



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 9, 2023 – 10:45 AM EDT

PDB ID : 8E4X
Title : Human Adenosine Deaminase Acting on dsRNA (ADAR2-R2D) bound to dsRNA containing a G:3-deaza dA pair adjacent to the target site
Authors : Fisher, A.J.; Mendoza, H.G.
Deposited on : 2022-08-19
Resolution : 2.80 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 : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35.1
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) : 2.35.1

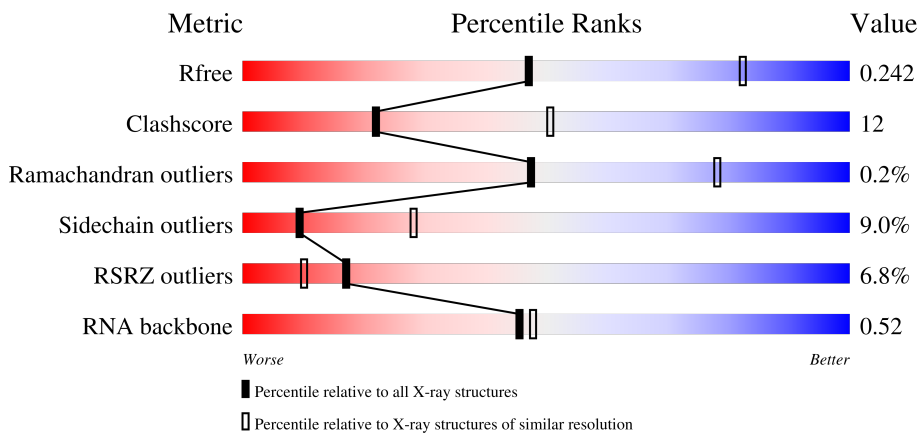
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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	3140 (2.80-2.80)
Clashscore	141614	3569 (2.80-2.80)
Ramachandran outliers	138981	3498 (2.80-2.80)
Sidechain outliers	138945	3500 (2.80-2.80)
RSRZ outliers	127900	3078 (2.80-2.80)
RNA backbone	3102	1227 (3.10-2.50)

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	488	 11% 57% 19% 21%
1	B	488	 11% 61% 28% 7%
2	C	32	 47% 47% 6%
3	D	32	 59% 25% 12%

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 8029 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 Double-stranded RNA-specific editase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	384	Total 3019	C 1904	N 550	O 554	S 11	0	0	0
1	B	454	Total 3539	C 2234	N 639	O 653	S 13	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	214	GLY	-	expression tag	UNP P78563
A	488	GLN	GLU	engineered mutation	UNP P78563
B	214	GLY	-	expression tag	UNP P78563
B	488	GLN	GLU	engineered mutation	UNP P78563

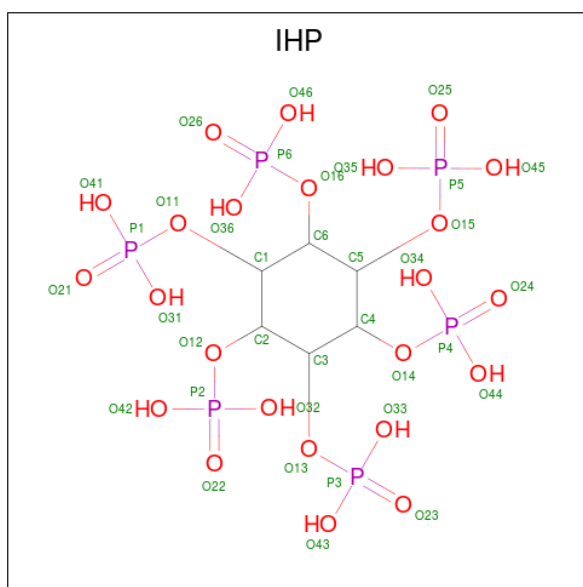
- Molecule 2 is a RNA chain called RNA (5-R(*GP*CP*UP*CP*GP*CP*GP*AP*UP*GP*CP*GP*(8AZ)P*GP*AP*GP*GP*GP*CP*UP*CP*UP*GP*AP*UP*AP*GP*CP*UP*AP*CP*G)-3).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
2	C	32	Total 685	C 305	N 126	O 223	P 31	0	0	0

- Molecule 3 is a RNA chain called RNA(5-R(*CP*GP*UP*AP*GP*CP*UP*AP*UP*CP*AP*GP*AP*GP*CP*CP*CP*CP*CP*(4DU)*GP*CP*AP*UP*CP*GP*CP*GP*AP*GP*CP)-3).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
3	D	32	Total 674	C 304	N 121	O 218	P 31	0	0	0

- Molecule 4 is INOSITOL HEXAKISPHOSPHATE (three-letter code: IHP) (formula: C₆H₁₈O₂₄P₆).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
4	A	1	Total	C	O	P	0	0
			36	6	24	6		
4	B	1	Total	C	O	P	0	0
			36	6	24	6		

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Zn	0	0
			1	1		
5	B	1	Total	Zn	0	0
			1	1		

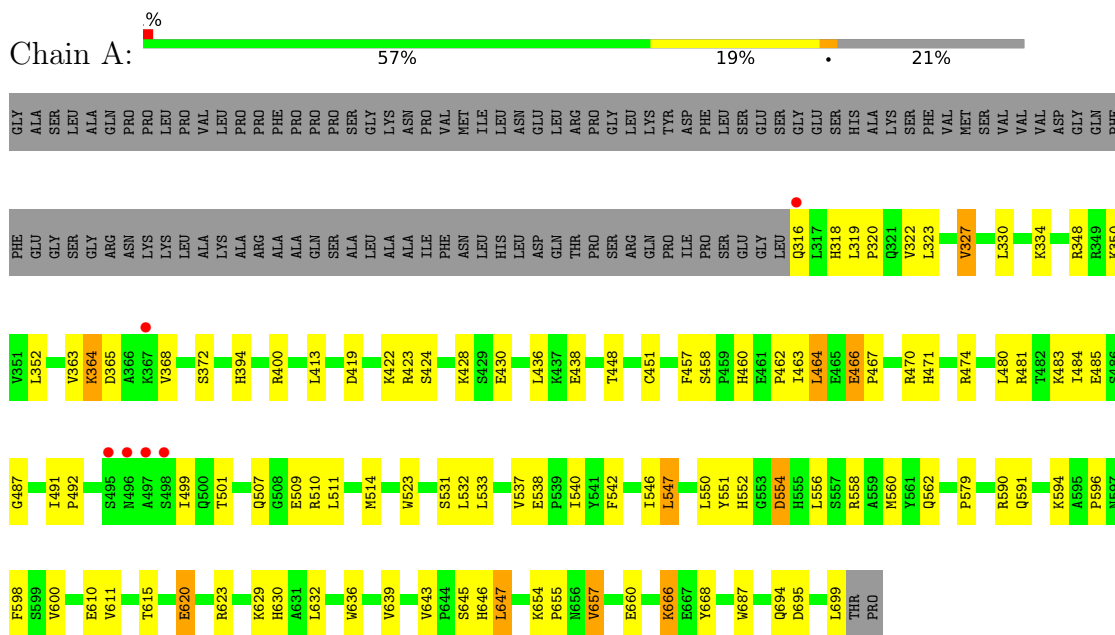
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	19	Total	O	0	0
			19	19		
6	B	9	Total	O	0	0
			9	9		
6	C	6	Total	O	0	0
			6	6		
6	D	4	Total	O	0	0
			4	4		

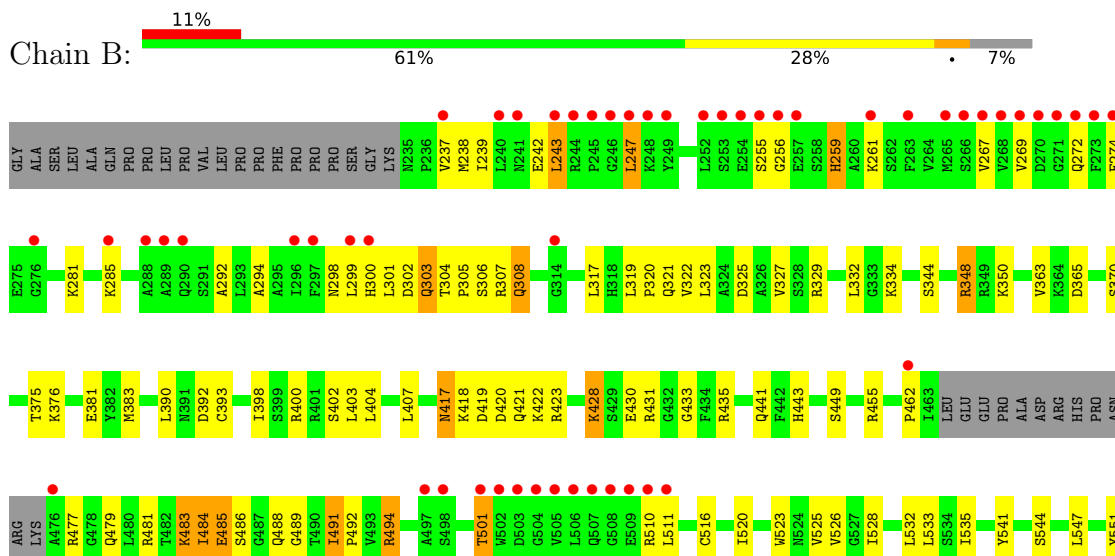
3 Residue-property plots

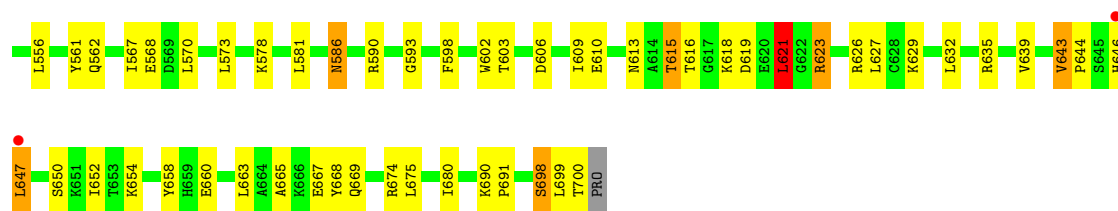
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Double-stranded RNA-specific editase 1



• Molecule 1: Double-stranded RNA-specific editase 1





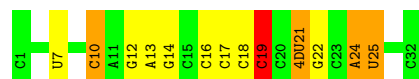
- Molecule 2: RNA (5-R(*GP*CP*UP*CP*GP*CP*GP*AP*UP*GP*CP*GP*(8AZ)P*GP*AP*GP*GP*GP*CP*UP*CP*UP*GP*AP*UP*AP*GP*CP*UP*AP*CP*G)-3)

Chain C: 47% 47% 6%



- Molecule 3: RNA(5-R(*CP*GP*UP*AP*GP*CP*UP*AP*UP*CP*AP*GP*AP*GP*CP*CP*CP*CP*CP*(4DU)*GP*CP*AP*UP*CP*GP*CP*GP*AP*GP*C)-3)

Chain D: 59% 25% 12%



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	169.91Å 63.24Å 142.65Å 90.00° 118.07° 90.00°	Depositor
Resolution (Å)	58.27 – 2.80 58.27 – 2.80	Depositor EDS
% Data completeness (in resolution range)	94.9 (58.27-2.80) 94.9 (58.27-2.80)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.58 (at 2.81Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.195 , 0.239 0.196 , 0.242	Depositor DCC
R_{free} test set	1582 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	81.8	Xtrriage
Anisotropy	0.559	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 86.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	8029	wwPDB-VP
Average B, all atoms (Å ²)	110.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.76% 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: 8AZ, ZN, 4DU, IHP

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	0.62	0/3081	0.92	4/4164 (0.1%)
1	B	0.50	0/3609	0.70	1/4874 (0.0%)
2	C	0.72	0/740	1.35	7/1151 (0.6%)
3	D	0.81	0/727	1.45	9/1128 (0.8%)
All	All	0.60	0/8157	0.95	21/11317 (0.2%)

There are no bond length outliers.

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	12	G	O4'-C1'-N9	9.04	115.43	108.20
2	C	12	G	N3-C2-N2	-8.03	114.28	119.90
3	D	16	C	C6-N1-C2	-6.53	117.69	120.30
3	D	10	C	C2-N1-C1'	6.20	125.62	118.80
1	A	590	ARG	C-N-CA	-6.19	106.22	121.70
2	C	14	G	C2-N3-C4	6.04	114.92	111.90
1	A	647	LEU	CB-CG-CD2	-5.82	101.11	111.00
3	D	19	C	C6-N1-C2	-5.81	117.98	120.30
2	C	2	C	N1-C2-O2	5.80	122.38	118.90
3	D	16	C	C2-N1-C1'	5.65	125.01	118.80
1	A	457	PHE	CB-CG-CD2	-5.61	116.87	120.80
3	D	14	G	N3-C4-N9	5.41	129.25	126.00
3	D	16	C	C5-C6-N1	5.37	123.68	121.00
3	D	24	A	O5'-P-OP1	-5.25	100.97	105.70
2	C	12	G	N1-C2-N2	5.18	120.86	116.20
2	C	12	G	N1-C6-O6	5.15	122.99	119.90
3	D	16	C	N3-C4-C5	-5.11	119.86	121.90
2	C	18	G	C8-N9-C4	5.07	108.43	106.40
1	B	621	LEU	CA-CB-CG	5.07	126.95	115.30
1	A	547	LEU	CA-CB-CG	5.02	126.84	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	25	U	C5-C4-O4	5.01	128.91	125.90

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	3019	0	3051	70	0
1	B	3539	0	3567	100	0
2	C	685	0	337	11	0
3	D	674	0	351	8	0
4	A	36	0	6	1	0
4	B	36	0	6	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
6	A	19	0	0	1	0
6	B	9	0	0	0	0
6	C	6	0	0	0	0
6	D	4	0	0	0	0
All	All	8029	0	7318	181	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 12.

All (181) 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:654:LYS:HG3	1:A:655:PRO:HD2	1.59	0.84
1:B:300:HIS:CG	1:B:301:LEU:H	1.96	0.83
1:A:620:GLU:OE2	6:A:901:HOH:O	1.97	0.81
1:B:428:LYS:HD3	1:B:428:LYS:H	1.46	0.79
1:A:554:ASP:OD1	1:A:554:ASP:N	2.14	0.75
1:B:305:PRO:HG3	1:B:462:PRO:HB2	1.65	0.75
1:B:400:ARG:HD3	1:B:523:TRP:CE2	2.22	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:492:PRO:O	1:B:494:ARG:NH1	2.22	0.72
1:B:319:LEU:HB3	1:B:322:VAL:HG13	1.72	0.71
1:A:327:VAL:HG21	1:A:546:ILE:HD13	1.73	0.70
1:B:239:ILE:HA	1:B:242:GLU:HG2	1.74	0.69
1:B:308:GLN:OE1	1:B:308:GLN:N	2.26	0.69
1:A:464:LEU:HD13	1:A:464:LEU:H	1.61	0.66
1:B:281:LYS:NZ	2:C:19:C:OP1	2.28	0.66
1:B:698:SER:HB2	1:B:700:THR:HG22	1.76	0.66
1:B:325:ASP:HB3	1:B:329:ARG:HH21	1.61	0.65
1:B:449:SER:HB3	1:B:455:ARG:HG3	1.78	0.64
1:B:300:HIS:CG	1:B:301:LEU:N	2.67	0.63
1:B:317:LEU:HB3	1:B:323:LEU:HD13	1.81	0.61
2:C:24:A:H2'	2:C:25:U:H6	1.66	0.61
1:B:348:ARG:HH21	1:B:598:PHE:HE2	1.49	0.61
1:A:451:CYS:SG	1:A:483:LYS:HE3	2.41	0.60
1:B:301:LEU:O	1:B:303:GLN:N	2.34	0.60
1:A:436:LEU:HD21	1:A:540:ILE:HG12	1.84	0.59
1:A:487:GLY:O	2:C:14:G:H1'	2.02	0.58
1:A:501:THR:HG22	1:B:491:ILE:HD13	1.86	0.58
1:B:501:THR:HA	1:B:691:PRO:HB3	1.85	0.58
3:D:12:G:H2'	3:D:13:A:H8	1.68	0.58
1:A:323:LEU:O	1:A:327:VAL:HG13	2.03	0.58
1:A:657:VAL:HG22	1:A:660:GLU:HG2	1.86	0.58
1:A:319:LEU:HB3	1:A:322:VAL:HG23	1.86	0.57
1:B:443:HIS:HB3	1:B:544:SER:HB2	1.86	0.57
1:B:247:LEU:HD21	1:B:269:VAL:HB	1.85	0.57
1:B:393:CYS:HA	1:B:398:ILE:HD11	1.87	0.57
1:B:639:VAL:O	1:B:643:VAL:HG22	2.05	0.56
1:A:430:GLU:OE1	1:A:430:GLU:N	2.25	0.56
1:B:317:LEU:HD12	1:B:363:VAL:HG13	1.88	0.56
1:B:484:ILE:HG12	1:B:484:ILE:O	2.05	0.56
1:A:462:PRO:HB3	1:A:552:HIS:CE1	2.41	0.55
1:A:654:LYS:HG2	1:A:660:GLU:HB3	1.88	0.55
1:B:516:CYS:O	1:B:520:ILE:HG13	2.06	0.55
2:C:24:A:H2'	2:C:25:U:C6	2.42	0.55
1:A:460:HIS:C	1:A:550:LEU:HD22	2.26	0.55
1:A:514:MET:HG3	1:A:687:TRP:CE2	2.42	0.55
1:B:535:ILE:HG23	1:B:650:SER:HB2	1.89	0.55
1:B:300:HIS:CD2	1:B:301:LEU:H	2.25	0.54
1:B:621:LEU:HD21	1:B:623:ARG:NH2	2.23	0.54
1:B:430:GLU:H	1:B:430:GLU:CD	2.12	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:458:SER:HB2	1:A:552:HIS:CD2	2.44	0.53
2:C:23:G:H2'	2:C:24:A:H8	1.74	0.53
3:D:12:G:H2'	3:D:13:A:C8	2.44	0.53
1:B:392:ASP:OD2	1:B:483:LYS:NZ	2.36	0.53
1:B:303:GLN:HB3	1:B:306:SER:HB2	1.91	0.52
1:A:471:HIS:HB3	1:A:474:ARG:HG3	1.91	0.52
1:B:400:ARG:HD3	1:B:523:TRP:CZ2	2.44	0.52
1:B:365:ASP:OD1	1:B:365:ASP:N	2.43	0.52
3:D:19:C:H5''	3:D:19:C:H6	1.73	0.52
1:B:239:ILE:O	1:B:243:LEU:HB2	2.09	0.52
1:B:294:ALA:HA	1:B:298:ASN:O	2.10	0.52
1:B:319:LEU:O	1:B:322:VAL:HG22	2.10	0.52
1:B:644:PRO:HB2	1:B:646:HIS:ND1	2.25	0.52
1:B:422:LYS:HE3	1:B:423:ARG:NH1	2.25	0.51
1:A:316:GLN:HA	1:A:363:VAL:HG12	1.91	0.51
1:A:413:LEU:HD21	1:A:423:ARG:HB2	1.93	0.51
1:A:537:VAL:HG12	1:A:538:GLU:O	2.10	0.51
1:A:558:ARG:HA	1:A:562:GLN:HB2	1.92	0.51
1:B:267:VAL:HG12	1:B:274:PHE:HB2	1.92	0.51
1:B:485:GLU:HB3	1:B:510:ARG:HD2	1.93	0.51
3:D:17:C:H2'	3:D:18:C:O4'	2.12	0.50
1:A:484:ILE:HG23	1:A:487:GLY:HA3	1.92	0.50
1:B:586:ASN:ND2	1:B:586:ASN:H	2.08	0.50
1:A:532:LEU:HB3	1:A:636:TRP:CD1	2.47	0.49
1:B:300:HIS:CE1	1:B:301:LEU:HG	2.48	0.49
1:A:394:HIS:CE1	1:A:483:LYS:HE2	2.48	0.49
1:B:430:GLU:OE2	1:B:435:ARG:HD3	2.12	0.49
1:A:448:THR:OG1	1:A:550:LEU:HD12	2.13	0.49
1:A:319:LEU:HD22	1:A:320:PRO:HD2	1.94	0.49
1:B:613:ASN:OD1	1:B:615:THR:HG23	2.13	0.48
2:C:30:A:H2'	2:C:31:C:C6	2.49	0.48
1:B:237:VAL:HG21	1:B:285:LYS:HG2	1.96	0.48
1:A:629:LYS:NZ	4:A:801:IHP:O42	2.42	0.48
1:B:417:ASN:HB2	1:B:420:ASP:OD2	2.14	0.48
1:A:419:ASP:HA	1:A:422:LYS:HE2	1.95	0.48
1:A:596:PRO:HB3	1:A:598:PHE:CE2	2.48	0.48
1:B:525:VAL:O	1:B:541:TYR:OH	2.28	0.48
1:B:383:MET:HB2	1:B:511:LEU:HD11	1.96	0.47
1:A:430:GLU:H	1:A:430:GLU:CD	2.07	0.47
1:A:481:ARG:HA	1:A:491:ILE:O	2.14	0.47
1:B:323:LEU:O	1:B:327:VAL:HG13	2.13	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:484:ILE:HD13	1:B:489:GLY:O	2.14	0.47
1:A:547:LEU:HD12	1:A:551:TYR:HA	1.97	0.47
3:D:18:C:H2'	3:D:19:C:O4'	2.15	0.47
1:A:350:LYS:NZ	1:A:591:GLN:O	2.28	0.47
1:A:510:ARG:HD2	1:B:593:GLY:HA2	1.97	0.47
1:B:317:LEU:HD23	1:B:441:GLN:OE1	2.15	0.47
1:A:463:ILE:O	1:A:466:GLU:HG3	2.14	0.46
1:B:663:LEU:HD23	1:B:663:LEU:HA	1.74	0.46
1:B:317:LEU:HD12	1:B:363:VAL:HG22	1.97	0.46
1:B:308:GLN:HA	1:B:551:TYR:OH	2.16	0.46
1:B:418:LYS:HA	1:B:421:GLN:HG3	1.98	0.46
2:C:8:A:H2'	2:C:9:U:C6	2.50	0.46
1:B:319:LEU:HD23	1:B:320:PRO:HD2	1.98	0.46
1:B:348:ARG:NH2	1:B:598:PHE:HE2	2.14	0.46
1:B:654:LYS:HB3	1:B:654:LYS:HE2	1.76	0.46
1:B:606:ASP:CG	1:B:626:ARG:HH12	2.19	0.45
1:A:364:LYS:HZ3	1:A:364:LYS:HB2	1.80	0.45
1:B:308:GLN:NE2	1:B:321:GLN:OE1	2.50	0.45
1:B:449:SER:HA	1:B:547:LEU:HD13	1.98	0.45
1:B:256:GLY:O	1:B:261:LYS:HE3	2.17	0.45
1:B:556:LEU:HD23	1:B:581:LEU:HB3	1.98	0.45
1:B:404:LEU:HD22	1:B:533:LEU:HD12	1.98	0.45
1:A:480:LEU:O	1:A:492:PRO:HA	2.16	0.45
2:C:23:G:H2'	2:C:24:A:C8	2.52	0.45
1:A:316:GLN:HB3	1:A:364:LYS:NZ	2.31	0.45
1:A:319:LEU:HB3	1:A:322:VAL:CG2	2.46	0.45
1:A:400:ARG:HD3	1:A:523:TRP:CE2	2.52	0.45
1:B:433:GLY:HA2	1:B:647:LEU:HD13	1.99	0.45
1:A:413:LEU:HD23	1:A:424:SER:HA	1.97	0.44
2:C:20:U:C2	2:C:21:C:C5	3.06	0.44
1:B:305:PRO:HG3	1:B:462:PRO:CB	2.43	0.44
1:B:532:LEU:HA	1:B:532:LEU:HD23	1.68	0.44
1:A:463:ILE:HG13	1:A:466:GLU:H	1.82	0.44
1:A:467:PRO:HB3	1:A:470:ARG:HH21	1.81	0.44
1:A:501:THR:OG1	1:B:489:GLY:HA3	2.17	0.44
1:B:259:HIS:ND1	1:B:259:HIS:N	2.64	0.44
1:A:542:PHE:O	1:A:579:PRO:HB3	2.18	0.44
1:A:316:GLN:N	1:A:316:GLN:OE1	2.51	0.43
1:A:533:LEU:HD23	1:A:533:LEU:HA	1.85	0.43
1:B:561:TYR:CD2	1:B:578:LYS:HA	2.53	0.43
1:A:632:LEU:HA	1:A:632:LEU:HD23	1.65	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:21:C:H2'	2:C:22:U:H6	1.83	0.43
3:D:24:A:H2'	3:D:25:U:H6	1.84	0.43
1:B:403:LEU:O	1:B:407:LEU:HG	2.18	0.43
1:B:370:SER:HB2	1:B:402:SER:HB2	2.00	0.43
1:B:390:LEU:HD21	1:B:627:LEU:HB3	2.01	0.43
1:B:626:ARG:H	1:B:626:ARG:HG2	1.54	0.43
1:B:647:LEU:HD22	1:B:647:LEU:HA	1.83	0.43
1:A:348:ARG:HG2	1:A:596:PRO:HG3	2.00	0.43
1:B:269:VAL:HG11	1:B:292:ALA:HB1	2.00	0.43
1:A:485:GLU:OE2	1:B:590:ARG:NH2	2.26	0.42
1:B:477:ARG:O	1:B:479:GLN:N	2.49	0.42
1:B:699:LEU:HD23	1:B:699:LEU:HA	1.83	0.42
1:A:600:VAL:HA	1:A:610:GLU:O	2.19	0.42
1:B:317:LEU:HD13	1:B:317:LEU:HA	1.69	0.42
1:B:616:THR:O	1:B:618:LYS:HG2	2.20	0.42
1:A:480:LEU:HA	1:A:480:LEU:HD23	1.77	0.42
1:A:531:SER:HB3	1:A:668:TYR:CE1	2.54	0.42
1:B:528:ILE:C	1:B:528:ILE:HD12	2.39	0.42
1:A:481:ARG:NH1	1:A:492:PRO:HD3	2.35	0.42
1:A:509:GLU:OE2	1:B:488:GLN:N	2.48	0.42
1:B:300:HIS:NE2	1:B:301:LEU:HG	2.33	0.42
1:B:307:ARG:HA	1:B:308:GLN:OE1	2.19	0.42
1:A:316:GLN:HA	1:A:363:VAL:H	1.85	0.42
1:B:239:ILE:HG13	1:B:242:GLU:OE2	2.19	0.42
1:A:666:LYS:HA	1:A:666:LYS:HD3	1.85	0.42
1:B:325:ASP:HB3	1:B:329:ARG:NH2	2.32	0.42
1:B:602:TRP:HB2	1:B:609:ILE:HG22	2.02	0.42
1:A:600:VAL:HG12	1:A:611:VAL:HG22	2.01	0.42
1:B:629:LYS:HG2	1:B:658:TYR:CE2	2.55	0.42
3:D:24:A:H2'	3:D:25:U:C6	2.55	0.42
1:B:526:VAL:HB	1:B:668:TYR:CE2	2.55	0.41
1:B:635:ARG:HA	1:B:635:ARG:HD2	1.87	0.41
1:A:350:LYS:HA	1:A:350:LYS:HD3	1.73	0.41
1:A:352:LEU:HD12	1:A:372:SER:O	2.21	0.41
1:A:694:GLN:HG3	1:A:695:ASP:OD1	2.20	0.41
1:B:562:GLN:OE1	1:B:562:GLN:HA	2.20	0.41
2:C:12:G:N3	2:C:12:G:H2'	2.35	0.41
1:B:570:LEU:HD23	1:B:570:LEU:HA	1.82	0.41
1:A:639:VAL:O	1:A:643:VAL:HG23	2.20	0.41
1:A:646:HIS:CE1	1:A:647:LEU:HG	2.56	0.41
1:B:255:SER:O	1:B:261:LYS:HA	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:256:GLY:HA3	1:B:261:LYS:HA	2.01	0.41
1:B:665:ALA:O	1:B:669:GLN:HG2	2.21	0.41
3:D:21:4DU:H14	3:D:21:4DU:H8	1.87	0.41
1:A:485:GLU:HG2	1:A:511:LEU:H	1.86	0.40
1:A:507:GLN:HB2	1:B:455:ARG:NH1	2.36	0.40
1:B:567:ILE:HD12	1:B:675:LEU:HA	2.03	0.40
1:A:330:LEU:HB3	1:A:368:VAL:CG2	2.50	0.40
1:B:610:GLU:OE2	1:B:626:ARG:HG2	2.21	0.40
1:A:630:HIS:CE1	1:A:699:LEU:HD22	2.55	0.40
1:A:556:LEU:O	1:A:560:MET:HG2	2.21	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	382/488 (78%)	370 (97%)	11 (3%)	1 (0%)	41	72
1	B	450/488 (92%)	416 (92%)	33 (7%)	1 (0%)	47	78
All	All	832/976 (85%)	786 (94%)	44 (5%)	2 (0%)	47	78

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	486	SER
1	A	499	ILE

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	329/415 (79%)	312 (95%)	17 (5%)	23	55
1	B	384/415 (92%)	337 (88%)	47 (12%)	5	15
All	All	713/830 (86%)	649 (91%)	64 (9%)	9	28

All (64) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	318	HIS
1	A	327	VAL
1	A	334	LYS
1	A	364	LYS
1	A	365	ASP
1	A	428	LYS
1	A	438	GLU
1	A	464	LEU
1	A	466	GLU
1	A	554	ASP
1	A	594	LYS
1	A	615	THR
1	A	620	GLU
1	A	623	ARG
1	A	645	SER
1	A	657	VAL
1	A	666	LYS
1	B	238	MET
1	B	243	LEU
1	B	247	LEU
1	B	259	HIS
1	B	272	GLN
1	B	299	LEU
1	B	302	ASP
1	B	303	GLN
1	B	304	THR
1	B	308	GLN
1	B	332	LEU
1	B	334	LYS
1	B	344	SER
1	B	348	ARG
1	B	350	LYS
1	B	375	THR

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Mol	Chain	Res	Type
1	B	376	LYS
1	B	381	GLU
1	B	417	ASN
1	B	419	ASP
1	B	428	LYS
1	B	431	ARG
1	B	481	ARG
1	B	483	LYS
1	B	484	ILE
1	B	485	GLU
1	B	491	ILE
1	B	494	ARG
1	B	501	THR
1	B	568	GLU
1	B	573	LEU
1	B	586	ASN
1	B	603	THR
1	B	615	THR
1	B	619	ASP
1	B	621	LEU
1	B	623	ARG
1	B	632	LEU
1	B	643	VAL
1	B	647	LEU
1	B	652	ILE
1	B	660	GLU
1	B	667	GLU
1	B	674	ARG
1	B	680	ILE
1	B	690	LYS
1	B	698	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	316	GLN
1	A	488	GLN
1	A	552	HIS
1	A	630	HIS
1	B	696	GLN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	C	30/32 (93%)	2 (6%)	0
3	D	30/32 (93%)	4 (13%)	0
All	All	60/64 (93%)	6 (10%)	0

All (6) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	C	10	G
2	C	29	U
3	D	7	U
3	D	10	C
3	D	19	C
3	D	22	G

There are no RNA pucker outliers to report.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

2 non-standard protein/DNA/RNA residues 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	4DU	D	21	3	18,23,24	1.74	6 (33%)	21,33,36	1.67	6 (28%)
2	8AZ	C	13	5,2	17,24,25	0.83	0	14,35,38	0.84	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	4DU	D	21	3	-	0/3/21/22	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	8AZ	C	13	5,2	-	2/3/35/36	0/3/3/3

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	21	4DU	C6-N6	3.35	1.46	1.34
3	D	21	4DU	O5'-C5'	-3.16	1.37	1.44
3	D	21	4DU	C3-C4	-2.73	1.35	1.41
3	D	21	4DU	C5-N7	2.65	1.49	1.39
3	D	21	4DU	C1'-N9	-2.20	1.42	1.49
3	D	21	4DU	C3'-C4'	-2.11	1.47	1.53

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	21	4DU	C3-C4-N9	3.48	135.07	132.11
3	D	21	4DU	C2-N1-C6	2.93	121.90	117.61
3	D	21	4DU	C2'-C1'-N9	-2.77	107.87	114.27
3	D	21	4DU	C3-C2-N1	-2.65	121.19	123.81
3	D	21	4DU	O3'-C3'-C4'	-2.48	100.63	110.10
3	D	21	4DU	C2'-C3'-C4'	2.16	107.25	102.76

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	13	8AZ	O4'-C4'-C5'-O5'
2	C	13	8AZ	C3'-C4'-C5'-O5'

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	21	4DU	1	0

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 2 are monoatomic - leaving 2 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
4	IHP	A	801	-	36,36,36	0.77	0	54,60,60	0.81	1 (1%)
4	IHP	B	801	-	36,36,36	0.79	1 (2%)	54,60,60	0.75	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
4	IHP	A	801	-	-	2/30/54/54	0/1/1/1
4	IHP	B	801	-	-	1/30/54/54	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	801	IHP	P4-O14	2.06	1.63	1.59

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	801	IHP	O12-P2-O22	-2.26	100.66	109.39

There are no chirality outliers.

All (3) torsion outliers are listed below:

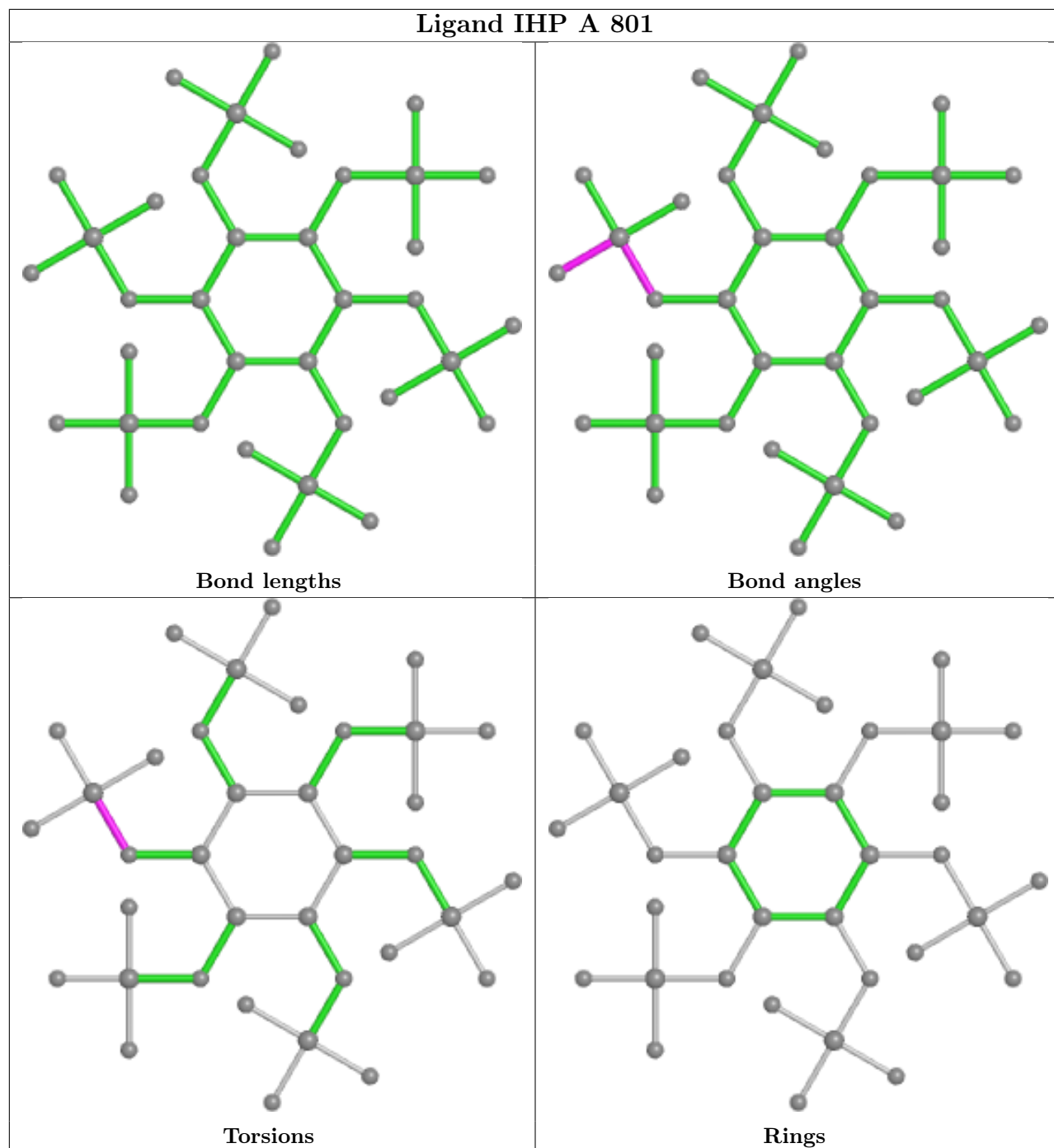
Mol	Chain	Res	Type	Atoms
4	A	801	IHP	C2-O12-P2-O32
4	B	801	IHP	C2-O12-P2-O22
4	A	801	IHP	C2-O12-P2-O42

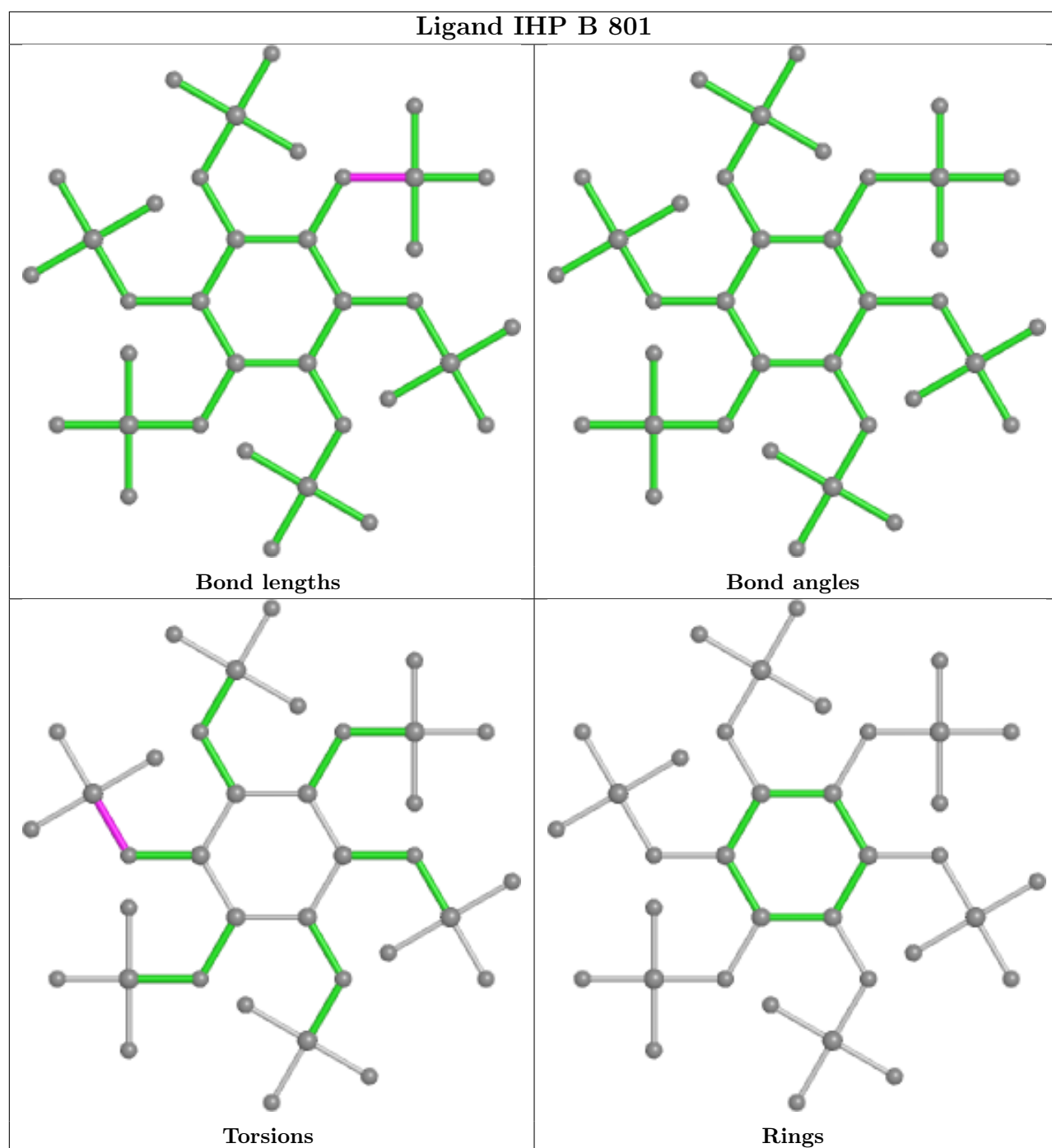
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	801	IHP	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	384/488 (78%)	0.07	6 (1%) 72 66	73, 88, 135, 204	0
1	B	454/488 (93%)	0.56	55 (12%) 4 2	80, 107, 176, 213	0
2	C	31/32 (96%)	-0.21	0 100 100	81, 114, 182, 188	0
3	D	31/32 (96%)	-0.32	0 100 100	80, 130, 180, 193	0
All	All	900/1040 (86%)	0.29	61 (6%) 17 10	73, 99, 174, 213	0

All (61) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	502	TRP	6.5
1	A	496	ASN	6.4
1	B	256	GLY	6.4
1	B	505	VAL	6.4
1	B	300	HIS	6.3
1	B	249	TYR	6.0
1	B	272	GLN	5.9
1	B	273	PHE	5.8
1	B	248	LYS	5.5
1	B	267	VAL	5.5
1	B	511	LEU	5.2
1	B	268	VAL	5.2
1	B	462	PRO	4.9
1	B	269	VAL	4.5
1	B	245	PRO	4.5
1	B	247	LEU	4.5
1	B	240	LEU	4.4
1	B	508	GLY	4.2
1	B	503	ASP	4.2
1	B	243	LEU	3.8
1	B	501	THR	3.8

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Mol	Chain	Res	Type	RSRZ
1	B	244	ARG	3.8
1	B	299	LEU	3.6
1	B	261	LYS	3.6
1	B	274	PHE	3.6
1	B	265	MET	3.5
1	A	497	ALA	3.5
1	B	254	GLU	3.5
1	B	257	GLU	3.4
1	B	241	ASN	3.4
1	B	504	GLY	3.3
1	B	237	VAL	3.2
1	B	270	ASP	3.2
1	B	506	LEU	3.2
1	B	255	SER	3.0
1	B	276	GLY	3.0
1	B	314	GLY	2.9
1	B	507	GLN	2.8
1	B	253	SER	2.8
1	B	289	ALA	2.7
1	A	316	GLN	2.7
1	B	252	LEU	2.7
1	B	476	ALA	2.7
1	B	266	SER	2.7
1	B	646	HIS	2.7
1	B	297	PHE	2.6
1	B	246	GLY	2.6
1	B	509	GLU	2.5
1	A	498	SER	2.4
1	B	497	ALA	2.4
1	A	495	SER	2.4
1	B	285	LYS	2.3
1	B	271	GLY	2.3
1	B	647	LEU	2.3
1	B	263	PHE	2.2
1	B	498	SER	2.2
1	A	367	LYS	2.2
1	B	510	ARG	2.2
1	B	288	ALA	2.2
1	B	296	ILE	2.1
1	B	290	GLN	2.1

6.2 Non-standard residues in protein, DNA, RNA chains [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
3	4DU	D	21	21/22	0.97	0.18	79,82,90,95	0
2	8AZ	C	13	22/23	0.98	0.16	72,76,83,83	0

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

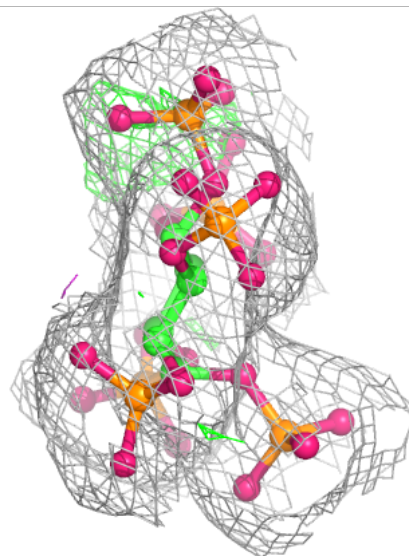
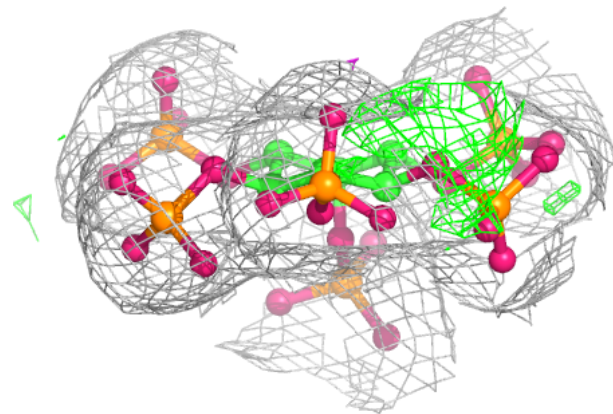
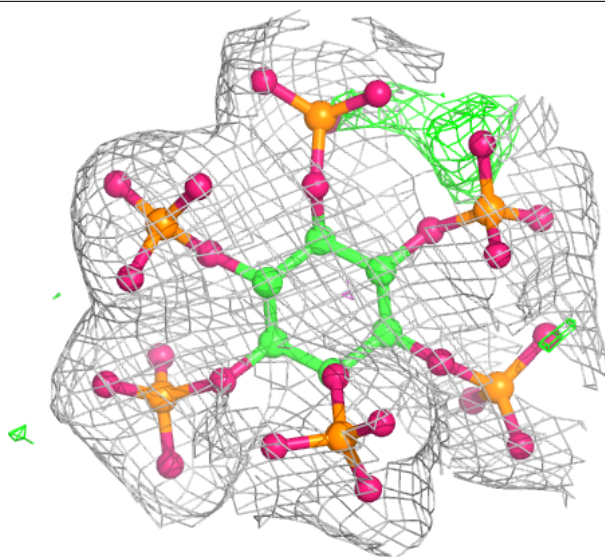
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

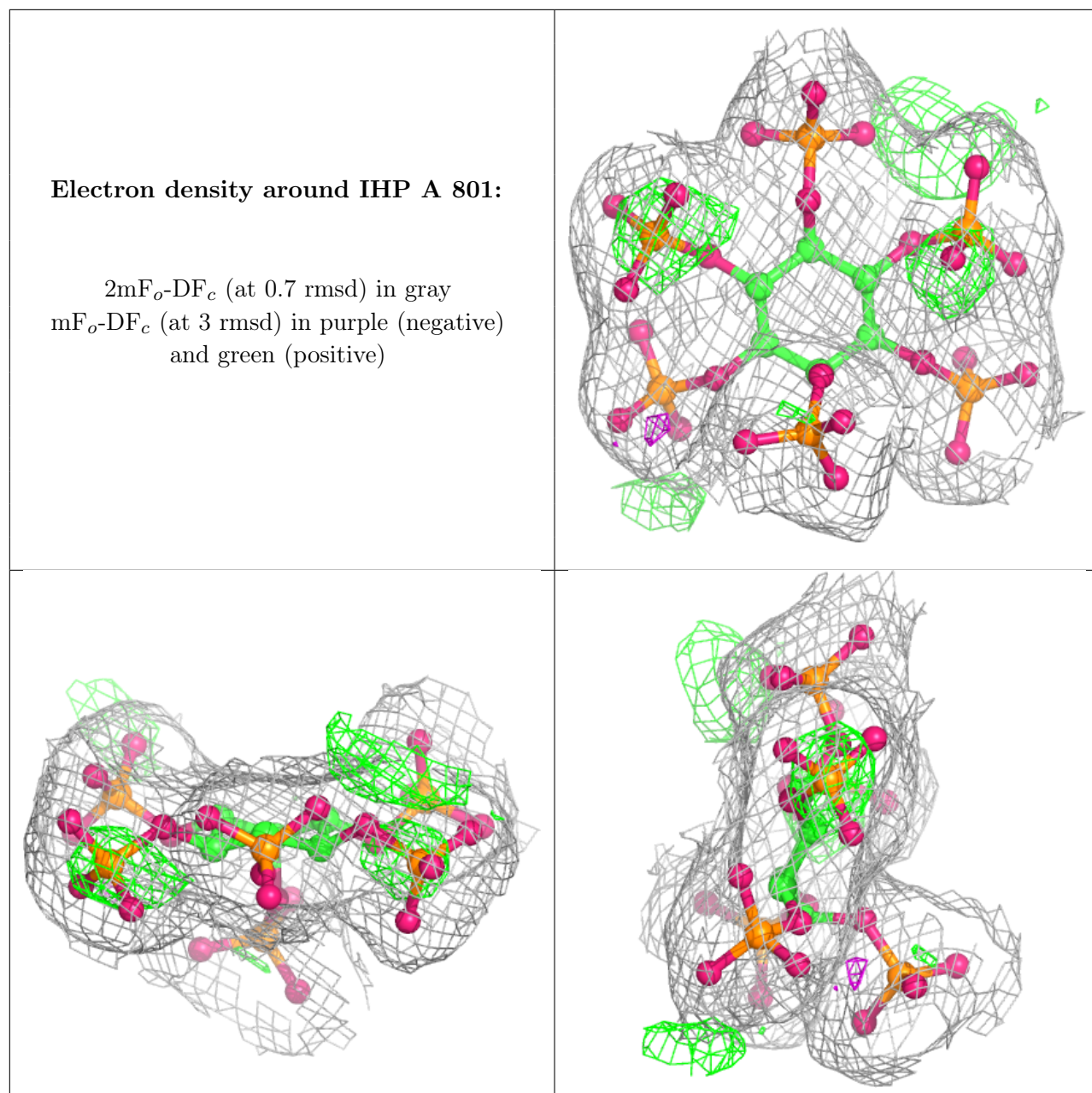
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	IHP	B	801	36/36	0.97	0.16	78,90,98,104	0
4	IHP	A	801	36/36	0.98	0.19	67,75,84,86	0
5	ZN	A	802	1/1	0.98	0.22	74,74,74,74	0
5	ZN	B	802	1/1	1.00	0.21	90,90,90,90	0

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 IHP B 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 [i](#)

There are no such residues in this entry.