



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 11, 2024 – 12:49 AM EST

PDB ID : 3BEG  
Title : Crystal structure of SR protein kinase 1 complexed to its substrate ASF/SF2  
Authors : Ngo, J.C.; Giang, K.; Chakrabarti, S.; Ma, C.-T.; Huynh, N.; Hagopian, J.;  
Dorrestein, P.C.; Fu, X.-D.; Adams, J.A.; Ghosh, G.  
Deposited on : 2007-11-18  
Resolution : 2.90 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

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

---

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

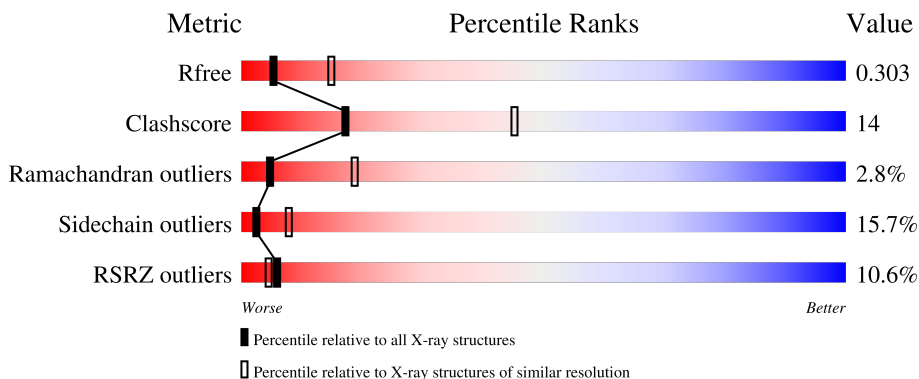
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 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))
$R_{free}$	130704	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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 of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. 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.

Mol	Chain	Length	Quality of chain
1	A	381	
2	B	115	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	ALA	A	2	-	-	-	X

## 2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 3446 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 Serine/threonine-protein kinase SRPK1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	348	2744	1772	464	497	11	0	0	0

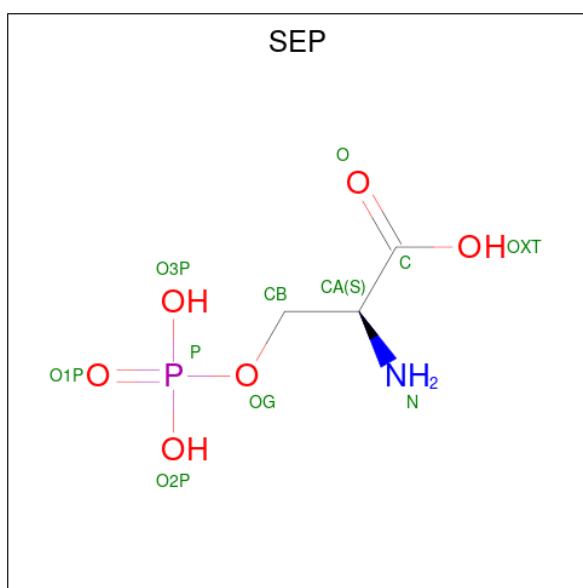
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	473	ALA	-	linker	? ?

- Molecule 2 is a protein called Splicing factor, arginine/serine-rich 1.

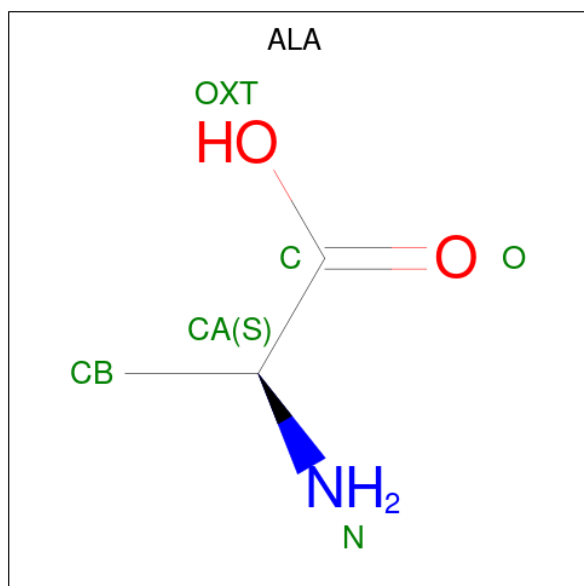
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	86	656	404	120	129	3	0	0	0

- Molecule 3 is PHOSPHOSERINE (three-letter code: SEP) (formula: C<sub>3</sub>H<sub>8</sub>NO<sub>6</sub>P).



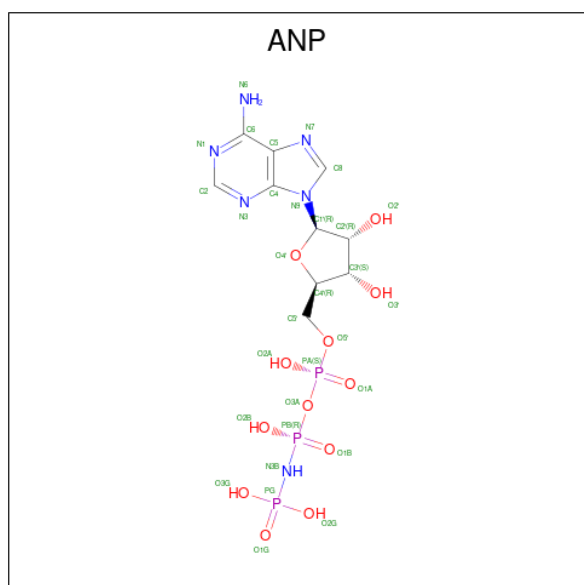
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	A	1	10	3	1	5	1	0	0

- Molecule 4 is ALANINE (three-letter code: ALA) (formula:  $C_3H_7NO_2$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
4	A	1	5	3	1	1	0	0

- Molecule 5 is PHOSPHOAMINOPHOSPHONIC ACID-ADENYLATE ESTER (three-letter code: ANP) (formula:  $C_{10}H_{17}N_6O_{12}P_3$ ).

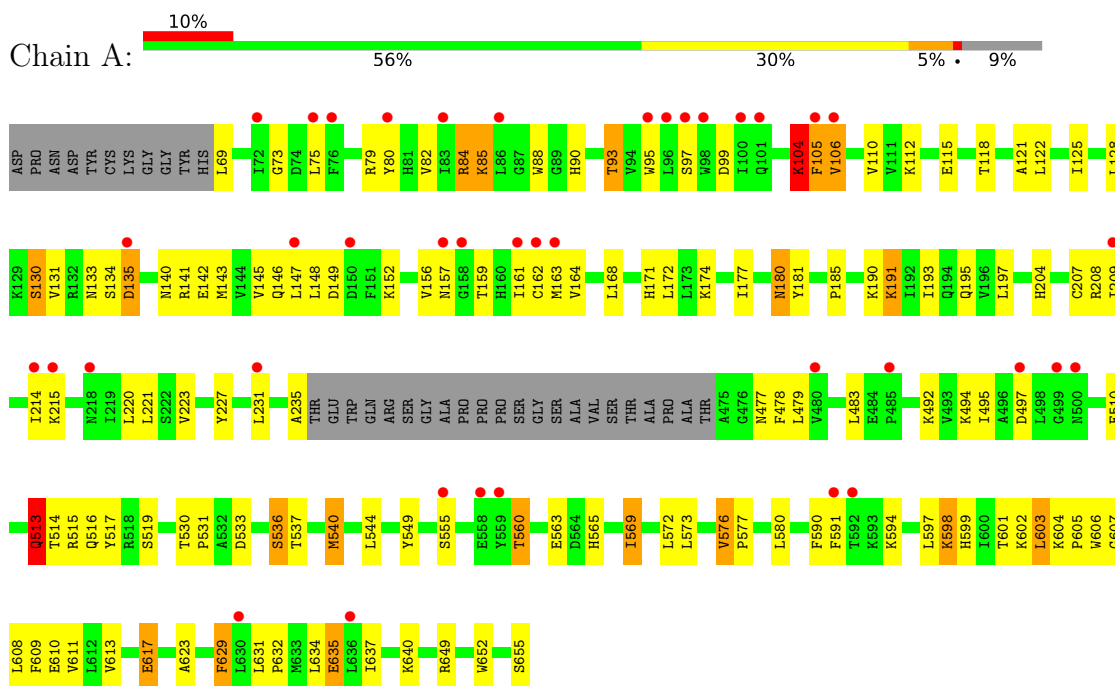


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
5	A	1	31	10	6	12	3	0	0

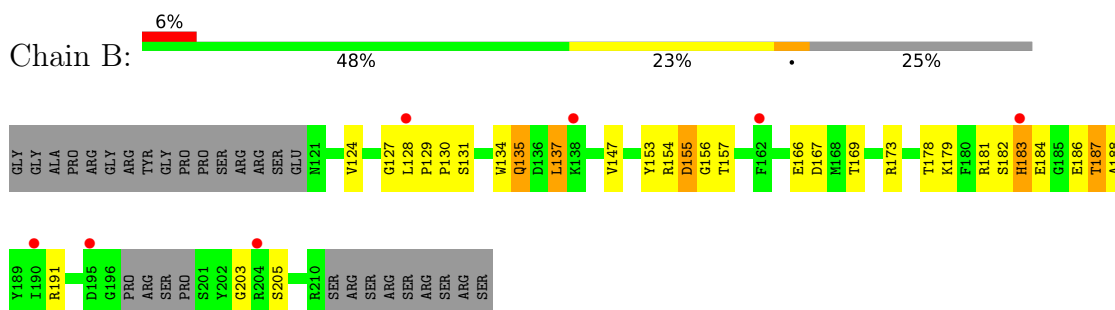
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Serine/threonine-protein kinase SRPK1



- Molecule 2: Splicing factor, arginine/serine-rich 1



## 4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	57.41Å 117.53Å 193.55Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.40 – 2.90 38.40 – 2.90	Depositor EDS
% Data completeness (in resolution range)	92.7 (38.40-2.90) 92.6 (38.40-2.90)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.06	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.08 (at 2.90Å)	Xtrriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.237 , 0.298 0.233 , 0.303	Depositor DCC
$R_{free}$ test set	707 reflections (5.10%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	90.2	Xtrriage
Anisotropy	0.816	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.30 , 129.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	3446	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	117.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.63% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.



## 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: SEP, ANP

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	0.54	0/2810	0.69	2/3819 (0.1%)
2	B	0.73	0/667	0.78	0/900
All	All	0.58	0/3477	0.71	2/4719 (0.0%)

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
2	B	0	1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	A	649	ARG	NE-CZ-NH1	5.96	123.28	120.30
1	A	649	ARG	NE-CZ-NH2	-5.06	117.77	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	183	HIS	Peptide

### 5.2 Too-close contacts [i](#)

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	2744	0	2699	77	0
2	B	656	0	604	22	0
3	A	10	0	5	0	0
4	A	5	0	5	1	0
5	A	31	0	13	0	0
All	All	3446	0	3326	94	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 14.

All (94) 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)
2:B:134:TRP:O	2:B:135:GLN:HB2	1.74	0.85
1:A:121:ALA:O	1:A:125:ILE:HG12	1.79	0.83
1:A:190:LYS:HE2	1:A:652:TRP:CE2	2.14	0.82
1:A:572:LEU:HD23	1:A:573:LEU:HD21	1.69	0.73
1:A:195:GLN:HE22	1:A:492:LYS:HG2	1.54	0.73
2:B:134:TRP:O	2:B:135:GLN:CB	2.40	0.68
1:A:73:GLY:H	1:A:82:VAL:HG23	1.58	0.68
1:A:604:LYS:O	1:A:604:LYS:HG3	1.94	0.66
1:A:601:THR:HG22	1:A:602:LYS:H	1.61	0.65
2:B:186:GLU:HG3	2:B:187:THR:H	1.62	0.65
1:A:193:ILE:O	1:A:197:LEU:HB2	1.98	0.63
1:A:215:LYS:HA	1:A:540:MET:HG3	1.81	0.62
2:B:129:PRO:HD3	2:B:156:GLY:O	1.99	0.62
2:B:182:SER:O	2:B:184:GLU:N	2.29	0.60
1:A:513:GLN:NE2	1:A:519:SER:H	1.98	0.60
2:B:186:GLU:CG	2:B:187:THR:H	2.15	0.59
1:A:560:THR:HG23	1:A:563:GLU:HB2	1.87	0.57
1:A:515:ARG:HE	1:A:565:HIS:HD2	1.53	0.56
1:A:118:THR:HG22	1:A:161:ILE:HG12	1.88	0.55
1:A:603:LEU:O	1:A:605:PRO:HD3	2.07	0.55
1:A:149:ASP:O	1:A:164:VAL:HG12	2.07	0.54
1:A:84:ARG:NH2	1:A:84:ARG:HB2	2.22	0.54
1:A:613:VAL:O	1:A:617:GLU:HA	2.08	0.54
1:A:477:ASN:O	1:A:479:LEU:N	2.41	0.53
2:B:155:ASP:OD1	2:B:157:THR:HG22	2.08	0.53
1:A:530:THR:N	1:A:531:PRO:HD2	2.24	0.53

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:565:HIS:O	1:A:569:ILE:HG12	2.09	0.53
1:A:171:HIS:HD2	1:A:174:LYS:H	1.55	0.52
1:A:143:MET:O	1:A:494:LYS:HA	2.09	0.52
1:A:145:VAL:HA	1:A:494:LYS:HE3	1.91	0.52
1:A:118:THR:O	1:A:122:LEU:HB2	2.10	0.52
1:A:185:PRO:HD3	1:A:483:LEU:HD12	1.93	0.51
1:A:79:ARG:HG3	1:A:99:ASP:HB2	1.92	0.51
1:A:148:LEU:HB2	1:A:164:VAL:HG13	1.92	0.51
1:A:207:CYS:O	1:A:209:ILE:HG13	2.12	0.49
1:A:516:GLN:NE2	1:A:516:GLN:H	2.11	0.49
2:B:166:GLU:HG2	2:B:167:ASP:N	2.28	0.49
1:A:84:ARG:HD2	1:A:235:ALA:HB3	1.93	0.49
1:A:580:LEU:HB2	1:A:637:ILE:CD1	2.43	0.49
2:B:153:TYR:HD2	2:B:157:THR:HG23	1.77	0.49
1:A:88:TRP:CH2	2:B:135:GLN:HA	2.49	0.48
2:B:166:GLU:HG2	2:B:167:ASP:H	1.78	0.48
1:A:190:LYS:HE2	1:A:652:TRP:CZ2	2.49	0.47
1:A:134:SER:O	1:A:135:ASP:HB2	2.14	0.47
2:B:128:LEU:HA	2:B:156:GLY:O	2.14	0.47
1:A:181:TYR:CE1	2:B:154:ARG:HD3	2.49	0.47
1:A:572:LEU:HD23	1:A:573:LEU:CD2	2.41	0.47
1:A:580:LEU:HB2	1:A:637:ILE:HD13	1.97	0.46
1:A:637:ILE:HB	1:A:640:LYS:HD2	1.97	0.46
2:B:129:PRO:CD	2:B:156:GLY:O	2.62	0.45
1:A:191:LYS:HE3	1:A:191:LYS:HA	1.98	0.45
1:A:635:GLU:OE1	1:A:635:GLU:HA	2.16	0.45
1:A:105:PHE:CD2	1:A:105:PHE:N	2.84	0.45
1:A:598:LYS:HB3	1:A:599:HIS:CD2	2.52	0.45
1:A:88:TRP:O	2:B:135:GLN:NE2	2.46	0.45
1:A:93:THR:HB	1:A:95:TRP:HE1	1.82	0.45
1:A:104:LYS:HD2	1:A:105:PHE:H	1.81	0.45
2:B:179:LYS:HA	2:B:188:ALA:O	2.16	0.44
1:A:84:ARG:HB2	1:A:84:ARG:HH21	1.81	0.44
1:A:609:PHE:HD1	1:A:623:ALA:O	2.00	0.44
1:A:533:ASP:O	1:A:536:SER:HB2	2.18	0.44
1:A:180:ASN:HD22	1:A:180:ASN:HA	1.63	0.44
1:A:629:PHE:O	1:A:632:PRO:HD2	2.17	0.44
1:A:606:TRP:HD1	1:A:610:GLU:HG3	1.83	0.43
2:B:127:GLY:N	2:B:191:ARG:O	2.48	0.43
1:A:128:LEU:HD13	1:A:147:LEU:HB2	2.00	0.43
1:A:110:VAL:HG22	1:A:162:CYS:SG	2.58	0.43

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:152:LYS:HG3	1:A:161:ILE:HG22	2.00	0.43
1:A:544:LEU:HD23	1:A:544:LEU:HA	1.94	0.43
2:B:137:LEU:HD23	2:B:137:LEU:HA	1.85	0.43
1:A:85:LYS:HB3	1:A:95:TRP:CZ3	2.55	0.42
1:A:549:TYR:CE2	2:B:154:ARG:NH1	2.88	0.42
1:A:112:LYS:HA	1:A:112:LYS:HD2	1.85	0.42
1:A:130:SER:HB3	1:A:209:ILE:HD11	1.99	0.42
1:A:515:ARG:HA	1:A:515:ARG:HD2	1.76	0.42
1:A:118:THR:O	1:A:161:ILE:HD11	2.20	0.42
1:A:121:ALA:HB3	1:A:161:ILE:HD11	2.02	0.42
1:A:227:TYR:O	1:A:231:LEU:HB2	2.20	0.41
1:A:590:PHE:HB2	1:A:591:PHE:CD2	2.55	0.41
1:A:75:LEU:HA	1:A:80:TYR:O	2.20	0.41
1:A:517:TYR:CD2	1:A:517:TYR:N	2.88	0.41
1:A:204:HIS:CG	1:A:530:THR:HB	2.56	0.41
1:A:104:LYS:H	1:A:104:LYS:HG3	1.65	0.41
1:A:177:ILE:O	1:A:180:ASN:N	2.52	0.41
1:A:604:LYS:HG2	2:B:205:SER:HB2	2.02	0.41
1:A:106:VAL:HG11	1:A:148:LEU:CD1	2.51	0.41
1:A:147:LEU:HD13	1:A:163:MET:HB2	2.03	0.41
1:A:214:ILE:HD13	1:A:214:ILE:HA	1.94	0.41
1:A:604:LYS:O	1:A:604:LYS:CG	2.67	0.41
2:B:129:PRO:HD2	2:B:156:GLY:CA	2.51	0.40
1:A:576:VAL:HA	1:A:577:PRO:HD3	1.95	0.40
1:A:220:LEU:O	1:A:494:LYS:N	2.45	0.40
4:A:2:ALA:HB1	2:B:153:TYR:OH	2.20	0.40
1:A:607:GLY:O	1:A:611: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	344/381 (90%)	295 (86%)	42 (12%)	7 (2%)	7 27
2	B	82/115 (71%)	66 (80%)	11 (13%)	5 (6%)	1 4
All	All	426/496 (86%)	361 (85%)	53 (12%)	12 (3%)	5 19

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	104	LYS
1	A	478	PHE
2	B	131	SER
2	B	135	GLN
2	B	183	HIS
2	B	203	GLY
1	A	135	ASP
1	A	497	ASP
1	A	513	GLN
1	A	629	PHE
1	A	156	VAL
2	B	130	PRO

### 5.3.2 Protein sidechains [i](#)

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	290/331 (88%)	243 (84%)	47 (16%)	2 7
2	B	67/98 (68%)	58 (87%)	9 (13%)	4 11
All	All	357/429 (83%)	301 (84%)	56 (16%)	2 8

All (56) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	69	LEU
1	A	84	ARG
1	A	85	LYS
1	A	90	HIS

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	93	THR
1	A	97	SER
1	A	104	LYS
1	A	105	PHE
1	A	106	VAL
1	A	115	GLU
1	A	130	SER
1	A	131	VAL
1	A	133	ASN
1	A	140	ASN
1	A	141	ARG
1	A	142	GLU
1	A	146	GLN
1	A	157	ASN
1	A	159	THR
1	A	168	LEU
1	A	172	LEU
1	A	180	ASN
1	A	191	LYS
1	A	208	ARG
1	A	221	LEU
1	A	223	VAL
1	A	495	ILE
1	A	510	GLU
1	A	513	GLN
1	A	514	THR
1	A	536	SER
1	A	537	THR
1	A	540	MET
1	A	555	SER
1	A	560	THR
1	A	569	ILE
1	A	576	VAL
1	A	594	LYS
1	A	597	LEU
1	A	598	LYS
1	A	603	LEU
1	A	608	LEU
1	A	617	GLU
1	A	631	LEU
1	A	634	LEU
1	A	635	GLU

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	A	655	SER
2	B	124	VAL
2	B	137	LEU
2	B	147	VAL
2	B	155	ASP
2	B	169	THR
2	B	173	ARG
2	B	178	THR
2	B	181	ARG
2	B	187	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	157	ASN
1	A	160	HIS
1	A	171	HIS
1	A	180	ASN
1	A	218	ASN
1	A	481	ASN
1	A	505	HIS
1	A	513	GLN
1	A	516	GLN
1	A	565	HIS
1	A	620	GLN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

### 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

### 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry

3 ligands are 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
4	ALA	A	2	3	3,4,5	0.77	0	2,4,6	0.84	0
3	SEP	A	1	4	8,9,10	1.63	2 (25%)	8,12,14	1.74	2 (25%)
5	ANP	A	656	-	29,33,33	1.83	7 (24%)	31,52,52	2.24	7 (22%)

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
4	ALA	A	2	3	-	0/0/2/4	-
3	SEP	A	1	4	-	0/5/8/10	-
5	ANP	A	656	-	-	3/14/38/38	0/3/3/3

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	656	ANP	PG-N3B	4.15	1.74	1.63
5	A	656	ANP	PB-N3B	3.93	1.73	1.63
5	A	656	ANP	PG-O1G	3.75	1.52	1.46
3	A	1	SEP	P-O1P	3.35	1.61	1.50
5	A	656	ANP	C5-C4	2.87	1.48	1.40
5	A	656	ANP	PB-O1B	2.69	1.50	1.46
5	A	656	ANP	C2-N3	2.64	1.36	1.32
5	A	656	ANP	PB-O3A	2.32	1.62	1.59
3	A	1	SEP	P-O2P	2.03	1.62	1.54

All (9) bond angle outliers are listed below:



Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	656	ANP	O1G-PG-N3B	-8.02	99.96	111.77
5	A	656	ANP	O1B-PB-N3B	-5.07	104.31	111.77
5	A	656	ANP	O2B-PB-O1B	3.87	118.04	109.92
3	A	1	SEP	OG-CB-CA	3.72	111.77	108.14
5	A	656	ANP	N3-C2-N1	-3.11	123.82	128.68
5	A	656	ANP	PB-O3A-PA	-2.89	122.43	132.62
5	A	656	ANP	C3'-C2'-C1'	2.57	104.85	100.98
5	A	656	ANP	C4-C5-N7	-2.29	107.01	109.40
3	A	1	SEP	P-OG-CB	-2.20	112.24	118.30

There are no chirality outliers.

All (3) torsion outliers are listed below:

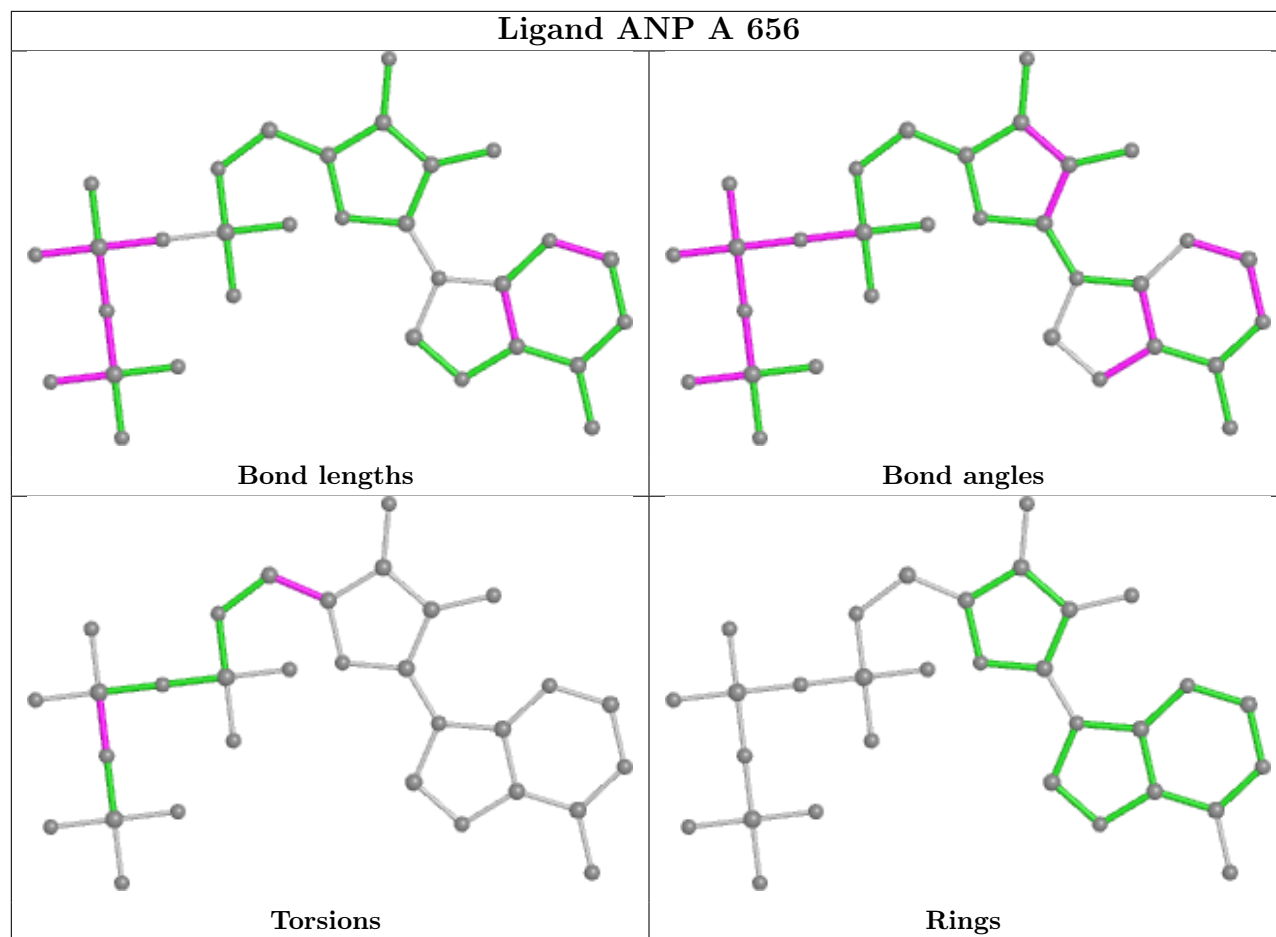
Mol	Chain	Res	Type	Atoms
5	A	656	ANP	PG-N3B-PB-O1B
5	A	656	ANP	O4'-C4'-C5'-O5'
5	A	656	ANP	C3'-C4'-C5'-O5'

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	2	ALA	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 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

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	348/381 (91%)	0.86	39 (11%) <b>5</b> <b>4</b>	99, 117, 135, 141	0
2	B	86/115 (74%)	0.60	7 (8%) <b>12</b> <b>9</b>	101, 111, 125, 127	0
All	All	434/496 (87%)	0.81	46 (10%) <b>6</b> <b>4</b>	99, 116, 134, 141	0

All (46) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	98	TRP	4.5
1	A	83	ILE	4.3
1	A	80	TYR	4.2
1	A	559	TYR	4.0
2	B	183	HIS	3.9
1	A	150	ASP	3.8
1	A	96	LEU	3.8
1	A	72	ILE	3.7
1	A	76	PHE	3.5
1	A	97	SER	3.4
1	A	555	SER	3.3
1	A	591	PHE	3.3
1	A	86	LEU	3.3
1	A	100	ILE	3.1
1	A	592	THR	3.1
1	A	497	ASP	3.1
1	A	162	CYS	2.9
1	A	500	ASN	2.9
1	A	157	ASN	2.9
1	A	218	ASN	2.9
1	A	105	PHE	2.9
1	A	101	GLN	2.9
2	B	190	ILE	2.8
1	A	75	LEU	2.8

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	A	558	GLU	2.7
2	B	128	LEU	2.7
1	A	106	VAL	2.7
1	A	231	LEU	2.7
1	A	135	ASP	2.6
1	A	158	GLY	2.6
1	A	161	ILE	2.5
1	A	209	ILE	2.5
1	A	147	LEU	2.5
2	B	195	ASP	2.4
1	A	214	ILE	2.4
1	A	480	VAL	2.3
2	B	162	PHE	2.3
1	A	636	LEU	2.2
1	A	215	LYS	2.1
1	A	95	TRP	2.1
1	A	485	PRO	2.1
2	B	138	LYS	2.1
1	A	499	GLY	2.1
2	B	204	ARG	2.1
1	A	630	LEU	2.0
1	A	163	MET	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

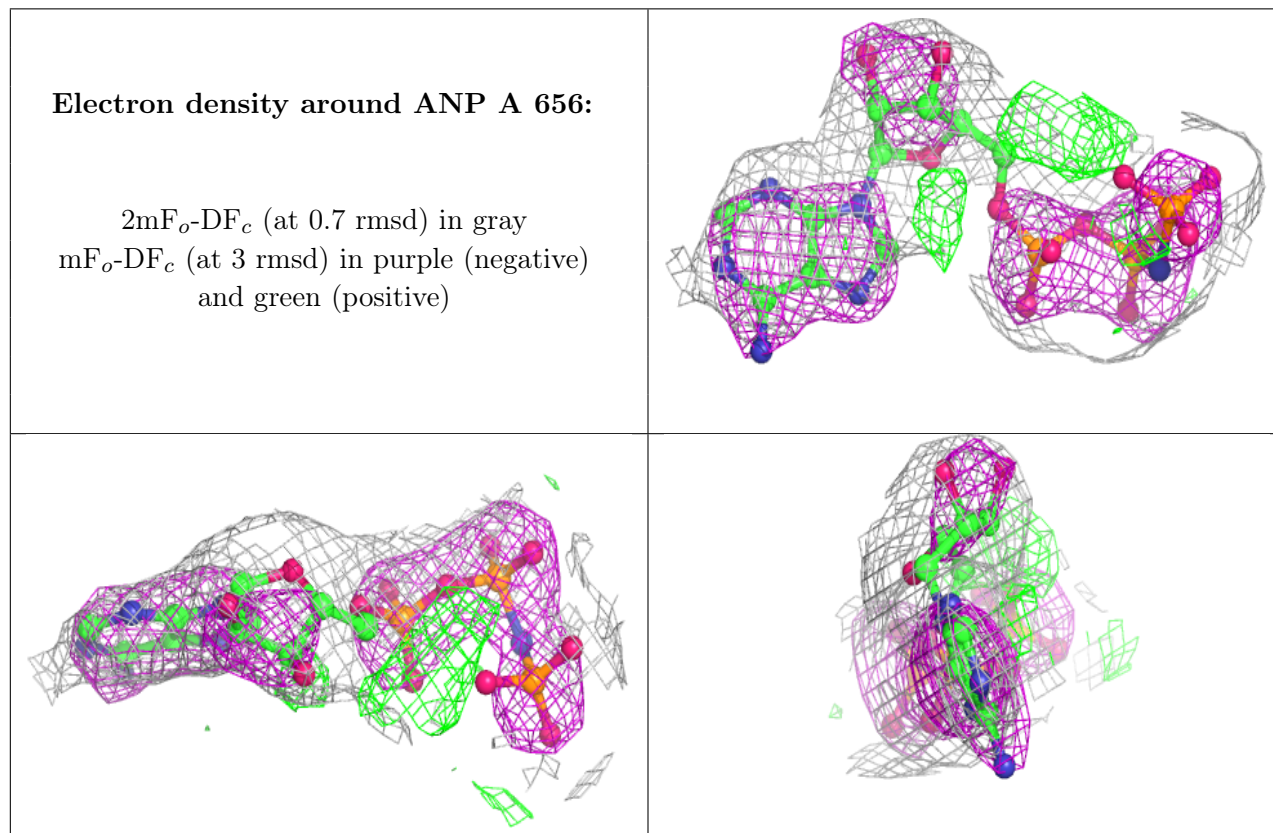
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	SEP	A	1	10/11	0.59	0.31	136,137,138,138	0

*Continued on next page...*

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
4	ALA	A	2	5/6	0.69	0.66	137,137,137,137	0
5	ANP	A	656	31/31	0.86	0.20	115,118,121,121	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



## 6.5 Other polymers [i](#)

There are no such residues in this entry.