



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 12:03 PM UTC

PDB ID : 3BFG / pdb_00003bfg
Title : class A beta-lactamase SED-G238C complexed with meropenem
Authors : Pernot, L.; Petrella, S.; Sougakoff, W.
Deposited on : 2007-11-21
Resolution : 2.00 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

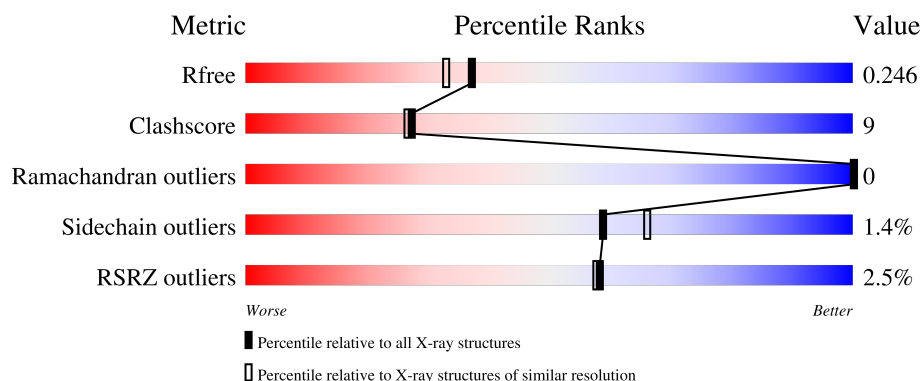
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

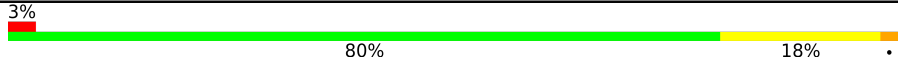
The reported resolution of this entry is 2.00 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	262	
1	B	262	
1	C	262	
1	D	262	

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
2	MER	A	301	X	-	-	-
2	MER	B	302	X	-	-	-
2	MER	C	303	X	-	-	-
2	MER	D	304	X	-	-	-

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 8875 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.

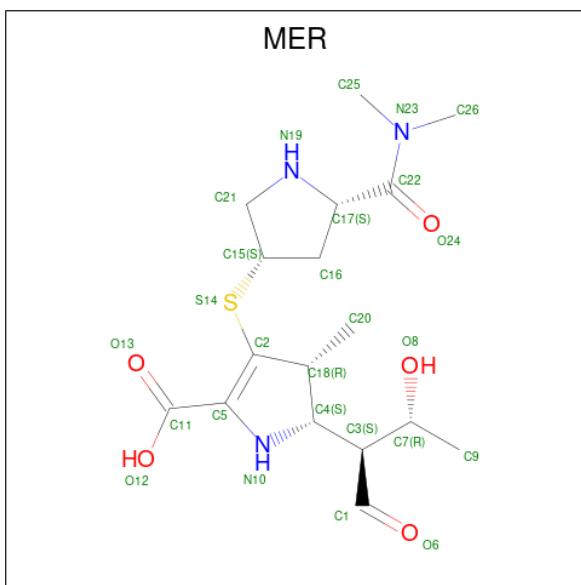
- Molecule 1 is a protein called Class A beta-lactamase Sed1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	262	Total	C	N	O	S	0	0	0
			1987	1240	354	385	8			
1	B	262	Total	C	N	O	S	0	0	0
			1987	1240	354	385	8			
1	C	262	Total	C	N	O	S	0	0	0
			1987	1240	354	385	8			
1	D	262	Total	C	N	O	S	0	0	0
			1987	1240	354	385	8			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	238	CYS	GLY	engineered mutation	UNP Q93PQ0
B	238	CYS	GLY	engineered mutation	UNP Q93PQ0
C	238	CYS	GLY	engineered mutation	UNP Q93PQ0
D	238	CYS	GLY	engineered mutation	UNP Q93PQ0

- Molecule 2 is (4R,5S)-3-{[(3S,5S)-5-(dimethylcarbamoyl)pyrrolidin-3-yl]sulfanyl}-5-[(2S,3R)-3-hydroxy-1-oxobutan-2-yl]-4-methyl-4,5-dihydro-1H-pyrrole-2-carboxylic acid (CCD ID: MER) (formula: C₁₇H₂₇N₃O₅S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 26	C 17	N 3	O 5	S 1	0	0
2	B	1	Total 26	C 17	N 3	O 5	S 1	0	0
2	C	1	Total 26	C 17	N 3	O 5	S 1	0	0
2	D	1	Total 26	C 17	N 3	O 5	S 1	0	0

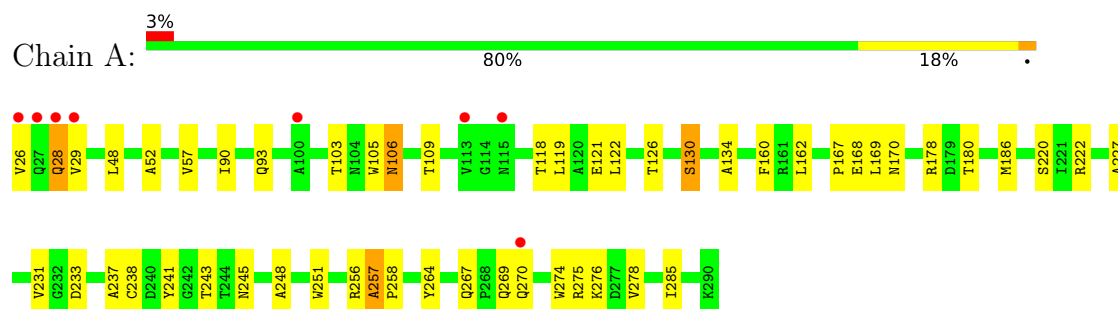
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	209	Total O 209 209	0	0
3	B	219	Total O 219 219	0	0
3	C	197	Total O 197 197	0	0
3	D	198	Total O 198 198	0	0

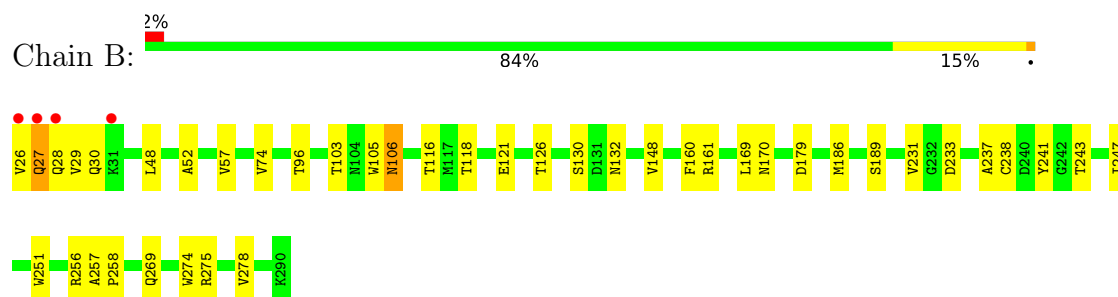
3 Residue-property plots

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.

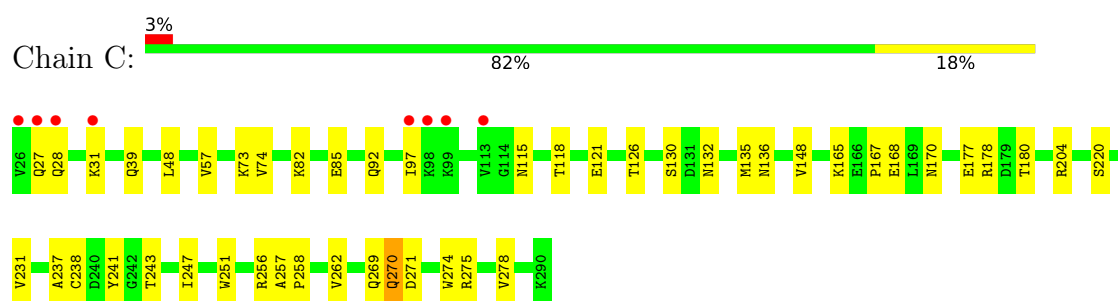
- Molecule 1: Class A beta-lactamase Sed1



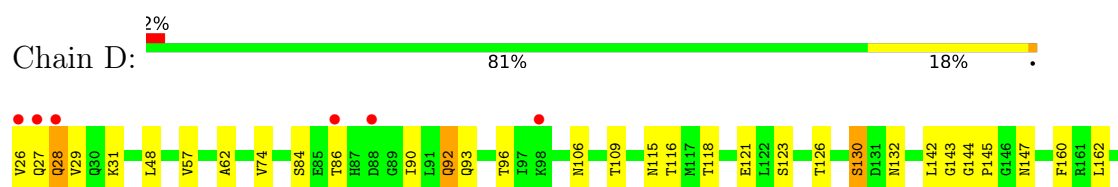
- Molecule 1: Class A beta-lactamase Sed1



- Molecule 1: Class A beta-lactamase Sed1



- Molecule 1: Class A beta-lactamase Sed1



L169	N170	L184	R222	D233	A237	C238	D240	Y241	G242	T243	I247	A248	L261	F265	Q269	W274	K284	I285	E288	G289	K290
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4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	188.14Å 73.18Å 105.38Å 90.00° 122.42° 90.00°	Depositor
Resolution (Å)	34.10 – 2.00 34.10 – 2.00	Depositor EDS
% Data completeness (in resolution range)	91.9 (34.10-2.00) 92.1 (34.10-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.93 (at 2.00Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.198 , 0.248 0.206 , 0.246	Depositor DCC
R_{free} test set	3076 reflections (4.08%)	wwPDB-VP
Wilson B-factor (Å ²)	16.3	Xtriage
Anisotropy	0.639	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 59.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.230 for -h-2*k,l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	8875	wwPDB-VP
Average B, all atoms (Å ²)	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 30.31 % 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 1.3353e-03. 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MER

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	0.38	0/2018	0.90	8/2737 (0.3%)
1	B	0.39	0/2018	1.00	9/2737 (0.3%)
1	C	0.37	0/2018	0.87	4/2737 (0.1%)
1	D	0.38	0/2018	0.89	4/2737 (0.1%)
All	All	0.38	0/8072	0.91	25/10948 (0.2%)

There are no bond length outliers.

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	30	GLN	OE1-CD-NE2	-10.52	112.08	122.60
1	B	27	GLN	OE1-CD-NE2	-9.84	112.76	122.60
1	B	28	GLN	OE1-CD-NE2	-9.31	113.29	122.60
1	A	220	SER	N-CA-C	7.62	115.03	108.78
1	B	30	GLN	CG-CD-NE2	6.65	126.37	116.40
1	B	27	GLN	CG-CD-NE2	6.59	126.29	116.40
1	B	28	GLN	CG-CD-NE2	6.48	126.12	116.40
1	A	227	ALA	N-CA-C	5.89	118.49	111.71
1	B	28	GLN	N-CA-C	-5.89	105.81	112.87
1	A	257	ALA	CA-C-N	5.87	125.88	119.89
1	A	257	ALA	C-N-CA	5.87	125.88	119.89
1	D	28	GLN	N-CA-C	-5.80	104.96	111.28
1	D	144	GLY	CA-C-N	5.79	125.92	119.32
1	D	144	GLY	C-N-CA	5.79	125.92	119.32
1	C	231	VAL	N-CA-C	5.76	116.98	108.45
1	A	267	GLN	CA-C-N	5.76	125.13	118.85
1	A	267	GLN	C-N-CA	5.76	125.13	118.85
1	C	148	VAL	N-CA-C	-5.49	105.17	110.72
1	C	220	SER	N-CA-C	5.31	113.13	108.78
1	A	28	GLN	N-CA-C	-5.29	105.41	111.07

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	27	GLN	N-CA-C	-5.16	107.03	113.38
1	B	231	VAL	N-CA-C	5.14	116.06	108.45
1	B	148	VAL	N-CA-C	-5.12	105.42	111.00
1	A	231	VAL	N-CA-C	5.03	115.96	108.46
1	D	261	LEU	N-CA-C	5.01	117.22	108.76

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	1987	0	2010	44	0
1	B	1987	0	2010	27	0
1	C	1987	0	2010	30	0
1	D	1987	0	2010	41	0
2	A	26	0	24	8	0
2	B	26	0	24	4	0
2	C	26	0	24	2	0
2	D	26	0	24	3	0
3	A	209	0	0	4	0
3	B	219	0	0	0	0
3	C	197	0	0	2	0
3	D	198	0	0	4	0
All	All	8875	0	8136	147	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 9.

All (147) 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)
2:A:301:MER:H9B	3:A:354:HOH:O	1.48	1.12
1:D:132:ASN:HD21	2:D:304:MER:H9	1.46	0.81
1:A:276:LYS:HZ3	2:A:301:MER:H21A	1.51	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:276:LYS:NZ	2:A:301:MER:H21A	2.01	0.74
1:A:126:THR:HG22	1:A:134:ALA:HB3	1.69	0.74
1:A:122:LEU:O	1:A:126:THR:HG23	1.90	0.72
1:C:39:GLN:HA	3:C:570:HOH:O	1.88	0.72
1:D:96:THR:HA	1:D:116:THR:HG22	1.72	0.71
1:B:105:TRP:HZ2	2:B:302:MER:O24	1.74	0.70
1:C:28:GLN:HA	1:C:31:LYS:HE2	1.75	0.69
1:A:126:THR:HG22	1:A:134:ALA:CB	2.24	0.67
1:B:118:THR:OG1	1:B:121:GLU:HG3	1.95	0.67
1:D:27:GLN:O	1:D:31:LYS:HG2	1.95	0.67
1:A:170:ASN:ND2	2:A:301:MER:H9A	2.10	0.66
1:D:26:VAL:HG11	1:D:28:GLN:HE21	1.61	0.66
1:C:118:THR:OG1	1:C:121:GLU:HG3	1.97	0.65
1:B:132:ASN:HD21	2:B:302:MER:H9	1.62	0.64
1:C:170:ASN:HB3	1:C:238:CYS:HB2	1.80	0.63
1:A:106:ASN:HB3	1:A:109:THR:OG1	1.99	0.62
1:B:105:TRP:CZ2	2:B:302:MER:O24	2.53	0.61
1:D:26:VAL:CB	1:D:28:GLN:HE21	2.12	0.61
1:B:186:MET:HE3	1:B:189:SER:HB2	1.84	0.59
1:A:105:TRP:C	1:A:106:ASN:ND2	2.60	0.59
2:A:301:MER:C9	3:A:354:HOH:O	2.26	0.59
1:D:115:ASN:ND2	1:D:116:THR:H	2.02	0.58
1:D:284:LYS:O	1:D:288:GLU:HB2	2.03	0.58
1:A:26:VAL:HG13	1:A:28:GLN:NE2	2.19	0.58
1:D:26:VAL:CG1	1:D:28:GLN:HE21	2.16	0.57
1:D:118:THR:OG1	1:D:121:GLU:HG3	2.03	0.57
1:B:186:MET:HE3	1:B:186:MET:HA	1.88	0.56
1:D:29:VAL:HG13	1:D:285:ILE:HG22	1.87	0.56
1:A:105:TRP:C	1:A:106:ASN:HD22	2.14	0.56
1:D:48:LEU:HB3	1:D:57:VAL:HB	1.89	0.55
1:B:103:THR:H	1:B:106:ASN:HD21	1.54	0.54
1:D:132:ASN:ND2	2:D:304:MER:H9	2.21	0.54
1:B:126:THR:O	1:B:130:SER:HA	2.08	0.53
1:B:251:TRP:CD1	1:B:258:PRO:HG3	2.44	0.53
1:A:168:GLU:CD	1:A:168:GLU:H	2.16	0.52
1:B:27:GLN:C	1:B:29:VAL:N	2.66	0.52
1:B:52:ALA:HB2	1:B:257:ALA:HB3	1.92	0.52
1:A:126:THR:O	1:A:130:SER:HA	2.10	0.52
1:A:169:LEU:HD12	1:A:169:LEU:C	2.35	0.52
1:C:132:ASN:HD21	2:C:303:MER:H9	1.74	0.51
1:C:204:ARG:HD3	3:C:392:HOH:O	2.09	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:90:ILE:HD12	1:D:93:GLN:NE2	2.26	0.51
1:C:97:ILE:HD12	1:C:97:ILE:N	2.25	0.51
1:C:168:GLU:H	1:C:168:GLU:CD	2.19	0.51
1:D:123:SER:O	1:D:126:THR:HG22	2.10	0.51
1:A:118:THR:OG1	1:A:121:GLU:HG3	2.11	0.51
1:B:170:ASN:HB3	1:B:238:CYS:HB2	1.93	0.51
1:A:233:ASP:HB2	1:A:248:ALA:HB2	1.93	0.50
1:C:275:ARG:HB3	1:C:278:VAL:HG23	1.93	0.50
1:A:233:ASP:CB	1:A:248:ALA:HB2	2.41	0.50
1:D:169:LEU:C	1:D:169:LEU:HD12	2.37	0.50
1:C:28:GLN:CD	1:C:28:GLN:H	2.20	0.49
1:A:29:VAL:HG13	1:A:285:ILE:HG22	1.94	0.49
1:B:96:THR:HG22	1:B:116:THR:HG22	1.94	0.49
1:C:241:TYR:HA	1:C:269:GLN:O	2.12	0.49
1:C:167:PRO:HD2	1:C:168:GLU:OE2	2.13	0.49
1:B:26:VAL:HB	1:B:29:VAL:HG23	1.94	0.49
1:C:126:THR:O	1:C:130:SER:HA	2.12	0.49
1:D:26:VAL:CG1	1:D:28:GLN:HG3	2.42	0.49
1:A:251:TRP:CD1	1:A:258:PRO:HG3	2.48	0.49
1:D:86:THR:HG23	3:D:336:HOH:O	2.13	0.48
2:C:303:MER:H15	2:C:303:MER:H20A	1.95	0.48
1:C:247:ILE:HG22	1:C:262:VAL:HG13	1.95	0.48
1:A:90:ILE:O	1:A:119:LEU:HD12	2.14	0.48
1:B:48:LEU:HB3	1:B:57:VAL:HB	1.96	0.47
1:B:103:THR:H	1:B:106:ASN:ND2	2.12	0.47
1:C:270:GLN:C	1:C:270:GLN:NE2	2.71	0.47
1:D:74:VAL:HG21	1:D:247:ILE:HD11	1.95	0.47
1:D:233:ASP:CB	1:D:248:ALA:HB2	2.44	0.47
1:B:27:GLN:C	1:B:29:VAL:H	2.21	0.47
1:A:275:ARG:HB3	1:A:278:VAL:HG23	1.97	0.47
1:C:247:ILE:O	1:C:247:ILE:HG13	2.13	0.47
1:D:26:VAL:HG12	1:D:27:GLN:N	2.30	0.47
1:D:143:GLY:C	1:D:147:ASN:HD22	2.23	0.47
1:B:237:ALA:HB1	1:B:274:TRP:CE2	2.49	0.47
1:B:241:TYR:HA	1:B:269:GLN:O	2.13	0.47
1:C:74:VAL:HG21	1:C:247:ILE:HD11	1.97	0.46
1:C:251:TRP:CD1	1:C:258:PRO:HG3	2.51	0.46
1:D:26:VAL:HG11	1:D:28:GLN:NE2	2.27	0.46
1:A:170:ASN:HD21	2:A:301:MER:C9	2.29	0.46
1:C:178:ARG:O	1:C:180:THR:HG23	2.16	0.46
1:B:169:LEU:HD12	1:B:169:LEU:C	2.41	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:84:SER:HA	1:D:90:ILE:CG2	2.46	0.45
1:D:233:ASP:HB2	1:D:248:ALA:HB2	1.98	0.45
1:B:275:ARG:HB3	1:B:278:VAL:HG23	1.98	0.45
1:C:237:ALA:HA	1:C:243:THR:O	2.16	0.45
1:D:243:THR:HA	1:D:265:PHE:O	2.17	0.45
1:D:170:ASN:HB3	1:D:238:CYS:HB2	1.98	0.45
1:A:52:ALA:HB2	1:A:257:ALA:HB3	1.99	0.45
1:C:28:GLN:CA	1:C:31:LYS:HE2	2.45	0.45
1:C:82:LYS:O	1:C:85:GLU:HB2	2.17	0.45
1:C:136:ASN:OD1	1:C:165:LYS:HB2	2.17	0.45
1:D:106:ASN:HB3	1:D:109:THR:OG1	2.17	0.44
1:B:237:ALA:HA	1:B:243:THR:O	2.16	0.44
1:A:170:ASN:ND2	2:A:301:MER:C9	2.80	0.44
1:A:160:PHE:CD1	1:A:160:PHE:C	2.95	0.44
1:B:160:PHE:C	1:B:160:PHE:CD1	2.96	0.44
2:D:304:MER:H20	2:D:304:MER:H3	1.65	0.44
1:A:237:ALA:HA	1:A:243:THR:O	2.17	0.44
1:A:170:ASN:HB3	1:A:238:CYS:HB2	1.99	0.43
1:D:92:GLN:NE2	3:D:447:HOH:O	2.51	0.43
1:A:48:LEU:HB3	1:A:57:VAL:HB	1.99	0.43
1:A:90:ILE:O	1:A:93:GLN:HB2	2.18	0.43
1:A:276:LYS:HZ1	2:A:301:MER:H21A	1.82	0.43
1:D:126:THR:O	1:D:130:SER:HA	2.17	0.43
1:A:237:ALA:HB1	1:A:274:TRP:CE2	2.53	0.43
1:B:257:ALA:HA	1:B:258:PRO:HD3	1.89	0.43
1:A:106:ASN:ND2	1:A:106:ASN:N	2.66	0.43
1:C:48:LEU:HB3	1:C:57:VAL:HB	2.01	0.43
1:A:222:ARG:HG3	3:A:305:HOH:O	2.19	0.42
1:A:245:ASN:HB3	1:A:264:TYR:CD1	2.55	0.42
1:A:269:GLN:CD	1:A:269:GLN:H	2.26	0.42
1:D:241:TYR:HA	1:D:269:GLN:O	2.19	0.42
1:A:178:ARG:O	1:A:180:THR:HG23	2.20	0.42
1:B:26:VAL:HG23	1:B:26:VAL:O	2.19	0.42
1:A:269:GLN:CD	1:A:269:GLN:N	2.78	0.42
1:B:161:ARG:O	1:B:179:ASP:HA	2.20	0.42
1:D:115:ASN:ND2	1:D:116:THR:N	2.67	0.42
2:B:302:MER:H20	2:B:302:MER:H3	1.80	0.42
1:C:257:ALA:HA	1:C:258:PRO:HD3	1.90	0.42
1:C:73:LYS:HE3	1:C:135:MET:HB2	2.02	0.42
1:C:237:ALA:HB1	1:C:274:TRP:CE2	2.55	0.42
1:A:241:TYR:HA	1:A:269:GLN:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:26:VAL:HG21	1:D:28:GLN:HE21	1.85	0.41
1:D:26:VAL:HG21	1:D:28:GLN:NE2	2.35	0.41
1:D:142:LEU:O	1:D:147:ASN:ND2	2.53	0.41
1:D:143:GLY:C	1:D:147:ASN:ND2	2.78	0.41
1:A:186:MET:O	1:A:186:MET:HE3	2.21	0.41
1:A:256:ARG:HG2	3:A:466:HOH:O	2.21	0.41
1:B:74:VAL:HG21	1:B:247:ILE:HD11	2.03	0.41
1:D:62:ALA:HB1	1:D:184:LEU:HB2	2.02	0.41
1:D:162:LEU:HD12	1:D:162:LEU:HA	1.91	0.41
1:A:241:TYR:CD1	1:A:270:GLN:HA	2.56	0.41
1:D:145:PRO:HD2	3:D:343:HOH:O	2.20	0.41
1:A:257:ALA:HA	1:A:258:PRO:HD3	1.83	0.41
1:C:251:TRP:NE1	1:C:258:PRO:HG3	2.36	0.41
1:A:162:LEU:HD12	1:A:162:LEU:HA	1.90	0.40
1:C:269:GLN:N	1:C:269:GLN:CD	2.80	0.40
1:C:270:GLN:NE2	1:C:271:ASP:N	2.69	0.40
1:A:167:PRO:HD2	1:A:168:GLU:OE2	2.21	0.40
1:D:160:PHE:CD1	1:D:160:PHE:C	2.99	0.40
1:A:103:THR:H	1:A:106:ASN:HD21	1.69	0.40
1:D:222:ARG:HG3	3:D:309:HOH:O	2.22	0.40
1:D:237:ALA:HB1	1:D:274:TRP:CE2	2.57	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	260/262 (99%)	248 (95%)	12 (5%)	0	100	100
1	B	260/262 (99%)	251 (96%)	9 (4%)	0	100	100
1	C	260/262 (99%)	250 (96%)	10 (4%)	0	100	100
1	D	260/262 (99%)	249 (96%)	11 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	1040/1048 (99%)	998 (96%)	42 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	209/209 (100%)	207 (99%)	2 (1%)	68	75
1	B	209/209 (100%)	206 (99%)	3 (1%)	59	66
1	C	209/209 (100%)	204 (98%)	5 (2%)	43	47
1	D	209/209 (100%)	207 (99%)	2 (1%)	68	75
All	All	836/836 (100%)	824 (99%)	12 (1%)	59	66

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	106	ASN
1	A	130	SER
1	B	106	ASN
1	B	233	ASP
1	B	256	ARG
1	C	92	GLN
1	C	115	ASN
1	C	177	GLU
1	C	256	ARG
1	C	270	GLN
1	D	92	GLN
1	D	130	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	28	GLN
1	A	106	ASN
1	A	115	ASN
1	A	170	ASN
1	B	30	GLN
1	B	87	HIS
1	B	92	GLN
1	B	106	ASN
1	B	170	ASN
1	C	93	GLN
1	C	115	ASN
1	C	270	GLN
1	D	28	GLN
1	D	92	GLN
1	D	93	GLN
1	D	115	ASN
1	D	132	ASN
1	D	147	ASN
1	D	170	ASN
1	D	270	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 oligosaccharides 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
2	MER	A	301	1	22,27,27	3.40	9 (40%)	20,39,39	2.81	6 (30%)
2	MER	B	302	1	22,27,27	3.03	9 (40%)	20,39,39	2.91	8 (40%)
2	MER	D	304	1	22,27,27	3.01	9 (40%)	20,39,39	2.88	6 (30%)
2	MER	C	303	1	22,27,27	2.96	9 (40%)	20,39,39	2.76	6 (30%)

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
2	MER	A	301	1	1/1/11/14	11/23/51/51	0/2/2/2
2	MER	B	302	1	1/1/11/14	9/23/51/51	0/2/2/2
2	MER	D	304	1	1/1/11/14	10/23/51/51	0/2/2/2
2	MER	C	303	1	1/1/11/14	7/23/51/51	0/2/2/2

All (36) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	MER	C22-N23	8.89	1.46	1.34
2	B	302	MER	C22-N23	8.72	1.46	1.34
2	D	304	MER	C22-N23	8.69	1.46	1.34
2	C	303	MER	C22-N23	8.35	1.46	1.34
2	A	301	MER	C3-C1	7.93	1.62	1.50
2	A	301	MER	O13-C11	6.74	1.39	1.22
2	D	304	MER	O13-C11	6.52	1.38	1.22
2	C	303	MER	O13-C11	6.38	1.38	1.22
2	B	302	MER	O13-C11	6.27	1.38	1.22
2	B	302	MER	C3-C1	5.51	1.58	1.50
2	D	304	MER	C3-C1	5.13	1.58	1.50
2	C	303	MER	C3-C1	5.05	1.58	1.50
2	A	301	MER	C5-C11	-3.41	1.43	1.48
2	A	301	MER	C17-C22	3.15	1.59	1.53
2	C	303	MER	C20-C18	3.13	1.59	1.53
2	A	301	MER	O8-C7	-3.10	1.34	1.43
2	D	304	MER	C5-C11	-3.04	1.43	1.48
2	C	303	MER	C5-C11	-3.03	1.43	1.48

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	302	MER	C5-C11	-2.94	1.43	1.48
2	B	302	MER	C20-C18	2.92	1.59	1.53
2	D	304	MER	C20-C18	2.90	1.59	1.53
2	B	302	MER	C17-C22	2.85	1.58	1.53
2	B	302	MER	O8-C7	-2.82	1.35	1.43
2	C	303	MER	O8-C7	-2.72	1.35	1.43
2	D	304	MER	C4-N10	-2.65	1.40	1.45
2	D	304	MER	O8-C7	-2.59	1.36	1.43
2	D	304	MER	C17-C22	2.55	1.58	1.53
2	B	302	MER	C4-N10	-2.49	1.41	1.45
2	C	303	MER	C17-C22	2.43	1.57	1.53
2	C	303	MER	C4-N10	-2.32	1.41	1.45
2	A	301	MER	O24-C22	2.26	1.26	1.22
2	C	303	MER	O24-C22	2.21	1.26	1.22
2	A	301	MER	C16-C17	2.20	1.59	1.54
2	A	301	MER	C20-C18	2.17	1.57	1.53
2	D	304	MER	O24-C22	2.10	1.26	1.22
2	B	302	MER	O24-C22	2.06	1.26	1.22

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	302	MER	O24-C22-N23	-9.46	110.11	121.89
2	A	301	MER	O24-C22-N23	-9.17	110.46	121.89
2	D	304	MER	O24-C22-N23	-8.58	111.20	121.89
2	C	303	MER	O24-C22-N23	-8.03	111.89	121.89
2	C	303	MER	O24-C22-C17	-5.90	108.82	119.61
2	D	304	MER	O24-C22-C17	-5.82	108.97	119.61
2	B	302	MER	O24-C22-C17	-5.60	109.37	119.61
2	A	301	MER	O24-C22-C17	-5.46	109.63	119.61
2	C	303	MER	C26-N23-C22	-3.79	108.57	121.89
2	D	304	MER	C26-N23-C22	-3.66	109.03	121.89
2	B	302	MER	C26-N23-C22	-3.55	109.40	121.89
2	D	304	MER	O6-C1-C3	-3.13	117.80	125.27
2	D	304	MER	C11-C5-N10	3.09	124.24	120.41
2	A	301	MER	C26-N23-C22	-3.07	111.10	121.89
2	C	303	MER	O6-C1-C3	-2.78	118.64	125.27
2	B	302	MER	O6-C1-C3	-2.60	119.06	125.27
2	A	301	MER	C18-C4-N10	-2.50	103.14	105.07
2	B	302	MER	C11-C5-N10	2.47	123.47	120.41
2	C	303	MER	C11-C5-N10	2.40	123.38	120.41
2	A	301	MER	O12-C11-O13	-2.35	118.30	123.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	303	MER	O12-C11-O13	-2.23	118.59	123.90
2	B	302	MER	O12-C11-O13	-2.15	118.78	123.90
2	B	302	MER	O12-C11-C5	2.11	120.08	116.73
2	D	304	MER	O12-C11-O13	-2.06	119.00	123.90
2	A	301	MER	C16-C17-N19	-2.04	102.27	106.20
2	B	302	MER	C18-C4-N10	-2.01	103.52	105.07

All (4) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	301	MER	C17
2	B	302	MER	C17
2	C	303	MER	C17
2	D	304	MER	C17

All (37) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	MER	C5-C2-S14-C15
2	A	301	MER	C7-C3-C4-C18
2	A	301	MER	C4-C3-C7-O8
2	A	301	MER	C16-C17-C22-N23
2	A	301	MER	C17-C22-N23-C25
2	A	301	MER	C17-C22-N23-C26
2	A	301	MER	O24-C22-N23-C26
2	B	302	MER	C7-C3-C4-C18
2	B	302	MER	C16-C15-S14-C2
2	B	302	MER	C21-C15-S14-C2
2	B	302	MER	C16-C17-C22-N23
2	B	302	MER	C17-C22-N23-C25
2	B	302	MER	C17-C22-N23-C26
2	B	302	MER	O24-C22-N23-C26
2	C	303	MER	C7-C3-C4-C18
2	C	303	MER	C16-C17-C22-N23
2	C	303	MER	C17-C22-N23-C25
2	C	303	MER	C17-C22-N23-C26
2	C	303	MER	O24-C22-N23-C26
2	D	304	MER	C7-C3-C4-C18
2	D	304	MER	C16-C15-S14-C2
2	D	304	MER	C21-C15-S14-C2
2	D	304	MER	C16-C17-C22-N23
2	D	304	MER	C17-C22-N23-C25

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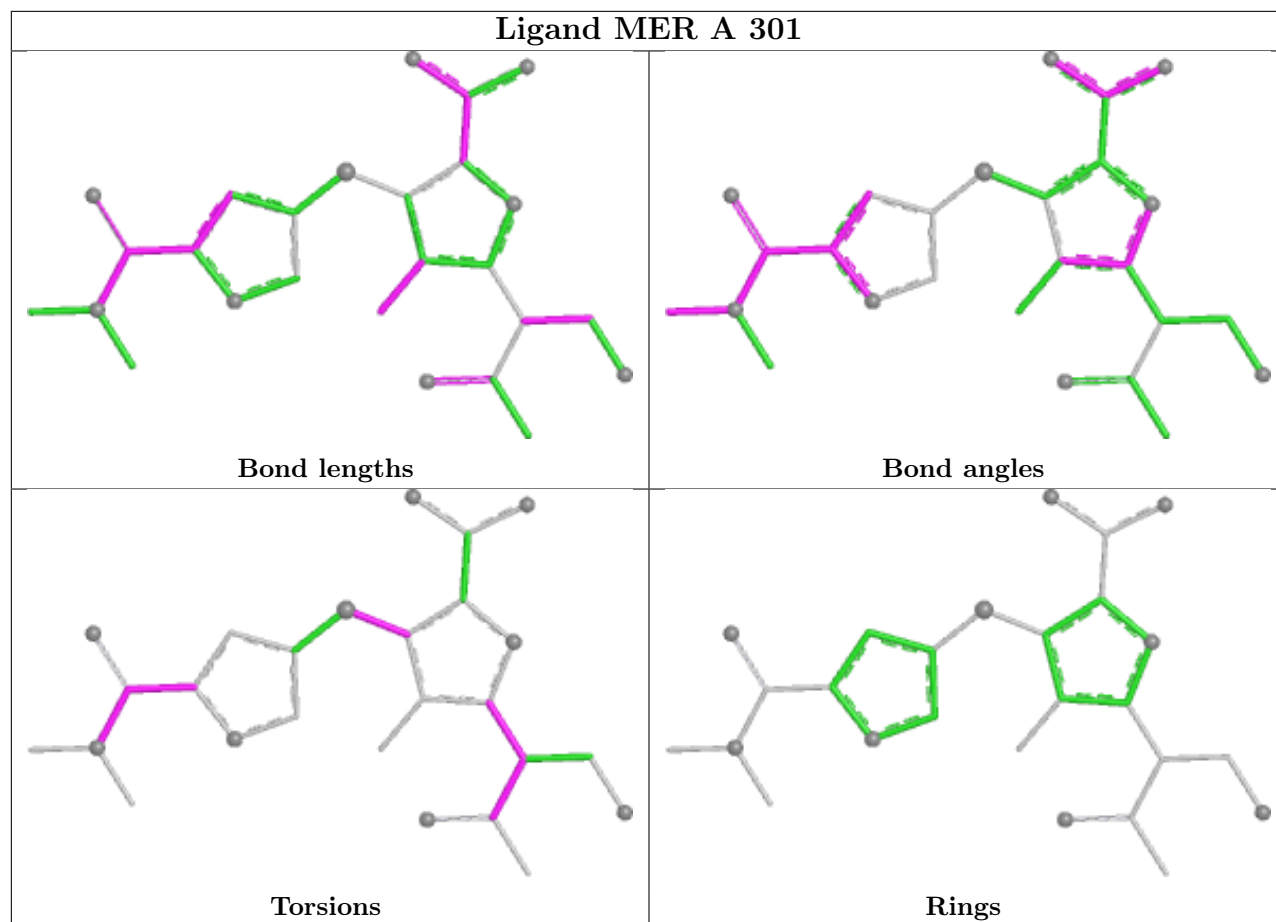
Mol	Chain	Res	Type	Atoms
2	D	304	MER	C17-C22-N23-C26
2	D	304	MER	O24-C22-N23-C26
2	D	304	MER	O24-C22-N23-C25
2	B	302	MER	C16-C17-C22-O24
2	A	301	MER	N19-C17-C22-N23
2	C	303	MER	C16-C17-C22-O24
2	D	304	MER	C16-C17-C22-O24
2	A	301	MER	C16-C17-C22-O24
2	A	301	MER	C1-C3-C7-C9
2	A	301	MER	C4-C3-C7-C9
2	B	302	MER	N19-C17-C22-N23
2	C	303	MER	N19-C17-C22-N23
2	D	304	MER	N19-C17-C22-N23

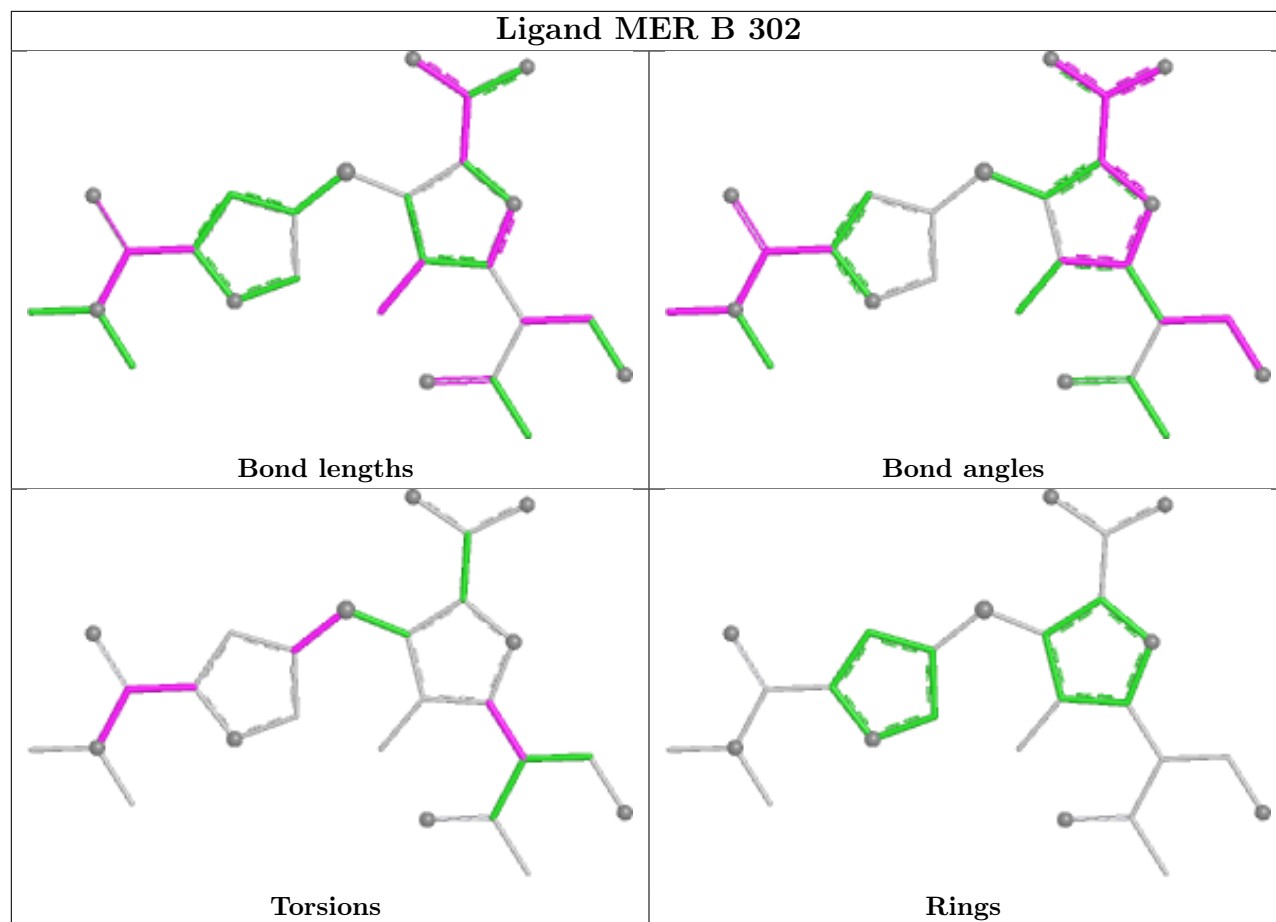
There are no ring outliers.

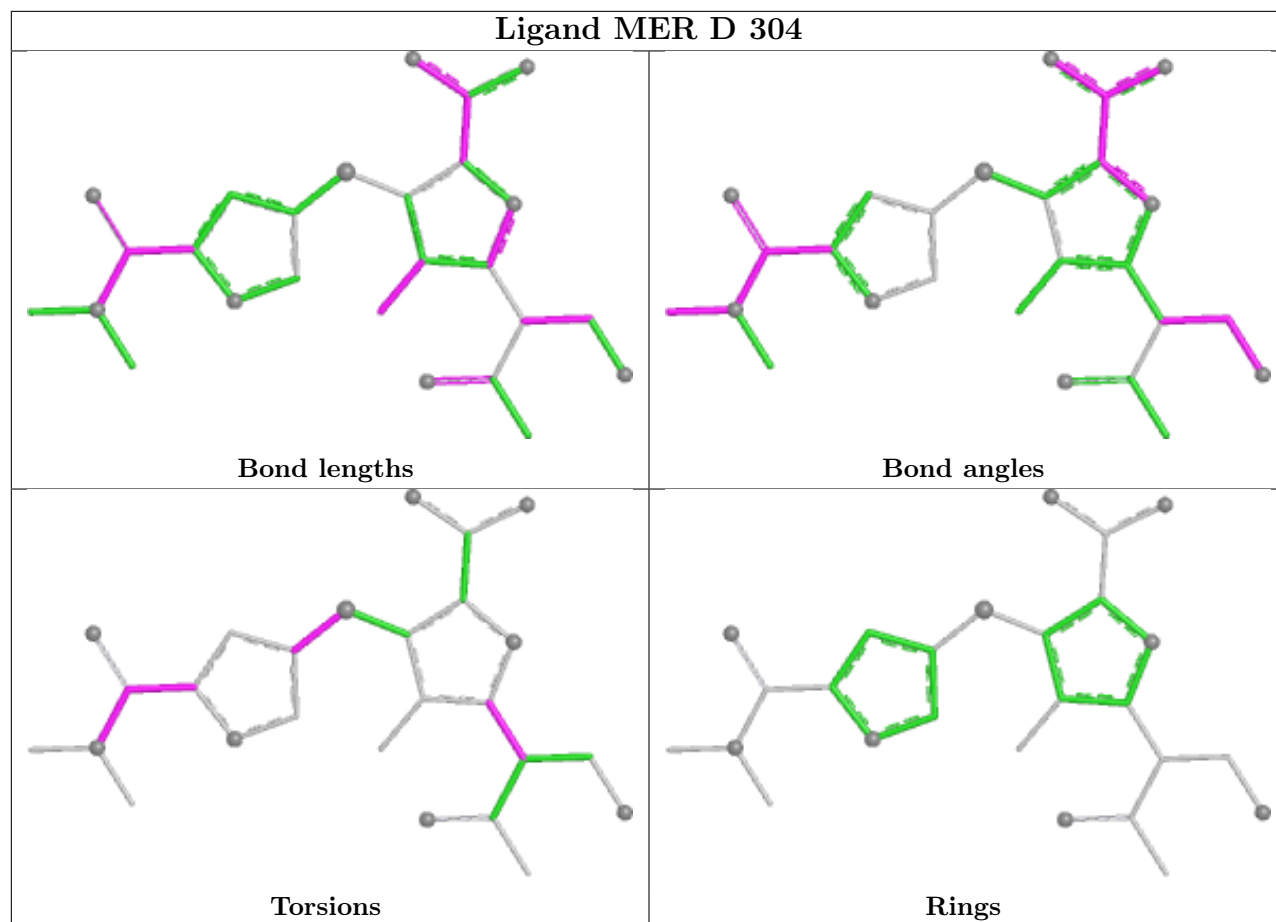
4 monomers are involved in 17 short contacts:

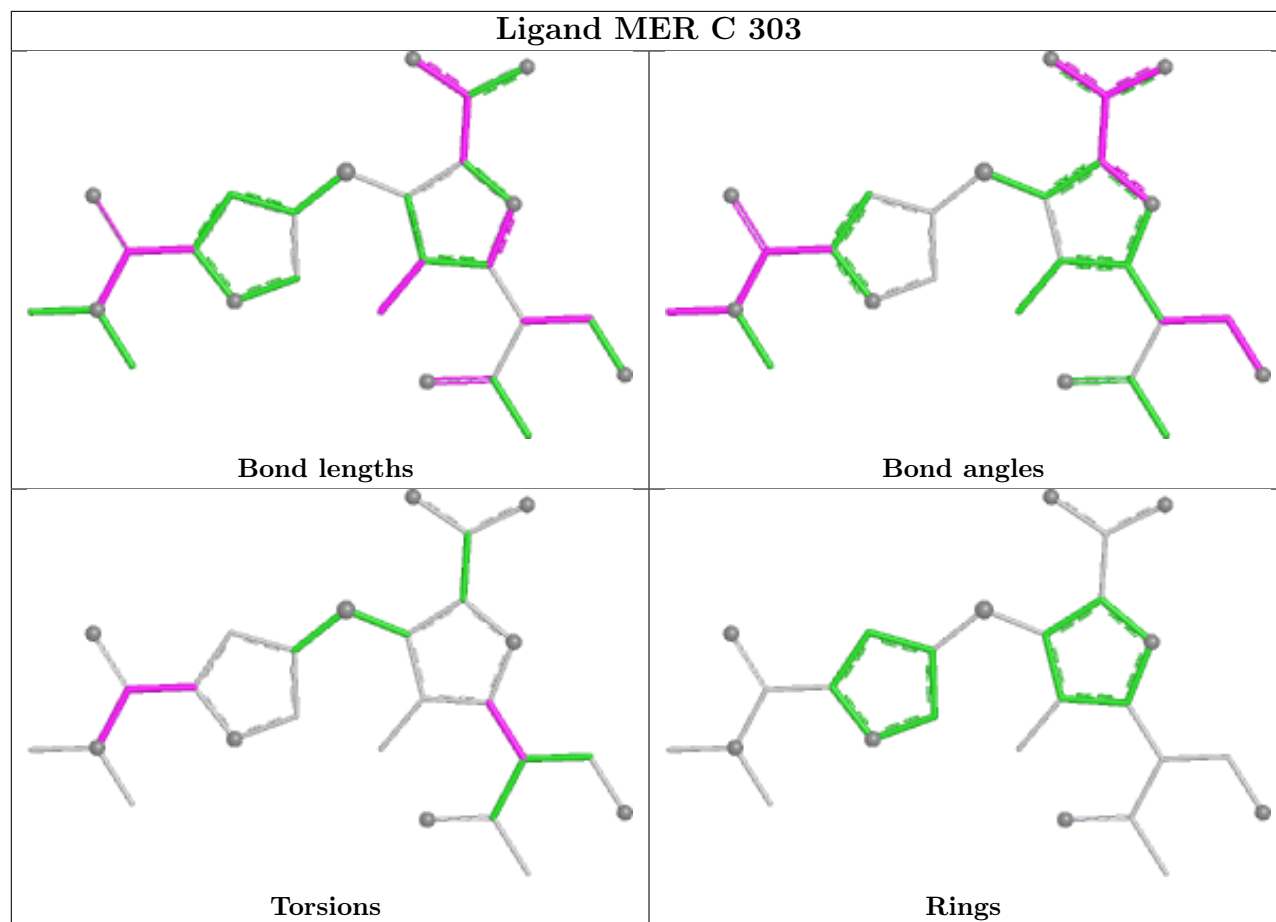
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	301	MER	8	0
2	B	302	MER	4	0
2	D	304	MER	3	0
2	C	303	MER	2	0

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	262/262 (100%)	-0.18	8 (3%) 51 50	11, 18, 41, 69	0
1	B	262/262 (100%)	-0.28	4 (1%) 72 71	9, 17, 39, 68	0
1	C	262/262 (100%)	-0.15	8 (3%) 51 50	10, 19, 42, 68	0
1	D	262/262 (100%)	-0.29	6 (2%) 61 60	10, 17, 36, 64	0
All	All	1048/1048 (100%)	-0.23	26 (2%) 58 58	9, 18, 40, 69	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	26	VAL	6.0
1	A	26	VAL	5.8
1	C	26	VAL	5.3
1	D	26	VAL	4.9
1	B	28	GLN	4.1
1	B	27	GLN	3.8
1	C	99	LYS	3.0
1	A	100	ALA	2.8
1	B	31	LYS	2.7
1	D	28	GLN	2.6
1	C	113	VAL	2.5
1	A	270	GLN	2.4
1	D	98	LYS	2.3
1	C	28	GLN	2.3
1	D	88	ASP	2.2
1	A	27	GLN	2.2
1	A	28	GLN	2.2
1	C	97	ILE	2.2
1	A	29	VAL	2.1
1	A	115	ASN	2.1
1	D	27	GLN	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	113	VAL	2.1
1	C	31	LYS	2.1
1	C	98	LYS	2.1
1	C	27	GLN	2.0
1	D	86	THR	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

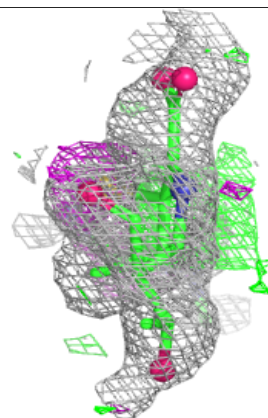
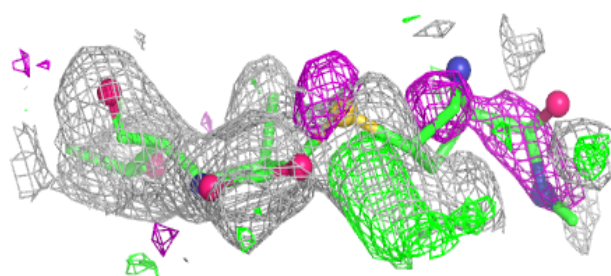
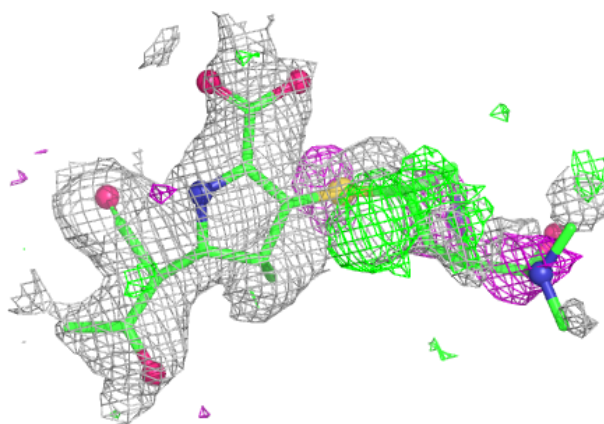
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	MER	A	301	26/26	0.62	0.25	35,53,72,73	0
2	MER	C	303	26/26	0.69	0.24	42,59,82,82	0
2	MER	B	302	26/26	0.74	0.24	35,54,74,76	0
2	MER	D	304	26/26	0.79	0.19	33,49,73,74	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.

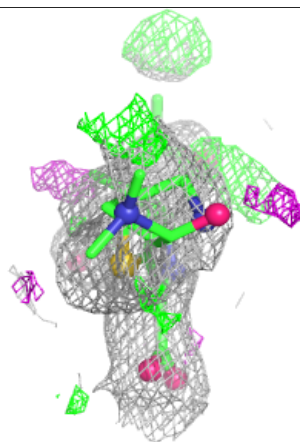
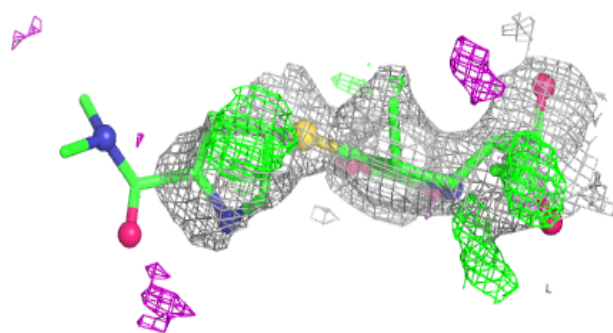
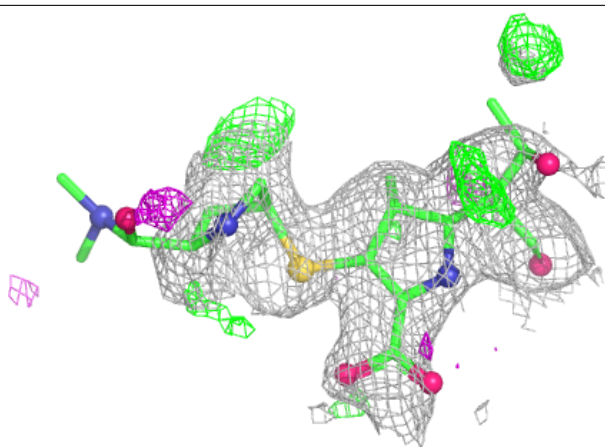
Electron density around MER A 301:

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



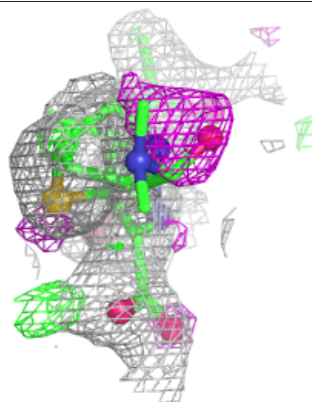
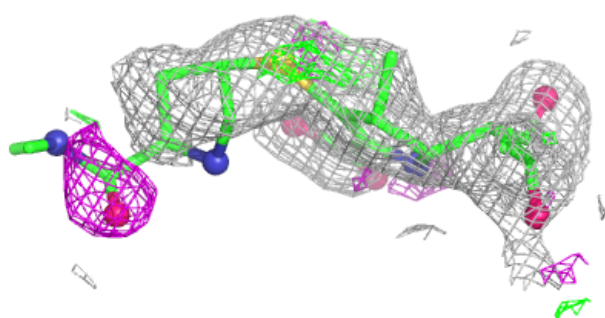
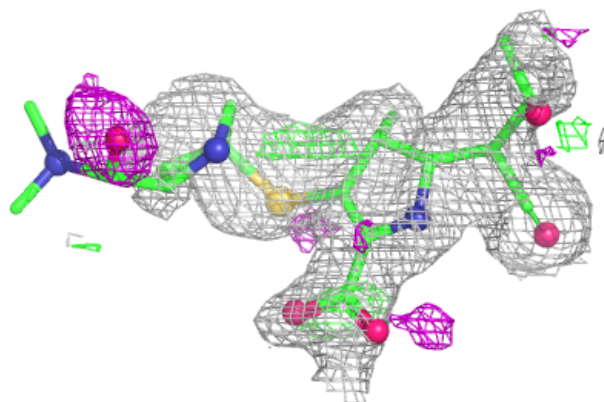
Electron density around MER C 303:

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

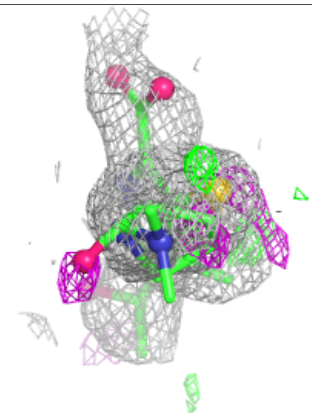
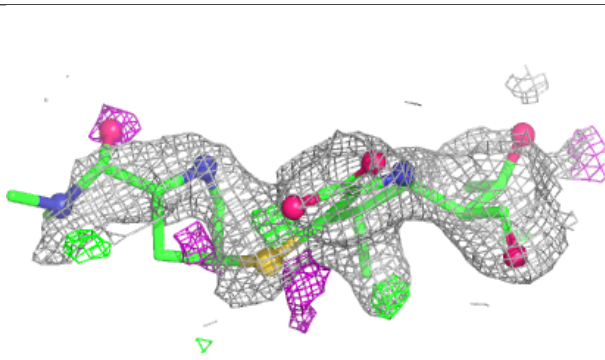
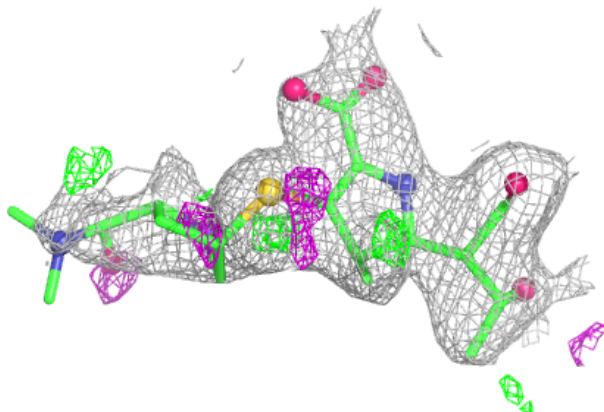


Electron density around MER B 302:

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

**Electron density around MER D 304:**

$2mF_o-DF_c$ (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.