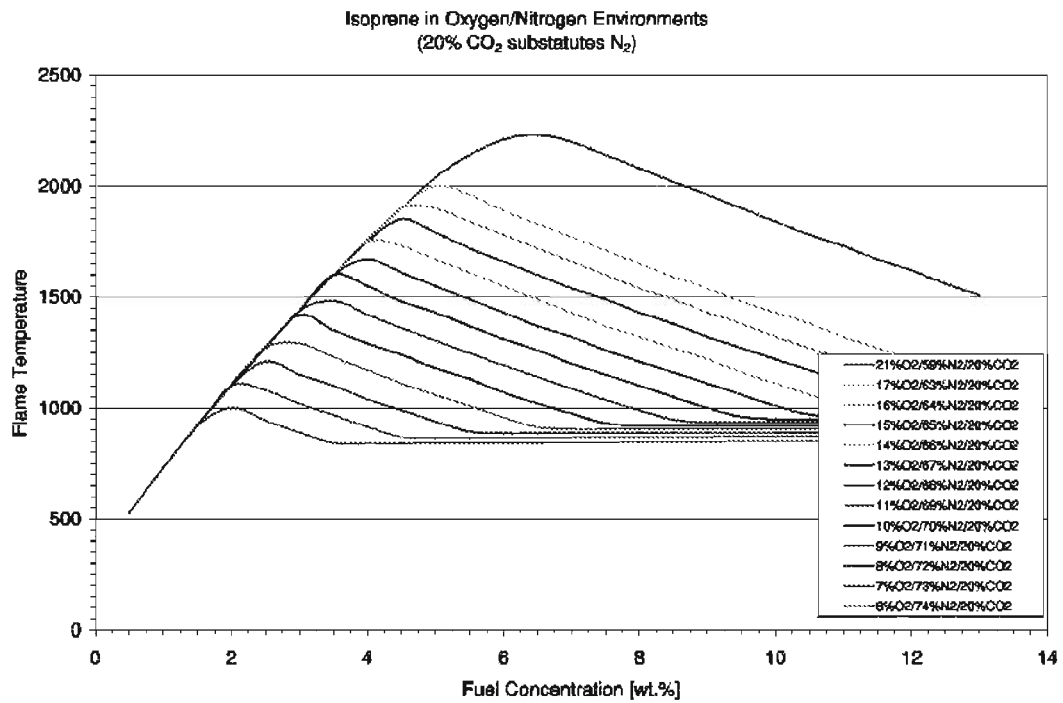
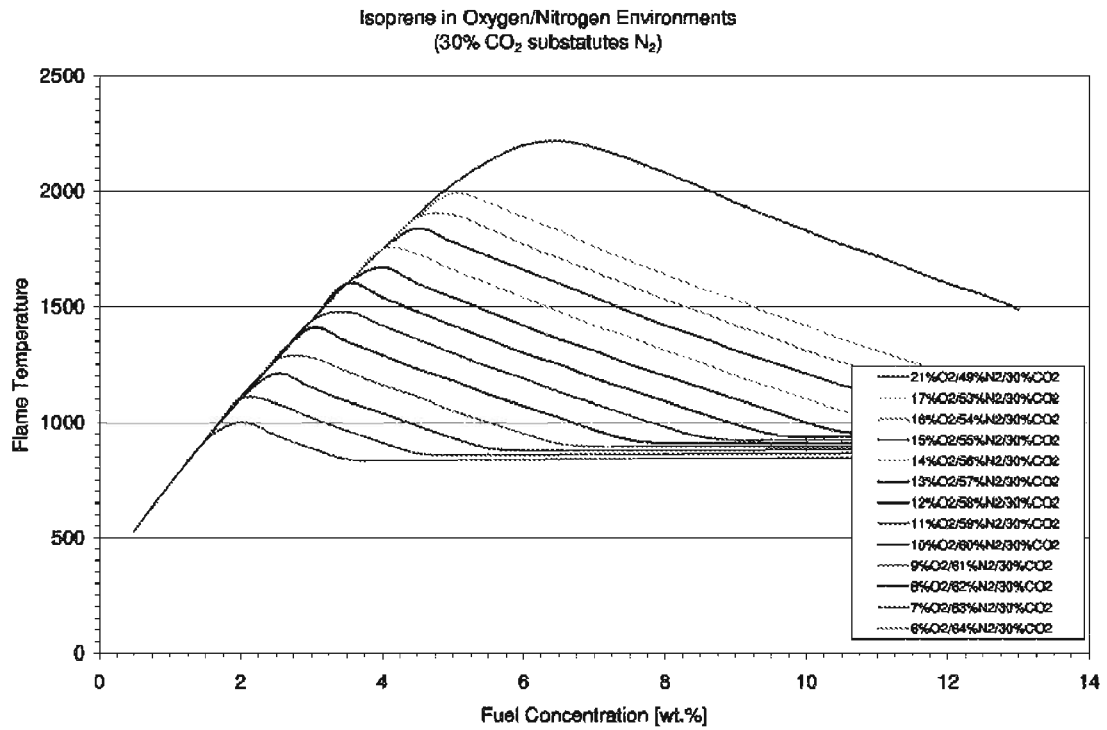


Figure 74



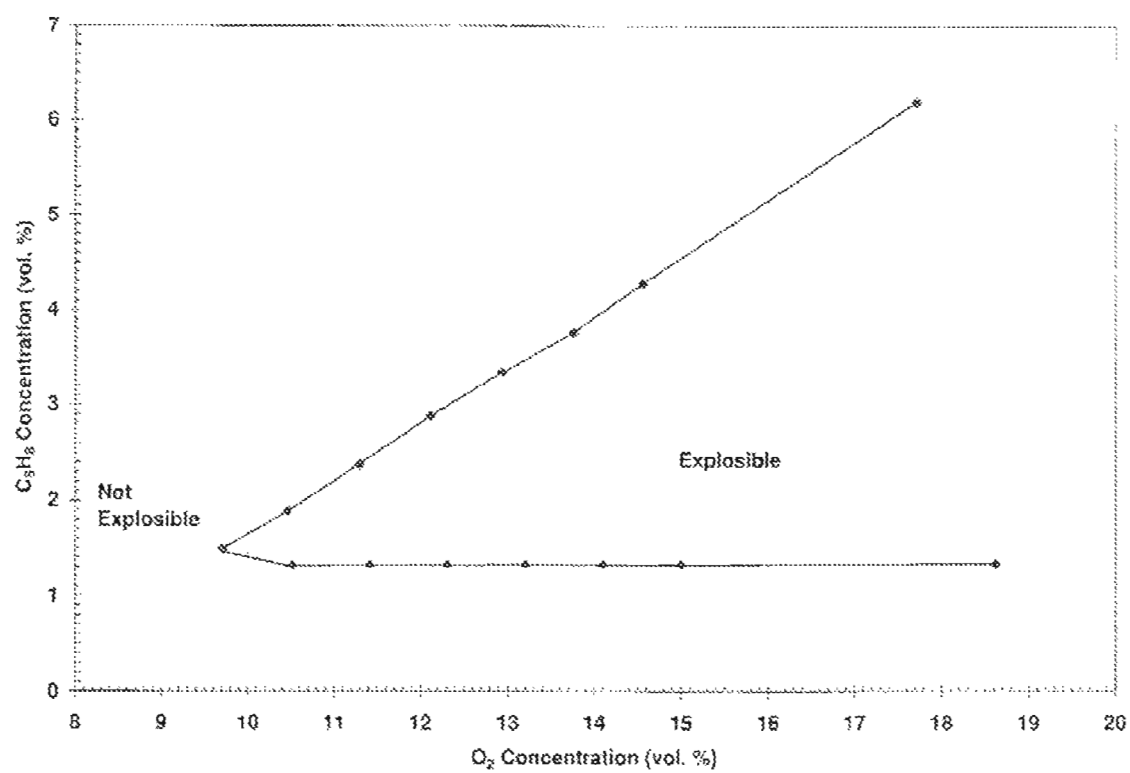
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Figure 75A

| 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 <sub>2</sub> O (wt. %) | O <sub>2</sub> (wt. %) | N <sub>2</sub> (wt. %) | Isoprene (mmole)                            | H <sub>2</sub> O (mmole) | O <sub>2</sub> (mmole) | N <sub>2</sub> (mmole) | Total (mmole) | Isoprene (vol. %)                                | O <sub>2</sub> (vol. %) | N <sub>2</sub> (vol. %) | H <sub>2</sub> 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                      |

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Figure 75B



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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. (wt. %)            | Oxidizer Conc. (wt. %) | Isoprene (wt. %) | H <sub>2</sub> O (wt. %) | O <sub>2</sub> (wt. %) | N <sub>2</sub> (wt. %) | Isoprene (mole)                             | H <sub>2</sub> O (mole) | O <sub>2</sub> (mole) | N <sub>2</sub> (mole) | Total (mole) | Isoprene (vol. %)                                | O <sub>2</sub> (vol. %) | N <sub>2</sub> (vol. %) | H <sub>2</sub> 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                      |

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Figure 76B

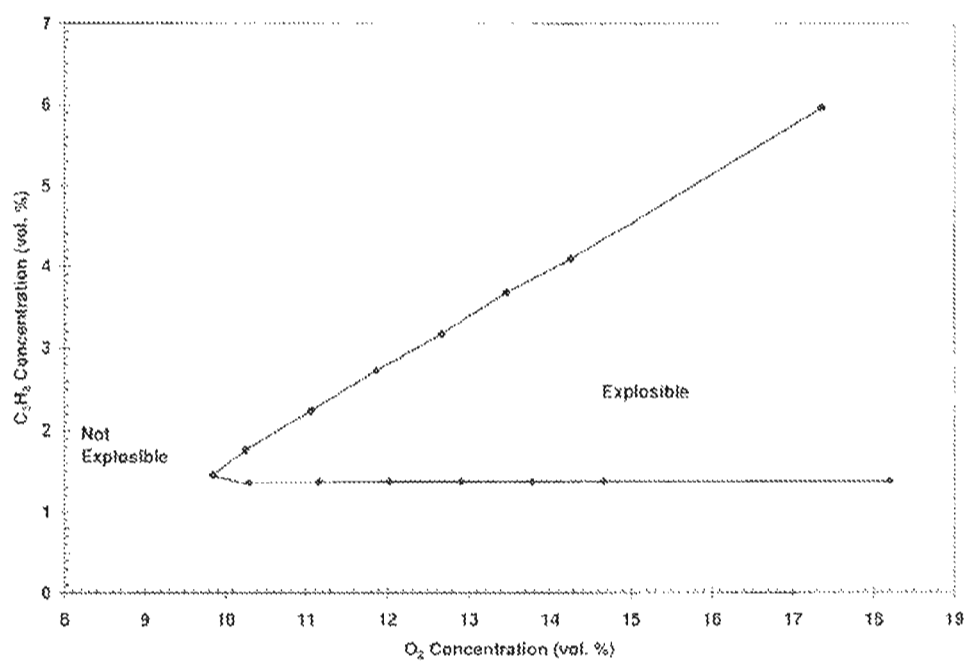
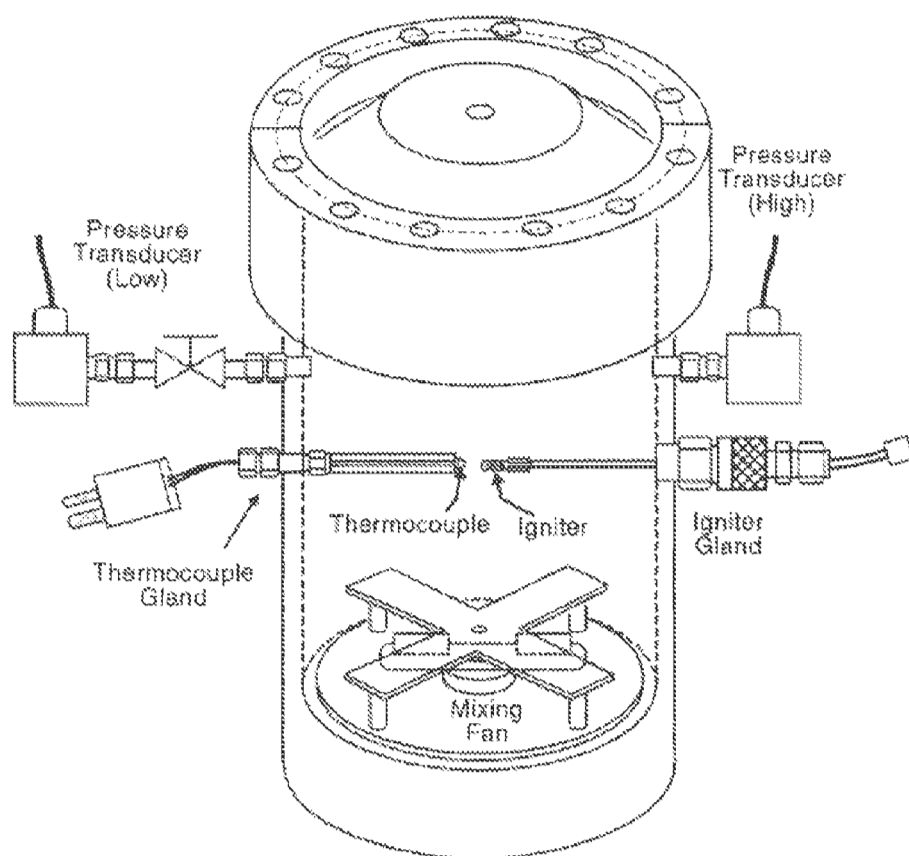


Figure 77



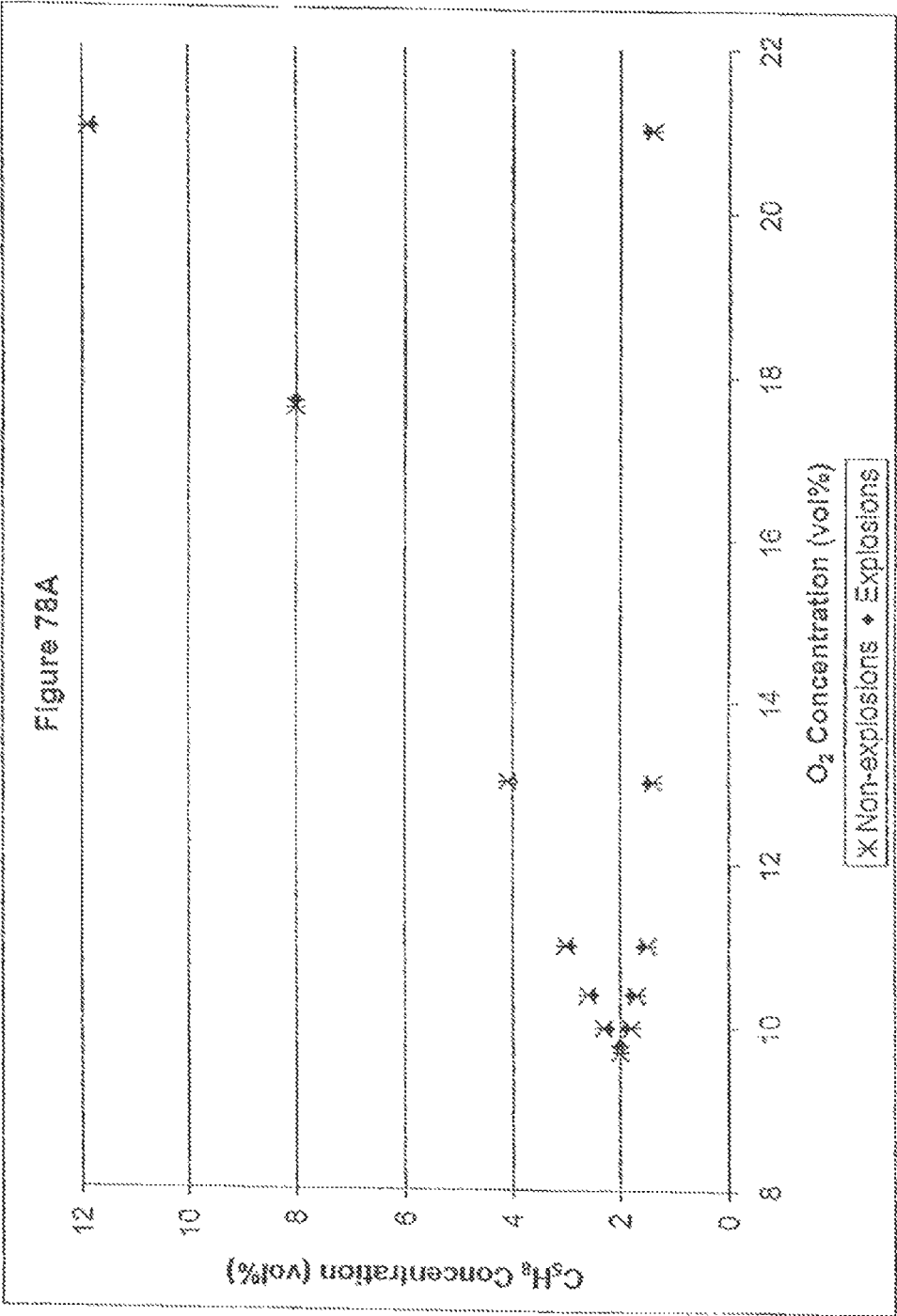
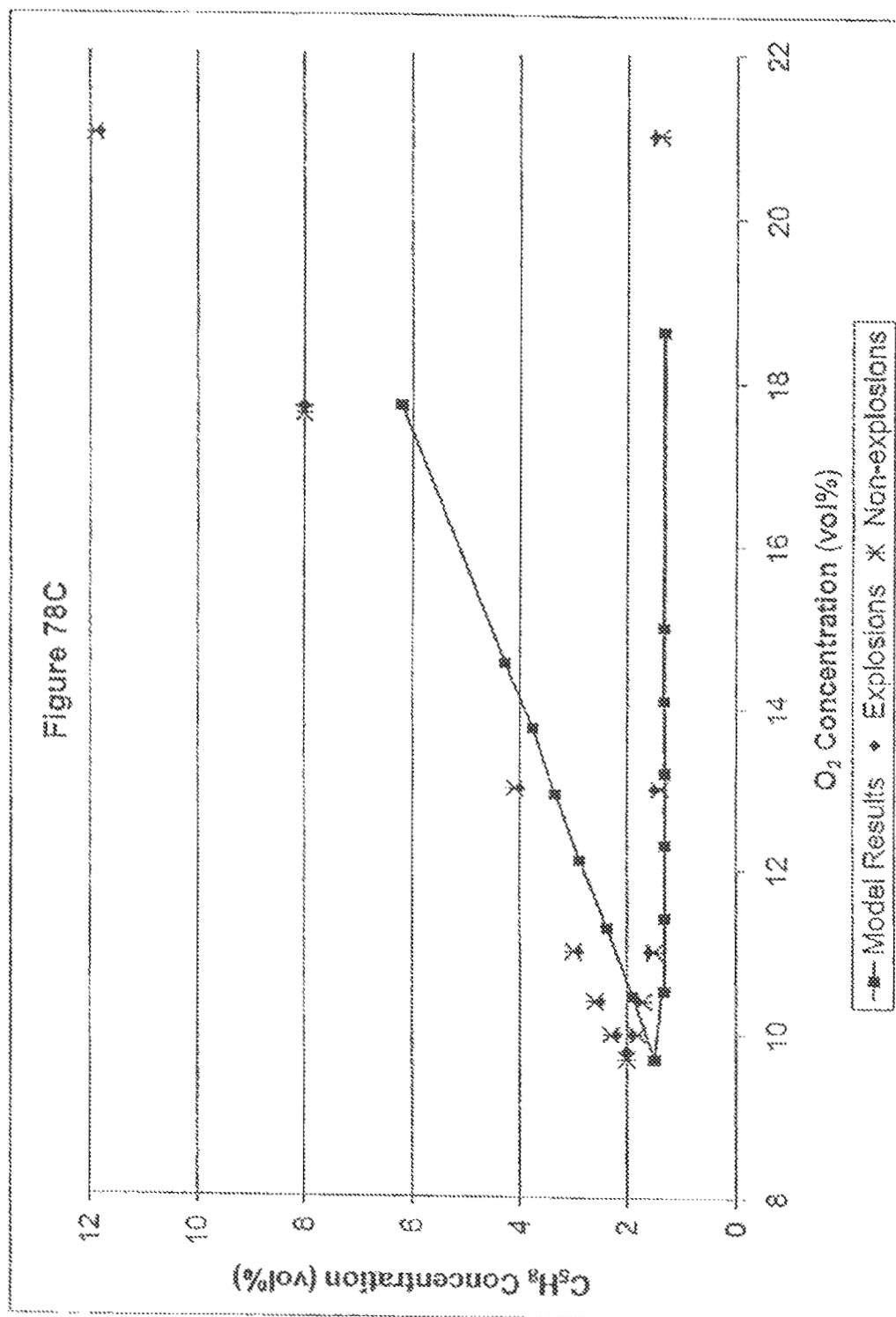


Figure 78B

| Explosions                               |                                                         | Non-explosions                           |                                                         |
|------------------------------------------|---------------------------------------------------------|------------------------------------------|---------------------------------------------------------|
| O <sub>2</sub> Concentration<br>(vol. %) | C <sub>5</sub> H <sub>8</sub> Concentration<br>(vol. %) | O <sub>2</sub> Concentration<br>(vol. %) | C <sub>5</sub> H <sub>8</sub> Concentration<br>(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                                                    |

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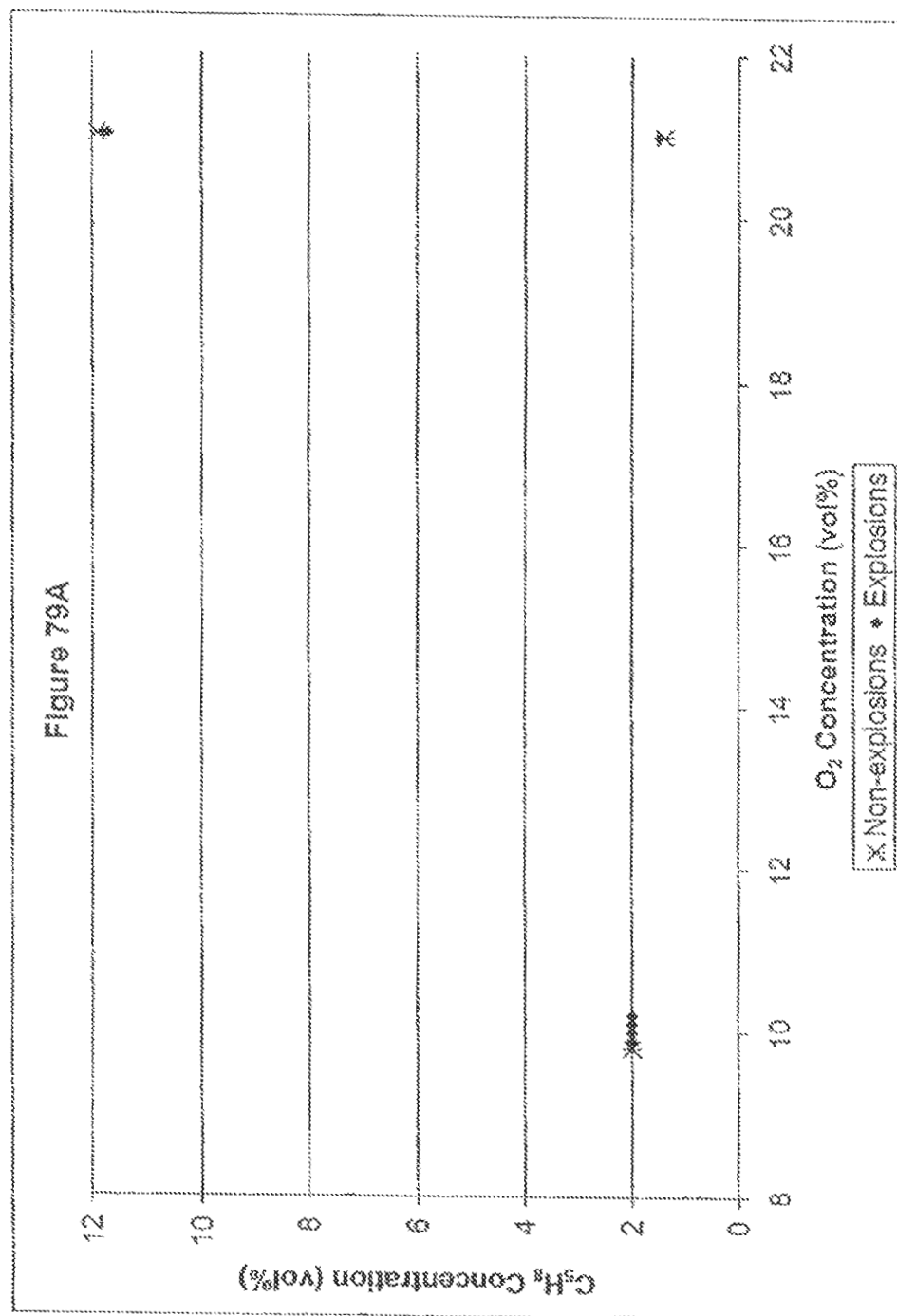


Figure 79B

| Explosions                               |                                                         | Non-explosions                           |                                                         |
|------------------------------------------|---------------------------------------------------------|------------------------------------------|---------------------------------------------------------|
| O <sub>2</sub> Concentration<br>(vol. %) | C <sub>5</sub> H <sub>8</sub> Concentration<br>(vol. %) | O <sub>2</sub> Concentration<br>(vol. %) | C <sub>5</sub> H <sub>8</sub> Concentration<br>(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 80A

## TEST SERIES 1

| Test | Data File Name | Temp<br>°C | Initial<br>Pressure<br>bara | Partial Pressures                     |                        |                        | Concentrations                          |                          |                          | Result        | P <sub>exp</sub><br>bara |
|------|----------------|------------|-----------------------------|---------------------------------------|------------------------|------------------------|-----------------------------------------|--------------------------|--------------------------|---------------|--------------------------|
|      |                |            |                             | C <sub>2</sub> H <sub>6</sub><br>mbar | N <sub>2</sub><br>mbar | O <sub>2</sub><br>mbar | C <sub>2</sub> H <sub>6</sub><br>vol. % | N <sub>2</sub><br>vol. % | O <sub>2</sub><br>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                                    | 786                    | 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     | 4.21                     |
| 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                       | 15                                    | 866                    | 132                    | 1.5                                     | 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<br>°C | Initial Pressure<br>bara | Partial Pressures                     |                        |                        | Concentrations                          |                          |                          | Result        | P <sub>ex</sub><br>bara |
|------|----------------|------------|--------------------------|---------------------------------------|------------------------|------------------------|-----------------------------------------|--------------------------|--------------------------|---------------|-------------------------|
|      |                |            |                          | C <sub>5</sub> H <sub>8</sub><br>mbar | N <sub>2</sub><br>mbar | O <sub>2</sub><br>mbar | C <sub>5</sub> H <sub>8</sub><br>vol. % | N <sub>2</sub><br>vol. % | O <sub>2</sub><br>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                                     | 87.9                     | 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                    | 99                     | 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<br>°C | Initial Pressure<br>bara | Partial Pressures        |                                       |                        |                        | Concentrations             |                                         |                          |                          | Result        | Pex<br>bara |
|------|----------------|------------|--------------------------|--------------------------|---------------------------------------|------------------------|------------------------|----------------------------|-----------------------------------------|--------------------------|--------------------------|---------------|-------------|
|      |                |            |                          | H <sub>2</sub> O<br>mbar | C <sub>2</sub> H <sub>6</sub><br>mbar | N <sub>2</sub><br>mbar | O <sub>2</sub><br>mbar | H <sub>2</sub> O<br>vol. % | C <sub>2</sub> H <sub>6</sub><br>vol. % | N <sub>2</sub><br>vol. % | O <sub>2</sub><br>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                                    | 62.1                     | 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                                    | 63.0                     | 21.0                     | Explosion     | 1.09        |
| 6    | T11150705      | 40         | 1.014                    | 40                       | 121                                   | 640                    | 213                    | 3.9                        | 11.9                                    | 63.1                     | 21.0                     | Non-explosion | 1.06        |
| 7    | T11150706      | 40         | 1.014                    | 40                       | 15                                    | 746                    | 213                    | 3.9                        | 1.5                                     | 73.6                     | 21.0                     | Explosion     | 4.66        |
| 8    | T11150707      | 40         | 1.014                    | 41                       | 15                                    | 746                    | 213                    | 4.0                        | 1.5                                     | 73.6                     | 21.0                     | Explosion     | 6.27        |
| 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     | 1.08        |
| 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        |

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Figure 82

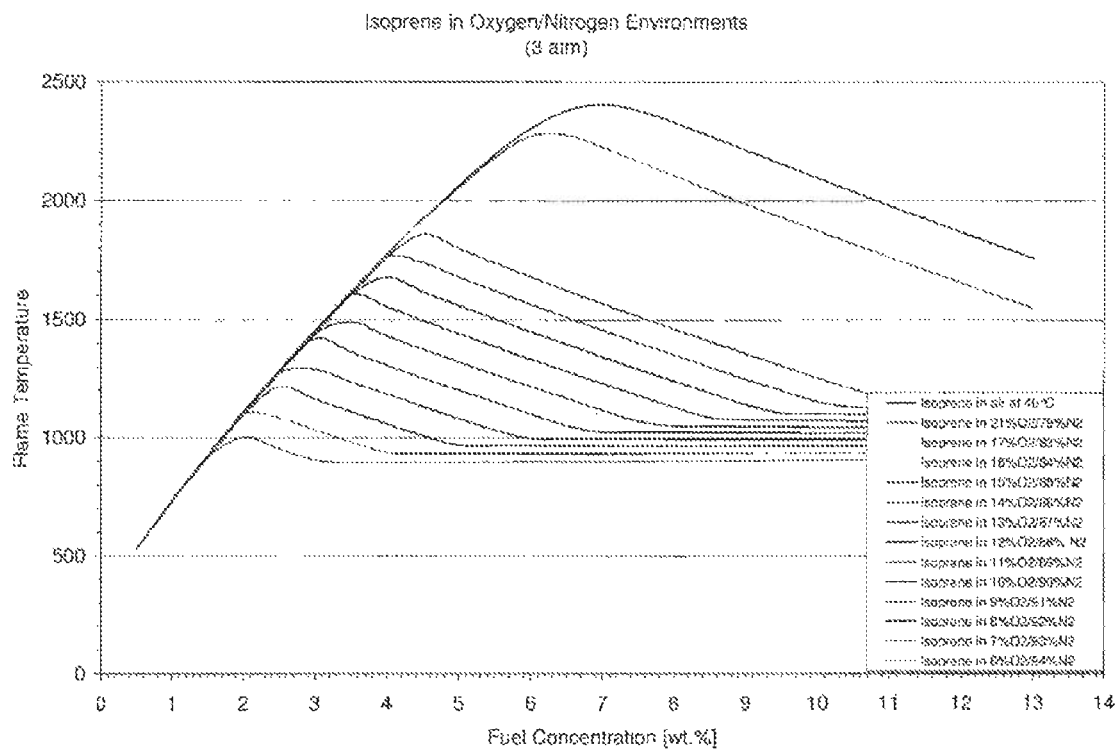
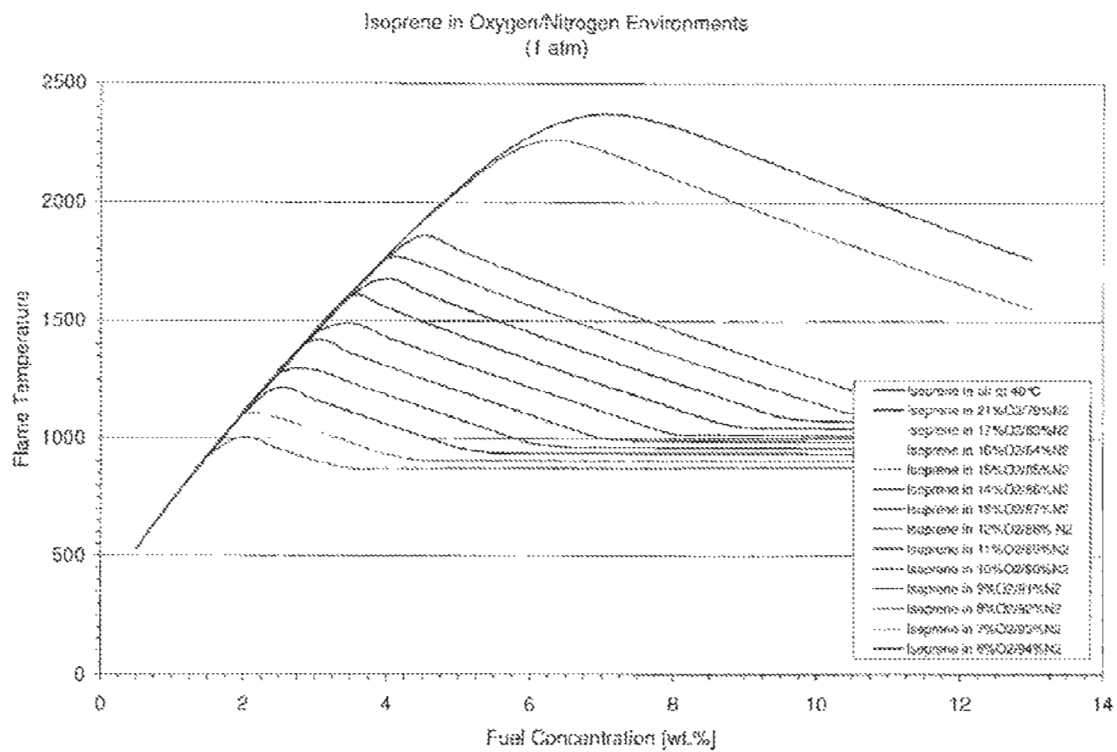
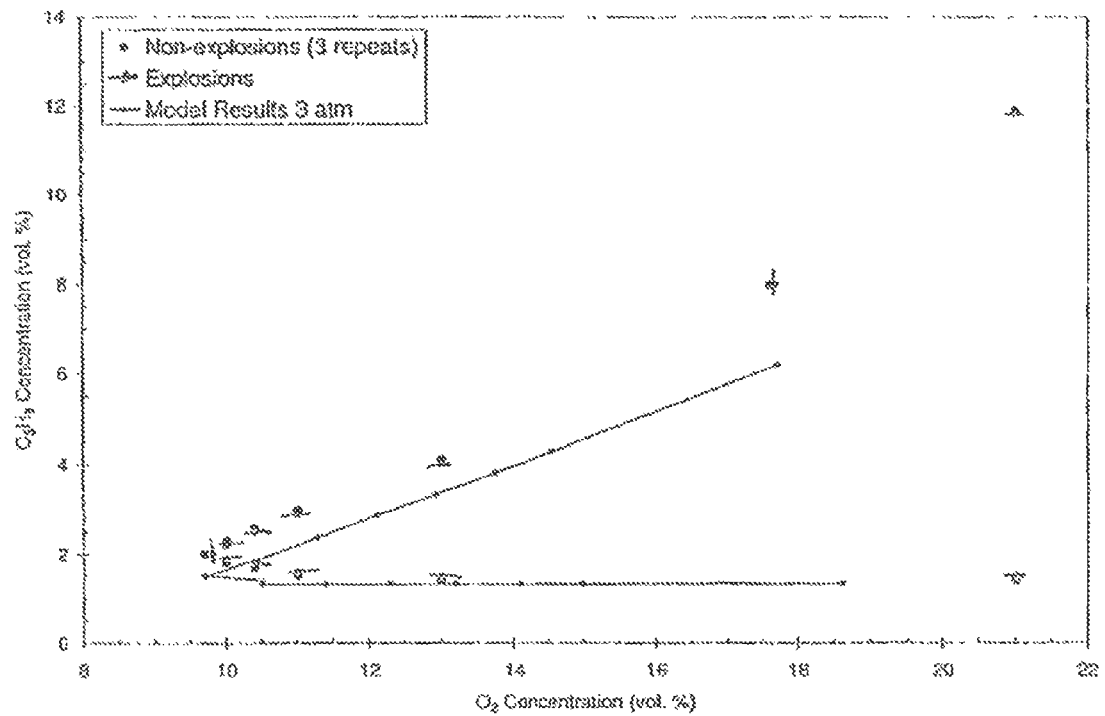


Figure 83



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Figure 84



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Figure 85

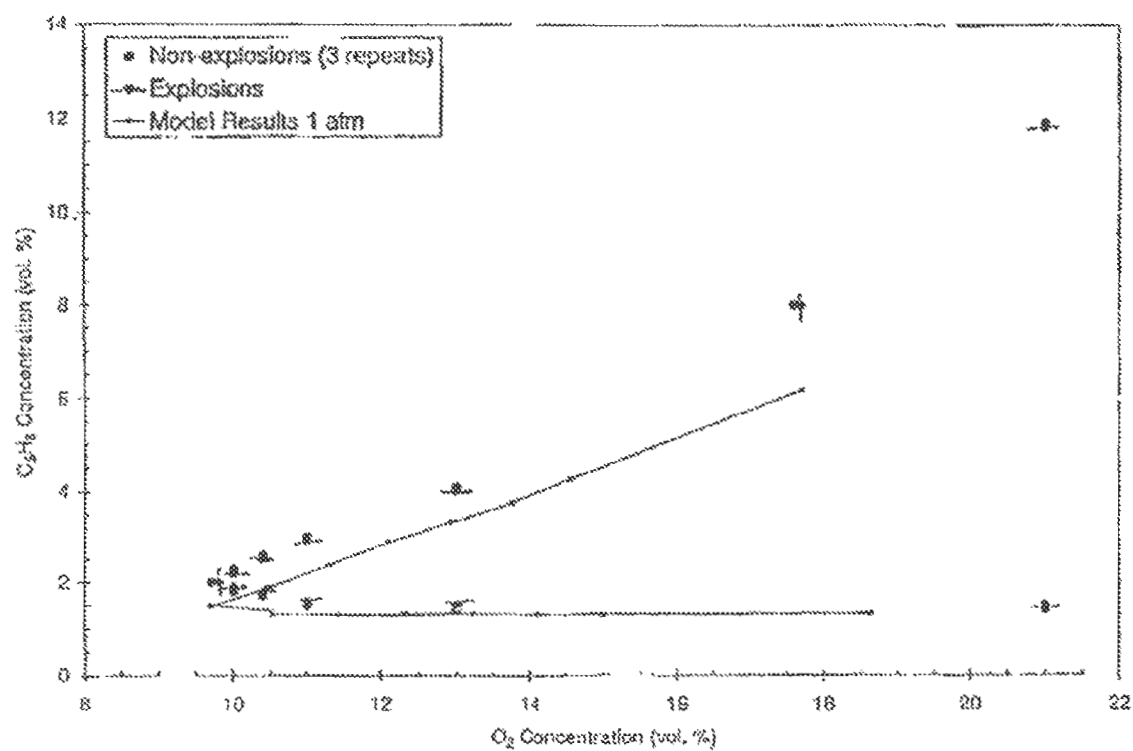


Figure 86A

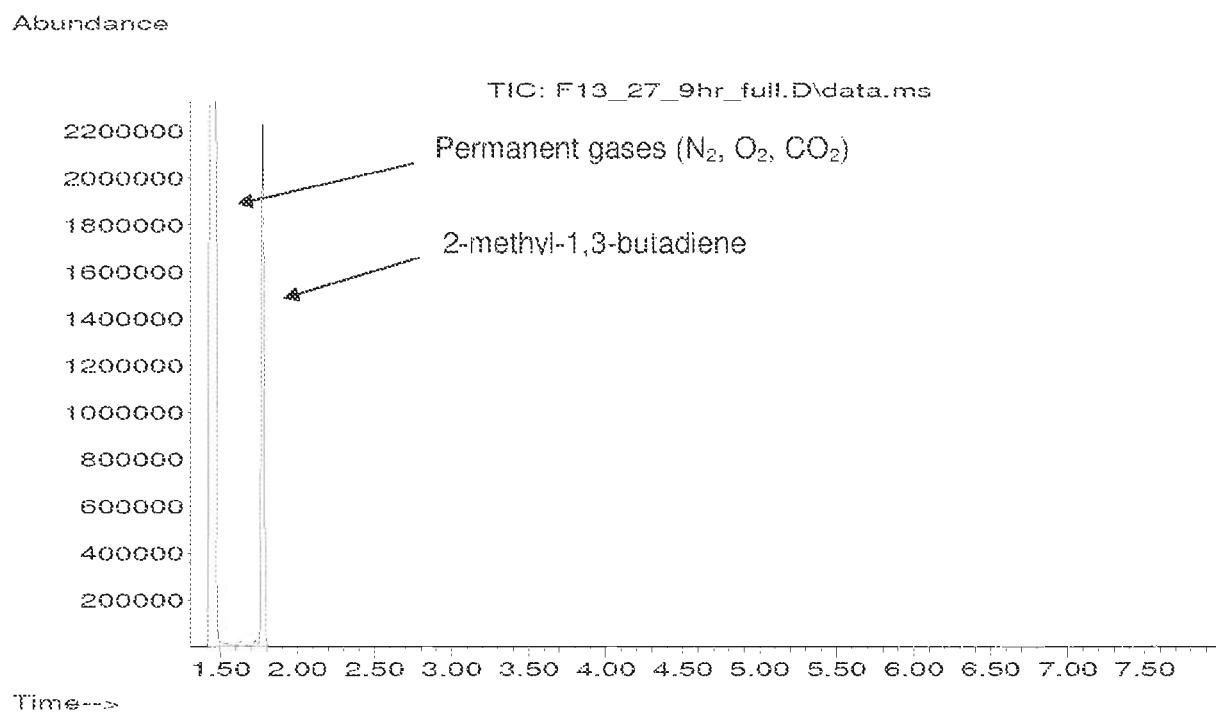
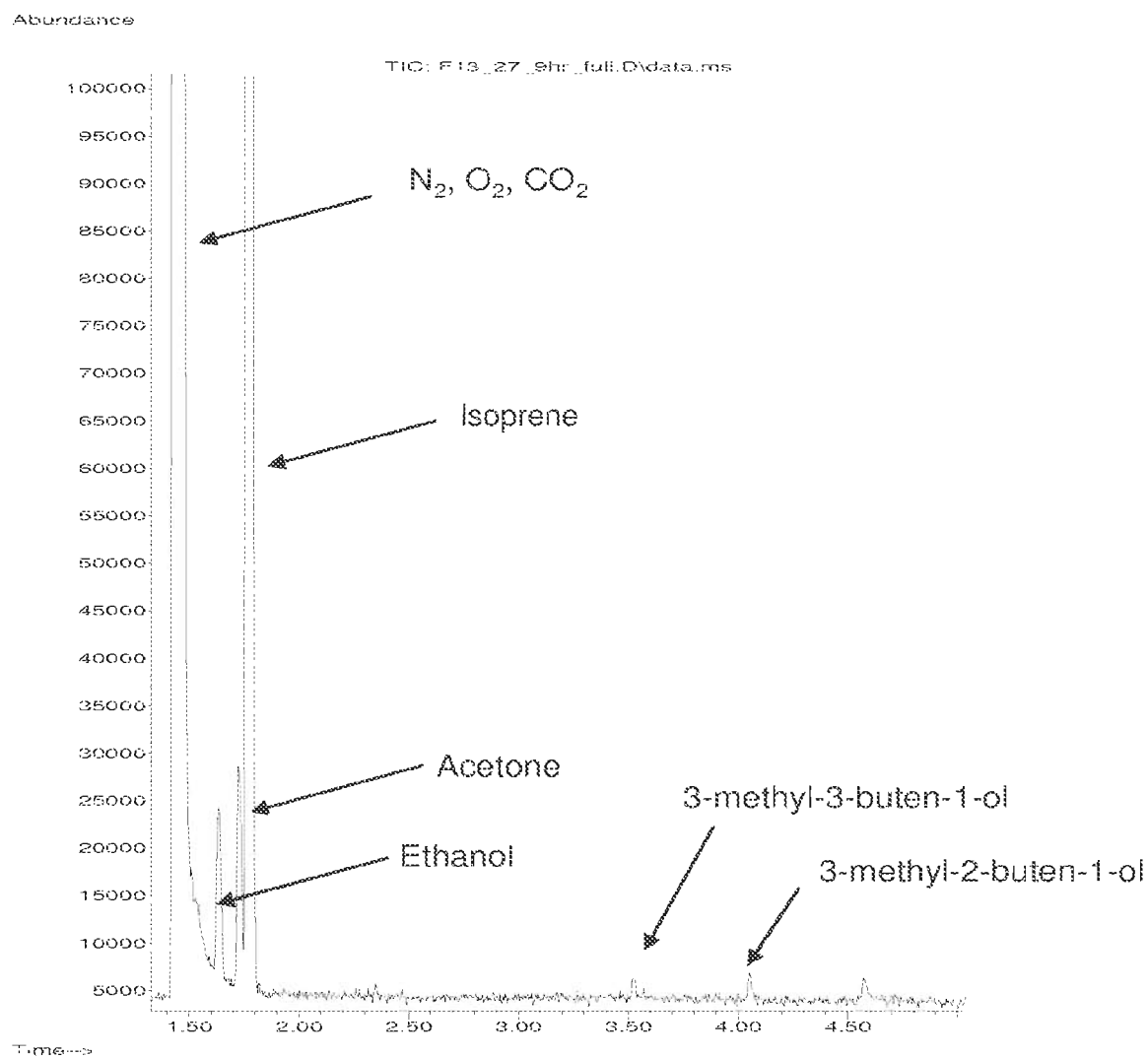


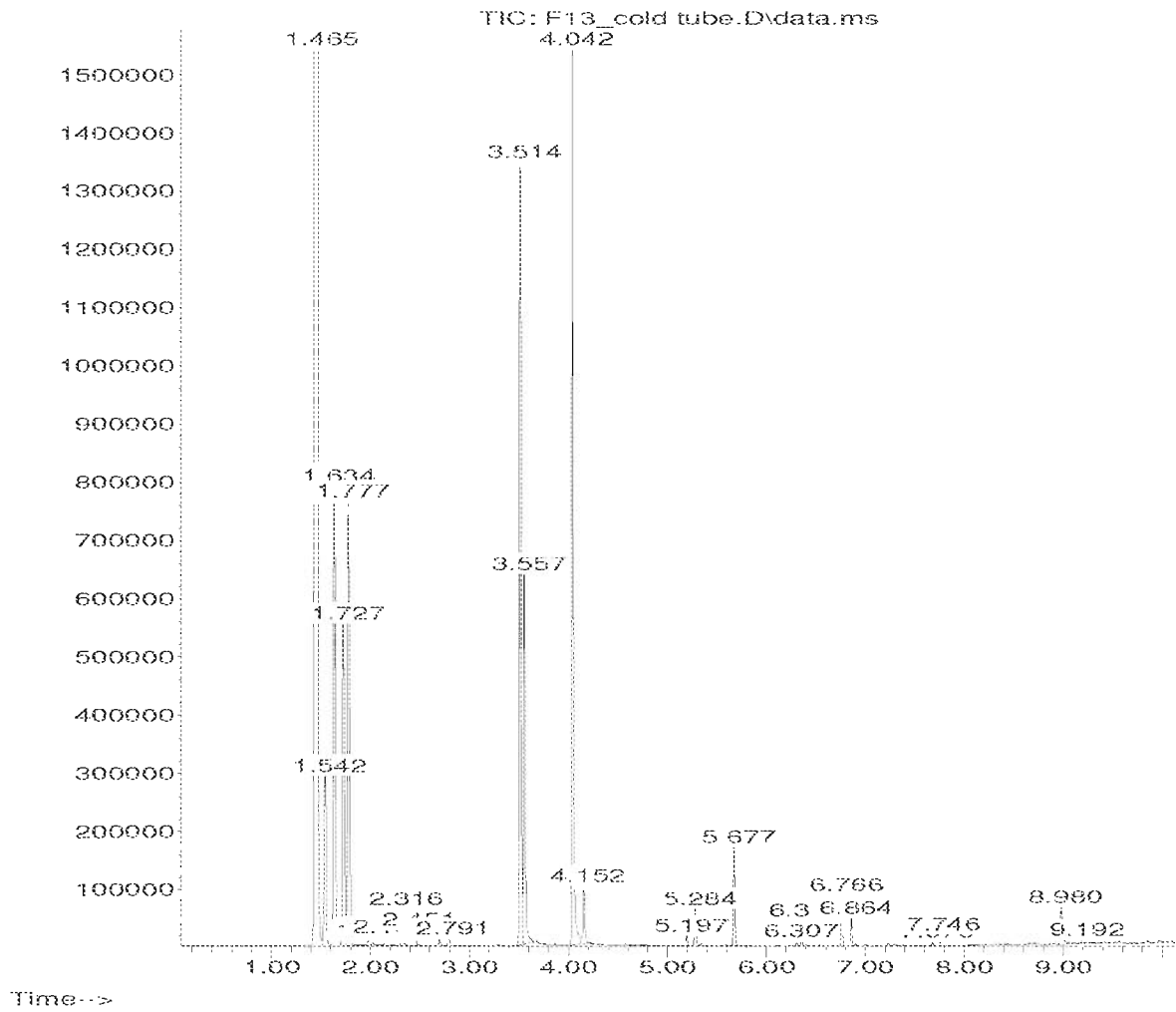
Figure 86B



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Figure 87A

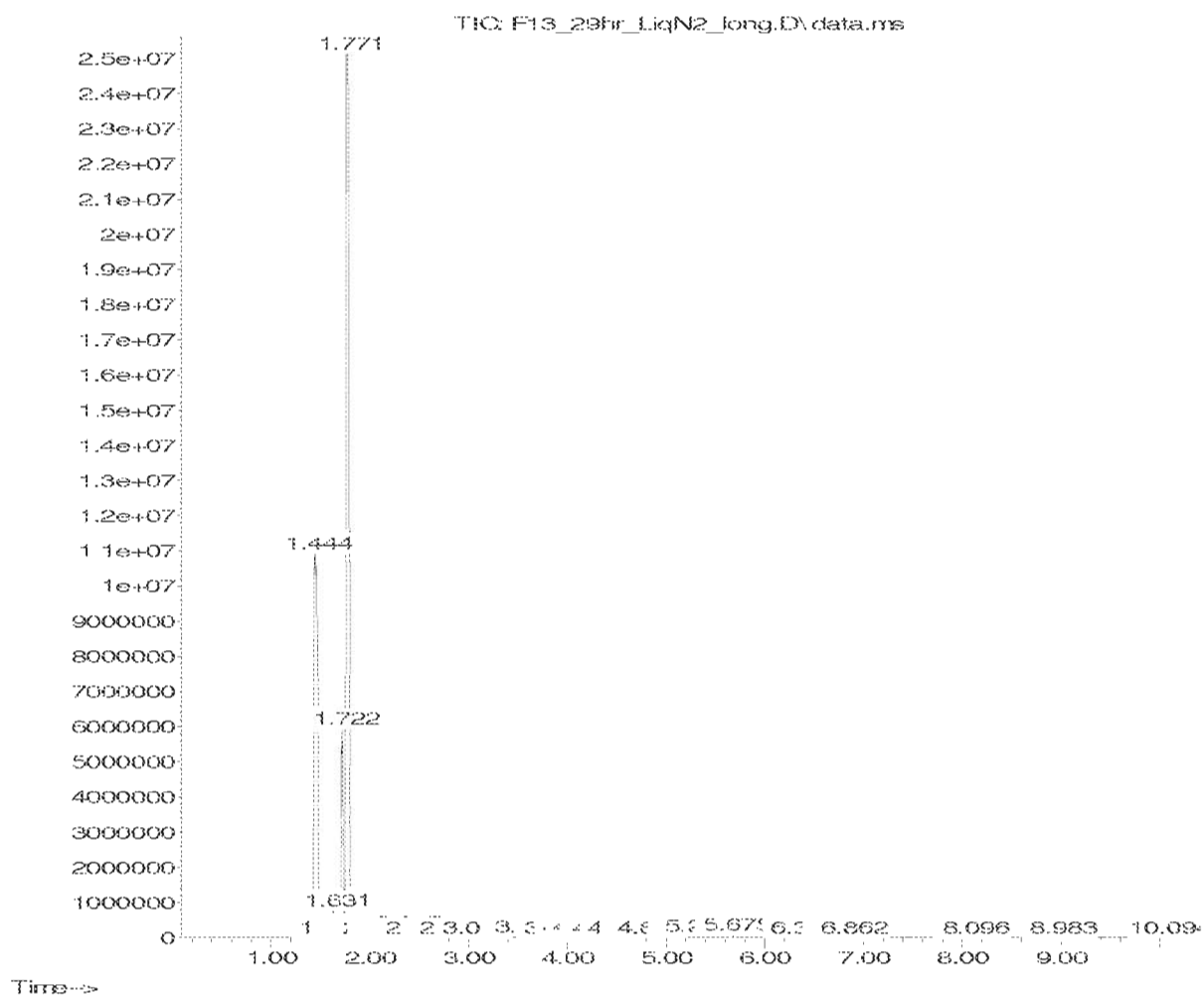
Abundance



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Figure 87B

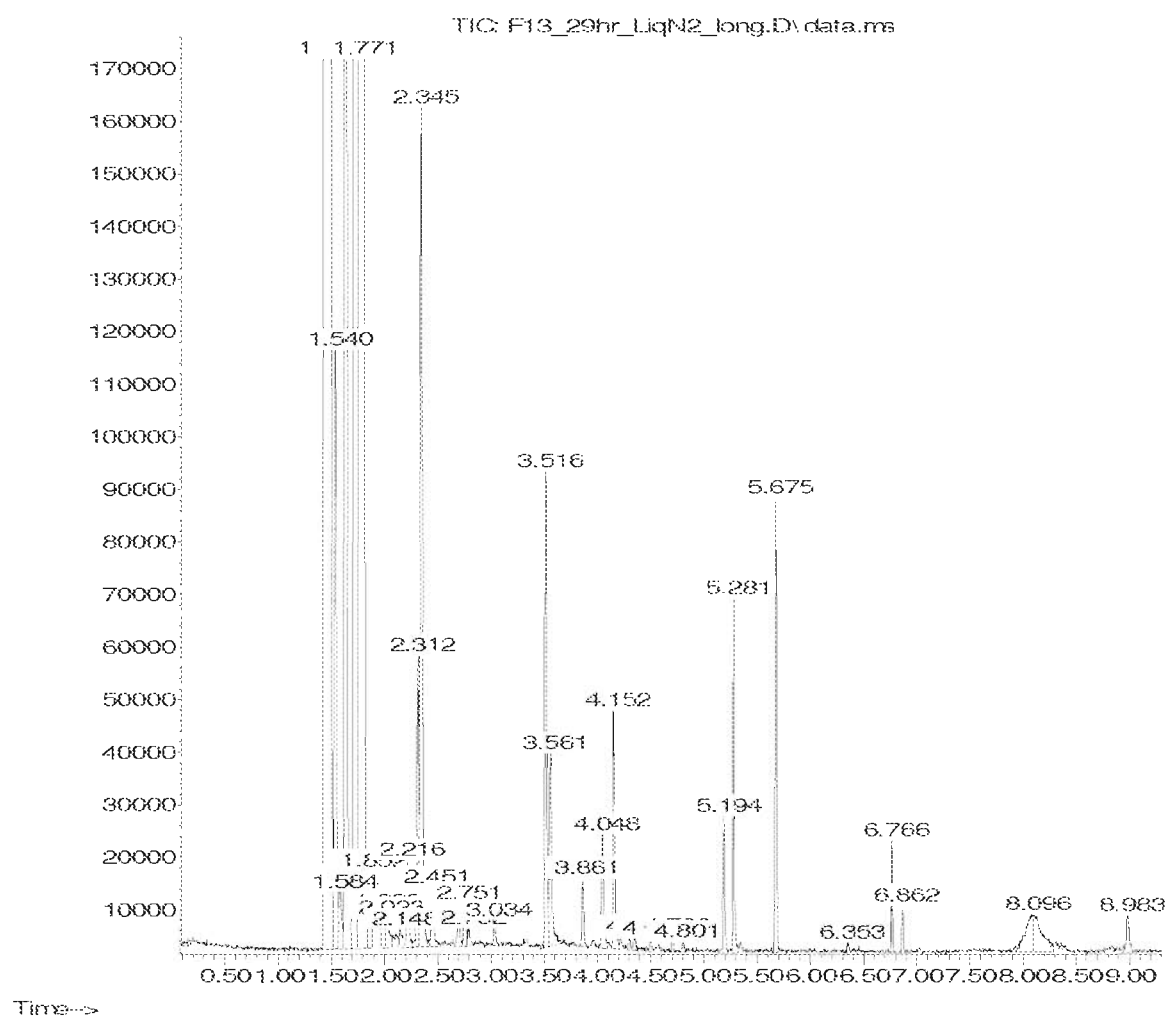
Abundance



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Figure 87C

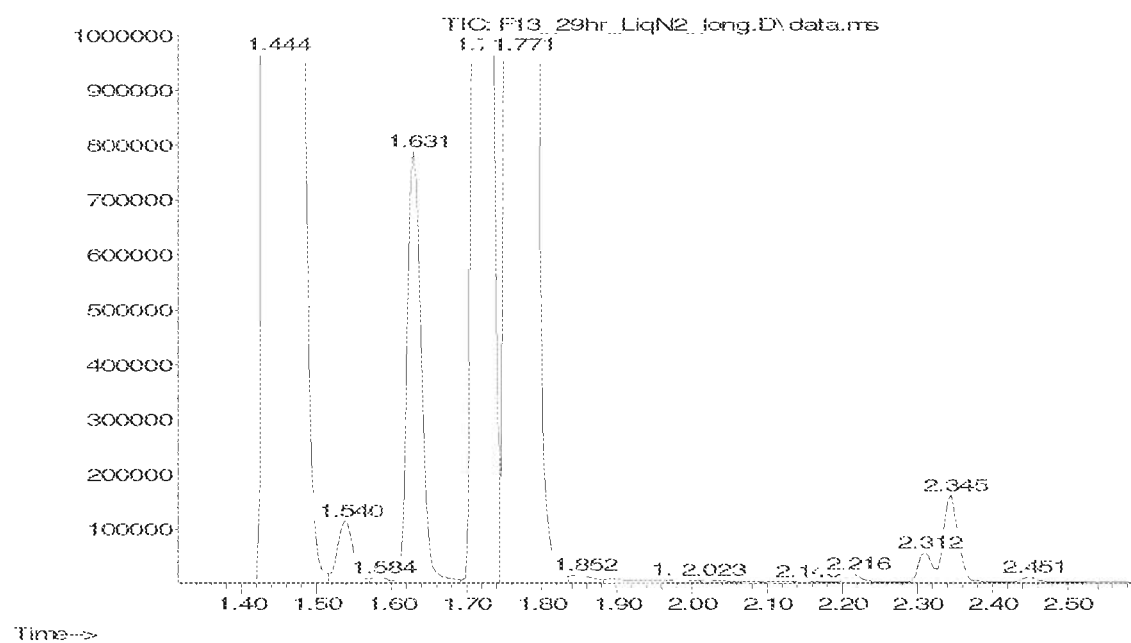
Abundance



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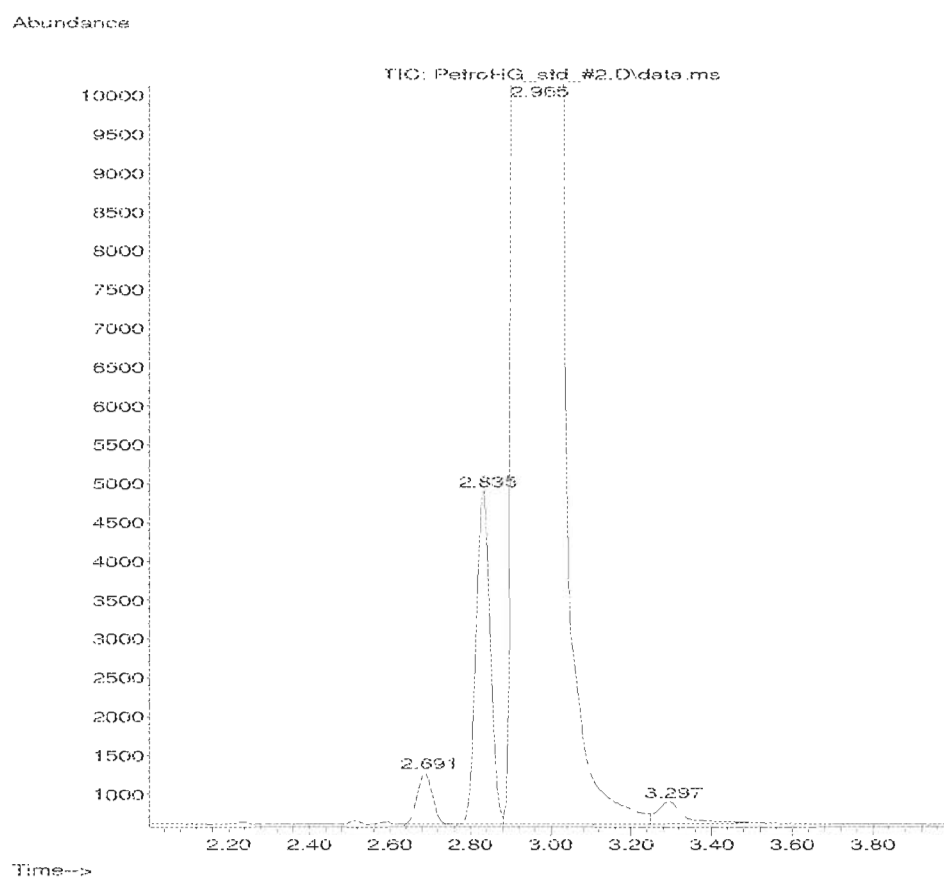
**Figure 87D**

Abundance



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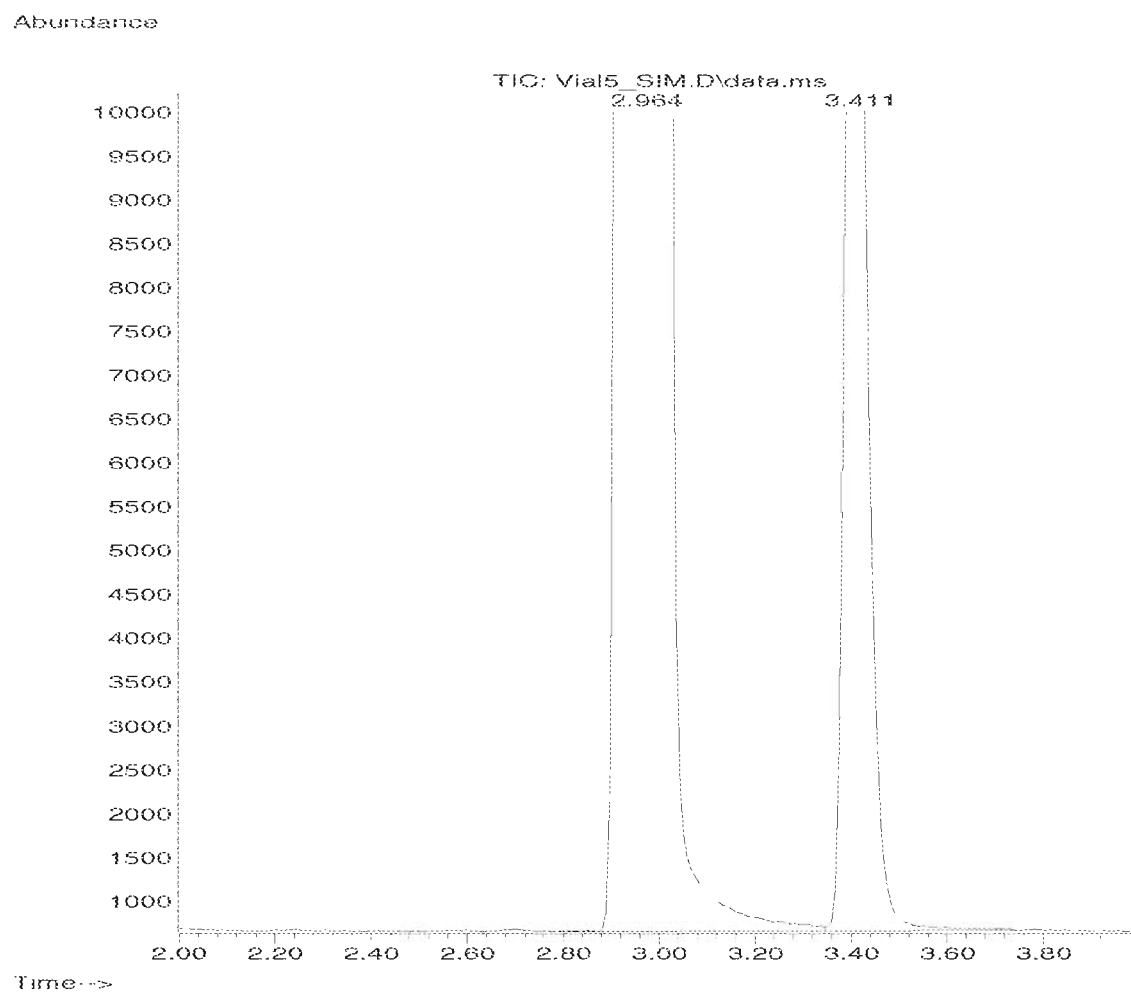
Figure 88A



2-methyl-1,3-butadiene standard.

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Figure 88B

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

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Figure 89

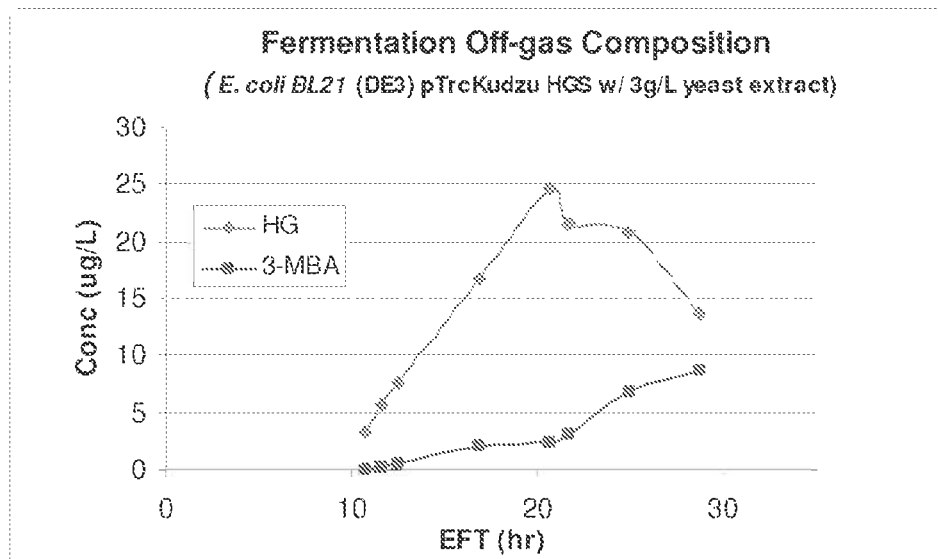
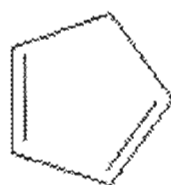
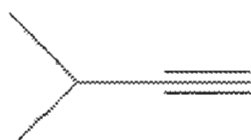


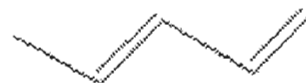
Figure 90



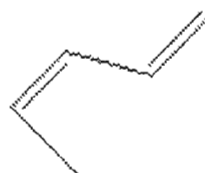
cyclopentadiene



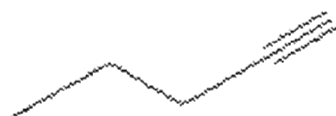
"isopryne" = 3-Me-1-butyne



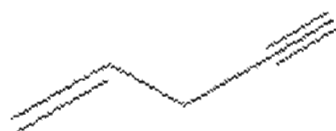
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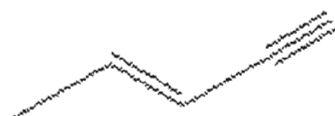
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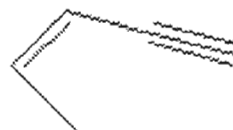
1-pentyne



pent-4-ene-1-yne

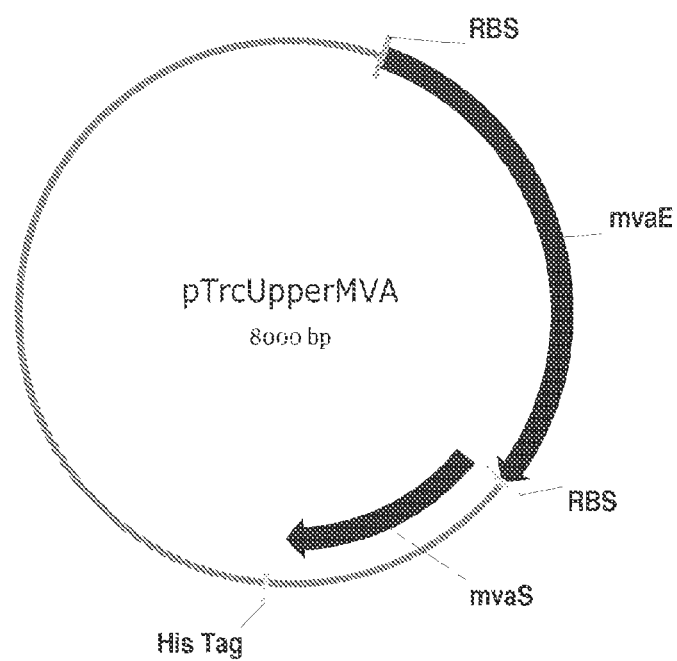


trans-pent-3-ene-1-yne



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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Figure 93

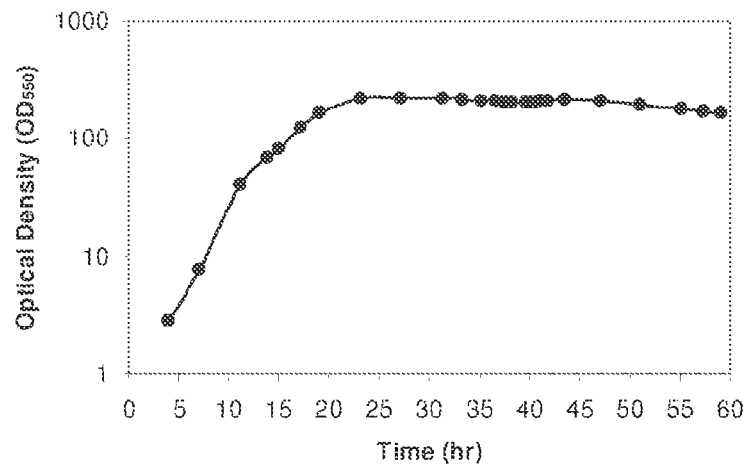
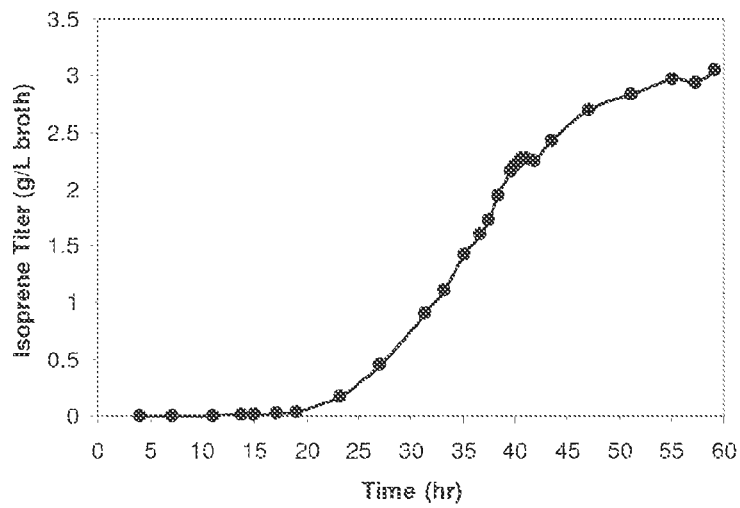


Figure 94



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Figure 95

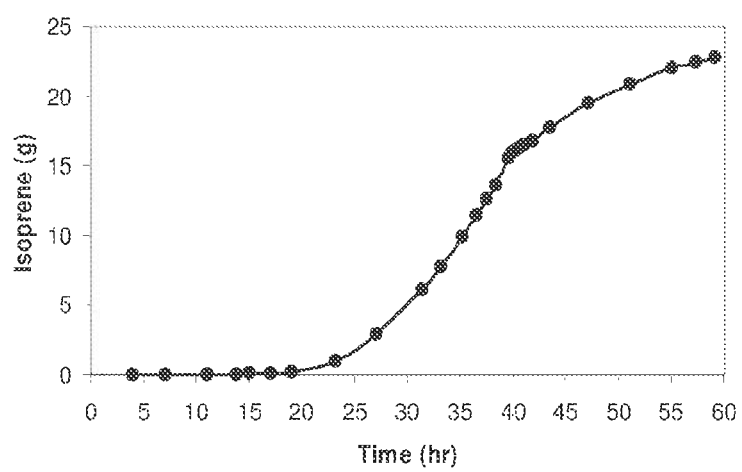
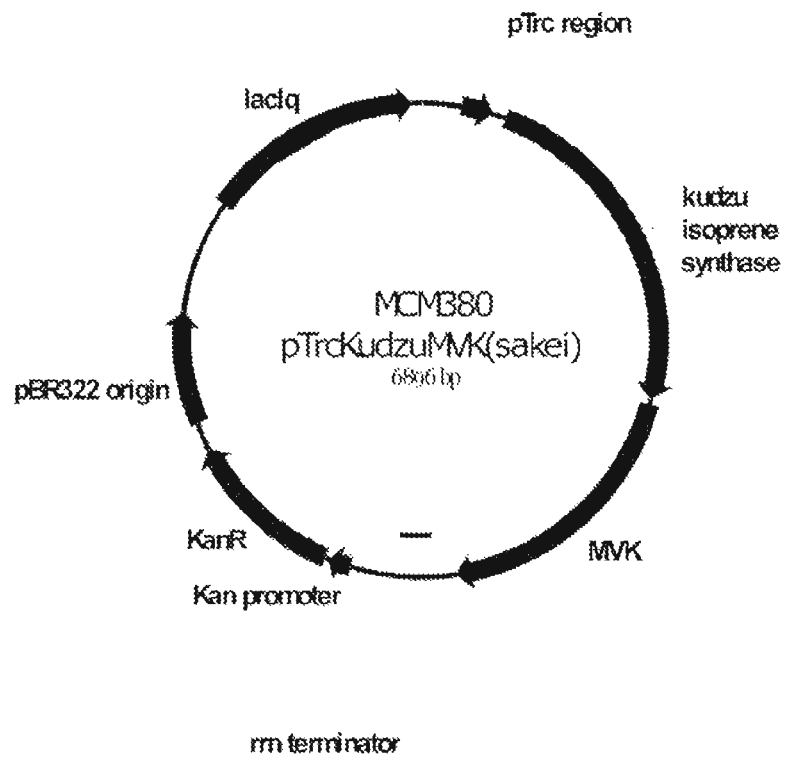


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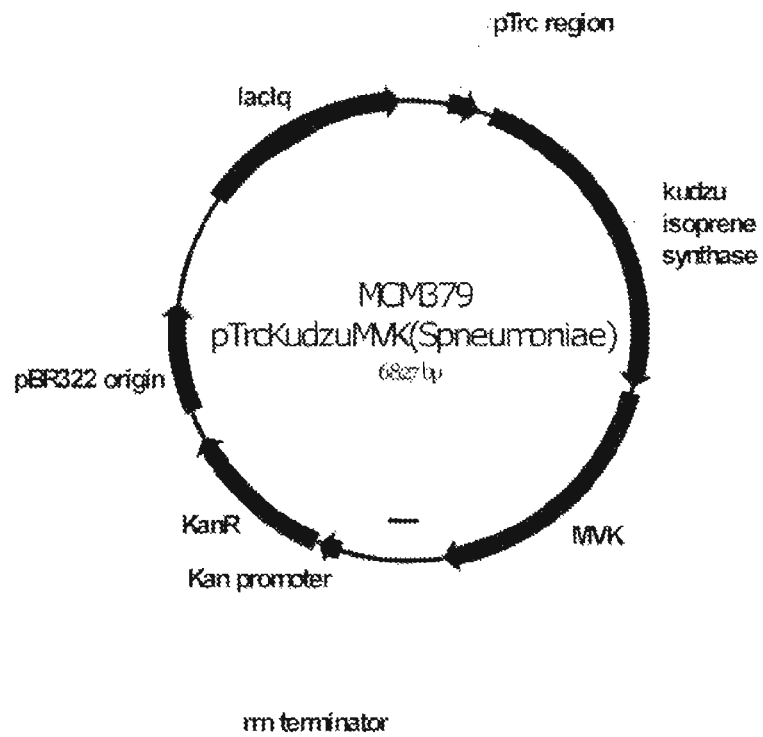


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## Figure 96C

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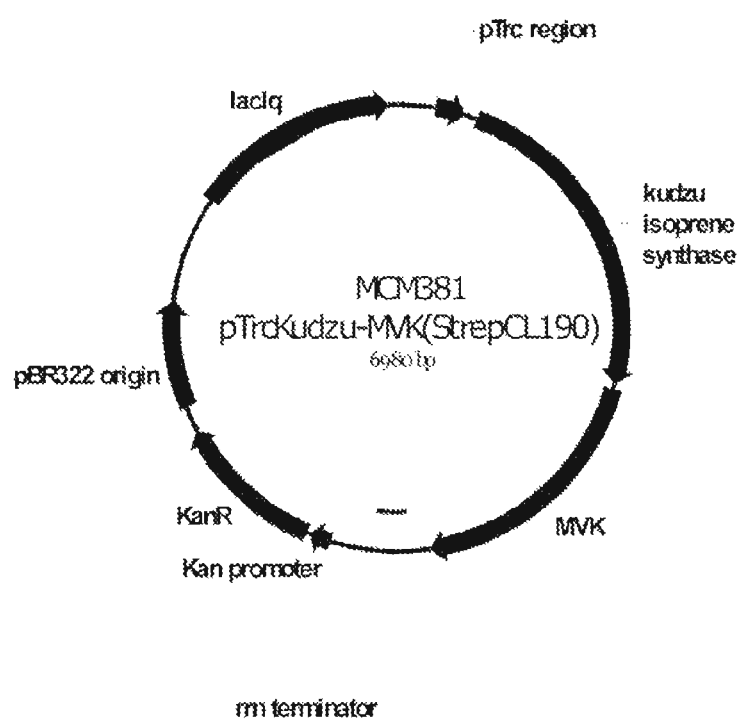
Figure 97A





(SEQ ID NO:108)

Figure 98A



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## Figure 98C

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Figure 99

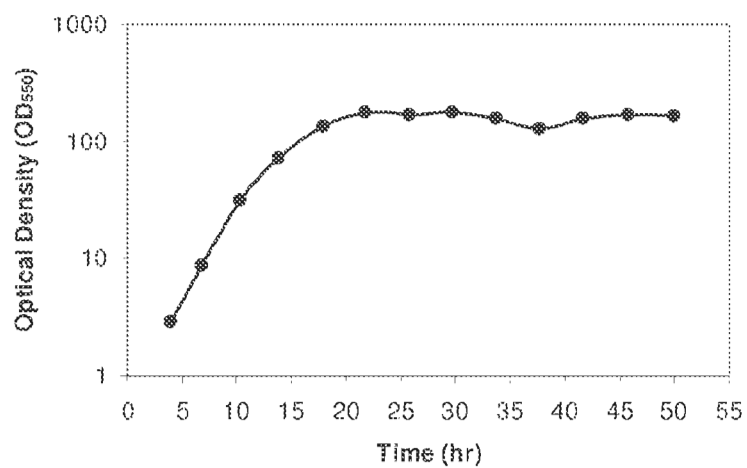
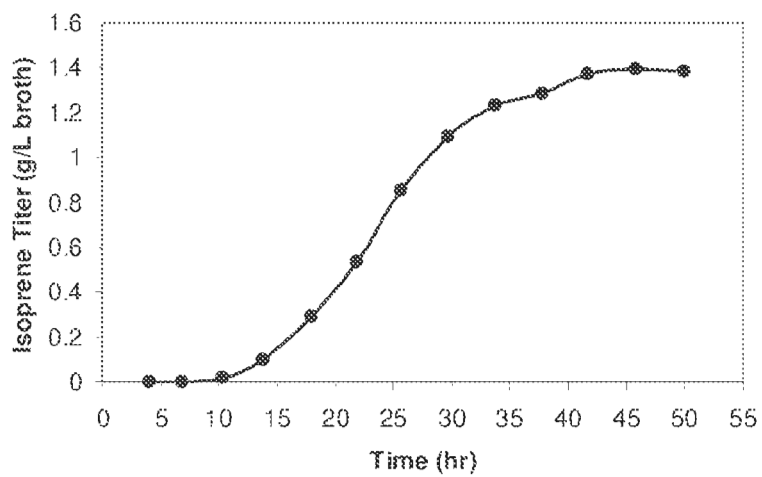


Figure 100



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Figure 101

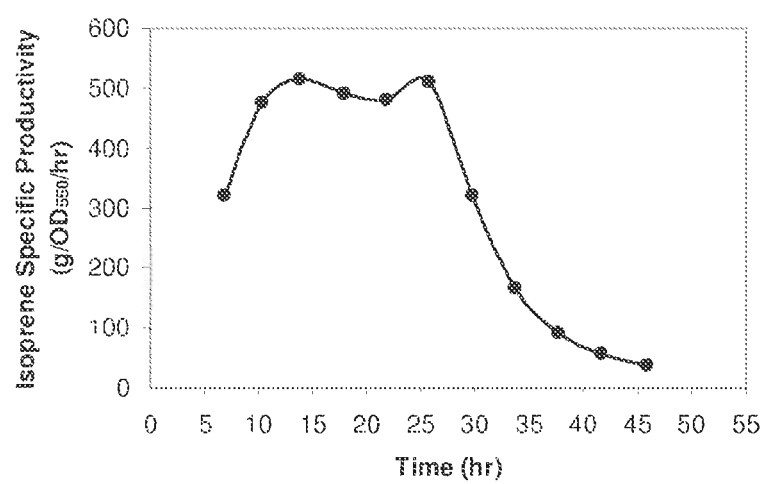
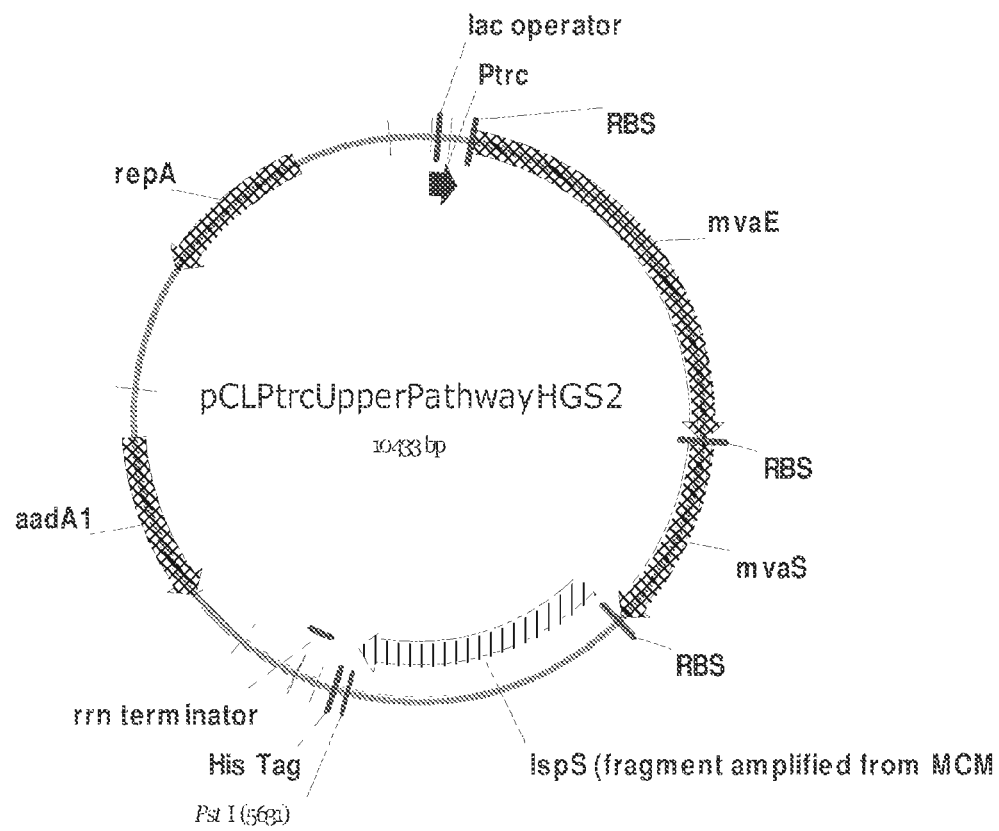


Figure 102



**Figure 103A**

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**Figure 103B**

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(SEQ ID NO:87)

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Figure 104

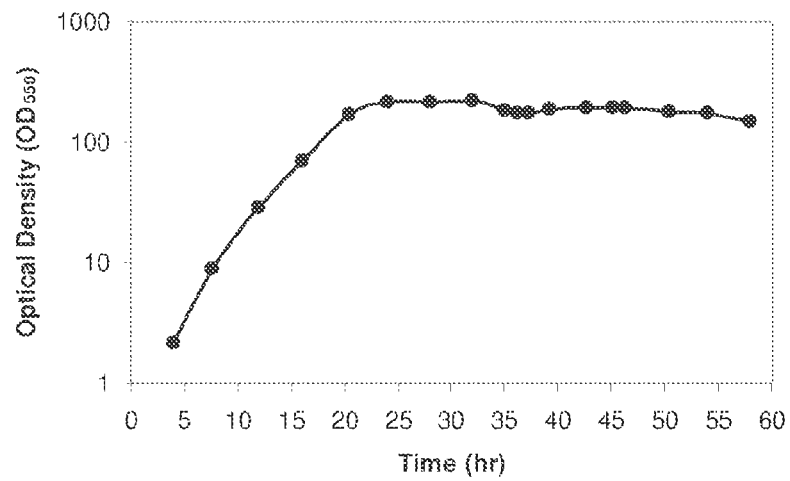
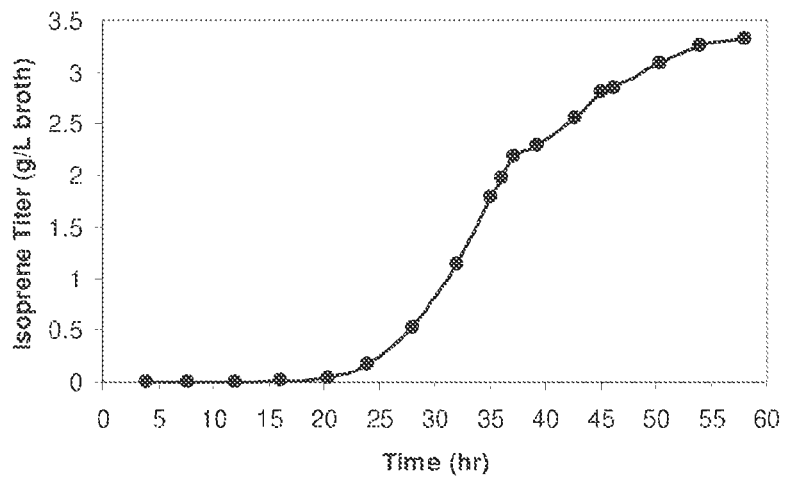


Figure 105



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Figure 106

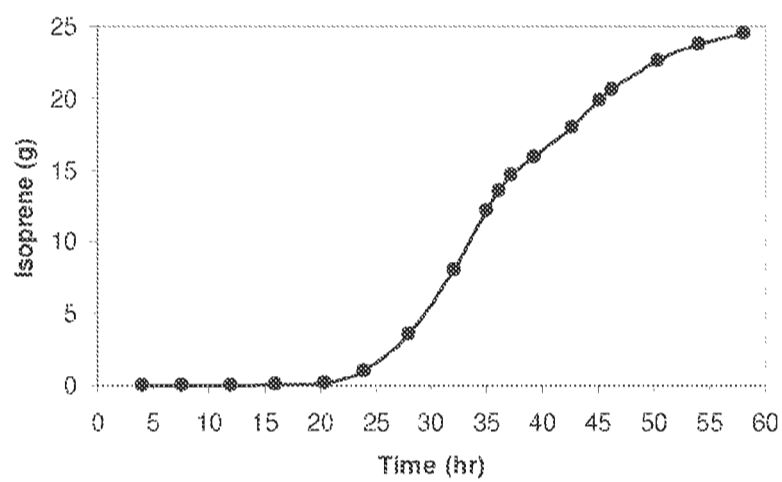
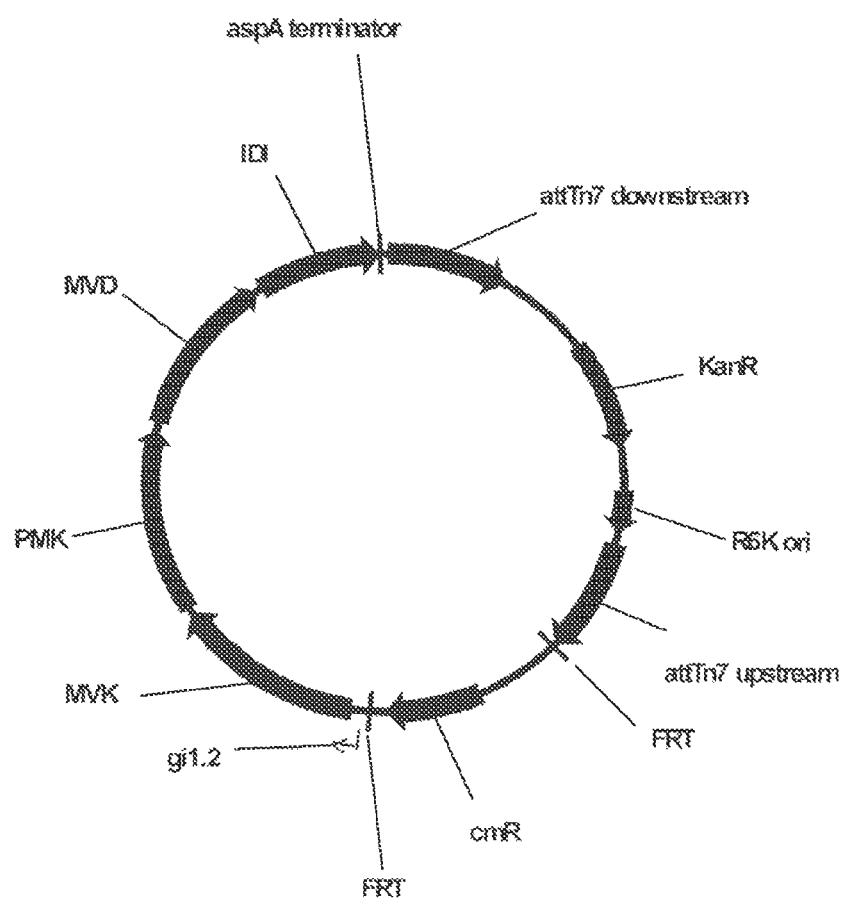


Figure 107



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## Figure 108A

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**Figure 108B**

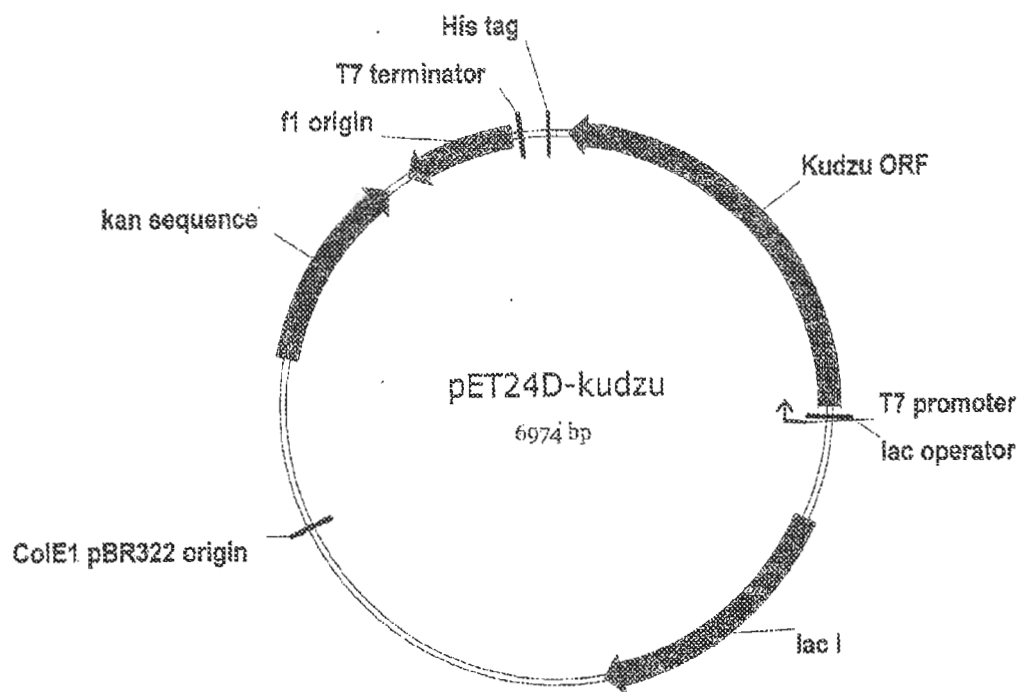
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(SEQ ID NO:90)

Figure 109



## Figure 110A

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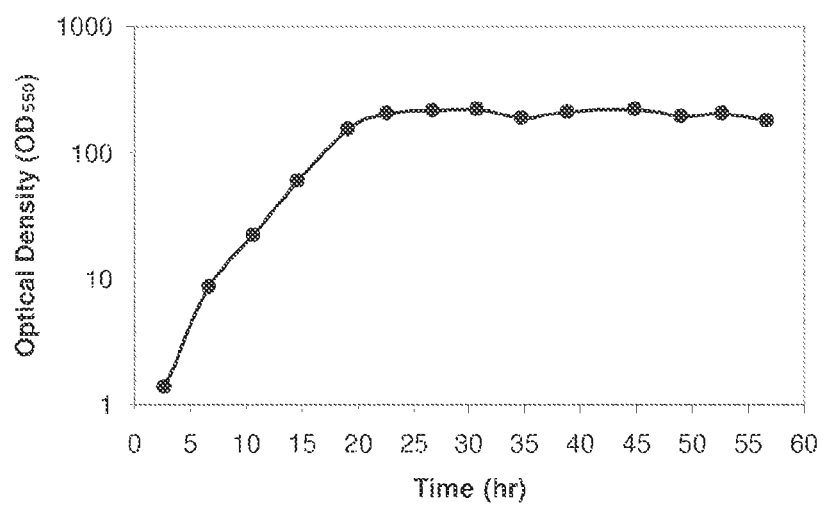
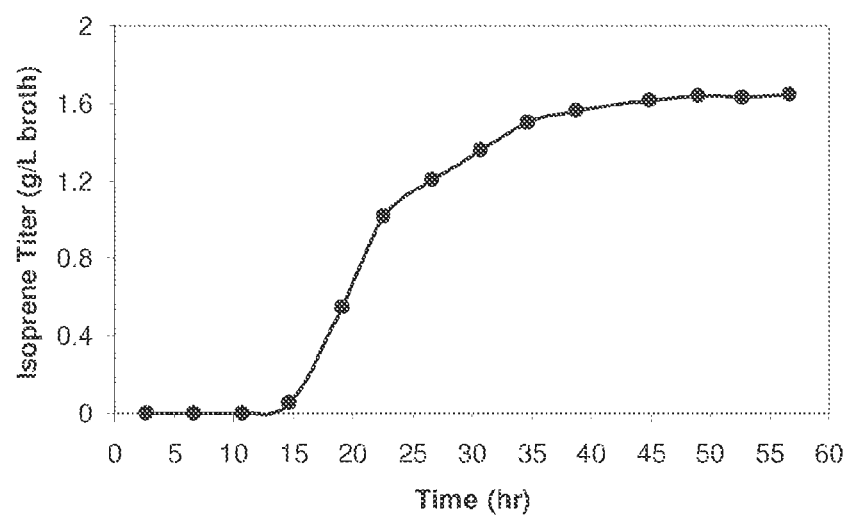


Figure 111B



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Figure 111C

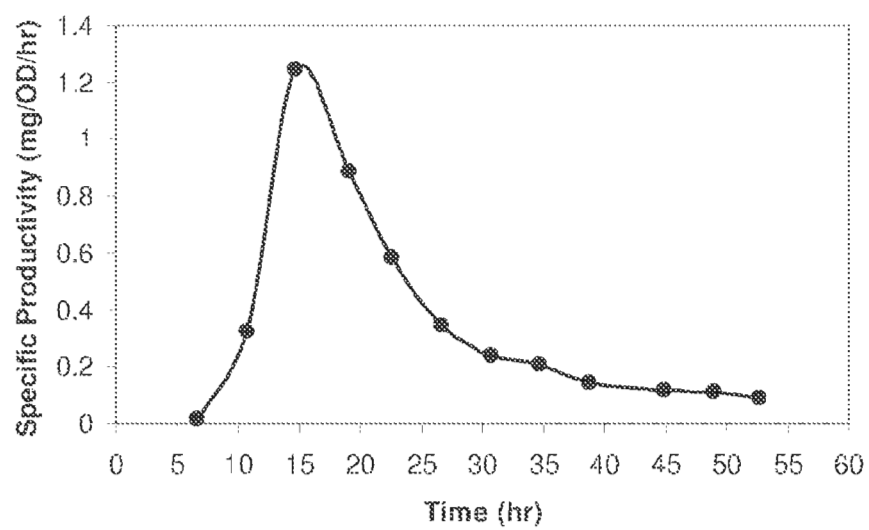
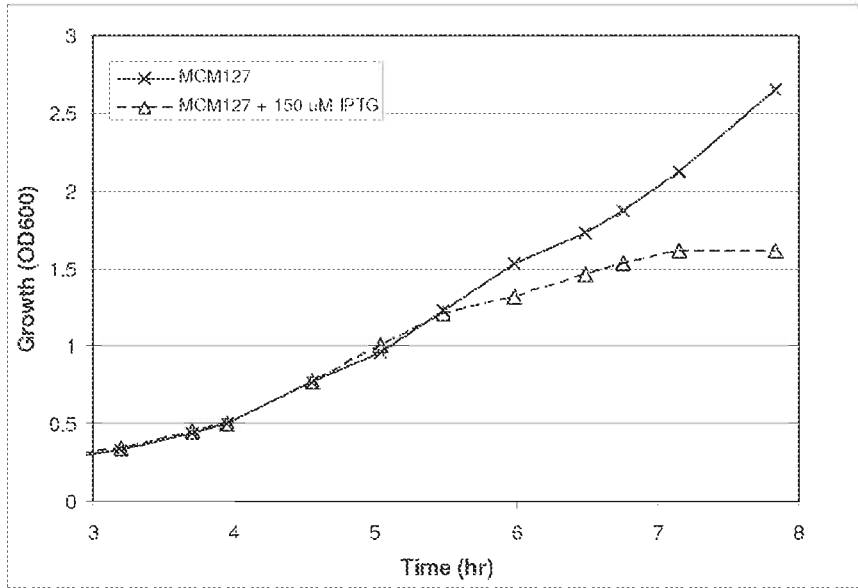


Figure 112A-112B

A



B

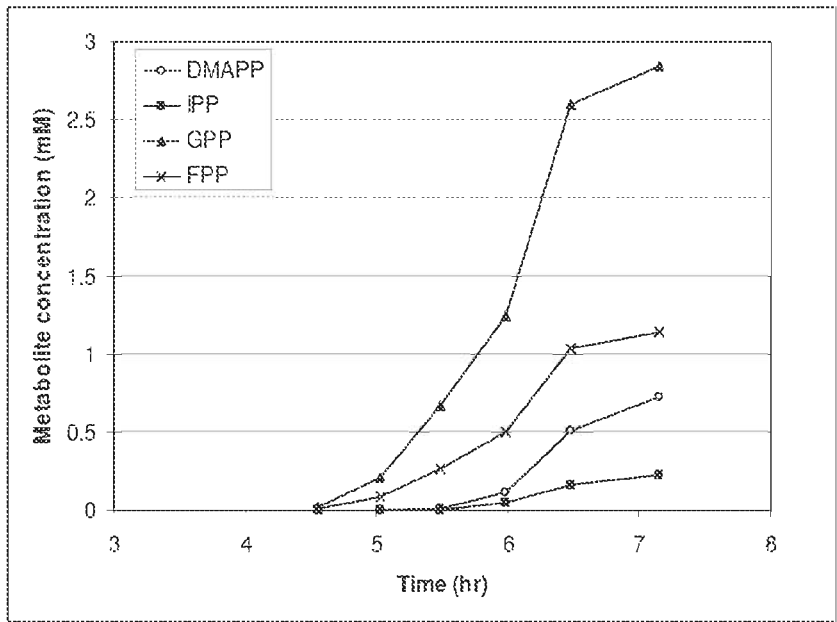
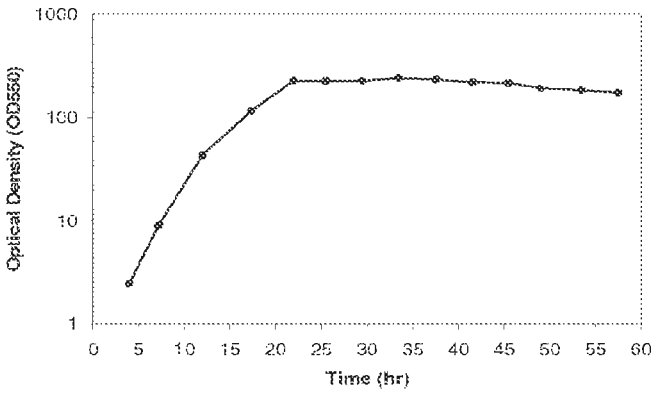
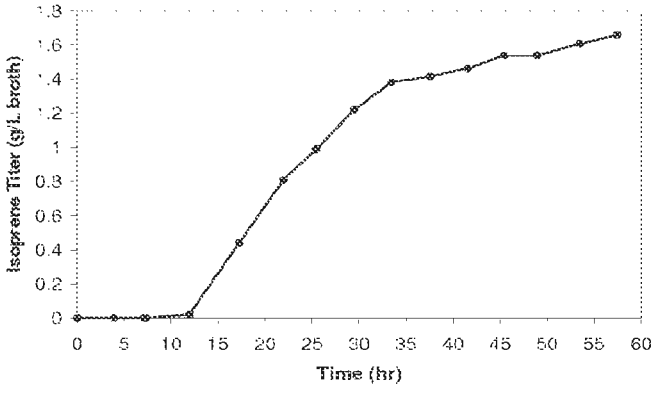


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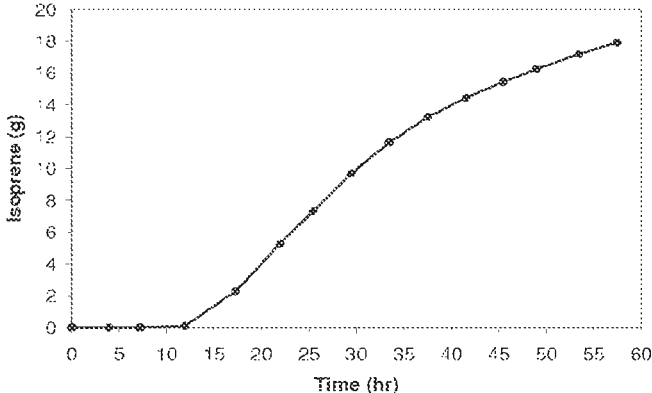
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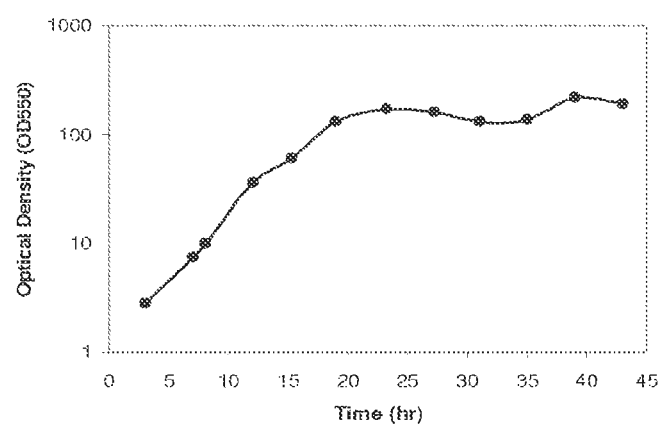
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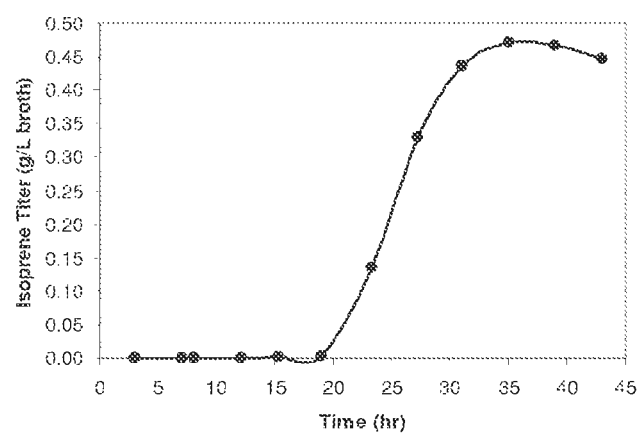
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Figure 112F-112H

F



G



H

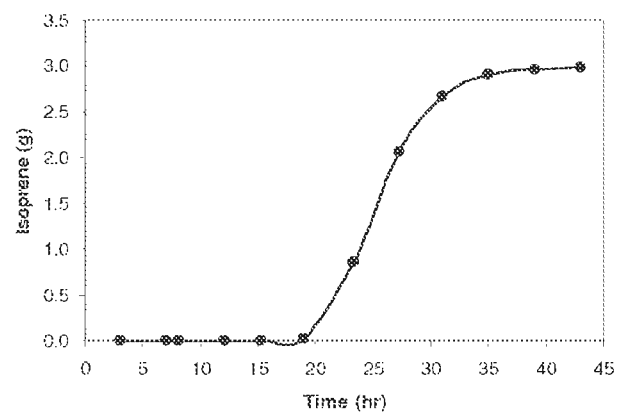


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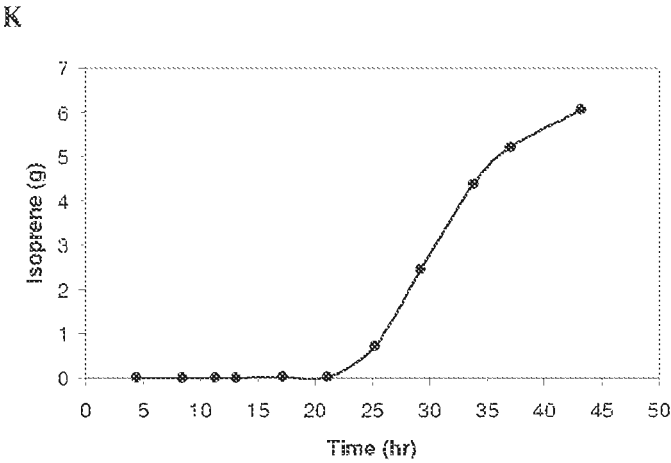
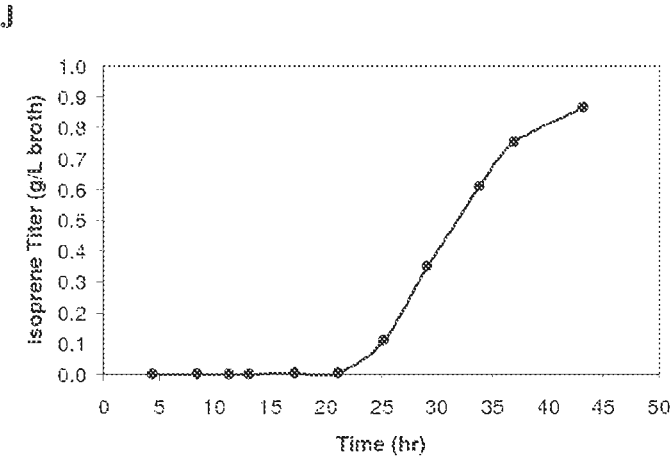
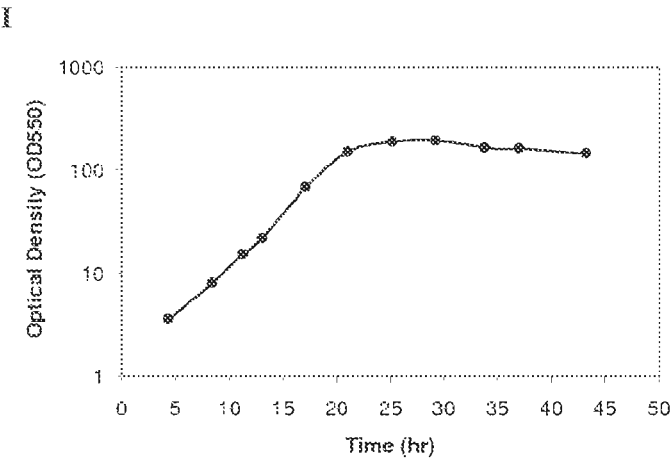


Figure 112L-112N

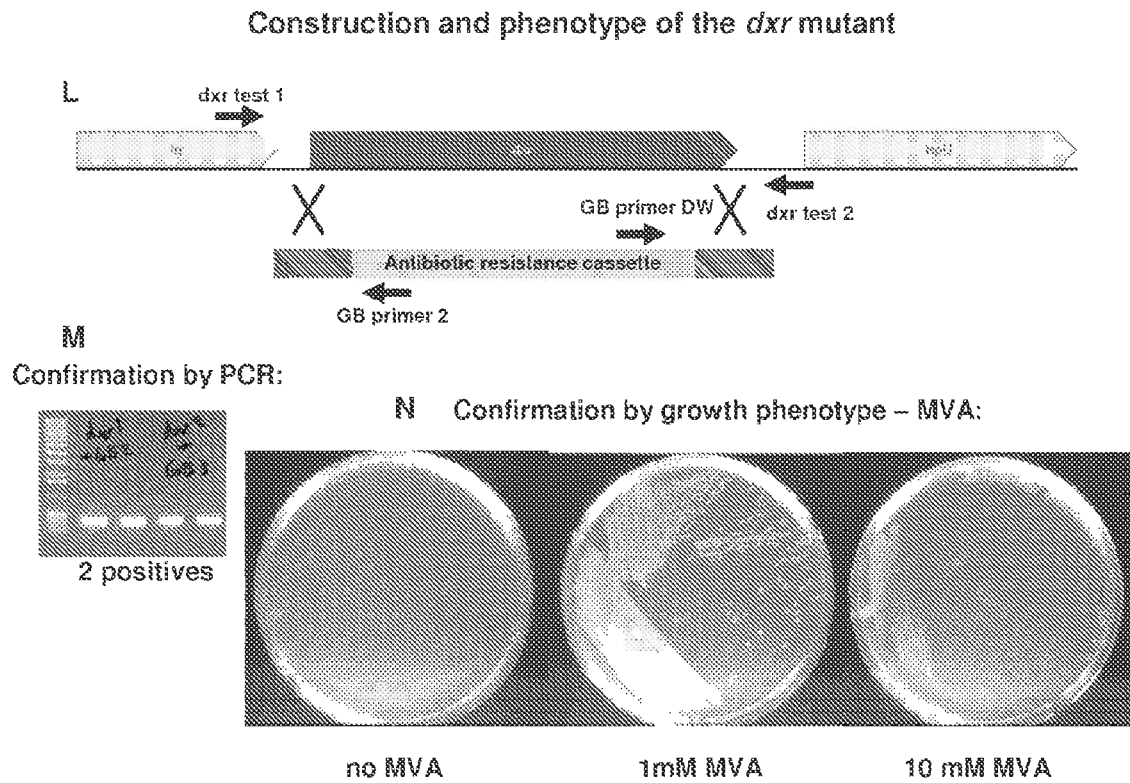
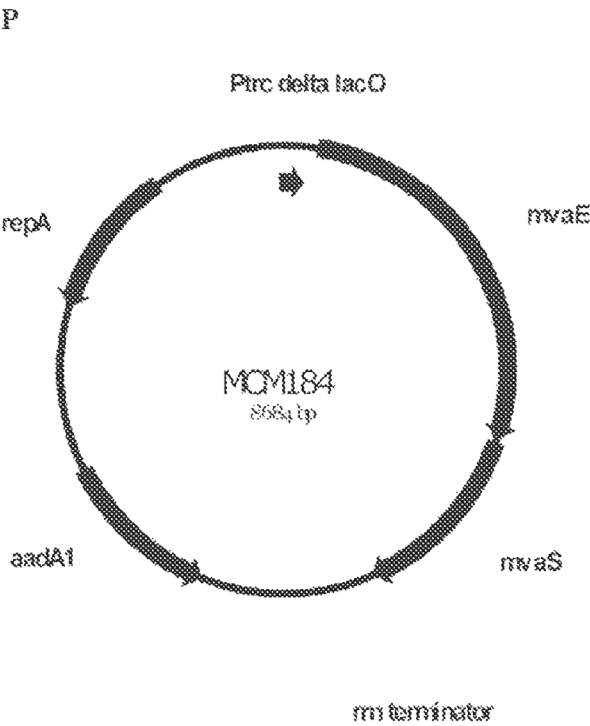


Figure 112O-112P

|       |                                  |                                                                  |
|-------|----------------------------------|------------------------------------------------------------------|
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| MCM63 | P <sub>trc</sub> minus lacO forw | Tcattcggctcgtataatgtgtggtcacacaggaaacngcgccgtga (SEQ ID NO:139)  |
| MCM64 | P <sub>trc</sub> minus lacO rev  | Tcagcggcgctgtttcctgtgtgaccacacattatacgagccggatga (SEQ ID NO:140) |



## Figure 112Q

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**Figure 112S**

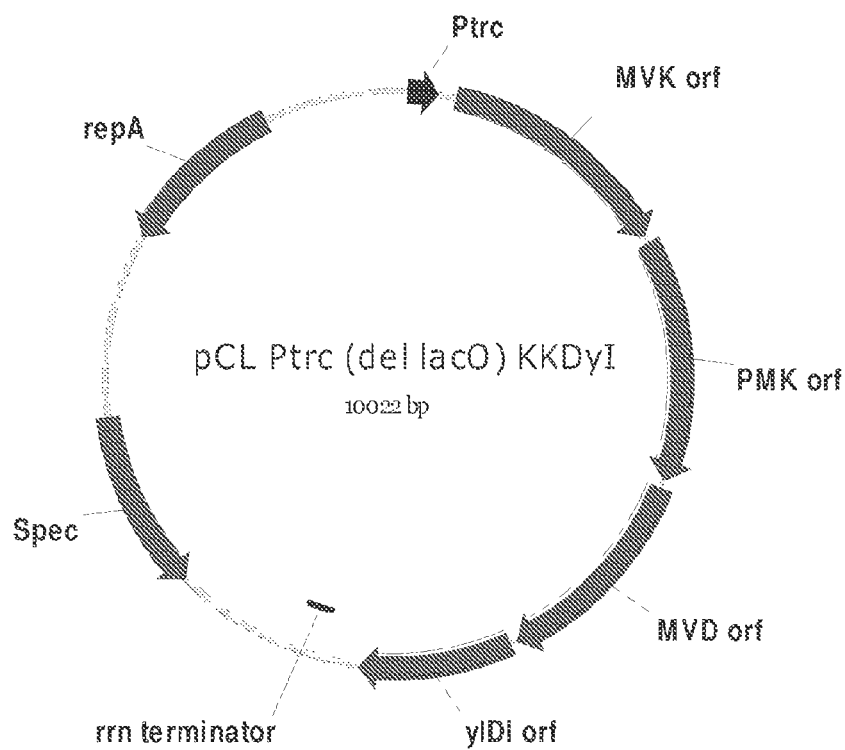
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**Figure 112T-112U****T**

EL-976 : (+) PCR of KKDI insertion into pCL vector (upstream of promoter region)  
CTTCTCAGGGCGTTTTATGGC (SEQ ID NO:142)

EL-977 : (-) PCR of KKDI insertion into pCL vector (anneals to MVK gene)  
GTTGAGCTAACAACGGATCC (SEQ ID NO:143)

EL-978 : (+) sequence from yeast IDI towards terminator  
GACTGTCAACCCAAACGTCAATG (SEQ ID NO :144)

**U**

## Figure 112V

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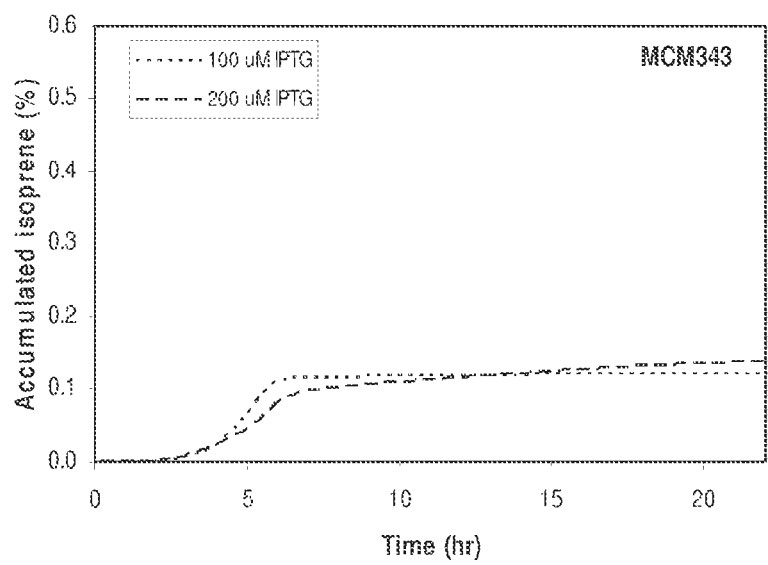
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**Figure 112X**

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Figure 113A-113B

A



B

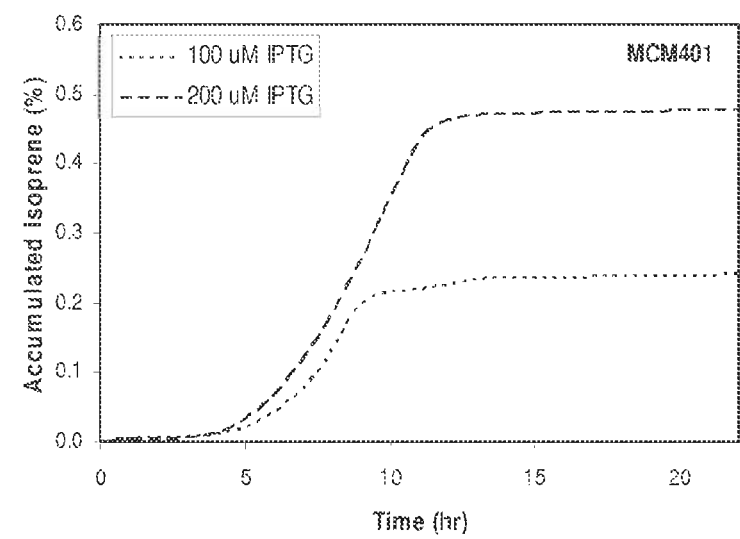
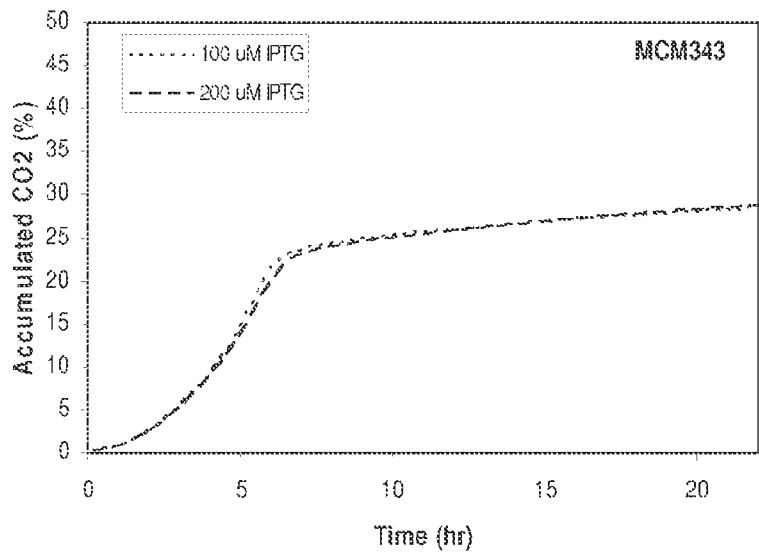
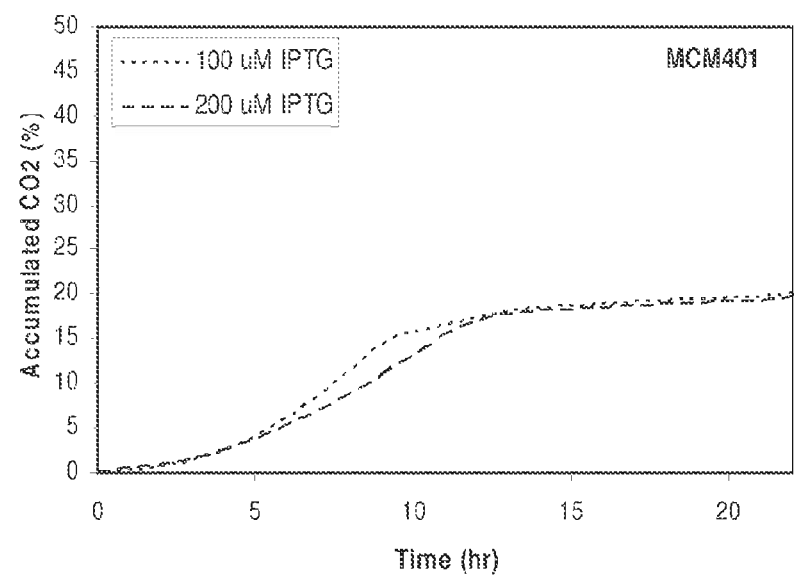


Figure 113C-113D

C



D



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Figure 114

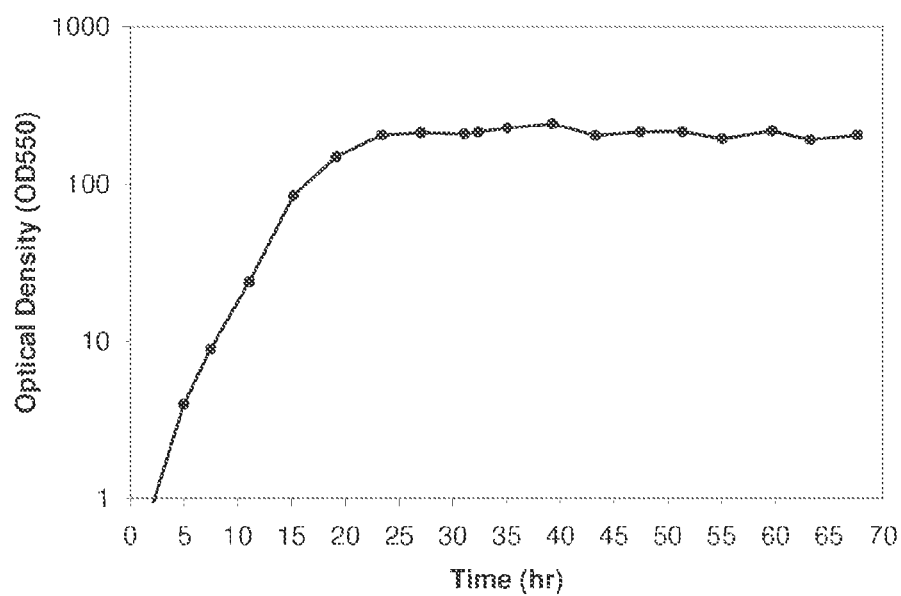
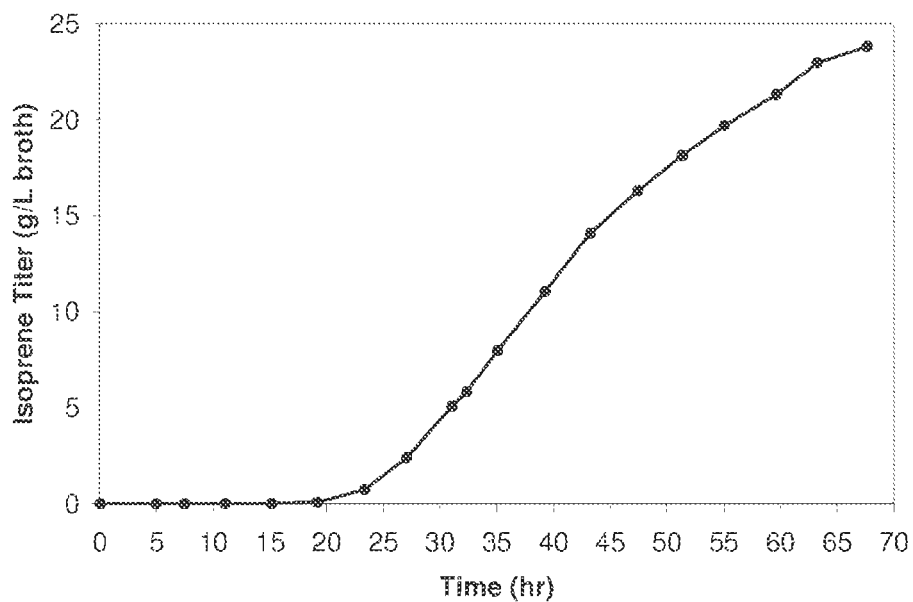


Figure 115



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Figure 116

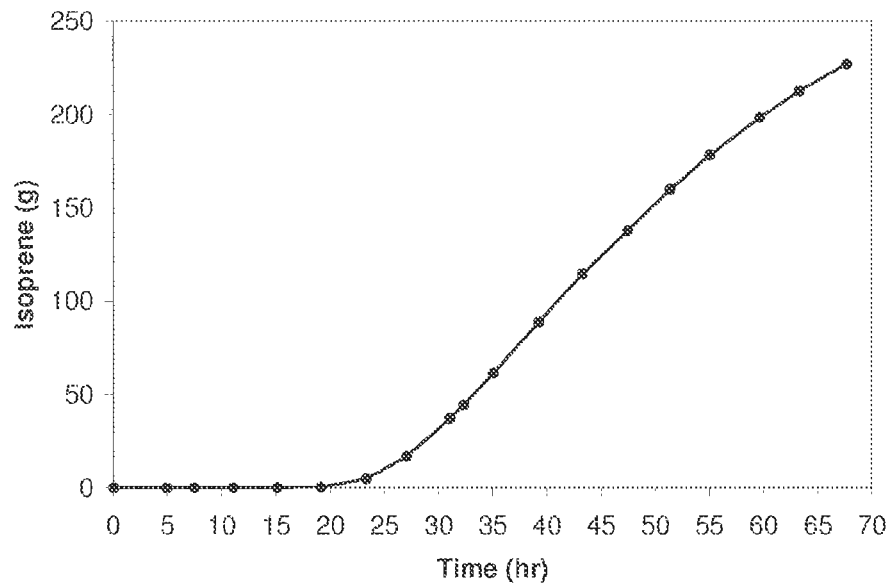
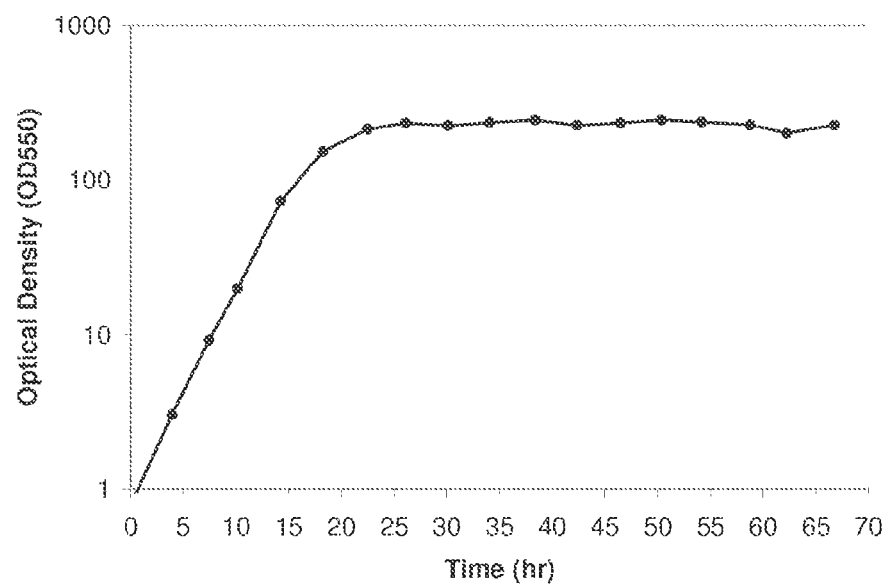


Figure 117



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Figure 118

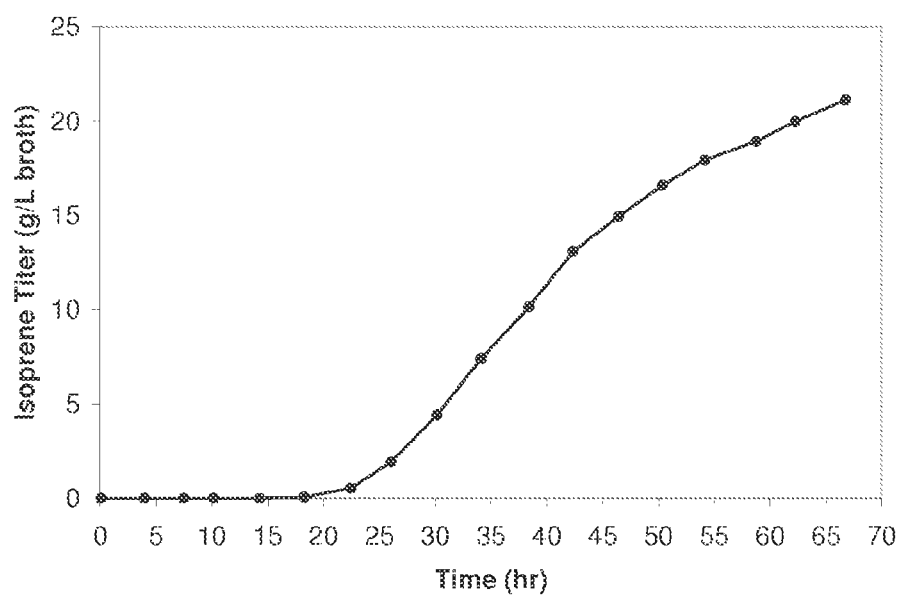
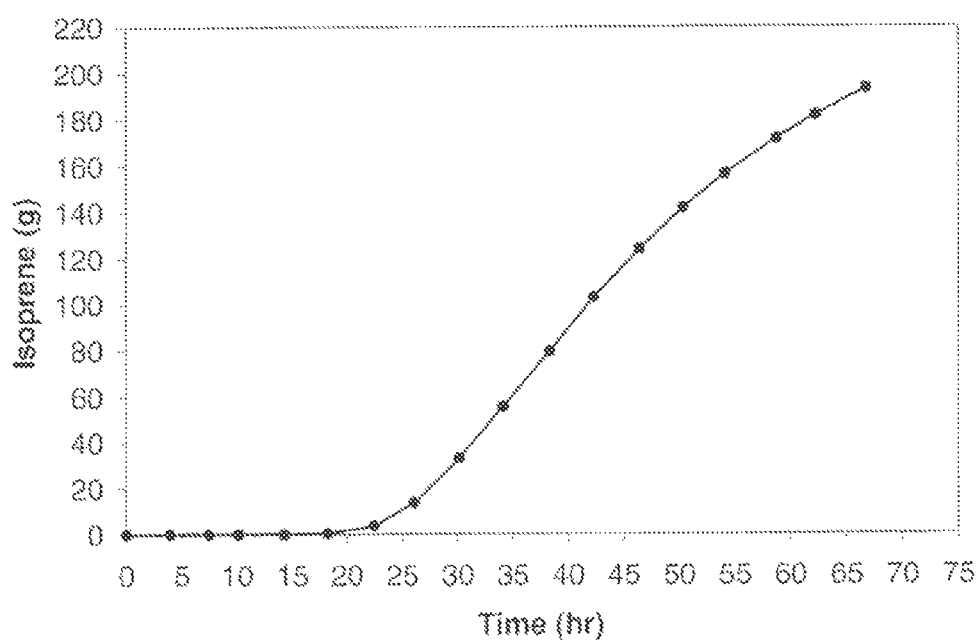


Figure 119



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Figure 120

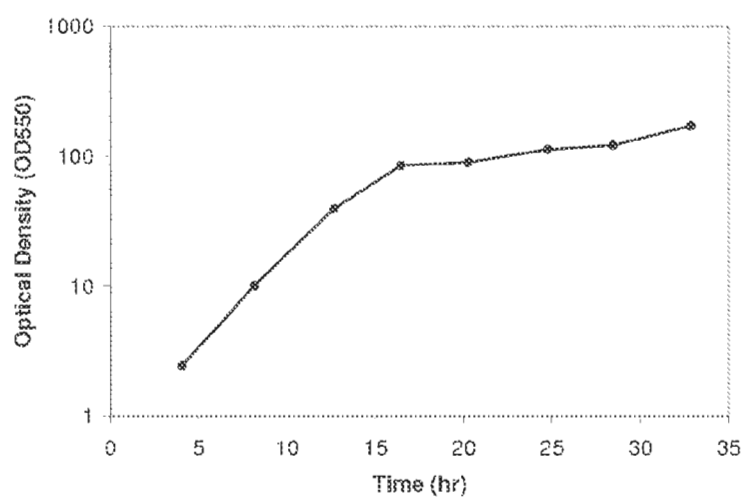
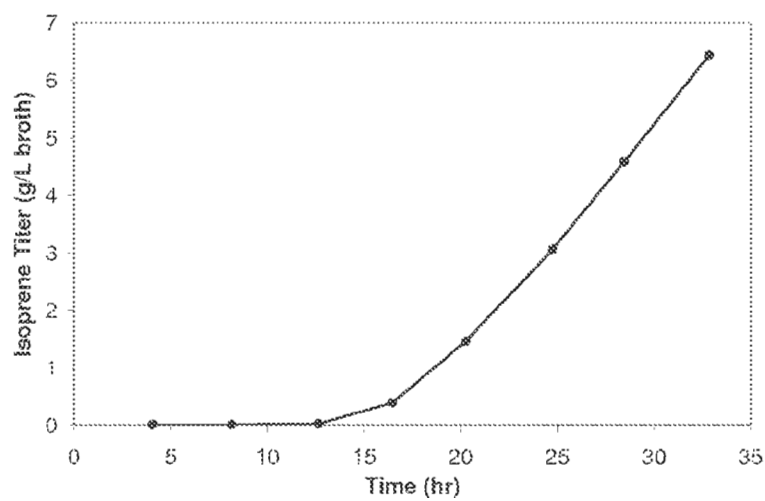


Figure 121



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Figure 122

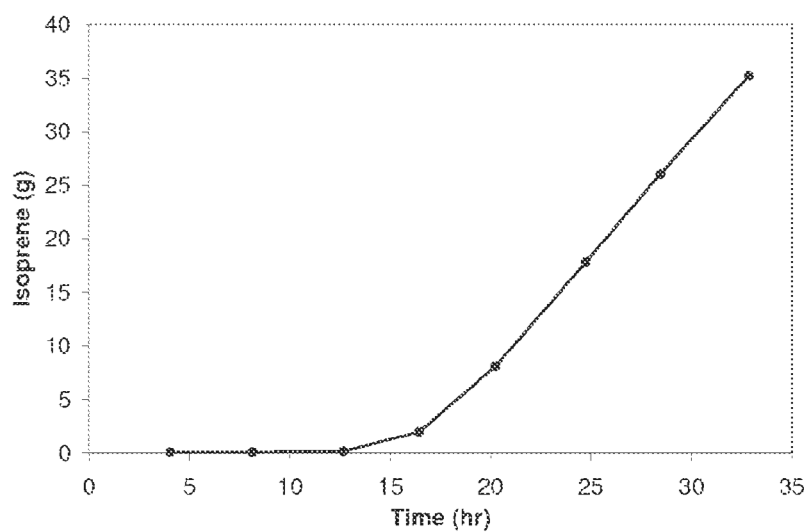
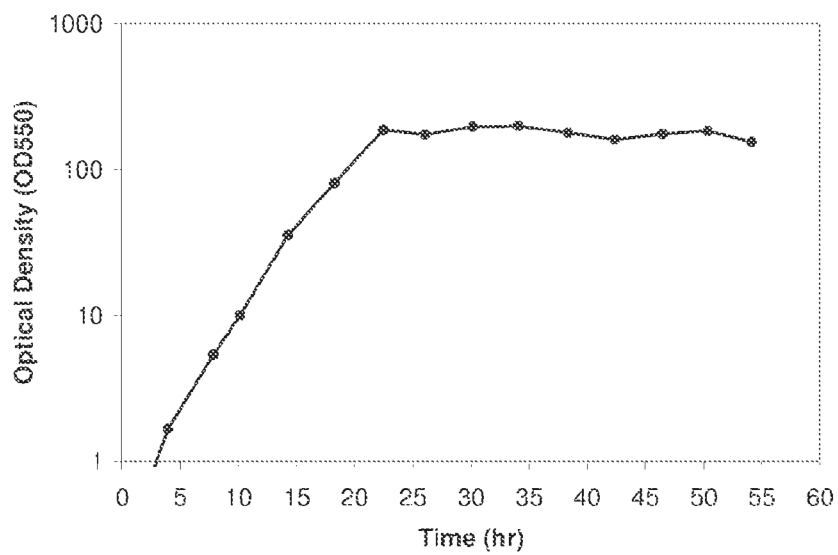


Figure 123



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Figure 124

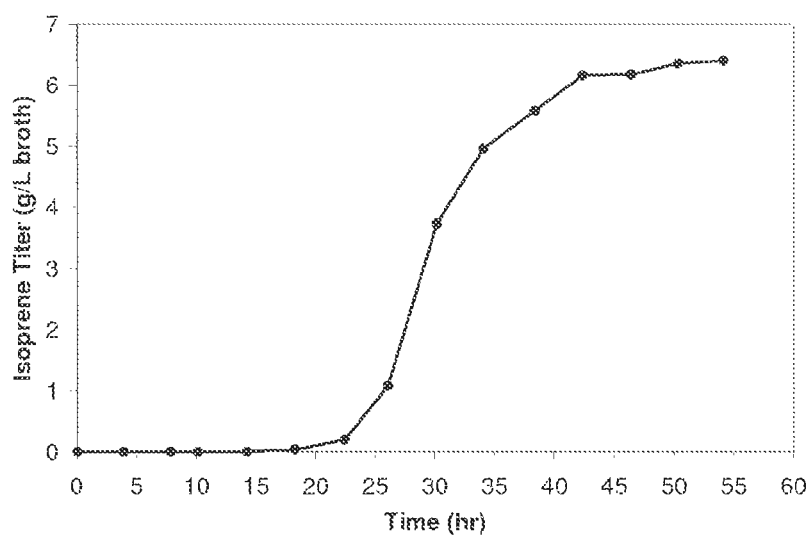
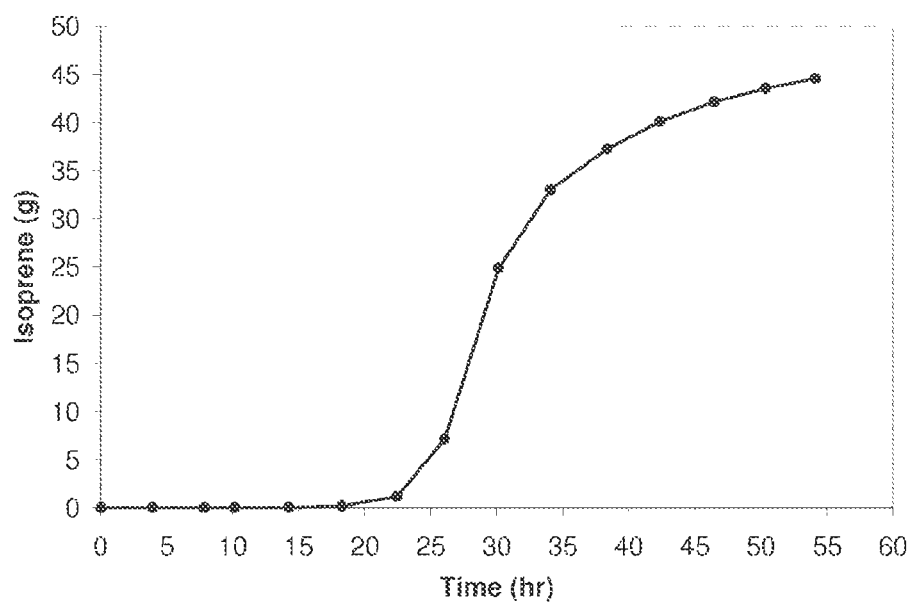


Figure 125



## Figure 126A

1-

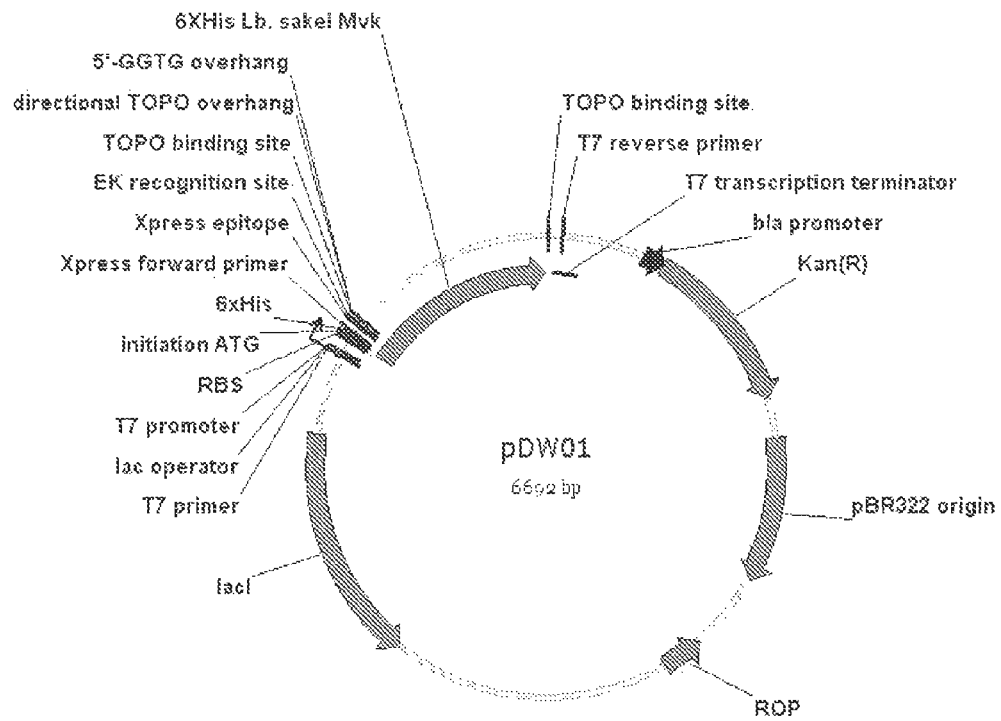
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**Figure 126B**

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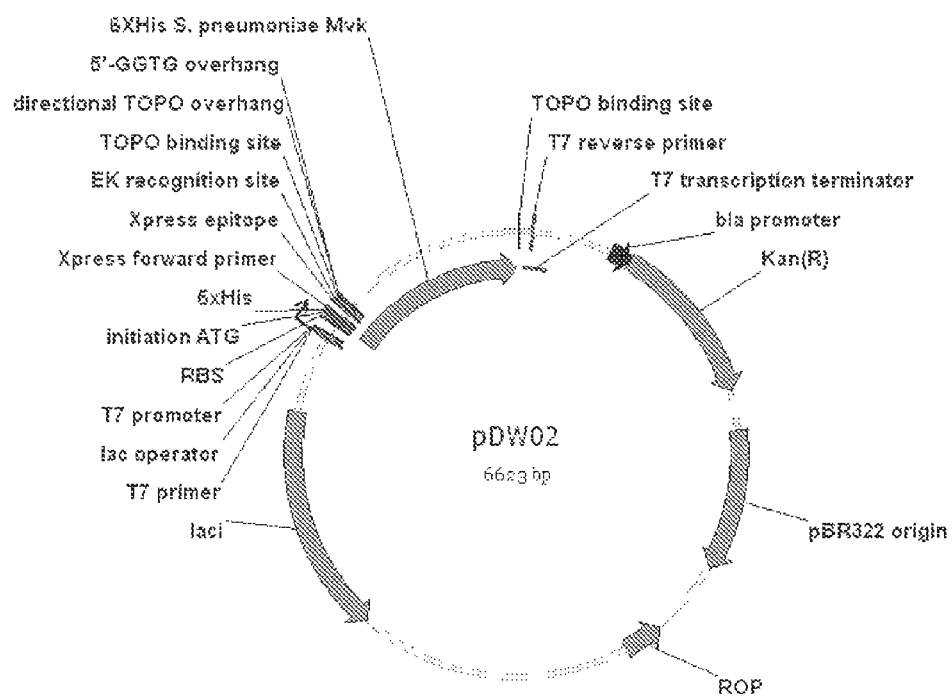
Figure 127A



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Figure 128A



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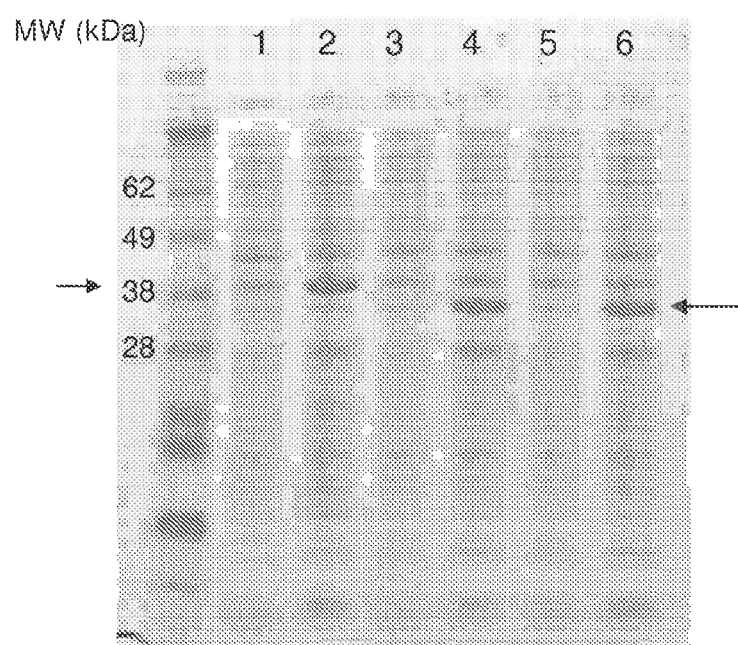
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(SEQ ID NO:113)

Figure 129



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Figure 130

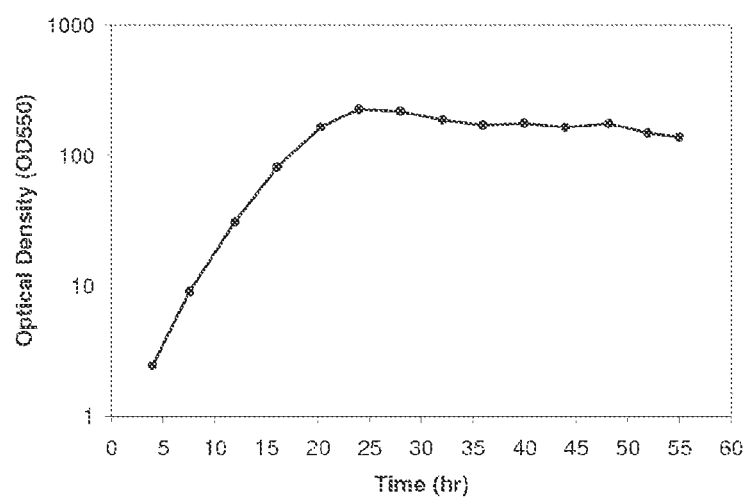
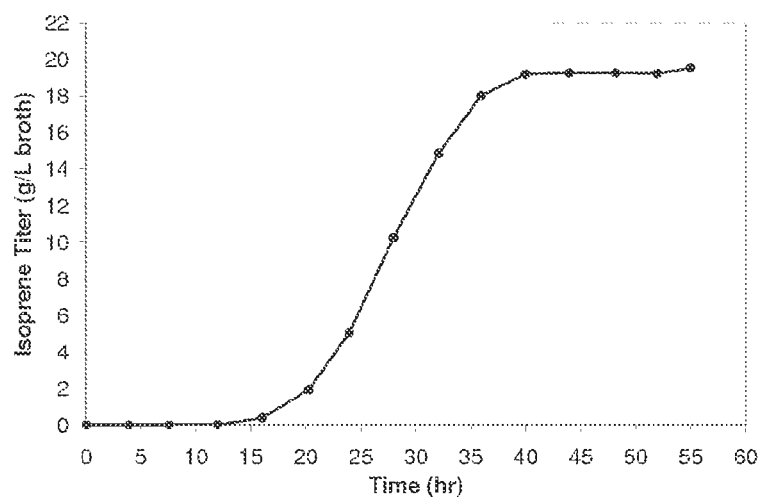


Figure 131



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Figure 132

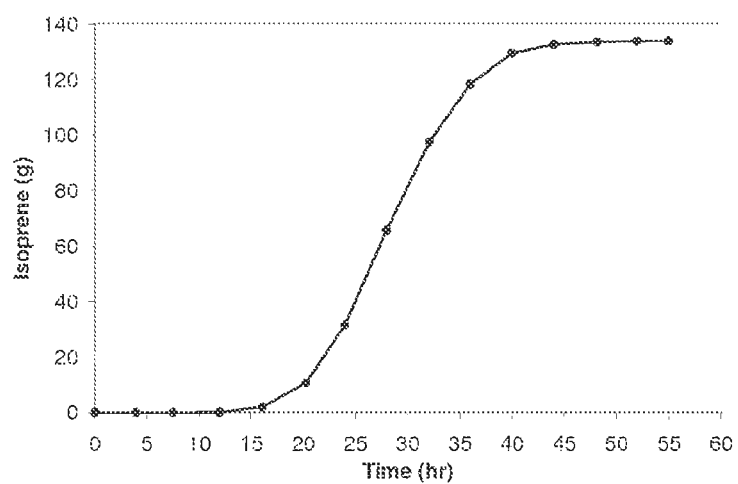
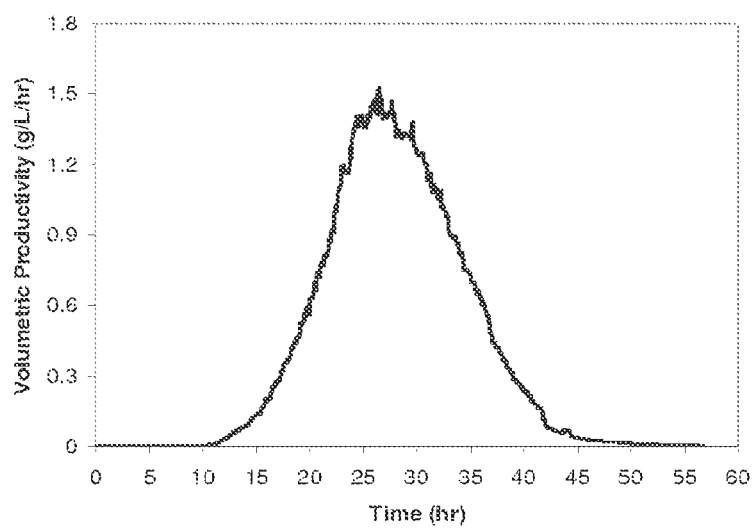


Figure 133



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Figure 134

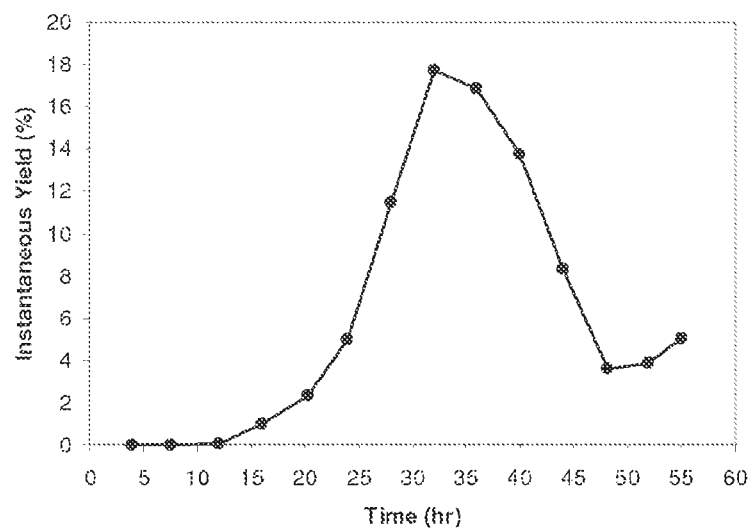
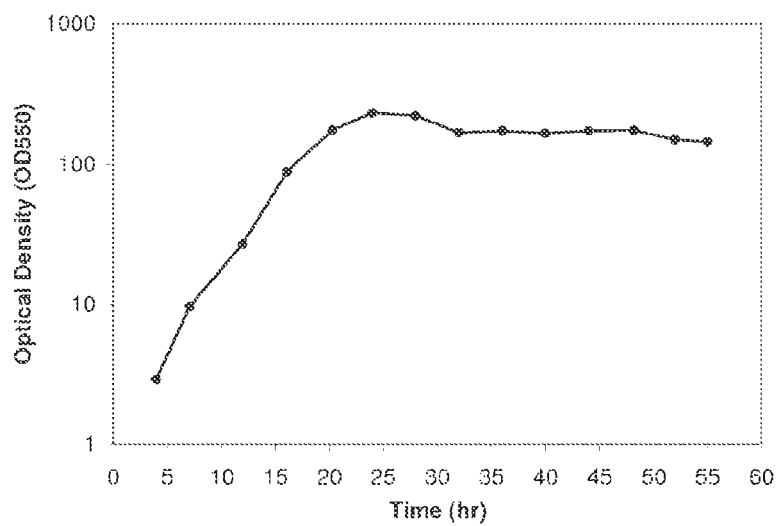


Figure 135



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Figure 136

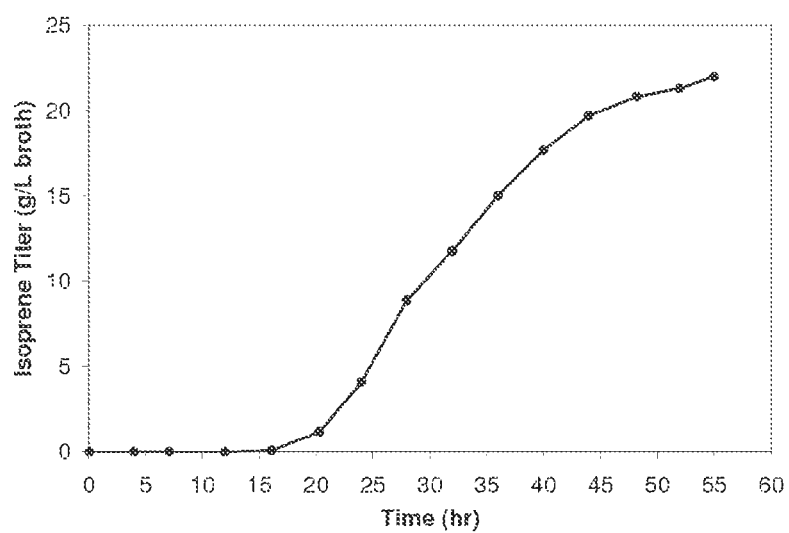


Figure 137

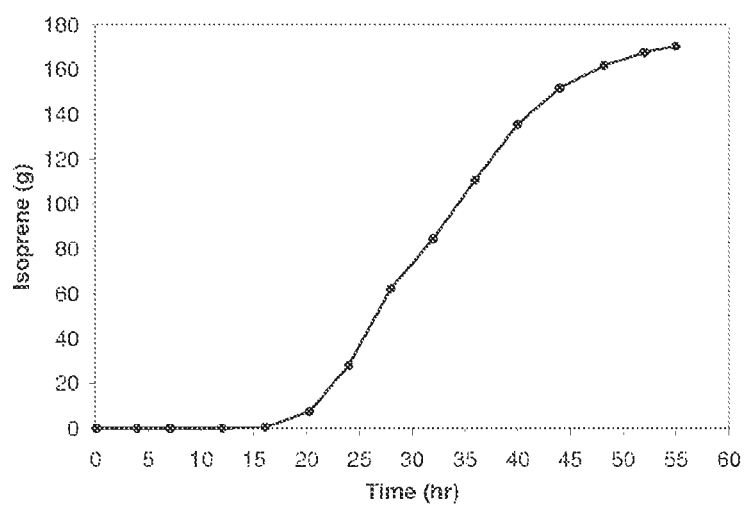
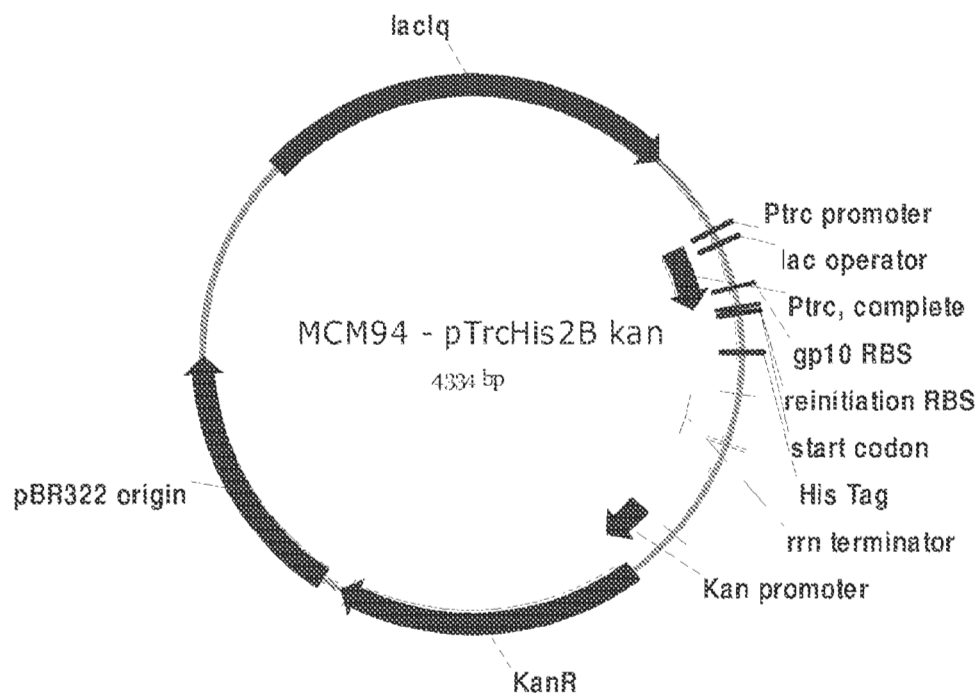


Figure 138A



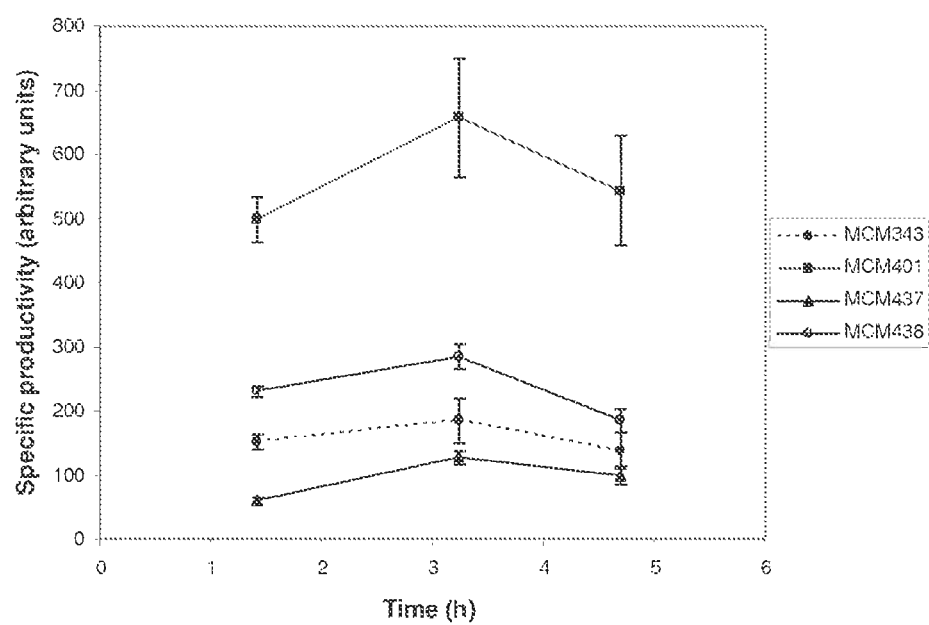


**Figure 138C**

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Figure 139



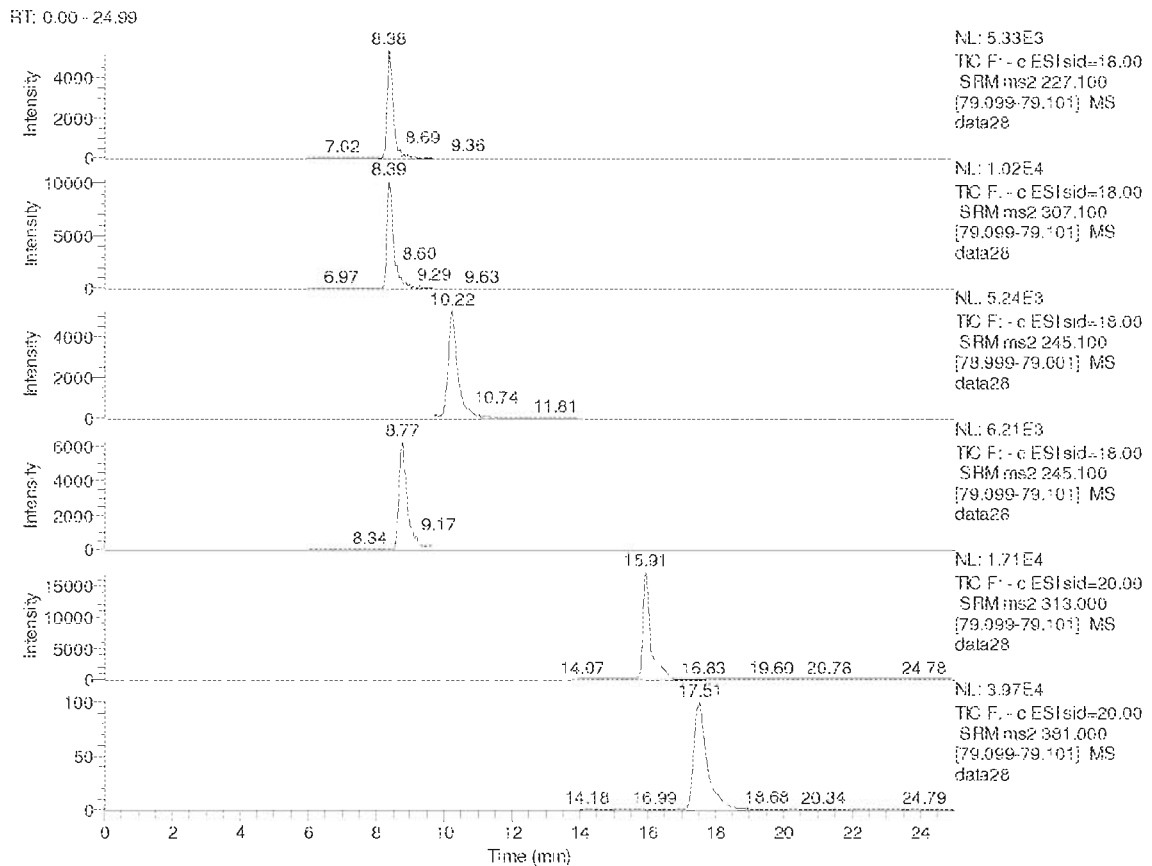
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Figure 140

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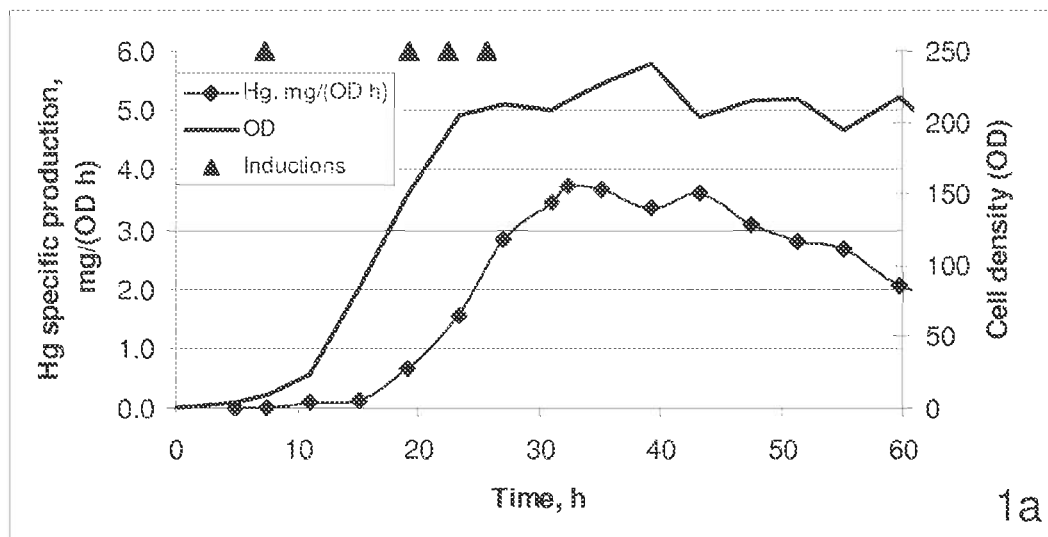
3/8/2008 1:20:26 AM

710 50h

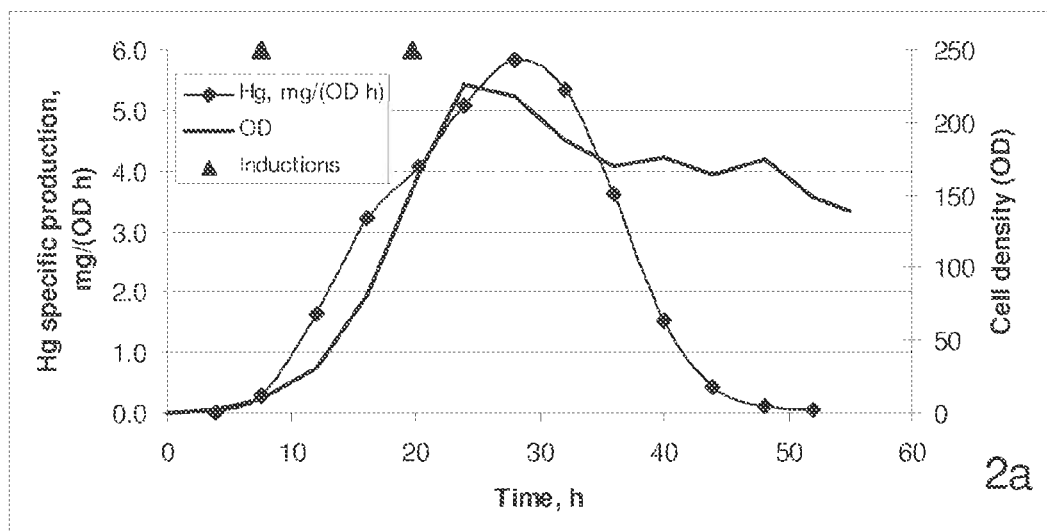


## Figures 141A-141B

A

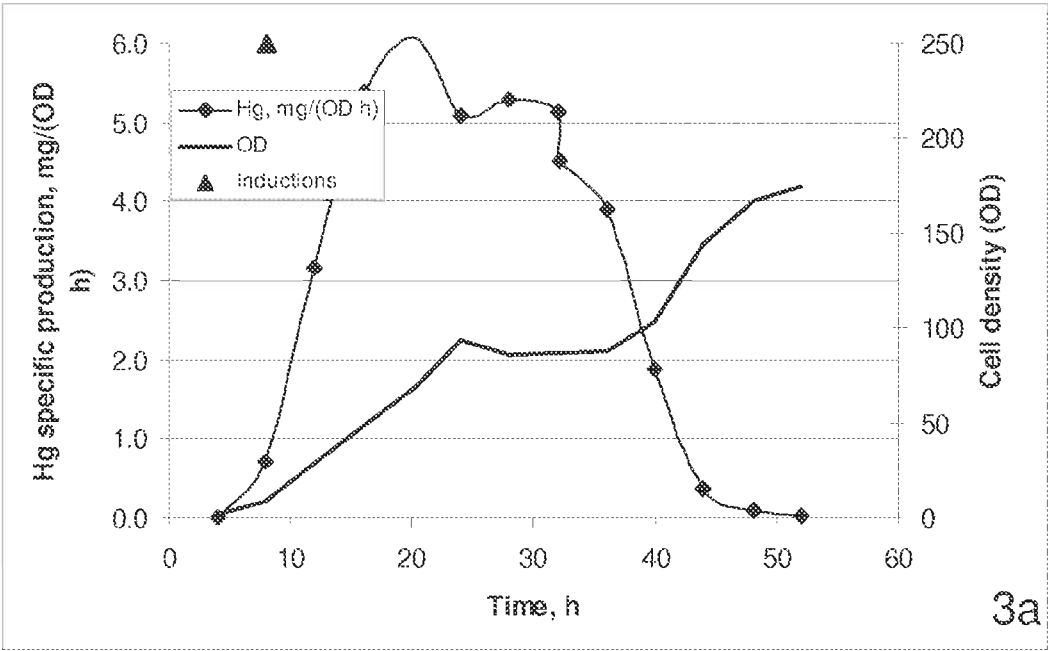


B

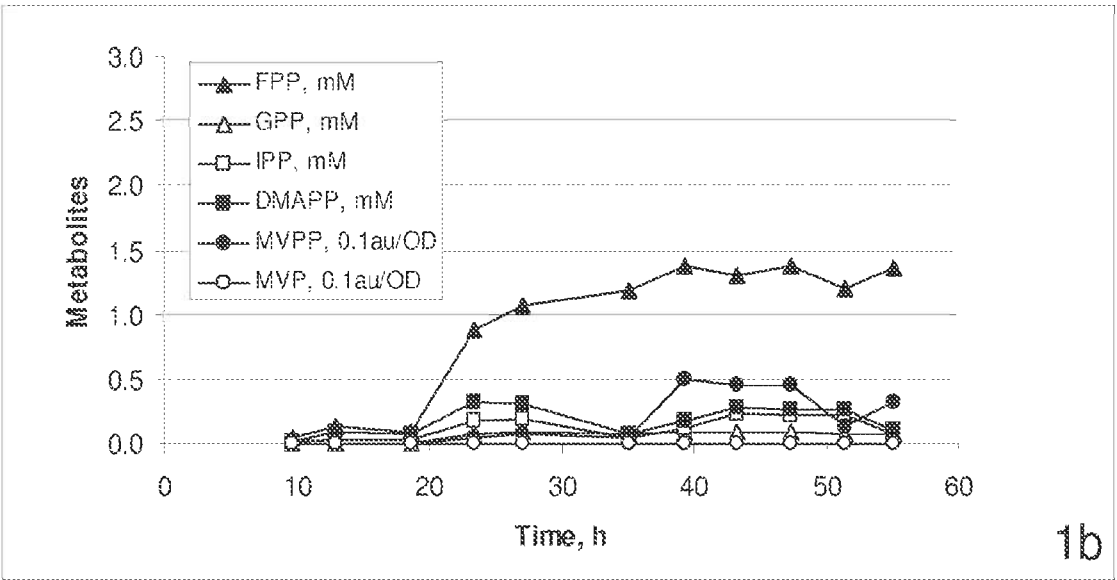


Figures 141C-141D

C



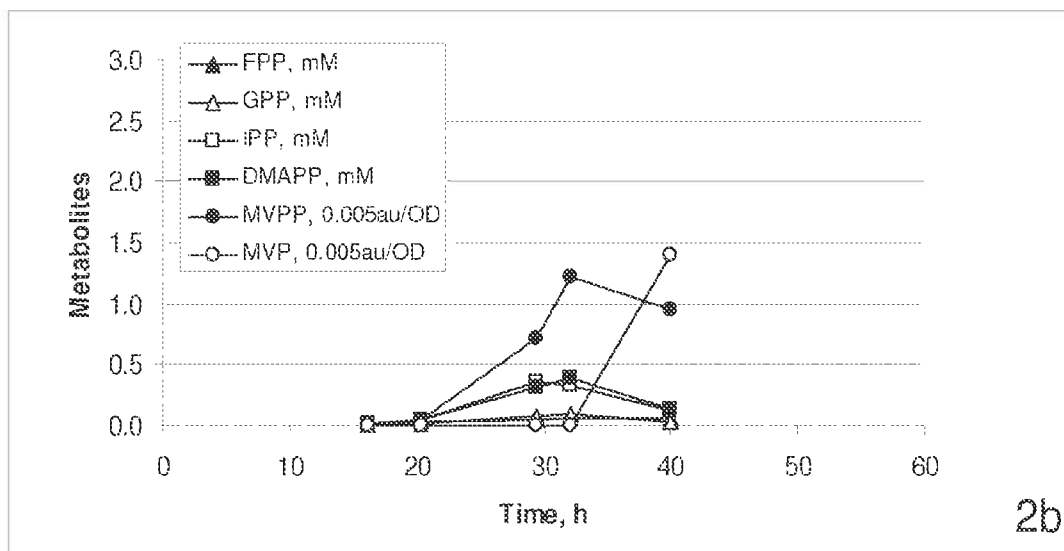
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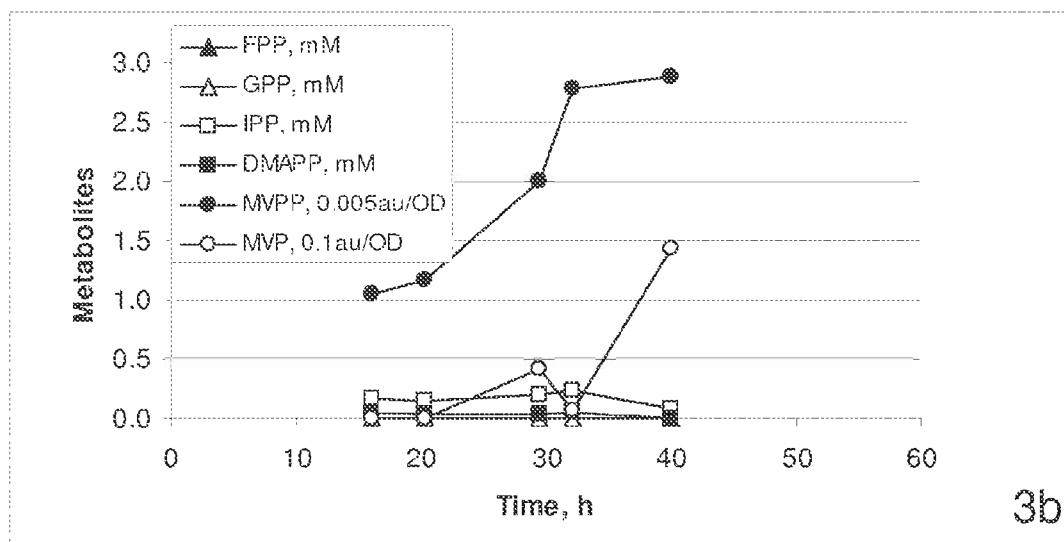
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## Figures 141E-141F

E

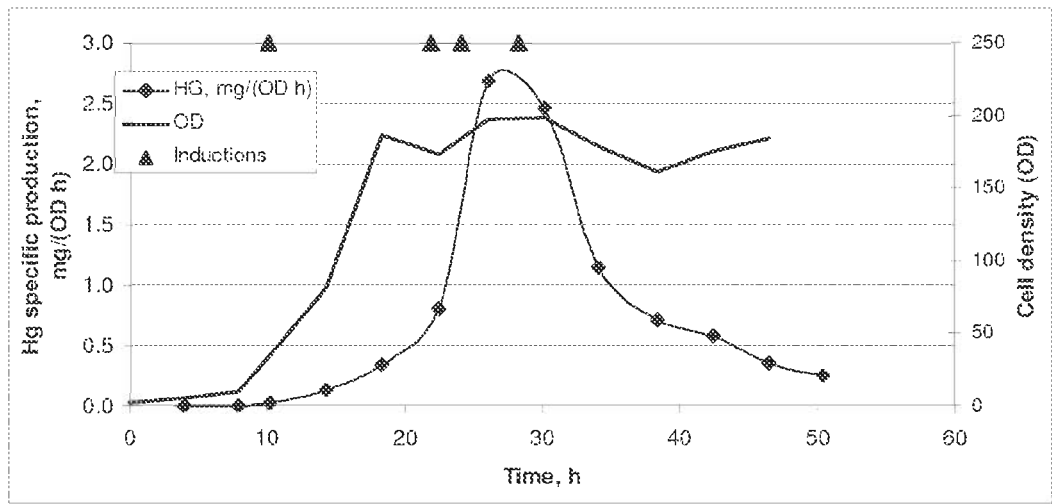


F

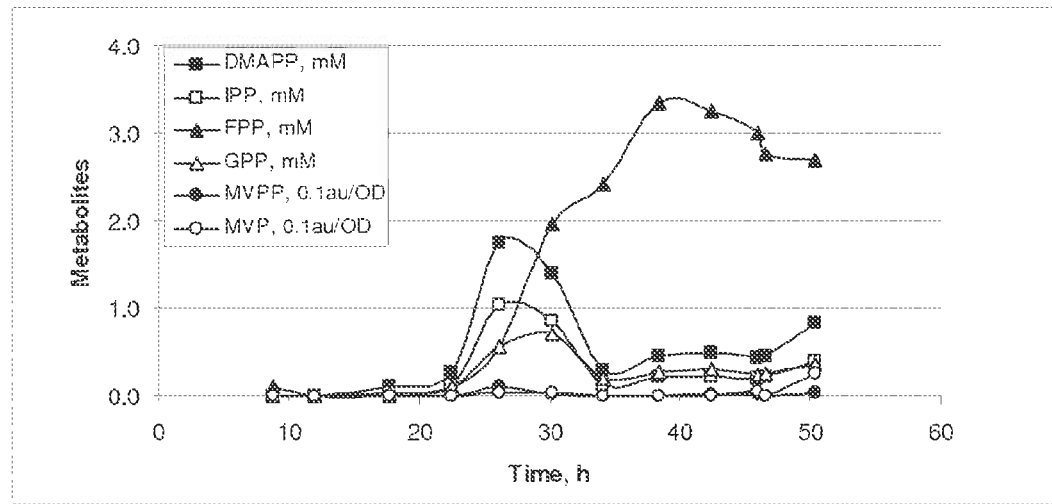


Figures 142A-142B

A

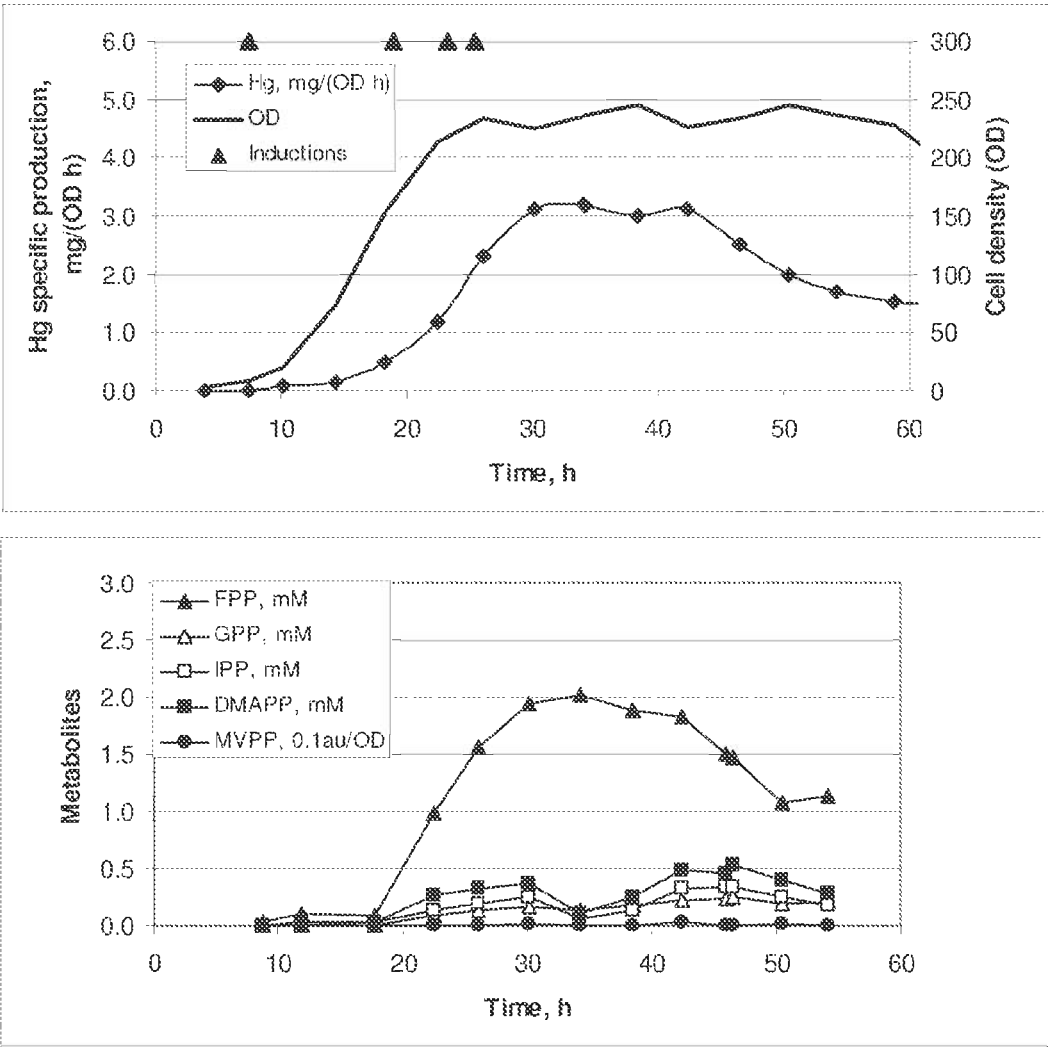


B



Figures 143A-143B

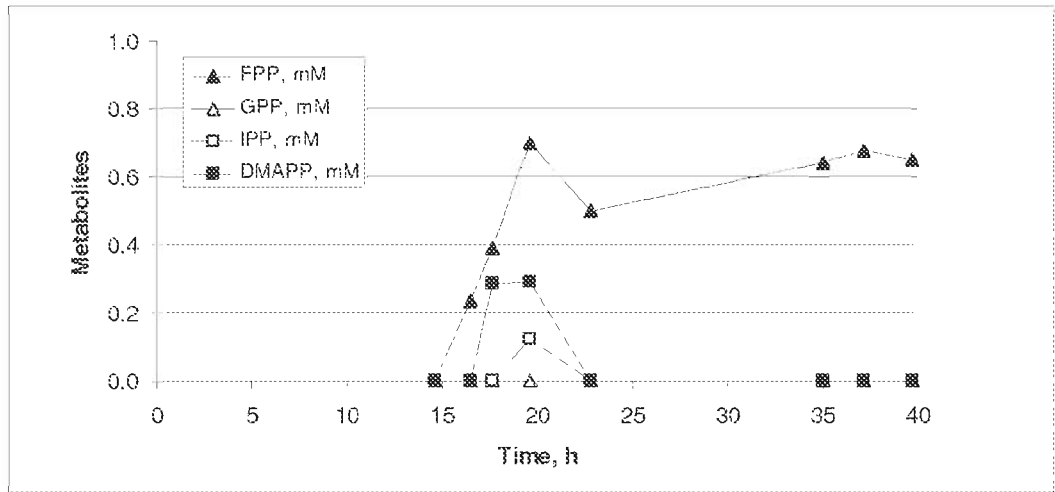
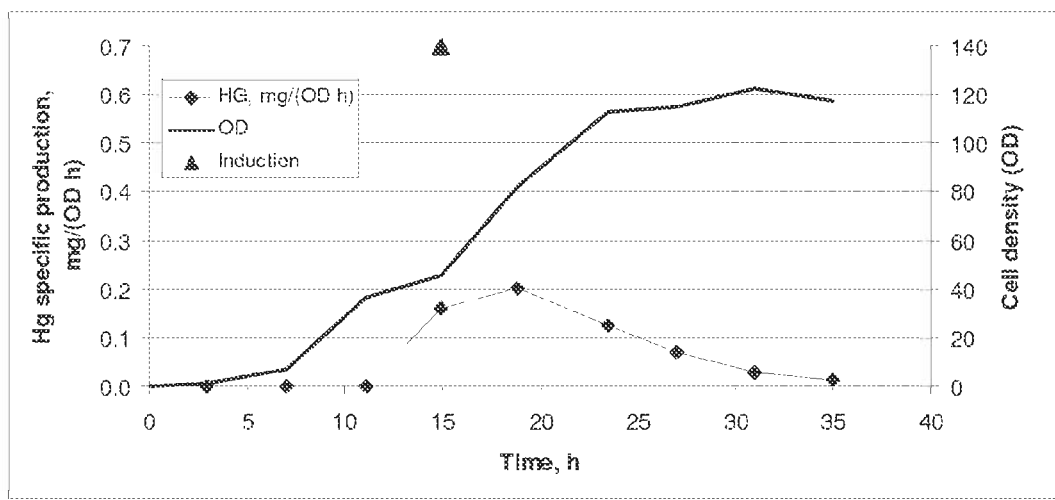
A



B

Figures 144A-144B

A



B

Figure 145

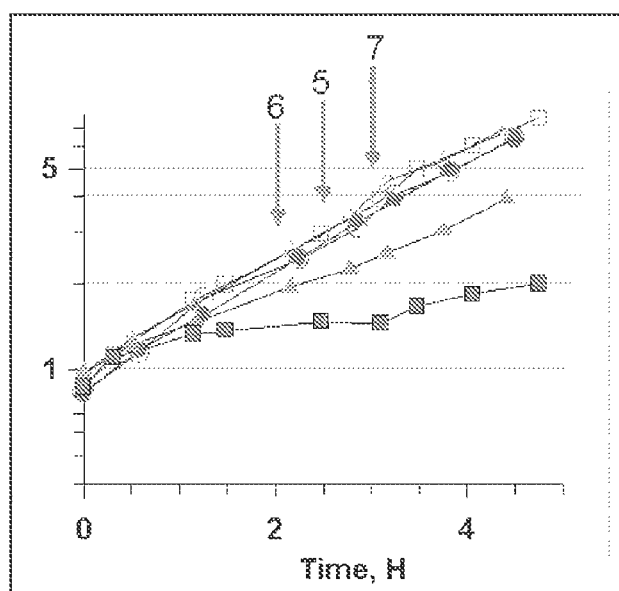


Figure 146

