



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2024 – 01:27 AM EST

PDB ID : 8GDV
Title : Structure of M66I mutant of disulfide stabilized HIV-1 CA hexamer in complex with CPSF6 peptide and IP6
Authors : Briganti, L.; Schope, L.; Kvaratskhelia, M.
Deposited on : 2023-03-06
Resolution : 3.30 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 : 2.36
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) : 2.36

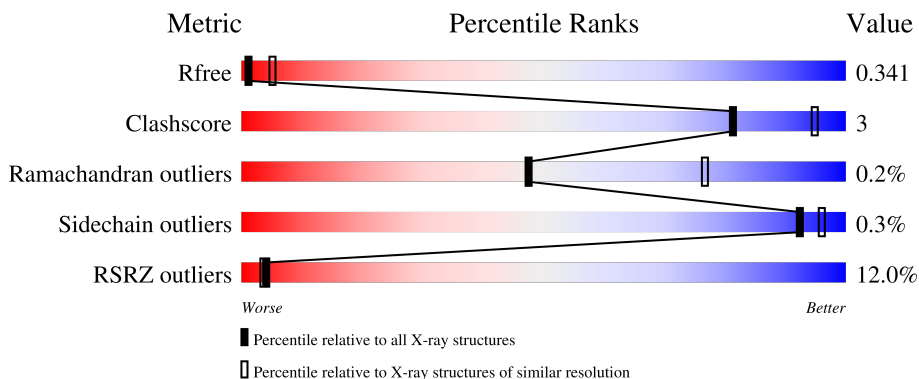
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.30 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.



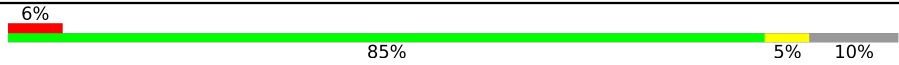
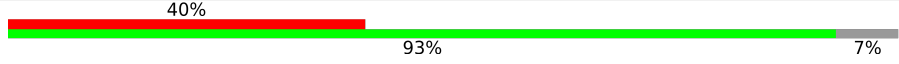

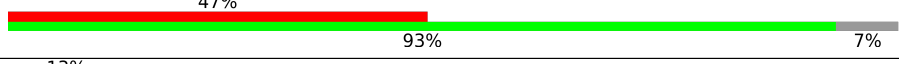

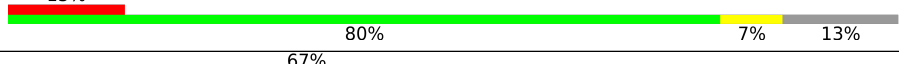
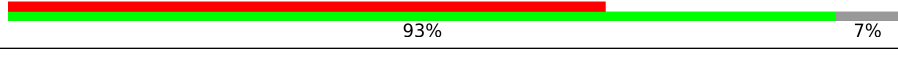
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1149 (3.34-3.26)
Clashscore	141614	1205 (3.34-3.26)
Ramachandran outliers	138981	1183 (3.34-3.26)
Sidechain outliers	138945	1182 (3.34-3.26)
RSRZ outliers	127900	1115 (3.34-3.26)

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	231	
1	B	231	
1	C	231	
1	D	231	
1	E	231	

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Mol	Chain	Length	Quality of chain
1	F	231	
2	M	15	
2	N	15	
2	O	15	
2	P	15	
2	Q	15	
2	R	15	

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	IHP	A	301	-	-	-	X
3	IHP	A	302	-	-	-	X

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 9980 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 Gag polyprotein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	198	1513	955	263	284	11	0	1	0
1	B	192	1464	927	255	271	11	0	1	0
1	C	197	1532	967	269	285	11	0	2	0
1	D	209	1607	1014	277	304	12	0	3	0
1	E	210	1617	1018	281	305	13	0	1	0
1	F	208	1588	1002	273	301	12	0	1	0

There are 30 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	14	CYS	ALA	engineered mutation	UNP D2ECD8
A	45	CYS	GLU	engineered mutation	UNP D2ECD8
A	66	ILE	MET	engineered mutation	UNP D2ECD8
A	184	ALA	TRP	engineered mutation	UNP D2ECD8
A	185	ALA	MET	engineered mutation	UNP D2ECD8
B	14	CYS	ALA	engineered mutation	UNP D2ECD8
B	45	CYS	GLU	engineered mutation	UNP D2ECD8
B	66	ILE	MET	engineered mutation	UNP D2ECD8
B	184	ALA	TRP	engineered mutation	UNP D2ECD8
B	185	ALA	MET	engineered mutation	UNP D2ECD8
C	14	CYS	ALA	engineered mutation	UNP D2ECD8
C	45	CYS	GLU	engineered mutation	UNP D2ECD8
C	66	ILE	MET	engineered mutation	UNP D2ECD8
C	184	ALA	TRP	engineered mutation	UNP D2ECD8
C	185	ALA	MET	engineered mutation	UNP D2ECD8
D	14	CYS	ALA	engineered mutation	UNP D2ECD8
D	45	CYS	GLU	engineered mutation	UNP D2ECD8

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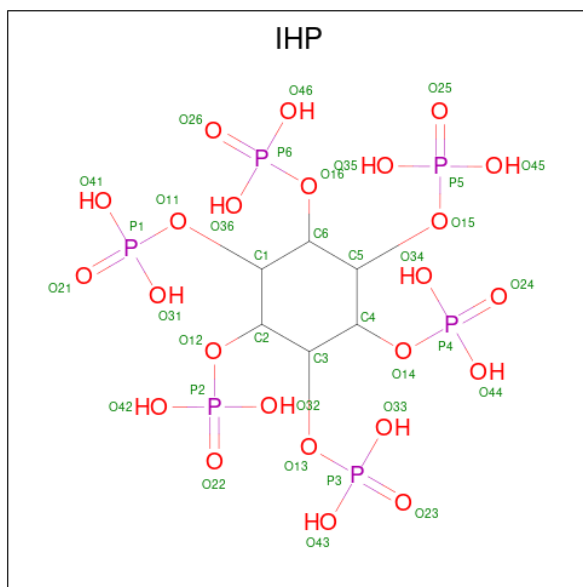
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Chain	Residue	Modelled	Actual	Comment	Reference
D	66	ILE	MET	engineered mutation	UNP D2ECD8
D	184	ALA	TRP	engineered mutation	UNP D2ECD8
D	185	ALA	MET	engineered mutation	UNP D2ECD8
E	14	CYS	ALA	engineered mutation	UNP D2ECD8
E	45	CYS	GLU	engineered mutation	UNP D2ECD8
E	66	ILE	MET	engineered mutation	UNP D2ECD8
E	184	ALA	TRP	engineered mutation	UNP D2ECD8
E	185	ALA	MET	engineered mutation	UNP D2ECD8
F	14	CYS	ALA	engineered mutation	UNP D2ECD8
F	45	CYS	GLU	engineered mutation	UNP D2ECD8
F	66	ILE	MET	engineered mutation	UNP D2ECD8
F	184	ALA	TRP	engineered mutation	UNP D2ECD8
F	185	ALA	MET	engineered mutation	UNP D2ECD8

- Molecule 2 is a protein called Cleavage and polyadenylation specificity factor subunit 6.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	M	14	Total	C	N	O	0	0	0
			103	71	16	16			
2	N	13	Total	C	N	O	0	0	0
			90	64	13	13			
2	O	14	Total	C	N	O	0	0	0
			103	71	16	16			
2	P	13	Total	C	N	O	0	0	0
			94	66	14	14			
2	Q	13	Total	C	N	O	0	0	0
			98	68	15	15			
2	R	14	Total	C	N	O	0	0	0
			99	69	15	15			

- Molecule 3 is INOSITOL HEXAKISPHOSPHATE (three-letter code: IHP) (formula: C₆H₁₈O₂₄P₆).

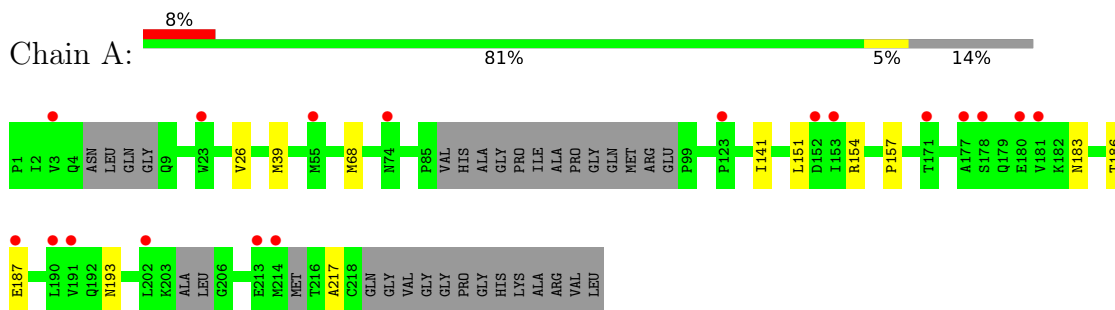


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
			Total	C	O			P
3	A	1	36	6	24	6	0	0
3	A	1	Total	C	O	P	0	0
			36	6	24	6		

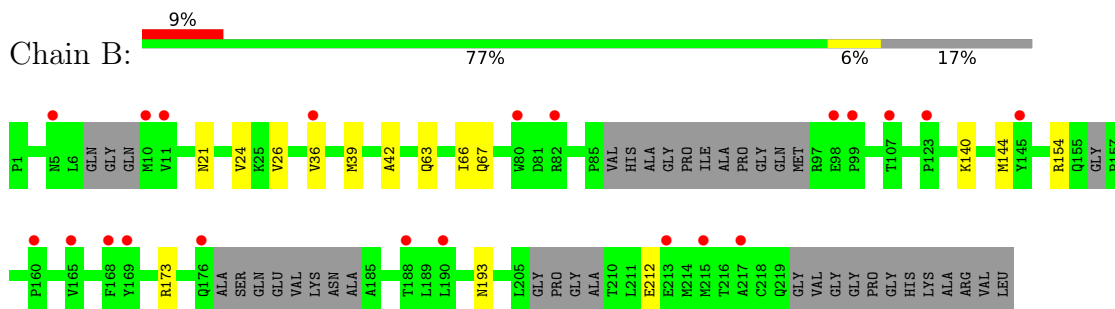
3 Residue-property plots [i](#)

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.

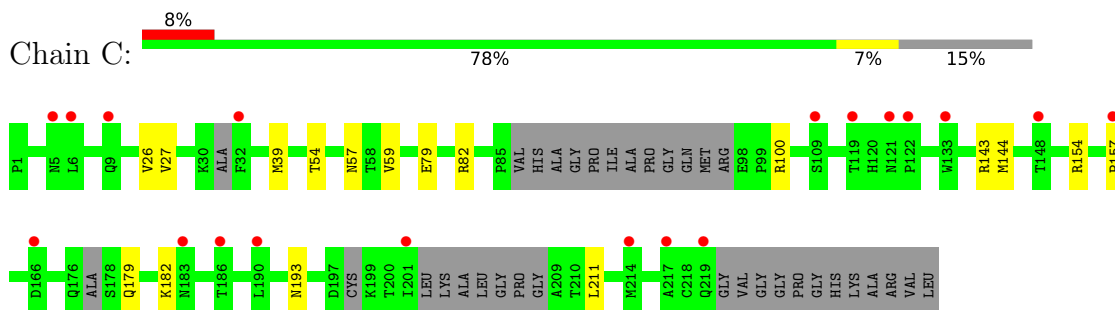
- Molecule 1: Gag polyprotein



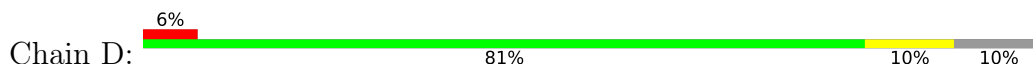
- Molecule 1: Gag polyprotein

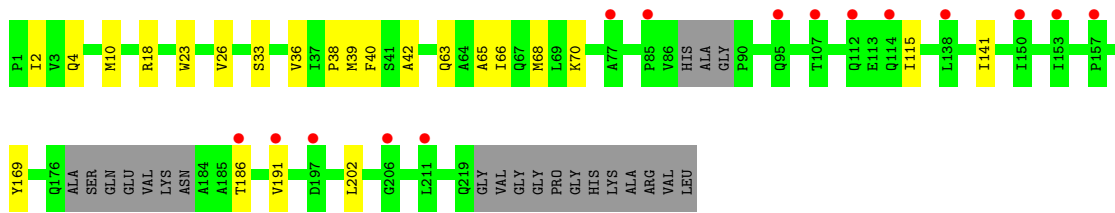


- Molecule 1: Gag polyprotein

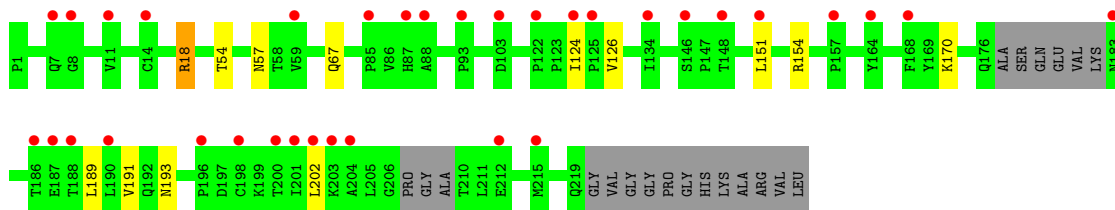
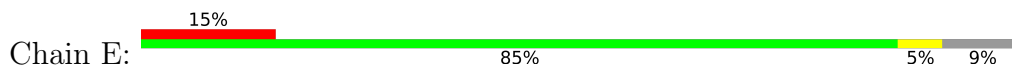


- Molecule 1: Gag polyprotein

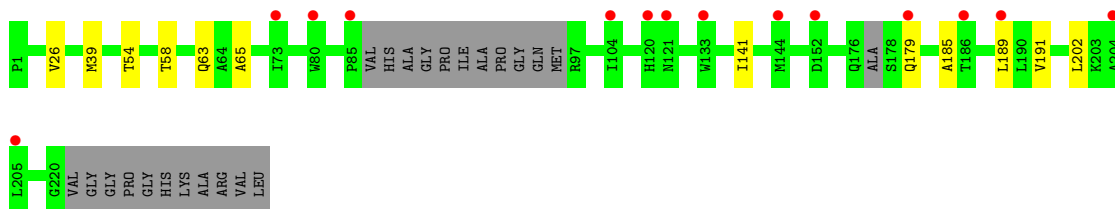
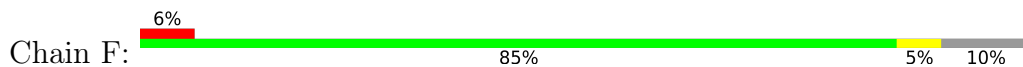




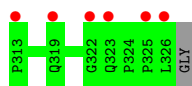
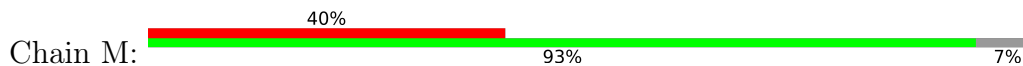
• Molecule 1: Gag polyprotein



• Molecule 1: Gag polyprotein



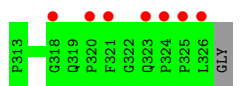
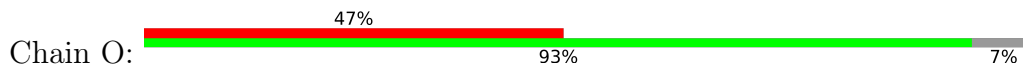
• Molecule 2: Cleavage and polyadenylation specificity factor subunit 6



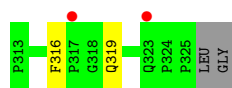
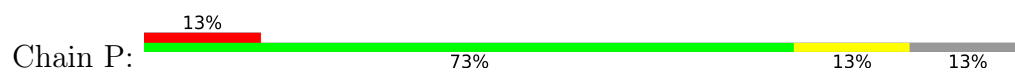
• Molecule 2: Cleavage and polyadenylation specificity factor subunit 6



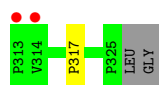
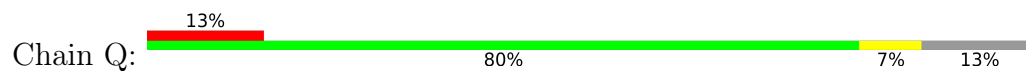
• Molecule 2: Cleavage and polyadenylation specificity factor subunit 6



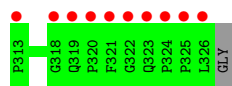
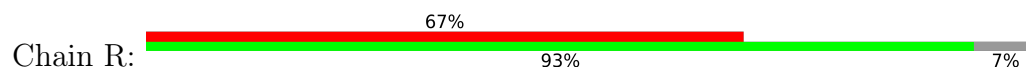
- Molecule 2: Cleavage and polyadenylation specificity factor subunit 6



- Molecule 2: Cleavage and polyadenylation specificity factor subunit 6



- Molecule 2: Cleavage and polyadenylation specificity factor subunit 6



4 Data and refinement statistics

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α , β , γ	133.17Å 133.17Å 205.25Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.88 – 3.30 47.88 – 3.30	Depositor EDS
% Data completeness (in resolution range)	95.4 (47.88-3.30) 96.1 (47.88-3.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.42 (at 3.33Å)	Xtrriage
Refinement program	PHENIX (1.19.2_4158: ???)	Depositor
R, R_{free}	0.307 , 0.347 0.305 , 0.341	Depositor DCC
R_{free} test set	1365 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	68.6	Xtrriage
Anisotropy	0.512	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 28.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.46$, $\langle L^2 \rangle = 0.28$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.84	EDS
Total number of atoms	9980	wwPDB-VP
Average B, all atoms (Å ²)	83.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.84% 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: 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	0.27	0/1543	0.47	0/2097
1	B	0.24	0/1492	0.44	0/2026
1	C	0.25	0/1563	0.46	0/2121
1	D	0.24	0/1641	0.43	0/2235
1	E	0.24	0/1651	0.44	0/2247
1	F	0.24	0/1620	0.42	0/2204
2	M	0.29	0/109	0.36	0/150
2	N	0.31	0/96	0.47	0/133
2	O	0.34	0/109	0.49	0/150
2	P	0.37	0/100	0.59	0/138
2	Q	0.28	0/104	0.36	0/143
2	R	0.34	0/105	0.46	0/145
All	All	0.25	0/10133	0.45	0/13789

There are no bond length outliers.

There are no bond angle outliers.

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	1513	0	1468	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	1464	0	1407	10	0
1	C	1532	0	1504	11	0
1	D	1607	0	1559	15	0
1	E	1617	0	1580	9	0
1	F	1588	0	1550	6	0
2	M	103	0	97	0	0
2	N	90	0	83	2	0
2	O	103	0	97	0	0
2	P	94	0	89	2	0
2	Q	98	0	95	1	0
2	R	99	0	91	0	0
3	A	72	0	12	2	0
All	All	9980	0	9632	51	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 3.

All (51) 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:26:VAL:HG21	1:A:39:MET:HG2	1.83	0.61
1:C:79:GLU:OE1	1:C:82:ARG:NH1	2.34	0.60
1:E:151:LEU:HD23	1:E:189:LEU:HD11	1.85	0.58
3:A:302:IHP:O24	1:E:18:ARG:NH1	2.37	0.57
2:N:324:PRO:O	2:N:325:PRO:C	2.43	0.57
1:F:54:THR:O	1:F:58:THR:OG1	2.26	0.53
1:D:186:THR:HG21	2:Q:317:PRO:HB2	1.91	0.53
1:B:26:VAL:HG12	1:B:36:VAL:HG23	1.93	0.51
1:D:70:LYS:NZ	2:P:319:GLN:O	2.35	0.51
1:B:42:ALA:HB2	1:C:54:THR:HG21	1.91	0.51
1:D:33:SER:O	1:D:36:VAL:HG22	2.11	0.50
1:D:2:ILE:HD11	1:D:115:ILE:HG12	1.94	0.50
1:D:63:GLN:HA	1:D:66:ILE:HB	1.95	0.49
1:B:154:ARG:HA	1:B:193:ASN:HB3	1.96	0.48
1:C:179:GLN:HE21	1:C:182:LYS:HD2	1.79	0.48
1:C:179:GLN:NE2	1:C:182:LYS:HD2	2.28	0.48
1:E:191:VAL:HG12	1:E:202:LEU:HD13	1.96	0.47
1:D:38:PRO:HG3	1:E:57:ASN:HB3	1.96	0.47
1:B:140:LYS:O	1:B:144:MET:HG2	2.15	0.46
1:A:183:ASN:O	1:A:187:GLU:HG2	2.14	0.46
1:F:185:ALA:O	1:F:189:LEU:HB2	2.16	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:26:VAL:HG11	1:B:39:MET:HG2	1.97	0.46
1:B:212:GLU:HG3	1:C:144:MET:HE1	1.99	0.45
1:E:124:ILE:O	1:E:126:VAL:N	2.50	0.45
1:D:42:ALA:HB2	1:E:54:THR:HG21	1.99	0.44
1:E:154:ARG:HA	1:E:193:ASN:HB3	1.99	0.44
1:A:68:MET:HE3	1:A:141:ILE:HG12	1.99	0.44
1:D:191:VAL:HG12	1:D:202:LEU:HD13	1.98	0.44
1:B:21:ASN:HA	1:B:24:VAL:HG12	2.00	0.44
1:C:211:LEU:HD23	1:D:68:MET:HG3	2.00	0.44
1:B:63:GLN:HA	1:B:66:ILE:HB	2.00	0.43
2:P:316:PHE:HB2	2:P:319:GLN:OE1	2.19	0.43
1:A:183:ASN:O	1:A:186:THR:OG1	2.34	0.43
1:C:154:ARG:HA	1:C:193:ASN:HB3	2.01	0.43
1:B:67:GLN:OE1	2:N:317:PRO:HA	2.18	0.42
1:F:65:ALA:HB1	1:F:141:ILE:HD13	2.01	0.42
1:E:170:LYS:HA	1:F:63:GLN:HG3	2.01	0.42
1:F:191:VAL:HG13	1:F:202:LEU:HB2	2.00	0.42
1:C:26:VAL:HG21	1:C:39:MET:HG2	2.03	0.41
1:D:23:TRP:CZ3	1:D:40:PHE:HB2	2.55	0.41
3:A:301:IHP:O43	1:D:18:ARG:NH2	2.54	0.41
1:F:26:VAL:HG21	1:F:39:MET:HG2	2.01	0.41
1:B:173:ARG:NH2	1:C:57:ASN:O	2.45	0.41
1:C:27:VAL:HG11	1:C:59:VAL:HG13	2.02	0.41
1:D:65:ALA:HB1	1:D:141:ILE:HD13	2.02	0.41
1:D:169:TYR:CZ	1:E:67:GLN:HG2	2.56	0.41
1:C:100:ARG:HH11	1:C:100:ARG:HG2	1.85	0.41
1:D:26:VAL:HG21	1:D:39:MET:HG2	2.03	0.41
1:A:154:ARG:HA	1:A:193:ASN:HB3	2.03	0.40
1:D:4:GLN:HB2	1:D:10:MET:SD	2.61	0.40
1:A:151:LEU:HD12	1:A:151:LEU:H	1.85	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	189/231 (82%)	183 (97%)	4 (2%)	2 (1%)	14	45
1	B	181/231 (78%)	178 (98%)	3 (2%)	0	100	100
1	C	187/231 (81%)	181 (97%)	5 (3%)	1 (0%)	29	61
1	D	206/231 (89%)	202 (98%)	4 (2%)	0	100	100
1	E	205/231 (89%)	198 (97%)	7 (3%)	0	100	100
1	F	203/231 (88%)	199 (98%)	4 (2%)	0	100	100
2	M	12/15 (80%)	11 (92%)	1 (8%)	0	100	100
2	N	11/15 (73%)	11 (100%)	0	0	100	100
2	O	12/15 (80%)	12 (100%)	0	0	100	100
2	P	11/15 (73%)	11 (100%)	0	0	100	100
2	Q	11/15 (73%)	11 (100%)	0	0	100	100
2	R	12/15 (80%)	11 (92%)	1 (8%)	0	100	100
All	All	1240/1476 (84%)	1208 (97%)	29 (2%)	3 (0%)	47	77

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	217	ALA
1	A	157	PRO
1	C	157	PRO

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	159/193 (82%)	159 (100%)	0	100	100
1	B	151/193 (78%)	151 (100%)	0	100	100
1	C	164/193 (85%)	163 (99%)	1 (1%)	86	91
1	D	170/193 (88%)	170 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	173/193 (90%)	172 (99%)	1 (1%)	86	91
1	F	169/193 (88%)	168 (99%)	1 (1%)	86	91
2	M	11/12 (92%)	11 (100%)	0	100	100
2	N	9/12 (75%)	9 (100%)	0	100	100
2	O	11/12 (92%)	11 (100%)	0	100	100
2	P	10/12 (83%)	10 (100%)	0	100	100
2	Q	11/12 (92%)	11 (100%)	0	100	100
2	R	10/12 (83%)	10 (100%)	0	100	100
All	All	1048/1230 (85%)	1045 (100%)	3 (0%)	92	96

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	143	ARG
1	E	18	ARG
1	F	179	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	4	GLN
1	C	179	GLN
2	M	319	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry

2 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	IHP	A	302	-	36,36,36	1.60	6 (16%)	54,60,60	0.93	2 (3%)
3	IHP	A	301	-	36,36,36	1.66	6 (16%)	54,60,60	1.00	5 (9%)

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	IHP	A	302	-	-	14/30/54/54	0/1/1/1
3	IHP	A	301	-	-	11/30/54/54	0/1/1/1

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	301	IHP	P4-O14	3.95	1.66	1.59
3	A	302	IHP	P4-O14	3.82	1.66	1.59
3	A	301	IHP	P5-O15	3.71	1.66	1.59
3	A	301	IHP	P2-O12	3.69	1.66	1.59
3	A	302	IHP	P3-O13	3.48	1.65	1.59
3	A	302	IHP	P5-O15	3.48	1.65	1.59
3	A	301	IHP	P1-O11	3.42	1.65	1.59
3	A	301	IHP	P3-O13	3.35	1.65	1.59
3	A	302	IHP	P1-O11	3.33	1.65	1.59
3	A	302	IHP	P6-O16	3.25	1.65	1.59
3	A	301	IHP	P6-O16	3.24	1.65	1.59
3	A	302	IHP	P2-O12	3.24	1.65	1.59

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	302	IHP	O14-C4-C3	3.89	117.86	108.69
3	A	301	IHP	C5-C6-C1	2.57	116.03	110.41
3	A	301	IHP	O14-C4-C3	2.51	114.61	108.69
3	A	301	IHP	C6-C1-C2	2.42	115.70	110.41
3	A	301	IHP	O14-C4-C5	2.41	114.38	108.69
3	A	302	IHP	O12-C2-C3	2.31	114.13	108.69
3	A	301	IHP	O13-C3-C4	2.06	113.54	108.69

There are no chirality outliers.

All (25) torsion outliers are listed below:

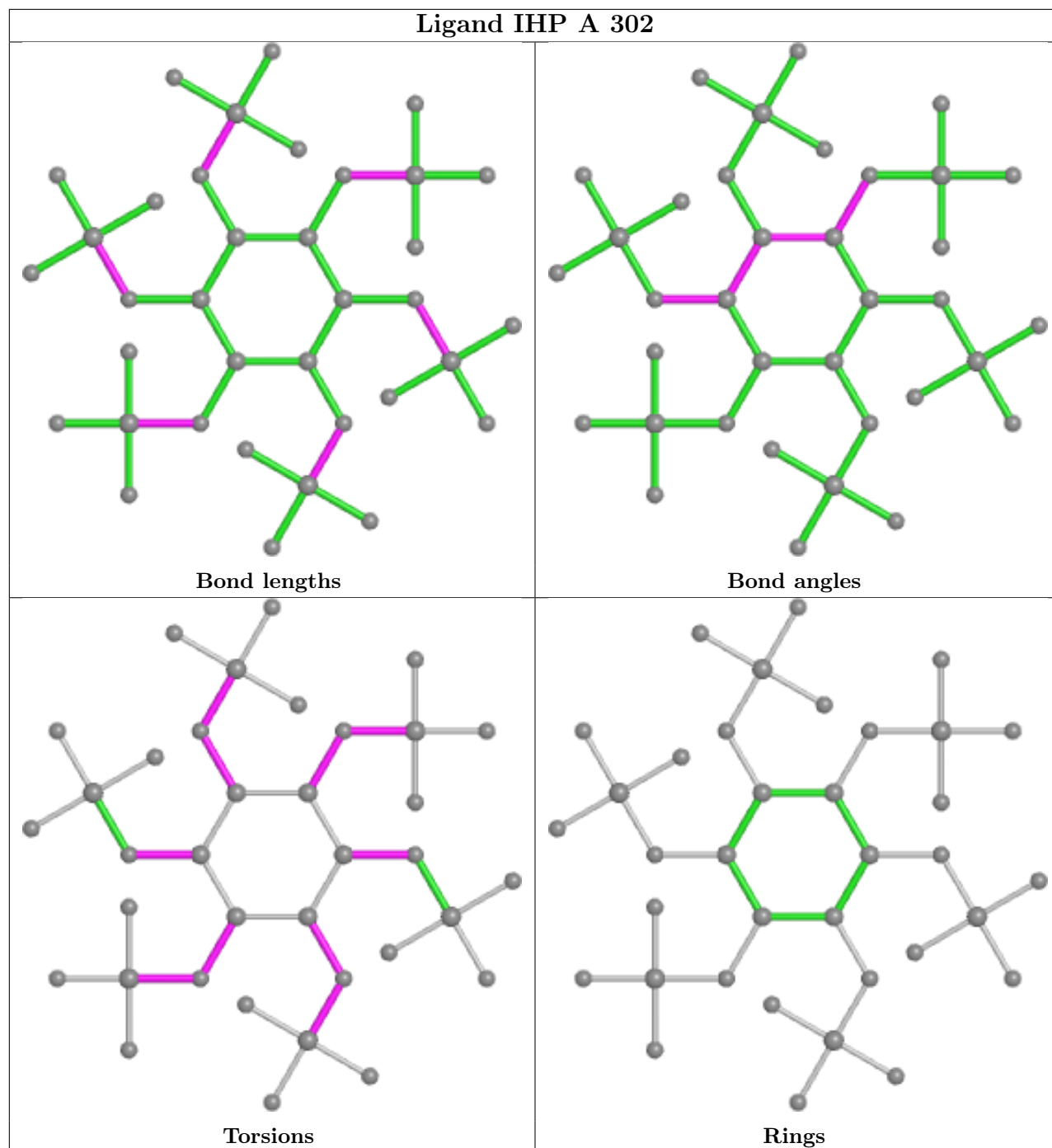
Mol	Chain	Res	Type	Atoms
3	A	301	IHP	C3-C2-O12-P2
3	A	301	IHP	C4-C3-O13-P3
3	A	301	IHP	C5-C4-O14-P4
3	A	301	IHP	C4-C5-O15-P5
3	A	301	IHP	C6-C5-O15-P5
3	A	301	IHP	C1-O11-P1-O21
3	A	301	IHP	C3-O13-P3-O43
3	A	302	IHP	C2-C1-O11-P1
3	A	302	IHP	C6-C1-O11-P1
3	A	302	IHP	C3-C2-O12-P2
3	A	302	IHP	C4-C3-O13-P3
3	A	302	IHP	C3-C4-O14-P4
3	A	302	IHP	C3-O13-P3-O23
3	A	301	IHP	C5-C6-O16-P6
3	A	301	IHP	C6-O16-P6-O26
3	A	302	IHP	C1-O11-P1-O21
3	A	302	IHP	C6-C5-O15-P5
3	A	302	IHP	C1-C6-O16-P6
3	A	302	IHP	C2-C3-O13-P3
3	A	302	IHP	C4-O14-P4-O24
3	A	302	IHP	C6-O16-P6-O26
3	A	301	IHP	C2-C3-O13-P3
3	A	301	IHP	C2-O12-P2-O42
3	A	302	IHP	C4-C5-O15-P5
3	A	302	IHP	C1-O11-P1-O31

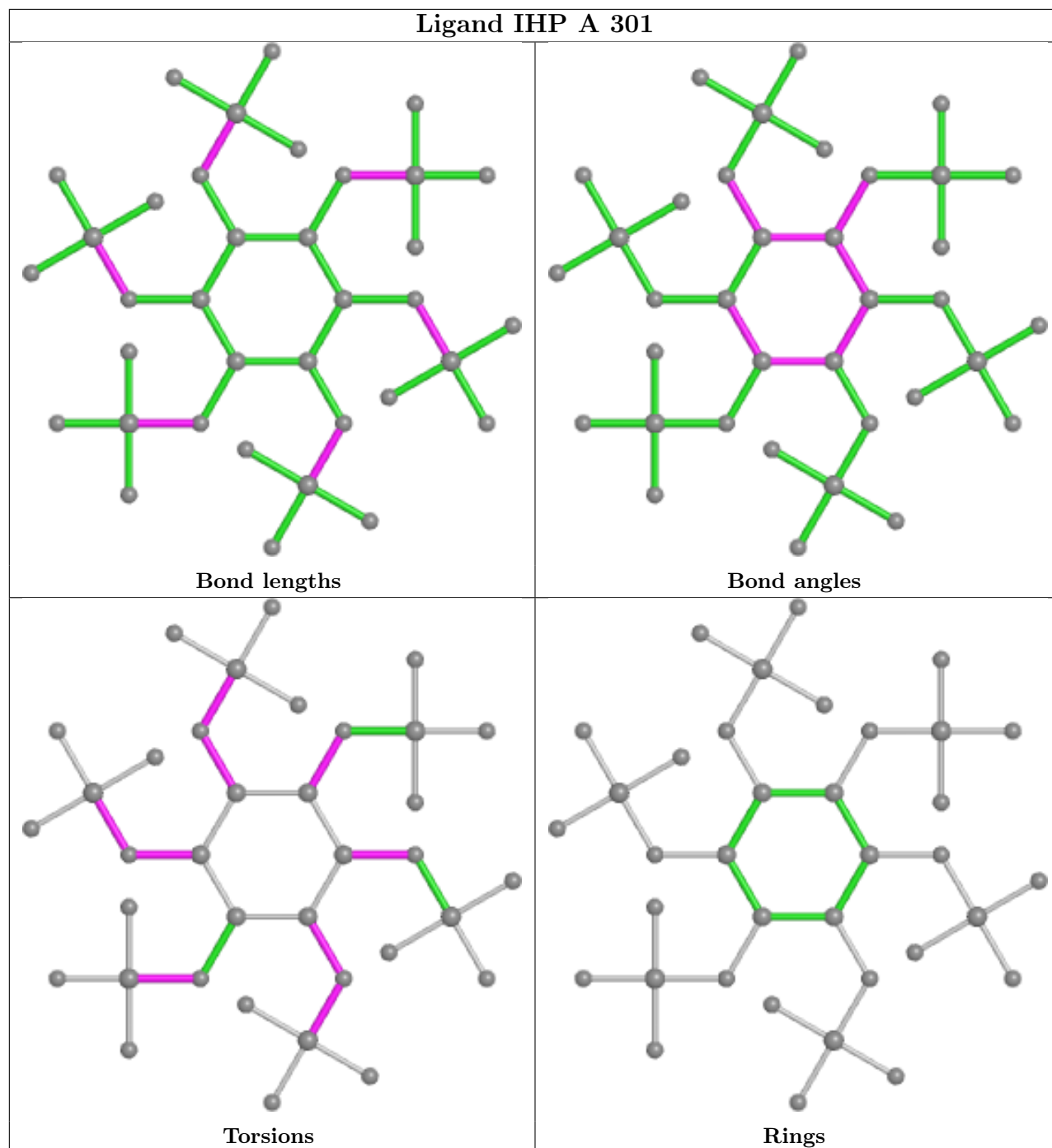
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	302	IHP	1	0
3	A	301	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	198/231 (85%)	0.58	18 (9%) 9 9	30, 67, 90, 100	0
1	B	192/231 (83%)	0.68	21 (10%) 5 5	56, 71, 122, 134	0
1	C	197/231 (85%)	0.84	19 (9%) 8 8	62, 84, 120, 135	0
1	D	209/231 (90%)	0.73	15 (7%) 15 15	66, 86, 128, 139	0
1	E	210/231 (90%)	0.95	34 (16%) 1 2	67, 92, 130, 138	0
1	F	208/231 (90%)	0.56	14 (6%) 17 17	60, 79, 99, 109	0
2	M	14/15 (93%)	1.89	6 (42%) 0 0	60, 68, 75, 85	0
2	N	13/15 (86%)	2.01	7 (53%) 0 0	67, 74, 91, 99	0
2	O	14/15 (93%)	2.22	7 (50%) 0 0	75, 85, 94, 96	0
2	P	13/15 (86%)	1.51	2 (15%) 2 2	79, 92, 100, 100	0
2	Q	13/15 (86%)	1.39	2 (15%) 2 2	82, 94, 101, 102	0
2	R	14/15 (93%)	2.49	10 (71%) 0 0	80, 99, 106, 117	0
All	All	1295/1476 (87%)	0.80	155 (11%) 4 3	30, 81, 122, 139	0

All (155) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	O	321	PHE	6.1
2	R	324	PRO	5.8
2	R	323	GLN	5.3
1	C	186	THR	4.9
1	C	6	LEU	4.8
1	E	125	PRO	4.4
1	E	124	ILE	4.4
1	C	166	ASP	4.3
2	N	314	VAL	4.3
1	C	183	ASN	4.2
1	E	186	THR	4.2

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Mol	Chain	Res	Type	RSRZ
1	E	200	THR	4.1
1	E	198	CYS	4.1
1	B	217	ALA	4.1
2	N	324	PRO	4.0
1	B	98	GLU	4.0
1	D	77	ALA	3.9
1	D	85	PRO	3.9
1	B	123	PRO	3.8
1	D	157	PRO	3.8
2	M	313	PRO	3.8
1	E	183	ASN	3.7
2	P	317	PRO	3.7
2	R	320	PRO	3.7
1	F	186	THR	3.7
1	B	165	VAL	3.6
1	C	122	PRO	3.6
2	O	326	LEU	3.6
1	E	11	VAL	3.5
1	B	11	VAL	3.4
1	E	122	PRO	3.4
1	E	202	LEU	3.4
2	O	320	PRO	3.4
1	D	206	GLY	3.3
1	E	87	HIS	3.3
1	B	99	PRO	3.3
2	M	322	GLY	3.3
2	R	322	GLY	3.3
2	N	315	LEU	3.3
2	O	323	GLN	3.3
1	B	10	MET	3.3
2	N	325	PRO	3.2
2	O	324	PRO	3.2
1	A	153	ILE	3.2
1	F	204	ALA	3.2
1	E	168	PHE	3.1
1	E	212	GLU	3.1
1	C	133	TRP	3.1
1	B	36	VAL	3.0
1	E	157	PRO	3.0
1	E	103	ASP	3.0
1	C	157	PRO	3.0
1	B	169	TYR	3.0

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Mol	Chain	Res	Type	RSRZ
2	N	318	GLY	3.0
1	F	85	PRO	3.0
1	E	187	GLU	3.0
2	M	323	GLN	2.9
1	A	152	ASP	2.9
1	C	219	GLN	2.9
2	N	313	PRO	2.9
1	D	191	VAL	2.9
1	B	168	PHE	2.8
1	E	190	LEU	2.8
2	R	326	LEU	2.8
1	B	215	MET	2.8
1	C	9	GLN	2.8
1	D	112	GLN	2.8
1	A	214	MET	2.8
1	F	133	TRP	2.8
2	P	323	GLN	2.7
1	F	189	LEU	2.7
1	E	151	LEU	2.7
1	C	201	ILE	2.7
1	E	201	ILE	2.7
1	B	190	LEU	2.7
1	E	148	THR	2.7
1	D	95	GLN	2.7
1	A	74	ASN	2.7
1	B	80	TRP	2.7
1	E	8	GLY	2.6
1	A	191	VAL	2.6
2	N	321	PHE	2.6
1	F	144	MET	2.6
2	M	325	PRO	2.6
2	M	326	LEU	2.6
1	A	190	LEU	2.6
1	E	85	PRO	2.6
2	R	321	PHE	2.6
1	F	80	TRP	2.6
1	E	59	VAL	2.6
2	Q	314	VAL	2.5
1	A	3	VAL	2.5
1	D	114	GLN	2.5
1	B	188	THR	2.5
1	B	176	GLN	2.5

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Mol	Chain	Res	Type	RSRZ
1	E	7	GLN	2.5
1	B	145	TYR	2.4
2	R	319	GLN	2.4
1	F	121	ASN	2.4
1	C	32	PHE	2.4
1	E	188	THR	2.4
1	B	160	PRO	2.4
2	O	325	PRO	2.4
1	A	213	GLU	2.4
1	C	121	ASN	2.4
1	D	197	ASP	2.4
1	A	123	PRO	2.3
1	A	177	ALA	2.3
2	O	318	GLY	2.3
1	D	153	ILE	2.3
2	R	325	PRO	2.3
1	D	107	THR	2.3
2	R	313	PRO	2.3
1	C	217	ALA	2.3
1	E	196	PRO	2.3
1	A	23	TRP	2.3
1	B	213	GLU	2.3
1	D	186	THR	2.3
1	E	134	ILE	2.3
1	C	5	ASN	2.2
1	E	204	ALA	2.2
1	B	107	THR	2.2
1	A	178	SER	2.2
2	M	319	GLN	2.2
1	D	138	LEU	2.2
1	F	205	LEU	2.2
1	E	88	ALA	2.2
1	F	179	GLN	2.2
1	A	55	MET	2.2
1	A	171	THR	2.2
1	D	211	LEU	2.1
1	C	190	LEU	2.1
1	E	164	TYR	2.1
1	E	215	MET	2.1
2	Q	313	PRO	2.1
1	A	180	GLU	2.1
1	E	93	PRO	2.1

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Mol	Chain	Res	Type	RSRZ
1	C	148	THR	2.1
1	F	104	ILE	2.1
1	E	146	SER	2.1
1	F	152	ASP	2.1
1	C	214	MET	2.1
1	F	120	HIS	2.1
1	C	109	SER	2.1
1	E	14	CYS	2.1
1	C	119	THR	2.1
1	D	150	ILE	2.1
1	B	82	ARG	2.1
2	R	318	GLY	2.1
1	E	203	LYS	2.0
1	A	187	GLU	2.0
1	B	5	ASN	2.0
1	F	73	ILE	2.0
1	A	202	LEU	2.0
1	A	181	VAL	2.0

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

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

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

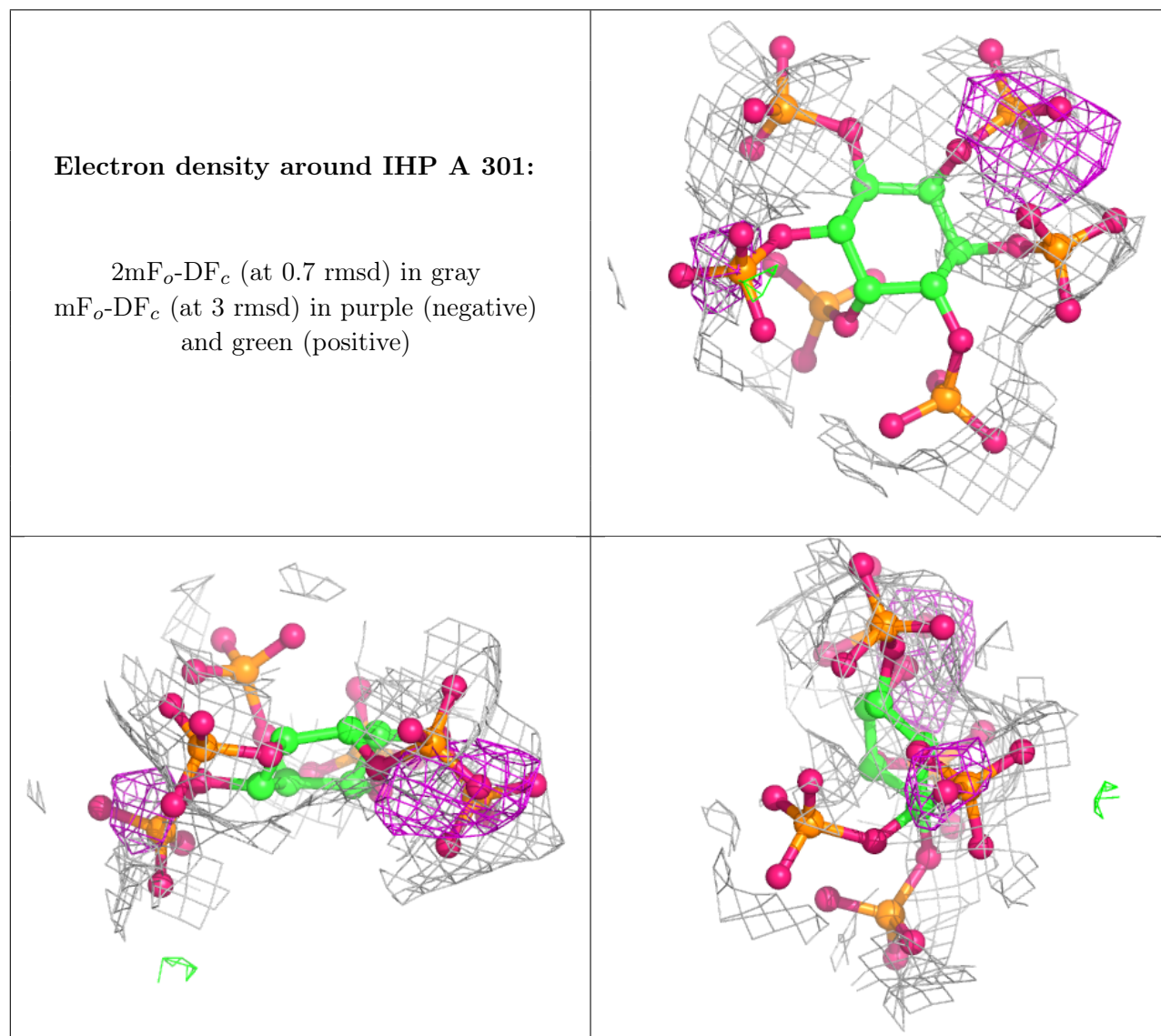
6.4 Ligands [i](#)

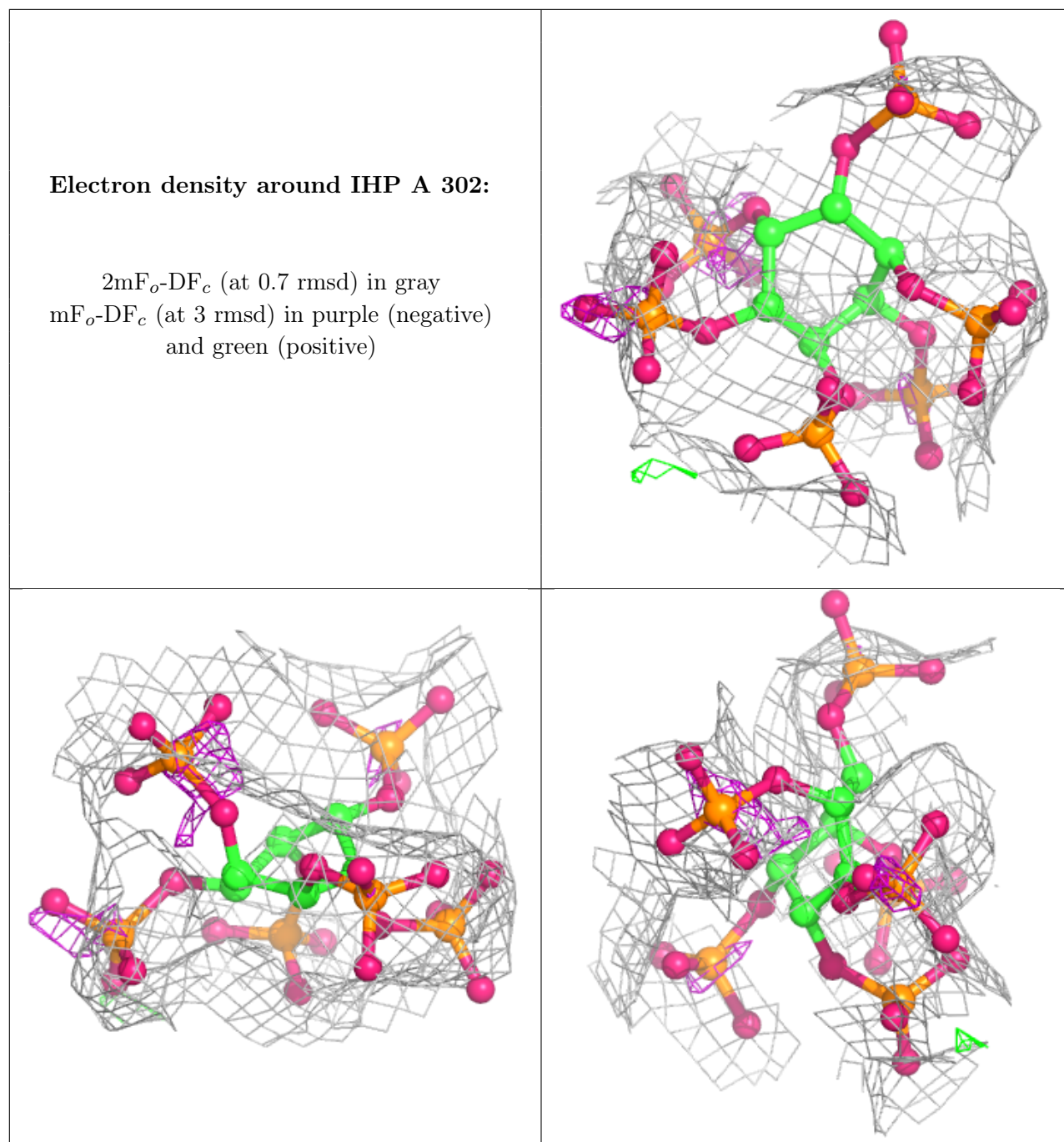
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	IHP	A	301	36/36	0.56	0.45	97,100,103,104	36
3	IHP	A	302	36/36	0.56	0.45	87,89,92,92	36

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.





6.5 Other polymers [\(i\)](#)

There are no such residues in this entry.