

Figure 1

1 snpyqrgpnp trsalttdgp fsvatysvsr lsvsgfgggv iyyptgttlt fggiamspgy
61 tadasslawl grrlashgfv vivintnsrl dfpdsrasql saalnlylrts spsavrarld
121 anrlavaghs mgggatlr is eqiptlkagv pltpwhtdkt fntpvqpliv gaeadt vapv
181 sqhaipfyqn lpsttpkvvy eldnathfap nspnaaisvy tiswmklwvd ndtryrqflc
241 nvndpalsdf rsnnrhcq

Figure 2A

	1				50
SEQ_ID_NO_1	-----	-----	-----	-----	-----
SEQ_ID_NO_4	H-----	-----	-----	-----	-----
SEQ_ID_NO_6	-----	-----	-----	-----	-----
Q47RJ7	-----	-MPPHAARPG	PAQNRRGRAM	AVITPRRERS	SLLS-----
CBY05529	-----	-MPPHAARPG	PAQNRRGCAM	AVMTPRRERS	SLLS-----
PZN61876	-----	-----	-----M	AVMTPRRERS	SLLS-----
AAZ54921	-----	-----	-----M	AVMTPRRERS	SLLS-----
BAK48590	-----	-----	-----M	SVTTPRR-ET	SLLS-----
A0A147KJY8	-----	-----	-----M	SVTTPRR-RT	PLLS-----
WP_083947829	-----	-----	-----	-----	-MLS-----
A0A4R6UW92	-----	-----	MNMTNSTLDQ	PTESPAKSAS	PLSRG-----
A0A5Q2RDB8	-----	-----	-----M	KGKPHMTTAA	RRRQ-----
ACU97777	-----	-----	---MRIRRQ	AGTGARASMA	RAIG-----
A0A561WKJ0	-----	-----	-----M	SVLHQT---	-----
G0FYZ7	-----	-----	-----M	SALTSQPTSS	GSSEKIPRLR
A0A0N0A0T6	-----	-----	-----	-----	---MPNEVYS
A0A1W2C2B9	-----	-----	---MRTWSPW	LQGRGRSSPC	S--LPNEVYS
A0A2T0T7X1	-----	-----	-----M	LPGRFPSRRF	G--VYNDVQL
A0A5Q0HE30	-----	-----	-----	-----	-----
A0A1Q4WZS7	-----	-----	-----	-----	-----
A0A4R4NB20	-MTGDFADAR	GPAACADCAR	PGAGPRLRPV	PGSRLPAPPP	EQERTDVRSL
A0A1D8SZ57	-----	-----	-----M	QRNPRTRT--	-----RAT
Q9L2J6	-----	-----	-----M	QQNPHTHAAP	GAARPVLRGV
A0A089Z882	-----	-----	-----M	QQQHRDTSAT	P-----RRR
A0A1H9JKT6	-----	-----	-----M	EPQQHDTTPG	TATR--HRGA
A0A1Y5XYT9	-----	-----	-----M	RRGVRLTGL	TIAP-----
R4SZ25	-----	-----	-----M	RSTTRILCGL	-----
A0A1Q8CLB3	-----	-----	-----M	RRTLRLCGL	A-----
U5W5F9	-----	-----	-----M	QSPTIPARLR	AR-----
AAE13316	-----	-----	-----	-----	-----

Figure 2B

	51				100
SEQ_ID_NO_1	-----	-----	-----	-----	---SNPYQRG
SEQ_ID_NO_4	---HHHHHS	SGLVPR----	-----	-----G	SHMSNPYQRG
SEQ_ID_NO_6	-----	-----	-----	-----	--QTNPYARG
Q47RJ7	-RALRFTAAA	ATALVTAVSL	-----	-----AAP	AHAANPYERG
CBY05529	-RALQVTAAA	ATALVTAVSL	-----	-----AAP	AHAANPYERG
PZN61876	-RALQVTAAA	ATALVTAVSL	-----	-----AAP	AHAANPYERG
AAZ54921	-RALQVTAAA	ATALVTAVSL	-----	-----AAP	AHAANPYERG
BAK48590	-RALRATAAAA	ATAVVATVAL	-----	-----AAP	AQAANPYERG
A0A147KJY8	-RVLRTAAVA	ATAAASVLAL	-----	-----SAP	AQAANPYERG
WP_083947829	-QVTAVVAAA	A-----AAVTL	-----	-----SAP	ALAANPYERG
A0A4R6UW92	VRTAIRTAVA	AALVAGGVGI	-----	-----ASP	AYAANPYERG
A0A5Q2RDB8	-TFVAIIAML	LASLALSPGA	-----	-----DAQ	AS--NPYQRG
ACU97777	-VMTTALAVL	VGAVGGVAGA	-----	-----EVS	TAQDNPYERG
A0A561WKJ0	-WRSALATTL	IAAIVTLLG-	-----	-----APA--	-RAANPYERG
G0FYZ7	GWRAKAAGVV	LAALALTTG-	-----	-----VAAPA	PAAANPYERG
A0A0N0A0T6	-AVQLRTLIP	LALTLVLVTG	-----	-----TAA	QAADNPYERG
A0A1W2C2B9	-AVQLRTLIP	IALSMVLLGG	-----	-----TVA	QAADNPYERG
A0A2T0T7X1	RSVFTTVTLV	AALVGAIGA	-----	-----SPA	IAAENPYERG
A0A5Q0HE30	-----	---MALALAA	-----	-----PQA	TAAETERYRG
A0A1Q4WZS7	-----MPALI	PALALSLGV	-----	-----TPA	TGAEEEFRRG
A0A4R4NB20	PSRAAKTLA	TALAAGALAV	PQ-----	-----ALSQAA	QAADNPYERG
A0A1D8SZ57	RR--RFAGVT	AAVAAVLA--	---LSTLTGP	-----GA	QAADNPYERG
Q9L2J6	RR--RLAAVT	AAVAAVLV--	---LGTLTGP	-----GA	QAADNPYERG
A0A089Z882	RRTGRLTGLA	AATAAVIG--	---LSTLSGT	-----GA	HAADNPYERG
A0A1H9JKT6	PR--RLTKLG	VALAMVLGGV	GVALPTAQAT	QDSGAAPAAV	QAAENPYERG
A0A1Y5XYT9	----VIGAVV	AAGVPATALG	AVVTGTPTTA	IG-----AVE	LSAENPYERG
R4SZ25	-----ATVA	ALTVAPTAY-	-----	-----	-AAENPYERG
A0A1Q8CLB3	-----LAGSV	LAGTASTAS-	-----	-----	-AQENPYERG
U5W5F9	-RLFVTAAAT	LTLVAGSLTG	-----	-----ATAA	QAAENPYERG
AAE13316	-----MKFF	TTILST----	-----	-----AS	LVAALPAAVD

Figure 2C

	101			150
SEQ_ID_NO_1	PNPTRSALTT	-DGPFSVATY	SVSRLSVSGF	GGGVIIYYPTG TTL-TFGGIA
SEQ_ID_NO_4	PNPTRSALTA	-DGPFSVATY	TVSRLSVSGF	GGGVIIYYPTG TSL-TFGGIA
SEQ_ID_NO_6	PNPTAASLEA	SAGPFTVRSF	TVSRP--SGY	GAGTVYYPTN AGG-TVGAIA
Q47RJ7	PNPTDALLEA	RSGPFSVSEE	RASRFGADGF	GGGTIIYYPR- ENN-TYGAVA
CBY05529	PNPTDALLEA	RSGPFSVSEE	NVSRLGASGF	GGGTIIYYPR- ENN-TYGAVA
PZN61876	PNPTDALLEA	RSGPFSVSEE	NVSRLSASGF	GGGTIIYYPR- ENN-TYGAVA
AAZ54921	PNPTDALLEA	SSGPFSVSEE	NVSRLSASGF	GGGTIIYYPR- ENN-TYGAVA
BAK48590	PNPTESMLEA	RSGPFSVSEE	RASRFGADGF	GGGTIIYYPR- ENN-TYGAIA
A0A147KJY8	PNPTQALLEA	RSGPFSVSSE	RAWRLGSDGF	GGGTIIYYPR- ENN-TYGAVA
WP_083947829	PDPTQASLEA	SRGPFVSVSEE	RVSSP-VSGF	GGGTIIYYPQ- ENN-TYGAVA
A0A4R6UW92	PDPTDSSVEA	LRGPYSVDDT	SVSSL-VSGF	GGGTIIYYPTG TNE-TFGAVV
A0A5Q2RDB8	PNPTQSSIEA	LRGPYSTTTT	SVSSF-VSGF	GGGTIIYYPTG TNE-TFGGVV
ACU97777	PDPTEDSIEA	IRGPFSVATE	RVSSF-ASGF	GGGTIIYYPRE TDEGTFGAVA
A0A561WKJ0	PAPTTASIEA	TRGPFAIAQL	TVARSSVSGF	GGGTIIYYPTD TSAGTFGAVA
G0FYZ7	PDPTTASIEA	TSGSFATSTV	TVSRLAVSGF	GGGTIIYYPTT TTAGTFGALS
A0A0N0A0T6	PAPTVSSIEA	LRGPFVAVSET	SVSSL-VGGF	GGGTIIYYPTS TTSAGTFGAVA
A0A1W2C2B9	PAPTNSIEA	SRGSFAVSET	SVSSL-VSGF	GGGTIIYYPTS TSAGTFGAVA
A0A2T0T7X1	PAPTNSIEA	SRGSFAVSET	SVSSLSVTGF	GGGTIIYYPTS TSAGTFGAIA
A0A5Q0HE30	PAPTNSIEA	LRGPFVAVSET	SVSSLVVTGF	GGGTIIYYPTS TAEGTFGAVA
A0A1Q4WZS7	PAPTNSIEA	SRGPFATSST	TVSSLSVTGF	GGGTIIYYPTS TAEGTFGAIA
A0A4R4NB20	PAPTQSSIEA	LRGPFATSQT	SVSSLSVSGF	GGGTIIYYPTS TAAGTFGAVA
A0A1D8SZ57	PAPTESSIEA	SRGSYSVADT	RVSSLAVTGF	GGGTIIYYPTS TADGTFGAVV
Q9L2J6	PAPTESSIEA	LRGPYSVADT	SVSSLAVTGF	GGGTIIYYPTS TSDGTFGAVV
A0A089Z882	PAPTQSSIEA	LRGPYAVSQT	SVSSLAVTGF	GGGTIIYYPTS TADGTFGAVA
A0A1H9JKT6	PDPTERSIEA	ARGPYSVSET	RVSSLSVTGF	GGGTIIYYPTT TSDGTFGAVA
A0A1Y5XYT9	PDPTESIEA	SRGPFSVSQT	TVSRLSATGF	GGGTIIYYPTS TSEGTFGALA
R4SZ25	PDPTESIEA	SRGSFAVSQT	SVSSLAVTGF	GGGTIIYYPTS TAQGTFGAVA
A0A1Q8CLB3	PDPTENSIEA	TRGPFVAVSQT	SVSSLVVTGF	GGGTIIYYPTS TAEGTFGAVA
U5W5F9	PAPTSVAVLDA	SRGPFATSQQ	SVSSLSVSGF	GGGVIIYYPTS TSAGTFGGIA
AAE13316	SNHTPAAPPEL	VARQLGAIE	GLESGSANAC	PDAILIFARG STEPNGMGIT

Figure 2D

	151				200
SEQ_ID_NO_1	MSPGYTADAS	SLAWLGRRRLA	SHGFVVIVIN	TNSRLDFPDS	RASQLSAAL-
SEQ_ID_NO_4	MSPGYTADAS	SLAWLGRRRLA	SHGFVVLVIN	TNSRFDYPDS	RASQLSAAL-
SEQ_ID_NO_6	IVPGYTARQS	SIKWGPRRLA	SHGFVVITID	TNSTLDQPDS	RSSQQMAALR
Q47RJ7	ISPGYTGTQA	SVAWLGERIA	SHGFVVITID	TNTTLDQPDS	RARQLNAAL-
CBY05529	ISPGYTGTQA	SVAWLGKRIA	SHGFVVITID	TITTLDQPDS	RARQLNAAL-
PZN61876	ISPGYTGTEA	SIAWLGERIA	SHGFVVITID	TITTLDQPDS	RAEQLNAAL-
AAZ54921	ISPGYTGTEA	SIAWLGERIA	SHGFVVITID	TITTLDQPDS	RAEQLNAAL-
BAK48590	ISPGYTGTQS	SIAWLGERIA	SHGFVVIAID	TNTTLDQPDS	RARQLNAAL-
A0A147KJY8	ISPGYTGTQA	SVAWLGERIA	SHGFVVITID	TNTTLDQPDS	RARQLDAAL-
WP_083947829	ISPGYTATQS	SVAWLGERIA	SHGFVVITID	TNTTLDQPDS	RADQLEAAL-
A0A4R6UW92	IAPGYTASSS	SMSWMGERLA	SQGFVIFTID	TNTRYDQPDS	RGDQISAAL-
A0A5Q2RDB8	VAPGFTASQS	SMSWLGHRRLA	SQGFVVFTID	TNGRFDQPGS	RADQLLAAA-
ACU97777	VAPGFTASQC	SMSWYGERVA	SQGFIVFTID	TNTRLDQPGQ	RGRQLLAAL-
A0A561WKJ0	ISPGFTASQS	SVSWLGPRIA	SQGFVVITID	TLSVYDQPD	RGTQLLAAL-
G0FYZ7	IAPGFTATQS	SIAWLGPRRLA	SQGFVVFTID	TLTSDQPD	RGRQLLASL-
A0A0N0A0T6	VSPGYTGTQS	SISWLGPRRLA	SQGFVVFTID	TNTIYDQPD	RASQLLAAL-
A0A1W2C2B9	ISPGYTGTQS	TISWLGPRRLA	SQGFVIFTID	TNSRYDQPD	RASQLLAAL-
A0A2T0T7X1	VSPGYTGTQS	SISWLGPRRLA	SQGFVVFTID	TITTLDQPD	RASQLLAAL-
A0A5Q0HE30	ISPGYTGTQS	SISWLGPRRLA	SQGFVVFTID	TNTTLDQPD	RADQLLAAL-
A0A1Q4WZS7	VSPGYTASQS	SMAWLGPRRLA	SQGFVVFTID	TNSRYDQPD	RASQLLSAL-
A0A4R4NB20	VAPGFTADQS	SMAWLGPRRLA	SQGFVIFTID	TNTRLDQPD	RARQLNAAL-
A0A1D8SZ57	ISPGYTAYQS	SIAWLGPRRLA	SQGFVVFTID	TNTTLDQPD	RGRQLLAAL-
Q9L2J6	IAPGFTAYQS	SIAWLGPRRLA	SQGFVVFTID	TNTTLDQPD	RGRQLLAAL-
A0A089Z882	ISPGFTAYES	SIAWLGPRRLA	SQGFVVFTID	TNTTMDQPAS	RGDQLLAAL-
A0A1H9JKT6	VSPGYTADQS	SMAWYGPRRLA	SQGFVVFTID	TNTRYDQPD	RGDQLLAAL-
A0A1Y5XYT9	ISPGFTATQS	SISWMGPRRLA	SQGFVVITID	TLSTLDQPD	RGDQLRAAL-
R4SZ25	ISPGFTATQS	SIAWIGPRRLA	SQGFVVFTID	TNTIYDQPD	RGDQLLAAL-
A0A1Q8CLB3	VSPGFTATQS	SIAWIGPRRLA	SQGFVVITID	TLTVLDQPD	RGDQLLAAL-
U5W5F9	ISPGYTASWS	SISWLGPRRLA	SHGFVVIGIE	TNSVFDQPS	RGNQLLAAL-
AAE13316	VGPALANG--	-----LE	SHIRNIWIQG	VGGPYDAALA	TN-----

Figure 2E

	201				250
SEQ_ID_NO_1	--NYLRTSSP	SAVRARLDAN	RLAVAGHSMG	GGATLRISQ	IPTLKAGVPL
SEQ_ID_NO_4	--NYLRTSSP	SAVRARLDAN	RLAVAGHSMG	GGGTLRIAEQ	NPSLKAAVPL
SEQ_ID_NO_6	QVASLNGTSS	SPIYGKVDTA	RMGVMGWSMG	GGGSLISAAN	NPSLKAAAPQ
Q47RJ7	--DYMINDAS	SAVRSRIDSS	RLAVMGHSMG	GGGTLRLASQ	RPDLKAAIPL
CBY05529	--DYMINDAS	SAVRSRIDSS	RLAVMGHSMG	GGGSLRLASQ	RPDLKAAIPL
PZN61876	--NHMINRAS	STVRSRIDSS	RLAVMGHSMG	GGGSLRLASQ	RPDLKAAIPL
AAZ54921	--NHMINRAS	STVRSRIDSS	RLAVMGHSMG	GGGTLRLASQ	RPDLKAAIPL
BAK48590	--DYMLTDAS	SAVRNRIDAS	RLAVMGHSMG	GGGTLRLASQ	RPDLKAAIPL
A0A147KJY8	--DHMLNDAS	SAVRSRIDRN	RLAVMGHSMG	GGGTLRLASQ	RPDLKAAIPL
WP_083947829	--DHMVDGAS	STVRSRIDRN	RLAVMGHSMG	GGGTLRLASR	RPDLKAAIPL
A0A4R6UW92	--DYLVEDST	SAVRNRIDPD	RLAAMGHSMG	GGGTLAVAAD	RPELKAAIPL
A0A5Q2RDB8	--DYLADDSS	SAVQARLDD	RLAVMGHSMG	GGGSIBASSD	RSSLKASIPL
ACU97777	--DYLVERSD	RKVRERLDPN	RLAVMGHSMG	GGGSLEATVM	RPSLKASIPL
A0A561WKJ0	--DYLTGSSA	--VRTRIDAT	RLGVMGHSMG	GGGSLAASRT	RPALQAAVPL
G0FYZ7	--DYLTQQSS	--VRSRIDST	RLGVVGHSMG	GGGTLEAARS	RPTLQAAVPL
A0A0N0A0T6	--DYLTQQSS	--VRSRIDAT	RLGVMGHSMG	GGGTLRAASQ	RPTLQAAIPL
A0A1W2C2B9	--DYLTQQSS	--VRTRIDSS	RLGVMGHSMG	GGGTLRAASQ	RPSLQAAIPL
A0A2T0T7X1	--DYLTQRSA	--VRARIDAT	RLGVMGHSMG	GGGTLRAAAN	RPALQAAIPL
A0A5Q0HE30	--DYLTQRSS	--VRTRIDNT	RLGVMGHSMG	GGGTLRAAEQ	RPSLQAAIPL
A0A1Q4WZS7	--DYLTQRSS	--VRSRIDAS	RLGVMGHSMG	GGGTLRAAEQ	RPALQAAIPL
A0A4R4NB20	--DYLTQRSS	--VRSRIDAS	RLGVMGHSMG	GGGTLRAEAD	RPQLQAAIPL
A0A1D8SZ57	--DYLTGRSS	--VRERIDSS	RLGVMGHSMG	GGGSLEAAKS	RPSLQAAIPL
Q9L2J6	--DYLTGRSS	--VRGRIDSG	RLGVMGHSMG	GGGTLEAAKS	RPSLQAAIPL
A0A089Z882	--DYLTQRSS	--VRGRVDAT	RLGVMGHSMG	GGGSLEAAKD	RPSLQAAIPL
A0A1H9JKT6	--DYLTQRSS	--VRGRIDSG	RLAVMGHSMG	GGGSLEAAKD	RPSLKAAIPL
A0A1Y5XYT9	--TYLTQRST	--VRTRIDAS	RLAVAGHSMG	GGGSLEAAAD	QPTLQAAIPI
R4SZ25	--DYLTQRST	--VRSRIDTS	RLAVAGHSMG	GGGSLEAAQD	RPSLQAAVPL
A0A1Q8CLB3	--DYLTQRSS	--VRGRIDAS	RLAVSGHSMG	GGGSLEATET	RPSLQASVPL
U5W5F9	--DYLTTRSS	--VRTRVDAS	RLAVAGHSMG	GGGSLEAAKD	RPSLQAAVPL
AAE13316	---	FLPRGTS	---	QANIDEG	KRLFALANQK CPNTPVVAGG YSQGAALIAA

Figure 2F

	251				300
SEQ_ID_NO_1	TPWHTDKTFN	-TPVPQLIVG	AEADTVAPVS	QHAIPFYQNL	PSTTPKVYVE
SEQ_ID_NO_4	TPWHTDKTFN	-TSVPVLIVG	AEADTVAPVS	QHAIPFYQNL	PSTTPKVYVE
SEQ_ID_NO_6	APWDSSTNFS	SVTVPTLIIFA	CENDSIAPVN	SSALPIYDSM	SRN-AKQFLE
Q47RJ7	TPWHLNKNWS	SVRVPTLIIG	ADLDTIAPVL	THARPFYNSL	PTSISKAYLE
CBY05529	TPWHLNKNWS	SVRVPTLIIG	ADLDTIAPVL	THARPFYNSL	PTSISKAYLE
PZN61876	TPWHLNKNWS	SVTVPTLIIG	ADLDTIAPVA	THAKPFYNSL	PSSISKAYLE
AAZ54921	TPWHLNKNWS	SVTVPTLIIG	ADLDTIAPVA	THAKPFYNSL	PSSISKAYLE
BAK48590	TPWHLNKSWS	DITVPTLIIG	AEYDTIASVT	LHAKPFYNSI	PSPTDKAYLE
A0A147KJY8	TPWHLNKSWS	NVQVPTLIIG	ADLDTIAPVL	THAEFFYNSI	PTSTRKAYLE
WP_083947829	TPWHLNKSWS	NVQVPTLIIG	AENDTVAPVA	LHAEPFYTSI	PTSTRKAYLE
A0A4R6UW92	TPWHLDKTWS	EVDVPTMIIG	AENDTVASVS	SHSIPFYNSL	SGAPDKVYLE
A0A5Q2RDB8	TPWHTRKTWS	SVQVPTLVVG	AENDSVASTS	SHAIPLYNGL	PSSLDKAYLE
ACU97777	TPWNLDKTWG	QVQVPTFIIG	AELDTIASVR	THAKPFYESL	PSSLPKAYME
A0A561WKJ0	APWHTTKSWS	TDRVPTLIIG	AESDTVAPVA	SHAEPFYTSL	PSTLDKAYLE
G0FYZ7	TAWDLTKNWS	TLQVPTLVVG	AQSDTVAPVA	SHSIPFYTSL	PSTLDRAYLE
A0A0N0A0T6	TAWHTTKNWS	SVRVPTLVVG	AEDDSIAPVA	THSEPFYTTL	PSTLDKAYLE
A0A1W2C2B9	TGWHTTKNWS	SVRVPTLVVG	AENDSVASVS	SHSEPFYTSL	PSTLDKAYLE
A0A2T0T7X1	TGWHTDKTWG	DVRVPTLVVG	ADGDTIAPVA	THSKPFYNSL	PSSLDRAYLE
A0A5Q0HE30	TGWHTDKTWG	SVRVPTLVIG	ADGDTIAPVS	SHSEPFYTTL	PSTLDKAYLE
A0A1Q4WZS7	TGWHTDKTWG	SVRVPTLVVG	AENDSVASVS	SHSIPFYNSL	PSTLDKAYLE
A0A4R4NB20	TPWDLQKNFS	DVRVPTMIIG	AEADTIAPVA	THSKPFYTSI	PASSEKAYLE
A0A1D8SZ57	TPWNLDKWP	EVSTPTLVVG	ADGDTIAPVA	SHAEPFYSSL	PSATDRAYLE
Q9L2J6	TPWNLDKSWP	EVSTPTLVVG	ADGDTIAPVA	SHAEPFYSSL	PSSTDRAYLE
A0A089Z882	TPWNLDKTWS	EVRTPTLIIFG	ADGDTIAPVS	SHAEPFYQNL	PSSLDKAYLE
A0A1H9JKT6	TPWNLDKTWR	EITVPTFIVG	ADGDSIASVR	SHAEPFYESL	PSSTDRAYME
A0A1Y5XYT9	AAWNTQKTWS	TLRVPTFVIG	GESDSVAPVA	SHSIPFYTSI	PASAEKAYME
R4SZ25	APWNTQKSWS	SLRVPTFIIG	GESDSVAPVA	SHSIPFYTSI	PATAEKAYME
A0A1Q8CLB3	APWNADKTWS	SVRTPTFIIG	GESDSVASVS	SHSIPFYQSI	PAASEKAYME
U5W5F9	APWNTTKTWS	GLQVPTLIIG	GESDTVAPVS	SHSIPFYNSI	PSSAEKAYLE
AAE13316	AVSELSGAVK	EQVKGVALFG	YTQN---LQN	RGGIPNY---	PRERTKVFCN

Figure 2G

	301				350
SEQ_ID_NO_1	LDNATHFAPN	SPNAA---IS	VYTISWMKLW	VDNDTRYRQF	LCN---VND
SEQ_ID_NO_4	LDNASHFAPN	SNNAA---IS	VYTISWMKLW	VDNDTRYRQF	LCN---VND
SEQ_ID_NO_6	INGGSHSCAN	SGNSNQALIG	KKGVAWMKRF	MDNDTRYSTF	ACENPNSTRV
Q47RJ7	LDGATHFAPN	IPNKI---IG	KYSVAWLKRF	VDNDTRYTQF	LCPGPRDGLF
CBY05529	LDGATHFAPN	IPNKI---IG	KYSVAWLKRF	VDNDTRYTQF	LCPGPRDGLF
PZN61876	LDGATHFAPN	IPNKI---IG	KYSVAWLKRF	VDNDTRYTQF	LCPGPRDGLF
AAZ54921	LDGATHFAPN	IPNKI---IG	KYSVAWLKRF	VDNDTRYTQF	LCPGPRDGLF
BAK48590	LDGASHFAPN	ITNKT---IG	MYSVAWLKRF	VDEDTRYTQF	LCPGPRTGLL
A0A147KJY8	LDGATHFAPN	ITNST---IG	MYSVAWLKRF	VDEDTRYTQF	LCPGPRTGLF
WP_083947829	LNGASHFAPS	VANAT---IG	MYGVAWLKRF	VDEDTRYTRF	LCPGPRTGLF
A0A4R6UW92	LDGASHFAPN	LSNTT---IA	KYSISWLKRF	VDEDTRYSQF	LCPGPSTGLG
A0A5Q2RDB8	LDGASHFAPN	SNNTT---IA	AYSIWLKRF	VDNDTRYDQF	LCG--PNHTAD
ACU97777	LDGATHFAPN	IPNTT---IA	KYVISWLKRF	VDEDTRYSQF	LC--PN-PTD
A0A561WKJ0	LNNASHSAPT	SANVT---VA	KYSISWLKRF	IDNDTRYEQF	LC--PAPSGS
G0FYZ7	LRGASHFAPN	SPNTT---IA	KYTLSWLKRF	IDNDTRYEQF	LC--PIPSTS
A0A0N0A0T6	LNNATHFAPN	SNNTT---IA	KYSISWLKRF	IDNDTRYEQF	LC--PAPGRS
A0A1W2C2B9	LNNASHFAPN	SPNTT---IA	KYSISWLKRF	IDNDTRYEQF	LC--PAPGRS
A0A2T0T7X1	LRGATHFTPN	SSNTT---IA	KYSISWLKRF	IDNDTRYEQF	LC--PTPSSS
A0A5Q0HE30	LNGATHFTPN	TSNTT---IA	KYSISWLKRF	IDNDTRYEQF	LC--PAPRG-
A0A1Q4WZS7	LNGASHFAPN	SSNTT---IA	KYSIAWLKRF	IDNDTRYEQF	LC--PSPANS
A0A4R4NB20	LNGASHFAPN	IANTT---IA	KYSISWLKRY	IDNDTRYDQF	LC--PGPSRD
A0A1D8SZ57	LNNATHFSPN	TSNTT---IA	KYSISWLKRF	IDNDTRYEQF	LC--PLPRPS
Q9L2J6	LNNATHFSPN	TSNTT---IA	KYSISWLKRF	IDDDTRYEQF	LC--PLPRPS
A0A089Z882	LNNATHFTPN	SNDTT---IA	KYSISWLKRF	IDNDTRYEQF	LC--PLPRPS
A0A1H9JKT6	LNNATHFTPN	TSNTE---IA	KYSISWLKRF	VDNDTRYEQF	LC--PLPRPS
A0A1Y5XYT9	LDNASHFFPQ	TPNTT---MA	KYMISWLKRF	VDNDTRYEQF	LC--PAPN-D
R4SZ25	LDNASHFFPN	TANTT---MA	KYTISWLKRF	VDNDTRYEQF	LC--PAPD-D
A0A1Q8CLB3	LDGASHFFPN	TPNTT---MA	KYLISWMKRF	VDNDTRYEQF	LC--PPPN-D
U5W5F9	LNNASHFFPQ	STNTP---TG	RQAVAWLKRF	VDNDTRYDQF	IC--PGPS-S
AAE13316	VGDAVCTG--	-----TL	IITPAHLSYT	IEARGEAAAF	LR-----

Figure 2H

	351					400
SEQ_ID_NO_1	PALSDFRSNN	RHCQ-----	-----	-----	-----	-----
SEQ_ID_NO_4	PALSDFRINN	RHCQ-----	-----	-----	-----	-----
SEQ_ID_NO_6	SDFRTANCSL	EHHHHHH---	-----	-----	-----	-----
Q47RJ7	GEVEEYRSTC	PF-----	-----	-----	-----	-----
CBY05529	GEVEEYRSTC	PF-----	-----	-----	-----	-----
PZN61876	GEVEEYRSTC	PF-----	-----	-----	-----	-----
AAZ54921	GEVEEYRSTC	PF-----	-----	-----	-----	-----
BAK48590	SDVEEYRSTC	PF-----	-----	-----	-----	-----
A0A147KJY8	SDVEEYRSTC	PF-----	-----	-----	-----	-----
WP_083947829	SDVEEYRSTC	PF-----	-----	-----	-----	-----
A0A4R6UW92	SDVSDYRNTC	PV-----	-----	-----	-----	-----
A0A5Q2RDB8	RDISDYRSTC	PYSPVDPGDP	GDPGTPGGEC	VRTHTRNHVD	AGRATNVWGT	
ACU97777	RAIEEYRSTC	PY-----	-----	-----	-----	-----
A0A561WKJ0	-AIQEYRDTC	PHS-----	-----	-----	-----	-----
G0FYZ7	LSISDYRGNC	PHNG-----	-----	-----	-----	-----
A0A0N0A0T6	TLIEEYRDTC	PHS-----	-----	-----	-----	-----
A0A1W2C2B9	TLIEEYRDTC	PHS-----	-----	-----	-----	-----
A0A2T0T7X1	LLIAEFRGNC	PHSS-----	-----	-----	-----	-----
A0A5Q0HE30	AAIQEYRDTC	PHST-----	-----	-----	-----	-----
A0A1Q4WZS7	SLISDYRDTC	PHGV-----	-----	-----	-----	-----
A0A4R4NB20	LNISEYRDTC	PNS-----	-----	-----	-----	-----
A0A1D8SZ57	LTIEEYRGNC	PHGS-----	-----	-----	-----	-----
Q9L2J6	LTIEEYRGNC	PHGS-----	-----	-----	-----	-----
A0A089Z882	LTIEEYRGNC	PHTS-----	-----	-----	-----	-----
A0A1H9JKT6	LAIEEFRGNC	PH-----	-----	-----	-----	-----
A0A1Y5XYT9	REISDYRDTC	PHS-----	-----	-----	-----	-----
R4SZ25	RAISDYRDTC	PHA-----	-----	-----	-----	-----
A0A1Q8CLB3	SDIEEYRHTC	PHV-----	-----	-----	-----	-----
U5W5F9	SSISDYRNSC	PLT-----	-----	-----	-----	-----
AAE13316	---DRIRA--	-----	-----	-----	-----	-----

Figure 2I

	401			435
SEQ_ID_NO_1	-----	-----	-----	-----
SEQ_ID_NO_4	-----	-----	-----	-----
SEQ_ID_NO_6	-----	-----	-----	-----
Q47RJ7	-----	-----	-----	-----
CBY05529	-----	-----	-----	-----
PZN61876	-----	-----	-----	-----
AAZ54921	-----	-----	-----	-----
BAK48590	-----	-----	-----	-----
A0A147KJY8	-----	-----	-----	-----
WP_083947829	-----	-----	-----	-----
A0A4R6UW92	-----	-----	-----	-----
A0A5Q2RDB8	AYAVGSGDNL	GSHSYFNYVS	LQSISSGGWTE	VSSCP
ACU97777	-----	-----	-----	-----
A0A561WKJ0	-----	-----	-----	-----
G0FYZ7	-----	-----	-----	-----
A0A0N0A0T6	-----	-----	-----	-----
A0A1W2C2B9	-----	-----	-----	-----
A0A2T0T7X1	-----	-----	-----	-----
A0A5Q0HE30	-----	-----	-----	-----
A0A1Q4WZS7	-----	-----	-----	-----
A0A4R4NB20	-----	-----	-----	-----
A0A1D8SZ57	-----	-----	-----	-----
Q9L2J6	-----	-----	-----	-----
A0A089Z882	-----	-----	-----	-----
A0A1H9JKT6	-----	-----	-----	-----
A0A1Y5XYT9	-----	-----	-----	-----
R4SZ25	-----	-----	-----	-----
A0A1Q8CLB3	-----	-----	-----	-----
U5W5F9	-----	-----	-----	-----
AAE13316	-----	-----	-----	-----

Figure 3

	%Sequence Identity w.r.t. SEQ ID NO:1
SEQ ID NO:4	94
SEQ ID NO:6	42
Q47RJ7	55
CBY05529	56
PZN61876	56
AAZ54921	56
BAK48590	56
A0A147KJY8	55
WP_083947829	54
A0A4R6UW92	56
A0A5Q2RDB8	58
ACU97777	55
A0A561WKJ0	55
G0FYZ7	55
A0A0N0A0T6	57
A0A1W2C2B9	57
A0A2T0T7X1	56
A0A5Q0HE30	56
A0A1Q4WZS7	58
A0A4R4NB20	56
A0A1D8SZ57	54
Q9L2J6	54
A0A089Z882	55
A0A1H9JKT6	56
A0A1Y5XYT9	55
R4SZ25	55
A0A1Q8CLB3	55
U5W5F9	57
AAE13316.1	13

Figure 4

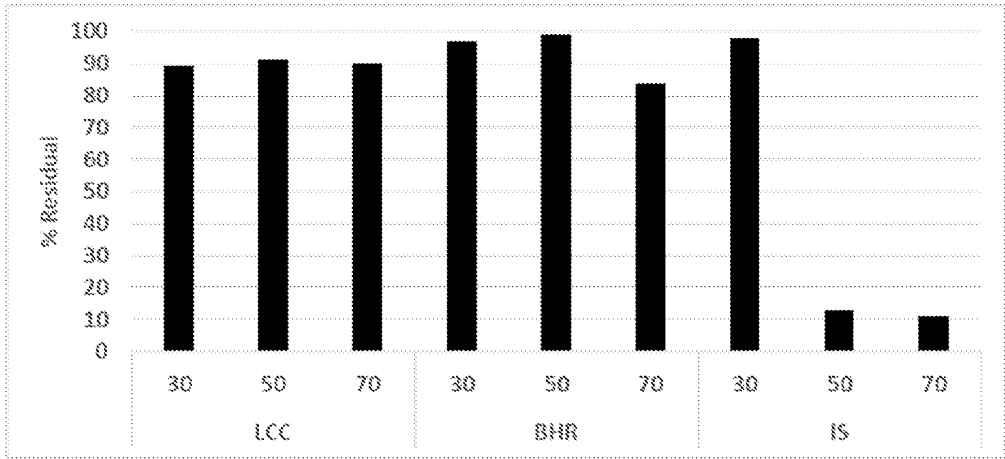


Figure 5

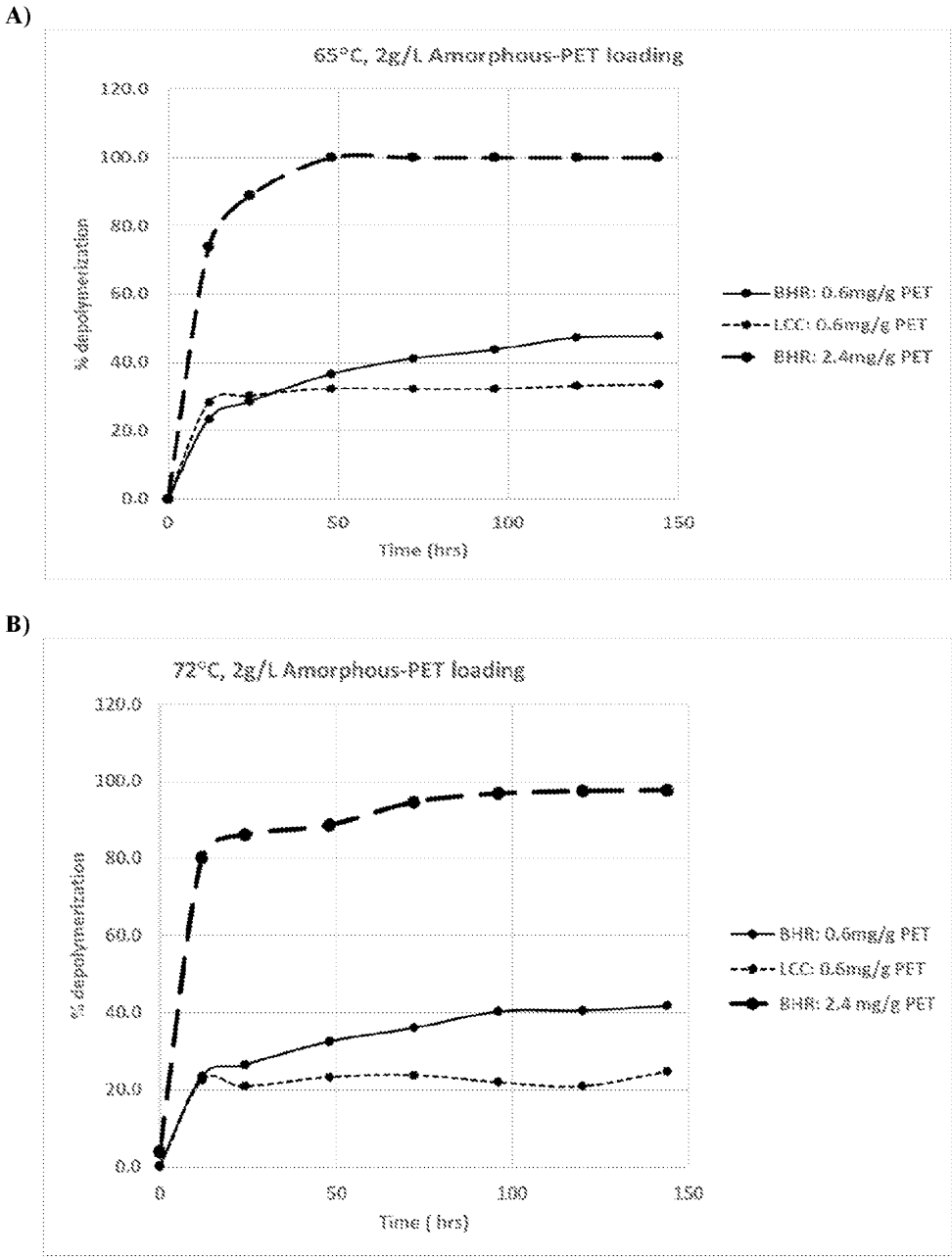


Figure 6

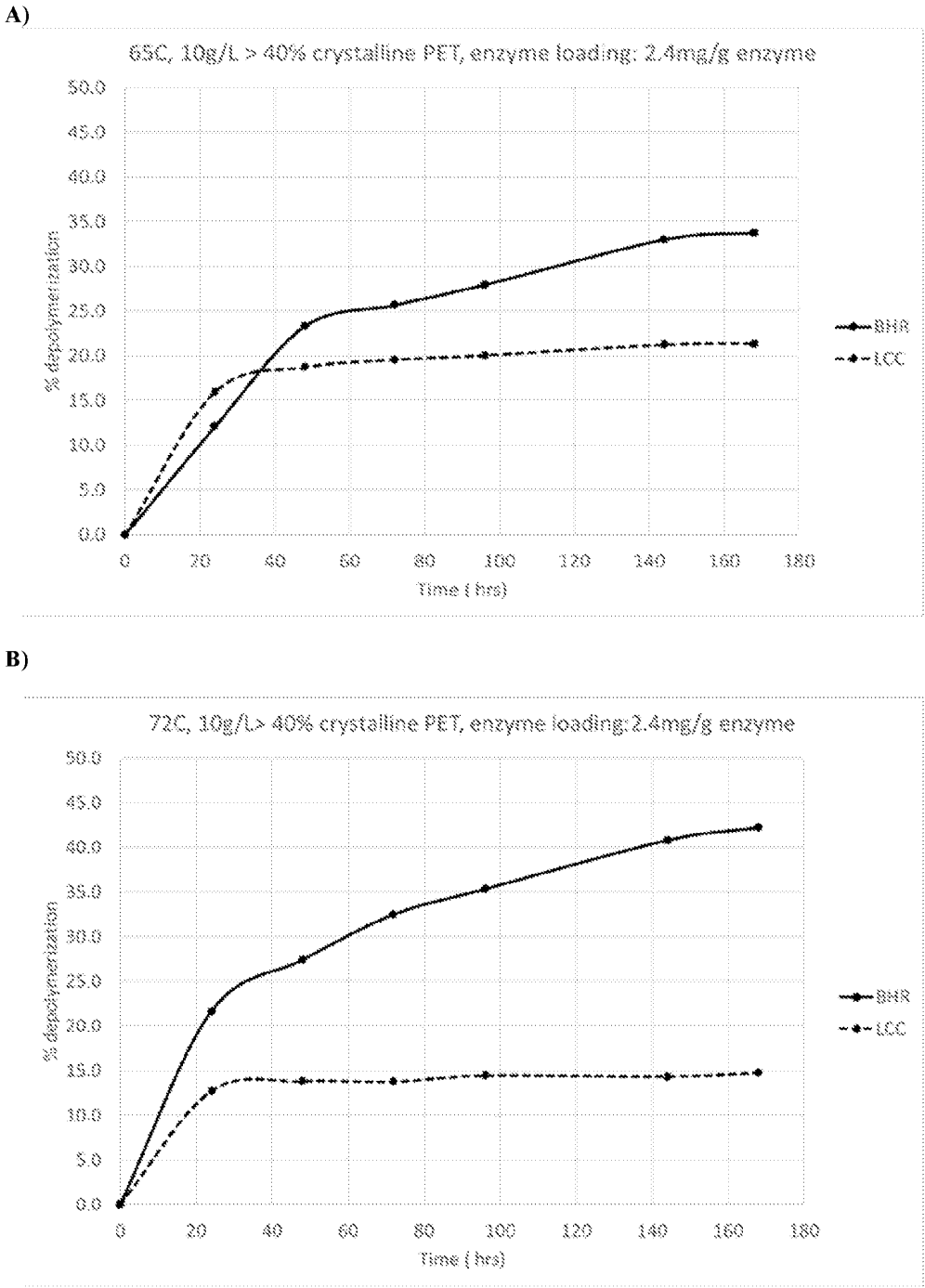


Figure 7A

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	Improvement of Thermostability w.r.t. G1P: PF at 86°C, 3hr followed by pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00002082	1.09	1.60	T136A
ICL00002119	1.38	1.73	L90Y
ICL00002250	1.32	1.34	D158L
ICL00002407	1.09	1.35	F92G
ICL00002455	1.86	2.04	A127S
ICL00002587	1.67	1.50	F92L
ICL00002892	1.10	1.59	D158E
ICL00002957	1.20	2.00	D158I
ICL00003148	1.17	4.79	S212F
ICL00003268	2.23	2.96	N211F
ICL00003464	1.69	7.47	N211M
ICL00003521	2.11	3.17	N211V
ICL00003619	1.79	3.87	S212L
ICL00004007	1.34	1.66	S212M
ICL00004572	1.08	2.00	T136V
ICL00004599	2.52	3.03	S181R
ICL00004620	1.04	5.11	N211L
ICL00004701	2.79	3.51	S181C
ICL00004746	2.54	1.81	R251K
ICL00004960	1.30	10.50	D203R
ICL00005328	1.21	1.47	T17A/S27T/I82L/S252T
ICL00005456	1.35	1.10	T17A/S27T/T48S/I82L
ICL00005564	3.91	3.24	S27T/T48S/I82L/F92Y/S252T
ICL00005612	1.19	1.53	T17A/S27T/T48S
ICL00005678	1.50	1.35	T17A/S27T
ICL00005703	1.99	4.82	T17A/S27T/T48S/I82L/L90F/F92Y/S252T
ICL00005893	1.41	1.32	D18R/V40T/I139A/D203N
ICL00006174	1.55	2.69	D18R
ICL00007723	1.32	1.59	S32K
ICL00007799	1.71	1.07	T48S
ICL00007884	1.22	1.56	T25V
ICL00007898	1.20	1.18	V23T
ICL00007932	1.02	1.45	S27W
ICL00007957	1.01	1.06	S22I/Y26K
ICL00008145	1.52	1.13	V23L

Figure 7B

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	Improvement of Thermostability w.r.t. G1P: PF at 86°C, 3hr followed by pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00008196	1.23	1.70	S27F
ICL00008216	1.17	1.41	A24V
ICL00008219	1.12	1.31	Y26L
ICL00008225	1.21	1.48	S22V
ICL00008265	1.46	1.57	S13R
ICL00008348	1.16	1.37	S22K
ICL00008461	1.09	1.30	A14K
ICL00008475	1.06	1.17	S32Q
ICL00008588	1.21	1.26	N9S
ICL00008962	1.07	1.09	P20T
ICL00008996	1.18	1.15	N2R
ICL00009048	1.19	1.37	S1A
ICL00009065	1.03	1.24	N9E
ICL00009097	1.80	3.36	S27L (G2P)
ICL00009224	1.13	1.30	Y26T
ICL00010754	1.35	1.01	N204S
ICL00010780	1.25	1.10	S193K
ICL00010882	1.33	1.44	V219L
ICL00010896	1.19	1.23	S193N
ICL00010936	1.01	1.23	N204K
ICL00010943	1.19	1.48	S193P
ICL00011142	1.20	3.14	R255L
ICL00011148	1.03	1.38	N231S
ICL00011374	1.14	1.29	S193H
ICL00011392	1.17	1.12	R255V
ICL00011544	1.07	1.29	A246D
ICL00011557	1.14	1.39	R255M
ICL00011716	1.17	1.63	Q189L
ICL00011873	1.09	1.73	S193E
ICL00012205	1.07	1.03	S98N
ICL00012227	1.63	1.23	S113K
ICL00012261	1.06	1.41	T160V
ICL00012306	1.01	1.20	N162R
ICL00012320	1.15	2.86	N87I
ICL00012326	1.12	1.90	N122E

17/51

Figure 7C

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	Improvement of Thermostability w.r.t. G1P: PF at 86°C, 3hr followed by pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00012345	1.06	2.64	N87L
ICL00012356	1.13	1.18	S101K
ICL00012359	1.29	1.31	S101A
ICL00012402	1.30	1.17	Q142L
ICL00012403	1.23	1.21	A114K
ICL00012416	1.14	1.11	S101F/T136A
ICL00012464	1.19	1.24	S110R
ICL00012482	1.10	1.02	S98V
ICL00012493	1.14	1.80	T160K
ICL00012514	1.03	1.38	R108K
ICL00012584	1.27	1.39	S98L
ICL00012627	1.49	1.30	R108T
ICL00012633	1.14	1.34	N87V
ICL00012656	1.04	1.30	S113Q
ICL00012658	1.31	1.02	T109L
ICL00012662	1.15	1.33	R108H
ICL00012671	1.03	1.65	S101H
ICL00012729	1.09	1.45	N87H
ICL00012758	1.09	1.66	N87M
ICL00012801	1.01	1.16	T109K
ICL00012844	1.02	1.43	R108E
ICL00012857	1.06	1.26	S113A
ICL00012942	1.15	1.53	S98A
ICL00012974	1.11	1.09	N122A
ICL00013044	1.01	1.02	S101W
ICL00013060	1.20	1.28	N122S
ICL00013096	1.76	2.67	N87F
ICL00013100	1.23	2.22	Q142W
ICL00013155	1.01	1.47	T160R
ICL00013169	1.19	1.46	S98T
ICL00013185	1.10	1.04	S110G
ICL00013203	1.05	1.06	S101N
ICL00013205	1.60	1.17	N122P
ICL00013208	1.03	1.19	N87R
ICL00013211	1.07	1.65	S101Q

Figure 7D

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	Improvement of Thermostability w.r.t. G1P: PF at 86°C, 3hr followed by pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00013218	1.05	1.32	S113R
ICL00013227	1.35	1.06	R108C
ICL00013243	1.43	2.00	N87Y
ICL00013247	1.37	1.27	R108Q
ICL00013314	1.19	1.40	R108S
ICL00013329	1.05	1.03	R108P
ICL00013378	1.12	1.06	N122H
ICL00013380	1.25	1.08	A114V
ICL00013386	1.18	1.67	S98E
ICL00013398	1.03	1.24	S113N
ICL00013405	1.33	1.41	I82F
ICL00013444	1.02	1.28	S98M
ICL00014454	1.20	1.05	T17L
ICL00014577	1.86	1.20	Y60H
ICL00014581	1.17	1.54	S252T
ICL00014863	1.05	1.08	T17C
ICL00014900	1.18	1.07	T17G
ICL00014910	1.29	1.26	T17S
ICL00014948	1.42	1.12	V229I

Figure 8A

Colony Tracking Number	Improvement of Thermostability w.r.t. G1P: PF at 86°C, 3hr followed by pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00003326	1.45	S181A
ICL00003543	1.45	T206G
ICL00003873	4.05	N211I
ICL00004073	1.89	D203V
ICL00004246	1.25	D158K
ICL00004507	2.03	A174K
ICL00004604	3.85	A174R
ICL00004797	5.11	E173R
ICL00005377	1.51	T17A/S27T/I82L
ICL00008040	1.07	S1M
ICL00008384	1.23	T25F
ICL00008521	1.08	S32M
ICL00008535	1.18	Y26K
ICL00008555	1.39	S34R
ICL00008628	1.18	S22R
ICL00008912	1.17	T25Q
ICL00008957	1.08	T25R
ICL00008972	1.39	T48N
ICL00011040	1.63	R236C
ICL00011072	1.83	A216P
ICL00011100	1.21	V219K
ICL00011261	1.14	N231L
ICL00011269	1.30	N231Q
ICL00011336	1.02	V219R
ICL00011353	1.02	F250Y
ICL00011377	1.44	Q189I
ICL00011563	1.15	I222L
ICL00011570	1.02	V219I
ICL00012235	1.49	T160Q
ICL00012311	1.70	N87K
ICL00012329	1.30	I82M
ICL00012335	1.32	S98Q/A209V
ICL00012728	1.05	K147N
ICL00012740	1.77	S101R
ICL00012777	1.01	S101D
ICL00013327	1.11	R108V

Figure 8B

Colony Tracking Number	Improvement of Thermostability w.r.t. G1P: PF at 86°C, 3hr followed by pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00013334	1.01	T160S
ICL00013955	1.03	T17A
ICL00014745	1.09	T17K/A125S
ICL00014884	1.36	T17Q

21/51

Figure 9A

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00002273	1.68	F92V
ICL00002384	1.83	F92I
ICL00002394	1.31	R138L
ICL00002395	2.29	S57V
ICL00002398	2.10	M56I
ICL00002408	1.41	T136M
ICL00002426	1.77	S57M
ICL00002451	1.71	M56L
ICL00002454	1.47	A127V
ICL00002458	1.26	S88K
ICL00002463	1.17	T153L
ICL00002464	1.39	L70M
ICL00002490	1.19	T157A
ICL00002492	1.05	G149V
ICL00002511	1.34	L90K
ICL00002572	1.74	F92K
ICL00002575	1.50	V150L
ICL00002726	1.48	F92N
ICL00002830	1.35	A97F
ICL00002907	1.18	A55V
ICL00002926	1.16	T136S
ICL00003056	1.08	A102V/T136M
ICL00003247	1.19	T206P
ICL00003278	1.21	P179Q
ICL00003410	2.43	F208L
ICL00003475	1.29	V170L
ICL00003638	2.11	T206R
ICL00003718	1.62	T206L
ICL00003752	2.12	T206K
ICL00004309	1.03	A55L
ICL00004349	1.64	F208T
ICL00004360	1.17	F208G
ICL00004409	1.23	T157G
ICL00004439	1.24	S57I
ICL00004440	1.04	G149S
ICL00004447	1.47	F92Q

22/51

Figure 9B

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00004493	1.02	I139T
ICL00004570	1.10	G149C
ICL00004663	1.13	R251I
ICL00004687	2.28	R251V
ICL00004709	1.10	F161W
ICL00004829	1.20	Q182T
ICL00004900	2.36	I217S
ICL00004929	1.06	F208R
ICL00004936	1.64	I185L
ICL00004989	1.14	I185Y
ICL00005005	1.31	P213R
ICL00005066	1.15	D249T
ICL00005133	1.61	T17A/S27T/T48S/I82L/L90F/Q167V/P213N/S252T
ICL00005159	1.88	T17A/S27T/L90F/F92Y/P213N
ICL00005170	1.43	T17A/S27T/T48S/A135G/Q167V/P213N
ICL00005175	1.46	T17A/S27T/L90F/A135G/S140A/Q167V/P213N/S252T
ICL00005183	1.13	T17A/T48S/P213N
ICL00005218	1.46	T17A/S27T/I82L/L90F/F92Y/Q167V
ICL00005240	3.46	T17A/T48S/I82L/F92Y/Q167V/S252T
ICL00005248	1.49	S27T/T48S/I82L/S140A/I143N/G149A
ICL00005327	1.14	T17A/S27T/I82L/T145S/G149A/P213N
ICL00005347	1.02	T17A/S27T/T48S/I82L/P213N/S252T
ICL00005408	1.07	T17A/Q167V
ICL00005428	3.20	T17A/I82L/F92Y/P213N
ICL00005493	2.02	T17A/T48S/I82L/L90F/A135G/S140A/Q167V
ICL00005494	1.45	S27T/I82L/P213N
ICL00005495	1.74	T17A/S27T/I82L/P213N
ICL00005508	2.19	T17A/I82L/L90F/F92Y/Q167V
ICL00005512	1.08	T17A/T48S/I82L
ICL00005528	5.36	T17A/S27T/T48S/L90F/F92Y
ICL00005536	1.55	T17A/S27T/T48S/I82L/L90F/Q167V
ICL00005568	1.65	T17A/I82L/L90F/F92Y/A135G/S140A/I143N/G149A/Q167V
ICL00005577	2.43	T17A/S27T/L90F/F92Y/A135G/Q167V/S252T
ICL00005594	1.04	T17A/S27T/T48S/P213N
ICL00005609	1.70	T17A/S27T/T48S/I82L/L90F/P213N/S252T

Figure 9C

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00005649	1.35	T17A/S27T/T48S/I82L/L90F/F92Y/S140A/T145S/P213N
ICL00005661	1.42	T17A/S27T/I82L/P213N/S252T
ICL00005697	1.83	S27T/T48S/I82L/L90F/A135G/S140A/I143N/T145S/P213N
ICL00005699	1.34	T17A/S27T/T48S/I82L/L90F/F92Y/S140A/T145S
ICL00005719	1.18	T17A/S27T/T48S/A135G/S140A
ICL00005720	1.06	T17A/S27T/I82L/G149A/Q167V/P213N
ICL00005732	1.25	T17A/I82L/S140A/I143N/Q167V/P213N/S252T
ICL00005743	1.38	T17A/S27T/T48S/T145S/Q167V
ICL00005745	2.06	T17A/S27T/T48S/I82L/L90F/F92Y/Q167V/S252T
ICL00005778	1.90	I82F/R108T/L119I/V150I/F161W/Q167T/T194S/D203N
ICL00005815	4.18	N9A/D18R/M56I/N85D/L119I/N254R
ICL00006031	1.13	R108T/L119I/K147Q/F161W/A184S/D203N
ICL00006249	1.51	T16E/D18R/M56I/K147Q/Q167T/A184S/D203N
ICL00006285	1.60	T16E/D18R/R108T/K147Q/Q167T/A184S/N190S/T194S
ICL00006354	2.63	Q5E/S22A/R72P/H77Q/F92Q
ICL00006389	1.21	T16E/D18R/S22A/V40T/A97G/S101L/L119I/A127M/Q167T/D203N
ICL00006409	2.23	D18R/M56I/R72P/H77Q/F92Q/A127M/V150I/A184S/D203N/N254R
ICL00006438	1.08	T16E/D18R/Y26T/S88T/S101L/H156N/V200L
ICL00006466	1.48	T16E/D18R/S22A/M56I/N85D/L119I/A184S
ICL00006472	2.11	T16E/D18R/V40T/S88T/L119I/A127M/V150I/D203N
ICL00006482	1.30	M56I/S88T/R108T/N190S/L227R
ICL00006522	3.10	N9A/S22A/G46S/M56I/R72P/F92Q/L119I/T221S/M225L
ICL00006530	2.26	A14S/L15I/S22A/F92Q/I143R/Q167T/V219K
ICL00006562	3.09	D18R/M56I/I139A/L227R/W228F
ICL00006566	2.95	S22A/I54V/R72P/F92Q/V150I/V200L
ICL00006581	1.09	S22A/G46S/S101L/F161W/D203N/R236E
ICL00006661	1.90	T16E/D18R/G53A/I54V/R72P/L119I/A127M/Q167T/V200L
ICL00006710	3.67	D18R/I54V/I82F/R108T/V150I/N253Y/N254R
ICL00006743	2.42	T16E/D18R/M56I/N85D/S88T/R108T/F161W/Q167T
ICL00006771	1.71	G53A/R108T/Q167T/A184S/T194S/N243P
ICL00006790	1.90	N9A/S22A/Q167T
ICL00006811	2.84	T16E/D18R/M56I/A127M/R138E/T194S/V200L/M225L

24/51

Figure 9D

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00006843	1.72	S22A/A97G/V150I/D203N/M225L/R236E
ICL00006877	3.91	D18R/I54V/M56I/R138E/I139A/T194S/D203N/V219K/F250I
ICL00006896	1.26	D18R/V40T/I82F/S101L/N105D/L119I/H156N/F161W/N190S/T194S/D203N
ICL00006914	2.47	N9A/V40T/L49G/I54V/R108T/V150I/D203N/T221S/M225L
ICL00006921	1.65	D18R/I54V/I82F/N105D/A127M/A184S/S218A/V219K/M225L/N241P/N243P
ICL00006928	1.73	L15I/D18R/R108T/R138E/I139A/F161W/A184S/N190S/D203N
ICL00006935	1.23	S22A/L49G/M56I/V83T/S101L/R108T/L119I/A127M/T194S
ICL00006942	1.94	M56I/I82F/R108T/I139A/F161W/T194S/D203N/N241P
ICL00006978	1.34	I143R/Q167T/V198A/W228F
ICL00006980	1.07	S22A/A24S/G46S/V150I/Q167T
ICL00006984	2.13	S88T/R108T/V150I/A184S/D203N/T221S/M225L/N243P
ICL00007007	1.65	Q5E/N9A/M56I/F92Q/R108T/L119I/Q167T/N253Y
ICL00007084	2.24	T16E/D18R/V40T/M56I/I82F/R108T/L119I/F161W/L227R/Q258P
ICL00007113	1.70	D18R/V40T/M56I/R108T/R138E/H156N
ICL00007179	1.57	D18R/M56I/R138E/I139A/N190S/D203N/M225L
ICL00007298	1.37	T16E/D18R/M56I/V150I/S218A/V219K
ICL00007465	1.48	T16E/D18R/S88T/R108T/W228F
ICL00007504	1.56	D18R/N85D/R108T/L119I/N190S/T194S
ICL00007604	1.35	D18R/G46S/M56I/R108T/A127M/R138E/I139A/N190S/L227R/W228F/R236E
ICL00007658	1.83	D18R/I139A/F161W/W228F
ICL00007805	1.15	G46L
ICL00007887	1.29	S1G
ICL00007890	2.02	S32Y/A62T
ICL00008057	1.08	S13L
ICL00008180	1.21	N9S/T25H
ICL00008192	1.35	R30K
ICL00008296	1.12	T25A
ICL00008309	1.25	V33T
ICL00008359	1.26	V33Q
ICL00008376	1.82	V33G
ICL00008393	1.15	A68F

Figure 9E

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00008636	1.09	S27H
ICL00008936	1.28	S22P
ICL00009061	1.21	S1R
ICL00010801	2.21	V177A/A216L
ICL00010809	1.01	R255E
ICL00010811	1.01	S193V
ICL00010827	1.02	A246K
ICL00010831	1.01	R236K
ICL00010885	1.14	R255Y
ICL00010888	1.07	N204A
ICL00010945	1.17	S193F
ICL00010950	1.10	A246T
ICL00010970	1.25	N204R
ICL00010981	1.24	T194S
ICL00011066	1.08	V219F
ICL00011150	1.54	N204A/Q237R
ICL00011156	1.09	A216V
ICL00011159	1.06	T194G
ICL00011246	1.06	R255W
ICL00011384	1.09	R236Q
ICL00011413	1.58	R255S
ICL00011509	1.09	S193T
ICL00011585	1.02	R255G
ICL00011635	1.08	A216S
ICL00011679	1.34	S223A
ICL00011733	1.40	Q189V
ICL00011827	2.22	A246S
ICL00011919	1.04	V242T
ICL00012070	1.47	S223C
ICL00012171	1.31	A117N
ICL00012175	1.20	N122R
ICL00012281	1.10	R108N
ICL00012342	1.15	S101V
ICL00012400	1.81	N162E
ICL00012534	1.35	T109F
ICL00012591	1.03	T109R

Figure 9F

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00012596	1.14	A117Q
ICL00012912	1.21	K147F
ICL00012929	1.22	A117G
ICL00012941	1.02	S110H
ICL00012945	1.22	L74W
ICL00013009	1.25	S113Y
ICL00013089	1.30	A117S
ICL00013150	1.33	S98D
ICL00013160	1.12	K147G
ICL00013170	1.09	P164S
ICL00013172	1.24	N162H
ICL00013228	1.26	S113T
ICL00013231	1.28	S101M
ICL00013248	1.03	T109N
ICL00013251	1.30	A121S
ICL00013266	1.06	A114S
ICL00013343	1.08	A114L
ICL00013423	1.12	N87W
ICL00013433	1.08	S113P
ICL00013476	1.56	N162P
ICL00013866	1.01	V229C
ICL00013929	1.16	A125S
ICL00014084	1.95	Y60A
ICL00014177	1.30	Y60I
ICL00014360	2.06	T163S
ICL00014465	1.21	T17H
ICL00014486	1.04	L119M
ICL00014565	1.01	R12K
ICL00014609	2.12	T195F
ICL00014700	1.16	F21W

27/51

Figure 9G

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00024094	1.56	L90F/F92G/D158L/A174R/D203V
ICL00024108	1.69	V23L/A24V/S32K/N87F/F92Y/A125S/T136A
ICL00024121	2.61	P20T/L90Y/F92L/S101M/D158E/A174K/I222L
ICL00024155	1.32	D18R/S32K/Y60H/L90F
ICL00024157	2.22	P20T/F21W/A24V/L90Y/F92L/T109K/A125S/T136A
ICL00024167	1.91	Y60H/S101A/A114K/A117Q/D203R/I222L
ICL00024241	1.41	S32Q/F92G/S101Q/A114K/Q142W/D158I/D203R/I222L
ICL00024247	1.26	T17G/L90F/F92L/T109R/A114K/D158E/D203V/I222L
ICL00024297	1.49	R12K/S32K/F92L/T136A/D158E/A174R
ICL00024334	2.11	L90F/F92G/T109K/A125S/A174K
ICL00024335	1.96	S32K/L90F/F92L/T109K/A114K/Q142W
ICL00024354	1.20	V23T/S32Q/N87I/L90F/F92Y/S101N/A114V/Q142W/A174R/D203R/I222L/V229I
ICL00024372	2.46	S32Q/F92G/A114V/D203V
ICL00024388	2.67	R12K/S32K/L90Y/F92L/T136A/A174K/D203V/I222L
ICL00024391	3.17	R12K/A14K/V23T/L90Y/F92G/S101A/D203R
ICL00024401	2.75	T17G/S32M/L90Y/F92Y/D203R/A216P
ICL00024406	1.70	S32Q/F92L/A114V/A125S
ICL00024416	2.18	P20T/F21W/S32M/L90Y/F92G/A114K/A125S/T136V/D158E/A174K/D203V/I222L
ICL00024437	1.34	R12K/F21W/S32K/F92L/T109K/A125S/T136V/D158E/D203R
ICL00024448	3.00	T17Q/L90Y/F92L/A174K/D203V/I222L
ICL00024524	1.43	F21W/F92L/S101A/A117Q/D203R
ICL00024546	1.26	T17A/S32M/Y60H/Q142L/D203V/I222L
ICL00024565	2.14	R12K/Y60H/L90F/S101R/A114V/A117N/D158E
ICL00024581	1.77	T17S/D18R/L90Y/F92G/A114V/A117Q/D203R
ICL00024595	1.58	L90Y/F92L/S101A/S110R/A125S/Q142W/A174R/A216P
ICL00024600	1.07	S32M/S110R/A125S/D158E
ICL00024625	2.14	R12K/V23L/A24V/F92G/T136V/D203R
ICL00024627	3.74	A24V/S32Q/F92L/T136V
ICL00024632	3.27	S32K/L90Y/F92G/A114K/D203V
ICL00024661	1.68	S32M/L90F/F92G/A114V/A117N/A125S/A174K/D203R
ICL00024669	1.20	R12K/T17A/V23L/A24V/L90F/F92G/S101N/A125S/Q142W/D158I/D203R
ICL00024670	1.23	P20T/F21W/Y60I/S101A/T109K/A174K
ICL00024675	1.41	T17C/L90Y/F92L/S101N/T109L/S110R/A125S/A174K/D203R

28/51

Figure 9H

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00024684	2.91	T17Q/L90F/F92G/S101M/A117Q/T136A/D158I/A174R
ICL00024718	3.31	V23L/L90F/F92G/A125S/D203V/I222L
ICL00024772	3.93	T17C/L90Y/F92L/A125S/T136V/D158E/A174K
ICL00024785	1.32	V23L/S32Q/Y60I/A117Q/T136A/A174K/V229C
ICL00024799	3.23	V23T/L90F/F92Y/D203V
ICL00024813	2.12	R12K/A24V/Y60H/A174R
ICL00024825	1.10	T17G/P20T/Y60I/F92G/D203V
ICL00024839	2.67	L90Y/F92L/S110R/A125S/D158E/D203V
ICL00024847	2.79	T17Q/L90Y/F92L/T109L/T136A/D158E/A174R/D203V/V229C
ICL00024914	2.33	R12K/V23T/A24V/S32Q/F92G/D158L/A174R/D203R
ICL00024925	2.71	S32M/N87Y/L90F/F92G/A174K/D203V
ICL00024934	1.41	T17S/V23L/S32Q/L90F/F92L/A114K/A117N/A125S/T136V/D158E/D203V/V229I
ICL00024942	2.77	P20T/F21W/S32M/L90Y/F92G/T109L/S110R
ICL00024943	2.49	A14K/S32M/L90Y/S101R/A114V/T136A/A216P
ICL00024962	2.43	P20T/F21W/L90Y/F92G/A125S/A174K/V229I
ICL00024966	1.60	V23L/S32K/L90F/F92L/S101R/T109R/T136V/I222L
ICL00025010	2.36	A24V/F92L/Q142L/A216P
ICL00025986	2.67	F92G/A125S/T136A/D158E/A216P
ICL00026026	1.62	N87R/F92G/A117N/D203V/A216P
ICL00026034	1.10	R12K/A14K/F92G/S110R/A117N/A125S/A174R/D203R
ICL00026058	2.38	S32Q/N87F/L90F/F92G/S101M/A114V/A117Q/D203V
ICL00026071	1.79	T17Q/A24V/N87M/F92G/A114K/A117N/D158E/D203R/I222L
ICL00026072	1.95	N2R/S32Q/L90F/F92G/Q142L/D203V
ICL00026095	1.55	A14K/S32Q/L90F/F92G/A114K/A117N/A174R/D203V/A216P/I222L
ICL00026110	1.08	R12K/P20T/D158E/D203R/I222L
ICL00026111	1.82	N2R/A14K/T17A/L90F/F92G/S101H/A174R/D203V
ICL00026144	3.04	T17G/A24V/L90F/F92G/Q142W
ICL00026159	3.27	S32K/L90Y/F92Y/S101A
ICL00026164	3.13	V23T/N87I/F92G/A125S/T136A/D158L/D203R

Figure 9I

Colony Tracking Number	Improvement of Total Activity w.r.t. G1P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00026166	1.15	T17S/N87L/V229I
ICL00026190	1.83	A24T/L90F/F92L/A125S/T136A/D203V
ICL00026191	2.53	R12K/A14K/F92G/T109R/T136A/Q142L/D158E/A174K/D203R/I222L
ICL00026196	2.15	A24V/S32Q/Y60A/T136A
ICL00026232	1.32	D18R/S32Q/N87H/L90Y/F92G/S101K/Q142L/D158I/A174R
ICL00026236	2.64	T17A/F21W/S32K/N87F/L90F/F92Y/S101Q/T136A/D203R
ICL00026238	2.36	A24V/L90F/F92G/A114V/A117N/T136V/Q142L/D203V/V229C
ICL00026256	2.62	T17Q/L90Y/F92G/S101N/T109L/S110R/T136V/Q142L/D203V/A216P
ICL00026306	3.43	S32Q/L90Y/F92L/T109K/A125S/T136V
ICL00026310	1.87	Y60H/N87K/A114K/A117Q/D158E/A174K/A216P
ICL00026327	1.54	P20T/L90Y/T109K/T136A/D158I/D203R
ICL00026342	2.37	T17L/Y60A/D203V
ICL00026344	2.55	N2R/S32Q/L90Y/F92Y/T109K/D203V
ICL00026349	1.35	T17H/A24V/S32Q/L90Y/F92L/S101H/A114K/D158I/A174R/D203V
ICL00026353	1.30	N2R/S32M/F92Y/T109K/S110R/I222L
ICL00026354	1.44	P20T/F92Y/S101K/A125S/D158E/D203R
ICL00026368	1.56	R12K/A14K/P20T/F21W/S32M/F92L
ICL00026393	1.42	R12K/A14K/V23T/A24V/L90F/F92L/S101W/T136A/D203V
ICL00026466	2.15	T17L/S32K/F92L/T109L/A114V/T136V/D158L/R236H
ICL00026476	2.25	P20T/F21W/S32Q/N87F/F92L/D158E/D203V
ICL00026496	2.81	F21W/L90F/F92G/S101A/A114V/A125S/T136V/Q142L/D203V/A216P
ICL00026534	1.94	P20T/F21W/S32K/F92G/A125S/V229I
ICL00026535	2.53	V23T/A24V/L90Y/F92G/A125S/T136V/D203V
ICL00026552	1.99	P20T/S32K/L90Y/F92G/S101N/T109L/S110R/A125S/A174K/D203R/A216P
ICL00026561	1.57	V23L/L90F/F92L/T136A/D203R/I222L
ICL00026618	3.01	R12K/A14K/A24V/N87L/L90Y/A125S/T136V/A216P
ICL00026643	1.55	P20T/F21W/L90Y/A125S
ICL00026671	1.44	N2R/L90Y/A114K/A117Q/D203V/V229I
ICL00026673	1.56	F21W/S32K/L90Y/A125S/D158E/A216P/V229I

Figure 9J

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00015105	1.35	S27L/T136V
ICL00015156	1.03	S27L/P8T/T17Q/F21W/S101A/T136V/Q142L
ICL00015324	1.02	S27L/N2R/T17L
ICL00015579	1.11	S27L/V23T/A24V/T136A/Q142W
ICL00015633	1.11	S27L/F21W/T136V
ICL00015643	1.31	S27L/T17Q/T109K/A114K/T136V/V229I
ICL00015653	1.19	S27L/T17Q
ICL00015773	1.42	S27L/T136V/I222L/V229C
ICL00015796	1.36	S27L/T17A/A114V/A117N/T136A
ICL00015830	1.07	S27L/N2R/T136A
ICL00015846	1.02	S27L/N2R/T17A
ICL00015853	1.16	S27L/T17C/S101A/T136V
ICL00015873	1.04	S27L/P20T/T136A
ICL00015972	1.12	S27L/T136V/Q142W/V229I
ICL00016002	1.05	S27L/T109K/T136V/I222L/V229I
ICL00016095	1.01	S27L/T17L/S101H/A117N/Q142L/I222L/V229I
ICL00016114	1.22	S27L/S101Q/T109L/A117N/T136A/Q142L
ICL00016342	1.03	S27L/T109K/S110R/S193N/S252T/R255M
ICL00016399	1.19	S27L/S22R/Y26K/R236Q
ICL00016411	1.67	S27L/L90F/F92L/S98E/S113Y/A114K/T136A/D158E/S181R/T206G/S212M/V219I
ICL00016478	1.55	S27L/N9S/S22P/T48N/L90Y/F92G/T109K/S110R/T136A/Q189V/N211F/R236Q
ICL00016797	1.02	S27L/T17A/Y26L/T48N/I82M/S101D/R236Q
ICL00016852	1.24	S27L/Y26T/S101D/D158E/V219I/S252T
ICL00016862	1.36	S27L/S13R/S98E/T136V/S181R/T206G/V229I/N231S
ICL00016937	1.36	S27L/F21W/F92L/S98N/S193P/I222L
ICL00017036	1.46	S27L/S1G/Y26K/L90Y/S113Y/A114V/T136A/Q189V/N204R/N211L/R236Q
ICL00017369	2.59	S27L/S22K/I82L/L90Y/F92G/R108S/A117N/D158E/S193N
ICL00017517	1.33	S27L/S1G/N9S/T48S/L90Y/S98T/S101A/S113N/A114K/L119M/S193N/T206G/S252T
ICL00017595	1.12	S27L/N9E/R12K/S22P/V23L/T160R/D203R/I222L
ICL00017708	1.12	S27L/N9E/R12K/S22P/V23T/T48S/S98E/R108S/T160S/Q189V/T206G/S212L/V229I

Figure 9K

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00017714	1.45	S27L/S1A/N2R/N9S/T48N/L90F/F92L/D203V/S223A
ICL00017757	2.78	S27L/N9E/R12K/V23T/I82M/L90Y/F92L/T136V/N204K/N231S/R255M
ICL00017873	1.49	S27L/S1G/N9S/S22V/I82F/L90Y/F92L/A117N/L119M/Q142L/T206G/S212L/S223A
ICL00017905	1.55	S27L/N9S/Y60H/R108C/S193P/V219L
ICL00017934	1.47	S27L/N9E/S22K/S32M/L90F/F92G/R108T/L119M/Q189V/I222L/S223A/R236Q
ICL00017976	1.39	S27L/T17Q/F92G/S98N/Q142L/Q189L/R236C
ICL00018033	1.50	S27L/N9E/R12K/Q142W/T160Q/T206G/S212M
ICL00018093	1.39	S27L/Y26T/S113N/A114V/T136A/D158E/D203R/N211F/R236Q/S252T/R255M
ICL00018101	2.45	S27L/S1A/T17H/S22V/L90Y/F92G/S98E/A114V/T136A
ICL00018188	1.97	S27L/N9E/T48S/I82M/L90Y/F92L/N122A/A127S/T160S/A174R/T206G/S212L/R255M
ICL00018404	1.57	S27L/N9S/S22P/V23L/L90Y/F92G/A125S/T160S/N204R/I222L/S223A/R236Q
ICL00018431	1.14	S27L/N9E/S22P/T48S/L90Y/F92L/T109R/E173R/A174K/D203V/S223A
ICL00018459	1.25	S27L/R12K/Y26K/T48N/I82L/L90F/A125S/N211I/A216P
ICL00018572	1.39	S27L/N9S/R12K/F92Y/T109K/S110R/T160K/Q189L/S223A/S252T/R255M
ICL00018576	1.01	S27L/S1A/N2R/N9E/R12K/S32K/N87F/R108T/N211I/V219K/R255M
ICL00018627	1.05	S27L/L90F/F92G/N122A/T136A/T160V/E173R/D203R/S252T
ICL00018644	2.41	S27L/L90Y/F92G/S98T/T109L/D158I/S193K/V219K/R236Q/S252T
ICL00018837	1.15	S27L/N9E/R12K/T48N/L90F/S98L/R108Q/A117Q/T136A/T206G/S212F/V219I/V229I/R255L
ICL00018957	1.19	S27L/S1A/S22V/N87K/R108K/N122E/D158E/S193P/V219I/R255M
ICL00019051	1.05	S27L/F21W/Y26T/S34R/R108H/L119M/N211M/R236C/S252T
ICL00019281	2.22	S27L/S1A/N9E/R12K/V23T/T48S/N87H/S101Q/Q189L/N211M/V219I/R236Q/R255M
ICL00019296	1.99	S27L/N9S/T25Q/L90Y/S101D/T136A/Q142L/Q189L/R236Q
ICL00019312	2.68	S27L/A14K/I82F/F92G/S98E/R108C/A117N/L119M/Q189V/T206G/I222L/S223A

Figure 9L

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00019341	2.33	S27L/T17C/Y26T/N87V/R108C/N122E/T136V/S193P/S252T/R255M
ICL00019489	2.81	S27L/L90Y/F92G/T109L/N122S/R255M
ICL00019574	1.37	S27L/R12K/L90Y/T160V/A174R/R236Q
ICL00019589	1.04	S27L/N9E/R12K/T48N/L90Y/F92G/S98T/S113R/N122R/A127S/T136A/A174K/N204K/S212L
ICL00019618	1.61	S27L/V23T/L90Y/F92G/S98E/T109L/A125S/T160V/A174K/S181C/S193K/T206G/S212M/R255M
ICL00019634	1.03	S27L/A24V/F92G/S101D/A114V/A117N/A125S/T136V/D203R
ICL00019661	1.12	S27L/R12K/S32Q/S101Q
ICL00019736	1.70	S27L/L90F/F92G/T136V/A174R/D203R
ICL00019743	1.27	S27L/P20T/S32K/L90Y/D203V
ICL00019873	1.19	S27L/N2R/A14K/T17S/L90Y/T109K/T136V/A216P
ICL00019890	1.19	S27L/N2R/V23T/A24V/S32M/L90Y/F92G
ICL00020004	1.65	S27L/A14K/L90Y/F92L/S101D/A117N/D158I/D203R
ICL00020035	1.37	S27L/F21W/N87H/A114V/A117N/T136V
ICL00020130	1.19	S27L/N2R/V23T/A24V/N87M/F92L/S101K/A125S/T136A
ICL00020240	1.24	S27L/L90Y/F92L/S101N/T109R/S110R/Q142W
ICL00020265	1.45	S27L/S32M/F92G/A216P
ICL00020456	1.46	S27L/F21W/L90Y/F92L/A114K/A117N/T136A/D203V
ICL00020806	1.09	S27L/N2R/V23T/S32M/N87M/F92L/T136A
ICL00020830	1.93	S27L/R12K/L90F/F92G/S101A/D203V
ICL00020832	1.82	S27L/A24V/L90F/F92G
ICL00020874	1.36	S27L/R12K/F92L/S101A/A125S/T136A/D203R
ICL00021047	1.18	S27L/R12K/V23L/L90F/F92L/A114K/T136A/D158E/D203V/I222L
ICL00021082	1.68	S27L/L90F/F92G
ICL00021198	1.17	S27L/T17L/L90F/F92G/A125S/A174R/D203V
ICL00022077	1.37	S27L/N2R/N87K/A114K/A117Q/T136V/D203V
ICL00022293	1.11	S27L/N2R/A114K/T136V/D203V
ICL00022297	1.32	S27L/N2R/T17A/T136V/A216P
ICL00022389	1.33	S27L/N2R/R12K/N87F/T136V/D158E/A174R
ICL00022421	1.38	S27L/D203R
ICL00022429	1.38	S27L/R12K/T17Q/T136V/D203V/A216P

Figure 9M

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00022507	1.69	S27L/N87F/T109L/Q142L
ICL00022559	1.02	S27L/N2R/T17Q/A24V/A114K/A117Q/T136A/D158E/A174K/D203V/I222L
ICL00022567	1.07	S27L/N2R/P20T/F21W/N87M/T109R/A117N/A125S/T136V/D203V/I222L
ICL00022638	1.44	S27L/V23T/A24V/T136A/D158E/A174K/D203V/I222L
ICL00022671	1.03	S27L/R12K/V23L/A114K/T136A/D158I/D203V/I222L
ICL00022776	1.77	S27L/N87Y/T136V/D158E/D203V
ICL00022809	1.08	S27L/T109K/S110R/D203R
ICL00022817	1.06	S27L/N2R/T17L/A125S/T136A/D158E
ICL00022909	1.13	S27L/A24V/D158E/A174K/A216P
ICL00022974	1.06	S27L/T17G/V23L/N87L/A117Q/A125S/T136V/D158E/V229C
ICL00022977	2.32	S27L/V23L/N87L/T109R/A114K/A117N/A125S/T136V/Q142L
ICL00023114	1.63	S27L/N87Y/S101A/A114V/A117Q/T136V/A174K/A216P/I222L
ICL00023130	1.21	S27L/R12K/T109R/Q142L
ICL00023421	1.09	S27L/D203V
ICL00023612	1.48	S27L/T17G/N87F/S101A/D203V
ICL00023655	1.06	S27L/T17L/N87M/Q142L/D203V
ICL00023715	1.05	S27L/N2R/R12K/S101D/A117N/T136A/D203V
ICL00023819	1.23	S27L/R12K/P20T/F21W/A114K/Q142W/D203R
ICL00023836	1.01	S27L/N2R/T17G/T109L/S110R/A114K/A117Q/T136V/Q142L/D203R
ICL00023911	1.06	S27L/N2R
ICL00026699	1.58	S27L/S32K/L90F/F92G/S101M/A114V/A117N/A125S/T136A/D158E/D203V
ICL00026739	1.83	S27L/R12K/T17A/F21W/S32Q/Y60H/D203R
ICL00026757	2.05	S27L/R12K/F92L/S110R/T136V/I222L
ICL00026766	2.38	S27L/A14K/V23T/A24V/L90Y/F92G/A114V/A117Q/Q142L/A174R/I222L
ICL00026785	1.37	S27L/F21W/S32Q/L90Y/S101D/T109K/A125S/T136A/A174K
ICL00026858	2.42	S27L/V23T/L90Y/F92G/T136A/D203V/A216P
ICL00026885	3.31	S27L/T17S/L90Y/F92G/A117N/T136A/D158L
ICL00026903	1.12	S27L/A14K/V23L/A24V/F92L/Q142W/D203V
ICL00026906	2.14	S27L/T17L/L90F/F92G/S101K/A174K

Figure 9N

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00026952	1.01	S27L/L90F/F92L/A125S/T136V/A174K/D203V/A216P/I222L
ICL00026975	1.69	S27L/R12K/P20T/S32M/L90F/F92G/S101M/A114V/D203V
ICL00027010	1.35	S27L/T17A/S32Q/L90F/F92L/T136V/Q142W/A174K/D203R
ICL00027020	1.34	S27L/R12K/S32M/L90F/F92G/S101W/A114V/D158I/I222L
ICL00027052	2.34	S27L/P20T/S32M/L90Y/F92L/A114V/A117N/I222L
ICL00027066	2.07	S27L/T17C/L90Y/F92G/T136A/A174K/D203V
ICL00027067	1.30	S27L/S32Q/N87Y/F92G/T109K/A114K/A117N/T136V/D203V/V229C
ICL00027073	1.83	S27L/F21W/L90F/F92G/T136V/A174R
ICL00027087	1.05	S27L/P20T/N87Y/T136A/D203V/I222L
ICL00027091	2.27	S27L/A24V/L90Y/F92L/D158I/A174K/D203R/I222L
ICL00027102	1.56	S27L/F21W/S32Q/L90Y/S110R/A114K/T136V/D203R/A216P/V229I
ICL00027186	2.19	S27L/N87H/F92G/D203R
ICL00027190	1.15	S27L/R12K/S32K/Y60A/A125S/T136V/D158L
ICL00027212	1.45	S27L/V23T/A24V/S32Q/L90F/F92L/T136A
ICL00027275	1.25	S27L/F92L/A114V/D158E/D203R
ICL00027329	1.73	S27L/S32Q/L90Y/D203V/V229I
ICL00027330	1.07	S27L/V23T/S32Q/Y60H/T109K/T136V/A216P/I222L
ICL00027332	1.05	S27L/A14K/A24V/L90F/F92G/T109K/T136V/D158L/A174R/D203V/I222L/V229I
ICL00027420	1.48	S27L/R12K/N87F/A174K
ICL00027421	1.46	S27L/P20T/S32Q/Y60H/T109K/A114V/T136A/A174K
ICL00027432	1.04	S27L/V23T/A24V/Y60A/A125S/A174R/A216P
ICL00027436	1.84	S27L/F92Y/D158L/I222L
ICL00027502	1.54	S27L/V23L/A24V/L90Y/F92G/D203V/I222L
ICL00027545	1.24	S27L/V23T/A24V/S32Q/L90F/F92G/S101H/T136A/A174K/D203V/V229C
ICL00027572	1.12	S27L/S32K/N87H/A125S
ICL00027600	1.61	S27L/P20T/F21W/F92G/A114V
ICL00027601	1.83	S27L/T17L/V23L/A24V/L90Y/F92L/A117N/T136V/L137M/Q142L
ICL00027603	1.74	S27L/P20T/L90Y/D203R
ICL00027613	1.13	S27L/S110R/Q142L/D158I/D203R/V229I
ICL00027615	1.01	S27L/P20T/S32Q/L90F/F92L/T109K/S110R/A125S/D203V

Figure 90

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00027619	1.87	S27L/V23T/A24V/L90F/F92G/D158E/D203R
ICL00028399	1.49	S27L/F92G/T136A/A174R/D203V/V229C
ICL00028473	1.26	S27L/P20T/L90Y/F92G/T109R/S110R/A125S/D203R
ICL00028524	1.61	S27L/A14K/L90Y/F92L/D158L/A174R/D203V
ICL00028530	1.25	S27L/F21W/S32Q/L90Y/F92G/T109L/S110R/A117N/D158I/A174K/D203V
ICL00028665	1.33	S27L/R12K/A114K/A117N/D158E/D203V
ICL00028670	1.05	S27L/T17S/N87H/T109R/A114K/A117N/T136V/Q142W/D203V
ICL00028711	1.06	S27L/N2R/N87Y
ICL00028716	1.03	S27L/T17S/V23T/A24V/S32Q/Y60H/N87K/T136A/D203R
ICL00028725	1.49	S27L/P20T/F92Y/T109K/D158E/D203V
ICL00028798	1.18	S27L/S32K/N87M/F92L/S101M/T109L/S110R/D203V
ICL00028833	2.82	S27L/L90Y/F92G/T136A/D158E/D203V/A216P/V229I
ICL00028865	1.71	S27L/A14K/S32M/F92L/A125S
ICL00028868	2.86	S27L/L90Y/F92G/T136V/D158L/D203V
ICL00028895	2.18	S27L/A24V/L90Y/F92G/S101A/T109L/S110R/A117Q/A174R/D203R
ICL00028917	1.93	S27L/P20T/S101D/A114V/T136V/Q142W/D158E/D203R/A216P
ICL00028920	1.34	S27L/N87Y/F92G/S101Q/A114K/A117N/T136A/D158L/D203R/A216P
ICL00028962	1.64	S27L/V23T/A24V/N87Y/L90Y/F92L/S101D/T109R/A174K/D203R/A216P
ICL00028982	1.05	S27L/N2R/P20T/F21W/L90F/F92Y
ICL00029054	1.54	S27L/L90Y/F92G/D158I/D203V/V229C
ICL00029064	2.00	S27L/S32Q/F92G/Q142W/I222L
ICL00029068	1.12	S27L/N2R/R12K/S32M/N87Q/L90F/F92L/I222L
ICL00029092	1.40	S27L/R12K/S32K/F92L/A114V/A117Q/T136A/D158E/A216P
ICL00029093	3.13	S27L/L90Y/F92G
ICL00029107	1.32	S27L/R12K/F21W/S32M/F92G/T136V/Q142L/D203R
ICL00029140	2.12	S27L/R12K/A14K/L90Y/F92L/A125S/A174K
ICL00029141	1.02	S27L/A24V/A114V/A117Q/T136V/D203V
ICL00029149	2.97	S27L/R12K/T17Q/V23L/S32M/L90Y/F92G/S101D/T136V/I222L
ICL00029167	1.09	S27L/V23T/A24V/S32Q/F92L/S101N/T109L/S110R/D203R
ICL00029172	1.38	S27L/P20T/Y60H/N87K/T136A/A174R/D203V

Figure 9P

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00029173	1.48	S27L/P20T/F21W/L90Y/F92L/T136A/A174R/D203V/V229C
ICL00029174	1.49	S27L/T17G/F21W/S32K/L90F/F92G/A125S/T136A/A174K
ICL00029199	1.31	S27L/T17G/N87Y/T136A/D203V/A216P
ICL00029219	1.42	S27L/F21W/L90F/F92G/S101D/A117N/T136A/A174K/D203V
ICL00029303	1.16	S27L/R12K/A14K/A24V/L90Y/D203V
ICL00029304	1.19	S27L/N2R/L90F/F92G/S101M/Q142L/D158L
ICL00029361	1.08	S27L/N2R/T17C/A24V/N87K/A174K/A216P
ICL00029375	1.14	S27L/N87M/Q142L/I222L
ICL00031774	1.16	S27L/F92L/S98T/R108C/A117Q/A127S/Q142L/Q189V/A216P/R236Q
ICL00031820	1.45	S27L/S22K/F92L/R108H/A127S/T136A/N211I
ICL00031919	1.80	S27L/F21W/T48S/L90Y/F92L/T109L/A127S/T136V/N204K/S223A
ICL00031936	1.45	S27L/T17L/L90Y/F92L/S98M/A174K/D203V/N211M/S212L/S223A
ICL00031945	1.56	S27L/N87K/S98M/N211M
ICL00032000	1.29	S27L/N9E/S22P/L90Y/N204K
ICL00032160	1.78	S27L/S32M/T48S/F92G/A127S/Q142W
ICL00032187	1.24	S27L/T17S/S22K/L90F/F92L/D158E/D203V/V219L/S252T
ICL00032196	1.28	S27L/L90F/F92L/A127S/D203V
ICL00032208	1.52	S27L/T25F/L90Y/F92G/N204R/S223A/N231S/R236C
ICL00032229	1.34	S27L/F21W/S22V/T48S/L90F/F92L
ICL00032231	2.39	S27L/S1A/S98T/S113K/A114V/L119M/A127S/Q142W/S193K/V219K/S252T/R255L
ICL00032241	2.17	S27L/A24V/I82L/L90F/F92G/T109L/L119M/A127S/E173R/N204K
ICL00032282	1.03	S27L/T17C/Y60H/L90F/A127S/E173R/A174R/N204K
ICL00032284	1.53	S27L/L90F/F92L/Q142W/D203V/S223A
ICL00032351	1.64	S27L/P20Q/L90Y/Q142L/S223A
ICL00032357	1.35	S27L/N9S/Y60A/A216P/R236Q/R255M
ICL00032378	2.34	S27L/F92G/R108C/S110R/A117Q/T136A/N211M
ICL00032380	1.17	S27L/S22P/Y60H/S98A/S113K/A114K/T136V/Q189L/S193H
ICL00032410	1.58	S27L/V23L/S98A/Q142L/N211M
ICL00032471	1.39	S27L/V23L/Y26L/L31M/T48S/F92G/A174R/N204K/S252T

Figure 9Q

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00032491	1.34	S27L/S13R/A14K/Y26T/T136A/S181R/N211M/S212M
ICL00032493	2.62	S27L/F21W/I82F/L90Y/F92G/A127S/N211M
ICL00032565	2.08	S27L/P20T/Y60H/S98L/T136A/R255L
ICL00032569	1.08	S27L/P20T/S34R/N87M/D158E/S252T
ICL00032570	1.82	S27L/T25A/L90F/F92G/Q189L/S193P/V229I
ICL00032573	1.08	S27L/V219L/I222L
ICL00032659	1.02	S27L/N9E/T48S/L90F/F92L/S98N/R108H/S110R/S113Y/N211V/S212L/S252T
ICL00032721	1.71	S27L/L90F/F92Y/S113R/V219I/R255L
ICL00032725	1.53	S27L/F21W/S22K/T48S/F92G/T109R/A127S
ICL00032765	1.86	S27L/S1G/A14K/P20T/S32K/T48S/L90Y/F92L/T109L/T160R/V219L/I222L/S252T/R255L
ICL00032814	1.71	S27L/L90F/F92G/D158E/T160R/S193N/N204K/S223A
ICL00032848	1.73	S27L/A14K/Y26T/F92L/Q142L/S212L
ICL00032855	1.78	S27L/S22R/L90Y/F92G/V126I/A127S/A174K/N204K
ICL00032968	1.37	S27L/P20T/T25A/L90F/F92L/A117N/L119M/S252T/R255L
ICL00033027	1.58	S27L/T17A/A24V/T48S/L90F/F92G/T109R/A127S/T160K/D203R/S223A
ICL00033067	1.07	S27L/F21W/T48S/T109L/A127S/V219I/R255L
ICL00033176	1.10	S27L/A14K/S22P/T48S/L90F/F92L/T109L/A127S/Q142L/A174R/N204K/S223A
ICL00033197	1.01	S27L/T136A/S212M/N231S
ICL00033301	1.57	S27L/F21W/L90F/F92G/A127S/S223A
ICL00033317	2.06	S27L/T48S/L90Y/F92L/R108S/S110R/A127S/T136V/E173R/S223A
ICL00033533	1.86	S27L/T48S/F92G/S98E/Q142L/Q189V/S193P/N204R/S223A
ICL00033548	1.30	S27L/T17S/L90F/F92Y/S101K/A127S/T136V/N204R/N211I/V229I/N231S
ICL00033559	2.40	S27L/N9E/F21W/T48S/L90Y/F92L/T109R/N204K/R236Q
ICL00033571	1.20	S27L/N9E/S22R/T48S/F92L/S101N/A127S/E173R/N204R
ICL00033575	1.24	S27L/S22K/N87F/A117Q/S181C/N204K/N211M/V229I/N231S/R236Q
ICL00033591	1.54	S27L/N9S/T48S/L90F/F92G/S101N/A127S/N204K/A216P/S252T/R255M
ICL00033593	1.70	S27L/I82L/S193H/N211M/S212F/S223A
ICL00033594	2.02	S27L/A14K/P20T/T48S/L90F/F92G/S98N/R108C/T136A/N204K/N211L/S212L/R236Q/S252T

Figure 9R

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00033653	1.71	S27L/S13R/T17L/T25Q/L90F/F92G/R108C/A127S/T160R/I222L/R255L
ICL00033677	2.53	S27L/T48S/L90Y/F92G/T109L/S193N
ICL00033696	2.36	S27L/S22V/T48S/L90Y/F92L/S98E/A127S/T136A/N204K/A216P/S223A
ICL00033714	1.65	S27L/V23L/N87H/F92L/R108C/S110R/N122A/T160S/Q189L/S193P/N204K/S223A/R255L
ICL00033737	1.36	S27L/F92G/A127S/A174R/S223A/V229I/N231S/R236C
ICL00033740	1.61	S27L/S1G/L90Y/A127S/E173R/S223A
ICL00033846	2.10	S27L/F92Y/S98N/Q142W
ICL00033909	1.48	S27L/P20T/S32M/S34R/T48S/L90Y/F92L/R108K/A127S/Q142W/A174R/N204K/V219I/S252T
ICL00034025	2.25	S27L/F92G/A127S/Q189V/S193N/S223A
ICL00034065	1.08	S27L/S34R/F92G/S110R/D158L/D203V/R255M
ICL00034182	2.12	S27L/N9E/F21W/T48S/F92G/T109L/A127S/R236C
ICL00034192	1.71	S27L/S1A/S22P/T48S/L90Y/F92G/A127S/E173R/A174R/N204K/S223A
ICL00034240	1.01	S27L/S22K/T48S/T160S/N204K
ICL00034243	1.33	S27L/F21W/T48S/L90Y/F92G/S98V/R108C/A127S/N211L/S212M/N231S/R236C
ICL00034264	1.05	S27L/V23L/A24V/A114K/T136A/I222L/V229I
ICL00034622	1.39	S27L/P20T/S101H/T109R/A114V/T136A/Q142L/I222L/V229I
ICL00035440	1.21	S27L/V23L/S101H/T109K/A114K/A117N/T136V/Q142L/I222L/V229I
ICL00035481	1.09	S27L/T17L/F21W/S101H/T109R/A114V/T136A/Q142L/I222L/V229I
ICL00035505	1.40	S27L/T17S/T136V/Q142L/I222L/V229C
ICL00035526	1.36	S27L/T17C/S22P/T48S/L90F/F92G/A127S/A174R/P192A/S193H/N204K/S223A/V229I/N231S/R236Q/R255L
ICL00035531	1.22	S27L/N9E/T48N/N87H/F92L/A174K/Q189L/S193K/N204R/V219I
ICL00035551	1.40	S27L/A14K/V23L/Y26L/L90F/F92G/S98E/S113K/A114K/T136A/V229I/N231S
ICL00035558	2.51	S27L/L90Y/F92L/S101D/A117N/Q142L/S193N
ICL00035590	1.01	S27L/S22K/T25A/L90Y/Q142L/E173R/N204K/S223A
ICL00035602	1.07	S27L/P20T/L90Y/T109L/A127S/A174K/V229C
ICL00035610	1.97	S27L/S22V/L90Y/F92L/A117Q/R236C/R255L
ICL00035710	2.23	S27L/V23L/A24G/Y26T/I82F/L90Y/F92G/R108H/T136A/D158L/T160K/D203V

Figure 9S

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00035724	1.52	S27L/A14K/S22K/F92G/A127S/N204K/V229I
ICL00035770	1.19	S27L/S22V/L90F/F92G/A127S/A174R/A216P/R236C
ICL00035778	1.61	S27L/V23L/Y60A/S98T/T109L/A127S/T136V/T160Q/N204K/S223A/R255L
ICL00035819	1.71	S27L/S13R/L90Y/S98L/T160V/Q189L/S193P/A216P/S252T/N253S/R255L
ICL00035823	1.62	S27L/S22R/I82M/F92L/T109L/A127S/Q142W/Q189L/S223A
ICL00035834	2.14	S27L/S1G/Y60A/L90F/F92L/N122E/T136A/N204K/S223A/N231S
ICL00035839	2.20	S27L/S32K/F92G/S98L/R108Q/S110R/R255L
ICL00035855	2.09	S27L/L90Y/F92G/L119M/A127S/A174R/S252T
ICL00035862	1.19	S27L/L90F/S110R/S181R/N211F
ICL00035934	1.37	S27L/A14K/S22P/Y60H/S110R/N122S/D158I/N204K/S223A/R255M
ICL00036094	1.05	S27L/F92L/S98V/T109L/N122A/E173R/R255L
ICL00036169	1.53	S27L/S22R/N87L/F92G/R236C
ICL00036178	1.34	S27L/S32M/S34R/I82L/F92G/N204K/S223A
ICL00036235	1.55	S27L/A24V/T25Q/Y60I/A127S/A174K/N204K/V219I/S223A/S252T/R255M
ICL00036239	2.11	S27L/S98V/T136A/N211F
ICL00036276	1.70	S27L/N9S/L90F/F92L/A127S/N204R/S212M
ICL00036287	1.02	S27L/S22R/T48S/F92G/R108H/S110R/A127S/E173R/N204K/S223A/R236Q
ICL00036293	2.84	S27L/A14K/L90Y/F92G/A127S
ICL00036332	1.09	S27L/A14K/T48S/F92G/E173R/N204R/S223A/N231S
ICL00036349	1.76	S27L/L90Y/T109R/S113N/V219L/I222L
ICL00036373	2.09	S27L/N9S/T48S/L90Y/T136A/T206G/S223A
ICL00036387	1.63	S27L/S22K/T48N/L90F/F92G/N204K/S223A/V229C/N231S
ICL00036443	1.34	S27L/S22P/T48S/L90F/F92G/A127S/A174R/N204R/S223A
ICL00036446	1.03	S27L/S1G/P20T/S32K/S34R/T48S/N87F/S98A/A127S/T136A
ICL00036453	1.24	S27L/F21W/S22R/S98E/Q142L/T160V/S223A/S252T/R255L
ICL00036454	1.84	S27L/P20T/T48S/F92Y/R108K/S110R/A127S/V219L/S223A/V229I/R236Q
ICL00036455	2.54	S27L/Y26T/L90Y/F92L/A127S/V219L/S252T/R255L
ICL00036510	1.05	S27L/N9S/F21W/T48S/F92L/A127S/D203V/S212F

40/51

Figure 9T

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00036526	1.19	S27L/F21W/Y60H/S98E/L119M/D158E/R236Q
ICL00036577	1.39	S27L/F21W/S22R/L90F/F92L/N122S/Q142W/R236Q
ICL00036610	2.07	S27L/F21W/T48S/L90F/F92G/T109K
ICL00036629	2.11	S27L/L90Y/F92L/T109R/A127S/E173R/N204K/S223A
ICL00036782	2.58	S27L/N9S/F21W/T48S/L90Y/F92G/A127S/N204K/V219I/R255M
ICL00036790	1.82	S27L/N9E/I82F/L90Y/F92L/S95N/T109L/A127S/A174R/S223A
ICL00036809	1.30	S27L/L90F/F92L/S98L/N204K/A216P
ICL00036837	1.62	S27L/A24V/T48S/A117Q/N211M/S212M/S223A
ICL00036848	2.43	S27L/L90Y/F92G/T109L/A127S/N204R/S223A
ICL00036911	1.01	S27L/N2R/S32Q/N87K/A125S/V219L
ICL00037006	1.78	S27L/S22P/T48S/L90F/F92L/S193N/V219L/S223A
ICL00037042	1.91	S27L/T25Q/L119M/N211M/R236Q
ICL00037061	2.58	S27L/L90Y/F92G/N122S/A127S/E173R/A216P/R236Q
ICL00037075	1.85	S27L/P20T/S32K/L90F/F92G/N122E/D158E/T160S/Q189L/S223A/S252T
ICL00037121	1.93	S27L/N9S/F21W/T48S/N87H/L90F/F92L/S113N/V229C
ICL00037148	1.96	S27L/T25Q/I82L/L90F/F92G/S98L/S113R/A114V/T136A/S181R
ICL00037152	3.42	S27L/P20T/R108Q/S110R/D203V/N211I
ICL00037185	1.89	S27L/S1G/N2R/P20T/Y26T/S32M/T48S/L90Y/F92L/A127S/N204R/V219L
ICL00037200	2.01	S27L/A14K/P20T/T48N/L90F/F92G/A117Q/A127S
ICL00037224	1.51	S27L/N9S/T48N/L90Y/F92L/S98M/T109K/A127S/N204R/N211I/S212L/V219I
ICL00037313	1.21	S27L/F21W/S22R/T48S/L90F/F92L/R108Q/A174K/N204K/S212F/S223A
ICL00037319	1.35	S27L/S22R/Y60H/S98T/T136V/S193K/R236Q
ICL00037336	2.70	S27L/S22K/Y26K/N87Y/L90Y/F92G/T109R/A127S/S252T/R255L
ICL00037337	1.58	S27L/L90F/F92L/T109L
ICL00037371	1.49	S27L/F21W/F92L/N204K/S252T/R255L
ICL00037378	2.44	S27L/V23L/L90Y/F92G/A127S/S193K/N204R/V219I/R236C/R255L
ICL00037436	2.29	S27L/F21W/L90Y/F92G/A114V/N122S/A127S/N204K/S223A/S252T
ICL00037450	1.92	S27L/P20T/Y60A/T109L/Q189L/S212L
ICL00037473	3.18	S27L/S22V/T48S/L90Y/F92G/N204K

Figure 9U

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00037489	1.66	S27L/S22V/S32K/T48S/I82F/F92G/A127S/N204K/S223A
ICL00037554	2.16	S27L/A55L
ICL00037558	1.20	S27L/A97V
ICL00037611	1.02	S27L/F250L
ICL00037629	1.05	S27L/T109G
ICL00037651	1.02	S27L/G38D
ICL00037677	1.13	S27L/A97S
ICL00037847	1.26	S27L/A55V/A216T
ICL00037864	1.11	S27L/P20D
ICL00037901	1.27	S27L/A55V
ICL00037943	1.03	S27L/T109Y
ICL00037946	1.11	S27L/V165I
ICL00037948	1.12	S27L/A184G
ICL00037955	1.28	S27L/A97E
ICL00037961	1.10	S27L/A184S
ICL00037963	1.15	S27L/A97F
ICL00037988	1.40	S27L/A97T
ICL00038033	1.13	S27L/K197Y
ICL00038067	1.39	S27L/A55I
ICL00038071	1.06	S27L/A97P
ICL00038085	1.14	S27L/A55M
ICL00038089	1.01	S27L/P20E
ICL00038124	1.12	S27L/A117L
ICL00038135	1.11	S27L/T109L
ICL00038140	1.08	S27L/K197T
ICL00038189	1.09	S27L/T136S
ICL00038207	1.45	S27L/A97L
ICL00038219	1.13	S27L/T109A
ICL00038277	1.15	S27L/P20I
ICL00038296	1.05	S27L/L191V
ICL00038299	1.08	S27L/A184C
ICL00038304	1.09	S27L/A97Q
ICL00038308	1.03	S27L/F250V
ICL00038341	1.13	S27L/K197V
ICL00038353	1.05	S27L/A117S
ICL00038364	1.08	S27L/K197R

Figure 9V

Colony Tracking Number	Improvement of Total Activity w.r.t. G2P: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00038379	1.06	S27L/T109K
ICL00038424	1.23	S27L/A55C
ICL00038486	1.51	S27L/N2S/V177A
ICL00038559	1.33	S27L/Q142D
ICL00038580	1.31	S27L/G149C
ICL00038591	1.15	S27L/F21Y
ICL00038623	1.26	S27L/G149A
ICL00038726	1.21	S27L/P164E
ICL00038757	1.16	S27L/Y26C
ICL00038766	1.04	S27L/T17N
ICL00038783	1.32	S27L/S57M
ICL00038791	1.01	S27L/D249I
ICL00038792	1.01	S27L/T17S
ICL00038834	1.06	S27L/P164T
ICL00038837	1.09	S27L/Q142L
ICL00038861	1.32	S27L/D249N
ICL00038862	1.06	S27L/I185R
ICL00038865	1.27	S27L/V83L
ICL00038866	1.32	S27L/G149S
ICL00038869	1.02	S27L/A24D
ICL00038901	1.24	S27L/R251V
ICL00038914	1.02	S27L/V83I
ICL00038944	1.05	S27L/S110N
ICL00039000	1.10	S27L/T17M
ICL00039034	1.14	S27L/F161W
ICL00039051	1.09	S27L/G46E
ICL00039053	1.02	S27L/D249T
ICL00039063	1.06	S27L/T17I
ICL00039064	1.61	S27L/S57C
ICL00039113	1.30	S27L/S57T
ICL00039173	1.67	S27L/S57L
ICL00039195	1.07	S27L/Q167T
ICL00039260	1.76	S27L/S57E
ICL00039288	1.10	S27L/T17K
ICL00039321	1.45	S27L/G149N
ICL00039344	1.06	S27L/Q142E

Figure 9W

Colony Tracking Number	Improvement of Total Activity: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00039414	1.38	S27L/S57F
ICL00039500	1.17	S27L/T17A
ICL00039501	1.13	S27L/P164H
ICL00039564	1.47	S27L/T17R
ICL00039573	1.22	S27L/G149T
ICL00039613	1.12	S27L/R251T
ICL00039624	1.07	S27L/S101Y
ICL00039636	1.56	S27L/S57V
ICL00039637	1.13	S27L/A24T
ICL00039669	1.14	S27L/I185E
ICL00039701	1.35	S27L/G46N
ICL00039711	1.02	S27L/P164N
ICL00039733	1.83	S27L/P164S
ICL00039734	1.28	S27L/Q167V
ICL00039757	1.37	S27L/F161V
ICL00039766	1.61	S27L/S57I
ICL00039771	1.53	S27L/G149D
ICL00039784	1.12	S27L/Q167I
ICL00039794	1.05	S27L/I185Q
ICL00043486	1.01	S27L/A114V/A117N/T136A/I222L/V229I
ICL00043848	1.54	S27L/A24V/V229C
ICL00044168	1.11	S27L/F21W
ICL00043551	1.07	S27L/F21W/A114V/T136A/I222L/V229I
ICL00044152	1.37	S27L/F21W/A24V
ICL00044069	1.39	S27L/F21W/A24V/A114V/A117Q/Q142W/I222L/V229C
ICL00043633	1.36	S27L/F21W/I222L/V229C
ICL00043952	1.43	S27L/F21W/I222L/V229I
ICL00043637	1.34	S27L/F21W/Q142L/I222L/V229C
ICL00044295	1.27	S27L/F21W/S101M/I222L/V229C
ICL00043472	1.26	S27L/F21W/T109K/S110R/T136A/V229I
ICL00044315	1.10	S27L/F21W/T109R/A117N/T136V/I222L/V229I
ICL00044330	1.57	S27L/F21W/T109R/A117N/T136V/Q142W/I222L/V229C
ICL00043752	1.25	S27L/F21W/T136A

Figure 9X

Colony Tracking Number	Improvement of Total Activity: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00043749	1.34	S27L/I222L/V229I
ICL00044510	1.39	S27L/P20T/A117Q/I222L/V229C
ICL00044441	1.02	S27L/P20T/A24V/S101Q/T109R/A117Q/I222L/V229I
ICL00044350	1.34	S27L/P20T/F21W/I222L/V229C
ICL00044428	1.30	S27L/P20T/F21W/Q142W/I222L/V229C
ICL00044371	1.43	S27L/P20T/F21W/Q142W/I222L/V229I
ICL00043526	1.62	S27L/P20T/F21W/T109K/A117N/I222L/V229C
ICL00043688	1.50	S27L/P20T/F21W/T109L/T136A/Q142W/I222L/V229C
ICL00043610	1.62	S27L/P20T/F21W/T109R/A117Q/T136V/Q142L/I222L/V229I
ICL00043813	1.25	S27L/P20T/F21W/T136A/Q142L/I222L/V229I
ICL00043577	1.39	S27L/P20T/F21W/V229I
ICL00044052	1.21	S27L/P20T/I222L/V229C
ICL00043941	1.18	S27L/P20T/S101H/A114V/A117N/I222L/V229I
ICL00044090	1.34	S27L/P20T/S101M/A114V/A117N/Q142W/I222L/V229C
ICL00043686	1.64	S27L/P20T/S101M/I222L/V229I
ICL00044408	1.55	S27L/P20T/T109K/A114K/Q142W/I222L/V229C
ICL00043842	1.26	S27L/P20T/T109L/S110R/A117N/I222L/V229I
ICL00043764	1.28	S27L/P20T/T109R/A114K/A117Q/T136V/I222L/V229C
ICL00043458	1.17	S27L/P20T/V23T/A24V/I222L/V229I
ICL00043499	1.48	S27L/P20T/V23T/A24V/T109L/S110R/I222L/V229I
ICL00043924	1.35	S27L/S101M/A114V/A117Q/T136A
ICL00043528	1.36	S27L/S101M/T136A/I222L/V229I
ICL00044207	1.30	S27L/S101N/A117Q/I222L
ICL00043491	1.35	S27L/S101Q/Q142L/I222L/V229I
ICL00043684	1.70	S27L/S101W/A114V/T136V/V229C
ICL00044177	1.22	S27L/T109K/A117N/T136V/I222L/V229C
ICL00043973	1.05	S27L/T109R/A117N/I222L/V229C
ICL00043940	1.42	S27L/T109R/I222L/V229I
ICL00043944	1.23	S27L/T136V/Q142W/I222L/V229I
ICL00043759	1.61	S27L/T17A/A24V/S101D/S110R/T136A
ICL00043639	1.25	S27L/T17A/F21W/S101Q/I222L/V229C
ICL00043731	1.29	S27L/T17A/F21W/T109R/S110R/I222L/V229I
ICL00044539	1.13	S27L/T17A/P20T/S101Q/T109K/S110R/T136A/I222L/V229C
ICL00043846	1.43	S27L/T17A/V23L/S101M/T109K/S110R/A114V/A117Q/T136V/V229I

Figure 9Y

Colony Tracking Number	Improvement of Total Activity: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00043721	1.19	S27L/T17A/V23T/A24V/T136A
ICL00044006	1.29	S27L/T17C/A114K/A117N/T136V/I222L/V229I
ICL00043926	1.26	S27L/T17C/T109K/A117N/T136A/I222L/V229I
ICL00043983	1.25	S27L/T17G/F21W/A117N/I222L/V229I
ICL00044547	1.39	S27L/T17G/P20T/F21W/A117Q/I222L/V229C
ICL00043831	1.04	S27L/T17G/V23T/A24V/T109L/A117Q/T136A/I222L/V229I
ICL00043487	1.34	S27L/T17H/F21W/T136V/Q142W/I222L/V229I
ICL00043844	1.83	S27L/T17H/S101Q/T136V/Q142L/V229C
ICL00044382	1.24	S27L/T17L/S101M/T109K/S110R/A117Q/I222L/V229C
ICL00043812	1.25	S27L/T17L/T109L/S110R/A117Q/I222L/V229I
ICL00043849	1.34	S27L/T17Q/A24V/S101W/T136A
ICL00044328	1.60	S27L/T17Q/Q142L/I222L/V229I
ICL00044164	1.56	S27L/T17Q/S101D/T136A/I222L/V229I
ICL00044355	1.24	S27L/T17Q/T136A/I222L/V229C
ICL00044226	1.31	S27L/T17Q/T136A/I222L/V229I
ICL00043568	1.39	S27L/T17Q/V23T/A24V/I222L/V229I
ICL00044481	1.25	S27L/T17S/F21W/Q142L
ICL00043742	1.20	S27L/T17S/S101N/T109K/A117N/T136V/Q142L/I222L/V229C
ICL00044186	1.31	S27L/T17S/V229I
ICL00043608	1.24	S27L/V229I
ICL00044340	1.12	S27L/V23L/A114V/A117N/T136A/I222L/V229I
ICL00044232	1.26	S27L/V23L/A117Q
ICL00043536	1.06	S27L/V23L/A24V/S101K/A117N/I222L/V229C
ICL00043839	1.28	S27L/V23L/A24V/T136A/Q142W/I222L/V229I
ICL00043592	1.29	S27L/V23L/I222L/V229C
ICL00043955	1.14	S27L/V23L/T136A/I222L/V229I
ICL00043772	2.02	S27L/V23T/A24V/I222L/V229C
ICL00044326	1.15	S27L/V23T/A24V/T109K/A114K/A117Q/T136A/I222L/V229C
ICL00044127	1.40	S27L/V23T/Q142L/I222L/V229C
ICL00043537	1.33	S27L/V23T/T109L/A114V/T136A/Q142L/I222L/V229C
ICL00040026	1.27	S27L/A117Y
ICL00040387	1.38	S27L/A24D/K197L
ICL00040146	1.48	S27L/A24D/L191F/R251Q
ICL00040453	1.42	S27L/A24D/S110K

Figure 9Z

Colony Tracking Number	Improvement of Total Activity: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00041680	1.57	S27L/A24D/T109L/K197L
ICL00040241	1.50	S27L/A24D/T136S/F250V
ICL00040069	1.78	S27L/A24H/G46E
ICL00040102	1.07	S27L/A24H/R251V
ICL00040329	1.13	S27L/A24N
ICL00041935	1.26	S27L/A24N/P164S/K197V/R251T
ICL00041682	1.26	S27L/A55V/V83L/A117T
ICL00040423	1.04	S27L/F21Y/A184S
ICL00041467	1.06	S27L/F21Y/A55T/T109A/A184S
ICL00040495	1.14	S27L/F21Y/G46E/A117T/T136S/G149C/R251Q
ICL00040518	1.16	S27L/F250L/R251Q
ICL00040336	1.34	S27L/G46E/A55I/Q142E
ICL00041273	1.14	S27L/G46N/I139T/Q142E/P164T/I185A/V229L/F250V
ICL00041071	1.11	S27L/G46R/T109K/T136S/D249T
ICL00040224	1.07	S27L/I139T/Q142E/I169V
ICL00042190	1.24	S27L/K197R/R251E
ICL00042046	1.11	S27L/N2E/G46N/A55V/I185Y/D249I
ICL00040842	1.27	S27L/N2E/G46S/V83L/T136S/A172T/V229C/D249N
ICL00041002	1.51	S27L/N2E/I169L/F250L/R251Q
ICL00041977	1.54	S27L/N2E/P20E/F250V/R251L
ICL00040909	1.30	S27L/N2E/P20I/T109L/L191V/K197L/V229C
ICL00039972	1.19	S27L/N2E/R251L
ICL00040106	1.22	S27L/N2F
ICL00041835	1.39	S27L/N2F/D249N/F250L
ICL00041533	1.23	S27L/N2F/G46E
ICL00040002	1.54	S27L/N2F/P20E
ICL00042252	1.04	S27L/N2F/P20E/S110D/A184S/L191V/R251V
ICL00040887	1.23	S27L/N2F/P20I/F21Y/R251Q
ICL00041364	1.34	S27L/N2F/R251Q
ICL00041574	1.10	S27L/N2F/S101C/A117F/P164S
ICL00041845	1.08	S27L/N2F/S101Y/Q142L/G149T/Q167I/I169C/V229L
ICL00040388	1.29	S27L/N2L
ICL00042100	1.32	S27L/N2L/A172T
ICL00039916	1.33	S27L/N2L/A24H/A55C/V229L
ICL00040800	1.23	S27L/N2L/A24T
ICL00041736	1.31	S27L/N2L/G46E/T109K/F161V

47/51

Figure 9AA

Colony Tracking Number	Improvement of Total Activity: PF at pH8.0, 65°C, 72hr	AA Mutations w.r.t G1P
ICL00040487	1.33	S27L/N2L/P20E/F21Y/V229L
ICL00040442	1.01	S27L/N2L/T17I/T136S/P164H/D249M
ICL00041938	1.27	S27L/N2L/T17N/S57C/S110D/A117L/P164N/I185G/V229L/R251T
ICL00041080	1.67	S27L/N2S/A24D/S101Y/P164E/V165I/I185E
ICL00040174	1.52	S27L/N2S/A24N/G46E/A55L/Q142D/V229C/R251L
ICL00040463	1.08	S27L/N2S/A55V/I185Q/R251E
ICL00040566	1.35	S27L/N2S/P20D/A97C/A117F/F250L/R251E
ICL00040090	1.20	S27L/N2S/V83L/A184S
ICL00040060	1.14	S27L/P164T/V165I/R251E
ICL00040865	1.20	S27L/P20D/A55T/A117Y/K197R
ICL00041737	1.05	S27L/P20D/F21Y/A55T/F250L/R251V
ICL00039868	1.32	S27L/P20D/F21Y/F250V
ICL00042042	1.54	S27L/P20D/F21Y/G46N/S110K/T163I/Q167V
ICL00041640	1.73	S27L/P20D/G46N/A55C/S110N/T163I/A184S
ICL00040630	1.27	S27L/P20D/G46S/A55I/K197T
ICL00042201	1.20	S27L/P20D/S57E/S101C
ICL00040296	1.42	S27L/P20E/A24D/D249S/F250V
ICL00042171	1.25	S27L/P20E/F21Y/G46E/V83L/A97Q
ICL00041696	1.01	S27L/P20E/F21Y/I139T/P164H/K197T/R251E
ICL00041182	1.43	S27L/P20E/F21Y/K197T
ICL00040186	1.19	S27L/P20E/F21Y/S110D/A117S
ICL00040431	1.17	S27L/P20E/F21Y/S57T/P164N/A184C/V229C
ICL00040166	1.24	S27L/P20I/F21Y/A117F/I185G/D249N
ICL00041084	1.10	S27L/Q142H/I185S/R251A
ICL00040993	1.03	S27L/S110D/A184S/K197T
ICL00042211	1.07	S27L/S110K/A117Y/P164R
ICL00040629	1.12	S27L/S57C/R251E
ICL00040501	1.03	S27L/T136S/D249T
ICL00041708	1.35	S27L/T163I
ICL00041406	1.38	S27L/T17H/S110K
ICL00042123	1.21	S27L/T17I/A24D/S57I
ICL00040258	1.68	S27L/T17N/A117S/V229L/R251A
ICL00039911	1.24	S27L/T17S/R251T
ICL00040420	1.17	S27L/V83L/A97S/A184C/D249S
ICL00041699	1.11	S27L/V83L/F250V/R251E

Figure 10A

Position	Parent	Variant	Position	Parent	Variant
27	S	L, F, H, T, W	68	A	F
1	S	A, G, M, R	70	L	M
2	N	E, F, L, R, S	72	R	P
5	Q	E	74	L	W
9	N	A, E, S	77	H	Q
12	R	K	82	I	F, L, M
13	S	L, R	83	V	I, L, T
14	A	K, S	85	N	D
15	L	I	87	N	F, H, I, K, L, M, Q, R, V, W, Y
16	T	E	88	S	K, T
17	T	A, C, G, H, I, K, L, M, N, Q, R, S	90	L	F, K, Y
18	D	R	92	F	G, I, K, L, N, Q, V, Y
20	P	D, E, I, Q, T	97	A	C, E, F, G, L, P, Q, S, T, V
21	F	W, Y	98	S	A, D, E, L, M, N, Q, T, V
22	S	A, I, K, P, R, V	101	S	A, C, D, F, H, K, L, M, N, Q, R, V, W, Y
23	V	L, T	102	A	V
24	A	D, G, H, N, S, T, V	105	N	D
25	T	A, F, H, Q, R, V	108	R	C, E, H, K, N, P, Q, S, T, V
26	Y	C, K, L, T	109	T	A, F, G, K, L, N, R, Y
30	R	K	110	S	D, G, H, K, N, R
32	S	K, M, Q, Y	113	S	A, K, N, P, Q, R, T, Y
33	V	G, Q, T	114	A	K, L, S, V
34	S	R	117	A	F, G, L, N, Q, S, T, Y
40	V	T	119	L	I, M
46	G	E, L, N, R, S	121	A	S
48	T	N, S	122	N	A, E, H, P, R, S
49	L	G	125	A	S
53	G	A	127	A	M, S, V
54	I	V	135	A	G
55	A	C, I, L, M, T, V	136	T	A, M, S, V
56	M	I, L	138	R	E, L
57	S	C, E, F, I, L, M, T, V	139	I	A, T
60	Y	A, H, I	140	S	A
62	A	T	142	Q	D, E, H, L, W

Figure 10B

Position	Parent	Variant	Position	Parent	Variant
143	I	N, R	206	T	G, K, L, P, R
145	T	S	208	F	G, L, R, T
147	K	F, G, N, Q	209	A	V
149	G	A, C, D, N, S, T, V	211	N	F, I, L, M, V
150	V	I, L	212	S	F, L, M
153	T	L	213	P	N, R
156	H	N	216	A	L, P, S, T, V
157	T	A, G	217	I	S
158	D	E, I, K, L	218	S	A
160	T	K, Q, R, S, V	219	V	F, I, K, L, R
161	F	V, W	221	T	S
162	N	E, H, P, R	222	I	L
163	T	I, S	223	S	A, C
164	P	E, H, N, R, S, T	225	M	L
167	Q	I, T, V	227	L	R
170	V	L	228	W	F
173	E	R	229	V	C, I, L
174	A	K, R	231	N	L, Q, S
177	V	A	236	R	C, E, H, K, Q
179	P	Q	237	Q	R
181	S	A, C, R	241	N	P
182	Q	T	242	V	T
184	A	C, G, S	243	N	P
185	I	A, E, G, L, Q, R, S, Y	246	A	D, K, S, T
189	Q	I, L, V	249	D	I, M, N, S, T
190	N	S	250	F	I, L, V, Y
193	S	E, F, H, K, N, P, T, V	251	R	A, E, I, K, L, Q, T, V
194	T	G, S	252	S	T
195	T	F	253	N	S, Y
198	V	A	254	N	R
200	V	L	255	R	E, G, L, M, S, V, W, Y
203	D	N, R, V	258	Q	P
204	N	A, K, R, S			
8	P	T	165	V	I
31	L	M	169	I	C, L, V
38	G	D	172	A	T
95	S	N	191	L	F, V
126	V	I	192	P	A
137	L	M	197	K	L, R, T, V, Y

Figure 11A

>SEQ ID NO:1 (wild type Bhr-PETase, G1P)

SNPYQRGPNPTRSALTTDGPFVSVATYSVSRLSVSGFGGGVIYYPTGTTLTFGGIAMSPGYTADASS
LAWLGRRRLASHGFVVIVINTNSRLDFPDSRASQLSAALNYLRTSSPSAVRARLDANRLAVAGHSMG
GGATLRRISEQIPTLKAGVPLTPWHTDKTFNTPVPQLIVGAEADTVAPVSQHAIPFYQNLPSSTTPKV
YVELDNATHFAPNSPNAAISVYTIISWMKLWVDNDTRYRQFLCNVNDPALSDFRSNNRHQC

>SEQ ID NO:2 (N.A. encoding wild type Bhr-PETase, codon optimized)

TCTAACCCATACCAGAGGGGACCTAACCCTACTAGGAGTGCCTTGACCACCGATGGTCCTTTCAGT
GTCGCCACCTACTCTGTCTCTAGGTTGTCTGTCTCTGGTTTCGGAGGTGGAGTCATCTACTACCCA
ACCGGAACCACCCCTACCTTCGGAGGTATCGCCATGTCTCCCGGATACACTGCCGATGCTTCTAGT
CTTGCTTGGTTGGGTAGGAGGCTTGCTAGTCACGGATTTCGTGTCATCGTCATCAACACCAACAGT
AGGTTGGACTTTCCAGACAGTAGGGCCTCTCAGCTTTCTGCCGCCCTTAACCTACCTTAGGACCTCT
TCTCCAAGTGCCGTTAGAGCTAGGTTGGACGCTAATAGATTGGCTGTGCTGGACACTCTATGGGT
GGAGGTGCCACTTTGAGGATCAGTGAGCAGATCCCTACCCTTAAAGCCGGTGTTCCTTTGACCCCT
TGGCACACTGACAAGACCTTCAACACTCCAGTCCCACAGTTGATTGTGCGAGCCGAAGCCGATACT
GTTGCTCCAGTTTCTCAGCACGCCATCCCATTCTACCAGAACCTTCCTAGTACCACCCCAAAGGTC
TACGTCGAGTTGGATAACGCCACCCACTTCGCTCCAACTCTCCAAACGCTGCCATCAGTGTTTAC
ACCATTTCTTGGATGAAGTTGTGGGTGACAAACGACACTAGATATAGACAGTTCCTTTGCAACGTC
AACGACCCAGCTTTGTCTGACTTTAGAAGTAACAATAGACATTGTGAC

>SEQ ID NO:3 (N.A. encoding wild type Bhr-PETase, codon optimized)

AGTAACCCATACCAGCGCGGTCCGAATCCGACCCGTAGTGCGCTGACGACCGATGGTCCGTTTAGC
GTGGCCACCTACAGCGTGAGCCGTCTGAGTGTAGCGGCTTTGGCGGCGGTGTTATCTACTACCCG
ACGGGCACACGCTGACCTTTGGTGGCATCGCCATGAGTCCGGGCTACACCGCGGACGCCAGTAGT
CTGGCGTGGCTCGGTGTCGTCTGGCGAGCCATGGCTTCGTGGTGATCGTGATCAACACCAACAGC
CGCCTCGACTTTCCAGATAGTCGTGCCAGTCAGCTGAGCGCCGCGCTGAATTATCTGCGTACCAGT
AGCCCAAGCGCGGTTTCGTGCCCCTCTGGATGCCAATCGCCTCGCCGTTGCCGGTCATAGTATGGGC
GGTGGTGCCACGCTGCGTATCAGCGAACAGATTCCGACGCTGAAAGCGGGCGTGCCACTGACCCCA
TGGCACACGGACAAGACGTTTAAACACCCCGGTTCCGCAGCTCATTGTGGGTGCCGAAGCCGACACC
GTTGCCCCAGTTAGCCAGCACGCGATCCCGTTTACCAGAATCTGCCAAGCACCACGCCGAAAGTT
TACGTGGAACCTGACAACGCGACCCACTTTGCGCGGAACAGTCCGAACGCCGCCATCAGCGTGATAC
ACCATCAGCTGGATGAAACTCTGGGTGGACAACGATACCCGCTACCGCCAGTTTCTGTGCAACGTT
AATGATCCGGCGCTGAGCGACTTCCGCAGCAATAACCGCCATTGCCAG

Figure 11B

>SEQ ID NO:4 (wild type Lcc-PETase)

HHHHHHSSGLVPRGSHMSNPYQRGNPTRSALTADGPFVSATYTVSRLSVSGFGGGVIYYPTGTSL
TFGGIAMSPGYTADASSLAWLGRRLASHGFVVLVINTNSRFDYPDSRASQLSAAALNYLRTSSPSAV
RARLDANRLAVAGHSMGGGGTLRIAEQNPSLKAAPVPLTPWHTDKTFNTSVPVLI VGAEDTVAPVS
QHAIPFYQNL PSTTPKVYVELDNASHFAPNSNNAISVYTI SWMKLWVDNDTRYRQFLCNVNDPAL
SDFRTNNRH CQ

>SEQ ID NO: 5 (N.A. encoding wild type Lcc-PETase)

CATCATCATCATCATCACAGCAGCGGCCTGGTGCCGCGCGGCAGCCATATGAGTAACCCATAC CAG
CGCGGTCCGAATCCGACCCG TAGTGCGCTGACGCGCGATGGTCCGTTTAGCGTGGCCACCTACACC
GTGAGCCGTCTGAGTGTTAGCGGCCTTTGGCGGCGGTGTTATCTACTACCCGACGGGCAC CAGTCTG
ACCTTTGGTGGCATCGCCATGAGTCCGGGCTACACCGCGGACGCCAGTAGTCTGGCGTGGCTCGGT
CGTCGTCTGGCGAGCCATGGCTTCGTGGTGCTGGTGATCAACACCAACAGCCGCTTCGACTATCCA
GATAGTCGTGCCAGTCAGCTGAGCGCCGCGCTGAATTATCTGCGTACCAGTAGCCCAAGCGCGGTT
CGTGCCCGTCTGGATGCCAATCGCCTCGCCGTTGCCGTCATAGTATGGGCGGTGGTGGTACGCTG
CGTATCGCCGAACAGAATCCGAGTCTGAAAGCGGCCGTGCCACTGACCCCATGGCACACGGACAAG
ACGTTTAAACACCAGCGTTCGGTGCTCATTGTGGGTGCCGAAGCCGACACCGTTGCCCCAGTTAGC
CAGCAGCGGATCCCGTTTACCAGAATCTGCCAAGCACCACGCCGAAAGTTTACGTGGAAC TCGAC
AACGCGAGCCACTTTGCGCCGAACAGTAATAACGCCGCCATCAGCGTGTAACCATCAGCTGGATG
AAACTCTGGGTGGACAACGATAACCGCTACCGCCAGTTTCTGTGCAACGTTAATGATCCGGCGCTG
AGCGACTTCCGCACCAATAACCGCCATTGCCAG

>SEQ ID NO:6 (wild type Is-PETase)

QTNPYARGPNPTAASLEASAGPFTVRSFTVSRPSGYGAGTVYYPTNAGGTVGAI AIVPGYTARQSS
IKWWGRLASHGFVVITIDTNSTLDQPSSRSSQMAALRQVASLNGTSSSPIYGVDTARMGVMGW
SMGGGSLISAANNPSLKAAPQAPWDSSTNFSSVTVP TLI FACENDSIAPVNSSALPIYDSMSRN
AKQFLEINGGSHSCANSNGNSNQALIGKKGVAMKRFMDNDTRYSTFACENPNSTRVSD FRTANCSL
EHHHHHH

>SEQ ID NO:7 ((N.A. encoding wild type Is-PETase)

CAGACGAATCCATACGCCCCGCGGTCCAAATCCAACCGCGGCGAGTCTGGAAGCCAGTGCGGGCCCA
TTCACCGTTTCGAGCTTTACCGTTAGTCGTCCAAGCGGTTACGGTGCCGGCACCGTG TACTACCCG
ACGAATGCGGGTGGTACCGTGCGTATCGCCATCGTTCCGGGCTATACCGCGCGCCAGAGTAGC
ATCAAATGGTGGGGTCCACGTCTGGCGAGTCATGGCTTCGTGGTGATCACGATCGACACCAATAGC
ACCCTCGATCAGCCAAGCAGCCGAGCAGTCAACAGATGGCGGCGCTGCGCCAAGTTGCCAGTCTG
AACGGCACGAGTAGCAGCCCGATTTACGGTAAAGTGGACACCGCGCGTATGGGCGTGATGGGCTGG
AGCATGGGTGGTGGTGGCAGTCTGATCAGTGCCGCCAACAATCCAAGCCTCAAAGCGGCGGCCCA
CAAGCGCCATGGGATAGCAGCACGAAC TTTAGCAGCGTGACCGTGCCAACGCTGATCTTCGCGTGC
GAAAACGACAGCATCGCCCCGGTGAATAGCAGTGCGCTGCCGATCTATGACAGCATGAGTCGCAAC
GCCAAGCAGTTTCTGGAGATCAACGGTGGCAGCCATAGCTGCGCGAACAGCGGCAACAGCAATCAA
GCCCTCATCGGTAAAAAGGCGTGGCGTGGATGAAGCGCTTTATGGACAACGACACCCGCTACAGC
ACCTTCGCGTGCGAGAATCCGAACAGTACCGCGTGAGCGATTTCCGCACCGCCAATTGCAGCCTC
GAGCACCACCACCACCACCAC