



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 12:31 AM UTC

PDB ID : 9D5G / pdb_00009d5g
Title : Crystal structure of the ILK/alpha-parvin core complex bound to 4-methyl
erlotinib
Authors : Fukuda, K.; Qin, J.
Deposited on : 2024-08-13
Resolution : 1.55 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

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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

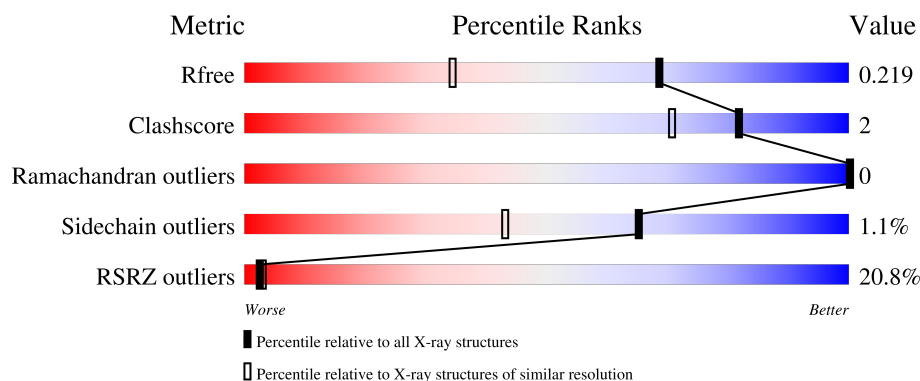
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.55 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}	180053	2145 (1.56-1.56)
Clashscore	190562	2189 (1.56-1.56)
Ramachandran outliers	187476	2153 (1.56-1.56)
Sidechain outliers	187428	2150 (1.56-1.56)
RSRZ outliers	180081	2146 (1.56-1.56)

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 ≥ 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	AAAA	271	<div> <div>11%</div> <div>99%</div> </div>
2	BBBB	129	<div> <div>40%</div> <div>95%</div> </div>

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 3546 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 Integrin-linked protein kinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	AAAA	271	Total	C	N	O	S	0	0	0
			2171	1386	383	384	18			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
AAAA	182	MET	-	initiating methionine	UNP Q13418
AAAA	346	SER	CYS	engineered mutation	UNP Q13418
AAAA	422	SER	CYS	engineered mutation	UNP Q13418

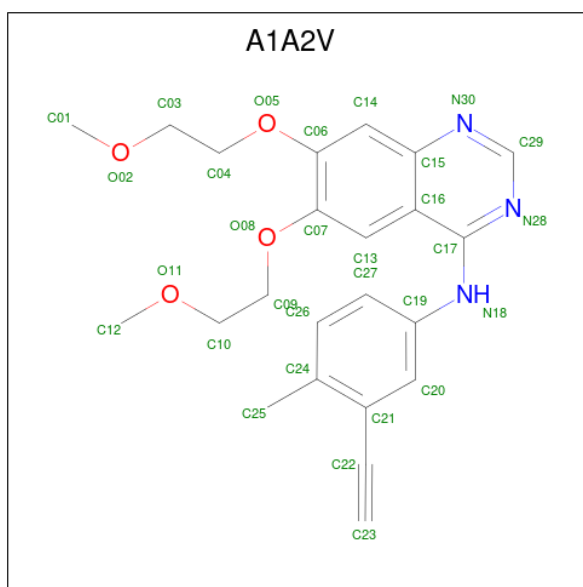
- Molecule 2 is a protein called Alpha-parvin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	BBBB	124	Total	C	N	O	S	1	0	0
			1011	662	160	186	3			

There are 4 discrepancies between the modelled and reference sequences:

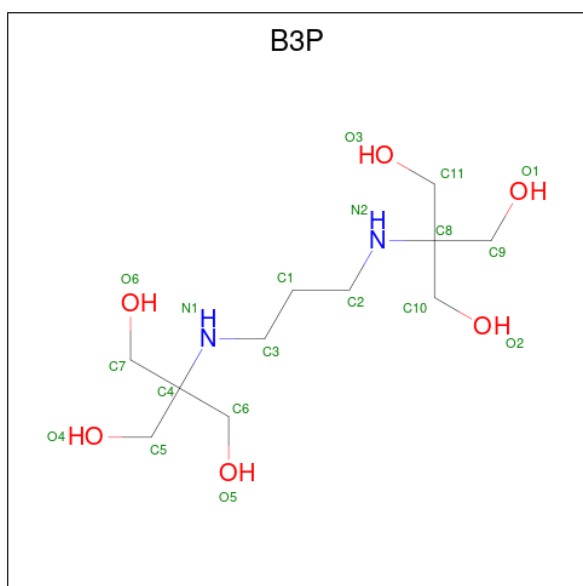
Chain	Residue	Modelled	Actual	Comment	Reference
BBBB	244	GLY	-	expression tag	UNP Q9NVD7
BBBB	245	SER	-	expression tag	UNP Q9NVD7
BBBB	246	HIS	-	expression tag	UNP Q9NVD7
BBBB	247	MET	-	expression tag	UNP Q9NVD7

- Molecule 3 is 4-methyl Erlotinib (CCD ID: A1A2V) (formula: $C_{23}H_{25}N_3O_4$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	AAAA	1	Total	C	N	O	0	0
			30	23	3	4		

- Molecule 4 is 2-[3-(2-HYDROXY-1,1-DIHYDROXYMETHYL-ETHYLAMINO)-PROPYLAMINO]-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: B3P) (formula: $C_{11}H_{26}N_2O_6$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	BBBB	1	Total	C	N	O	0	0
			19	11	2	6		

- Molecule 5 is water.

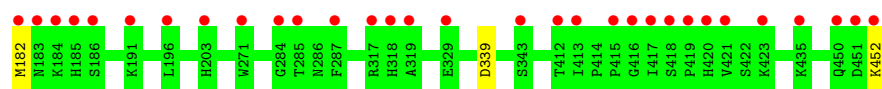
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	AAAA	252	Total 252	O 252	0	0
5	BBBB	63	Total 63	O 63	0	0

3 Residue-property plots [i](#)

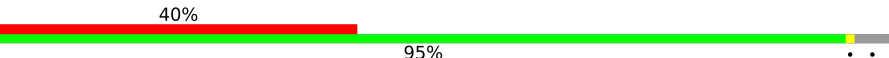
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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.

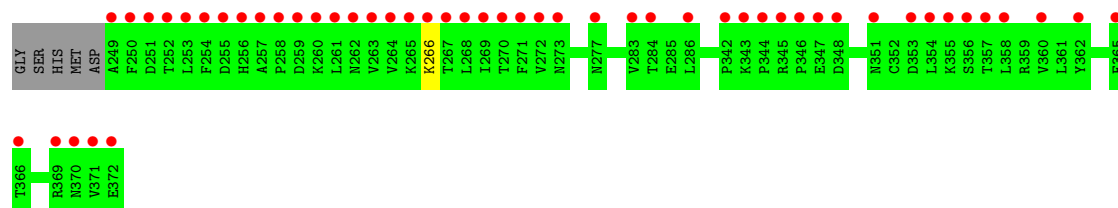
- Molecule 1: Integrin-linked protein kinase

Chain AAAA:  11% 99%



- Molecule 2: Alpha-parvin

Chain BBBB:  40% 95%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	44.15Å 117.92Å 47.71Å 90.00° 101.58° 90.00°	Depositor
Resolution (Å)	40.61 – 1.55 40.61 – 1.55	Depositor EDS
% Data completeness (in resolution range)	96.3 (40.61-1.55) 93.0 (40.61-1.55)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.64 (at 1.55Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.194 , 0.221 0.194 , 0.219	Depositor DCC
R_{free} test set	3457 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	18.5	Xtriage
Anisotropy	0.265	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 42.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	3546	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.18% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: A1A2V, B3P

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	AAAA	0.34	0/2230	0.56	0/3021
2	BBBB	0.24	0/1034	0.46	0/1400
All	All	0.31	0/3264	0.53	0/4421

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	AAAA	2171	0	0	0	0
2	BBBB	1011	0	0	0	0
3	AAAA	30	0	0	0	0
4	BBBB	19	0	0	0	0
5	AAAA	252	0	0	0	0
5	BBBB	63	0	0	0	0
All	All	3546	0	0	0	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 2.

There are no clashes within the asymmetric unit.

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	AAAA	269/271 (99%)	268 (100%)	1 (0%)	0	100	100
2	BBBB	122/129 (95%)	119 (98%)	3 (2%)	0	100	100
All	All	391/400 (98%)	387 (99%)	4 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	AAAA	241/241 (100%)	238 (99%)	3 (1%)	63	40
2	BBBB	115/119 (97%)	114 (99%)	1 (1%)	70	51
All	All	356/360 (99%)	352 (99%)	4 (1%)	65	43

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	AAAA	182	MET
1	AAAA	339	ASP
1	AAAA	452	LYS
2	BBBB	266	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

2 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	B3P	BBBB	401	-	18,18,18	0.48	0	23,23,23	1.10	2 (8%)
3	A1A2V	AAAA	501	-	32,32,32	1.82	6 (18%)	41,42,42	2.25	11 (26%)

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	B3P	BBBB	401	-	-	3/28/28/28	-
3	A1A2V	AAAA	501	-	-	5/15/16/16	0/3/3/3

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	AAAA	501	A1A2V	C17-N18	6.35	1.45	1.36
3	AAAA	501	A1A2V	C16-C15	-4.06	1.36	1.42
3	AAAA	501	A1A2V	C21-C22	3.33	1.53	1.44
3	AAAA	501	A1A2V	C17-C16	-2.60	1.41	1.44
3	AAAA	501	A1A2V	C29-N30	2.48	1.35	1.32
3	AAAA	501	A1A2V	C19-N18	2.33	1.45	1.40

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	AAAA	501	A1A2V	N30-C29-N28	-6.59	119.73	128.67
3	AAAA	501	A1A2V	C29-N28-C17	4.95	120.44	116.60
3	AAAA	501	A1A2V	C29-N30-C15	4.83	120.92	115.43
3	AAAA	501	A1A2V	C13-C16-C17	-4.50	121.18	124.84
3	AAAA	501	A1A2V	O05-C06-C14	-4.50	117.81	125.20
3	AAAA	501	A1A2V	C17-C16-C15	3.65	118.02	115.86
4	BBBB	401	B3P	C3-N1-C4	-3.64	110.84	116.17
3	AAAA	501	A1A2V	N18-C17-N28	3.20	122.31	118.71
4	BBBB	401	B3P	C2-N2-C8	-2.76	112.13	116.17
3	AAAA	501	A1A2V	C16-C17-N18	-2.64	117.10	119.77
3	AAAA	501	A1A2V	O08-C07-C13	-2.49	121.11	125.20
3	AAAA	501	A1A2V	C16-C15-N30	-2.37	120.31	122.82
3	AAAA	501	A1A2V	O05-C06-C07	2.26	120.42	115.75

There are no chirality outliers.

All (8) torsion outliers are listed below:

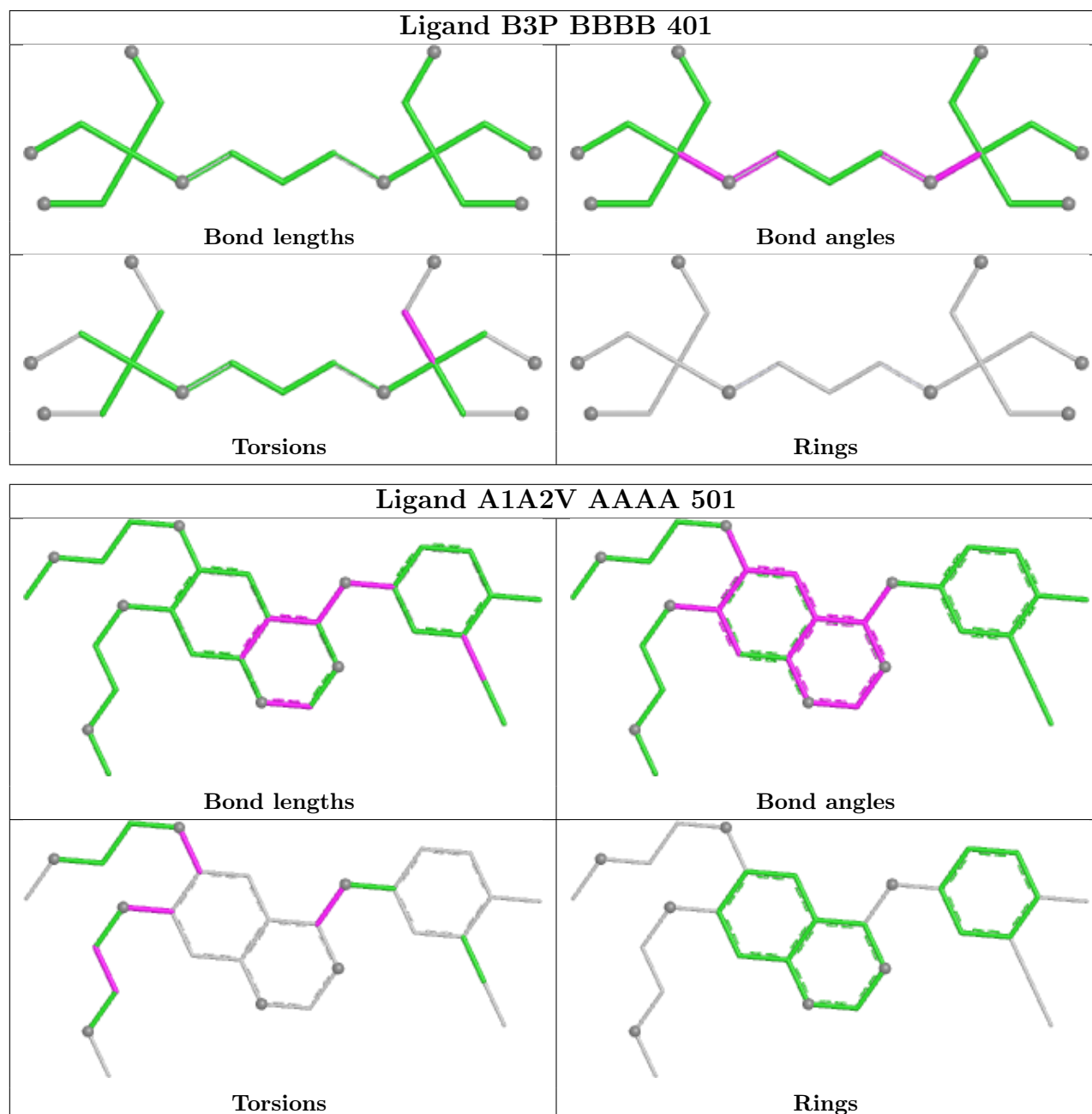
Mol	Chain	Res	Type	Atoms
4	BBBB	401	B3P	O3-C11-C8-N2
4	BBBB	401	B3P	O3-C11-C8-C9
4	BBBB	401	B3P	O3-C11-C8-C10
3	AAAA	501	A1A2V	N28-C17-N18-C19
3	AAAA	501	A1A2V	O02-C03-C04-O05
3	AAAA	501	A1A2V	C16-C17-N18-C19
3	AAAA	501	A1A2V	C07-C06-O05-C04
3	AAAA	501	A1A2V	C06-C07-O08-C09

There are no ring outliers.

No monomer is involved in short contacts.

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

There are no such residues in this entry.

5.8 Polymer linkage issues

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, 95th 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 ²)	Q<0.9
1	AAAA	271/271 (100%)	0.58	31 (11%)	10 11	12, 22, 39, 63	0
2	BBBB	124/129 (96%)	1.93	51 (41%)	0 0	16, 35, 71, 75	1 (0%)
All	All	395/400 (98%)	1.00	82 (20%)	2 3	12, 24, 55, 75	1 (0%)

All (82) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	BBBB	253	LEU	7.5
2	BBBB	263	VAL	7.0
2	BBBB	249	ALA	6.5
2	BBBB	257	ALA	6.5
2	BBBB	255	ASP	6.2
1	AAAA	183	ASN	5.5
2	BBBB	354	LEU	5.2
2	BBBB	254	PHE	5.1
2	BBBB	256	HIS	5.1
2	BBBB	252	THR	5.0
2	BBBB	258	PRO	4.9
1	AAAA	416	GLY	4.8
2	BBBB	269	ILE	4.5
1	AAAA	184	LYS	4.4
1	AAAA	452	LYS	4.2
1	AAAA	185	HIS	4.2
2	BBBB	250	PHE	4.0
1	AAAA	287	PHE	3.9
2	BBBB	267	THR	3.9
2	BBBB	259	ASP	3.9
2	BBBB	270	THR	3.8
1	AAAA	182	MET	3.8
2	BBBB	251	ASP	3.7
2	BBBB	261	LEU	3.7

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Mol	Chain	Res	Type	RSRZ
2	BBBB	358	LEU	3.5
2	BBBB	260	LYS	3.4
2	BBBB	362	TYR	3.4
1	AAAA	451	ASP	3.3
2	BBBB	262	ASN	3.3
1	AAAA	318	HIS	3.2
2	BBBB	371	VAL	3.2
1	AAAA	413	ILE	3.1
1	AAAA	415	PRO	3.1
1	AAAA	285	THR	2.9
1	AAAA	420	HIS	2.9
2	BBBB	355	LYS	2.9
2	BBBB	266	LYS	2.8
1	AAAA	412	THR	2.8
2	BBBB	366	THR	2.8
2	BBBB	372	GLU	2.7
2	BBBB	370	ASN	2.7
2	BBBB	286	LEU	2.7
2	BBBB	277	ASN	2.6
1	AAAA	418	SER	2.6
2	BBBB	342	PRO	2.6
1	AAAA	319	ALA	2.6
2	BBBB	271	PHE	2.6
2	BBBB	343	LYS	2.5
2	BBBB	369	ARG	2.5
2	BBBB	264	VAL	2.5
2	BBBB	357	THR	2.5
2	BBBB	273	ASN	2.5
2	BBBB	351	ASN	2.5
1	AAAA	423	LYS	2.5
1	AAAA	284	GLY	2.4
1	AAAA	317	ARG	2.4
2	BBBB	365	PHE	2.4
1	AAAA	191	LYS	2.4
2	BBBB	356	SER	2.4
2	BBBB	353	ASP	2.3
2	BBBB	265	LYS	2.3
1	AAAA	329	GLU	2.3
2	BBBB	344	PRO	2.2
2	BBBB	346	PRO	2.2
2	BBBB	347	GLU	2.2
1	AAAA	196	LEU	2.2

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Mol	Chain	Res	Type	RSRZ
2	BBBB	268	LEU	2.2
2	BBBB	360	VAL	2.2
1	AAAA	435	LYS	2.2
1	AAAA	343	SER	2.1
1	AAAA	419	PRO	2.1
2	BBBB	284	THR	2.1
1	AAAA	203	HIS	2.1
2	BBBB	283	VAL	2.1
1	AAAA	450	GLN	2.1
1	AAAA	421	VAL	2.0
2	BBBB	272	VAL	2.0
2	BBBB	345	ARG	2.0
1	AAAA	417	ILE	2.0
1	AAAA	186	SER	2.0
1	AAAA	271	TRP	2.0
2	BBBB	348	ASP	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

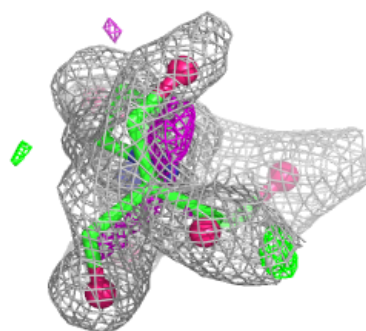
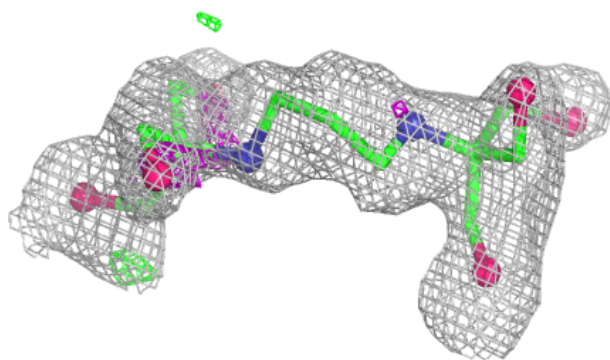
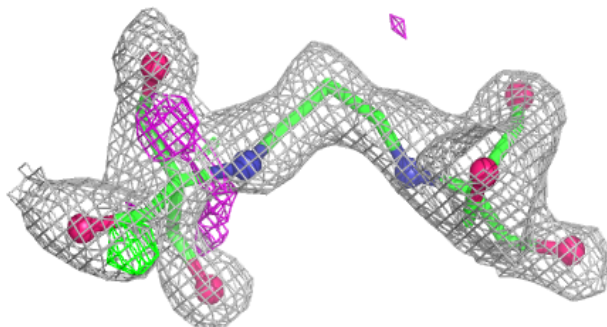
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	B3P	BBBB	401	19/19	0.81	0.14	37,42,51,53	0
3	A1A2V	AAAA	501	30/30	0.87	0.13	23,29,39,42	0

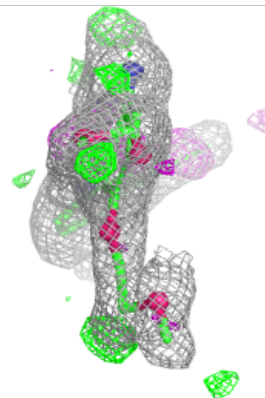
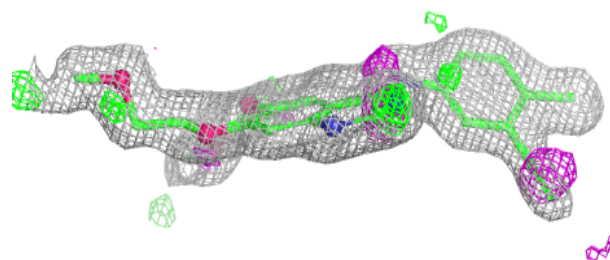
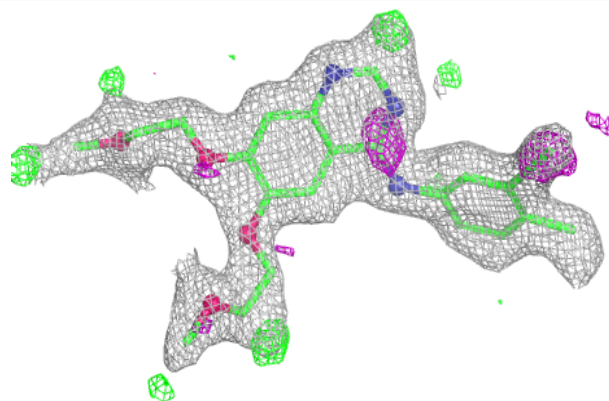
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around B3P BBBB 401:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around A1A2V AAAA 501:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers [i](#)

There are no such residues in this entry.