



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 06:40 PM GMT

PDB ID : 1BYG  
Title : KINASE DOMAIN OF HUMAN C-TERMINAL SRC KINASE (CSK) IN  
COMPLEX WITH INHIBITOR STAUROSPORINE  
Authors : Antson, A.A.; Lamers, M.B.A.C.; Scott, R.K.; Williams, D.H.; Hubbard, R.E.  
Deposited on : 1998-10-14  
Resolution : 2.40 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.  
We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

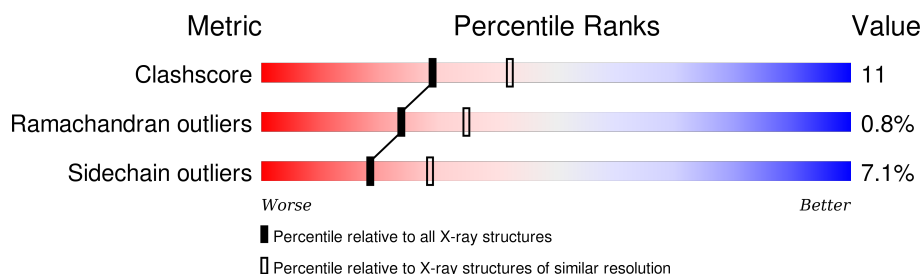
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	102246	3407 (2.40-2.40)
Ramachandran outliers	100387	3351 (2.40-2.40)
Sidechain outliers	100360	3352 (2.40-2.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	278	

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 2140 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

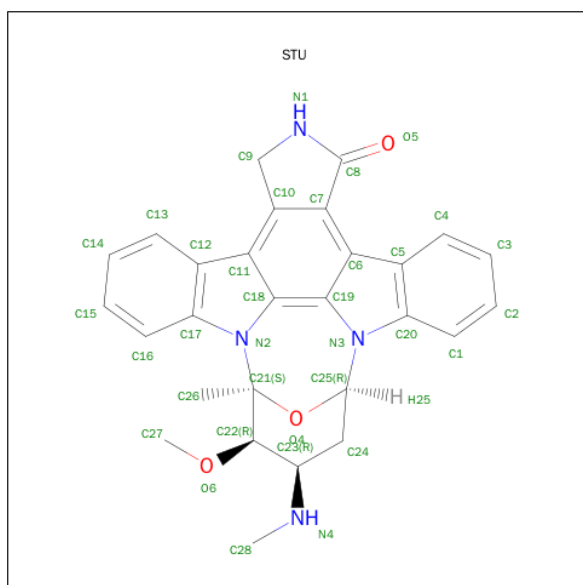
- Molecule 1 is a protein called PROTEIN (C-TERMINAL SRC KINASE).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	246	1953	1254	333	353	13	48	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	174	GLY	GLU	CONFLICT	UNP P41240
A	176	SER	THR	CONFLICT	UNP P41240

- Molecule 2 is STAUROSPORINE (three-letter code: STU) (formula:  $C_{28}H_{26}N_4O_3$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	35	28	4	3	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	152	Total 152	O 152	0	0



Note EDS was not executed.

- Chain A:
- 
- 58% 24% 5% 12%

## 4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section will therefore be incomplete.

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	44.49 Å   120.58 Å   48.29 Å 90.00°   90.00°   90.00°	Depositor
Resolution (Å)	20.00 – 2.40	Depositor
% Data completeness (in resolution range)	93.6 (20.00-2.40)	Depositor
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.199 , 0.287	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2140	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	45.0	wwPDB-VP

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: STU

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	1.17	12/1992 (0.6%)	1.87	35/2687 (1.3%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	1	1

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	284	SER	CB-OG	-18.74	1.17	1.42
1	A	240	MET	CG-SD	-17.03	1.36	1.81
1	A	293	LYS	CG-CD	14.96	2.03	1.52
1	A	239	VAL	CA-CB	-14.48	1.24	1.54
1	A	255	ILE	CB-CG1	-12.27	1.19	1.54
1	A	236	GLU	CG-CD	-11.27	1.35	1.51
1	A	187	GLY	CA-C	-10.81	1.34	1.51
1	A	196	LYS	CE-NZ	-10.29	1.23	1.49
1	A	448	LEU	CA-CB	8.40	1.73	1.53
1	A	206	PHE	CB-CG	6.88	1.63	1.51
1	A	393	LYS	CB-CG	6.46	1.70	1.52
1	A	196	LYS	CD-CE	-5.56	1.37	1.51

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	448	LEU	CB-CA-C	-24.61	63.44	110.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	187	GLY	CA-C-O	-19.95	84.68	120.60
1	A	384	ARG	NE-CZ-NH2	17.36	128.98	120.30
1	A	187	GLY	CA-C-N	15.99	152.39	117.20
1	A	283	ARG	CB-CG-CD	15.51	151.91	111.60
1	A	430	ARG	NE-CZ-NH1	11.70	126.15	120.30
1	A	276	ASP	CB-CG-OD2	-11.64	107.82	118.30
1	A	196	LYS	CD-CE-NZ	11.55	138.26	111.70
1	A	318	ARG	NE-CZ-NH1	9.40	125.00	120.30
1	A	437	ARG	NE-CZ-NH2	-9.14	115.73	120.30
1	A	384	ARG	NE-CZ-NH1	-8.53	116.04	120.30
1	A	244	ARG	NE-CZ-NH1	7.83	124.22	120.30
1	A	394	ASP	CB-CG-OD1	7.82	125.34	118.30
1	A	244	ARG	NE-CZ-NH2	-7.75	116.42	120.30
1	A	255	ILE	CG1-CB-CG2	7.56	128.03	111.40
1	A	187	GLY	N-CA-C	-7.43	94.51	113.10
1	A	206	PHE	CA-CB-CG	-7.42	96.10	113.90
1	A	255	ILE	CB-CG1-CD1	-7.20	93.75	113.90
1	A	267	GLU	CA-CB-CG	7.08	128.97	113.40
1	A	283	ARG	CG-CD-NE	-6.55	98.04	111.80
1	A	426	ASP	CB-CG-OD1	6.40	124.06	118.30
1	A	430	ARG	NE-CZ-NH2	-6.24	117.18	120.30
1	A	255	ILE	CA-CB-CG1	6.18	122.73	111.00
1	A	313	ARG	NE-CZ-NH2	-6.11	117.25	120.30
1	A	387	TYR	CB-CG-CD2	6.10	124.66	121.00
1	A	293	LYS	CB-CG-CD	-6.09	95.77	111.60
1	A	215	ARG	NE-CZ-NH2	-5.52	117.54	120.30
1	A	279	ARG	NE-CZ-NH1	-5.50	117.55	120.30
1	A	389	ARG	CA-CB-CG	5.48	125.45	113.40
1	A	335	LEU	CB-CG-CD2	5.43	120.24	111.00
1	A	208	ASP	CB-CG-OD2	-5.40	113.44	118.30
1	A	398	ARG	NE-CZ-NH2	5.38	122.99	120.30
1	A	417	GLU	OE1-CD-OE2	-5.33	116.90	123.30
1	A	350	VAL	CG1-CB-CG2	5.27	119.33	110.90
1	A	284	SER	CA-CB-OG	5.22	125.29	111.20

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	A	255	ILE	CB

All (1) planarity outliers are listed below:



Mol	Chain	Res	Type	Group
1	A	312	HIS	Mainchain

## 5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1953	0	1970	43	0
2	A	35	0	26	2	0
3	A	152	0	0	3	0
All	All	2140	0	1996	44	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 11.

All (44) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:224:ILE:HD12	1:A:262:LEU:HB2	1.51	0.91
1:A:211:LEU:HD21	1:A:218:LYS:HE2	1.52	0.89
1:A:194:GLU:OE2	1:A:215:ARG:HD2	1.86	0.74
1:A:203:LYS:HB3	1:A:208:ASP:OD1	1.92	0.69
1:A:255:ILE:HB	1:A:263:TYR:HB2	1.79	0.64
1:A:396:VAL:O	1:A:400:GLU:HG3	1.97	0.64
1:A:249:VAL:HB	3:A:110:HOH:O	2.00	0.61
1:A:190:LEU:HG	1:A:253:GLY:HA3	1.83	0.61
1:A:234:LEU:HD21	1:A:256:VAL:HG23	1.82	0.59
1:A:190:LEU:HD13	1:A:214:TYR:CZ	2.41	0.56
1:A:237:ALA:O	1:A:241:THR:N	2.34	0.56
1:A:203:LYS:HA	1:A:208:ASP:HA	1.87	0.56
1:A:252:LEU:HB2	1:A:265:VAL:HG12	1.88	0.55
1:A:223:CYS:SG	1:A:263:TYR:HE1	2.30	0.55
1:A:256:VAL:HA	1:A:262:LEU:HD23	1.88	0.55
2:A:501:STU:H261	2:A:501:STU:H16	1.88	0.55
1:A:218:LYS:HE3	3:A:60:HOH:O	2.07	0.53
1:A:356:GLU:O	1:A:360:GLU:HB2	2.08	0.53
1:A:230:ALA:O	1:A:234:LEU:HB2	2.09	0.52
1:A:194:GLU:OE2	1:A:215:ARG:NH1	2.42	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:394:ASP:O	1:A:398:ARG:HG3	2.11	0.51
1:A:211:LEU:HD13	1:A:268:TYR:CE1	2.46	0.51
1:A:353:THR:HB	1:A:358:LEU:HD21	1.94	0.50
1:A:443:ILE:HA	1:A:447:GLU:OE1	2.11	0.50
1:A:242:GLN:HA	1:A:244:ARG:NH2	2.26	0.49
1:A:234:LEU:HD22	1:A:262:LEU:HD21	1.93	0.48
1:A:190:LEU:HD13	1:A:214:TYR:CE1	2.49	0.48
1:A:239:VAL:O	1:A:242:GLN:HB3	2.14	0.48
1:A:251:LEU:HD11	1:A:253:GLY:O	2.14	0.47
1:A:253:GLY:O	1:A:254:VAL:HG23	2.14	0.47
1:A:191:ASN:OD1	1:A:193:LYS:HG3	2.14	0.47
1:A:396:VAL:HB	1:A:397:PRO:HD3	1.97	0.46
1:A:437:ARG:O	1:A:441:GLU:HG2	2.15	0.46
1:A:298:VAL:HG11	1:A:375:LEU:CD2	2.46	0.45
1:A:222:LYS:HB3	1:A:264:ILE:HB	1.98	0.45
1:A:394:ASP:OD2	1:A:398:ARG:NH2	2.48	0.44
1:A:321:LEU:HD21	2:A:501:STU:H271	2.00	0.43
1:A:308:ASN:O	1:A:309:ASN:HB2	2.19	0.42
1:A:255:ILE:CB	1:A:263:TYR:HB2	2.49	0.42
1:A:388:PRO:HD2	3:A:1:HOH:O	2.19	0.42
1:A:270:ALA:HB3	1:A:324:GLU:HB2	2.01	0.41
1:A:226:ASN:ND2	1:A:226:ASN:H	2.18	0.41
1:A:225:LYS:HB2	1:A:225:LYS:HE3	1.95	0.41
1:A:294:PHE:O	1:A:298:VAL:HG23	2.21	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	238/278 (86%)	219 (92%)	17 (7%)	2 (1%)	24 35

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	215	ARG
1	A	395	VAL

### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	211/235 (90%)	196 (93%)	15 (7%)	18	28

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	194	GLU
1	A	203	LYS
1	A	226	ASN
1	A	231	GLN
1	A	236	GLU
1	A	238	SER
1	A	239	VAL
1	A	241	THR
1	A	255	ILE
1	A	273	SER
1	A	283	ARG
1	A	284	SER
1	A	335	LEU
1	A	360	GLU
1	A	389	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	226	ASN
1	A	231	GLN
1	A	446	HIS

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z  > 2$	Counts	RMSZ	# $ Z  > 2$
2	STU	A	501	-	27,42,42	1.12	2 (7%)	23,68,68	2.31	8 (34%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	STU	A	501	-	-	0/4/42/42	0/0/8/8

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	STU	C11-C18	-2.14	1.39	1.42
2	A	501	STU	C26-C21	2.06	1.54	1.51

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
2	A	501	STU	C1-C20-N3	-5.82	125.18	132.18
2	A	501	STU	C3-C4-C5	-4.51	113.02	120.79
2	A	501	STU	C2-C1-C20	-4.04	111.04	119.32
2	A	501	STU	C11-C18-C19	-2.17	118.46	121.69
2	A	501	STU	C2-C3-C4	2.41	123.96	120.45
2	A	501	STU	C24-C23-N4	2.73	118.34	112.16
2	A	501	STU	C3-C2-C1	2.99	124.80	120.45
2	A	501	STU	C1-C20-C5	3.50	125.79	120.73

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	STU	2	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

EDS was not executed - this section will therefore be empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

EDS was not executed - this section will therefore be empty.

### 6.3 Carbohydrates ⓘ

EDS was not executed - this section will therefore be empty.

### 6.4 Ligands ⓘ

EDS was not executed - this section will therefore be empty.

### 6.5 Other polymers ⓘ

EDS was not executed - this section will therefore be empty.