Electronic Supplementary Material (ESI) for Dalton Transactions

ELECTRONIC SUPPORTING INFORMATION

Bioactive Cyclometalated Phthalimides: Design, Synthesis and Kinase Inhibition

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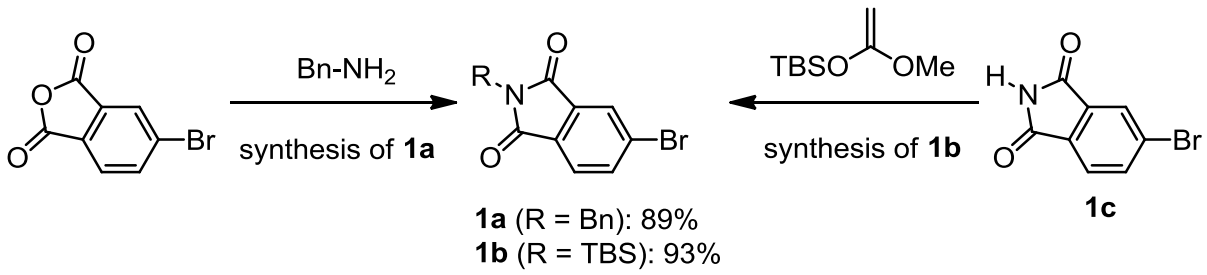
Table of Contents

1. Synthesis of the Phthalimides 1b and 1b



Scheme S1. Synthesis of *N*-(benzyl)-4-bromophthalimide (**1a**) and *N*-(*tert*-butyldimethylsilyl)-4-bromophthalimide (**1b**).

***N*-(Benzyl)-4-bromophthalimide (1a).** 4-Bromo phthalic anhydride[1] (5.00 g, 22.0 mmol) was dissolved in 50 mL glacial acetic acid. Benzylamine (2.40 mL, 22.0 mmol) was added and the solution was heated to 130 °C for 4 h. The hot solution was carefully poured into 200 mL ice-cold water, the resulting solid filtered off, and washed with 100 mL water. *N*-Benzyl-4-bromophthalimide (**1a**) was obtained as beige solid (6.22 g, 89%). ^{1}H-NMR (300 MHz, $CDCl_3$): δ (ppm) 7.97 (dd, *J* = 1.6, 0.3 Hz, 1H), 7.84 (dd, *J* = 7.9, 1.7 Hz, 1H), 7.69-7.72 (m, 1H), 7.40-7.43 (m, 2H), 7.27-7.35 (m, 3H), 4.83 (s, 2H). ^{13}C-NMR (75 MHz, $CDCl_3$): δ (ppm) 167.2, 166.7, 137.0, 136.0, 133.7, 130.6, 128.9, 128.7, 128.6, 128.0, 126.7, 124.7, 41.8. IR (film): ν (cm^{-1}) 3065, 3033, 1772, 1710, 1607, 1430, 1418, 1387, 1345, 1186, 1170, 1102, 1068, 942, 739, 714, 398. HRMS calcd for $C_{15}H_{11}BrNO_2$ $(M+H)^+$ 317.9949, found 317.9950.

***N*-(*tert*-Butyldimethylsilyl)-4-bromophthalimide (1b).** 4-Bromophthalimide (**1c**)[1] (4.00 g, 17.7 mmol) was suspended in 100 mL MeCN, (*tert*-butyldimethylsilyl)-methoxyethene[2] (6.16 mL, 28.3 mmol) was added, and the suspension heated to reflux for 5 h. The solvent was removed and the crude product subjected to silica gel chromatography with CH_2Cl_2. The combined product eluents were dried *in vacuo* and *N*-(*tert*-butyldimethylsilyl)-4-bromophthalimide (**1b**) was obtained as white solid (5.59 g, 93%) ^{1}H-NMR (300 MHz, $CDCl_3$): δ (ppm) 7.93 (d, *J* = 0.9 Hz, 1H), 7.83 (dd, *J* = 8.1, 0.9 Hz, 1H), 7.67 (d, *J* = 8.1 Hz,

1H) 0.97 (s, 9H), 0.51 (s, 6H). ^{13}C-NMR (75 MHz, $CDCl_3$): δ (ppm) 172.8, 172.3, 136.9, 135.7, 132.6, 128.8, 126.4, 124.4, 26.3, 19.0, -4.3. IR (film): ν (cm^{-1}) 2955, 2932, 2857, 1757, 1700, 1599, 1464, 1414, 1331, 1293, 1255, 1167, 1068, 885, 834, 792, 746, 705, 672. HRMS calcd for $C_{14}H_{19}BrNO_2Si$ $(M+H)^+$ 340.0363, found 340.0365.

2. Crystal Structure of *N*-(*tert*-Butyldimethylsilyl)-4-bromophthalimide (1b)

Single crystals of *N*-(*tert*-butyldimethylsilyl)-4-bromophthalimide (**1b**) were obtained by slow evaporation of CH_2Cl_2 at 23 °C. The intensity data set was collected at 100 K using a STOE IPDS2 system. The data was corrected for absorption effects using multi scanned reflections.[3] The structure was solved using direct (SIR2008)[4] and refined using the full matrix least squares procedure implemented in SHELX-97.[5] One of the two independent molecules in the asymmetric unit showed positional disorder of the Br atom. Hydrogen atoms were included at calculated positions.

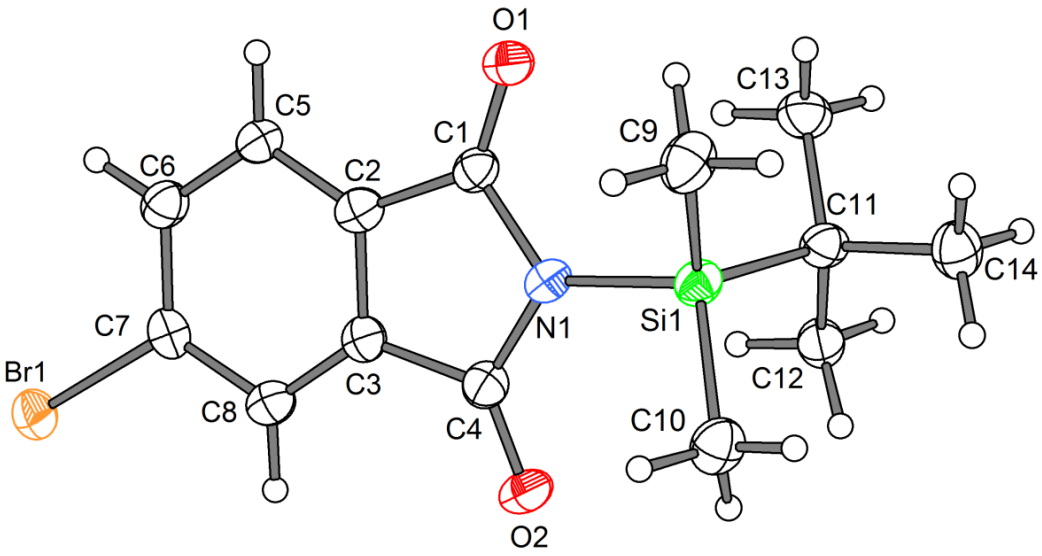


Figure S1. Crystal structure of *N*-(*tert*-butyldimethylsilyl)-4-bromophthalimide (**1b**). ORTEP drawing with 50% probability thermal ellipsoids.

Table S1. Crystallographic data for **1b.**[a]

formula	$C_{14}H_{18}BrNO_2Si$
fw	340.29
a(Å)	16.9037(7)
b(Å)	13.2574(3)
c(Å)	14.3409(6)
α(°)	90
β(°)	108.001(3)
γ(°)	90
V(Å^3)	3056.5(2)
Z	8
space group	$P2_1/c$
d_{calcd}(Mg/m^3)	1.479
μ(mm^{-1})	2.766
θ range(°)	1.27 – 26.74
no. of indep. reflections	6471
no. of parameters	362
wR2 (all data)[b]	0.0752
R1 (I > 2σ(I))[b]	0.0364
CCDC no.[c]	861338

[a] MoKα radiation (λ = 0.71073 Å). [b] $R1 = \Sigma||F_o| - |F_c||/\Sigma|F_o|$; $wR2=[w(F_o^2 - F_c^2)^2/ \Sigma w(F_o^2)^2]^{1/2}$.

[c] Crystallographic data (excluding structure factors) have been deposited in the Cambridge Crystallographic Data Center. A CIF file can be obtained from the CCDC free of charge via http://www.ccdc.cam.ac.uk/data_request/cif.

3. Supplementary Kinase Inhibition Data

The protein kinase selectivity profile of racemic complexes **8b** and **9b** at an assay concentration of 10 μM was derived from an active-site-directed affinity screening against 442 human protein kinases (KINOMEscan, DiscoveRx).[6,7]

Table S2. KINOME*scan* Screening Data for Complex **8b** (DiscoveRx).

Ambit Gene Symbol	Entrez Gene Symbol	Percent Control
AAK1	AAK1	91
ABL1(E255K)-phosphorylated	ABL1	16
ABL1(F317I)-nonphosphorylated	ABL1	100
ABL1(F317I)-phosphorylated	ABL1	71
ABL1(F317L)-nonphosphorylated	ABL1	48
ABL1(F317L)-phosphorylated	ABL1	23
ABL1(H396P)-nonphosphorylated	ABL1	3.3
ABL1(H396P)-phosphorylated	ABL1	27
ABL1(M351T)-phosphorylated	ABL1	28
ABL1(Q252H)-nonphosphorylated	ABL1	13
ABL1(Q252H)-phosphorylated	ABL1	54
ABL1(T315I)-nonphosphorylated	ABL1	3.1
ABL1(T315I)-phosphorylated	ABL1	1.6
ABL1(Y253F)-phosphorylated	ABL1	40
ABL1-nonphosphorylated	ABL1	27
ABL1-phosphorylated	ABL1	35
ABL2	ABL2	67
ACVR1	ACVR1	100
ACVR1B	ACVR1B	95
ACVR2A	ACVR2A	100
ACVR2B	ACVR2B	93
ACVRL1	ACVRL1	100
ADCK3	CABC1	88
ADCK4	ADCK4	90
AKT1	AKT1	0.7
AKT2	AKT2	35
AKT3	AKT3	8.7
ALK	ALK	30
AMPK-alpha1	PRKAA1	1.4
AMPK-alpha2	PRKAA2	7.4
ANKK1	ANKK1	100
ARK5	NUAK1	16
ASK1	MAP3K5	100
ASK2	MAP3K6	63
AURKA	AURKA	23
AURKB	AURKB	16
AURKC	AURKC	31

AXL	AXL	8.3
BIKE	BMP2K	62
BLK	BLK	1.2
BMPR1A	BMPR1A	98
BMPR1B	BMPR1B	100
BMPR2	BMPR2	15
BMX	BMX	76
BRAF	BRAF	100
BRAF(V600E)	BRAF	100
BRK	PTK6	100
BRSK1	BRSK1	100
BRSK2	BRSK2	100
BTK	BTK	0.1
CAMK1	CAMK1	41
CAMK1D	CAMK1D	2.3
CAMK1G	CAMK1G	45
CAMK2A	CAMK2A	30
CAMK2B	CAMK2B	35
CAMK2D	CAMK2D	65
CAMK2G	CAMK2G	43
CAMK4	CAMK4	1.3
CAMKK1	CAMKK1	0.9
CAMKK2	CAMKK2	0.95
CASK	CASK	100
CDC2L1	CDC2L1	100
CDC2L2	CDC2L2	100
CDC2L5	CDC2L5	100
CDK11	CDC2L6	98
CDK2	CDK2	32
CDK3	CDK3	72
CDK4-cyclinD1	CDK4	100
CDK4-cyclinD3	CDK4	99
CDK5	CDK5	100
CDK7	CDK7	7
CDK8	CDK8	100
CDK9	CDK9	100
CDKL1	CDKL1	100
CDKL2	CDKL2	100
CDKL3	CDKL3	100
CDKL5	CDKL5	100
CHEK1	CHEK1	41
CHEK2	CHEK2	2
CIT	CIT	100
CLK1	CLK1	38
CLK2	CLK2	1.4
CLK3	CLK3	5.2
CLK4	CLK4	84
CSF1R	CSF1R	71
CSK	CSK	77
CSNK1A1	CSNK1A1	100
CSNK1A1L	CSNK1A1L	100

CSNK1D	CSNK1D	100
CSNK1E	CSNK1E	92
CSNK1G1	CSNK1G1	100
CSNK1G2	CSNK1G2	100
CSNK1G3	CSNK1G3	100
CSNK2A1	CSNK2A1	98
CSNK2A2	CSNK2A2	80
CTK	MATK	93
DAPK1	DAPK1	61
DAPK2	DAPK2	76
DAPK3	DAPK3	68
DCAMKL1	DCLK1	7.8
DCAMKL2	DCLK2	4
DCAMKL3	DCLK3	25
DDR1	DDR1	53
DDR2	DDR2	53
DLK	MAP3K12	54
DMPK	DMPK	73
DMPK2	CDC42BPG	60
DRAK1	STK17A	100
DRAK2	STK17B	100
DYRK1A	DYRK1A	82
DYRK1B	DYRK1B	82
DYRK2	DYRK2	100
EGFR	EGFR	100
EGFR(E746-A750del)	EGFR	100
EGFR(G719C)	EGFR	100
EGFR(G719S)	EGFR	100
EGFR(L747-E749del, A750P)	EGFR	92
EGFR(L747-S752del, P753S)	EGFR	100
EGFR(L747-T751del,Sins)	EGFR	100
EGFR(L858R)	EGFR	100
EGFR(L858R,T790M)	EGFR	65
EGFR(L861Q)	EGFR	84
EGFR(S752-I759del)	EGFR	100
EGFR(T790M)	EGFR	24
EIF2AK1	EIF2AK1	100
EPHA1	EPHA1	100
EPHA2	EPHA2	93
EPHA3	EPHA3	29
EPHA4	EPHA4	79
EPHA5	EPHA5	94
EPHA6	EPHA6	74
EPHA7	EPHA7	89
EPHA8	EPHA8	65
EPHB1	EPHB1	100
EPHB2	EPHB2	100
EPHB3	EPHB3	84
EPHB4	EPHB4	100
EPHB6	EPHB6	76
ERBB2	ERBB2	84

ERBB3	ERBB3	100
ERBB4	ERBB4	95
ERK1	MAPK3	15
ERK2	MAPK1	19
ERK3	MAPK6	95
ERK4	MAPK4	100
ERK5	MAPK7	2.5
ERK8	MAPK15	49
ERN1	ERN1	64
FAK	PTK2	8.5
FER	FER	2.9
FES	FES	54
FGFR1	FGFR1	12
FGFR2	FGFR2	30
FGFR3	FGFR3	47
FGFR3(G697C)	FGFR3	54
FGFR4	FGFR4	29
FGR	FGR	24
FLT1	FLT1	86
FLT3	FLT3	29
FLT3(D835H)	FLT3	12
FLT3(D835Y)	FLT3	50
FLT3(ITD)	FLT3	44
FLT3(K663Q)	FLT3	12
FLT3(N841I)	FLT3	2.7
FLT3(R834Q)	FLT3	18
FLT4	FLT4	66
FRK	FRK	36
FYN	FYN	23
GAK	GAK	5.6
GCN2(Kin.Dom.2,S808G)	EIF2AK4	98
GRK1	GRK1	1.6
GRK4	GRK4	100
GRK7	GRK7	1
GSK3A	GSK3A	3.6
GSK3B	GSK3B	1.2
HCK	HCK	22
HIPK1	HIPK1	88
HIPK2	HIPK2	45
HIPK3	HIPK3	65
HIPK4	HIPK4	100
HPK1	MAP4K1	38
HUNK	HUNK	100
ICK	ICK	4.9
IGF1R	IGF1R	16
IKK-alpha	CHUK	100
IKK-beta	IKBKB	100
IKK-epsilon	IKBKE	100
INSR	INSR	11
INSRR	INSRR	26
IRAK1	IRAK1	78

IRAK3	IRAK3	51
IRAK4	IRAK4	1.3
ITK	ITK	14
JAK1(JH1domain-catalytic)	JAK1	95
JAK1(JH2domain-pseudokinase)	JAK1	73
JAK2(JH1domain-catalytic)	JAK2	31
JAK3(JH1domain-catalytic)	JAK3	4.8
JNK1	MAPK8	100
JNK2	MAPK9	100
JNK3	MAPK10	75
KIT	KIT	64
KIT(A829P)	KIT	63
KIT(D816H)	KIT	92
KIT(D816V)	KIT	73
KIT(L576P)	KIT	42
KIT(V559D)	KIT	62
KIT(V559D,T670I)	KIT	87
KIT(V559D,V654A)	KIT	87
LATS1	LATS1	74
LATS2	LATS2	7.4
LCK	LCK	3.8
LIMK1	LIMK1	92
LIMK2	LIMK2	100
LKB1	STK11	81
LOK	STK10	65
LRRK2	LRRK2	100
LRRK2(G2019S)	LRRK2	78
LTK	LTK	5.8
LYN	LYN	49
LZK	MAP3K13	46
MAK	MAK	100
MAP3K1	MAP3K1	71
MAP3K15	MAP3K15	100
MAP3K2	MAP3K2	28
MAP3K3	MAP3K3	17
MAP3K4	MAP3K4	100
MAP4K2	MAP4K2	100
MAP4K3	MAP4K3	0.85
MAP4K4	MAP4K4	76
MAP4K5	MAP4K5	9
MAPKAPK2	MAPKAPK2	100
MAPKAPK5	MAPKAPK5	100
MARK1	MARK1	42
MARK2	MARK2	4.8
MARK3	MARK3	24
MARK4	MARK4	47
MAST1	MAST1	81
MEK1	MAP2K1	5.2
MEK2	MAP2K2	10
MEK3	MAP2K3	0
MEK4	MAP2K4	5.8

MEK5	MAP2K5	5.8
MEK6	MAP2K6	85
MELK	MELK	100
MERTK	MERTK	5.4
MET	MET	33
MET(M1250T)	MET	16
MET(Y1235D)	MET	31
MINK	MINK1	12
MKK7	MAP2K7	14
MKNK1	MKNK1	100
MKNK2	MKNK2	0.6
MLCK	MYLK3	99
MLK1	MAP3K9	29
MLK2	MAP3K10	66
MLK3	MAP3K11	26
MRCKA	CDC42BPA	78
MRCKB	CDC42BPB	46
MST1	STK4	4.9
MST1R	MST1R	64
MST2	STK3	50
MST3	STK24	3
MST4	MST4	0.2
MTOR	FRAP1	100
MUSK	MUSK	100
MYLK	MYLK	15
MYLK2	MYLK2	100
MYLK4	MYLK4	85
MYO3A	MYO3A	2.1
MYO3B	MYO3B	23
NDR1	STK38	7.8
NDR2	STK38L	14
NEK1	NEK1	74
NEK11	NEK11	100
NEK2	NEK2	63
NEK3	NEK3	56
NEK4	NEK4	100
NEK5	NEK5	95
NEK6	NEK6	100
NEK7	NEK7	100
NEK9	NEK9	100
NIM1	MGC42105	100
NLK	NLK	77
OSR1	OXSR1	30
p38-alpha	MAPK14	99
p38-beta	MAPK11	72
p38-delta	MAPK13	54
p38-gamma	MAPK12	70
PAK1	PAK1	0.8
PAK2	PAK2	12
PAK3	PAK3	25
PAK4	PAK4	14

PAK6	PAK6	13
PAK7	PAK7	0.55
PCTK1	PCTK1	17
PCTK2	PCTK2	52
PCTK3	PCTK3	100
PDGFRA	PDGFRA	79
PDGFRB	PDGFRB	39
PDPK1	PDPK1	62
PFCDPK1(P.falciparum)	PFB0815w	100
PFPK5(P.falciparum)	MAL13P1.279	37
PFTAIRE2	PFTK2	4.4
PFTK1	PFTK1	39
PHKG1	PHKG1	75
PHKG2	PHKG2	7.8
PIK3C2B	PIK3C2B	100
PIK3C2G	PIK3C2G	100
PIK3CA	PIK3CA	100
PIK3CA(C420R)	PIK3CA	100
PIK3CA(E542K)	PIK3CA	97
PIK3CA(E545A)	PIK3CA	88
PIK3CA(E545K)	PIK3CA	100
PIK3CA(H1047L)	PIK3CA	100
PIK3CA(H1047Y)	PIK3CA	100
PIK3CA(I800L)	PIK3CA	73
PIK3CA(M1043I)	PIK3CA	100
PIK3CA(Q546K)	PIK3CA	100
PIK3CB	PIK3CB	84
PIK3CD	PIK3CD	93
PIK3CG	PIK3CG	77
PIK4CB	PI4KB	4.7
PIM1	PIM1	22
PIM2	PIM2	79
PIM3	PIM3	39
PIP5K1A	PIP5K1A	100
PIP5K1C	PIP5K1C	49
PIP5K2B	PIP4K2B	100
PIP5K2C	PIP4K2C	100
PKAC-alpha	PRKACA	1.4
PKAC-beta	PRKACB	2
PKMYT1	PKMYT1	58
PKN1	PKN1	4.3
PKN2	PKN2	35
PKNB(M.tuberculosis)	pknB	38
PLK1	PLK1	97
PLK2	PLK2	100
PLK3	PLK3	72
PLK4	PLK4	0.95
PRKCD	PRKCD	85
PRKCE	PRKCE	4.4
PRKCH	PRKCH	40
PRKCI	PRKCI	31

PRKCQ	PRKCQ	1
PRKD1	PRKD1	58
PRKD2	PRKD2	67
PRKD3	PRKD3	25
PRKG1	PRKG1	53
PRKG2	PRKG2	100
PRKR	EIF2AK2	58
PRKX	PRKX	21
PRP4	PRPF4B	100
PYK2	PTK2B	32
QSK	KIAA0999	100
RAF1	RAF1	77
RET	RET	2.4
RET(M918T)	RET	2
RET(V804L)	RET	4.8
RET(V804M)	RET	6.9
RIOK1	RIOK1	65
RIOK2	RIOK2	100
RIOK3	RIOK3	98
RIPK1	RIPK1	100
RIPK2	RIPK2	100
RIPK4	RIPK4	100
RIPK5	DSTKY	5.4
ROCK1	ROCK1	1.4
ROCK2	ROCK2	3.6
ROS1	ROS1	90
RPS6KA4(Kin.Dom.1-N-terminal)	RPS6KA4	2.8
RPS6KA4(Kin.Dom.2-C-terminal)	RPS6KA4	100
RPS6KA5(Kin.Dom.1-N-terminal)	RPS6KA5	17
RPS6KA5(Kin.Dom.2-C-terminal)	RPS6KA5	100
RSK1(Kin.Dom.1-N-terminal)	RPS6KA1	7.2
RSK1(Kin.Dom.2-C-terminal)	RPS6KA1	3.9
RSK2(Kin.Dom.1-N-terminal)	RPS6KA3	0.3
RSK3(Kin.Dom.1-N-terminal)	RPS6KA2	4.4
RSK3(Kin.Dom.2-C-terminal)	RPS6KA2	51
RSK4(Kin.Dom.1-N-terminal)	RPS6KA6	3
RSK4(Kin.Dom.2-C-terminal)	RPS6KA6	14
S6K1	RPS6KB1	11
SBK1	SBK1	100
SgK110		100
SGK3	SGK3	44
SIK	SIK1	29
SIK2	SIK2	66
SLK	SLK	34
SNARK	NUAK2	13
SNRK	SNRK	100
SRC	SRC	2
SRMS	SRMS	60
SRPK1	SRPK1	100
SRPK2	SRPK2	100
SRPK3	SRPK3	100

STK16	STK16	60
STK33	STK33	9
STK35	STK35	36
STK36	STK36	84
STK39	STK39	98
SYK	SYK	100
TAK1	MAP3K7	69
TAOK1	TAOK1	11
TAOK2	TAOK2	76
TAOK3	TAOK3	60
TBK1	TBK1	45
TEC	TEC	19
TESK1	TESK1	100
TGFBR1	TGFBR1	100
TGFBR2	TGFBR2	100
TIE1	TIE1	46
TIE2	TEK	51
TLK1	TLK1	31
TLK2	TLK2	81
TNIK	TNIK	12
TNK1	TNK1	56
TNK2	TNK2	50
TNNI3K	TNNI3K	86
TRKA	NTRK1	0.25
TRKB	NTRK2	1.4
TRKC	NTRK3	2.3
TRPM6	TRPM6	75
TSSK1B	TSSK1B	100
TTK	TTK	64
TXK	TXK	90
TYK2(JH1domain-catalytic)	TYK2	9.4
TYK2(JH2domain-pseudokinase)	TYK2	100
TYRO3	TYRO3	84
ULK1	ULK1	11
ULK2	ULK2	4.3
ULK3	ULK3	0.3
VEGFR2	KDR	69
VRK2	VRK2	0.75
WEE1	WEE1	100
WEE2	WEE2	67
YANK1	STK32A	21
YANK2	STK32B	44
YANK3	STK32C	65
YES	YES1	13
YSK1	STK25	28
YSK4	YSK4	52
ZAK	ZAK	100
ZAP70	ZAP70	85

Table S3. KINOME*scan* Screening Data for Complex **9b** (DiscoveRx).

Ambit Gene Symbol	Entrez Gene Symbol	Percent Control
AAK1	AAK1	79
ABL1(E255K)-phosphorylated	ABL1	100
ABL1(F317I)-nonphosphorylated	ABL1	100
ABL1(F317I)-phosphorylated	ABL1	100
ABL1(F317L)-nonphosphorylated	ABL1	100
ABL1(F317L)-phosphorylated	ABL1	100
ABL1(H396P)-nonphosphorylated	ABL1	100
ABL1(H396P)-phosphorylated	ABL1	100
ABL1(M351T)-phosphorylated	ABL1	100
ABL1(Q252H)-nonphosphorylated	ABL1	100
ABL1(Q252H)-phosphorylated	ABL1	100
ABL1(T315I)-nonphosphorylated	ABL1	100
ABL1(T315I)-phosphorylated	ABL1	71
ABL1(Y253F)-phosphorylated	ABL1	90
ABL1-nonphosphorylated	ABL1	100
ABL1-phosphorylated	ABL1	100
ABL2	ABL2	100
ACVR1	ACVR1	100
ACVR1B	ACVR1B	91
ACVR2A	ACVR2A	100
ACVR2B	ACVR2B	100
ACVRL1	ACVRL1	100
ADCK3	CABC1	56
ADCK4	ADCK4	95
AKT1	AKT1	3.9
AKT2	AKT2	65
AKT3	AKT3	11
ALK	ALK	21
AMPK-alpha1	PRKAA1	26
AMPK-alpha2	PRKAA2	55
ANKK1	ANKK1	100
ARK5	NUAK1	27
ASK1	MAP3K5	100
ASK2	MAP3K6	100
AURKA	AURKA	100
AURKB	AURKB	57
AURKC	AURKC	56
AXL	AXL	11
BIKE	BMP2K	60
BLK	BLK	43
BMPR1A	BMPR1A	79
BMPR1B	BMPR1B	100
BMPR2	BMPR2	63
BMX	BMX	92
BRAF	BRAF	63

BRAF(V600E)	BRAF	50
BRK	PTK6	66
BRSK1	BRSK1	70
BRSK2	BRSK2	90
BTK	BTK	76
CAMK1	CAMK1	62
CAMK1D	CAMK1D	11
CAMK1G	CAMK1G	66
CAMK2A	CAMK2A	59
CAMK2B	CAMK2B	67
CAMK2D	CAMK2D	76
CAMK2G	CAMK2G	86
CAMK4	CAMK4	1
CAMKK1	CAMKK1	39
CAMKK2	CAMKK2	48
CASK	CASK	100
CDC2L1	CDC2L1	100
CDC2L2	CDC2L2	100
CDC2L5	CDC2L5	100
CDK11	CDC2L6	100
CDK2	CDK2	48
CDK3	CDK3	42
CDK4-cyclinD1	CDK4	84
CDK4-cyclinD3	CDK4	90
CDK5	CDK5	76
CDK7	CDK7	18
CDK8	CDK8	100
CDK9	CDK9	92
CDKL1	CDKL1	100
CDKL2	CDKL2	74
CDKL3	CDKL3	100
CDKL5	CDKL5	96
CHEK1	CHEK1	15
CHEK2	CHEK2	76
CIT	CIT	95
CLK1	CLK1	4.5
CLK2	CLK2	1.4
CLK3	CLK3	3.4
CLK4	CLK4	11
CSF1R	CSF1R	57
CSK	CSK	89
CSNK1A1	CSNK1A1	19
CSNK1A1L	CSNK1A1L	31
CSNK1D	CSNK1D	9.3
CSNK1E	CSNK1E	5.4
CSNK1G1	CSNK1G1	74
CSNK1G2	CSNK1G2	56
CSNK1G3	CSNK1G3	84
CSNK2A1	CSNK2A1	83
CSNK2A2	CSNK2A2	44
CTK	MATK	86

DAPK1	DAPK1	20
DAPK2	DAPK2	50
DAPK3	DAPK3	18
DCAMKL1	DCLK1	14
DCAMKL2	DCLK2	19
DCAMKL3	DCLK3	1.4
DDR1	DDR1	94
DDR2	DDR2	75
DLK	MAP3K12	52
DMPK	DMPK	47
DMPK2	CDC42BPG	66
DRAK1	STK17A	100
DRAK2	STK17B	100
DYRK1A	DYRK1A	7
DYRK1B	DYRK1B	12
DYRK2	DYRK2	61
EGFR	EGFR	100
EGFR(E746-A750del)	EGFR	100
EGFR(G719C)	EGFR	97
EGFR(G719S)	EGFR	100
EGFR(L747-E749del, A750P)	EGFR	72
EGFR(L747-S752del, P753S)	EGFR	90
EGFR(L747-T751del,Sins)	EGFR	88
EGFR(L858R)	EGFR	100
EGFR(L858R,T790M)	EGFR	94
EGFR(L861Q)	EGFR	92
EGFR(S752-I759del)	EGFR	100
EGFR(T790M)	EGFR	41
EIF2AK1	EIF2AK1	100
EPHA1	EPHA1	63
EPHA2	EPHA2	100
EPHA3	EPHA3	63
EPHA4	EPHA4	88
EPHA5	EPHA5	90
EPHA6	EPHA6	85
EPHA7	EPHA7	96
EPHA8	EPHA8	96
EPHB1	EPHB1	84
EPHB2	EPHB2	100
EPHB3	EPHB3	89
EPHB4	EPHB4	97
EPHB6	EPHB6	100
ERBB2	ERBB2	53
ERBB3	ERBB3	100
ERBB4	ERBB4	82
ERK1	MAPK3	98
ERK2	MAPK1	100
ERK3	MAPK6	69
ERK4	MAPK4	100
ERK5	MAPK7	4.6
ERK8	MAPK15	0.85

ERN1	ERN1	99
FAK	PTK2	67
FER	FER	46
FES	FES	88
FGFR1	FGFR1	32
FGFR2	FGFR2	56
FGFR3	FGFR3	69
FGFR3(G697C)	FGFR3	69
FGFR4	FGFR4	79
FGR	FGR	61
FLT1	FLT1	100
FLT3	FLT3	16
FLT3(D835H)	FLT3	3.7
FLT3(D835Y)	FLT3	11
FLT3(ITD)	FLT3	25
FLT3(K663Q)	FLT3	6
FLT3(N841I)	FLT3	0.45
FLT3(R834Q)	FLT3	16
FLT4	FLT4	54
FRK	FRK	74
FYN	FYN	71
GAK	GAK	64
GCN2(Kin.Dom.2,S808G)	EIF2AK4	78
GRK1	GRK1	6.1
GRK4	GRK4	100
GRK7	GRK7	1.7
GSK3A	GSK3A	0.2
GSK3B	GSK3B	0.35
HCK	HCK	60
HIPK1	HIPK1	49
HIPK2	HIPK2	14
HIPK3	HIPK3	9.6
HIPK4	HIPK4	90
HPK1	MAP4K1	61
HUNK	HUNK	100
ICK	ICK	21
IGF1R	IGF1R	60
IKK-alpha	CHUK	100
IKK-beta	IKBKB	100
IKK-epsilon	IKBKE	100
INSR	INSR	59
INSRR	INSRR	65
IRAK1	IRAK1	65
IRAK3	IRAK3	44
IRAK4	IRAK4	25
ITK	ITK	56
JAK1(JH1domain-catalytic)	JAK1	76
JAK1(JH2domain-pseudokinase)	JAK1	86
JAK2(JH1domain-catalytic)	JAK2	52
JAK3(JH1domain-catalytic)	JAK3	17
JNK1	MAPK8	100

JNK2	MAPK9	91
JNK3	MAPK10	67
KIT	KIT	69
KIT(A829P)	KIT	62
KIT(D816H)	KIT	57
KIT(D816V)	KIT	33
KIT(L576P)	KIT	56
KIT(V559D)	KIT	65
KIT(V559D,T670I)	KIT	63
KIT(V559D,V654A)	KIT	88
LATS1	LATS1	79
LATS2	LATS2	20
LCK	LCK	82
LIMK1	LIMK1	100
LIMK2	LIMK2	100
LKB1	STK11	75
LOK	STK10	59
LRRK2	LRRK2	100
LRRK2(G2019S)	LRRK2	100
LTK	LTK	44
LYN	LYN	92
LZK	MAP3K13	100
MAK	MAK	100
MAP3K1	MAP3K1	86
MAP3K15	MAP3K15	100
MAP3K2	MAP3K2	42
MAP3K3	MAP3K3	26
MAP3K4	MAP3K4	100
MAP4K2	MAP4K2	100
MAP4K3	MAP4K3	7.6
MAP4K4	MAP4K4	78
MAP4K5	MAP4K5	56
MAPKAPK2	MAPKAPK2	100
MAPKAPK5	MAPKAPK5	100
MARK1	MARK1	98
MARK2	MARK2	36
MARK3	MARK3	56
MARK4	MARK4	90
MAST1	MAST1	100
MEK1	MAP2K1	85
MEK2	MAP2K2	81
MEK3	MAP2K3	1.7
MEK4	MAP2K4	100
MEK5	MAP2K5	91
MEK6	MAP2K6	82
MELK	MELK	78
MERTK	MERTK	5.4
MET	MET	56
MET(M1250T)	MET	27
MET(Y1235D)	MET	54
MINK	MINK1	72

MKK7	MAP2K7	83
MKNK1	MKNK1	97
MKNK2	MKNK2	85
MLCK	MYLK3	100
MLK1	MAP3K9	62
MLK2	MAP3K10	84
MLK3	MAP3K11	58
MRCKA	CDC42BPA	96
MRCKB	CDC42BPB	61
MST1	STK4	14
MST1R	MST1R	80
MST2	STK3	22
MST3	STK24	79
MST4	MST4	3.4
MTOR	FRAP1	100
MUSK	MUSK	100
MYLK	MYLK	3.1
MYLK2	MYLK2	90
MYLK4	MYLK4	90
MYO3A	MYO3A	70
MYO3B	MYO3B	93
NDR1	STK38	14
NDR2	STK38L	18
NEK1	NEK1	71
NEK11	NEK11	100
NEK2	NEK2	68
NEK3	NEK3	79
NEK4	NEK4	100
NEK5	NEK5	100
NEK6	NEK6	100
NEK7	NEK7	100
NEK9	NEK9	99
NIM1	MGC42105	100
NLK	NLK	61
OSR1	OXSR1	76
p38-alpha	MAPK14	100
p38-beta	MAPK11	76
p38-delta	MAPK13	81
p38-gamma	MAPK12	100
PAK1	PAK1	34
PAK2	PAK2	18
PAK3	PAK3	34
PAK4	PAK4	48
PAK6	PAK6	54
PAK7	PAK7	29
PCTK1	PCTK1	94
PCTK2	PCTK2	98
PCTK3	PCTK3	100
PDGFRA	PDGFRA	80
PDGFRB	PDGFRB	17
PDPK1	PDPK1	84

PFCDPK1(P.falciparum)	PFB0815w	100
PFPK5(P.falciparum)	MAL13P1.279	73
PFTAIRE2	PFTK2	43
PFTK1	PFTK1	100
PHKG1	PHKG1	79
PHKG2	PHKG2	33
PIK3C2B	PIK3C2B	100
PIK3C2G	PIK3C2G	100
PIK3CA	PIK3CA	100
PIK3CA(C420R)	PIK3CA	100
PIK3CA(E542K)	PIK3CA	100
PIK3CA(E545A)	PIK3CA	98
PIK3CA(E545K)	PIK3CA	100
PIK3CA(H1047L)	PIK3CA	100
PIK3CA(H1047Y)	PIK3CA	100
PIK3CA(I800L)	PIK3CA	91
PIK3CA(M1043I)	PIK3CA	100
PIK3CA(Q546K)	PIK3CA	100
PIK3CB	PIK3CB	58
PIK3CD	PIK3CD	80
PIK3CG	PIK3CG	96
PIK4CB	PI4KB	100
PIM1	PIM1	1.6
PIM2	PIM2	4.8
PIM3	PIM3	2
PIP5K1A	PIP5K1A	73
PIP5K1C	PIP5K1C	16
PIP5K2B	PIP4K2B	100
PIP5K2C	PIP4K2C	100
PKAC-alpha	PRKACA	12
PKAC-beta	PRKACB	11
PKMYT1	PKMYT1	66
PKN1	PKN1	3
PKN2	PKN2	11
PKNB(M.tuberculosis)	pknB	16
PLK1	PLK1	95
PLK2	PLK2	100
PLK3	PLK3	100
PLK4	PLK4	47
PRKCD	PRKCD	2.2
PRKCE	PRKCE	17
PRKCH	PRKCH	6
PRKCI	PRKCI	57
PRKCQ	PRKCQ	2.4
PRKD1	PRKD1	54
PRKD2	PRKD2	65
PRKD3	PRKD3	29
PRKG1	PRKG1	62
PRKG2	PRKG2	16
PRKR	EIF2AK2	28
PRKX	PRKX	54

PRP4	PRPF4B	100
PYK2	PTK2B	74
QSK	KIAA0999	100
RAF1	RAF1	94
RET	RET	5.4
RET(M918T)	RET	1.9
RET(V804L)	RET	10
RET(V804M)	RET	12
RIOK1	RIOK1	100
RIOK2	RIOK2	87
RIOK3	RIOK3	100
RIPK1	RIPK1	100
RIPK2	RIPK2	100
RIPK4	RIPK4	100
RIPK5	DSTKY	77
ROCK1	ROCK1	1.1
ROCK2	ROCK2	8.4
ROS1	ROS1	40
RPS6KA4(Kin.Dom.1-N-terminal)	RPS6KA4	12
RPS6KA4(Kin.Dom.2-C-terminal)	RPS6KA4	100
RPS6KA5(Kin.Dom.1-N-terminal)	RPS6KA5	36
RPS6KA5(Kin.Dom.2-C-terminal)	RPS6KA5	100
RSK1(Kin.Dom.1-N-terminal)	RPS6KA1	29
RSK1(Kin.Dom.2-C-terminal)	RPS6KA1	62
RSK2(Kin.Dom.1-N-terminal)	RPS6KA3	2.6
RSK3(Kin.Dom.1-N-terminal)	RPS6KA2	18
RSK3(Kin.Dom.2-C-terminal)	RPS6KA2	89
RSK4(Kin.Dom.1-N-terminal)	RPS6KA6	4.4
RSK4(Kin.Dom.2-C-terminal)	RPS6KA6	34
S6K1	RPS6KB1	25
SBK1	SBK1	84
SgK110		100
SGK3	SGK3	58
SIK	SIK1	93
SIK2	SIK2	70
SLK	SLK	42
SNARK	NUAK2	16
SNRK	SNRK	100
SRC	SRC	70
SRMS	SRMS	85
SRPK1	SRPK1	100
SRPK2	SRPK2	93
SRPK3	SRPK3	100
STK16	STK16	57
STK33	STK33	11
STK35	STK35	62
STK36	STK36	89
STK39	STK39	100
SYK	SYK	92
TAK1	MAP3K7	35
TAOK1	TAOK1	5.8

TAOK2	TAOK2	40
TAOK3	TAOK3	10
TBK1	TBK1	100
TEC	TEC	100
TESK1	TESK1	100
TGFBR1	TGFBR1	100
TGFBR2	TGFBR2	100
TIE1	TIE1	63
TIE2	TEK	92
TLK1	TLK1	41
TLK2	TLK2	91
TNIK	TNIK	65
TNK1	TNK1	52
TNK2	TNK2	100
TNNI3K	TNNI3K	79
TRKA	NTRK1	26
TRKB	NTRK2	18
TRKC	NTRK3	36
TRPM6	TRPM6	82
TSSK1B	TSSK1B	100
TTK	TTK	72
TXK	TXK	100
TYK2(JH1domain-catalytic)	TYK2	93
TYK2(JH2domain-pseudokinase)	TYK2	100
TYRO3	TYRO3	92
ULK1	ULK1	0.2
ULK2	ULK2	7
ULK3	ULK3	100
VEGFR2	KDR	75
VRK2	VRK2	9.5
WEE1	WEE1	100
WEE2	WEE2	85
YANK1	STK32A	43
YANK2	STK32B	68
YANK3	STK32C	92
YES	YES1	52
YSK1	STK25	43
YSK4	YSK4	0.2
ZAK	ZAK	100
ZAP70	ZAP70	100

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