



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 07:33 AM UTC

PDB ID : 2Y27 / pdb_00002y27
Title : crystal structure of PaaK1 in complex with ATP from Burkholderia cenocepacia
Authors : Law, A.; Boulanger, M.J.
Deposited on : 2010-12-13
Resolution : 1.60 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

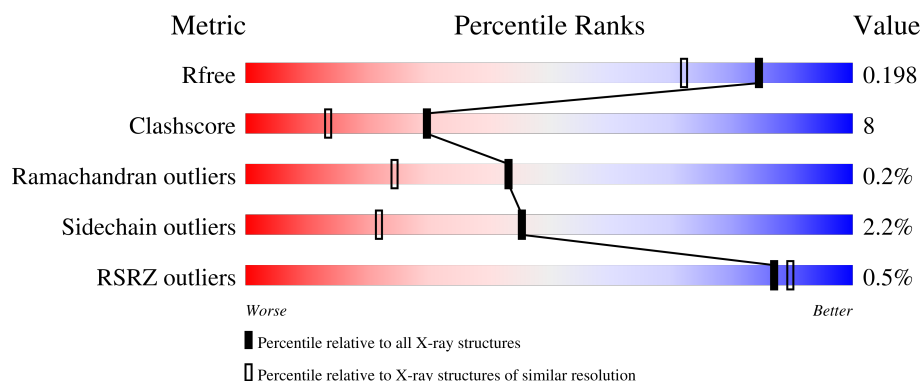
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.60 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	4673 (1.60-1.60)
Clashscore	190562	4931 (1.60-1.60)
Ramachandran outliers	187476	4831 (1.60-1.60)
Sidechain outliers	187428	4830 (1.60-1.60)
RSRZ outliers	180081	4672 (1.60-1.60)

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	A	437	 84% 13% .
1	B	437	 86% 11% .

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
2	SCN	B	501	-	-	X	-
3	GOL	A	505	-	-	X	-
3	GOL	B	505	-	-	X	-

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 7801 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.

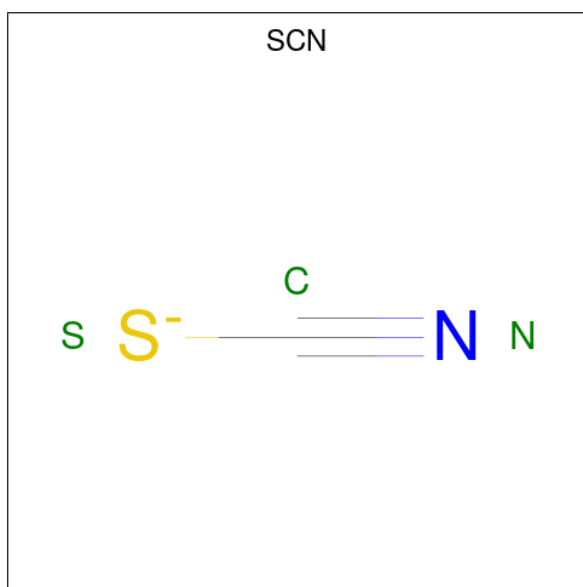
- Molecule 1 is a protein called PHENYLACETATE-COENZYME A LIGASE.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	425	Total	C	N	O	S	Se	0	5	0
			3338	2111	584	629	2	12			
1	B	427	Total	C	N	O	S	Se	0	7	0
			3358	2127	584	633	2	12			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-4	GLY	-	expression tag	UNP B4E7B5
A	-3	SER	-	expression tag	UNP B4E7B5
A	-2	HIS	-	expression tag	UNP B4E7B5
A	-1	MSE	-	expression tag	UNP B4E7B5
A	0	ALA	-	expression tag	UNP B4E7B5
A	1	SER	-	expression tag	UNP B4E7B5
B	-4	GLY	-	expression tag	UNP B4E7B5
B	-3	SER	-	expression tag	UNP B4E7B5
B	-2	HIS	-	expression tag	UNP B4E7B5
B	-1	MSE	-	expression tag	UNP B4E7B5
B	0	ALA	-	expression tag	UNP B4E7B5
B	1	SER	-	expression tag	UNP B4E7B5

- Molecule 2 is THIOCYANATE ION (CCD ID: SCN) (formula: CNS).



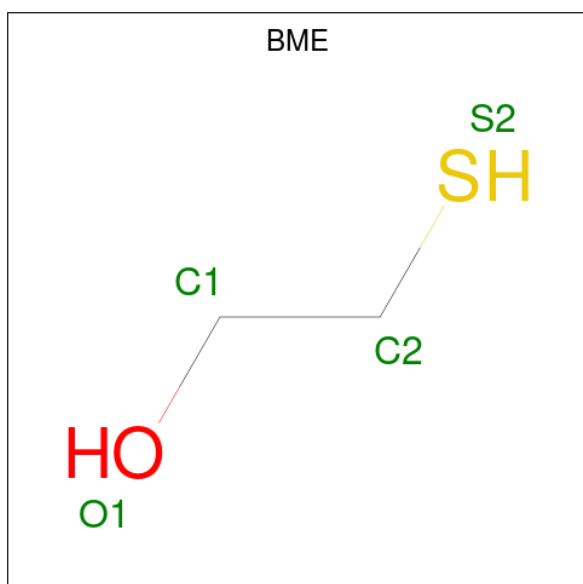
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	S	0	0
			3	1	1	1		
2	A	1	Total	C	N	S	0	0
			3	1	1	1		
2	A	1	Total	C	N	S	0	0
			3	1	1	1		
2	A	1	Total	C	N	S	0	0
			3	1	1	1		
2	A	1	Total	C	N	S	0	0
			3	1	1	1		
2	B	1	Total	C	N	S	0	0
			3	1	1	1		
2	B	1	Total	C	N	S	0	0
			3	1	1	1		

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



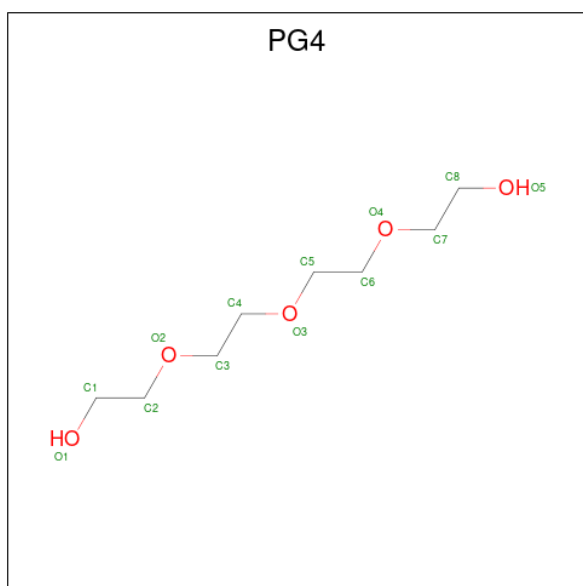
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		
3	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 4 is BETA-MERCAPTOETHANOL (CCD ID: BME) (formula: C_2H_6OS).



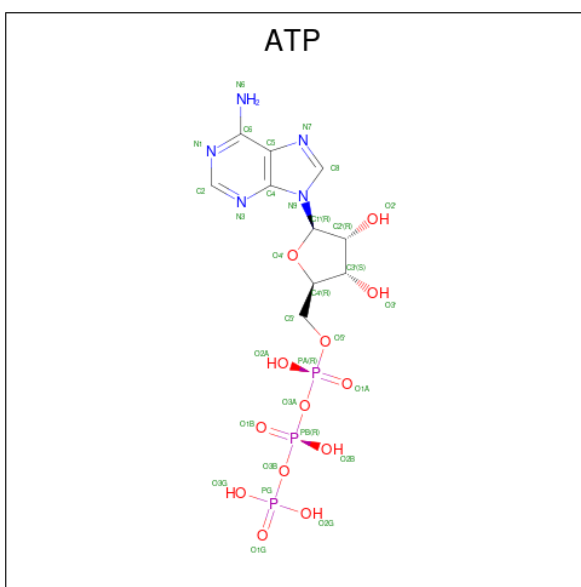
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	O	S	0	0
			4	2	1	1		
4	B	1	Total	C	O	S	0	0
			4	2	1	1		
4	B	1	Total	C	O	S	0	0
			4	2	1	1		
4	B	1	Total	C	O	S	0	0
			4	2	1	1		
4	B	1	Total	C	O	S	0	0
			4	2	1	1		

- Molecule 5 is TETRAETHYLENE GLYCOL (CCD ID: PG4) (formula: $C_8H_{18}O_5$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			12	8	4		

- Molecule 6 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total 31	C 10	N 5	O 13	P 3	0	0
6	B	1	Total 31	C 10	N 5	O 13	P 3	0	0

- Molecule 7 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	3	Total Mg 3 3	0	0
7	B	3	Total Mg 3 3	0	0

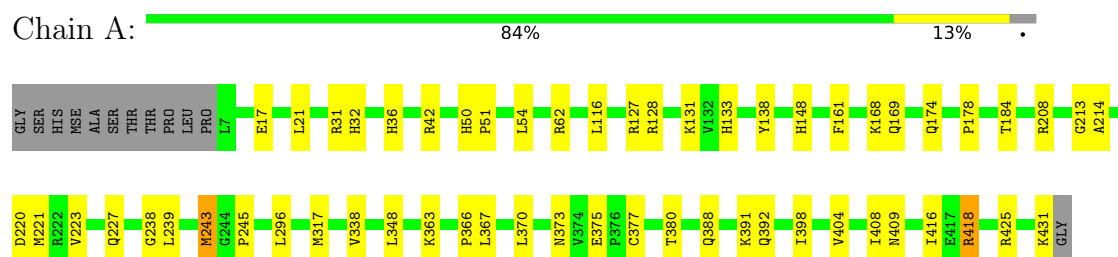
- Molecule 8 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	459	Total O 459 459	0	0
8	B	489	Total O 489 489	0	0

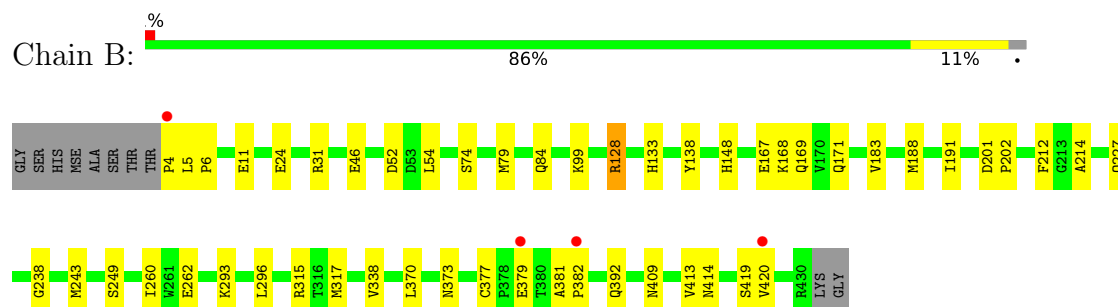
3 Residue-property plots

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: PHENYLACETATE-COENZYME A LIGASE



• Molecule 1: PHENYLACETATE-COENZYME A LIGASE



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	56.71Å 62.47Å 78.49Å 90.97° 109.81° 106.51°	Depositor
Resolution (Å)	29.98 – 1.60 29.98 – 1.60	Depositor EDS
% Data completeness (in resolution range)	95.8 (29.98-1.60) 95.7 (29.98-1.60)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.32 (at 1.60Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.164 , 0.194 0.170 , 0.198	Depositor DCC
R_{free} test set	6103 reflections (4.80%)	wwPDB-VP
Wilson B-factor (Å ²)	18.1	Xtriage
Anisotropy	0.136	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 47.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	7801	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.61% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, MG, SCN, ATP, PG4, BME

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	0.50	0/3410	0.73	1/4611 (0.0%)
1	B	0.56	0/3438	0.75	0/4652
All	All	0.53	0/6848	0.74	1/9263 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	208	ARG	N-CA-C	-5.24	107.55	114.04

There are no chirality outliers.

There are no planarity outliers.

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	3338	0	3363	58	0
1	B	3358	0	3393	50	0
2	A	18	0	0	2	0
2	B	9	0	0	2	0
3	A	6	0	8	5	0
3	B	24	0	32	12	0
4	A	4	0	6	2	0
4	B	16	0	24	3	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	12	0	15	3	0
6	A	31	0	12	2	0
6	B	31	0	12	2	0
7	A	3	0	0	0	0
7	B	3	0	0	0	0
8	A	459	0	0	25	0
8	B	489	0	0	17	0
All	All	7801	0	6865	116	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 8.

All (116) 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:348:LEU:HG	8:A:621:HOH:O	1.19	1.32
1:A:373:ASN:ND2	1:A:409:ASN:HD22	1.41	1.18
1:A:392:GLN:HG2	8:A:1000:HOH:O	1.47	1.11
1:A:243[B]:MSE:CE	8:A:964:HOH:O	1.97	1.10
1:A:243[B]:MSE:HE1	8:A:964:HOH:O	1.54	1.03
1:A:377:CYS:SG	4:A:506:BME:S2	2.55	1.01
1:B:260:ILE:O	1:B:317[B]:MSE:HG2	1.65	0.96
3:B:505:GOL:H31	8:B:904:HOH:O	1.66	0.94
1:A:42:ARG:NH2	8:A:601:HOH:O	1.97	0.93
1:B:24:GLU:HG3	8:B:1059:HOH:O	1.69	0.93
1:A:62:ARG:O	5:A:507:PG4:H62	1.71	0.90
3:B:505:GOL:H32	6:B:512:ATP:H8	1.40	0.87
1:A:373:ASN:HD22	1:A:409:ASN:HD22	1.26	0.83
1:B:171:GLN:HG3	8:B:1061:HOH:O	1.80	0.81
1:B:392:GLN:OE1	8:B:602:HOH:O	2.00	0.79
1:A:17:GLU:OE1	8:A:602:HOH:O	2.01	0.77
1:A:62:ARG:NH1	8:A:603:HOH:O	2.17	0.77
1:A:243[B]:MSE:HE2	8:A:964:HOH:O	1.75	0.77
5:A:507:PG4:H71	8:A:805:HOH:O	1.87	0.75
1:B:373:ASN:ND2	1:B:409:ASN:HD22	1.85	0.74
1:B:377:CYS:HG	4:B:511:BME:HS2	1.33	0.74
1:A:348:LEU:CB	8:A:621:HOH:O	2.27	0.74
1:A:373:ASN:ND2	1:A:409:ASN:ND2	2.27	0.73
1:B:293:LYS:CE	8:B:746:HOH:O	2.38	0.71
3:B:507:GOL:O1	8:B:601:HOH:O	1.77	0.70
1:B:262:GLU:HG2	1:B:317[B]:MSE:HG3	1.74	0.70

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:388:GLN:HG3	8:A:788:HOH:O	1.91	0.69
1:B:168:LYS:NZ	2:B:501:SCN:N	2.38	0.69
1:A:348:LEU:CG	8:A:621:HOH:O	1.96	0.69
1:A:238:GLY:C	3:A:505:GOL:H11	2.18	0.68
1:A:32:HIS:ND1	1:A:36:HIS:HD2	1.94	0.66
1:B:31:ARG:HD3	8:B:603:HOH:O	1.96	0.66
3:B:505:GOL:H32	6:B:512:ATP:C8	2.30	0.66
1:A:373:ASN:HD21	1:A:409:ASN:HD22	1.38	0.65
1:A:42:ARG:NE	8:A:601:HOH:O	2.30	0.64
1:B:419:SER:N	3:B:504:GOL:H31	2.12	0.63
1:A:380:THR:HG22	1:A:380:THR:O	1.98	0.63
1:B:133:HIS:HE1	1:B:169:GLN:OE1	1.82	0.62
1:B:99:LYS:HA	4:B:510:BME:H11	1.82	0.62
1:A:375:GLU:CD	1:A:418:ARG:HH22	2.09	0.61
1:B:52[B]:ASP:OD1	8:B:603:HOH:O	2.16	0.61
1:A:42:ARG:CZ	8:A:601:HOH:O	2.41	0.60
1:A:375:GLU:OE2	1:A:418:ARG:NH2	2.35	0.59
1:A:133:HIS:HD2	8:A:909:HOH:O	1.87	0.57
1:B:392:GLN:CD	8:B:602:HOH:O	2.42	0.57
1:B:419:SER:H	3:B:504:GOL:H31	1.70	0.57
1:A:184:THR:HG22	1:A:214:ALA:HB3	1.87	0.56
1:B:373:ASN:HD22	1:B:409:ASN:HB3	1.71	0.56
1:A:245:PRO:N	3:A:505:GOL:H12	2.20	0.56
1:A:50[A]:HIS:HD2	8:A:769:HOH:O	1.88	0.55
1:A:375:GLU:HG3	1:A:416:ILE:HD12	1.87	0.55
1:A:127:ARG:HD2	8:A:634:HOH:O	2.05	0.55
1:B:373:ASN:HD21	1:B:409:ASN:HD22	1.53	0.55
1:B:167:GLU:HG3	8:B:836:HOH:O	2.06	0.54
1:B:262:GLU:HG2	1:B:317[B]:MSE:CG	2.36	0.54
3:B:507:GOL:O1	3:B:507:GOL:O3	2.19	0.54
1:A:50[B]:HIS:CG	1:A:51:PRO:HD2	2.41	0.54
1:A:62:ARG:O	5:A:507:PG4:C6	2.52	0.54
1:B:262:GLU:CG	1:B:317[B]:MSE:HG3	2.37	0.54
1:A:31:ARG:HG3	8:A:857:HOH:O	2.09	0.53
1:B:133:HIS:HD2	8:B:948:HOH:O	1.91	0.53
1:B:74[B]:SER:OG	1:B:79:MSE:HG2	2.09	0.53
2:A:501:SCN:N	4:A:506:BME:H11	2.24	0.53
1:A:238:GLY:N	3:A:505:GOL:H32	2.24	0.53
8:A:986:HOH:O	1:B:128:ARG:HG3	2.08	0.53
1:A:220:ASP:CG	8:A:608:HOH:O	2.52	0.52
1:A:138:TYR:OH	1:A:148:HIS:HD2	1.93	0.52

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:373:ASN:HD22	1:A:409:ASN:ND2	2.01	0.52
3:A:505:GOL:H31	6:A:508:ATP:C8	2.44	0.51
1:A:161:PHE:O	2:A:504:SCN:N	2.44	0.51
1:A:418:ARG:HD2	8:A:607:HOH:O	2.10	0.50
1:B:46:GLU:OE2	3:B:506:GOL:C1	2.59	0.50
1:B:377:CYS:SG	4:B:511:BME:S2	2.96	0.50
1:B:11:GLU:HB3	1:B:315:ARG:HD2	1.92	0.50
1:B:188:MSE:HE3	1:B:191:ILE:HB	1.92	0.50
1:A:133:HIS:HE1	1:A:169:GLN:OE1	1.95	0.48
3:A:505:GOL:H31	6:A:508:ATP:N7	2.28	0.48
1:A:50[A]:HIS:HE1	8:A:944:HOH:O	1.96	0.48
1:B:214:ALA:H	3:B:505:GOL:H12	1.77	0.48
1:B:4:PRO:N	8:B:619:HOH:O	2.47	0.47
1:B:293:LYS:HE3	8:B:746:HOH:O	2.10	0.47
1:A:223:VAL:O	1:A:227:GLN:HG3	2.15	0.46
1:A:168:LYS:HE3	8:A:1012:HOH:O	2.15	0.46
1:B:238:GLY:N	3:B:505:GOL:H11	2.31	0.46
1:A:239:LEU:N	1:A:239:LEU:HD23	2.31	0.46
1:A:380:THR:O	1:A:380:THR:CG2	2.64	0.45
1:A:131:LYS:HE3	1:B:84[A]:GLN:CD	2.42	0.45
1:B:293:LYS:HE2	8:B:746:HOH:O	2.12	0.45
1:B:317[B]:MSE:HE3	1:B:317[B]:MSE:H	1.81	0.45
1:A:131:LYS:HB2	1:A:178:PRO:HA	1.97	0.45
1:A:221:MSE:N	8:A:621:HOH:O	2.51	0.44
1:B:31:ARG:HG3	8:B:751:HOH:O	2.17	0.44
1:B:31:ARG:CD	8:B:603:HOH:O	2.60	0.44
1:B:381:ALA:N	1:B:382:PRO:HD2	2.34	0.43
1:B:5:LEU:HA	1:B:6:PRO:HD3	1.89	0.43
1:B:183:VAL:O	1:B:212:PHE:HA	2.19	0.43
1:B:413:VAL:O	1:B:414:ASN:HB2	2.19	0.43
1:B:379:GLU:HB3	8:B:911:HOH:O	2.18	0.42
1:A:391:LYS:HG3	1:A:408:ILE:HB	2.02	0.42
1:A:32:HIS:ND1	1:A:36:HIS:CD2	2.82	0.42
1:A:116:LEU:HD23	1:A:116:LEU:HA	1.85	0.41
1:A:174:GLN:NE2	8:A:614:HOH:O	2.46	0.41
1:A:398:ILE:CG2	1:A:404:VAL:CG2	2.98	0.41
1:B:168:LYS:CE	2:B:501:SCN:N	2.83	0.41
1:B:419:SER:HB2	3:B:504:GOL:H32	2.01	0.41
1:B:381:ALA:N	1:B:382:PRO:CD	2.83	0.41
1:A:213:GLY:O	1:A:214:ALA:HB3	2.21	0.41
1:A:370:LEU:C	1:A:370:LEU:HD23	2.46	0.41

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:238:GLY:H	3:B:505:GOL:H11	1.86	0.41
1:B:138:TYR:OH	1:B:148:HIS:HD2	2.04	0.40
1:B:201:ASP:HA	1:B:202:PRO:HD2	1.96	0.40
1:A:363:LYS:NZ	1:A:366:PRO:O	2.48	0.40
1:A:373:ASN:HD22	1:A:409:ASN:HB3	1.86	0.40
1:A:425:ARG:HD2	1:A:425:ARG:HA	1.90	0.40
1:B:370:LEU:C	1:B:370:LEU:HD23	2.47	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	428/437 (98%)	418 (98%)	8 (2%)	2 (0%)	24	10
1	B	432/437 (99%)	423 (98%)	7 (2%)	2 (0%)	24	10
All	All	860/874 (98%)	841 (98%)	15 (2%)	4 (0%)	43	10

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	243[A]	MSE
1	B	243[B]	MSE
1	A	243[A]	MSE
1	A	243[B]	MSE

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	360/353 (102%)	351 (98%)	9 (2%)	42	18
1	B	364/353 (103%)	357 (98%)	7 (2%)	50	27
All	All	724/706 (102%)	708 (98%)	16 (2%)	45	22

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	21	LEU
1	A	54	LEU
1	A	128	ARG
1	A	296	LEU
1	A	317	MSE
1	A	338	VAL
1	A	367	LEU
1	A	418	ARG
1	A	431	LYS
1	B	54	LEU
1	B	128	ARG
1	B	227	GLN
1	B	249	SER
1	B	296	LEU
1	B	338	VAL
1	B	420	VAL

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	36	HIS
1	A	133	HIS
1	A	148	HIS
1	A	373	ASN
1	A	414	ASN
1	B	36	HIS
1	B	133	HIS
1	B	148	HIS
1	B	174	GLN
1	B	227	GLN
1	B	373	ASN

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 ⓘ

Of 28 ligands modelled in this entry, 6 are monoatomic - leaving 22 for Mogul analysis.

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	SCN	A	513	-	1,2,2	0.90	0	0,1,1	-	-
2	SCN	A	503	-	1,2,2	0.91	0	0,1,1	-	-
4	BME	B	511	-	3,3,3	0.49	0	2,2,2	0.46	0
3	GOL	A	505	-	5,5,5	0.62	0	5,5,5	1.28	1 (20%)
2	SCN	B	503	-	1,2,2	1.19	0	0,1,1	-	-
3	GOL	B	505	-	5,5,5	0.42	0	5,5,5	0.55	0
2	SCN	A	502	-	1,2,2	1.00	0	0,1,1	-	-
2	SCN	B	501	-	1,2,2	0.99	0	0,1,1	-	-
4	BME	B	509	-	3,3,3	0.41	0	2,2,2	0.24	0
3	GOL	B	507	-	5,5,5	0.39	0	5,5,5	0.33	0
6	ATP	B	512	7	32,33,33	1.53	7 (21%)	48,52,52	1.80	11 (22%)
4	BME	B	510	-	3,3,3	0.41	0	2,2,2	0.15	0
2	SCN	A	501	-	1,2,2	0.83	0	0,1,1	-	-
5	PG4	A	507	-	11,11,12	0.43	0	10,10,11	0.75	0
3	GOL	B	504	-	5,5,5	0.33	0	5,5,5	0.54	0
4	BME	A	506	-	3,3,3	0.33	0	2,2,2	0.43	0
3	GOL	B	506	-	5,5,5	0.30	0	5,5,5	0.74	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	SCN	A	512	-	1,2,2	0.98	0	0,1,1	-	-
4	BME	B	508	-	3,3,3	0.51	0	2,2,2	0.20	0
6	ATP	A	508	7	32,33,33	1.37	5 (15%)	48,52,52	1.61	7 (14%)
2	SCN	A	504	-	1,2,2	0.43	0	0,1,1	-	-
2	SCN	B	502	-	1,2,2	0.72	0	0,1,1	-	-

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
3	GOL	B	505	-	-	2/4/4/4	-
3	GOL	B	506	-	-	2/4/4/4	-
4	BME	B	509	-	-	1/1/1/1	-
4	BME	B	508	-	-	0/1/1/1	-
6	ATP	A	508	7	-	7/22/38/38	0/3/3/3
5	PG4	A	507	-	-	3/9/9/10	-
3	GOL	B	507	-	-	4/4/4/4	-
6	ATP	B	512	7	-	8/22/38/38	0/3/3/3
4	BME	B	511	-	-	1/1/1/1	-
3	GOL	B	504	-	-	2/4/4/4	-
3	GOL	A	505	-	-	4/4/4/4	-
4	BME	A	506	-	-	0/1/1/1	-
4	BME	B	510	-	-	0/1/1/1	-

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	512	ATP	PB-O3A	4.34	1.64	1.59
6	A	508	ATP	C5-C4	4.03	1.46	1.39
6	B	512	ATP	C5-C4	3.97	1.46	1.39
6	B	512	ATP	C5-N7	-2.72	1.34	1.39
6	A	508	ATP	C8-N7	2.66	1.36	1.31
6	A	508	ATP	C5-C6	2.63	1.48	1.41
6	A	508	ATP	PB-O3A	2.43	1.62	1.59
6	B	512	ATP	PA-O3A	2.29	1.62	1.59
6	A	508	ATP	PA-O3A	2.18	1.61	1.59
6	B	512	ATP	C8-N7	2.13	1.35	1.31
6	B	512	ATP	C5-C6	2.07	1.46	1.41

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	512	ATP	PB-O3B	2.05	1.61	1.59

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	512	ATP	C5-C4-N3	-5.48	119.17	126.72
6	A	508	ATP	C5-C4-N3	-5.12	119.67	126.72
6	B	512	ATP	N3-C4-N9	4.65	135.07	127.17
6	A	508	ATP	N3-C2-N1	-4.08	122.41	128.58
6	A	508	ATP	N3-C4-N9	3.68	133.43	127.17
6	B	512	ATP	N3-C2-N1	-3.53	123.23	128.58
6	A	508	ATP	C2-N3-C4	3.36	120.03	111.83
6	B	512	ATP	C2-N3-C4	3.07	119.33	111.83
6	B	512	ATP	C4-N9-C8	3.05	108.94	105.74
6	B	512	ATP	C4-C5-N7	-2.89	107.28	110.58
6	A	508	ATP	C4-C5-N7	-2.79	107.39	110.58
6	B	512	ATP	C5-N7-C8	2.79	107.83	103.45
6	B	512	ATP	N9-C8-N7	-2.75	110.04	113.94
6	B	512	ATP	C2'-C1'-N9	-2.60	106.83	113.30
6	B	512	ATP	O3A-PA-O1A	-2.60	102.88	110.70
6	A	508	ATP	C4-N9-C8	2.36	108.22	105.74
6	A	508	ATP	C2'-C1'-N9	-2.28	107.64	113.30
3	A	505	GOL	O3-C3-C2	2.27	120.58	110.38
6	B	512	ATP	O2B-PB-O3A	2.07	112.88	107.27

There are no chirality outliers.

All (34) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	505	GOL	C1-C2-C3-O3
3	A	505	GOL	O2-C2-C3-O3
3	B	504	GOL	O1-C1-C2-O2
3	B	504	GOL	O1-C1-C2-C3
4	B	509	BME	O1-C1-C2-S2
6	A	508	ATP	PB-O3B-PG-O3G
6	A	508	ATP	C5'-O5'-PA-O1A
6	A	508	ATP	C5'-O5'-PA-O2A
6	A	508	ATP	C5'-O5'-PA-O3A
6	B	512	ATP	PB-O3A-PA-O5'
6	B	512	ATP	C5'-O5'-PA-O2A
6	B	512	ATP	C5'-O5'-PA-O3A
3	B	507	GOL	O2-C2-C3-O3

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms
3	A	505	GOL	O1-C1-C2-C3
3	B	505	GOL	C1-C2-C3-O3
3	B	506	GOL	C1-C2-C3-O3
3	B	507	GOL	O1-C1-C2-C3
3	B	507	GOL	C1-C2-C3-O3
5	A	507	PG4	O3-C5-C6-O4
3	B	505	GOL	O2-C2-C3-O3
6	A	508	ATP	PB-O3B-PG-O1G
6	B	512	ATP	PB-O3B-PG-O1G
3	A	505	GOL	O1-C1-C2-O2
6	A	508	ATP	PB-O3A-PA-O5'
6	B	512	ATP	PB-O3B-PG-O3G
5	A	507	PG4	C1-C2-O2-C3
5	A	507	PG4	O2-C3-C4-O3
4	B	511	BME	O1-C1-C2-S2
6	B	512	ATP	C5'-O5'-PA-O1A
3	B	506	GOL	O2-C2-C3-O3
3	B	507	GOL	O1-C1-C2-O2
6	A	508	ATP	PB-O3A-PA-O1A
6	B	512	ATP	PB-O3A-PA-O2A
6	B	512	ATP	PB-O3A-PA-O1A

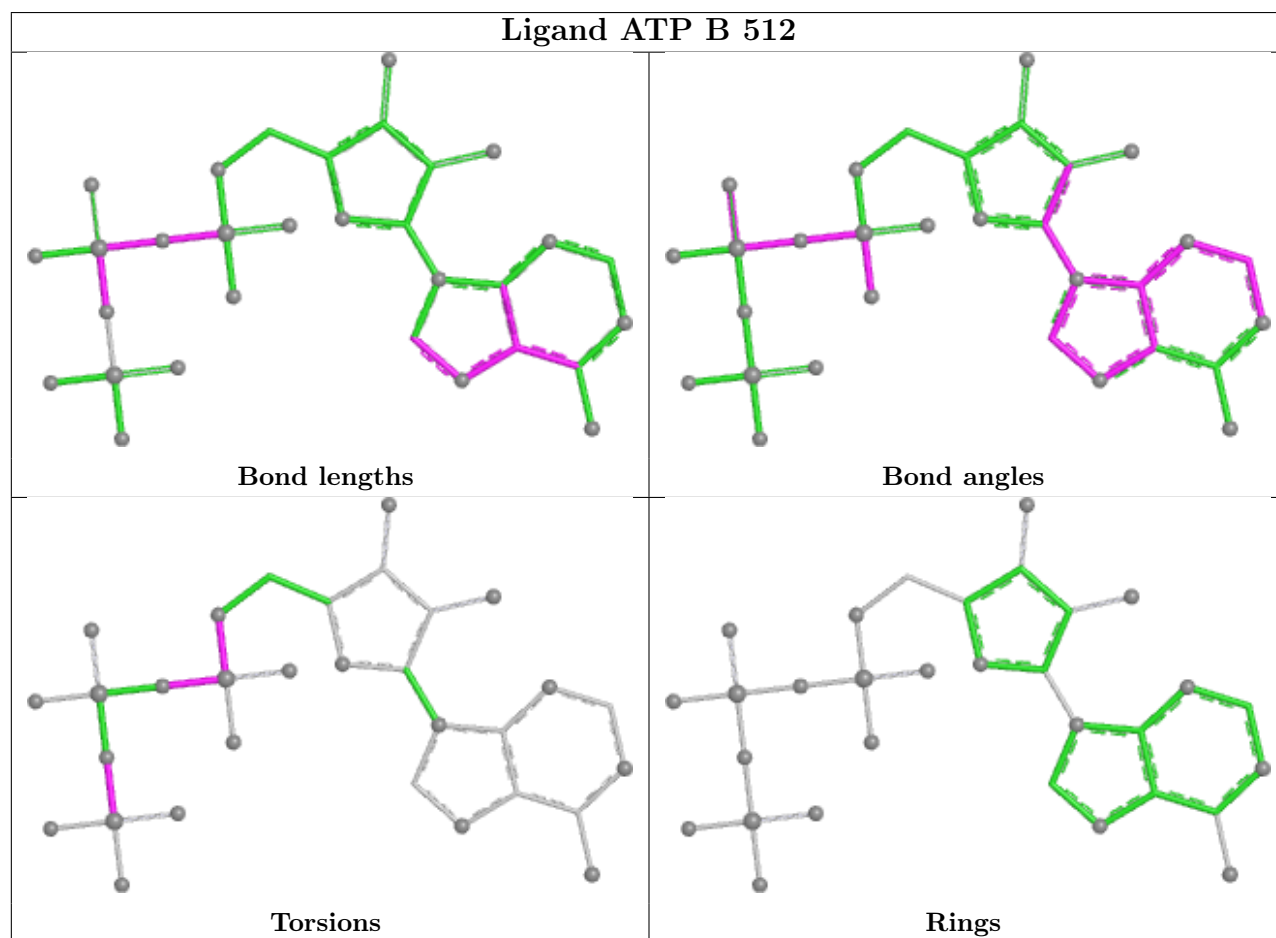
There are no ring outliers.

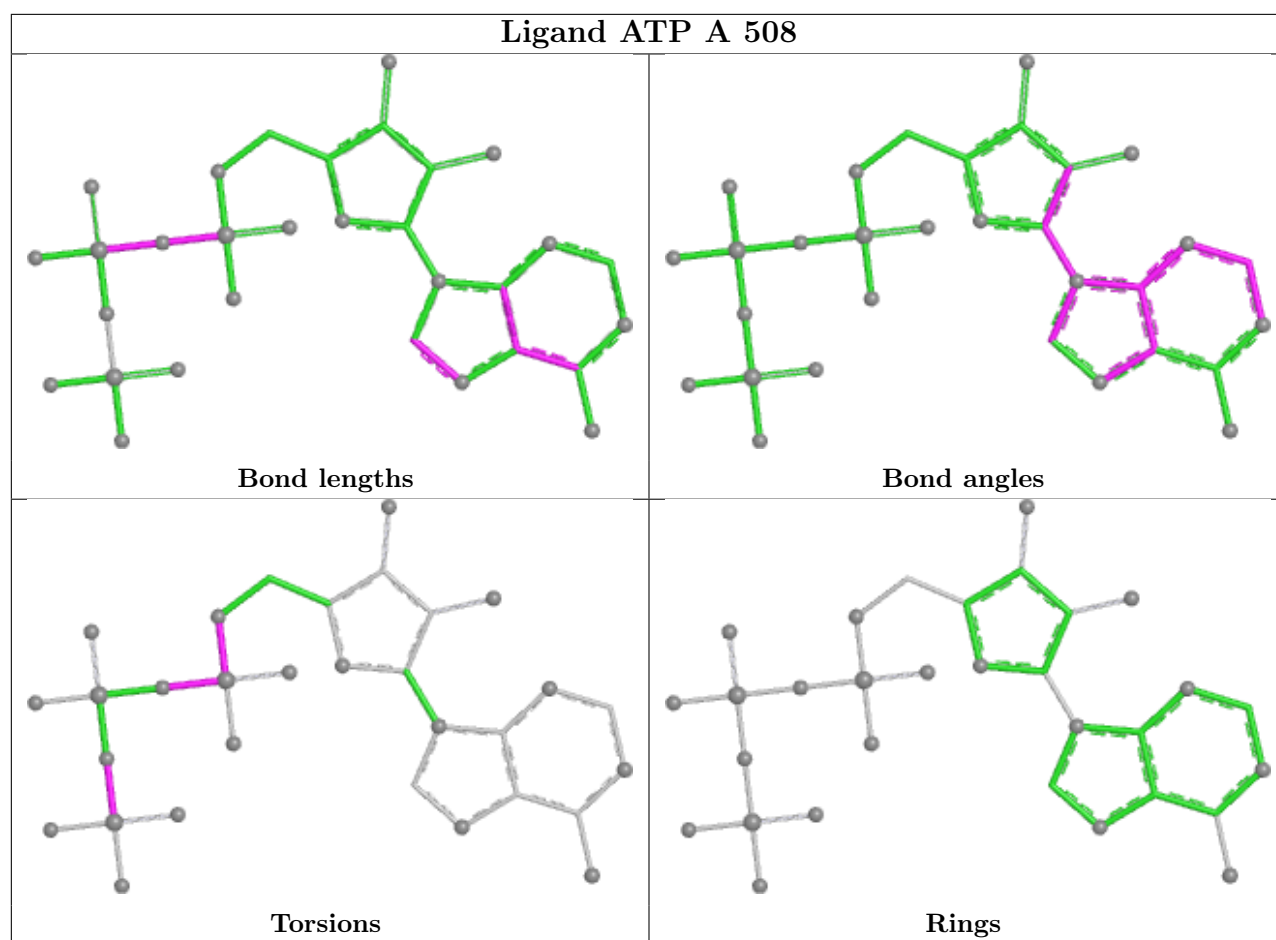
14 monomers are involved in 28 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	511	BME	2	0
3	A	505	GOL	5	0
3	B	505	GOL	6	0
2	B	501	SCN	2	0
3	B	507	GOL	2	0
6	B	512	ATP	2	0
4	B	510	BME	1	0
2	A	501	SCN	1	0
5	A	507	PG4	3	0
3	B	504	GOL	3	0
4	A	506	BME	2	0
3	B	506	GOL	1	0
6	A	508	ATP	2	0
2	A	504	SCN	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	A	415/437 (94%)	-0.27	0 100 100	8, 20, 33, 56	10 (2%)
1	B	417/437 (95%)	-0.43	4 (0%) 79 83	7, 17, 29, 41	12 (2%)
All	All	832/874 (95%)	-0.35	4 (0%) 87 90	7, 18, 32, 56	22 (2%)

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	379	GLU	2.9
1	B	4	PRO	2.6
1	B	420	VAL	2.5
1	B	382	PRO	2.3

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(Å ²)	Q<0.9
2	SCN	A	504	3/3	0.77	0.18	16,16,21,30	0

Continued on next page...

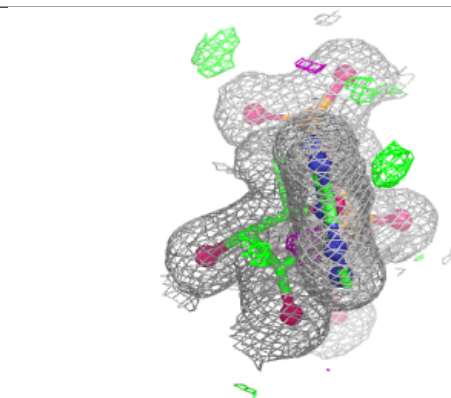
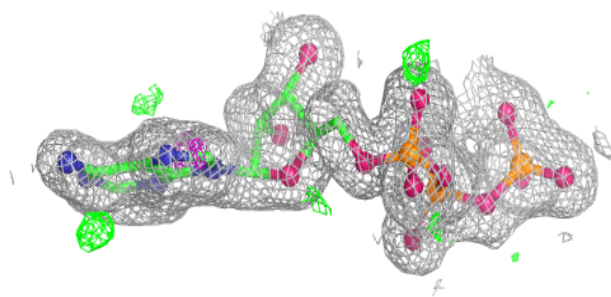
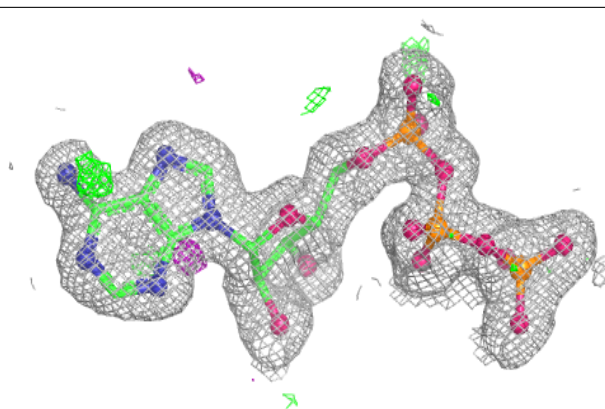
Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	BME	B	511	4/4	0.79	0.20	69,70,70,70	0
2	SCN	A	512	3/3	0.80	0.16	63,63,63,64	0
4	BME	B	510	4/4	0.82	0.15	57,59,59,60	0
4	BME	A	506	4/4	0.82	0.19	67,68,70,70	0
2	SCN	A	503	3/3	0.83	0.14	63,63,64,65	0
2	SCN	A	502	3/3	0.84	0.16	67,67,67,68	0
3	GOL	B	504	6/6	0.84	0.16	30,44,45,47	0
3	GOL	B	507	6/6	0.84	0.12	37,45,48,48	0
5	PG4	A	507	12/13	0.85	0.14	36,44,48,51	0
4	BME	B	509	4/4	0.86	0.13	39,44,48,62	0
3	GOL	A	505	6/6	0.88	0.15	18,25,35,35	0
2	SCN	A	501	3/3	0.89	0.21	41,41,42,43	0
2	SCN	B	503	3/3	0.89	0.12	46,46,47,51	0
4	BME	B	508	4/4	0.92	0.14	25,27,28,31	0
3	GOL	B	506	6/6	0.93	0.09	21,22,32,38	0
2	SCN	B	502	3/3	0.94	0.15	33,33,34,35	0
3	GOL	B	505	6/6	0.94	0.11	15,24,34,35	0
7	MG	B	514	1/1	0.95	0.05	14,14,14,14	0
2	SCN	A	513	3/3	0.96	0.11	30,30,31,33	0
7	MG	A	511	1/1	0.96	0.15	17,17,17,17	0
2	SCN	B	501	3/3	0.96	0.09	28,28,29,30	0
7	MG	B	515	1/1	0.98	0.17	17,17,17,17	0
7	MG	A	510	1/1	0.99	0.06	23,23,23,23	0
6	ATP	A	508	31/31	0.99	0.04	12,14,16,18	0
7	MG	B	513	1/1	0.99	0.05	22,22,22,22	0
6	ATP	B	512	31/31	0.99	0.04	8,12,16,17	0
7	MG	A	509	1/1	0.99	0.02	15,15,15,15	0

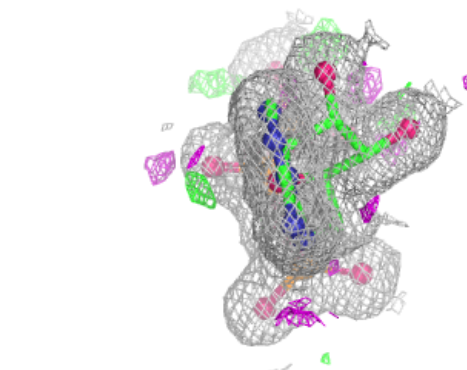
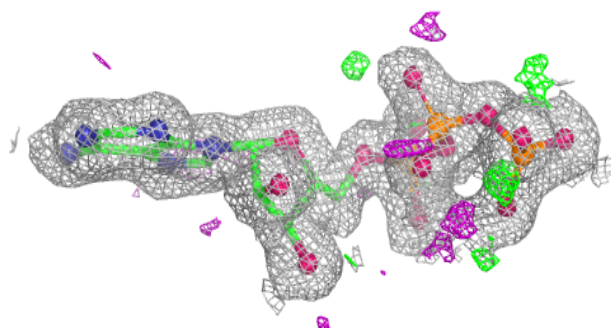
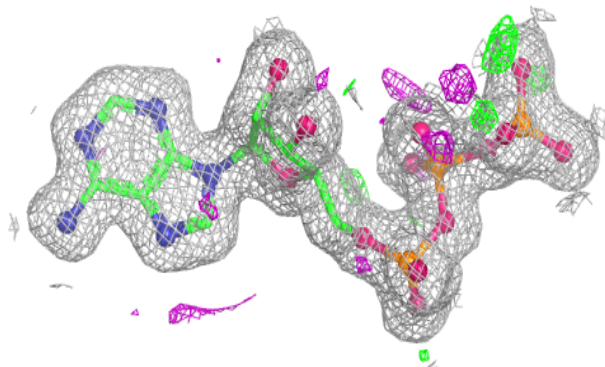
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ATP A 508:

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

**Electron density around ATP B 512:**

$2mF_o-DF_c$ (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.