



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 27, 2026 – 03:11 PM UTC

PDB ID : 4RF8 / pdb_00004rf8
Title : Crystal structure of double-domain arginine kinase from *Anthopleura japonica* in complex with ADP
Authors : Wang, Z.; Qiao, Z.; Ye, S.; Zhang, R.
Deposited on : 2014-09-25
Resolution : 2.17 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

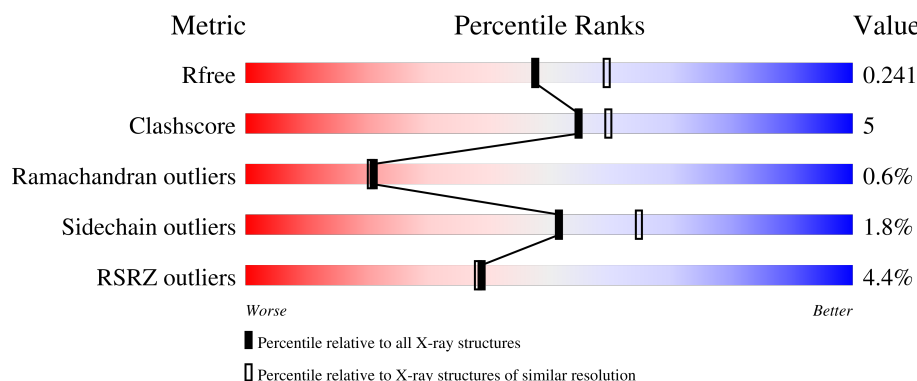
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.17 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	8975 (2.20-2.16)
Clashscore	190562	9786 (2.20-2.16)
Ramachandran outliers	187476	9664 (2.20-2.16)
Sidechain outliers	187428	9664 (2.20-2.16)
RSRZ outliers	180081	8979 (2.20-2.16)

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	718	
1	B	718	

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
3	NO3	A	1009	-	-	X	-

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 11633 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.

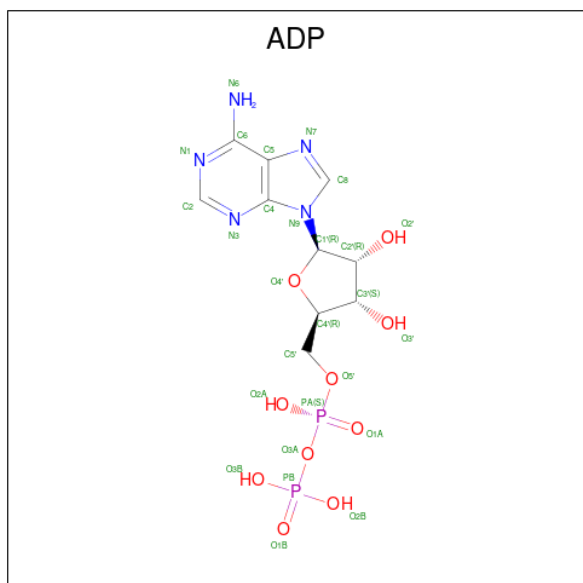
- Molecule 1 is a protein called Arginine kinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	686	Total	C	N	O	S	0	1	0
			5431	3430	958	1019	24			
1	B	693	Total	C	N	O	S	0	3	0
			5490	3467	970	1029	24			

There are 6 discrepancies between the modelled and reference sequences:

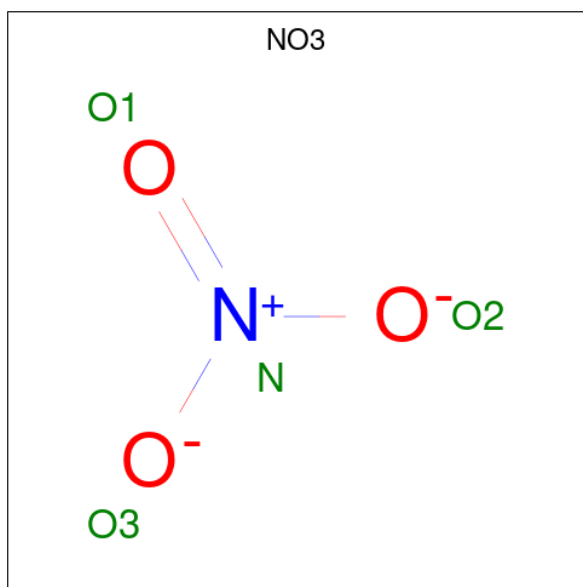
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP O15992
A	-1	PRO	-	expression tag	UNP O15992
A	0	HIS	-	expression tag	UNP O15992
B	-2	GLY	-	expression tag	UNP O15992
B	-1	PRO	-	expression tag	UNP O15992
B	0	HIS	-	expression tag	UNP O15992

- Molecule 2 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
2	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 3 is NITRATE ION (CCD ID: NO3) (formula: NO₃).



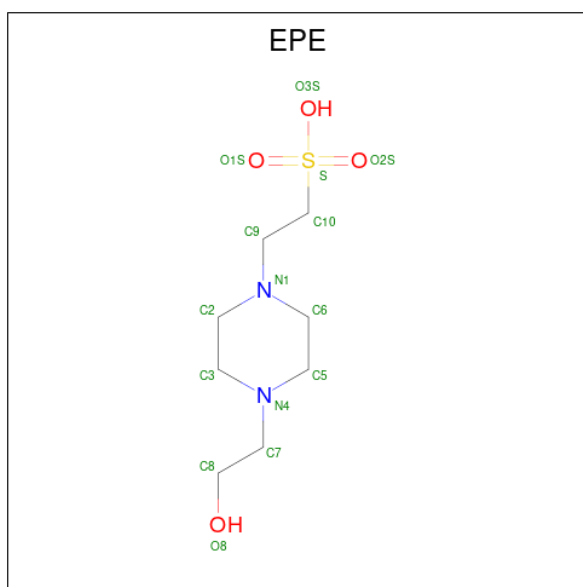
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	N	O	0	0
			4	1	3		
3	A	1	Total	N	O	0	0
			4	1	3		
3	A	1	Total	N	O	0	0
			4	1	3		
3	A	1	Total	N	O	0	0
			4	1	3		
3	A	1	Total	N	O	0	0
			4	1	3		
3	A	1	Total	N	O	0	0
			4	1	3		
3	A	1	Total	N	O	0	0
			4	1	3		
3	B	1	Total	N	O	0	0
			4	1	3		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	N	O	0	0
			4	1	3		
3	B	1	Total	N	O	0	0
			4	1	3		
3	B	1	Total	N	O	0	0
			4	1	3		
3	B	1	Total	N	O	0	0
			4	1	3		
3	B	1	Total	N	O	0	0
			4	1	3		
3	B	1	Total	N	O	0	0
			4	1	3		
3	B	1	Total	N	O	0	0
			4	1	3		
3	B	1	Total	N	O	0	0
			4	1	3		

- Molecule 4 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (CCD ID: EPE) (formula: $C_8H_{18}N_2O_4S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

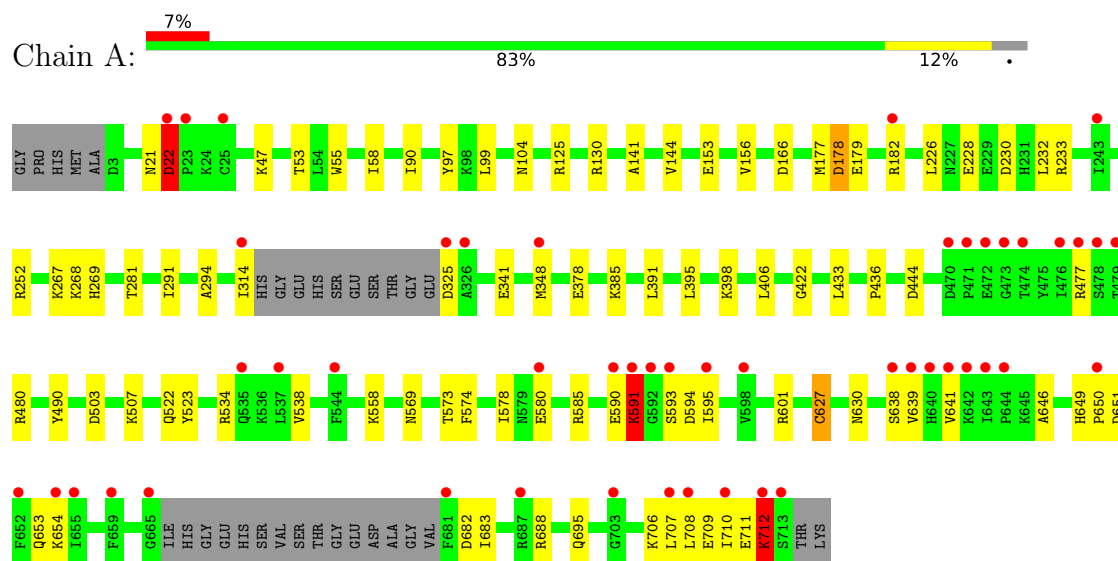
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	252	Total	O	0	0
			252	252		
5	B	296	Total	O	0	0
			296	296		

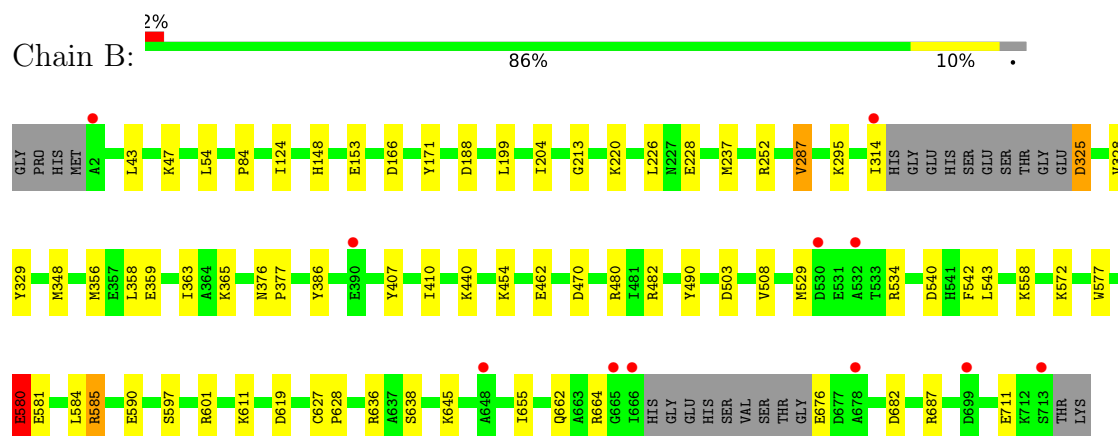
3 Residue-property plots [i](#)

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: Arginine kinase



• Molecule 1: Arginine kinase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	79.48Å 59.27Å 163.71Å 90.00° 90.75° 90.00°	Depositor
Resolution (Å)	47.51 – 2.17 47.51 – 2.17	Depositor EDS
% Data completeness (in resolution range)	98.4 (47.51-2.17) 92.3 (47.51-2.17)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.06 (at 2.18Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, R_{free}	0.192 , 0.239 0.194 , 0.241	Depositor DCC
R_{free} test set	3994 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å ²)	38.9	Xtriage
Anisotropy	0.226	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 56.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.017 for h,-k,-l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	11633	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.00% 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: ADP, NO3, EPE

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	0.31	0/5543	0.75	5/7474 (0.1%)
1	B	0.30	0/5611	0.72	0/7565
All	All	0.30	0/11154	0.73	5/15039 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	641	VAL	N-CA-C	5.37	115.63	108.27
1	A	627[A]	CYS	CA-C-N	5.33	125.00	119.56
1	A	627[A]	CYS	C-N-CA	5.33	125.00	119.56
1	A	627[B]	CYS	CA-C-N	5.33	125.00	119.56
1	A	627[B]	CYS	C-N-CA	5.33	125.00	119.56

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	A	5431	0	5422	53	0
1	B	5490	0	5491	52	0
2	A	27	0	12	1	0
2	B	27	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	36	0	0	2	0
3	B	44	0	0	1	0
4	B	30	0	34	7	0
5	A	252	0	0	7	0
5	B	296	0	0	8	0
All	All	11633	0	10971	106	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 5.

All (106) 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:B:462:GLU:HA	4:B:814:EPE:H91	1.66	0.76
1:A:125:ARG:NH1	1:A:325:ASP:OD2	2.16	0.73
1:B:558:LYS:NZ	3:B:809:NO3:O3	2.23	0.70
1:B:636:ARG:NH2	1:B:682:ASP:OD1	2.24	0.70
1:A:178:ASP:OD2	1:A:178:ASP:N	2.26	0.68
1:A:650:PRO:O	1:A:654:LYS:NZ	2.23	0.68
1:A:585:ARG:NH1	3:A:1009:NO3:O3	2.28	0.67
1:B:470:ASP:OD1	5:B:915:HOH:O	2.13	0.66
1:A:230:ASP:OD2	1:A:233:ARG:NH1	2.30	0.65
1:A:252:ARG:NH1	5:A:1219:HOH:O	2.30	0.65
1:B:148:HIS:ND1	5:B:1066:HOH:O	2.29	0.65
1:B:577:TRP:HB2	1:B:585[B]:ARG:HB2	1.77	0.65
1:B:47:LYS:NZ	5:B:1013:HOH:O	2.30	0.65
1:A:153:GLU:HA	1:A:226:LEU:HD21	1.77	0.64
1:A:166:ASP:OD1	1:A:252:ARG:NH2	2.29	0.64
1:A:99:LEU:HD13	1:A:268:LYS:HE3	1.81	0.63
1:B:590:GLU:HG3	1:B:601:ARG:HH22	1.63	0.62
1:A:558:LYS:NZ	5:A:1131:HOH:O	2.32	0.62
1:A:480:ARG:NH2	3:A:1009:NO3:O3	2.33	0.61
1:B:356:MET:SD	5:B:1136:HOH:O	2.57	0.61
1:A:695:GLN:HB3	4:B:813:EPE:H91	1.84	0.60
1:B:687:ARG:HH22	4:B:813:EPE:H101	1.68	0.59
1:A:591:LYS:NZ	1:A:591:LYS:H	2.00	0.59
1:A:590:GLU:OE1	1:A:601:ARG:NH2	2.28	0.59
1:B:529:MET:HE3	1:B:534:ARG:HB2	1.86	0.58
1:B:662:GLN:OE1	1:B:664:ARG:NH2	2.37	0.57
1:A:638:SER:OG	1:A:682:ASP:OD2	2.22	0.57
1:A:268:LYS:HE2	1:A:269:HIS:CE1	2.40	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:153:GLU:HA	1:B:226:LEU:HD21	1.87	0.55
1:B:508:VAL:HG11	1:B:584:LEU:HD21	1.89	0.55
1:A:22:ASP:OD2	1:A:22:ASP:N	2.34	0.55
1:B:480:ARG:NH1	5:B:1030:HOH:O	2.36	0.54
1:A:490:TYR:OH	1:A:503:ASP:OD1	2.22	0.54
1:A:639:VAL:HB	1:A:683:ILE:HB	1.88	0.54
1:A:385:LYS:NZ	5:A:1344:HOH:O	2.40	0.54
1:B:199:LEU:HD22	1:B:204:ILE:HD12	1.90	0.53
1:A:593:SER:O	1:A:595:ILE:N	2.42	0.53
1:B:580:GLU:CD	1:B:581:GLU:H	2.18	0.52
1:A:706:LYS:NZ	5:A:1329:HOH:O	2.44	0.51
1:A:156:VAL:HG11	1:A:232:LEU:HD21	1.93	0.50
1:A:130:ARG:NH1	2:A:1001:ADP:O3B	2.36	0.49
1:A:646:ALA:HB2	1:A:710:ILE:HB	1.94	0.49
1:B:188:ASP:OD2	1:B:220:LYS:NZ	2.29	0.48
1:B:295:LYS:HG3	1:B:329:TYR:CZ	2.49	0.48
1:A:590:GLU:HB2	1:A:591:LYS:HD2	1.95	0.47
1:A:523:TYR:CE1	1:A:578:ILE:HD12	2.49	0.47
1:A:391:LEU:HD11	1:A:436:PRO:HB2	1.97	0.47
1:B:325:ASP:N	1:B:325:ASP:OD1	2.47	0.47
1:B:490:TYR:OH	1:B:503:ASP:OD1	2.20	0.47
1:B:558:LYS:NZ	5:B:923:HOH:O	2.42	0.47
1:A:228:GLU:HB3	5:A:1226:HOH:O	2.14	0.47
1:B:386:TYR:CD1	1:B:440:LYS:HD3	2.50	0.46
1:A:422:GLY:N	5:A:1192:HOH:O	2.47	0.46
1:A:179:GLU:OE2	1:A:182:ARG:NE	2.49	0.46
1:B:611:LYS:NZ	5:B:1145:HOH:O	2.48	0.45
1:A:281:THR:HB	1:A:341:GLU:HG3	1.98	0.45
1:B:580:GLU:CD	1:B:585[B]:ARG:HG3	2.42	0.45
1:B:676:GLU:N	1:B:676:GLU:OE2	2.50	0.45
1:B:542:PHE:HZ	1:B:572:LYS:HB3	1.82	0.44
1:B:166:ASP:OD1	1:B:252:ARG:NH2	2.50	0.44
1:B:237:MET:SD	1:B:237:MET:N	2.90	0.44
1:B:124:ILE:HG23	1:B:287:VAL:HG13	1.99	0.44
1:B:529:MET:HE1	1:B:543:LEU:HD11	1.99	0.44
1:B:540:ASP:OD2	1:B:572:LYS:NZ	2.36	0.44
1:A:649:HIS:ND1	1:A:651:ASP:HB2	2.33	0.44
1:B:314:ILE:HD12	1:B:328:VAL:HG12	2.00	0.44
1:B:359:GLU:O	1:B:363:ILE:HG12	2.17	0.44
1:B:228:GLU:HB3	5:B:1106:HOH:O	2.18	0.43
1:A:707:LEU:HD23	1:A:707:LEU:HA	1.87	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:627[B]:CYS:HA	1:B:628:PRO:HD3	1.89	0.43
1:A:706:LYS:HA	1:A:709:GLU:HB2	2.00	0.43
1:B:580:GLU:OE1	1:B:585[B]:ARG:HG3	2.19	0.43
1:A:630:ASN:OD1	1:A:688:ARG:NH1	2.52	0.43
1:A:593:SER:O	1:A:595:ILE:HG13	2.19	0.43
1:A:97:TYR:HE2	1:A:99:LEU:HD23	1.83	0.43
1:A:398:LYS:HD3	1:A:433:LEU:HD11	2.01	0.43
1:A:90:ILE:HG21	1:A:99:LEU:HD21	2.00	0.42
1:B:577:TRP:HB3	1:B:580:GLU:HG2	2.01	0.42
1:A:649:HIS:CG	1:A:650:PRO:HD2	2.54	0.42
1:B:590:GLU:HG3	1:B:601:ARG:NH2	2.33	0.42
1:A:47:LYS:HG2	1:A:53:THR:HG22	2.02	0.42
1:B:348:MET:HE3	1:B:348:MET:HB3	1.90	0.42
1:A:395:LEU:HB2	1:A:406:LEU:HD22	2.01	0.42
1:B:407:TYR:HA	1:B:410:ILE:HG12	2.01	0.42
1:A:534:ARG:O	1:A:538:VAL:HG23	2.20	0.42
1:A:569:ASN:CG	1:A:574:PHE:H	2.27	0.42
1:B:597:SER:N	4:B:814:EPE:H72	2.35	0.42
1:B:43:LEU:HD11	1:B:84:PRO:HG2	2.00	0.42
1:A:141:ALA:O	1:A:144:VAL:HG12	2.20	0.42
1:B:43:LEU:HB2	1:B:54:LEU:HD22	2.01	0.42
1:B:376:ASN:HA	1:B:377:PRO:HD3	1.87	0.41
1:B:171:TYR:OH	1:B:213:GLY:HA3	2.21	0.41
1:B:638:SER:HB2	1:B:682:ASP:OD2	2.21	0.41
1:B:480:ARG:HH22	1:B:482[B]:ARG:CZ	2.33	0.41
1:A:444:ASP:OD1	5:A:1222:HOH:O	2.22	0.41
1:B:687:ARG:NH2	4:B:813:EPE:H101	2.34	0.41
1:A:710:ILE:C	1:A:712:LYS:H	2.28	0.41
1:A:695:GLN:NE2	4:B:813:EPE:H21	2.36	0.41
1:A:490:TYR:OH	1:A:507:LYS:HE2	2.20	0.41
1:A:104:ASN:OD1	1:A:267:LYS:NZ	2.53	0.40
4:B:814:EPE:H102	4:B:814:EPE:H22	1.54	0.40
1:A:55:TRP:HA	1:A:58:ILE:HG12	2.02	0.40
1:B:454:LYS:HG2	1:B:619:ASP:HB3	2.03	0.40
1:B:645:LYS:NZ	1:B:711:GLU:O	2.54	0.40
1:A:291:ILE:HB	1:A:294:ALA:HB3	2.02	0.40
1:B:482[B]:ARG:HH11	1:B:636:ARG:HD3	1.86	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	681/718 (95%)	648 (95%)	26 (4%)	7 (1%)	12	10
1	B	690/718 (96%)	675 (98%)	14 (2%)	1 (0%)	48	55
All	All	1371/1436 (96%)	1323 (96%)	40 (3%)	8 (1%)	21	20

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	712	LYS
1	A	177	MET
1	A	594	ASP
1	A	21	ASN
1	A	580	GLU
1	A	591	LYS
1	A	22	ASP
1	B	580	GLU

5.3.2 Protein sidechains

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	593/616 (96%)	578 (98%)	15 (2%)	42	53
1	B	599/616 (97%)	591 (99%)	8 (1%)	61	74
All	All	1192/1232 (97%)	1169 (98%)	23 (2%)	51	63

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	22	ASP
1	A	178	ASP
1	A	314	ILE
1	A	348	MET
1	A	378	GLU
1	A	477	ARG
1	A	522	GLN
1	A	573	THR
1	A	591	LYS
1	A	627[A]	CYS
1	A	627[B]	CYS
1	A	653	GLN
1	A	708	LEU
1	A	711	GLU
1	A	712	LYS
1	B	287	VAL
1	B	325	ASP
1	B	358	LEU
1	B	365	LYS
1	B	580	GLU
1	B	585[A]	ARG
1	B	585[B]	ARG
1	B	655	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	59	ASN
1	A	121	ASN
1	B	59	ASN
1	B	308	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

24 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$
3	NO3	A	1009	-	1,3,3	3.22	1 (100%)	0,3,3	-	-
3	NO3	B	809	-	1,3,3	3.26	1 (100%)	0,3,3	-	-
2	ADP	A	1001	-	28,29,29	1.44	5 (17%)	43,45,45	1.83	10 (23%)
3	NO3	B	810	-	1,3,3	3.28	1 (100%)	0,3,3	-	-
3	NO3	A	1008	-	1,3,3	3.25	1 (100%)	0,3,3	-	-
3	NO3	B	805	-	1,3,3	3.19	1 (100%)	0,3,3	-	-
3	NO3	B	812	-	1,3,3	3.27	1 (100%)	0,3,3	-	-
3	NO3	B	803	-	1,3,3	3.35	1 (100%)	0,3,3	-	-
3	NO3	A	1002	-	1,3,3	3.32	1 (100%)	0,3,3	-	-
3	NO3	A	1006	-	1,3,3	3.24	1 (100%)	0,3,3	-	-
3	NO3	A	1004	-	1,3,3	3.32	1 (100%)	0,3,3	-	-
4	EPE	B	813	-	15,15,15	0.81	1 (6%)	19,20,20	1.76	6 (31%)
3	NO3	B	806	-	1,3,3	3.26	1 (100%)	0,3,3	-	-
3	NO3	A	1010	-	1,3,3	3.26	1 (100%)	0,3,3	-	-
3	NO3	B	808	-	1,3,3	3.31	1 (100%)	0,3,3	-	-
3	NO3	A	1007	-	1,3,3	3.25	1 (100%)	0,3,3	-	-
3	NO3	B	811	-	1,3,3	3.24	1 (100%)	0,3,3	-	-
3	NO3	A	1003	-	1,3,3	3.25	1 (100%)	0,3,3	-	-
3	NO3	B	804	-	1,3,3	3.35	1 (100%)	0,3,3	-	-
3	NO3	A	1005	-	1,3,3	3.27	1 (100%)	0,3,3	-	-
3	NO3	B	801	-	1,3,3	3.34	1 (100%)	0,3,3	-	-
4	EPE	B	814	-	15,15,15	0.83	1 (6%)	19,20,20	2.11	4 (21%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	ADP	B	802	-	28,29,29	1.43	5 (17%)	43,45,45	1.83	9 (20%)
3	NO3	B	807	-	1,3,3	3.29	1 (100%)	0,3,3	-	-

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	EPE	B	814	-	-	7/9/19/19	0/1/1/1
2	ADP	B	802	-	-	6/16/32/32	0/3/3/3
4	EPE	B	813	-	-	7/9/19/19	0/1/1/1
2	ADP	A	1001	-	-	4/16/32/32	0/3/3/3

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	802	ADP	C5-C4	4.78	1.47	1.39
2	A	1001	ADP	C5-C4	4.75	1.47	1.39
3	B	803	NO3	O1-N	3.35	1.40	1.24
3	B	804	NO3	O1-N	3.35	1.40	1.24
3	B	801	NO3	O1-N	3.34	1.40	1.24
3	A	1004	NO3	O1-N	3.32	1.40	1.24
3	A	1002	NO3	O1-N	3.32	1.40	1.24
3	B	808	NO3	O1-N	3.31	1.40	1.24
3	B	807	NO3	O1-N	3.29	1.40	1.24
3	B	810	NO3	O1-N	3.28	1.40	1.24
3	A	1005	NO3	O1-N	3.27	1.40	1.24
3	B	812	NO3	O1-N	3.27	1.40	1.24
3	A	1010	NO3	O1-N	3.26	1.40	1.24
3	B	809	NO3	O1-N	3.26	1.40	1.24
3	B	806	NO3	O1-N	3.26	1.40	1.24
3	A	1007	NO3	O1-N	3.25	1.40	1.24
3	A	1003	NO3	O1-N	3.25	1.40	1.24
3	A	1008	NO3	O1-N	3.25	1.40	1.24
3	A	1006	NO3	O1-N	3.24	1.40	1.24
3	B	811	NO3	O1-N	3.24	1.40	1.24
3	A	1009	NO3	O1-N	3.22	1.40	1.24
3	B	805	NO3	O1-N	3.19	1.40	1.24
4	B	813	EPE	C10-S	2.79	1.81	1.77
2	A	1001	ADP	C5-C6	2.79	1.48	1.41

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	802	ADP	C5-C6	2.73	1.48	1.41
4	B	814	EPE	C10-S	2.69	1.81	1.77
2	A	1001	ADP	C8-N7	2.47	1.36	1.31
2	B	802	ADP	C8-N7	2.33	1.36	1.31
2	B	802	ADP	C5-N7	-2.21	1.35	1.39
2	A	1001	ADP	C5-N7	-2.16	1.35	1.39
2	A	1001	ADP	PA-O3A	2.08	1.61	1.59
2	B	802	ADP	PA-O3A	2.01	1.61	1.59

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	802	ADP	C5-C4-N3	-5.75	118.80	126.72
2	A	1001	ADP	C5-C4-N3	-5.72	118.84	126.72
4	B	813	EPE	C5-N4-C3	4.76	119.10	108.84
2	B	802	ADP	N3-C4-N9	4.60	135.00	127.17
4	B	814	EPE	C5-N4-C3	4.52	118.57	108.84
2	A	1001	ADP	N3-C4-N9	4.33	134.54	127.17
4	B	814	EPE	C6-N1-C2	4.20	117.89	108.84
4	B	814	EPE	C7-N4-C3	3.68	121.03	111.24
2	A	1001	ADP	C2-N3-C4	3.67	120.80	111.83
2	B	802	ADP	C2-N3-C4	3.67	120.79	111.83
2	A	1001	ADP	C4-C5-N7	-3.65	106.41	110.58
4	B	814	EPE	C7-N4-C5	3.44	120.39	111.24
2	B	802	ADP	C4-C5-N7	-3.38	106.71	110.58
2	A	1001	ADP	N3-C2-N1	-3.32	123.56	128.58
2	B	802	ADP	N3-C2-N1	-3.28	123.62	128.58
2	B	802	ADP	C4-N9-C8	2.63	108.50	105.74
4	B	813	EPE	C7-N4-C5	2.59	118.15	111.24
2	A	1001	ADP	C5-N7-C8	2.57	107.50	103.45
2	A	1001	ADP	O4'-C1'-N9	2.57	113.02	108.09
2	B	802	ADP	C5-N7-C8	2.51	107.39	103.45
2	A	1001	ADP	C4-N9-C8	2.45	108.31	105.74
4	B	813	EPE	C7-N4-C3	2.27	117.28	111.24
2	A	1001	ADP	C6-C5-N7	2.25	136.43	132.09
2	B	802	ADP	C3'-C2'-C1'	2.19	105.61	101.46
4	B	813	EPE	O2S-S-C10	2.12	109.94	106.73
4	B	813	EPE	C5-C6-N1	-2.10	106.41	110.65
4	B	813	EPE	O1S-S-C10	2.09	109.89	106.73
2	B	802	ADP	C6-C5-N7	2.05	136.04	132.09
2	A	1001	ADP	C2-N1-C6	2.02	122.04	118.73

There are no chirality outliers.

All (24) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1001	ADP	C5'-O5'-PA-O1A
2	A	1001	ADP	C5'-O5'-PA-O2A
2	A	1001	ADP	C5'-O5'-PA-O3A
2	B	802	ADP	C5'-O5'-PA-O1A
2	B	802	ADP	C5'-O5'-PA-O2A
2	B	802	ADP	C5'-O5'-PA-O3A
4	B	813	EPE	C10-C9-N1-C2
4	B	813	EPE	C9-C10-S-O2S
4	B	813	EPE	C9-C10-S-O3S
4	B	814	EPE	C10-C9-N1-C2
4	B	814	EPE	C8-C7-N4-C3
4	B	814	EPE	C9-C10-S-O1S
4	B	814	EPE	C9-C10-S-O3S
4	B	814	EPE	C10-C9-N1-C6
4	B	813	EPE	C9-C10-S-O1S
4	B	814	EPE	C9-C10-S-O2S
4	B	813	EPE	C10-C9-N1-C6
4	B	814	EPE	N4-C7-C8-O8
4	B	813	EPE	N4-C7-C8-O8
2	B	802	ADP	PB-O3A-PA-O2A
4	B	813	EPE	C8-C7-N4-C5
2	B	802	ADP	O4'-C4'-C5'-O5'
2	A	1001	ADP	PB-O3A-PA-O2A
2	B	802	ADP	PB-O3A-PA-O1A

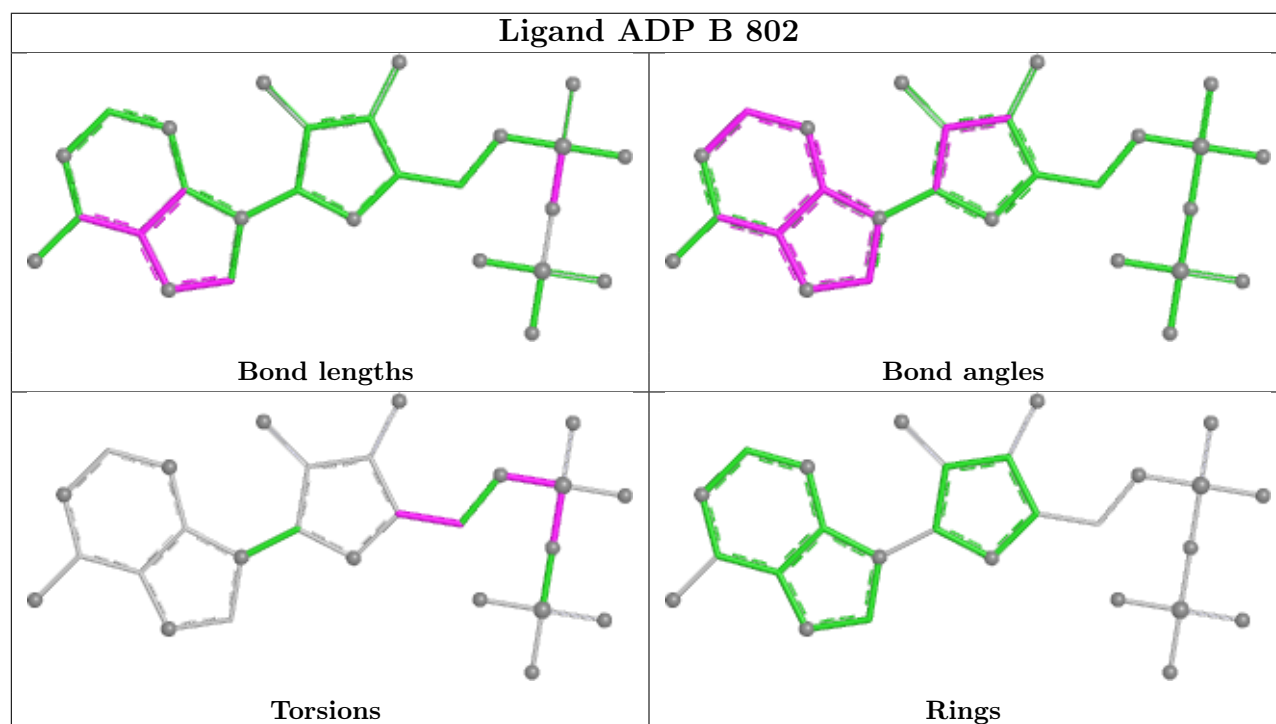
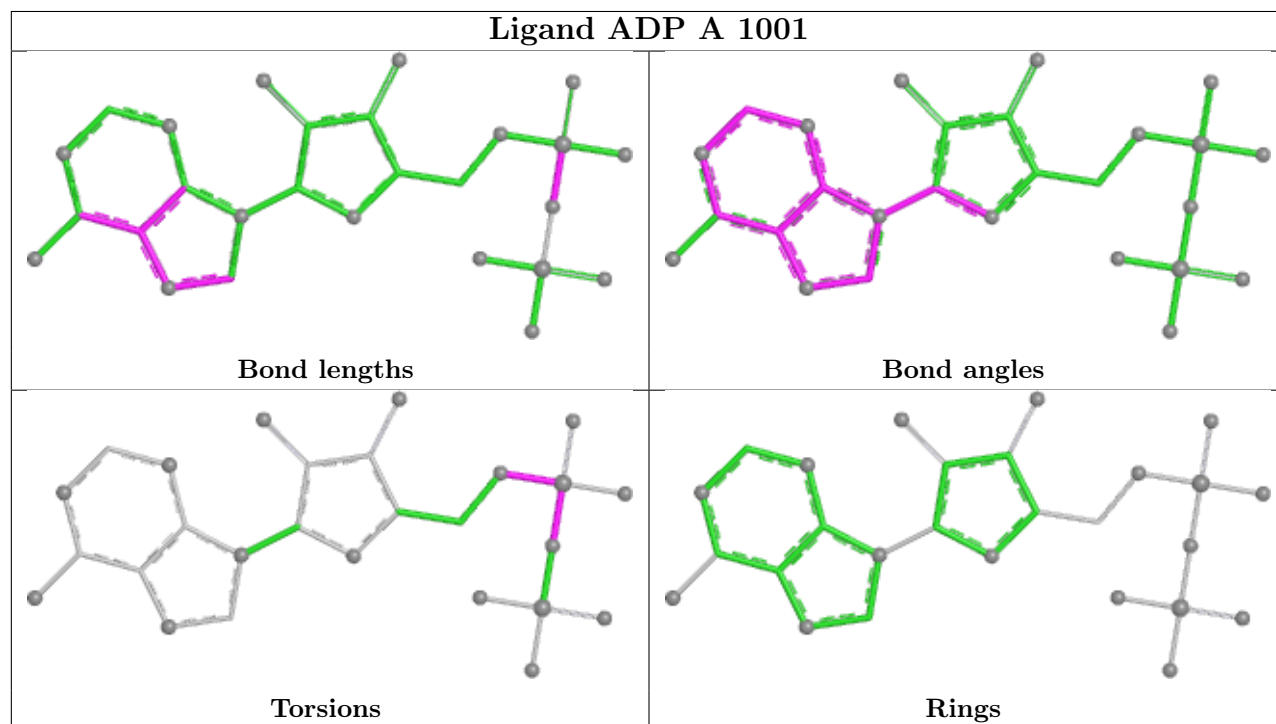
There are no ring outliers.

5 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1009	NO3	2	0
3	B	809	NO3	1	0
2	A	1001	ADP	1	0
4	B	813	EPE	4	0
4	B	814	EPE	3	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

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	A	686/718 (95%)	0.44	49 (7%)	22 21	23, 47, 100, 135	1 (0%)
1	B	693/718 (96%)	0.15	11 (1%)	70 70	21, 41, 73, 114	3 (0%)
All	All	1379/1436 (96%)	0.29	60 (4%)	39 38	21, 44, 88, 135	4 (0%)

All (60) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	666	ILE	5.4
1	A	681	PHE	5.0
1	A	665	GLY	4.9
1	A	473	GLY	4.3
1	A	708	LEU	4.2
1	A	592	GLY	4.0
1	A	655	ILE	3.7
1	A	652	PHE	3.7
1	A	476	ILE	3.6
1	A	593	SER	3.6
1	B	314	ILE	3.5
1	A	643	ILE	3.4
1	A	687	ARG	3.3
1	A	23	PRO	3.3
1	A	710	ILE	3.3
1	A	640	HIS	3.1
1	A	314	ILE	3.0
1	A	595	ILE	2.9
1	A	644	PRO	2.9
1	A	325	ASP	2.9
1	A	474	THR	2.9
1	A	707	LEU	2.8
1	A	544	PHE	2.8
1	A	182	ARG	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	638	SER	2.7
1	A	479	THR	2.7
1	B	678	ALA	2.6
1	A	471	PRO	2.6
1	A	659	PHE	2.6
1	A	478	SER	2.6
1	A	713	SER	2.5
1	A	535	GLN	2.5
1	A	650	PRO	2.4
1	A	470	ASP	2.4
1	A	712	LYS	2.4
1	B	713	SER	2.3
1	A	326	ALA	2.3
1	A	348	MET	2.3
1	B	390	GLU	2.2
1	A	641	VAL	2.2
1	A	22	ASP	2.2
1	B	648	ALA	2.2
1	A	243	ILE	2.1
1	A	598	VAL	2.1
1	A	639	VAL	2.1
1	A	25	CYS	2.1
1	B	532	ALA	2.1
1	A	472	GLU	2.1
1	A	703	GLY	2.1
1	A	642	LYS	2.1
1	A	580	GLU	2.1
1	A	477	ARG	2.1
1	A	654	LYS	2.1
1	A	590	GLU	2.0
1	B	2	ALA	2.1
1	B	530	ASP	2.0
1	B	699	ASP	2.0
1	A	591	LYS	2.0
1	B	665	GLY	2.0
1	A	537	LEU	2.0

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

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

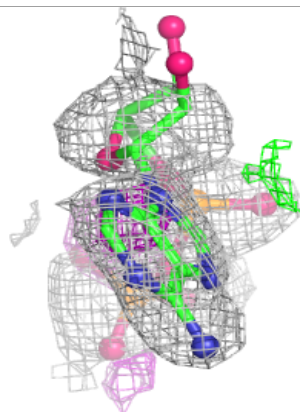
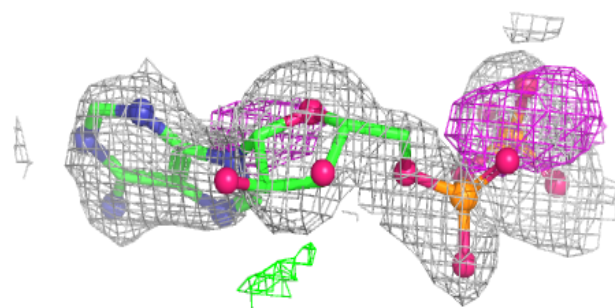
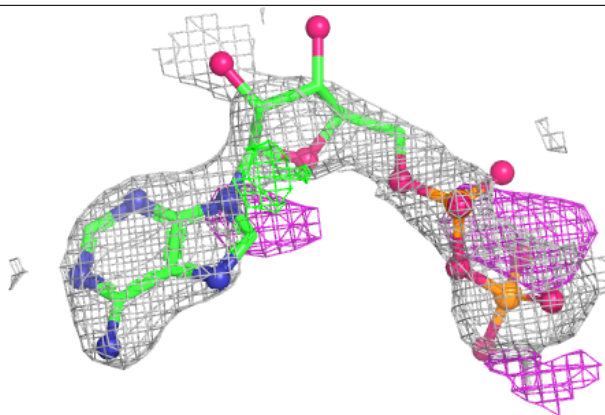
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	NO3	B	806	4/4	0.65	0.13	96,97,98,99	0
3	NO3	A	1007	4/4	0.71	0.14	56,69,71,72	0
3	NO3	B	804	4/4	0.74	0.13	47,52,62,63	0
3	NO3	B	808	4/4	0.76	0.11	51,55,60,60	0
3	NO3	B	803	4/4	0.77	0.11	42,54,58,65	0
3	NO3	A	1010	4/4	0.78	0.15	66,71,73,74	0
4	EPE	B	814	15/15	0.78	0.16	75,86,135,135	0
2	ADP	B	802	27/27	0.79	0.12	34,85,121,299	0
4	EPE	B	813	15/15	0.80	0.23	105,114,143,144	0
3	NO3	A	1009	4/4	0.80	0.10	88,88,91,98	0
2	ADP	A	1001	27/27	0.81	0.10	48,95,140,286	0
3	NO3	B	812	4/4	0.81	0.12	64,69,71,71	0
3	NO3	A	1005	4/4	0.82	0.10	63,66,67,73	0
3	NO3	B	811	4/4	0.85	0.11	57,72,74,74	0
3	NO3	B	805	4/4	0.85	0.13	43,53,53,55	0
3	NO3	A	1002	4/4	0.85	0.09	34,49,54,62	0
3	NO3	A	1004	4/4	0.85	0.18	63,69,69,73	0
3	NO3	B	807	4/4	0.86	0.12	70,71,73,78	0
3	NO3	A	1003	4/4	0.86	0.09	48,54,60,64	0
3	NO3	B	801	4/4	0.86	0.12	39,47,60,61	0
3	NO3	A	1008	4/4	0.87	0.09	84,84,85,85	0
3	NO3	A	1006	4/4	0.87	0.10	71,74,77,81	0
3	NO3	B	810	4/4	0.89	0.12	76,76,81,87	0
3	NO3	B	809	4/4	0.91	0.21	97,97,98,100	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.

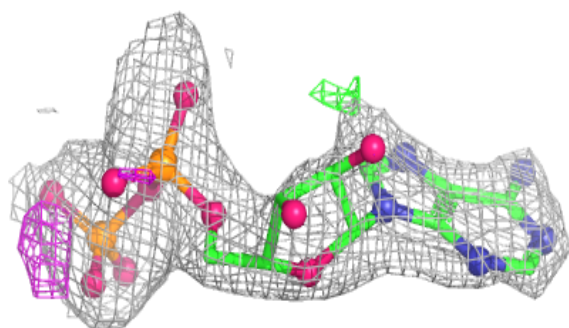
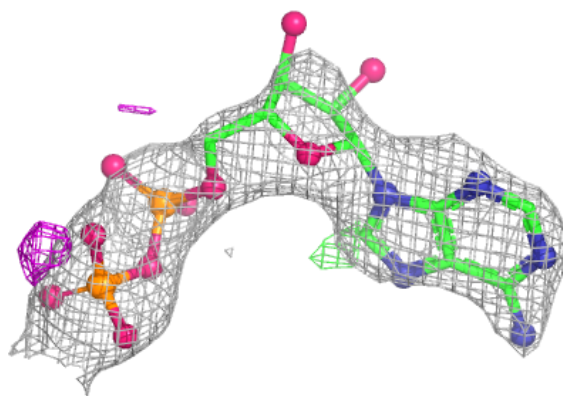
Electron density around ADP B 802:

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



Electron density around ADP A 1001:

$2mF_o-DF_c$ (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.