



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 12:19 AM UTC

PDB ID : 6HSN / pdb_00006hsn
Title : Crystal structure of the ternary complex of GephE-ADP-GABA(A) receptor derived peptide
Authors : Kasaragod, V.B.; Schindelin, H.
Deposited on : 2018-10-01
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

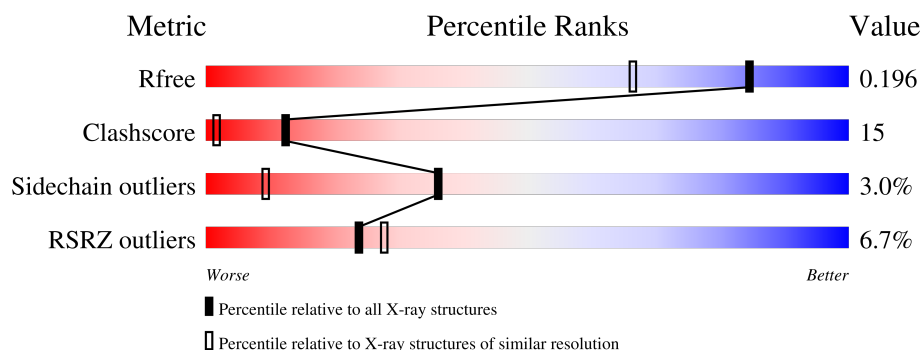
1 Overall quality at a glance

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)
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	A	419	
2	D	10	
2	E	10	

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
5	MPD	A	805	-	-	X	-
5	MPD	A	806	X	-	X	-
6	ACT	A	811	-	-	X	-
6	ACT	A	813	-	-	X	-

2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 7895 atoms, of which 3758 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 Gephyrin.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	411	Total	C	H	N	O	S	143	41	0
			6889	2163	3514	561	624	27			

- Molecule 2 is a protein called Gamma-aminobutyric acid receptor subunit alpha-3.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	D	10	Total	C	H	N	O	S	5	0	0
			153	51	75	11	15	1			
2	E	10	Total	C	H	N	O	S	5	0	0
			153	51	75	11	15	1			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	377	CYS	ILE	conflict	UNP P20236
E	377	CYS	ILE	conflict	UNP P20236

- Molecule 3 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).

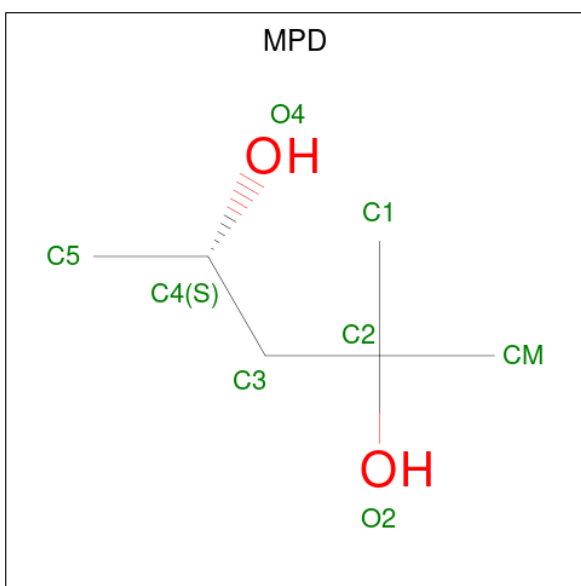


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
3	A	1	Total	C	H	N	O	P	4	0
			39	10	12	5	10	2		

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

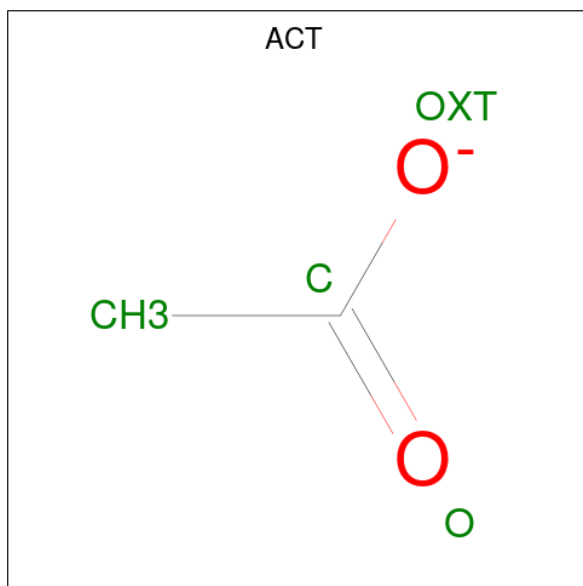
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	2	Total Mg 2 2	0	0

- Molecule 5 is (4S)-2-METHYL-2,4-PENTANEDIOL (CCD ID: MPD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	H	O	1	0
			22	6	14	2		
5	A	1	Total	C	H	O	1	0
			22	6	14	2		
5	A	1	Total	C	H	O	1	0
			22	6	14	2		

- Molecule 6 is ACETATE ION (CCD ID: ACT) (formula: $C_2H_3O_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	A	1	Total	C	H	O	0	0
			7	2	3	2		
6	A	1	Total	C	H	O	0	0
			7	2	3	2		
6	A	1	Total	C	H	O	0	0
			7	2	3	2		
6	A	1	Total	C	H	O	0	0
			7	2	3	2		
6	A	1	Total	C	H	O	0	0
			7	2	3	2		
6	A	1	Total	C	H	O	0	0
			7	2	3	2		
6	A	1	Total	C	H	O	0	0
			7	2	3	2		

- Molecule 7 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).

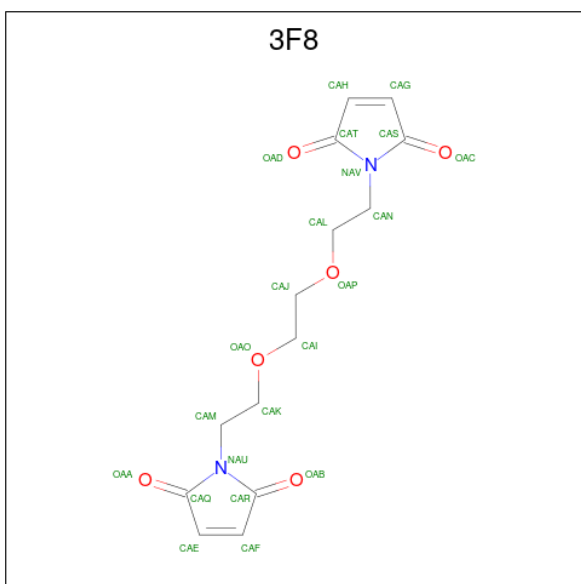


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	O	P	0	0
			5	4	1		

- Molecule 8 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total	Na	0	1
			2	2		

- Molecule 9 is 1,1'-[ethane-1,2-diylbis(oxyethane-2,1-diyl)]bis(1H-pyrrole-2,5-dione) (CCD ID: 3F8) (formula: C₁₄H₁₆N₂O₆).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	D	1	Total	C	H	N	O	0	0
			38	14	16	2	6		

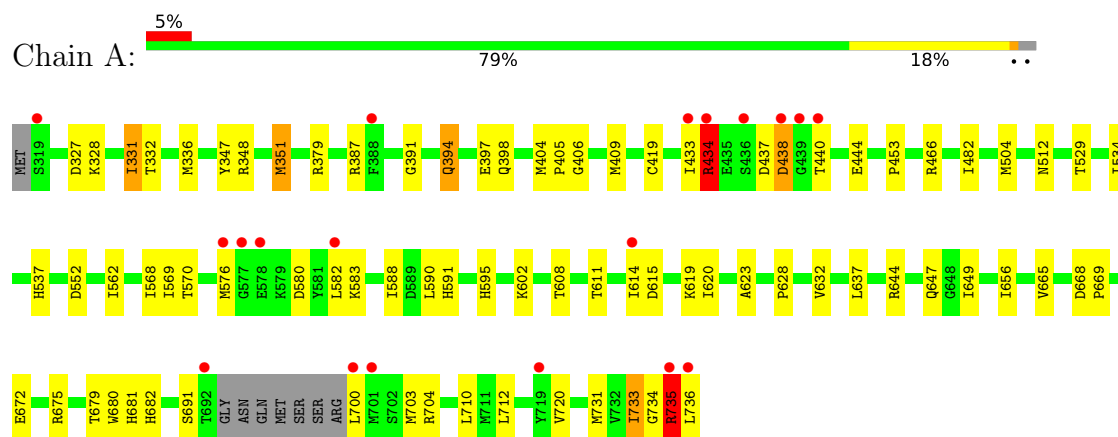
- Molecule 10 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	470	Total	O	0	12
			482	482		
10	D	6	Total	O	0	0
			6	6		
10	E	4	Total	O	0	0
			4	4		

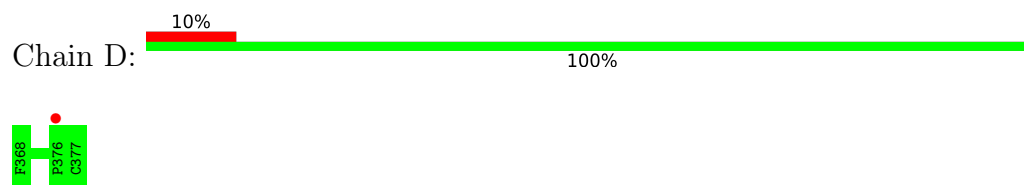
3 Residue-property plots [i](#)

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.

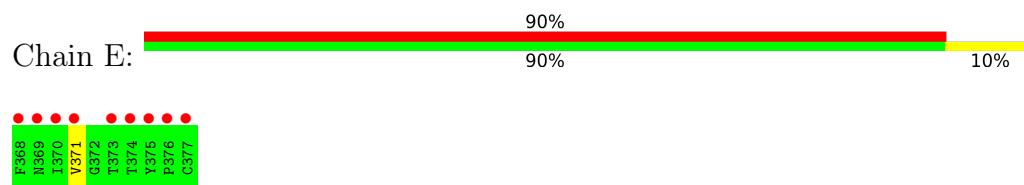
- Molecule 1: Gephyrin



- Molecule 2: Gamma-aminobutyric acid receptor subunit alpha-3



- Molecule 2: Gamma-aminobutyric acid receptor subunit alpha-3



4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	86.96Å 99.22Å 111.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 1.55 30.00 – 1.55	Depositor EDS
% Data completeness (in resolution range)	98.5 (30.00-1.55) 98.5 (30.00-1.55)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.76 (at 1.55Å)	Xtriage
Refinement program	REFMAC 5.8.0238	Depositor
R, R_{free}	0.159 , 0.196 (Not available) , 0.196	Depositor DCC
R_{free} test set	3468 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å ²)	18.6	Xtriage
Anisotropy	0.263	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 43.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	7895	wwPDB-VP
Average B, all atoms (Å ²)	31.0	wwPDB-VP

Xtriage'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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MPD, ACT, 3F8, PO4, NA, ADP, MG

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	1.03	1/3541 (0.0%)	1.18	9/4809 (0.2%)
2	D	0.84	0/80	1.26	0/108
2	E	0.85	0/80	1.31	2/108 (1.9%)
All	All	1.02	1/3701 (0.0%)	1.19	11/5025 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	735	ARG	C-O	5.02	1.29	1.23

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	735	ARG	CB-CA-C	8.37	123.96	109.65
1	A	733	ILE	CA-C-N	7.25	128.81	121.35
1	A	733	ILE	C-N-CA	7.25	128.81	121.35
1	A	434	ARG	NE-CZ-NH2	6.35	124.91	119.20
1	A	580	ASP	CA-CB-CG	6.34	118.94	112.60
1	A	735	ARG	CG-CD-NE	5.86	124.89	112.00
1	A	735	ARG	NE-CZ-NH2	5.39	124.05	119.20
1	A	398	GLN	O-C-N	-5.21	116.89	121.31
2	E	371	VAL	CA-C-N	5.10	124.94	120.10
2	E	371	VAL	C-N-CA	5.10	124.94	120.10
1	A	434	ARG	CG-CD-NE	5.07	123.16	112.00

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	3375	3514	3531	99	5
2	D	78	75	71	0	0
2	E	78	75	71	0	0
3	A	27	12	12	0	0
4	A	2	0	0	0	0
5	A	24	42	41	21	1
6	A	32	24	24	6	1
7	A	5	0	0	0	0
8	A	2	0	0	0	0
9	D	22	16	14	0	0
10	A	482	0	0	25	7
10	D	6	0	0	0	0
10	E	4	0	0	0	0
All	All	4137	3758	3764	114	12

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 15.

All (114) 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:433[C]:ILE:C	1:A:433[C]:ILE:HD12	1.59	1.28
5:A:806:MPD:H51	6:A:813:ACT:O	1.35	1.24
1:A:433[C]:ILE:HD12	1:A:433[C]:ILE:O	1.48	1.10
1:A:433[B]:ILE:HG22	1:A:434:ARG:HD2	1.38	1.03
5:A:805:MPD:HM3	10:A:903:HOH:O	1.63	0.98
1:A:433[C]:ILE:CG1	1:A:434:ARG:HD2	1.95	0.96
1:A:734:GLY:HA2	1:A:735:ARG:CZ	1.94	0.96
1:A:734:GLY:HA2	1:A:735:ARG:NH1	1.81	0.95
1:A:433[C]:ILE:HG13	1:A:434:ARG:HD2	1.48	0.94
1:A:433[C]:ILE:C	1:A:433[C]:ILE:CD1	2.37	0.94
5:A:806:MPD:C5	6:A:813:ACT:O	2.19	0.91
1:A:404[B]:MET:HB3	1:A:405[B]:PRO:CD	2.00	0.91
5:A:805:MPD:CM	10:A:903:HOH:O	2.15	0.91
5:A:805:MPD:H13	10:A:1045:HOH:O	1.71	0.90

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:404[B]:MET:HB3	1:A:405[B]:PRO:HD3	1.55	0.89
1:A:433[B]:ILE:CG2	1:A:434:ARG:HD2	1.98	0.89
1:A:704:ARG:HE	5:A:805:MPD:H53	1.38	0.88
6:A:811:ACT:C	10:A:912:HOH:O	2.21	0.88
1:A:419[A]:CYS:SG	10:A:1281:HOH:O	2.34	0.84
1:A:735:ARG:CB	5:A:806:MPD:HM3	2.10	0.81
1:A:336[B]:MET:HE1	1:A:595:HIS:CE1	2.19	0.77
1:A:434:ARG:HD3	1:A:444:GLU:OE1	1.86	0.75
5:A:806:MPD:H52	5:A:806:MPD:H11	1.68	0.74
1:A:327:ASP:O	1:A:331[A]:ILE:HG23	1.87	0.74
1:A:733:ILE:O	1:A:735:ARG:NH1	2.20	0.74
5:A:805:MPD:HM1	10:A:1246:HOH:O	1.88	0.73
1:A:735:ARG:H	1:A:735:ARG:CD	2.02	0.72
5:A:805:MPD:H52	10:A:950:HOH:O	1.90	0.71
1:A:735:ARG:HB2	5:A:806:MPD:HM3	1.73	0.69
1:A:583[A]:LYS:HE2	1:A:608:THR:OG1	1.94	0.68
5:A:806:MPD:C5	5:A:806:MPD:H11	2.24	0.67
1:A:637:LEU:HD23	1:A:731[A]:MET:HE1	1.75	0.67
1:A:534[B]:ILE:HD11	1:A:569:ILE:HD12	1.77	0.66
1:A:404[B]:MET:CB	1:A:405[B]:PRO:CD	2.74	0.66
1:A:433[A]:ILE:HG21	1:A:434:ARG:HD2	1.78	0.65
1:A:735:ARG:H	1:A:735:ARG:NE	1.94	0.65
1:A:552[A]:ASP:OD1	10:A:904:HOH:O	2.12	0.64
6:A:811:ACT:CH3	10:A:912:HOH:O	2.44	0.64
1:A:351[B]:MET:HG2	1:A:482[B]:ILE:HD11	1.81	0.62
1:A:576:MET:HG2	10:A:1288:HOH:O	1.98	0.62
1:A:351[B]:MET:HG2	1:A:482[B]:ILE:CD1	2.29	0.61
1:A:394[B]:GLN:OE1	10:A:905:HOH:O	2.16	0.61
1:A:679[B]:THR:HG23	1:A:681[B]:HIS:CE1	2.35	0.61
1:A:433[A]:ILE:CG2	1:A:434:ARG:HD2	2.31	0.59
1:A:736:LEU:OXT	5:A:805:MPD:H4	2.02	0.59
1:A:644[B]:ARG:HG3	1:A:649:ILE:HD12	1.85	0.59
1:A:665[B]:VAL:HG11	1:A:712:LEU:HD13	1.85	0.58
1:A:433[C]:ILE:CD1	1:A:434:ARG:HD2	2.34	0.58
5:A:805:MPD:HM1	10:A:903:HOH:O	1.93	0.57
1:A:735:ARG:HB3	5:A:806:MPD:HM3	1.84	0.57
5:A:805:MPD:O4	10:A:903:HOH:O	2.08	0.57
1:A:704:ARG:HH21	5:A:805:MPD:C5	2.18	0.56
6:A:811:ACT:H2	10:A:912:HOH:O	2.04	0.56
1:A:529:THR:HG21	1:A:632[A]:VAL:HG22	1.87	0.56
1:A:433[B]:ILE:HG22	1:A:434:ARG:CD	2.24	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:534[B]:ILE:HD11	1:A:569:ILE:CD1	2.37	0.55
1:A:734:GLY:CA	1:A:735:ARG:CZ	2.80	0.54
1:A:704:ARG:NE	5:A:805:MPD:H53	2.15	0.54
1:A:562[B]:ILE:HG12	1:A:568[B]:ILE:HD11	1.89	0.53
1:A:433[C]:ILE:HG13	1:A:434:ARG:CD	2.32	0.53
1:A:328:LYS:O	1:A:331[A]:ILE:HD13	2.09	0.52
1:A:433[C]:ILE:O	1:A:433[C]:ILE:CD1	2.38	0.52
1:A:583[B]:LYS:HE2	10:A:1240:HOH:O	2.09	0.52
1:A:328:LYS:HA	1:A:331[A]:ILE:HD12	1.91	0.52
1:A:347[A]:TYR:OH	1:A:348:ARG:NH2	2.43	0.51
1:A:691[B]:SER:OG	1:A:710[B]:LEU:CD1	2.58	0.51
1:A:438:ASP:OD1	1:A:438:ASP:N	2.44	0.50
1:A:735:ARG:HG3	1:A:735:ARG:HH21	1.77	0.50
1:A:665[B]:VAL:HG11	1:A:712:LEU:CD1	2.41	0.50
1:A:504:MET:HG2	1:A:570:THR:HG22	1.94	0.49
1:A:704:ARG:HH21	5:A:805:MPD:H51	1.78	0.49
1:A:680:TRP:CH2	1:A:736:LEU:HD13	2.47	0.49
1:A:735:ARG:CD	1:A:735:ARG:N	2.74	0.48
1:A:336[B]:MET:CE	1:A:595:HIS:CE1	2.93	0.47
1:A:512:ASN:ND2	10:A:902:HOH:O	2.07	0.47
1:A:562[A]:ILE:HD11	1:A:590:LEU:HD21	1.97	0.47
5:A:806:MPD:C4	6:A:813:ACT:O	2.63	0.47
1:A:433[B]:ILE:HG21	1:A:434:ARG:HD2	1.92	0.46
1:A:656:ILE:CD1	1:A:731[B]:MET:HG3	2.45	0.46
1:A:608:THR:HB	1:A:623:ALA:HB3	1.97	0.46
1:A:433[C]:ILE:HD11	1:A:434:ARG:HD2	1.97	0.46
1:A:529:THR:HG21	1:A:632[A]:VAL:CG2	2.46	0.46
1:A:588:ILE:O	1:A:591:HIS:CE1	2.69	0.46
1:A:591:HIS:ND1	10:A:909:HOH:O	2.35	0.46
1:A:700:LEU:HD12	1:A:703[B]:MET:HG3	1.98	0.45
1:A:434:ARG:NH1	10:A:917:HOH:O	2.49	0.45
1:A:404[B]:MET:HB3	1:A:405[B]:PRO:HD2	1.92	0.45
1:A:628:PRO:O	1:A:632[A]:VAL:HG23	2.16	0.45
1:A:681[A]:HIS:HD2	10:A:1005:HOH:O	1.98	0.45
1:A:615:ASP:HB2	10:A:1024:HOH:O	2.16	0.45
1:A:391:GLY:O	1:A:409[A]:MET:HG3	2.16	0.44
1:A:394[B]:GLN:NE2	1:A:397:GLU:CD	2.76	0.44
1:A:466:ARG:HD2	10:A:1253:HOH:O	2.16	0.44
1:A:351[A]:MET:HB3	1:A:351[A]:MET:HE2	1.48	0.44
1:A:734:GLY:HA2	1:A:735:ARG:NE	2.32	0.43
1:A:332:THR:O	1:A:336[B]:MET:HG3	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:387[B]:ARG:HD3	1:A:406[B]:GLY:HA2	2.01	0.43
1:A:433[C]:ILE:HD11	1:A:434:ARG:CD	2.48	0.43
1:A:562[B]:ILE:HG23	1:A:619:LYS:HG3	2.01	0.42
1:A:351[B]:MET:HB3	1:A:351[B]:MET:HE3	1.59	0.42
1:A:433[C]:ILE:HG23	1:A:444:GLU:C	2.45	0.42
1:A:675:ARG:NH1	10:A:918:HOH:O	2.49	0.42
1:A:331[A]:ILE:HD13	1:A:332:THR:N	2.35	0.42
1:A:351[B]:MET:SD	1:A:482[B]:ILE:HD12	2.59	0.42
1:A:537:HIS:HE1	10:A:989:HOH:O	2.01	0.42
1:A:679[B]:THR:CG2	1:A:681[B]:HIS:CE1	3.02	0.42
1:A:691[B]:SER:OG	1:A:710[B]:LEU:HD11	2.20	0.42
1:A:668:ASP:CG	1:A:669:PRO:HD2	2.45	0.41
1:A:602:LYS:O	1:A:672:GLU:HA	2.21	0.41
1:A:453:PRO:O	10:A:906:HOH:O	2.21	0.41
1:A:704:ARG:HH21	5:A:805:MPD:H53	1.85	0.41
1:A:735:ARG:O	1:A:736:LEU:OXT	2.39	0.41
1:A:611:THR:HG22	1:A:620[A]:ILE:HD13	2.04	0.40
1:A:735:ARG:HA	10:A:1188:HOH:O	2.20	0.40

All (12) 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)
10:A:1188:HOH:O	10:A:1188:HOH:O[3_659]	1.37	0.83
1:A:379:ARG:HH12	1:A:379:ARG:HH12[3_6510]	0.99	0.61
1:A:736:LEU:HD11	1:A:736:LEU:HD11[3_659]	1.01	0.59
10:A:902:HOH:O	10:A:902:HOH:O[2_655]	1.64	0.56
1:A:537:HIS:HE2	5:A:806:MPD:H52[3_659]	1.24	0.36
10:A:912:HOH:O	10:A:1090:HOH:O[3_659]	1.85	0.35
10:A:930:HOH:O	10:A:1188:HOH:O[3_659]	1.96	0.24
1:A:736:LEU:CD1	1:A:736:LEU:HD11[3_659]	1.51	0.09
10:A:903:HOH:O	10:A:915:HOH:O[3_659]	2.13	0.07
10:A:922:HOH:O	10:A:1074:HOH:O[3_659]	2.16	0.04
6:A:811:ACT:C	10:A:912:HOH:O[2_655]	2.18	0.02
1:A:437:ASP:OD2	1:A:682:HIS:H[6_655]	1.59	0.01

5.3 Torsion angles

5.3.1 Protein backbone

There are no protein backbone outliers to report in this entry.

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	390/356 (110%)	376 (96%)	14 (4%)	31	6
2	D	9/9 (100%)	9 (100%)	0	100	100
2	E	9/9 (100%)	9 (100%)	0	100	100
All	All	408/374 (109%)	394 (97%)	14 (3%)	36	7

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	331[A]	ILE
1	A	331[B]	ILE
1	A	351[A]	MET
1	A	351[B]	MET
1	A	394[A]	GLN
1	A	394[B]	GLN
1	A	434	ARG
1	A	438	ASP
1	A	440	THR
1	A	582	LEU
1	A	614	ILE
1	A	647	GLN
1	A	720	VAL
1	A	735	ARG

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	398	GLN
1	A	537	HIS
1	A	591	HIS
1	A	682	HIS

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 18 ligands modelled in this entry, 4 are monoatomic - leaving 14 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
6	ACT	A	809	-	3,3,3	0.96	0	3,3,3	0.91	0
6	ACT	A	810	-	3,3,3	1.10	0	3,3,3	0.79	0
6	ACT	A	811	-	3,3,3	1.00	0	3,3,3	0.88	0
3	ADP	A	801	4	28,29,29	0.72	1 (3%)	43,45,45	0.68	1 (2%)
7	PO4	A	815	-	4,4,4	0.71	0	6,6,6	0.54	0
6	ACT	A	808	-	3,3,3	0.94	0	3,3,3	0.90	0
5	MPD	A	806	-	7,7,7	0.80	0	9,10,10	1.47	2 (22%)
5	MPD	A	805	-	7,7,7	1.12	1 (14%)	9,10,10	0.76	0
6	ACT	A	812	-	3,3,3	1.41	0	3,3,3	0.50	0
6	ACT	A	813	-	3,3,3	1.77	2 (66%)	3,3,3	0.45	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
9	3F8	D	401	2	23,23,23	3.89	8 (34%)	30,30,30	3.07	11 (36%)
6	ACT	A	814	-	3,3,3	0.98	0	3,3,3	0.75	0
5	MPD	A	804	-	7,7,7	0.43	0	9,10,10	1.02	1 (11%)
6	ACT	A	807	-	3,3,3	0.98	0	3,3,3	0.90	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	ADP	A	801	4	-	1/16/32/32	0/3/3/3
5	MPD	A	806	-	1/1/2/2	3/5/5/5	-
5	MPD	A	805	-	-	1/5/5/5	-
9	3F8	D	401	2	-	2/11/37/37	0/2/2/2
5	MPD	A	804	-	-	3/5/5/5	-

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	D	401	3F8	CAE-CAQ	-8.49	1.33	1.48
9	D	401	3F8	CAF-CAR	-8.38	1.33	1.48
9	D	401	3F8	CAH-CAT	-8.37	1.33	1.48
9	D	401	3F8	CAG-CAS	-8.27	1.33	1.48
9	D	401	3F8	CAT-NAV	-4.22	1.32	1.39
9	D	401	3F8	CAQ-NAU	-3.87	1.32	1.39
9	D	401	3F8	CAS-NAV	-3.78	1.33	1.39
9	D	401	3F8	CAR-NAU	-3.39	1.33	1.39
5	A	805	MPD	O2-C2	2.66	1.51	1.44
6	A	813	ACT	CH3-C	2.15	1.57	1.49
6	A	813	ACT	O-C	2.12	1.31	1.22
3	A	801	ADP	PB-O3B	-2.07	1.47	1.54

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	D	401	3F8	CAM-NAU-CAR	6.97	134.20	124.86
9	D	401	3F8	CAR-NAU-CAQ	-6.92	104.33	109.93
9	D	401	3F8	CAE-CAQ-NAU	5.55	111.14	106.08
9	D	401	3F8	CAT-NAV-CAS	-5.52	105.46	109.93
9	D	401	3F8	CAF-CAR-NAU	5.23	110.84	106.08

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	D	401	3F8	CAH-CAT-NAV	4.99	110.63	106.08
9	D	401	3F8	CAG-CAS-NAV	4.59	110.26	106.08
5	A	806	MPD	C5-C4-C3	3.44	127.67	111.67
9	D	401	3F8	CAN-NAV-CAS	3.25	129.21	124.86
3	A	801	ADP	O3B-PB-O2B	2.63	117.67	107.80
5	A	806	MPD	O4-C4-C5	2.60	120.64	109.45
9	D	401	3F8	CAM-NAU-CAQ	-2.58	121.40	124.86
9	D	401	3F8	CAK-CAM-NAU	2.57	116.50	112.26
5	A	804	MPD	C5-C4-C3	2.06	121.25	111.67
9	D	401	3F8	OAB-CAR-CAF	-2.06	124.75	128.52

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
5	A	806	MPD	C4

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	806	MPD	C2-C3-C4-C5
9	D	401	3F8	CAM-CAK-OAO-CAI
3	A	801	ADP	PA-O3A-PB-O2B
9	D	401	3F8	CAI-CAJ-OAP-CAL
5	A	804	MPD	CM-C2-C3-C4
5	A	804	MPD	C2-C3-C4-C5
5	A	805	MPD	O2-C2-C3-C4
5	A	804	MPD	C2-C3-C4-O4
5	A	806	MPD	C1-C2-C3-C4
5	A	806	MPD	CM-C2-C3-C4

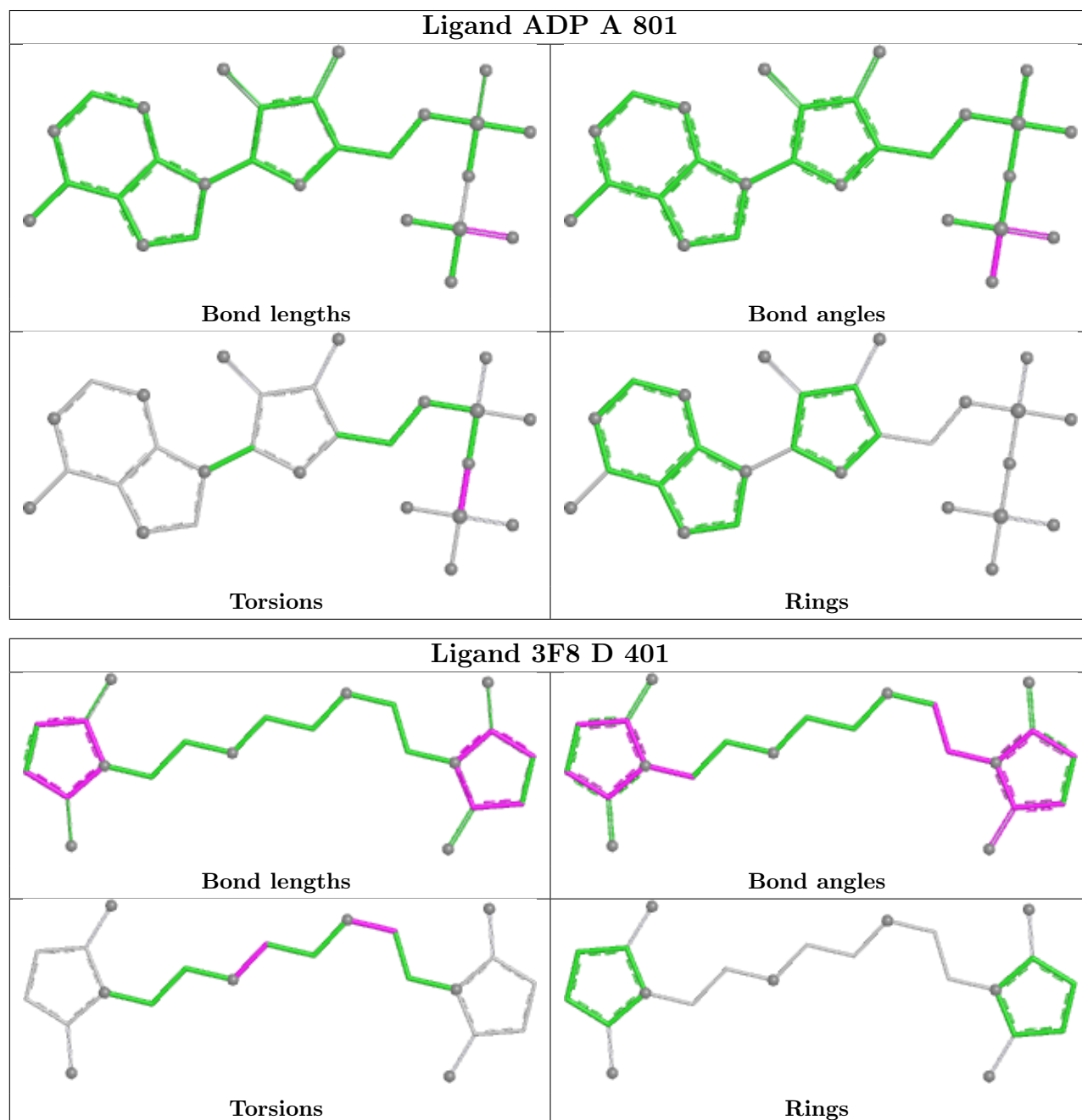
There are no ring outliers.

4 monomers are involved in 26 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	811	ACT	3	1
5	A	806	MPD	8	1
5	A	805	MPD	13	0
6	A	813	ACT	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 [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	411/419 (98%)	-0.01	19 (4%) 37 45	9, 23, 51, 91	41 (9%)
2	D	10/10 (100%)	0.69	1 (10%) 12 14	9, 12, 18, 21	10 (100%)
2	E	10/10 (100%)	3.14	9 (90%) 0 0	37, 40, 60, 61	10 (100%)
All	All	431/439 (98%)	0.08	29 (6%) 24 28	9, 23, 52, 91	61 (14%)

All (29) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	736	LEU	5.4
2	E	368	PHE	4.5
2	E	376	PRO	4.4
2	E	375	TYR	4.1
1	A	440	THR	4.0
1	A	436	SER	3.9
2	E	377	CYS	3.7
1	A	735	ARG	3.6
1	A	388	PHE	3.4
1	A	577	GLY	3.3
1	A	700	LEU	3.2
1	A	614	ILE	3.1
1	A	319	SER	3.0
1	A	701	MET	2.9
1	A	576	MET	2.9
2	E	374	THR	2.8
1	A	434	ARG	2.8
2	E	370	ILE	2.8
1	A	692	THR	2.7
1	A	719	TYR	2.7
1	A	439	GLY	2.6
2	E	369	ASN	2.5
2	E	373	THR	2.4

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Mol	Chain	Res	Type	RSRZ
2	E	371	VAL	2.4
2	D	376	PRO	2.2
1	A	438	ASP	2.1
1	A	578	GLU	2.1
1	A	433[A]	ILE	2.1
1	A	582	LEU	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(Å ²)	Q<0.9
5	MPD	A	806	8/8	0.71	0.20	36,39,53,58	1
6	ACT	A	808	4/4	0.83	0.16	54,56,59,62	0
6	ACT	A	809	4/4	0.84	0.15	46,48,49,52	0
9	3F8	D	401	22/22	0.84	0.15	30,63,117,120	38
6	ACT	A	814	4/4	0.85	0.15	49,52,58,59	0
6	ACT	A	813	4/4	0.85	0.13	33,40,42,49	0
6	ACT	A	812	4/4	0.86	0.13	34,37,39,40	0
5	MPD	A	804	8/8	0.86	0.13	38,39,42,45	1
6	ACT	A	807	4/4	0.89	0.14	46,58,59,64	0
7	PO4	A	815	5/5	0.89	0.10	55,64,66,75	0
6	ACT	A	811	4/4	0.89	0.09	32,33,44,44	7
6	ACT	A	810	4/4	0.90	0.15	45,60,62,63	0
5	MPD	A	805	8/8	0.92	0.09	20,25,28,36	1
4	MG	A	803	1/1	0.98	0.04	25,25,25,25	0
3	ADP	A	801	27/27	0.98	0.05	17,20,27,29	4
8	NA	A	816[A]	1/1	0.99	0.07	26,26,26,26	1
8	NA	A	816[B]	1/1	0.99	0.07	35,35,35,35	1

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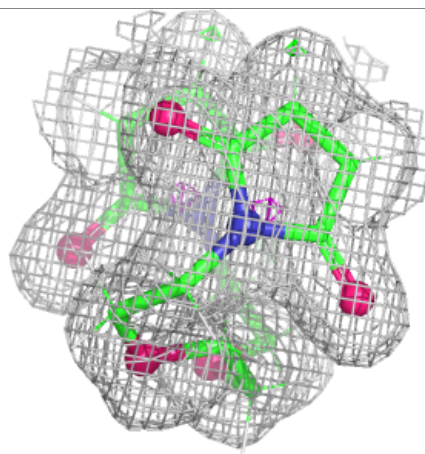
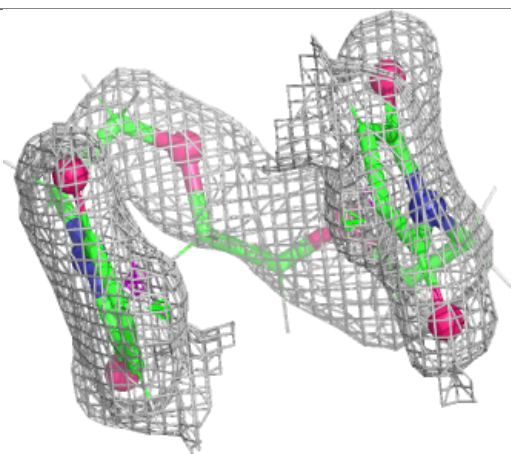
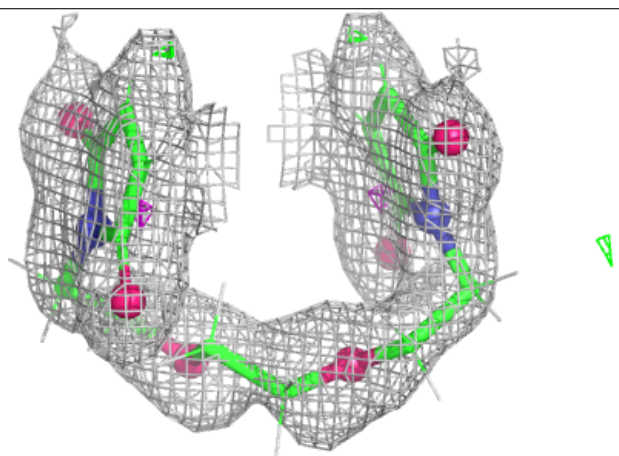
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	MG	A	802	1/1	0.99	0.02	21,21,21,21	0

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.

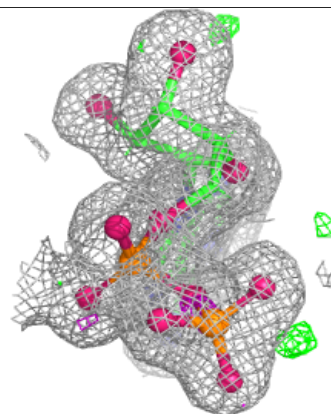
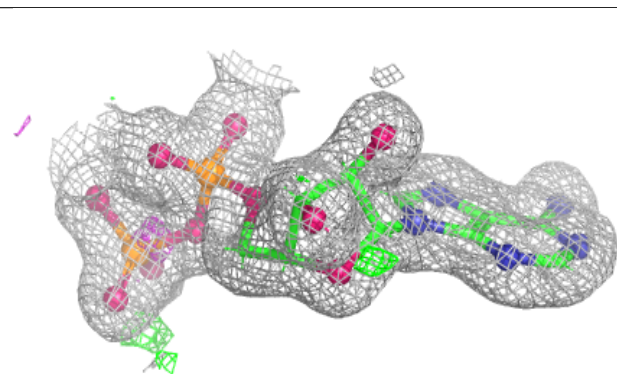
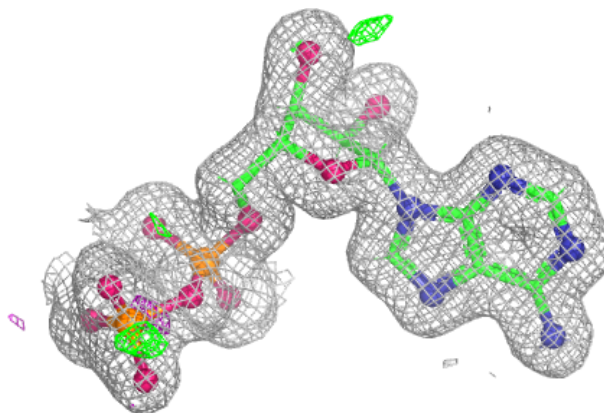
Electron density around 3F8 D 401:

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 ADP A 801:

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



6.5 Other polymers ⓘ

There are no such residues in this entry.