



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 19, 2021 – 11:46 am BST

PDB ID : 7OS4
Title : Crystal structure of mouse CARM1 in complex with histone H3_13-31 K18
Authors : Marechal, N.; Cura, V.; Troffer-Charlier, N.; Bonnefond, L.; Cavarelli, J.
Deposited on : 2021-06-07
Resolution : 2.54 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 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 : 2.23.2
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0267
CCP4 : 7.1.010 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.23.2

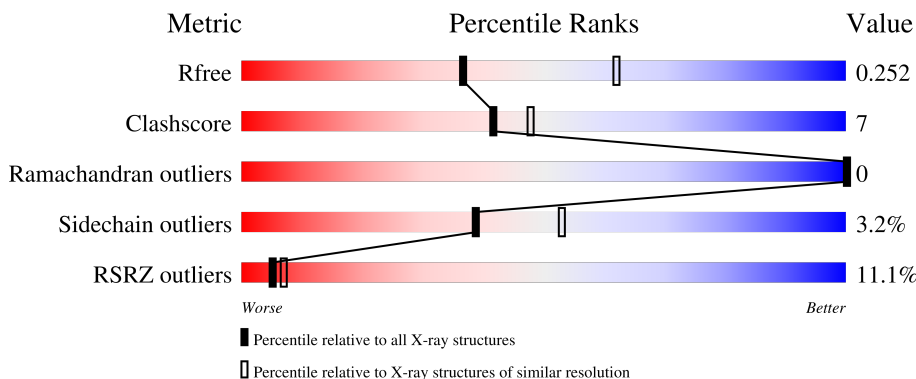
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.54 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.



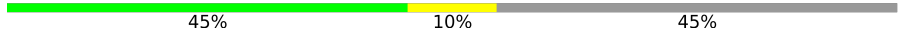
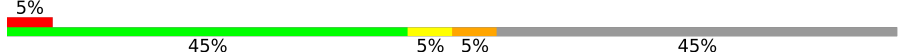
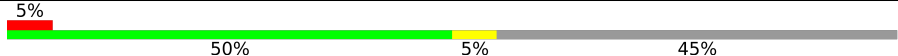
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1284 (2.56-2.52)
Clashscore	141614	1332 (2.56-2.52)
Ramachandran outliers	138981	1315 (2.56-2.52)
Sidechain outliers	138945	1315 (2.56-2.52)
RSRZ outliers	127900	1272 (2.56-2.52)

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	371	 10% 85% 12% •
1	B	371	 8% 72% 20% • 8%
1	C	371	 16% 80% 16% ••
1	D	371	 9% 68% 23% • 8%
2	E	20	 55% 45%

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Mol	Chain	Length	Quality of chain
2	F	20	
2	G	20	
2	H	20	

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 11702 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 Histone-arginine methyltransferase CARM1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	360	2870	1849	473	534	14	0	1	0
1	B	343	2769	1786	458	511	14	0	2	0
1	C	359	2864	1846	472	532	14	0	1	0
1	D	343	2751	1776	454	507	14	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	127	GLY	-	expression tag	UNP Q9WVG6
A	128	HIS	-	expression tag	UNP Q9WVG6
A	129	MET	-	expression tag	UNP Q9WVG6
B	127	GLY	-	expression tag	UNP Q9WVG6
B	128	HIS	-	expression tag	UNP Q9WVG6
B	129	MET	-	expression tag	UNP Q9WVG6
C	127	GLY	-	expression tag	UNP Q9WVG6
C	128	HIS	-	expression tag	UNP Q9WVG6
C	129	MET	-	expression tag	UNP Q9WVG6
D	127	GLY	-	expression tag	UNP Q9WVG6
D	128	HIS	-	expression tag	UNP Q9WVG6
D	129	MET	-	expression tag	UNP Q9WVG6

- Molecule 2 is a protein called Histone H3.1.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	E	11	77	48	16	13	0	0	0
2	F	11	77	48	16	13	0	0	0

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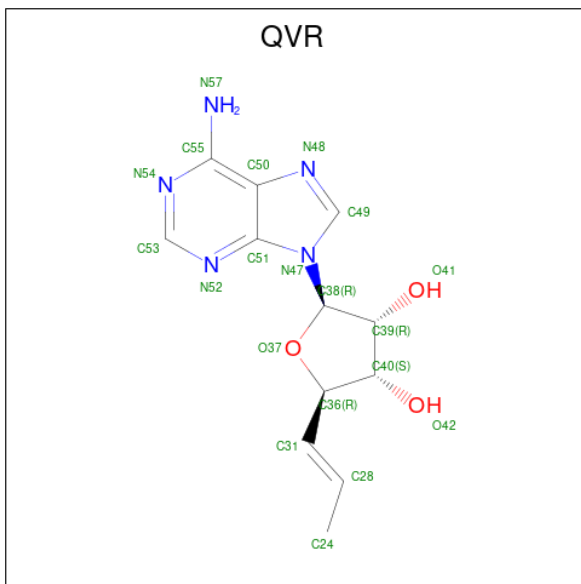
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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	G	11	Total	C	N	O	0	0	0
			77	48	16	13			
2	H	11	Total	C	N	O	0	0	0
			77	48	16	13			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	12	ACE	-	acetylation	UNP P68433
F	12	ACE	-	acetylation	UNP P68433
G	12	ACE	-	acetylation	UNP P68433
H	12	ACE	-	acetylation	UNP P68433

- Molecule 3 is (2 {R},3 {R},4 {S},5 {R})-2-(6-aminopurin-9-yl)-5-[({E})-prop-1-enyl]oxolan e-3,4-diol (three-letter code: QVR) (formula: C₁₂H₁₅N₅O₃) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	E	1	Total	C	N	O	0	0
			20	12	5	3		
3	F	1	Total	C	N	O	0	0
			20	12	5	3		
3	G	1	Total	C	N	O	0	0
			20	12	5	3		
3	H	1	Total	C	N	O	0	0
			20	12	5	3		

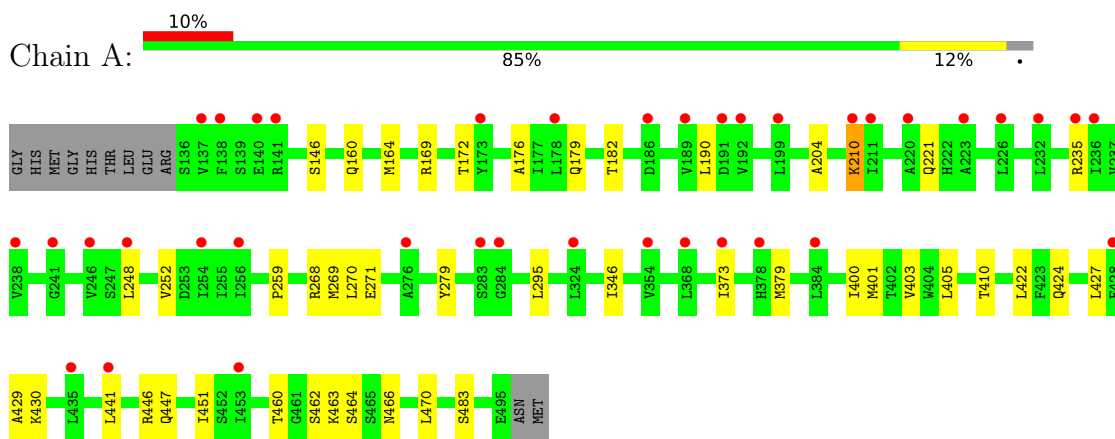
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	23	Total O 23 23	0	0
4	B	12	Total O 12 12	0	0
4	C	13	Total O 13 13	0	0
4	D	10	Total O 10 10	0	0
4	E	1	Total O 1 1	0	0
4	F	1	Total O 1 1	0	0

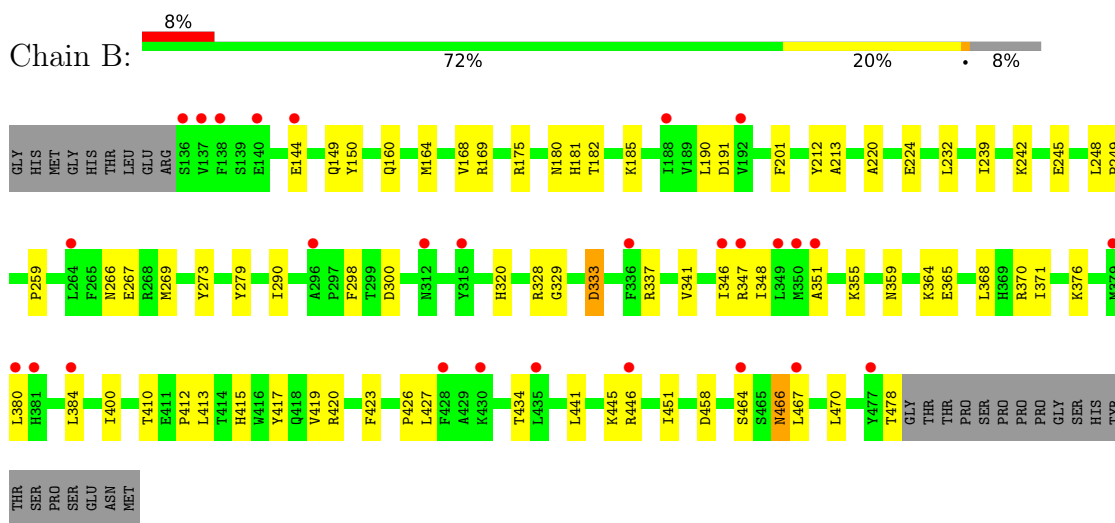
3 Residue-property plots [i](#)

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.

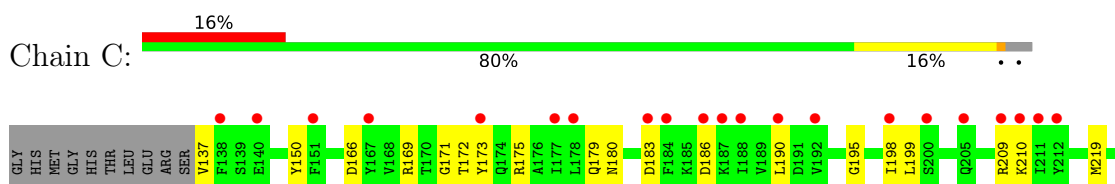
- Molecule 1: Histone-arginine methyltransferase CARM1

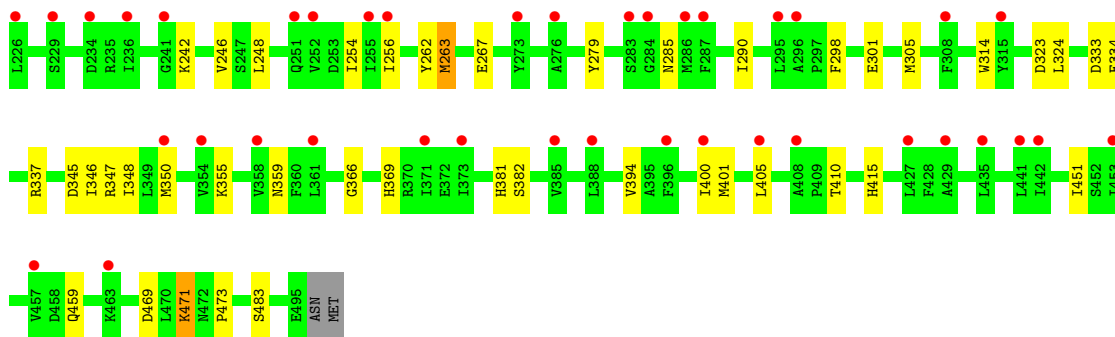


- Molecule 1: Histone-arginine methyltransferase CARM1

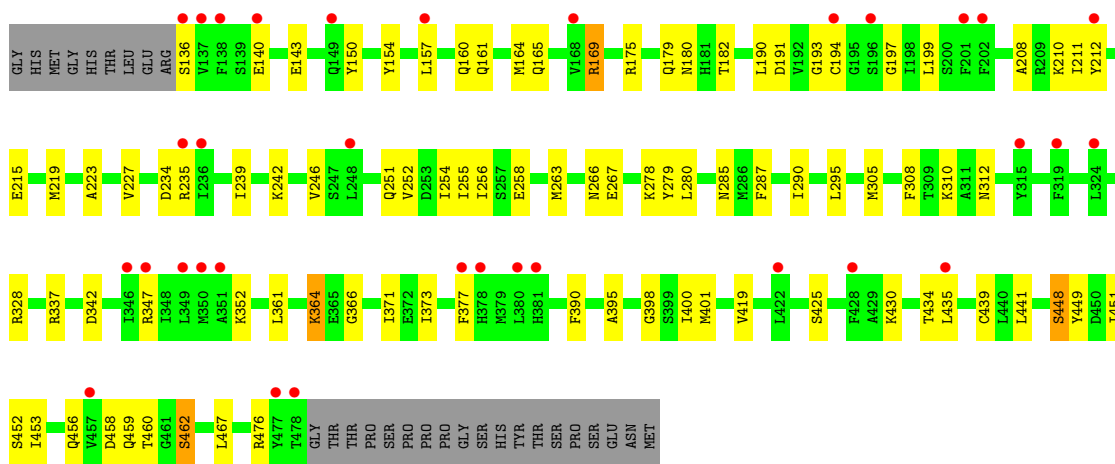


- Molecule 1: Histone-arginine methyltransferase CARM1

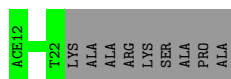




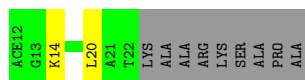
● Molecule 1: Histone-arginine methyltransferase CARM1



● Molecule 2: Histone H3.1



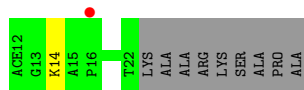
● Molecule 2: Histone H3.1



● Molecule 2: Histone H3.1



● Molecule 2: Histone H3.1



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	74.37Å 98.61Å 206.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.76 – 2.54 45.76 – 2.54	Depositor EDS
% Data completeness (in resolution range)	97.5 (45.76-2.54) 97.8 (45.76-2.54)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.31 (at 2.54Å)	Xtrriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.208 , 0.255 0.207 , 0.252	Depositor DCC
R_{free} test set	2466 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å ²)	55.4	Xtrriage
Anisotropy	0.418	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	(Not available) , (Not available)	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	11702	wwPDB-VP
Average B, all atoms (Å ²)	65.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 54.00 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 3.8895e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: QVR, ACE

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	0.32	0/2947	0.52	0/4000
1	B	0.28	0/2840	0.49	0/3849
1	C	0.28	0/2941	0.49	0/3992
1	D	0.27	0/2821	0.49	0/3823
2	E	0.33	0/75	0.65	0/99
2	F	0.36	0/75	0.67	0/99
2	G	0.33	0/75	0.69	0/99
2	H	0.33	0/75	0.63	0/99
All	All	0.29	0/11849	0.50	0/16060

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	2870	0	2802	26	0
1	B	2769	0	2708	42	0
1	C	2864	0	2797	39	0
1	D	2751	0	2699	56	0
2	E	77	0	87	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	77	0	87	3	0
2	G	77	0	87	2	0
2	H	77	0	87	1	0
3	E	20	0	0	0	0
3	F	20	0	0	0	0
3	G	20	0	0	0	0
3	H	20	0	0	0	0
4	A	23	0	0	0	0
4	B	12	0	0	2	0
4	C	13	0	0	2	0
4	D	10	0	0	3	0
4	E	1	0	0	0	0
4	F	1	0	0	0	0
All	All	11702	0	11354	162	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 7.

All (162) 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:190:LEU:HD13	1:A:248:LEU:HD11	1.52	0.92
1:C:263:MET:HE1	1:C:451:ILE:HD11	1.64	0.79
1:D:150:TYR:HE1	1:D:267:GLU:HG2	1.49	0.78
1:B:242:LYS:HB2	1:B:245:GLU:HG3	1.66	0.78
1:B:467:LEU:N	4:B:501:HOH:O	2.02	0.75
1:B:346:ILE:HG21	1:B:410:THR:HG22	1.70	0.73
1:B:427:LEU:HD21	1:B:464:SER:HB2	1.72	0.71
1:B:423:PHE:HA	1:B:466:ASN:ND2	2.05	0.71
1:B:180:ASN:HA	1:B:400:ILE:HD13	1.72	0.71
1:C:186:ASP:HA	1:C:209:ARG:HG3	1.74	0.70
1:C:415:HIS:HE1	2:G:17(A):ARG:HH21	1.39	0.69
1:C:137:VAL:N	4:C:502:HOH:O	2.24	0.69
1:C:290:ILE:HG22	1:C:359:ASN:HA	1.74	0.69
1:D:434:THR:OG1	1:D:458:ASP:OD2	2.11	0.68
1:D:373:ILE:HB	1:D:439:CYS:HB3	1.75	0.68
1:A:248:LEU:HB2	1:A:279:TYR:CE1	2.29	0.67
1:B:478:THR:O	4:B:503:HOH:O	2.13	0.67
1:D:364:LYS:HD3	1:D:366:GLY:H	1.59	0.66
1:D:371:ILE:HB	1:D:441:LEU:HB2	1.76	0.66
1:B:376:LYS:HE3	1:B:434:THR:HG21	1.78	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:212:TYR:HD1	1:D:239:ILE:HD11	1.61	0.66
1:D:448:SER:OG	1:D:449:TYR:N	2.30	0.65
1:C:199:LEU:HB3	1:C:256:ILE:HD12	1.78	0.64
1:B:160:GLN:O	1:B:164:MET:HG3	1.97	0.64
1:C:166:ASP:OD2	1:C:415:HIS:HD2	1.81	0.64
1:B:149:GLN:HE21	2:F:14:LYS:HA	1.62	0.64
1:D:434:THR:HG23	1:D:459:GLN:HE22	1.64	0.62
1:B:150:TYR:HE1	1:B:267:GLU:HG2	1.65	0.62
1:A:160:GLN:O	1:A:164:MET:HG3	2.00	0.61
1:B:423:PHE:HA	1:B:466:ASN:HD21	1.65	0.61
1:A:422:LEU:O	1:A:466:ASN:ND2	2.29	0.61
1:B:290:ILE:HG22	1:B:359:ASN:HA	1.82	0.61
1:C:337:ARG:NE	1:C:469:ASP:HB2	2.16	0.59
1:B:149:GLN:NE2	2:F:14:LYS:HA	2.17	0.59
1:C:469:ASP:OD2	1:C:471:LYS:HE3	2.01	0.59
1:D:193:GLY:O	4:D:501:HOH:O	2.15	0.59
1:B:212:TYR:HD1	1:B:239:ILE:HD11	1.67	0.59
1:D:160:GLN:O	1:D:164:MET:HG3	2.03	0.58
1:D:266:ASN:O	1:D:267:GLU:HB2	2.03	0.58
1:A:182:THR:HG23	1:A:400:ILE:HD11	1.87	0.57
1:D:180:ASN:HA	1:D:400:ILE:HD12	1.86	0.57
1:B:451:ILE:HD11	1:B:470:LEU:HD13	1.86	0.56
1:C:172:THR:HG21	1:C:405:LEU:HB2	1.87	0.56
1:A:190:LEU:HB2	1:A:252:VAL:HG11	1.86	0.56
1:C:400:ILE:HG22	1:C:401:MET:HG2	1.87	0.55
1:D:342:ASP:HB3	1:D:476:ARG:HB3	1.88	0.55
1:D:254:ILE:HD12	1:D:285:ASN:HB3	1.87	0.55
1:D:305:MET:HE3	1:D:308:PHE:HB3	1.89	0.54
1:D:160:GLN:HG3	1:D:219:MET:SD	2.47	0.54
1:B:220:ALA:O	1:B:224:GLU:HG3	2.08	0.54
1:C:190:LEU:HD13	1:C:248:LEU:HD21	1.90	0.53
1:D:179:GLN:HG2	1:D:401:MET:SD	2.48	0.53
1:C:337:ARG:HE	1:C:469:ASP:HB2	1.73	0.53
1:D:256:ILE:HG22	1:D:287:PHE:HB2	1.90	0.53
1:A:176:ALA:HA	1:A:403:VAL:HG21	1.91	0.53
1:A:295:LEU:HD11	1:A:373:ILE:HG21	1.90	0.52
1:C:323:ASP:OD2	4:C:501:HOH:O	2.19	0.52
1:B:181:HIS:ND1	1:B:182:THR:HG23	2.25	0.52
1:D:194:CYS:HB2	1:D:197:GLY:HA2	1.91	0.52
1:C:346:ILE:HD13	1:C:410:THR:HG23	1.92	0.52
1:D:255:ILE:HD11	1:D:280:LEU:HB2	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:146:SER:OG	1:A:447:GLN:HG3	2.11	0.51
1:D:223:ALA:O	1:D:227:VAL:HG23	2.11	0.51
1:A:248:LEU:HB2	1:A:279:TYR:CZ	2.46	0.50
1:D:377:PHE:HD2	1:D:435:LEU:HD23	1.76	0.50
1:B:266:ASN:O	1:B:267:GLU:HB2	2.11	0.50
1:A:451:ILE:HD11	1:A:470:LEU:HD13	1.94	0.49
1:D:190:LEU:HB2	1:D:252:VAL:HG11	1.93	0.49
1:D:328:ARG:NH1	4:D:505:HOH:O	2.45	0.49
1:D:251:GLN:NE2	1:D:278:LYS:O	2.46	0.49
1:B:182:THR:OG1	1:B:400:ILE:HD11	2.12	0.49
1:B:368:LEU:HA	1:B:371:ILE:HD11	1.95	0.49
1:B:329:GLY:O	1:B:333:ASP:OD1	2.30	0.49
1:C:262:TYR:CZ	1:C:473:PRO:HG3	2.48	0.48
1:B:364:LYS:HG2	1:B:365:GLU:N	2.27	0.48
1:C:179:GLN:NE2	1:C:401:MET:SD	2.87	0.48
1:C:180:ASN:HB3	1:C:183:ASP:OD2	2.13	0.48
1:D:263:MET:HB2	1:D:419:VAL:HG21	1.95	0.48
1:D:161:GLN:O	1:D:165:GLN:HG3	2.13	0.48
1:C:345:ASP:OD1	1:C:347:ARG:HD3	2.13	0.47
1:D:143:GLU:OE1	4:D:502:HOH:O	2.20	0.47
1:D:169:ARG:NE	1:D:258:GLU:OE2	2.43	0.47
1:D:182:THR:HG23	1:D:400:ILE:HD11	1.95	0.47
1:B:190:LEU:HD13	1:B:248:LEU:HD21	1.97	0.47
1:B:201:PHE:CE1	1:B:232:LEU:HD12	2.49	0.47
1:D:191:ASP:OD2	1:D:194:CYS:HB3	2.15	0.47
1:D:377:PHE:CD2	1:D:435:LEU:HD23	2.49	0.47
1:A:379:MET:HG3	1:A:429:ALA:HB1	1.96	0.46
1:D:337:ARG:HG2	1:D:467:LEU:O	2.14	0.46
2:G:14:LYS:O	2:H:14:LYS:HE2	2.15	0.46
1:A:172:THR:HG21	1:A:405:LEU:HB2	1.96	0.46
1:C:262:TYR:OH	1:C:473:PRO:HG3	2.15	0.46
1:C:366:GLY:HA2	1:C:369:HIS:ND1	2.30	0.46
1:D:234:ASP:OD1	1:D:234:ASP:N	2.40	0.46
1:B:434:THR:HG22	1:B:458:ASP:OD1	2.16	0.46
1:C:171:GLY:O	1:C:175:ARG:HG3	2.16	0.46
1:D:242:LYS:O	1:D:246:VAL:HG13	2.16	0.46
1:B:191:ASP:HB3	1:B:213:ALA:HA	1.98	0.46
1:B:384:LEU:HD12	1:B:426:PRO:HB2	1.98	0.46
1:D:441:LEU:HG	1:D:451:ILE:CD1	2.45	0.46
1:C:355:LYS:HB3	1:C:355:LYS:HE3	1.71	0.45
1:A:179:GLN:NE2	1:A:401:MET:SD	2.88	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:248:LEU:HB2	1:B:279:TYR:CE1	2.50	0.45
1:C:173:TYR:CD1	1:C:199:LEU:HD11	2.52	0.45
1:C:459:GLN:N	1:C:459:GLN:OE1	2.50	0.45
1:D:208:ALA:HB3	1:D:211:ILE:HD11	1.99	0.45
1:C:350:MET:HG2	1:C:381:HIS:HB2	1.99	0.45
1:A:248:LEU:HD23	1:A:248:LEU:HA	1.60	0.44
1:B:259:PRO:HG3	1:B:273:TYR:CD2	2.52	0.44
1:B:415:HIS:HA	2:F:20:LEU:HD13	1.99	0.44
1:B:351:ALA:HA	1:B:380:LEU:HD13	1.99	0.44
1:D:452:SER:O	1:D:453:ILE:HD13	2.16	0.44
1:B:300:ASP:OD2	1:B:420:ARG:NH1	2.41	0.44
1:C:248:LEU:HB2	1:C:279:TYR:CE1	2.52	0.44
1:D:154:TYR:OH	1:D:267:GLU:OE2	2.14	0.44
1:D:364:LYS:CD	1:D:366:GLY:H	2.27	0.44
1:D:199:LEU:HB3	1:D:256:ILE:HD12	1.99	0.43
1:D:175:ARG:O	1:D:179:GLN:HB2	2.18	0.43
1:B:371:ILE:HB	1:B:441:LEU:HB2	2.01	0.43
1:A:346:ILE:HD11	1:A:410:THR:HA	1.99	0.43
1:A:430:LYS:HB3	1:A:430:LYS:HE3	1.79	0.43
1:D:136:SER:O	1:D:140:GLU:HG3	2.18	0.43
1:D:456:GLN:HA	1:D:462:SER:O	2.19	0.43
1:A:441:LEU:HD22	1:A:451:ILE:HG12	2.01	0.43
1:C:172:THR:HB	1:C:405:LEU:HD13	2.01	0.43
1:A:460:THR:OG1	1:A:462:SER:OG	2.35	0.43
1:B:298:PHE:HB2	1:B:348:ILE:HG13	2.00	0.43
1:B:320:HIS:CD2	1:D:460:THR:HB	2.54	0.43
1:D:290:ILE:HG12	1:D:395:ALA:HB3	2.00	0.43
1:C:345:ASP:O	1:C:348:ILE:HG12	2.19	0.42
1:C:314:TRP:HE3	1:C:324:LEU:HB3	1.84	0.42
1:D:194:CYS:SG	1:D:215:GLU:HB2	2.59	0.42
1:A:268:ARG:HD2	1:A:271:GLU:OE2	2.19	0.42
1:C:150:TYR:HE1	1:C:267:GLU:HG2	1.84	0.42
1:A:463:LYS:HE3	1:A:463:LYS:HB2	1.73	0.42
1:C:334:GLU:OE1	1:D:157:LEU:N	2.46	0.42
1:D:459:GLN:OE1	1:D:459:GLN:N	2.52	0.42
1:A:204:ALA:O	1:A:235:ARG:NH2	2.53	0.42
1:D:451:ILE:O	1:D:467:LEU:HD23	2.19	0.42
1:B:423:PHE:HD1	1:B:466:ASN:ND2	2.17	0.42
1:A:146:SER:HB2	1:A:446:ARG:NH1	2.35	0.42
1:C:198:ILE:HG23	1:C:199:LEU:HD22	2.02	0.41
1:B:185:LYS:HA	1:B:185:LYS:HD3	1.92	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:254:ILE:HG13	1:C:285:ASN:HB3	2.03	0.41
1:C:195:GLY:C	1:C:219:MET:HG3	2.40	0.41
1:D:251:GLN:HG3	1:D:279:TYR:O	2.20	0.41
1:B:413:LEU:HD21	1:B:417:TYR:CE2	2.56	0.41
1:B:168:VAL:HG21	1:B:412:PRO:HB2	2.02	0.41
1:D:180:ASN:CG	1:D:398:GLY:HA3	2.40	0.41
1:B:341:VAL:HG22	1:B:419:VAL:HG22	2.03	0.41
1:D:305:MET:HA	1:D:305:MET:CE	2.51	0.41
1:C:394:VAL:HG23	1:C:405:LEU:HB3	2.03	0.41
1:C:242:LYS:O	1:C:246:VAL:HG13	2.21	0.41
1:D:150:TYR:CE1	1:D:267:GLU:HG2	2.40	0.41
1:B:248:LEU:HA	1:B:249:PRO:HD3	1.93	0.40
1:C:301:GLU:HG3	1:C:305:MET:SD	2.61	0.40
1:C:298:PHE:HB2	1:C:348:ILE:HD12	2.03	0.40
1:A:259:PRO:HB2	1:A:270:LEU:HD23	2.02	0.40
1:D:361:LEU:HD23	1:D:361:LEU:HA	1.93	0.40
1:A:210:LYS:HE2	1:A:210:LYS:HB2	1.89	0.40
1:A:427:LEU:HD21	1:A:464:SER:HB2	2.04	0.40
1:D:390:PHE:N	1:D:419:VAL:O	2.49	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	358/371 (96%)	347 (97%)	11 (3%)	0	100	100
1	B	343/371 (92%)	329 (96%)	14 (4%)	0	100	100
1	C	357/371 (96%)	342 (96%)	15 (4%)	0	100	100
1	D	341/371 (92%)	329 (96%)	12 (4%)	0	100	100
2	E	9/20 (45%)	9 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	F	9/20 (45%)	9 (100%)	0	0	100	100
2	G	9/20 (45%)	9 (100%)	0	0	100	100
2	H	9/20 (45%)	9 (100%)	0	0	100	100
All	All	1435/1564 (92%)	1383 (96%)	52 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	314/323 (97%)	308 (98%)	6 (2%)	57	72
1	B	301/323 (93%)	288 (96%)	13 (4%)	29	39
1	C	313/323 (97%)	306 (98%)	7 (2%)	52	66
1	D	299/323 (93%)	286 (96%)	13 (4%)	29	39
2	E	7/12 (58%)	7 (100%)	0	100	100
2	F	7/12 (58%)	7 (100%)	0	100	100
2	G	7/12 (58%)	6 (86%)	1 (14%)	3	3
2	H	7/12 (58%)	7 (100%)	0	100	100
All	All	1255/1340 (94%)	1215 (97%)	40 (3%)	39	53

All (40) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	169	ARG
1	A	210	LYS
1	A	221	GLN
1	A	269	MET
1	A	424	GLN
1	A	483	SER
1	B	144	GLU
1	B	169	ARG

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Mol	Chain	Res	Type
1	B	175	ARG
1	B	269	MET
1	B	328	ARG
1	B	333	ASP
1	B	337	ARG
1	B	347	ARG
1	B	355	LYS
1	B	370	ARG
1	B	445	LYS
1	B	446	ARG
1	B	466	ASN
1	C	169	ARG
1	C	210	LYS
1	C	263	MET
1	C	333	ASP
1	C	382	SER
1	C	471	LYS
1	C	483	SER
1	D	169	ARG
1	D	210	LYS
1	D	235	ARG
1	D	295	LEU
1	D	310	LYS
1	D	312	ASN
1	D	347	ARG
1	D	352	LYS
1	D	364	LYS
1	D	425	SER
1	D	430	LYS
1	D	448	SER
1	D	462	SER
2	G	14	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	231	ASN
1	A	447	GLN
1	B	149	GLN
1	B	466	ASN
1	C	179	GLN
1	C	415	HIS

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Mol	Chain	Res	Type
2	F	19	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 [i](#)

4 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	QVR	F	101	2	19,22,22	0.60	0	19,32,32	0.76	1 (5%)
3	QVR	E	101	2	19,22,22	0.63	0	19,32,32	0.76	1 (5%)
3	QVR	H	101	2	19,22,22	0.65	0	19,32,32	0.82	2 (10%)
3	QVR	G	101	2	19,22,22	0.62	0	19,32,32	0.71	1 (5%)

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	QVR	F	101	2	-	0/3/23/23	0/3/3/3
3	QVR	E	101	2	-	0/3/23/23	0/3/3/3
3	QVR	H	101	2	-	0/3/23/23	0/3/3/3
3	QVR	G	101	2	-	0/3/23/23	0/3/3/3

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
3	F	101	QVR	C50-C55-N57	2.39	123.98	120.35
3	G	101	QVR	C50-C55-N57	2.36	123.94	120.35
3	E	101	QVR	C50-C55-N57	2.30	123.85	120.35
3	H	101	QVR	C51-C50-N48	2.30	111.79	109.40
3	H	101	QVR	C50-C55-N57	2.14	123.61	120.35

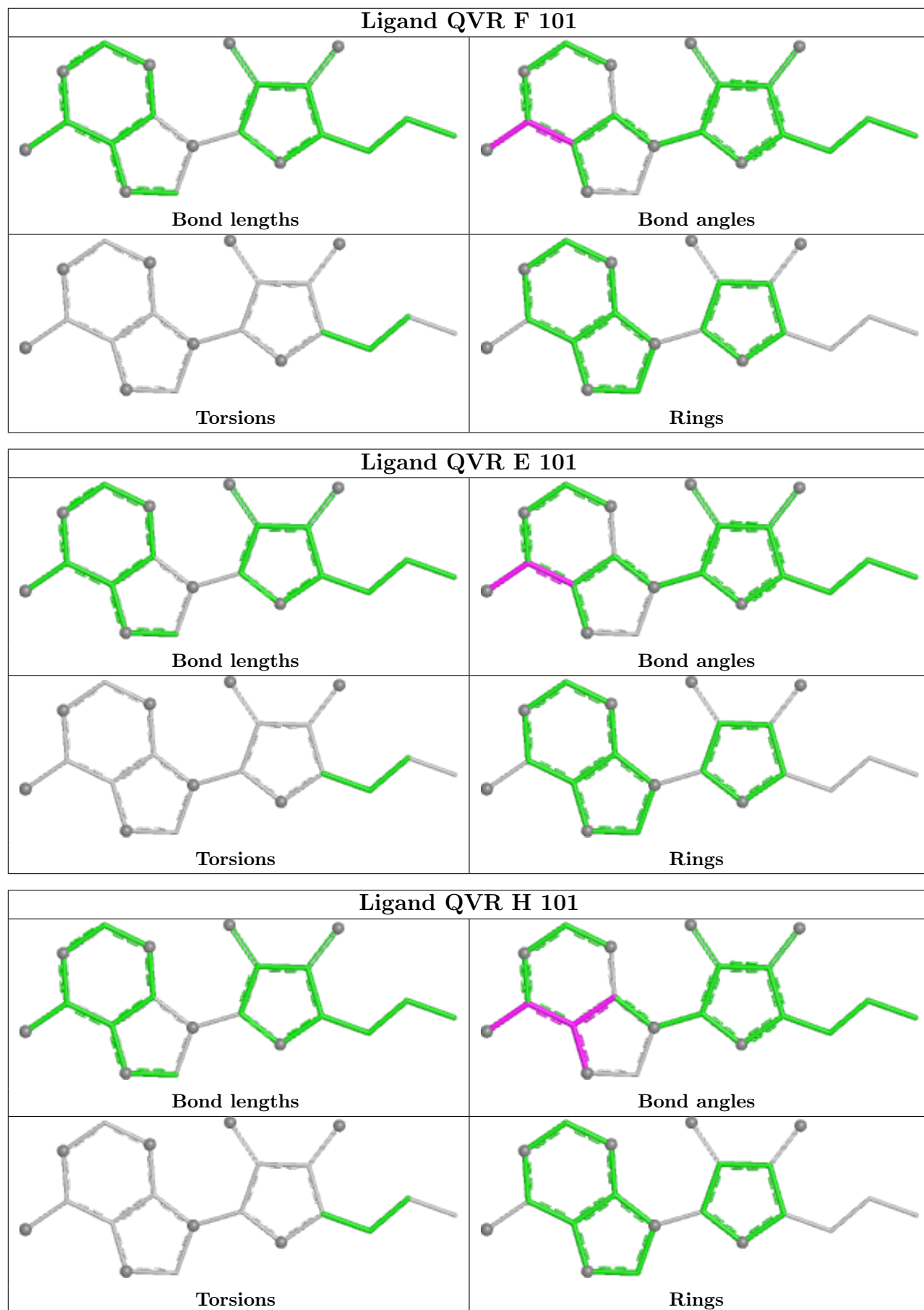
There are no chirality outliers.

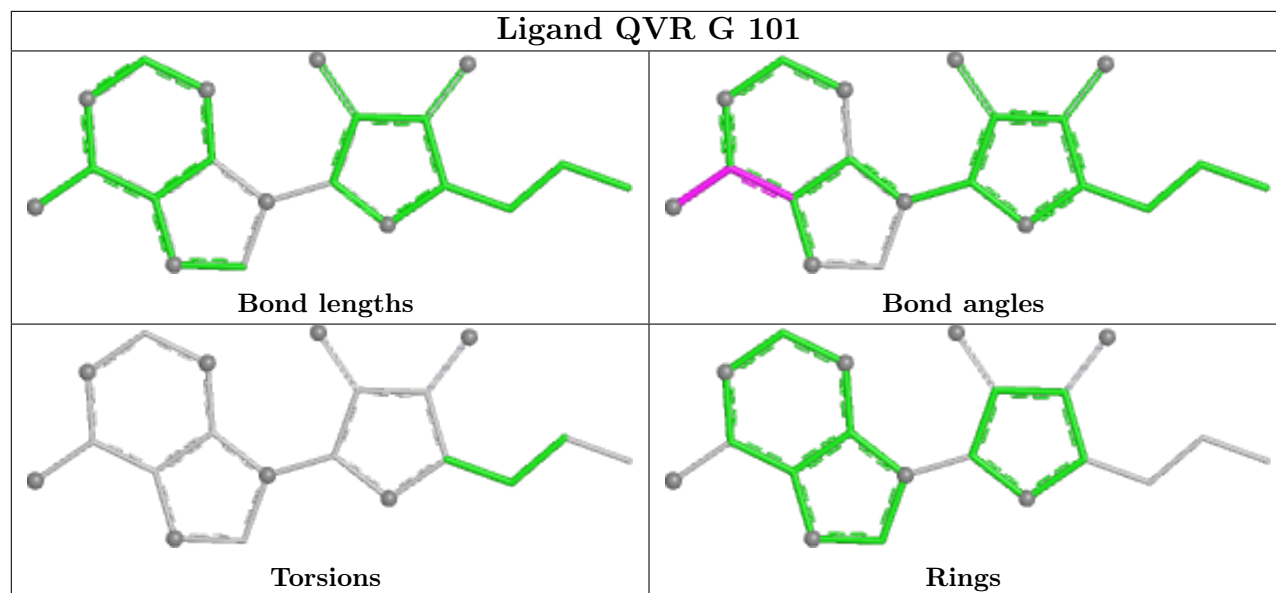
There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	360/371 (97%)	0.85	38 (10%) 6 8	39, 59, 79, 99	1 (0%)
1	B	343/371 (92%)	0.70	28 (8%) 11 14	41, 62, 78, 103	0
1	C	359/371 (96%)	1.02	60 (16%) 1 1	49, 69, 88, 103	1 (0%)
1	D	343/371 (92%)	0.81	33 (9%) 8 10	50, 66, 83, 105	1 (0%)
2	E	10/20 (50%)	0.72	0 100 100	54, 60, 75, 82	0
2	F	10/20 (50%)	0.66	0 100 100	60, 66, 79, 87	0
2	G	10/20 (50%)	0.89	1 (10%) 7 9	65, 72, 85, 92	0
2	H	10/20 (50%)	1.27	1 (10%) 7 9	67, 74, 88, 92	0
All	All	1445/1564 (92%)	0.85	161 (11%) 5 7	39, 65, 86, 105	3 (0%)

All (161) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	248	LEU	6.6
1	C	178	LEU	6.0
1	A	178	LEU	5.3
1	B	350	MET	5.3
1	B	428	PHE	5.2
1	D	378	HIS	4.8
1	A	241	GLY	4.8
1	C	241	GLY	4.7
1	D	347	ARG	4.7
1	D	137	VAL	4.4
1	D	349	LEU	4.2
1	C	138	PHE	4.2
1	D	381	HIS	4.2
1	D	140	GLU	4.2
1	D	350	MET	4.2
1	C	284	GLY	4.1

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Mol	Chain	Res	Type	RSRZ
1	B	138	PHE	4.1
1	B	347	ARG	4.0
1	A	276	ALA	4.0
1	D	315	TYR	3.9
1	A	435	LEU	3.9
1	A	236	ILE	3.8
1	A	189	VAL	3.8
1	A	428	PHE	3.6
1	A	283	SER	3.6
1	C	283	SER	3.5
1	C	286	MET	3.5
1	C	200	SER	3.5
1	B	380	LEU	3.4
1	C	184	PHE	3.4
1	C	361	LEU	3.3
1	B	430	LYS	3.3
1	D	138	PHE	3.3
1	B	137	VAL	3.2
1	D	457	VAL	3.2
1	A	211	ILE	3.2
1	A	140	GLU	3.1
1	C	186	ASP	3.1
1	D	136	SER	3.1
1	C	183	ASP	3.1
1	A	256	ILE	3.0
1	D	248	LEU	3.0
1	B	346	ILE	3.0
1	B	384	LEU	3.0
1	D	380	LEU	3.0
1	A	138	PHE	3.0
1	D	351	ALA	3.0
1	A	324	LEU	2.9
1	C	212	TYR	2.9
1	D	157	LEU	2.9
1	C	435	LEU	2.9
1	C	177	ILE	2.9
1	C	429	ALA	2.9
1	B	336	PHE	2.9
1	C	400	ILE	2.9
1	A	137	VAL	2.8
1	C	373	ILE	2.8
1	D	236	ILE	2.8

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Mol	Chain	Res	Type	RSRZ
1	D	346	ILE	2.8
1	A	220	ALA	2.8
1	C	388	LEU	2.8
1	B	315	TYR	2.8
1	C	192	VAL	2.8
1	D	377	PHE	2.8
1	B	136	SER	2.8
1	A	378	HIS	2.8
1	C	140	GLU	2.7
1	A	373	ILE	2.7
1	C	190	LEU	2.7
1	A	254	ILE	2.7
1	C	251	GLN	2.7
1	B	349	LEU	2.7
1	C	308	PHE	2.7
1	C	210	LYS	2.7
2	G	15	ALA	2.6
1	D	435	LEU	2.6
1	A	192	VAL	2.6
1	A	246	VAL	2.6
1	C	188	ILE	2.6
1	C	209	ARG	2.6
1	C	211	ILE	2.6
1	D	478	THR	2.6
1	A	232	LEU	2.6
1	C	405	LEU	2.5
1	C	296	ALA	2.5
1	C	252	VAL	2.5
1	C	315	TYR	2.5
1	C	167	TYR	2.5
1	C	396	PHE	2.5
1	C	151	PHE	2.5
1	C	234	ASP	2.5
1	D	202	PHE	2.5
1	C	173	TYR	2.4
1	D	168	VAL	2.4
1	B	464	SER	2.4
1	C	442	ILE	2.4
1	D	201	PHE	2.4
1	B	351	ALA	2.4
1	A	186	ASP	2.4
1	B	144	GLU	2.4

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Mol	Chain	Res	Type	RSRZ
1	C	457	VAL	2.4
1	B	188	ILE	2.3
1	C	198	ILE	2.3
1	C	236	ILE	2.3
1	C	273	TYR	2.3
1	C	354	VAL	2.3
1	C	255	ILE	2.3
1	C	295	LEU	2.3
1	A	223	ALA	2.3
1	B	467	LEU	2.3
1	C	385	VAL	2.3
1	B	296	ALA	2.3
1	C	408	ALA	2.3
1	C	427	LEU	2.3
1	C	441	LEU	2.3
1	D	324	LEU	2.3
1	C	350	MET	2.3
1	D	194	CYS	2.3
1	A	441	LEU	2.3
1	C	226	LEU	2.3
1	D	212	TYR	2.3
1	A	238	VAL	2.2
1	A	284	GLY	2.2
1	C	287	PHE	2.2
1	A	210	LYS	2.2
1	D	149	GLN	2.2
1	A	354	VAL	2.2
1	B	140	GLU	2.2
2	H	16	PRO	2.2
1	A	173	TYR	2.2
1	D	235	ARG	2.2
1	B	379	MET	2.2
1	C	358	VAL	2.2
1	C	256	ILE	2.2
1	A	384	LEU	2.2
1	B	264	LEU	2.2
1	B	435	LEU	2.2
1	D	422	LEU	2.2
1	C	187	LYS	2.1
1	C	463	LYS	2.1
1	C	453	ILE	2.1
1	A	141	ARG	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	312	ASN	2.1
1	C	276	ALA	2.1
1	A	235	ARG	2.1
1	B	477	TYR	2.1
1	D	477	TYR	2.1
1	A	453	ILE	2.1
1	C	229	SER	2.1
1	B	192	VAL	2.1
1	A	226	LEU	2.1
1	B	446	ARG	2.1
1	D	428	PHE	2.0
1	B	381	HIS	2.0
1	D	196	SER	2.0
1	A	199	LEU	2.0
1	A	368	LEU	2.0
1	C	371	ILE	2.0
1	D	319	PHE	2.0
1	A	191	ASP	2.0
1	C	205	GLN	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](#)

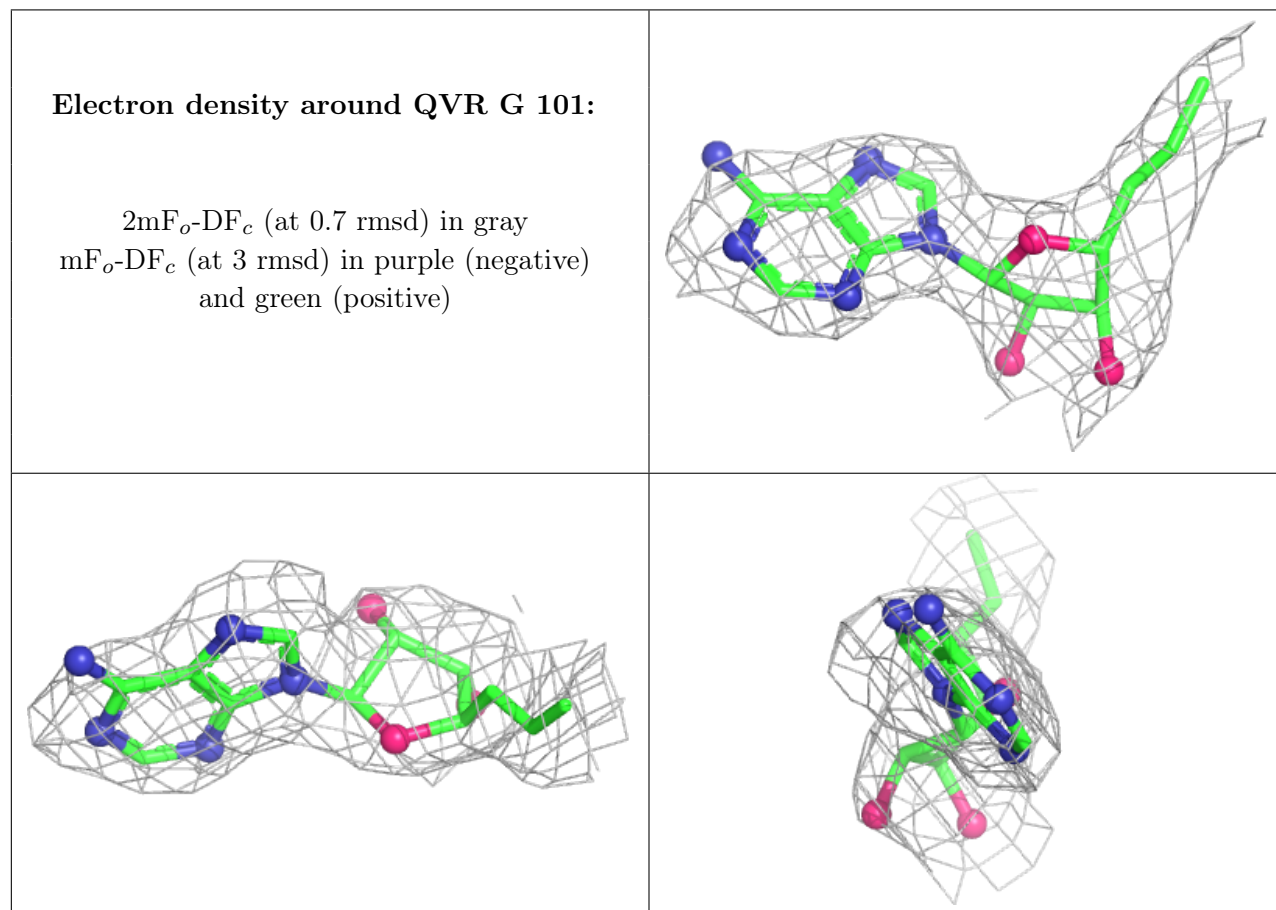
There are no monosaccharides in this entry.

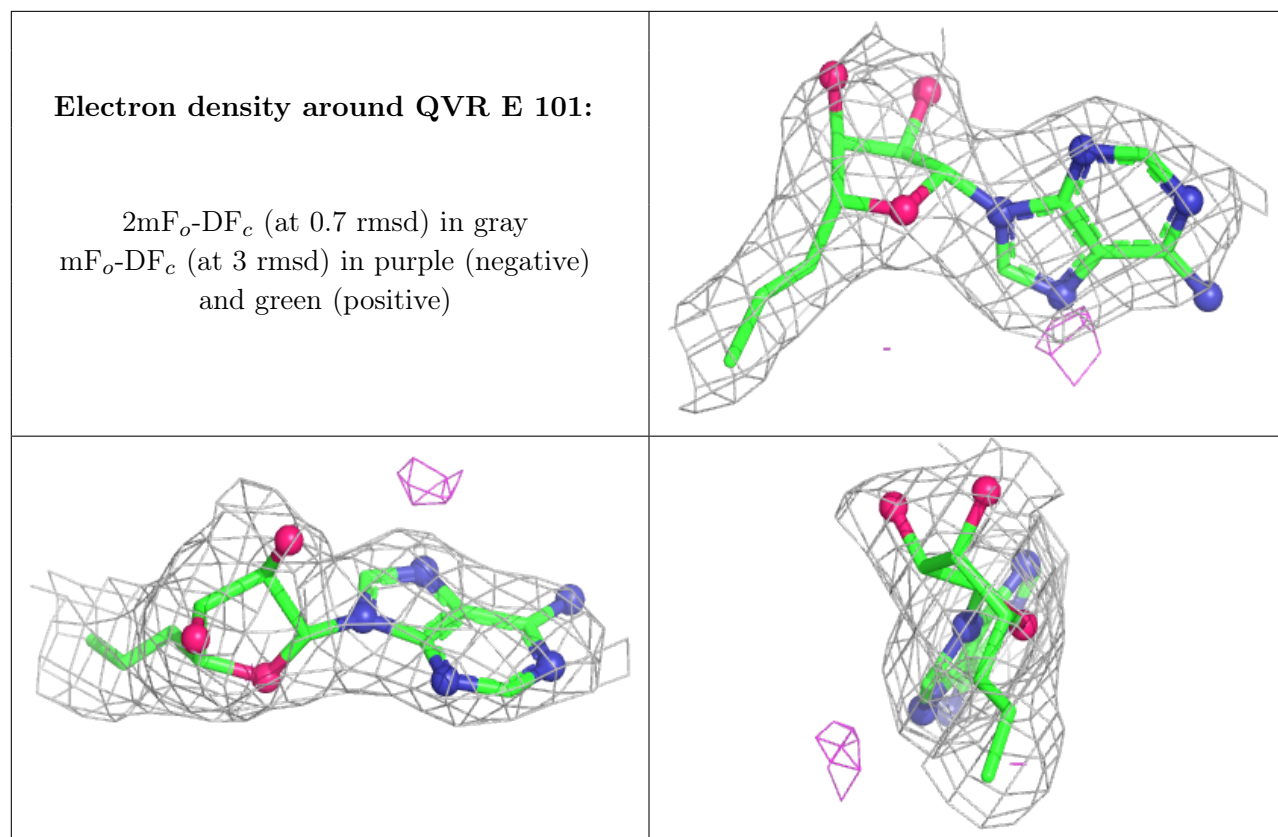
6.4 Ligands [i](#)

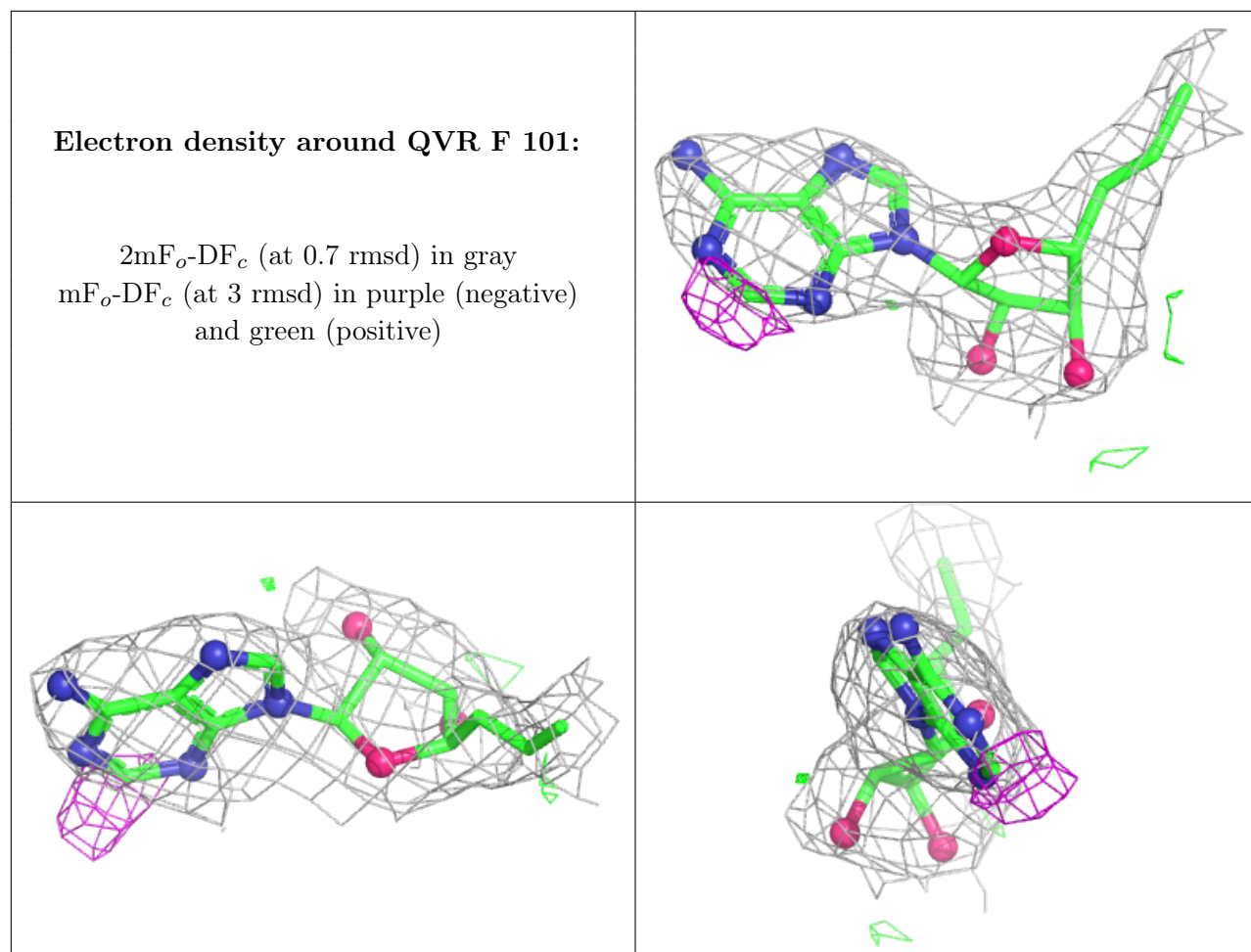
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q<0.9' lists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

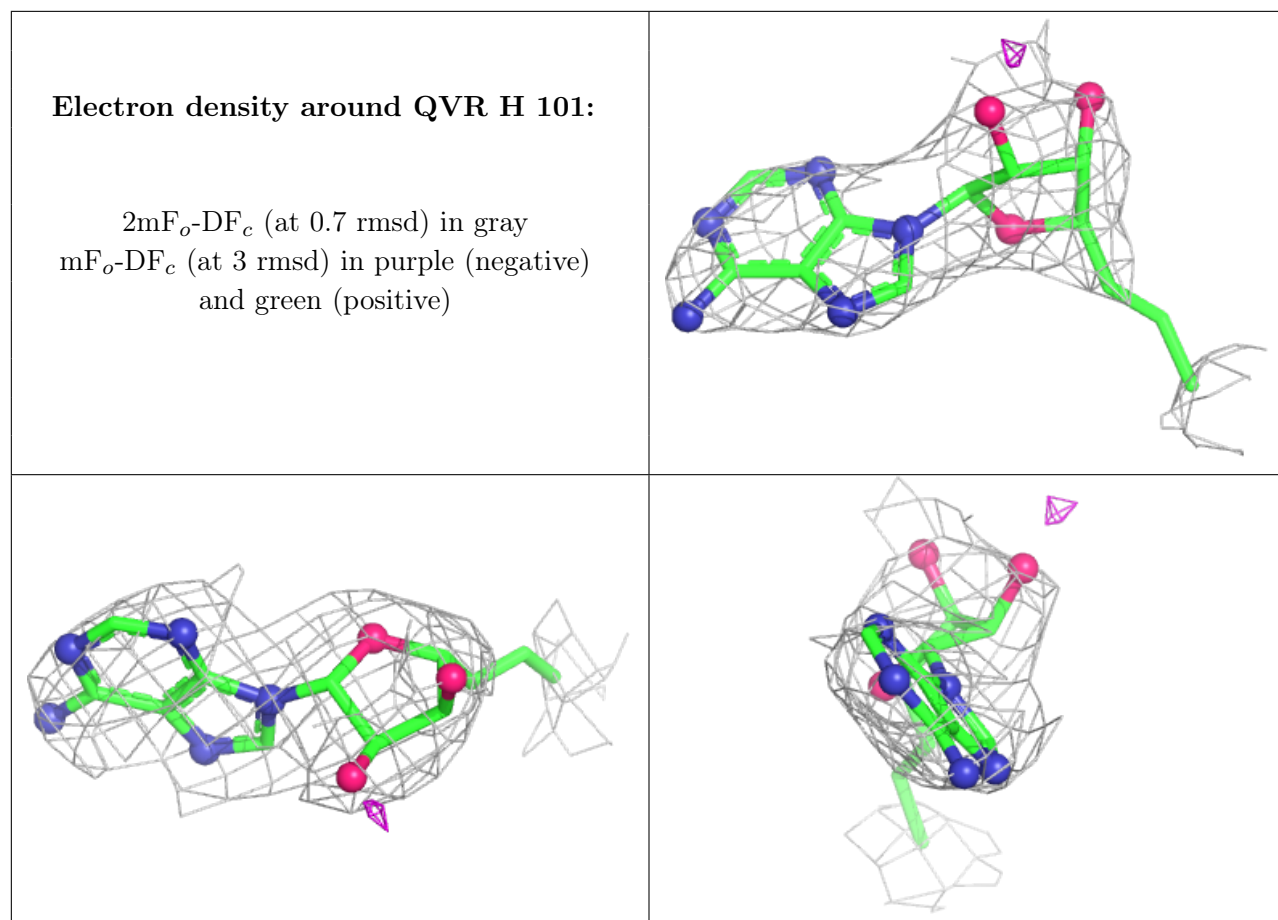
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	QVR	G	101	20/20	0.87	0.20	65,73,76,77	0
3	QVR	E	101	20/20	0.89	0.21	56,62,70,71	0
3	QVR	F	101	20/20	0.92	0.20	57,60,67,68	0
3	QVR	H	101	20/20	0.92	0.21	69,71,77,79	0

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.









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

There are no such residues in this entry.