



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 24, 2024 – 08:58 AM EDT

PDB ID : 6ASY
Title : BiP-ATP2
Authors : Liu, Q.; Yang, J.; Zong, Y.; Columbus, L.; Zhou, L.
Deposited on : 2017-08-26
Resolution : 1.85 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 : 4.02b-467
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 1.20.1
EDS : 2.37.1
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) : 2.37.1

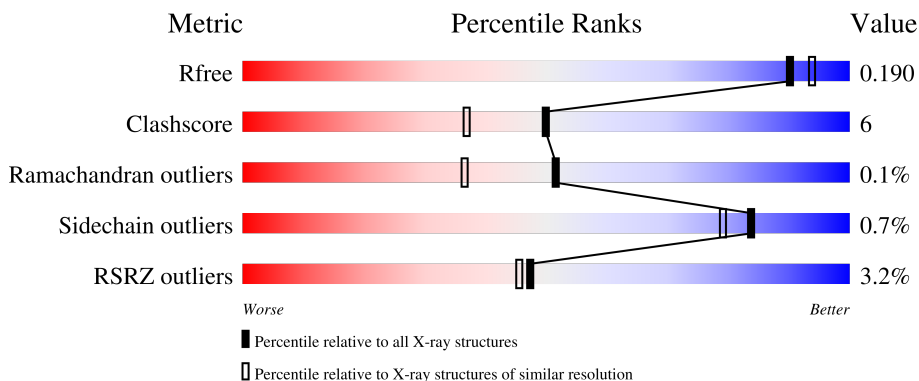
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.85 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	2469 (1.86-1.86)
Clashscore	141614	2625 (1.86-1.86)
Ramachandran outliers	138981	2592 (1.86-1.86)
Sidechain outliers	138945	2592 (1.86-1.86)
RSRZ outliers	127900	2436 (1.86-1.86)

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	606	
1	B	606	

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	SO4	B	706	-	-	X	-

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 10997 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 78 kDa glucose-regulated protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	606	4797	3010	822	953	12	0	11	0
1	B	606	4791	3006	821	952	12	0	10	0

There are 16 discrepancies between the modelled and reference sequences:

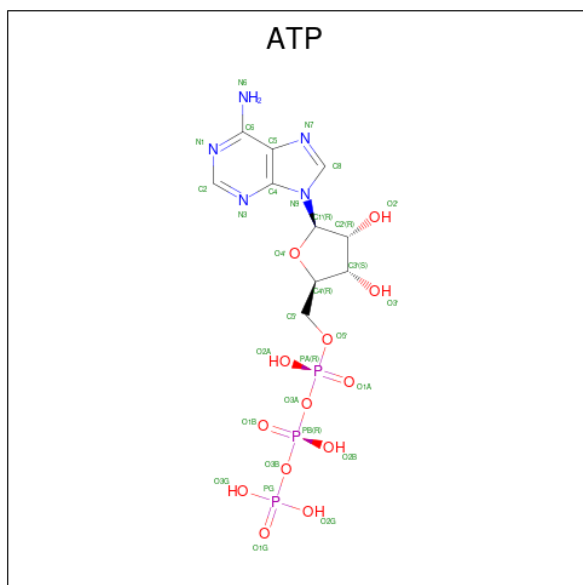
Chain	Residue	Modelled	Actual	Comment	Reference
A	24	SER	-	expression tag	UNP P11021
A	?	-	THR	deletion	UNP P11021
A	?	-	ALA	deletion	UNP P11021
A	?	-	SER	deletion	UNP P11021
A	?	-	ASP	deletion	UNP P11021
A	453	VAL	ASN	conflict	UNP P11021
A	454	GLY	GLN	conflict	UNP P11021
A	455	GLY	PRO	conflict	UNP P11021
B	24	SER	-	expression tag	UNP P11021
B	?	-	THR	deletion	UNP P11021
B	?	-	ALA	deletion	UNP P11021
B	?	-	SER	deletion	UNP P11021
B	?	-	ASP	deletion	UNP P11021
B	453	VAL	ASN	conflict	UNP P11021
B	454	GLY	GLN	conflict	UNP P11021
B	455	GLY	PRO	conflict	UNP P11021

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



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

- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



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

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



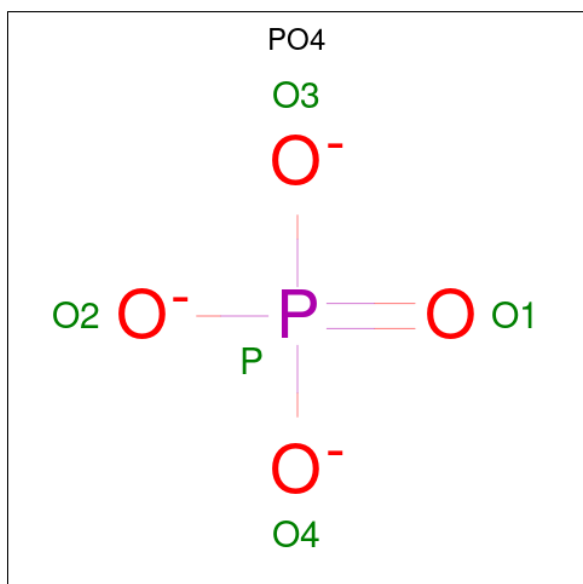
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	O	S	0	0
			5	4	1		
4	A	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		
4	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 5 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	P	0	0
			5	4	1		
5	A	1	Total	O	P	0	0
			5	4	1		
5	A	1	Total	O	P	0	0
			5	4	1		
5	A	1	Total	O	P	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	P	0	0
			5	4	1		
5	B	1	Total	O	P	0	0
			5	4	1		
5	B	1	Total	O	P	0	0
			5	4	1		
5	B	1	Total	O	P	0	0
			5	4	1		
5	B	1	Total	O	P	0	0
			5	4	1		

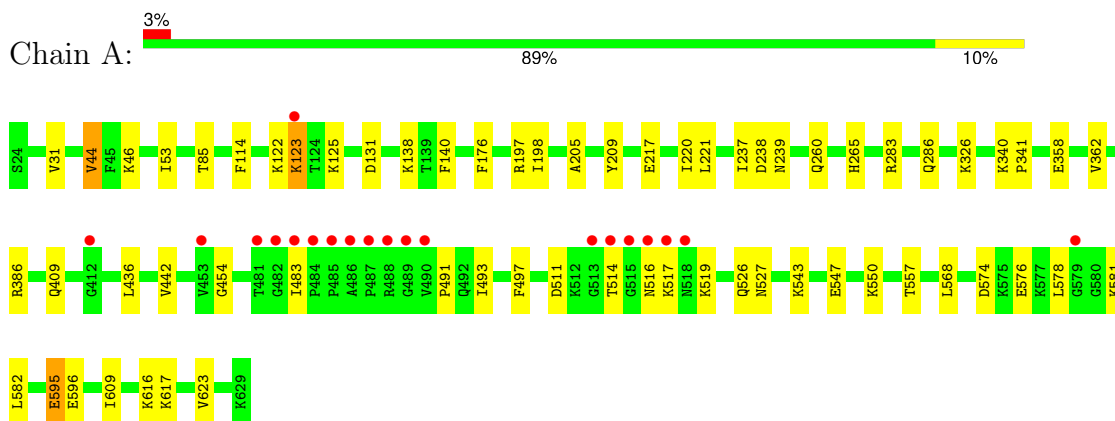
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	617	Total	O	0	0
			617	617		
6	B	592	Total	O	0	0
			592	592		

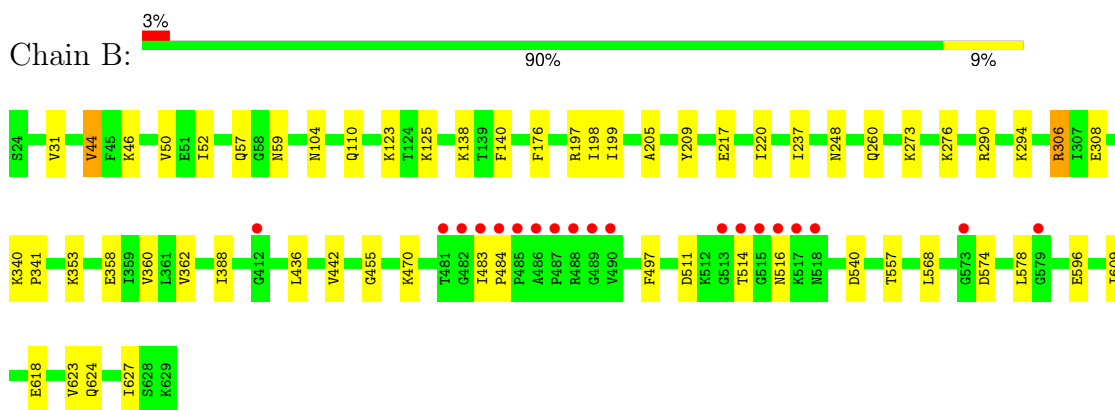
3 Residue-property plots [i](#)

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: 78 kDa glucose-regulated protein



- Molecule 1: 78 kDa glucose-regulated protein



4 Data and refinement statistics i

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	75.83Å 75.75Å 78.79Å 62.05° 62.23° 73.42°	Depositor
Resolution (Å)	39.09 – 1.85 39.27 – 1.85	Depositor EDS
% Data completeness (in resolution range)	97.6 (39.09-1.85) 96.9 (39.27-1.85)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.89 (at 1.85Å)	Xtrriage
Refinement program	PHENIX 1.8.4_1496	Depositor
R, R_{free}	0.159 , 0.189 0.162 , 0.190	Depositor DCC
R_{free} test set	5717 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	21.1	Xtrriage
Anisotropy	0.098	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 32.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.460 for -k,-h,-l	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	10997	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.12% 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: SO4, GOL, ATP, PO4

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	0.46	0/4864	0.57	0/6564
1	B	0.44	0/4858	0.56	0/6555
All	All	0.45	0/9722	0.57	0/13119

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	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	526	GLN	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	4797	0	4827	62	1
1	B	4791	0	4821	47	1
2	A	30	0	40	3	0
2	B	18	0	24	3	0
3	A	31	0	12	1	0
3	B	31	0	12	1	0
4	A	20	0	0	0	0
4	B	20	0	0	2	0
5	A	30	0	0	1	0
5	B	20	0	0	0	0
6	A	617	0	0	29	1
6	B	592	0	0	23	1
All	All	10997	0	9736	113	2

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 6.

All (113) 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:574:ASP:O	6:A:801:HOH:O	1.89	0.90
1:A:483:ILE:HD11	1:A:491:PRO:HB3	1.58	0.86
1:B:260:GLN:NE2	6:B:805:HOH:O	2.09	0.85
1:A:197[B]:ARG:NH1	1:A:198:ILE:O	2.12	0.82
5:A:711:PO4:O4	6:A:802:HOH:O	1.98	0.81
1:B:197[B]:ARG:NH1	1:B:198:ILE:O	2.11	0.81
1:A:519:LYS:NZ	6:A:807:HOH:O	2.10	0.81
1:B:306:ARG:NH2	6:B:807:HOH:O	2.14	0.80
1:A:46:LYS:NZ	6:A:810:HOH:O	2.14	0.78
1:A:527:ASN:O	6:A:803:HOH:O	2.03	0.77
1:A:578:LEU:N	6:A:801:HOH:O	2.17	0.76
1:A:217:GLU:OE1	6:A:804:HOH:O	2.05	0.74
1:B:110:GLN:OE1	6:B:801:HOH:O	2.05	0.73
1:B:578:LEU:N	6:B:808:HOH:O	2.18	0.73
3:B:704:ATP:O1B	6:B:803:HOH:O	2.05	0.73
1:B:618:GLU:OE2	6:B:802:HOH:O	2.05	0.72
1:A:543:LYS:HE2	6:A:1339:HOH:O	1.89	0.72
1:A:595:GLU:N	1:A:595:GLU:OE1	2.25	0.70
1:B:217:GLU:OE1	6:B:804:HOH:O	2.09	0.70
1:A:220:ILE:HG13	1:A:237:ILE:HD12	1.73	0.69
1:A:582:LEU:O	6:A:806:HOH:O	2.09	0.69
1:A:123:LYS:HB2	6:A:826:HOH:O	1.91	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:220:ILE:HG13	1:B:237:ILE:HD12	1.74	0.68
1:B:276:LYS:NZ	6:B:806:HOH:O	2.25	0.68
1:A:239:ASN:OD1	6:A:808:HOH:O	2.13	0.66
4:B:706:SO4:O2	6:B:806:HOH:O	2.12	0.66
1:A:543:LYS:NZ	1:A:547:GLU:OE2	2.30	0.64
1:B:104:ASN:HB2	6:B:955:HOH:O	1.98	0.64
1:A:454:GLY:O	6:A:809:HOH:O	2.14	0.64
1:A:114:PHE:CD1	1:A:260:GLN:NE2	2.66	0.64
1:B:290:ARG:NH1	6:B:812:HOH:O	2.24	0.63
1:A:197[B]:ARG:NH1	6:A:829:HOH:O	2.32	0.61
1:B:340:LYS:HG2	6:B:856:HOH:O	2.00	0.61
1:A:238:ASP:OD2	6:A:811:HOH:O	2.16	0.60
1:A:386:ARG:NH1	2:A:703:GOL:O3	2.36	0.58
1:A:616:LYS:HD2	6:A:1093:HOH:O	2.03	0.57
2:A:702:GOL:O1	6:A:812:HOH:O	2.17	0.57
1:B:514:THR:HG22	1:B:516:ASN:H	1.69	0.56
1:A:596:GLU:HG2	6:A:813:HOH:O	2.05	0.56
1:B:46:LYS:NZ	6:B:827:HOH:O	2.38	0.56
1:A:514:THR:HG23	1:A:516:ASN:N	2.21	0.55
1:B:31:VAL:HG12	1:B:44[B]:VAL:HG22	1.89	0.55
1:A:511:ASP:HB3	1:A:514:THR:HG22	1.90	0.53
1:A:514:THR:CG2	1:A:516:ASN:HB3	2.38	0.53
1:B:59:ASN:HA	2:B:701:GOL:H32	1.90	0.53
1:A:514:THR:HG23	1:A:516:ASN:H	1.73	0.53
1:A:454:GLY:HA2	1:A:483:ILE:HD13	1.90	0.52
1:A:574:ASP:HA	6:A:822:HOH:O	2.09	0.52
1:A:31:VAL:HG12	1:A:44[B]:VAL:HG22	1.93	0.51
1:A:596:GLU:OE2	6:A:813:HOH:O	2.18	0.51
1:A:557:THR:HG21	1:A:609:ILE:HD11	1.94	0.50
1:B:197[B]:ARG:NE	6:B:809:HOH:O	2.18	0.50
1:A:514:THR:HG23	1:A:516:ASN:HB3	1.92	0.50
1:B:557:THR:HG21	1:B:609:ILE:HD11	1.95	0.49
1:B:340:LYS:HB2	1:B:341:PRO:HD3	1.94	0.49
1:A:197[A]:ARG:NH1	6:A:805:HOH:O	2.21	0.49
1:B:568:LEU:HD13	1:B:623:VAL:HG21	1.95	0.48
1:B:511:ASP:HB3	1:B:514:THR:HB	1.95	0.48
1:A:197[A]:ARG:HD2	6:A:805:HOH:O	2.13	0.47
1:B:574:ASP:HB3	6:B:808:HOH:O	2.14	0.47
1:A:265:HIS:CE1	1:A:326:LYS:HE2	2.49	0.47
1:A:386:ARG:H	2:A:703:GOL:H12	1.80	0.47
1:A:568:LEU:HD13	1:A:623:VAL:HG21	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:353:LYS:NZ	2:B:703:GOL:H32	2.31	0.46
1:A:574:ASP:OD1	1:A:576:GLU:HG2	2.15	0.46
1:A:578:LEU:HD12	1:A:581:LYS:HD3	1.97	0.46
1:B:125:LYS:HB3	6:B:1274:HOH:O	2.15	0.46
1:B:353:LYS:HZ2	2:B:703:GOL:H32	1.81	0.46
1:B:442[B]:VAL:HG12	6:B:1145:HOH:O	2.15	0.46
1:A:442[B]:VAL:HG12	6:A:1146:HOH:O	2.15	0.46
3:A:706:ATP:O1B	6:A:815:HOH:O	2.20	0.46
1:A:340:LYS:HB2	1:A:341:PRO:HD3	1.97	0.46
1:B:294[A]:LYS:NZ	6:B:850:HOH:O	2.48	0.46
1:A:122:LYS:HB3	1:A:122:LYS:HE3	1.77	0.45
1:B:455:GLY:O	1:B:483:ILE:HD12	2.17	0.45
1:A:85:THR:O	1:A:283:ARG:NE	2.50	0.45
1:A:125:LYS:HD3	6:A:983:HOH:O	2.17	0.45
1:A:205:ALA:HB1	1:A:362:VAL:HG11	1.99	0.44
1:A:511:ASP:HB3	1:A:514:THR:CG2	2.46	0.44
1:A:409:GLN:N	6:A:814:HOH:O	2.19	0.44
1:A:131:ASP:OD2	6:A:816:HOH:O	2.21	0.44
1:A:516:ASN:OD1	1:A:517:LYS:N	2.50	0.44
1:A:617:LYS:HB2	1:A:617:LYS:HE3	1.72	0.44
1:B:209:TYR:OH	1:B:358:GLU:HG3	2.16	0.44
1:B:436:LEU:HD21	1:B:497:PHE:CD1	2.53	0.44
1:A:386:ARG:NH1	1:B:50:VAL:O	2.43	0.44
1:A:574:ASP:HB3	6:A:801:HOH:O	2.17	0.43
1:B:514:THR:CG2	1:B:516:ASN:HB2	2.49	0.43
1:A:209:TYR:OH	1:A:358:GLU:HG3	2.17	0.43
1:B:273:LYS:HB2	1:B:273:LYS:HE3	1.77	0.43
1:B:123:LYS:N	6:B:853:HOH:O	2.52	0.43
1:B:197[B]:ARG:NH1	1:B:199:ILE:HA	2.34	0.42
1:B:248:ASN:ND2	6:B:847:HOH:O	2.48	0.42
1:B:470:LYS:HE3	1:B:470:LYS:HB2	1.81	0.42
1:B:138:LYS:HG2	1:B:140:PHE:CZ	2.55	0.42
1:B:483:ILE:HA	1:B:484:PRO:HD3	1.91	0.42
1:A:483:ILE:HD12	1:A:493:ILE:HG12	2.01	0.42
1:B:205:ALA:HB1	1:B:362:VAL:HG11	2.02	0.41
1:B:540:ASP:HB3	6:B:1301:HOH:O	2.20	0.41
1:A:138:LYS:HG2	1:A:140:PHE:CZ	2.55	0.41
1:A:286:GLN:HG2	6:A:1077:HOH:O	2.20	0.41
1:B:360:VAL:HG13	1:B:388:ILE:HD13	2.02	0.41
1:B:624:GLN:OE1	1:B:627:ILE:HD11	2.20	0.41
4:B:706:SO4:O2	6:B:810:HOH:O	2.19	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:436:LEU:HD21	1:A:497:PHE:CD1	2.56	0.41
1:A:550:LYS:HA	1:A:550:LYS:HD2	1.78	0.41
1:B:220:ILE:HD12	1:B:358:GLU:HB2	2.03	0.41
1:B:596:GLU:HG2	6:B:838:HOH:O	2.19	0.41
1:A:386:ARG:NH2	1:B:52:ILE:HG12	2.36	0.41
1:B:306:ARG:HG2	1:B:308:GLU:OE1	2.20	0.41
1:A:44[A]:VAL:HG22	1:A:53:ILE:HD11	2.02	0.40
1:A:260:GLN:HA	1:A:260:GLN:OE1	2.22	0.40
1:A:125:LYS:NZ	6:A:864:HOH:O	2.53	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:1154:HOH:O	6:B:1087:HOH:O[1_545]	2.09	0.11
1:A:517:LYS:NZ	1:B:57:GLN:OE1[1_455]	2.15	0.05

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	615/606 (102%)	600 (98%)	14 (2%)	1 (0%)	47 33
1	B	614/606 (101%)	596 (97%)	18 (3%)	0	100 100
All	All	1229/1212 (101%)	1196 (97%)	32 (3%)	1 (0%)	51 36

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	123	LYS

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	527/519 (102%)	522 (99%)	5 (1%)	78	72
1	B	526/519 (101%)	522 (99%)	4 (1%)	81	76
All	All	1053/1038 (101%)	1044 (99%)	9 (1%)	84	72

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	44[A]	VAL
1	A	44[B]	VAL
1	A	176	PHE
1	A	221	LEU
1	A	595	GLU
1	B	44[A]	VAL
1	B	44[B]	VAL
1	B	176	PHE
1	B	306	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	527	ASN

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 [i](#)

28 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	SO4	A	709	-	4,4,4	0.22	0	6,6,6	0.10	0
2	GOL	A	704	-	5,5,5	0.39	0	5,5,5	0.25	0
5	PO4	B	710	-	4,4,4	0.95	0	6,6,6	0.38	0
2	GOL	B	703	-	5,5,5	0.35	0	5,5,5	0.29	0
2	GOL	A	701	-	5,5,5	0.40	0	5,5,5	0.21	0
5	PO4	A	712	-	4,4,4	0.91	0	6,6,6	0.55	0
5	PO4	A	715	-	4,4,4	0.91	0	6,6,6	0.50	0
5	PO4	A	714	-	4,4,4	0.91	0	6,6,6	0.52	0
3	ATP	B	704	-	28,33,33	1.39	3 (10%)	34,52,52	1.39	5 (14%)
3	ATP	A	706	-	28,33,33	1.38	3 (10%)	34,52,52	1.42	5 (14%)
4	SO4	B	706	-	4,4,4	0.22	0	6,6,6	0.15	0
5	PO4	A	716	-	4,4,4	0.95	0	6,6,6	0.52	0
5	PO4	B	709	-	4,4,4	0.94	0	6,6,6	0.39	0
5	PO4	A	711	-	4,4,4	0.94	0	6,6,6	0.49	0
2	GOL	A	702	-	5,5,5	0.37	0	5,5,5	0.34	0
2	GOL	A	703	-	5,5,5	0.35	0	5,5,5	0.42	0
5	PO4	B	711	-	4,4,4	0.94	0	6,6,6	0.51	0
5	PO4	B	712	-	4,4,4	0.91	0	6,6,6	0.47	0
4	SO4	A	707	-	4,4,4	0.24	0	6,6,6	0.14	0
4	SO4	A	710	-	4,4,4	0.23	0	6,6,6	0.09	0
4	SO4	B	705	-	4,4,4	0.23	0	6,6,6	0.09	0
4	SO4	A	708	-	4,4,4	0.24	0	6,6,6	0.08	0
5	PO4	A	713	-	4,4,4	0.93	0	6,6,6	0.37	0
4	SO4	B	707	-	4,4,4	0.23	0	6,6,6	0.07	0
2	GOL	A	705	-	5,5,5	0.37	0	5,5,5	0.28	0
2	GOL	B	702	-	5,5,5	0.39	0	5,5,5	0.22	0
2	GOL	B	701	-	5,5,5	0.37	0	5,5,5	0.43	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	SO4	B	708	-	4,4,4	0.23	0	6,6,6	0.09	0

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	ATP	B	704	-	-	5/18/38/38	0/3/3/3
2	GOL	A	703	-	-	4/4/4/4	-
3	ATP	A	706	-	-	4/18/38/38	0/3/3/3
2	GOL	A	705	-	-	4/4/4/4	-
2	GOL	B	702	-	-	2/4/4/4	-
2	GOL	A	704	-	-	2/4/4/4	-
2	GOL	B	701	-	-	4/4/4/4	-
2	GOL	B	703	-	-	2/4/4/4	-
2	GOL	A	701	-	-	4/4/4/4	-
2	GOL	A	702	-	-	2/4/4/4	-

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	706	ATP	PA-O3A	3.68	1.63	1.59
3	B	704	ATP	PA-O3A	3.64	1.63	1.59
3	B	704	ATP	PB-O3B	3.41	1.63	1.59
3	A	706	ATP	PB-O3A	3.19	1.62	1.59
3	B	704	ATP	PB-O3A	3.18	1.62	1.59
3	A	706	ATP	PB-O3B	3.18	1.62	1.59

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	704	ATP	N3-C2-N1	-3.73	123.61	128.67
3	A	706	ATP	N3-C2-N1	-3.48	123.95	128.67
3	A	706	ATP	C4'-O4'-C1'	-2.46	107.67	109.92
3	B	704	ATP	C4-C5-N7	-2.46	106.74	109.34
3	B	704	ATP	C4'-O4'-C1'	-2.44	107.69	109.92
3	B	704	ATP	O3A-PA-O1A	-2.37	103.58	110.70
3	A	706	ATP	C4-C5-N7	-2.17	107.04	109.34
3	B	704	ATP	O2A-PA-O1A	2.09	122.19	112.44

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	706	ATP	O2A-PA-O1A	2.08	122.13	112.44
3	A	706	ATP	O3B-PG-O1G	-2.01	100.49	111.04

There are no chirality outliers.

All (33) torsion outliers are listed below:

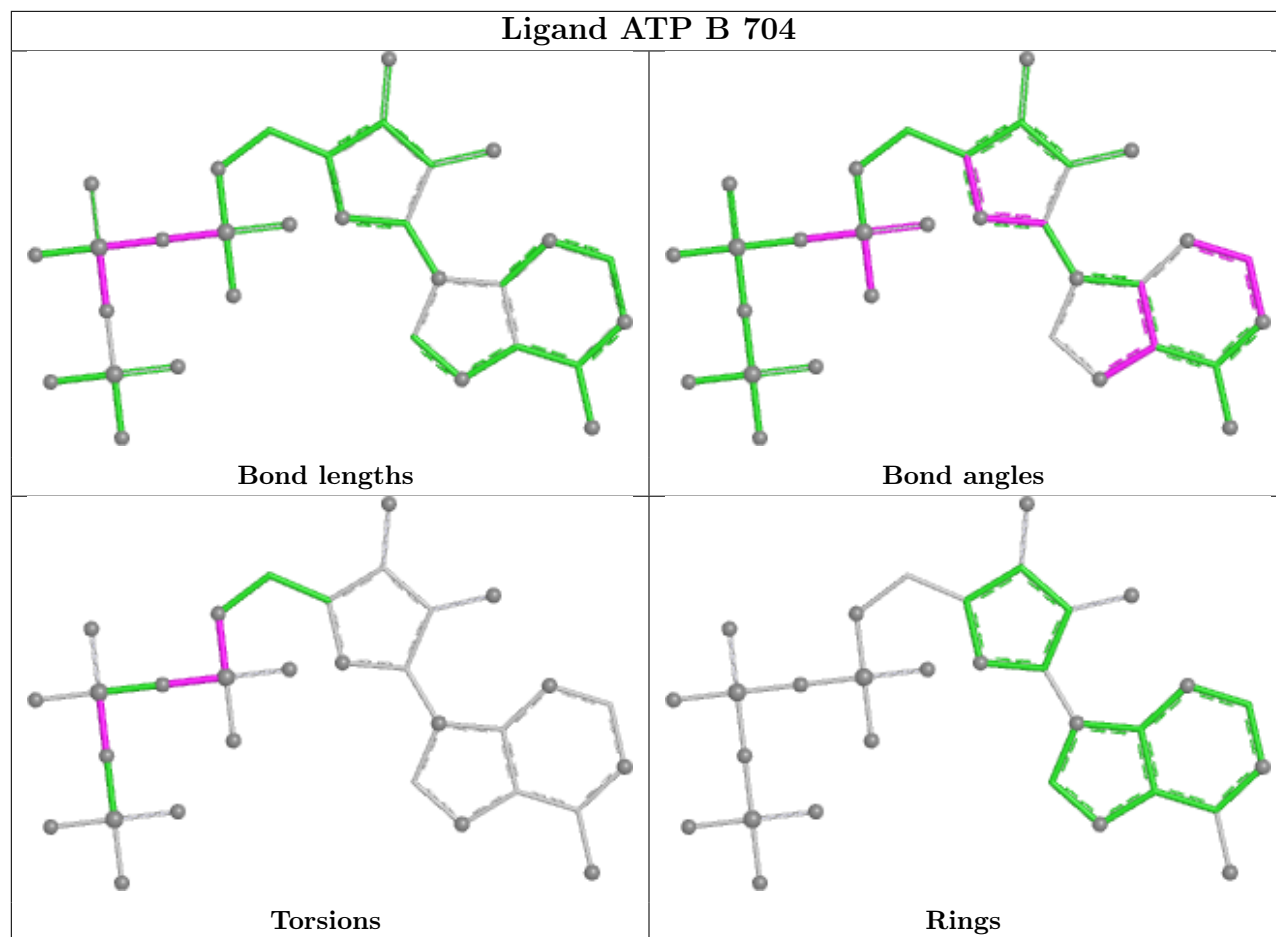
Mol	Chain	Res	Type	Atoms
2	A	701	GOL	O1-C1-C2-O2
2	A	701	GOL	O1-C1-C2-C3
2	A	701	GOL	C1-C2-C3-O3
2	A	701	GOL	O2-C2-C3-O3
2	A	703	GOL	O1-C1-C2-C3
2	A	703	GOL	C1-C2-C3-O3
2	A	705	GOL	O1-C1-C2-C3
3	A	706	ATP	C5'-O5'-PA-O2A
3	B	704	ATP	C5'-O5'-PA-O1A
2	A	702	GOL	O1-C1-C2-C3
2	A	704	GOL	C1-C2-C3-O3
2	A	705	GOL	C1-C2-C3-O3
2	B	701	GOL	O1-C1-C2-C3
2	B	701	GOL	C1-C2-C3-O3
2	B	703	GOL	O1-C1-C2-C3
2	A	702	GOL	O1-C1-C2-O2
2	A	703	GOL	O2-C2-C3-O3
2	B	701	GOL	O2-C2-C3-O3
2	B	703	GOL	O1-C1-C2-O2
2	A	705	GOL	O1-C1-C2-O2
2	A	705	GOL	O2-C2-C3-O3
2	B	701	GOL	O1-C1-C2-O2
2	A	703	GOL	O1-C1-C2-O2
2	B	702	GOL	O1-C1-C2-O2
3	B	704	ATP	PG-O3B-PB-O1B
2	B	702	GOL	C1-C2-C3-O3
3	A	706	ATP	PB-O3A-PA-O2A
3	A	706	ATP	PG-O3B-PB-O1B
2	A	704	GOL	O2-C2-C3-O3
3	B	704	ATP	PG-O3B-PB-O2B
3	A	706	ATP	PG-O3B-PB-O2B
3	B	704	ATP	PB-O3A-PA-O1A
3	B	704	ATP	PB-O3A-PA-O2A

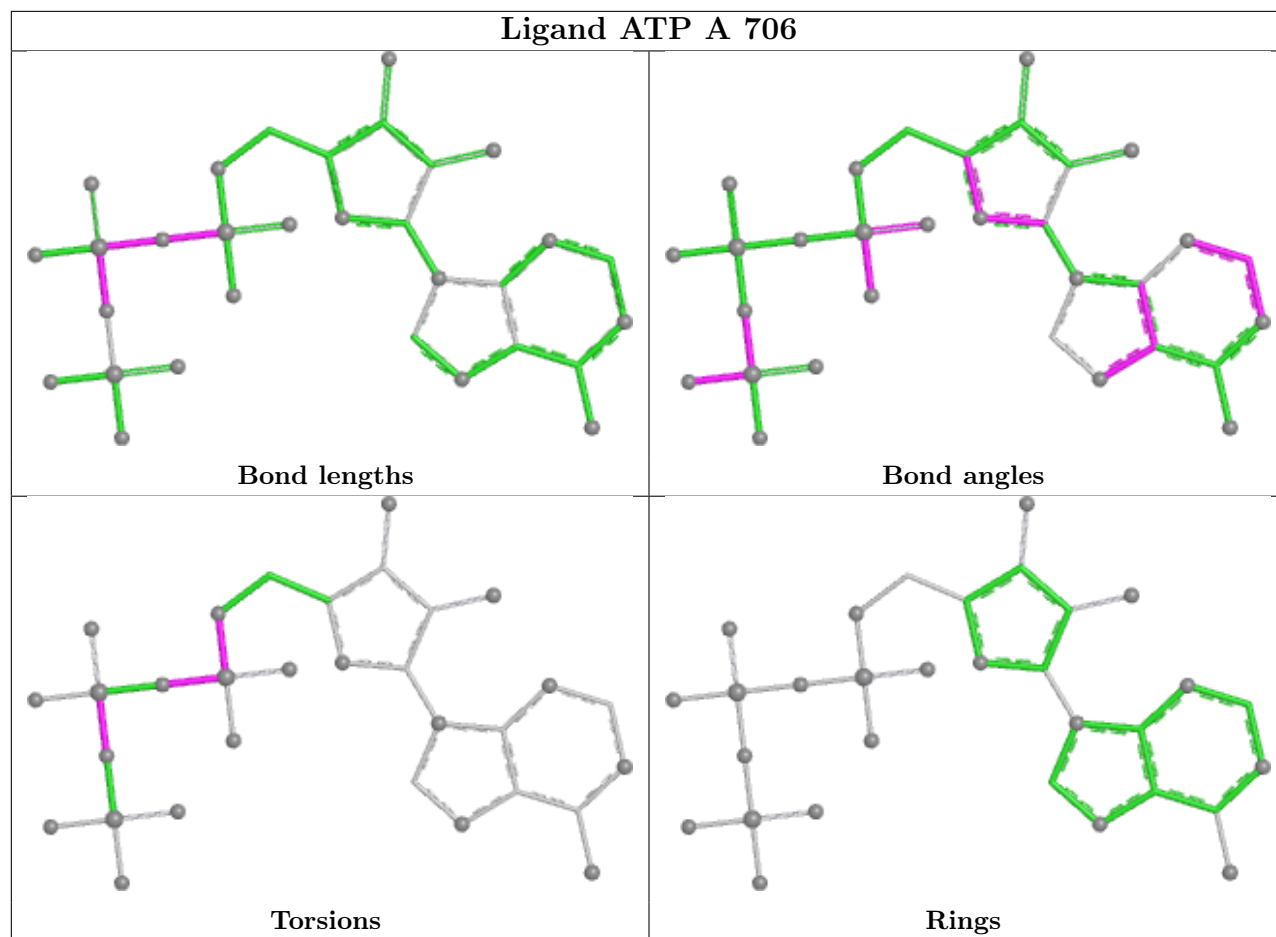
There are no ring outliers.

8 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	703	GOL	2	0
3	B	704	ATP	1	0
3	A	706	ATP	1	0
4	B	706	SO4	2	0
5	A	711	PO4	1	0
2	A	702	GOL	1	0
2	A	703	GOL	2	0
2	B	701	GOL	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, 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	606/606 (100%)	-0.29	20 (3%) 46 44	11, 24, 67, 135	0
1	B	606/606 (100%)	-0.26	19 (3%) 49 47	11, 24, 66, 134	0
All	All	1212/1212 (100%)	-0.27	39 (3%) 47 45	11, 24, 66, 135	0

All (39) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	482	GLY	13.6
1	B	482	GLY	12.1
1	B	487	PRO	11.5
1	A	487	PRO	10.7
1	B	486	ALA	9.5
1	A	515	GLY	9.3
1	A	486	ALA	8.6
1	B	515	GLY	8.5
1	A	485	PRO	7.9
1	B	488	ARG	7.7
1	B	483	ILE	7.7
1	A	489	GLY	6.9
1	B	485	PRO	6.8
1	B	484	PRO	5.9
1	B	490	VAL	5.8
1	A	488	ARG	4.4
1	A	490	VAL	4.4
1	B	489	GLY	4.4
1	A	484	PRO	4.1
1	B	513	GLY	3.8
1	A	483	ILE	3.7
1	B	514	THR	3.7
1	B	579	GLY	3.5
1	A	517	LYS	3.3

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Mol	Chain	Res	Type	RSRZ
1	A	516	ASN	3.1
1	A	514	THR	3.0
1	A	518	ASN	3.0
1	B	573	GLY	3.0
1	B	516	ASN	2.9
1	A	513	GLY	2.8
1	B	518	ASN	2.8
1	A	453	VAL	2.6
1	A	481	THR	2.6
1	B	481	THR	2.4
1	A	579	GLY	2.3
1	B	412	GLY	2.3
1	A	123	LYS	2.1
1	A	412	GLY	2.1
1	B	517	LYS	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, 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	GOL	A	704	6/6	0.63	0.16	48,56,57,60	0
2	GOL	B	702	6/6	0.66	0.17	40,54,55,58	0
2	GOL	A	705	6/6	0.71	0.24	63,72,74,76	0
2	GOL	A	702	6/6	0.75	0.26	62,75,80,81	0
2	GOL	A	703	6/6	0.77	0.17	58,61,65,67	0
2	GOL	B	703	6/6	0.78	0.19	55,58,63,67	0
5	PO4	B	710	5/5	0.81	0.15	76,79,82,86	0
4	SO4	B	707	5/5	0.82	0.16	106,106,107,109	0

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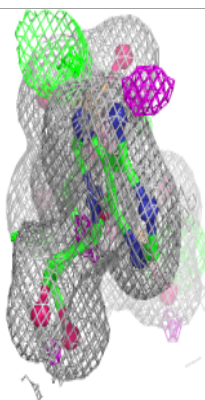
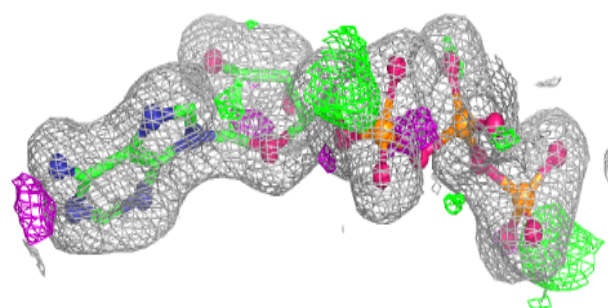
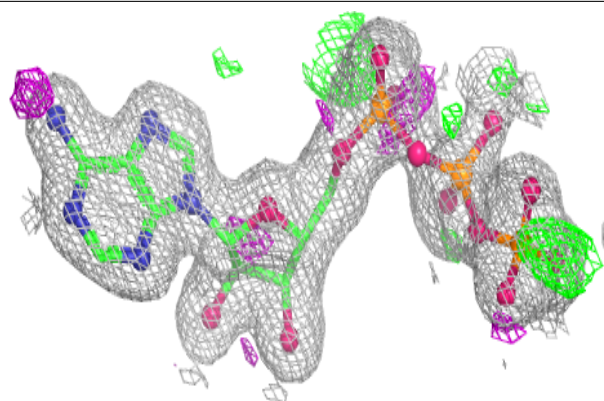
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	GOL	B	701	6/6	0.83	0.31	65,74,81,81	0
2	GOL	A	701	6/6	0.84	0.16	54,58,63,66	0
5	PO4	B	712	5/5	0.87	0.12	74,77,80,80	0
4	SO4	A	710	5/5	0.88	0.11	94,95,96,97	0
5	PO4	A	716	5/5	0.88	0.17	77,81,83,83	0
5	PO4	A	711	5/5	0.90	0.10	71,75,77,77	0
5	PO4	B	711	5/5	0.90	0.22	86,91,93,94	0
5	PO4	B	709	5/5	0.90	0.12	74,76,78,79	0
5	PO4	A	714	5/5	0.91	0.17	79,84,87,88	0
5	PO4	A	715	5/5	0.92	0.13	60,63,67,70	0
4	SO4	B	705	5/5	0.92	0.11	77,79,80,82	0
4	SO4	A	708	5/5	0.93	0.10	91,92,94,94	0
4	SO4	B	708	5/5	0.93	0.11	100,101,102,104	0
4	SO4	A	709	5/5	0.94	0.11	65,71,74,79	0
4	SO4	B	706	5/5	0.94	0.09	71,77,78,81	0
5	PO4	A	712	5/5	0.95	0.11	50,53,53,53	0
3	ATP	A	706	31/31	0.96	0.09	17,22,32,129	2
4	SO4	A	707	5/5	0.96	0.10	74,76,78,79	0
3	ATP	B	704	31/31	0.97	0.08	18,22,31,123	2
5	PO4	A	713	5/5	0.99	0.04	48,49,51,53	0

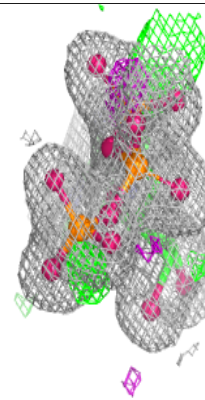
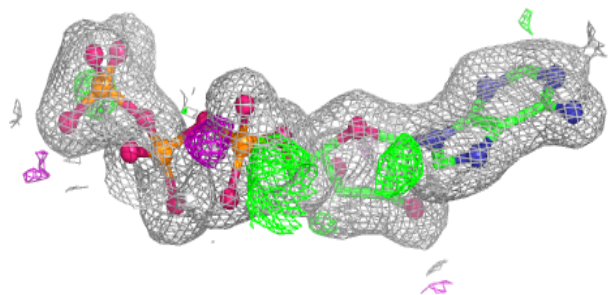
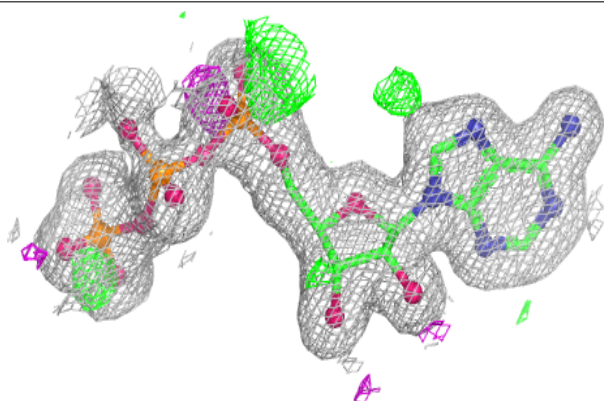
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around ATP A 706:

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

**Electron density around ATP B 704:**

$2mF_o-DF_c$ (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.