



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2026 – 01:41 PM UTC

PDB ID : 3DV1 / pdb_00003dv1
Title : Crystal structure of human beta-secretase in complex with NVP-ARV999
Authors : Rondeau, J.-M.
Deposited on : 2008-07-18
Resolution : 2.10 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

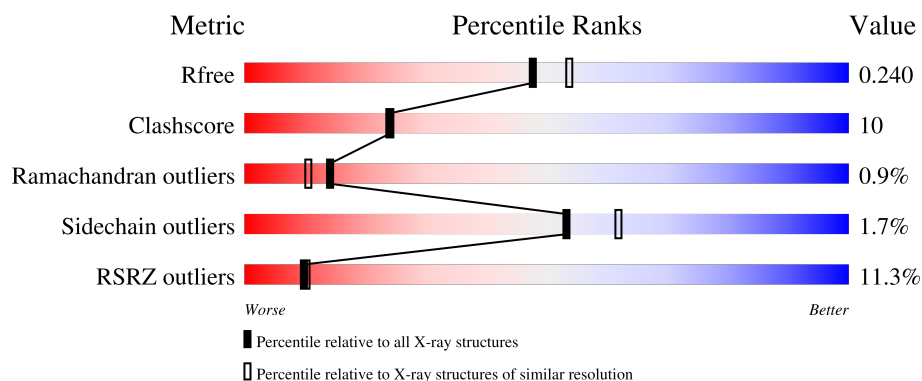
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

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	402	7% 73% 19% • 6%
1	B	402	14% 73% 18% • 6%
1	C	402	11% 72% 20% • 5%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 9552 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.

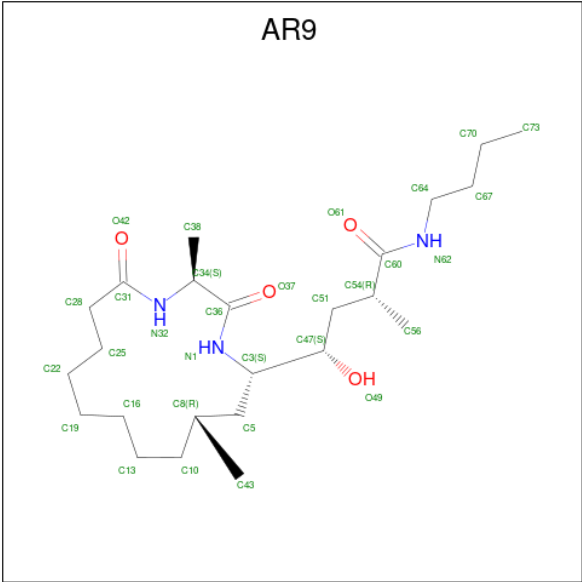
- Molecule 1 is a protein called Beta-secretase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	377	Total	C	N	O	S	0	0	0
			2966	1898	493	561	14			
1	B	378	Total	C	N	O	S	0	0	0
			2975	1904	494	563	14			
1	C	381	Total	C	N	O	S	0	0	0
			2993	1917	497	565	14			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	33P	GLY	-	expression tag	UNP P56817
A	34P	PRO	-	expression tag	UNP P56817
B	33P	GLY	-	expression tag	UNP P56817
B	34P	PRO	-	expression tag	UNP P56817
C	33P	GLY	-	expression tag	UNP P56817
C	34P	PRO	-	expression tag	UNP P56817

- Molecule 2 is (2R,4S)-N-butyl-4-[(2S,5S,7R)-2,7-dimethyl-3,15-dioxo-1,4-diazacyclopentadecan-5-yl]-4-hydroxy-2-methylbutanamide (CCD ID: AR9) (formula: C₂₄H₄₅N₃O₄).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			31	24	3	4		
2	B	1	Total	C	N	O	0	0
			31	24	3	4		
2	C	1	Total	C	N	O	0	0
			31	24	3	4		

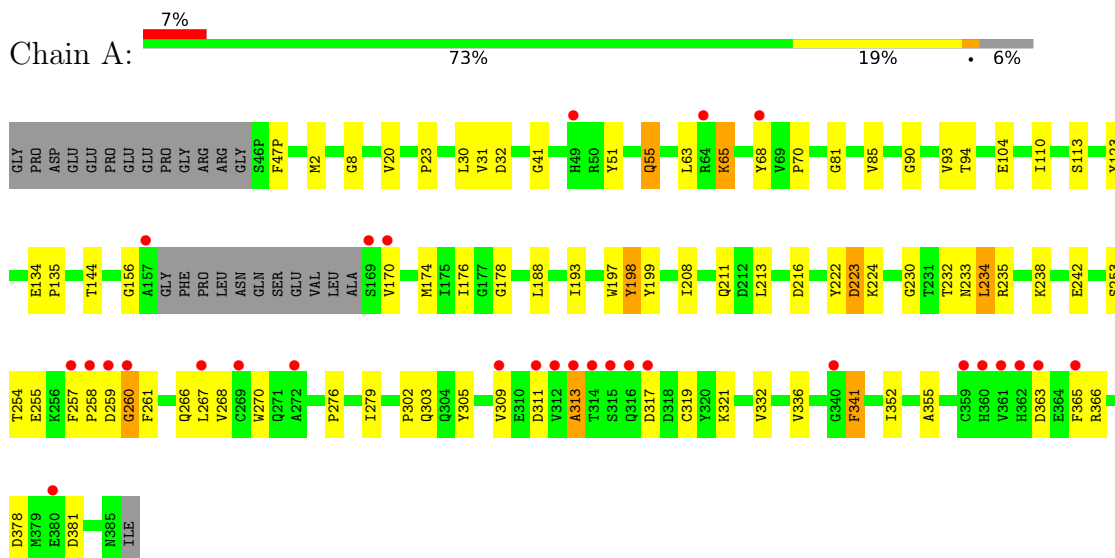
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	170	Total	O	0	0
			170	170		
3	B	164	Total	O	0	0
			164	164		
3	C	191	Total	O	0	0
			191	191		

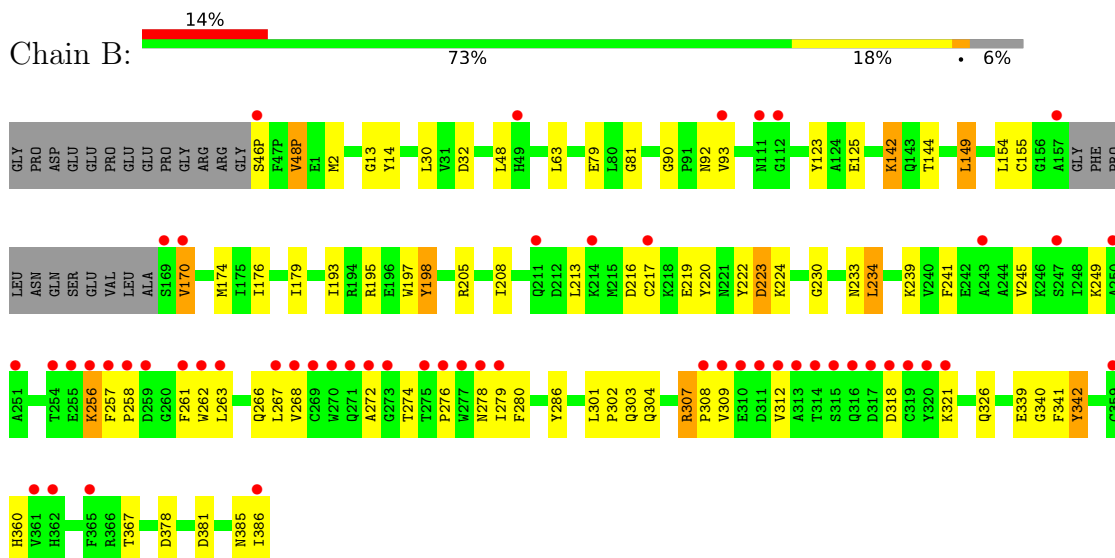
3 Residue-property plots

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.

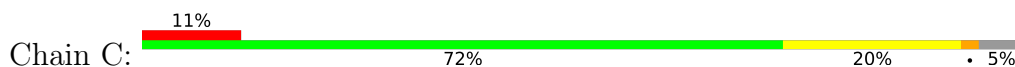
• Molecule 1: Beta-secretase 1

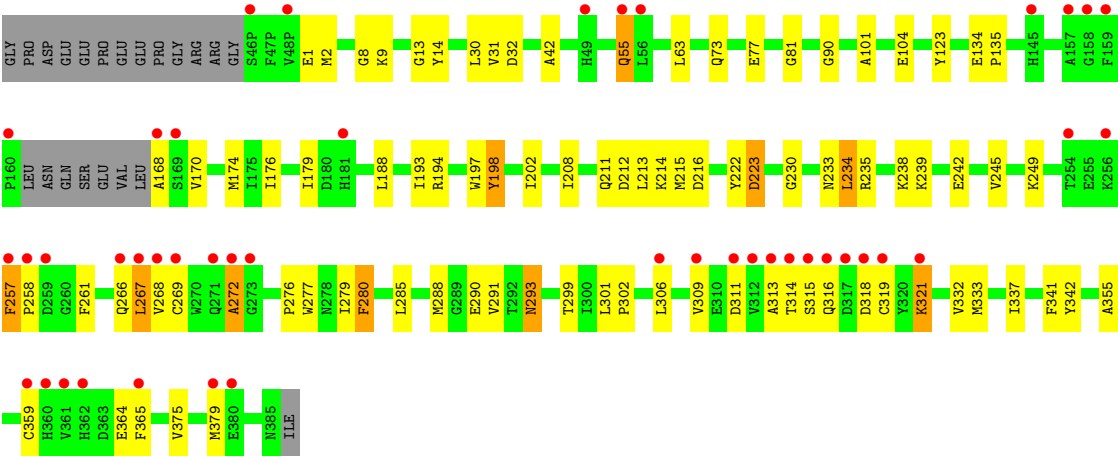


• Molecule 1: Beta-secretase 1



• Molecule 1: Beta-secretase 1





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	82.03Å 102.94Å 99.92Å 90.00° 103.66° 90.00°	Depositor
Resolution (Å)	55.52 – 2.10 55.52 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.4 (55.52-2.10) 99.5 (55.52-2.10)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.16 (at 2.10Å)	Xtriage
Refinement program	CNS, CNX	Depositor
R, R_{free}	0.207 , 0.241 0.207 , 0.240	Depositor DCC
R_{free} test set	9307 reflections (9.99%)	wwPDB-VP
Wilson B-factor (Å ²)	40.6	Xtriage
Anisotropy	0.204	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 38.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9552	wwPDB-VP
Average B, all atoms (Å ²)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.39% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: AR9

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	0.33	0/3041	0.92	10/4133 (0.2%)
1	B	0.33	0/3050	0.92	13/4144 (0.3%)
1	C	0.34	0/3070	0.94	12/4173 (0.3%)
All	All	0.34	0/9161	0.92	35/12450 (0.3%)

There are no bond length outliers.

All (35) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	260	GLY	N-CA-C	-10.52	103.10	114.67
1	C	198	TYR	N-CA-C	-9.12	97.37	110.59
1	B	198	TYR	N-CA-C	-8.58	97.06	110.36
1	A	198	TYR	N-CA-C	-8.49	98.28	110.59
1	C	234	LEU	N-CA-C	-7.92	96.36	108.96
1	A	234	LEU	N-CA-C	-7.40	95.54	108.20
1	B	216	ASP	N-CA-C	-6.51	100.39	110.10
1	C	293	ASN	N-CA-C	-6.46	104.71	112.59
1	C	290	GLU	N-CA-C	-6.34	104.42	111.71
1	C	233	ASN	N-CA-C	6.33	118.69	110.53
1	B	341	PHE	N-CA-C	6.21	118.39	109.14
1	A	341	PHE	N-CA-C	6.19	118.19	108.96
1	B	193	ILE	N-CA-C	-6.13	98.72	107.98
1	B	342	TYR	N-CA-C	-6.12	98.75	108.73
1	B	234	LEU	N-CA-C	-5.91	96.75	107.75
1	C	291	VAL	N-CA-C	-5.91	99.83	108.11
1	C	193	ILE	N-CA-C	-5.86	98.59	107.73
1	C	216	ASP	N-CA-C	-5.71	101.46	109.96
1	C	123	TYR	N-CA-C	5.60	118.81	110.52
1	A	23	PRO	CA-C-N	5.60	125.92	119.93
1	A	23	PRO	C-N-CA	5.60	125.92	119.93

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	193	ILE	N-CA-C	-5.58	99.56	107.98
1	B	123	TYR	N-CA-C	5.43	118.56	110.52
1	B	280	PHE	CA-C-N	5.42	125.40	120.03
1	B	280	PHE	C-N-CA	5.42	125.40	120.03
1	C	13	GLY	N-CA-C	5.42	119.04	112.48
1	C	280	PHE	CA-C-N	5.42	125.32	119.85
1	C	280	PHE	C-N-CA	5.42	125.32	119.85
1	A	123	TYR	N-CA-C	5.42	118.53	110.52
1	A	233	ASN	N-CA-C	5.38	118.39	110.59
1	B	307	ARG	CA-C-N	5.28	125.20	119.76
1	B	307	ARG	C-N-CA	5.28	125.20	119.76
1	B	278	ASN	N-CA-C	5.23	116.98	111.28
1	A	216	ASP	N-CA-C	-5.09	102.51	110.10
1	B	233	ASN	N-CA-C	5.04	117.90	110.59

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2966	0	2875	62	0
1	B	2975	0	2886	59	0
1	C	2993	0	2899	60	0
2	A	31	0	45	3	0
2	B	31	0	45	1	0
2	C	31	0	45	1	0
3	A	170	0	0	1	0
3	B	164	0	0	1	0
3	C	191	0	0	3	0
All	All	9552	0	8795	179	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 10.

All (179) 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:55:GLN:NE2	1:A:55:GLN:H	1.65	0.95
1:A:104:GLU:HB3	1:B:48(P):VAL:HG21	1.54	0.90
1:A:174:MET:HE3	1:A:176:ILE:HD11	1.61	0.82
1:B:301:LEU:H	1:B:304:GLN:NE2	1.77	0.82
1:A:55:GLN:H	1:A:55:GLN:HE21	1.26	0.81
1:B:258:PRO:HG3	1:B:266:GLN:NE2	1.96	0.81
1:B:208:ILE:HG12	1:B:213:LEU:HD11	1.66	0.78
1:C:267:LEU:HD23	1:C:267:LEU:H	1.48	0.77
1:B:174:MET:HE3	1:B:176:ILE:HD11	1.66	0.76
1:B:267:LEU:H	1:B:267:LEU:HD23	1.50	0.76
1:C:55:GLN:NE2	1:C:55:GLN:H	1.83	0.76
1:C:174:MET:HE3	1:C:176:ILE:HD11	1.69	0.74
1:B:301:LEU:H	1:B:304:GLN:HE21	1.35	0.73
1:B:309:VAL:HG21	1:B:321:LYS:HG3	1.68	0.73
1:A:104:GLU:HB3	1:B:48(P):VAL:CG2	2.20	0.71
1:A:303:GLN:NE2	1:A:363:ASP:HB3	2.08	0.69
1:A:104:GLU:OE1	1:B:46(P):SER:HA	1.94	0.67
1:A:267:LEU:HD13	1:A:319:CYS:HB3	1.75	0.67
1:B:272:ALA:HA	1:B:318:ASP:OD1	1.94	0.67
1:C:267:LEU:HD12	1:C:319:CYS:HB3	1.77	0.66
1:B:267:LEU:HB3	1:B:321:LYS:HG2	1.77	0.66
1:B:149:LEU:HD12	1:B:149:LEU:C	2.21	0.65
1:A:303:GLN:HE22	1:A:363:ASP:HB3	1.61	0.64
1:C:194:ARG:HD2	1:C:202:ILE:HD11	1.80	0.64
1:B:125:GLU:OE2	1:B:195:ARG:NH1	2.33	0.62
1:B:301:LEU:HB3	1:B:302:PRO:HD2	1.81	0.62
1:A:65:LYS:HB2	1:A:65:LYS:NZ	2.15	0.62
1:B:241:PHE:O	1:B:245:VAL:HG23	2.00	0.61
1:C:272:ALA:HA	1:C:318:ASP:OD2	2.01	0.61
1:B:222:TYR:O	1:B:223:ASP:CB	2.49	0.61
1:B:256:LYS:N	1:B:256:LYS:HD2	2.16	0.61
1:C:267:LEU:HD13	1:C:309:VAL:HG21	1.81	0.61
1:A:276:PRO:O	1:A:279:ILE:HG12	2.00	0.61
1:C:272:ALA:HB2	1:C:316:GLN:O	2.00	0.61
1:A:261:PHE:CD1	1:A:268:VAL:HG23	2.36	0.60
1:B:276:PRO:O	1:B:279:ILE:HG12	2.03	0.59
1:A:366:ARG:HA	1:C:211:GLN:HE22	1.67	0.59
1:B:219:GLU:OE1	1:B:239:LYS:HD2	2.02	0.58
1:A:197:TRP:CG	1:A:198:TYR:H	2.21	0.58
1:A:8:GLY:C	1:A:170:VAL:HG22	2.28	0.58
1:C:321:LYS:HB2	1:C:321:LYS:NZ	2.18	0.58
1:A:32:ASP:OD1	1:A:230:GLY:HA3	2.03	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:2:MET:HG2	1:B:90:GLY:HA2	1.85	0.58
1:C:211:GLN:HB2	3:C:648:HOH:O	2.03	0.57
1:B:257:PHE:HD2	1:B:268:VAL:HG11	1.69	0.57
1:A:55:GLN:HE21	1:A:55:GLN:N	2.01	0.57
1:C:197:TRP:CG	1:C:198:TYR:H	2.23	0.57
1:A:222:TYR:O	1:A:223:ASP:CB	2.53	0.56
1:B:258:PRO:HG3	1:B:266:GLN:HE22	1.71	0.56
1:A:208:ILE:HG13	1:A:213:LEU:HD11	1.88	0.56
1:A:65:LYS:HB2	1:A:65:LYS:HZ2	1.71	0.55
1:A:68:TYR:OH	1:A:70:PRO:HB3	2.06	0.55
1:C:2:MET:HG2	1:C:90:GLY:HA2	1.89	0.55
1:C:32:ASP:OD1	1:C:230:GLY:HA3	2.06	0.55
1:C:238:LYS:O	1:C:242:GLU:HG3	2.06	0.55
1:C:261:PHE:HA	1:C:266:GLN:O	2.06	0.54
1:B:249:LYS:HD3	1:B:262:TRP:NE1	2.22	0.54
1:C:333:MET:HE2	1:C:337:ILE:HG21	1.89	0.54
1:B:301:LEU:HD11	1:B:367:THR:HA	1.90	0.54
1:A:93:VAL:HG21	1:A:144:THR:CG2	2.38	0.53
1:B:197:TRP:CG	1:B:198:TYR:H	2.26	0.53
1:A:2:MET:HG2	1:A:90:GLY:HA2	1.91	0.53
1:B:142:LYS:HB2	1:B:142:LYS:NZ	2.24	0.52
1:A:222:TYR:O	1:A:223:ASP:HB3	2.08	0.52
1:B:32:ASP:OD1	1:B:230:GLY:HA3	2.10	0.52
1:A:238:LYS:O	1:A:242:GLU:HG3	2.10	0.52
1:B:93:VAL:HG21	1:B:144:THR:CG2	2.40	0.52
1:A:63:LEU:HG	1:A:81:GLY:HA2	1.90	0.52
1:A:253:SER:C	1:A:255:GLU:H	2.17	0.52
1:C:288:MET:HE1	1:C:379:MET:CG	2.41	0.51
1:C:293:ASN:HA	1:C:375:VAL:HA	1.92	0.51
1:C:288:MET:HE1	1:C:379:MET:HG3	1.93	0.51
1:B:385:ASN:O	1:B:386:ILE:C	2.53	0.50
1:C:63:LEU:HG	1:C:81:GLY:HA2	1.94	0.50
1:B:13:GLY:HA3	1:B:30:LEU:HD11	1.93	0.50
1:B:14:TYR:CE2	1:B:170:VAL:HG13	2.46	0.50
1:C:267:LEU:HD23	1:C:267:LEU:N	2.23	0.50
1:B:179:ILE:HG23	1:B:342:TYR:HE2	1.77	0.49
1:C:1:GLU:HG2	3:C:665:HOH:O	2.13	0.49
1:A:198:TYR:CE2	1:A:224:LYS:HE3	2.48	0.49
1:C:222:TYR:O	1:C:223:ASP:CB	2.60	0.49
1:C:269:CYS:HA	1:C:318:ASP:O	2.13	0.48
1:C:268:VAL:O	1:C:319:CYS:HA	2.13	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:285:LEU:CD1	1:C:333:MET:HE3	2.43	0.48
1:B:301:LEU:N	1:B:304:GLN:HE21	2.08	0.48
1:C:55:GLN:H	1:C:55:GLN:CD	2.20	0.48
1:C:276:PRO:O	1:C:279:ILE:HG12	2.13	0.48
1:A:255:GLU:HG3	1:A:279:ILE:CD1	2.44	0.48
1:A:257:PHE:HD2	1:A:268:VAL:HG21	1.78	0.48
1:A:267:LEU:HD12	1:A:267:LEU:O	2.13	0.47
1:C:8:GLY:O	1:C:170:VAL:HG22	2.14	0.47
1:A:197:TRP:CD1	1:A:198:TYR:H	2.33	0.47
1:B:155:CYS:O	1:B:170:VAL:HG22	2.14	0.47
1:B:205:ARG:HB3	1:B:286:TYR:HB2	1.96	0.47
1:B:272:ALA:O	1:B:274:THR:HG23	2.15	0.47
1:B:378:ASP:HB3	1:B:381:ASP:OD2	2.14	0.47
1:B:154:LEU:O	1:B:339:GLU:HA	2.15	0.47
1:A:258:PRO:C	1:A:260:GLY:H	2.22	0.46
1:C:197:TRP:CD1	1:C:198:TYR:H	2.33	0.46
1:B:307:ARG:HA	1:B:308:PRO:HD3	1.78	0.46
1:B:241:PHE:CD2	1:B:326:GLN:HB3	2.50	0.46
1:C:337:ILE:O	1:C:341:PHE:HD1	1.98	0.46
1:C:212:ASP:O	1:C:214:LYS:HG3	2.15	0.46
1:A:378:ASP:HB3	1:A:381:ASP:OD2	2.15	0.45
1:A:93:VAL:HG22	1:A:94:THR:N	2.31	0.45
1:C:188:LEU:HD23	1:C:355:ALA:HB2	1.99	0.45
1:A:188:LEU:HD23	1:A:355:ALA:HB2	1.98	0.45
1:A:30:LEU:HD13	2:A:501:AR9:H13	1.99	0.45
2:A:501:AR9:H16	2:A:501:AR9:H25	1.71	0.45
1:B:63:LEU:HG	1:B:81:GLY:HA2	1.99	0.45
1:B:92:ASN:C	1:B:92:ASN:HD22	2.25	0.45
1:B:149:LEU:C	1:B:149:LEU:CD1	2.89	0.45
1:A:267:LEU:HD12	1:A:267:LEU:C	2.41	0.45
1:A:110:ILE:HB	1:A:113:SER:HB3	1.99	0.44
1:A:311:ASP:OD1	1:A:313:ALA:HB3	2.17	0.44
2:B:501:AR9:H25	2:B:501:AR9:H16	1.72	0.44
1:A:8:GLY:O	1:A:170:VAL:HG22	2.17	0.44
1:A:134:GLU:HA	1:A:135:PRO:HD3	1.86	0.44
1:C:235:ARG:HB2	1:C:332:VAL:HB	1.98	0.44
1:B:79:GLU:HG3	3:B:777:HOH:O	2.16	0.44
1:C:364:GLU:HG3	1:C:365:PHE:CD1	2.53	0.44
1:A:232:THR:O	1:A:336:VAL:HG23	2.18	0.44
1:B:267:LEU:HD23	1:B:267:LEU:N	2.25	0.44
1:C:267:LEU:HD13	1:C:309:VAL:CG2	2.46	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:321:LYS:HB2	1:C:321:LYS:HZ3	1.82	0.44
1:A:41:GLY:O	1:A:51:TYR:HB2	2.18	0.43
1:B:142:LYS:HB2	1:B:142:LYS:HZ2	1.83	0.43
1:C:301:LEU:HB3	1:C:302:PRO:HD2	1.99	0.43
1:B:309:VAL:CG2	1:B:321:LYS:HG3	2.45	0.43
1:C:364:GLU:HG3	1:C:365:PHE:CE1	2.53	0.43
1:B:261:PHE:HA	1:B:266:GLN:O	2.19	0.43
1:A:31:VAL:HG23	1:A:31:VAL:O	2.17	0.43
1:C:208:ILE:HG13	1:C:213:LEU:HD21	2.01	0.43
1:A:197:TRP:CG	1:A:198:TYR:N	2.87	0.43
1:A:270:TRP:O	1:A:317:ASP:HB3	2.19	0.43
1:C:299:THR:HG21	3:C:649:HOH:O	2.18	0.43
1:B:93:VAL:HG11	1:B:144:THR:HG21	2.01	0.42
1:B:257:PHE:CD2	1:B:268:VAL:HG11	2.52	0.42
1:C:179:ILE:HG23	1:C:342:TYR:HE2	1.84	0.42
1:C:277:TRP:HZ3	1:C:306:LEU:HD12	1.84	0.42
1:C:285:LEU:HD13	1:C:333:MET:HE3	2.00	0.42
1:C:359:CYS:SG	1:C:359:CYS:O	2.77	0.42
1:A:341:PHE:HB3	1:A:355:ALA:O	2.19	0.42
1:C:9:LYS:HZ3	1:C:168:ALA:N	2.17	0.42
1:C:134:GLU:HA	1:C:135:PRO:HD3	1.86	0.42
1:A:261:PHE:HA	1:A:266:GLN:O	2.20	0.42
1:C:258:PRO:O	1:C:261:PHE:HB3	2.19	0.42
1:A:365:PHE:CD1	1:A:366:ARG:HG3	2.54	0.42
1:C:257:PHE:CD1	1:C:257:PHE:N	2.87	0.42
1:A:211:GLN:HB2	3:A:664:HOH:O	2.19	0.42
1:B:302:PRO:HG2	1:B:303:GLN:OE1	2.19	0.42
1:C:215:MET:CE	1:C:239:LYS:HG2	2.49	0.42
1:C:42:ALA:CB	1:C:101:ALA:HB1	2.49	0.42
1:A:30:LEU:CD1	2:A:501:AR9:H13	2.50	0.42
1:A:257:PHE:C	1:A:259:ASP:H	2.27	0.42
1:C:55:GLN:NE2	1:C:55:GLN:N	2.59	0.42
1:C:73:GLN:HG3	2:C:501:AR9:H38A	2.00	0.41
1:B:261:PHE:C	1:B:263:LEU:H	2.29	0.41
1:B:197:TRP:CD1	1:B:198:TYR:H	2.38	0.41
1:B:223:ASP:OD2	1:B:224:LYS:NZ	2.48	0.41
1:C:14:TYR:O	1:C:31:VAL:HG22	2.20	0.41
1:A:55:GLN:NE2	1:A:55:GLN:N	2.48	0.41
1:A:268:VAL:O	1:A:319:CYS:HA	2.21	0.41
1:A:302:PRO:HA	1:A:305:TYR:CE2	2.55	0.41
1:A:20:VAL:HG22	1:A:85:VAL:HG22	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:197:TRP:CG	1:C:198:TYR:N	2.89	0.41
1:A:235:ARG:HB2	1:A:332:VAL:HB	2.03	0.41
1:A:363:ASP:OD2	1:A:366:ARG:O	2.39	0.41
1:B:261:PHE:CD1	1:B:268:VAL:HG13	2.56	0.41
1:B:222:TYR:O	1:B:223:ASP:HB3	2.17	0.41
1:C:245:VAL:CG1	1:C:249:LYS:HE3	2.50	0.41
1:C:280:PHE:HB3	1:C:302:PRO:HB3	2.03	0.41
1:A:309:VAL:HG21	1:A:321:LYS:HG3	2.02	0.40
1:C:77:GLU:HB2	1:C:104:GLU:HG3	2.02	0.40
1:B:217:CYS:HA	1:B:220:TYR:CD1	2.56	0.40
1:B:340:GLY:HA2	1:B:360:HIS:HB2	2.03	0.40
1:A:47(P):PHE:CZ	1:A:178:GLY:HA3	2.56	0.40
1:A:199:TYR:HB3	1:A:352:ILE:HD11	2.03	0.40
1:C:311:ASP:OD1	1:C:315:SER:OG	2.39	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	373/402 (93%)	352 (94%)	17 (5%)	4 (1%)	11	8
1	B	374/402 (93%)	352 (94%)	20 (5%)	2 (0%)	24	22
1	C	377/402 (94%)	363 (96%)	10 (3%)	4 (1%)	11	8
All	All	1124/1206 (93%)	1067 (95%)	47 (4%)	10 (1%)	14	10

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	223	ASP
1	A	313	ALA
1	B	223	ASP

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Mol	Chain	Res	Type
1	C	223	ASP
1	A	254	THR
1	B	312	VAL
1	C	272	ALA
1	C	313	ALA
1	C	314	THR
1	A	156	GLY

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	322/342 (94%)	319 (99%)	3 (1%)	70	78
1	B	323/342 (94%)	316 (98%)	7 (2%)	45	53
1	C	324/342 (95%)	318 (98%)	6 (2%)	50	58
All	All	969/1026 (94%)	953 (98%)	16 (2%)	53	62

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	55	GLN
1	A	65	LYS
1	A	234	LEU
1	B	48(P)	VAL
1	B	48	LEU
1	B	142	LYS
1	B	149	LEU
1	B	170	VAL
1	B	234	LEU
1	B	256	LYS
1	C	30	LEU
1	C	55	GLN
1	C	234	LEU
1	C	257	PHE
1	C	267	LEU

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Mol	Chain	Res	Type
1	C	321	LYS

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	55	GLN
1	A	89	HIS
1	A	98	ASN
1	A	114	ASN
1	A	326	GLN
1	B	89	HIS
1	B	92	ASN
1	B	114	ASN
1	B	233	ASN
1	B	266	GLN
1	B	293	ASN
1	B	304	GLN
1	C	55	GLN
1	C	73	GLN
1	C	89	HIS
1	C	114	ASN
1	C	233	ASN
1	C	271	GLN
1	C	278	ASN
1	C	294	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

3 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	AR9	C	501	-	31,31,31	0.80	1 (3%)	37,39,39	1.37	5 (13%)
2	AR9	A	501	-	31,31,31	0.81	1 (3%)	37,39,39	1.38	6 (16%)
2	AR9	B	501	-	31,31,31	0.75	0	37,39,39	1.34	4 (10%)

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	AR9	C	501	-	-	9/43/43/43	0/0/1/1
2	AR9	A	501	-	-	9/43/43/43	0/0/1/1
2	AR9	B	501	-	-	9/43/43/43	0/0/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	AR9	C5-C3	2.36	1.56	1.53
2	C	501	AR9	C5-C3	2.20	1.56	1.53

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	AR9	C8-C5-C3	-3.65	108.36	115.56
2	C	501	AR9	C8-C5-C3	-3.39	108.87	115.56
2	B	501	AR9	C8-C5-C3	-3.34	108.97	115.56
2	B	501	AR9	C56-C54-C60	-3.12	103.90	109.64
2	A	501	AR9	C5-C3-N1	-2.84	106.56	110.20
2	C	501	AR9	C56-C54-C60	-2.70	104.68	109.64

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	AR9	C56-C54-C60	-2.69	104.70	109.64
2	C	501	AR9	O42-C31-C28	-2.65	117.22	122.02
2	C	501	AR9	C5-C3-N1	-2.61	106.84	110.20
2	A	501	AR9	O42-C31-C28	-2.58	117.34	122.02
2	B	501	AR9	C5-C3-N1	-2.43	107.08	110.20
2	B	501	AR9	O42-C31-C28	-2.37	117.73	122.02
2	A	501	AR9	C38-C34-N32	-2.15	106.43	110.38
2	A	501	AR9	C3-N1-C36	-2.07	119.65	123.25
2	C	501	AR9	C38-C34-N32	-2.02	106.68	110.38

There are no chirality outliers.

All (27) torsion outliers are listed below:

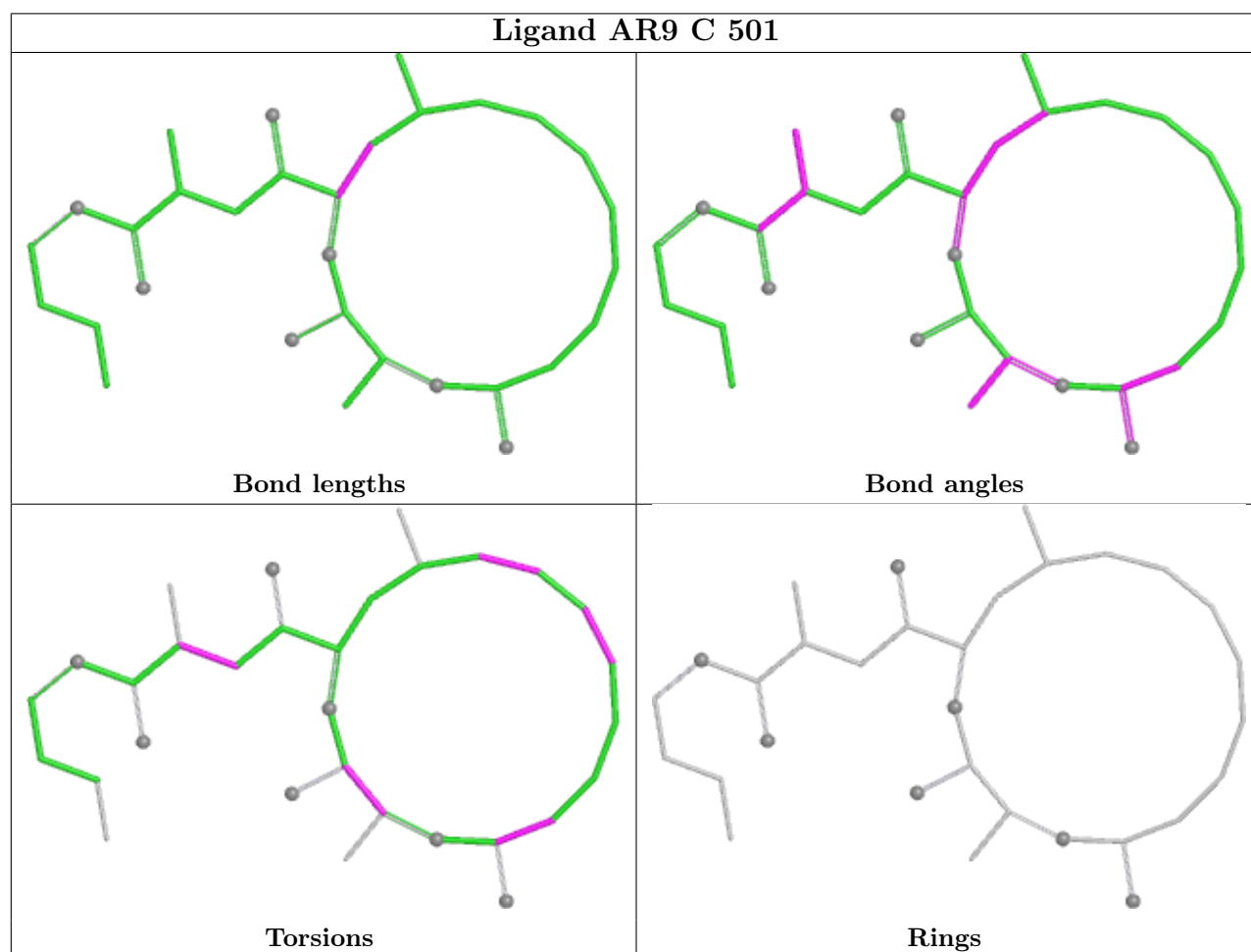
Mol	Chain	Res	Type	Atoms
2	A	501	AR9	C47-C51-C54-C60
2	B	501	AR9	C47-C51-C54-C60
2	C	501	AR9	C47-C51-C54-C60
2	B	501	AR9	N32-C34-C36-O37
2	C	501	AR9	N32-C34-C36-O37
2	A	501	AR9	N32-C34-C36-N1
2	B	501	AR9	N32-C34-C36-N1
2	C	501	AR9	N32-C34-C36-N1
2	A	501	AR9	N32-C34-C36-O37
2	A	501	AR9	C13-C16-C19-C22
2	B	501	AR9	C13-C16-C19-C22
2	C	501	AR9	C13-C16-C19-C22
2	B	501	AR9	C25-C28-C31-O42
2	A	501	AR9	C25-C28-C31-N32
2	B	501	AR9	C25-C28-C31-N32
2	A	501	AR9	C25-C28-C31-O42
2	C	501	AR9	C25-C28-C31-N32
2	C	501	AR9	C25-C28-C31-O42
2	B	501	AR9	C8-C10-C13-C16
2	C	501	AR9	C8-C10-C13-C16
2	A	501	AR9	C8-C10-C13-C16
2	B	501	AR9	C38-C34-C36-O37
2	C	501	AR9	C38-C34-C36-O37
2	B	501	AR9	C38-C34-C36-N1
2	C	501	AR9	C38-C34-C36-N1
2	A	501	AR9	C38-C34-C36-O37
2	A	501	AR9	C38-C34-C36-N1

There are no ring outliers.

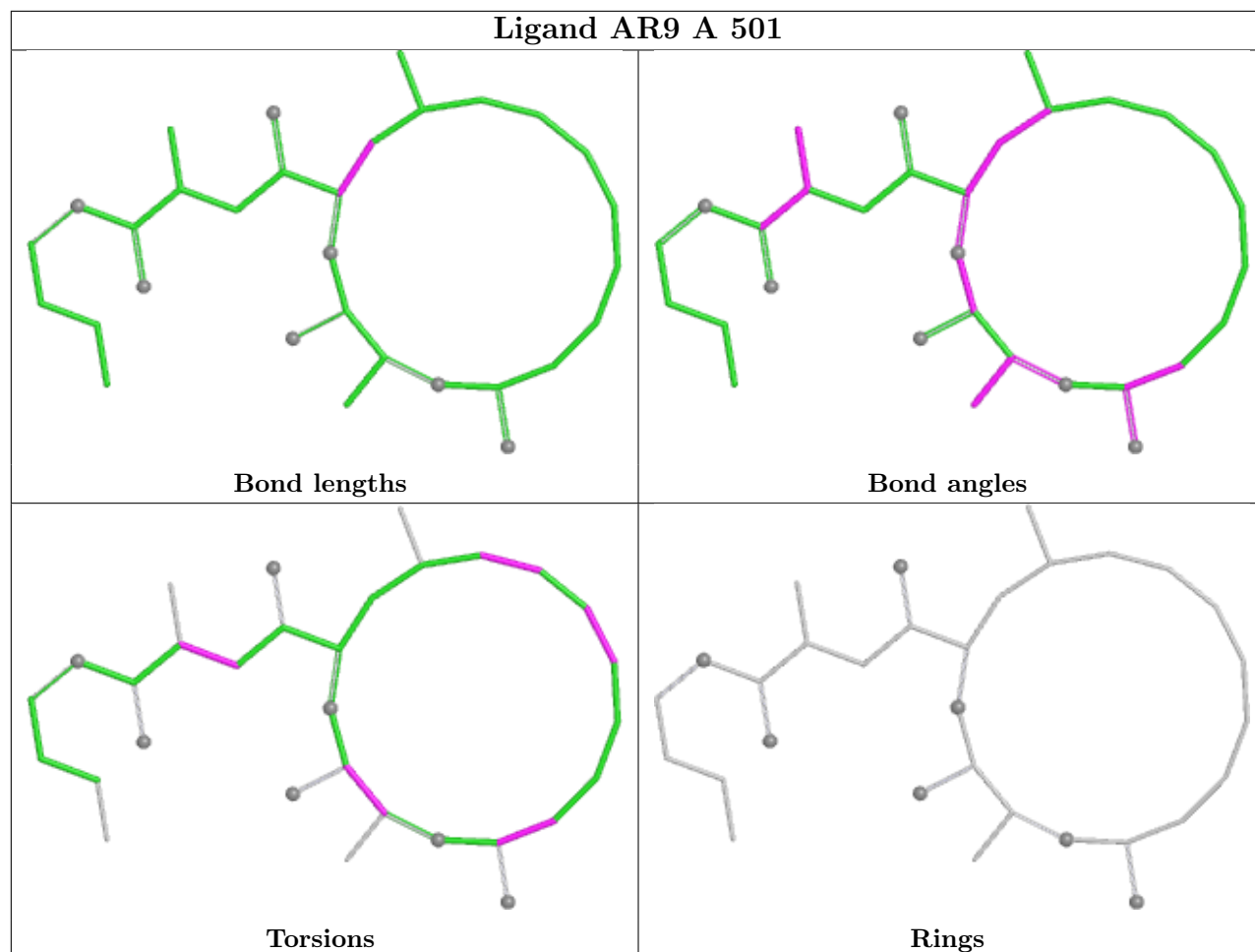
3 monomers are involved in 5 short contacts:

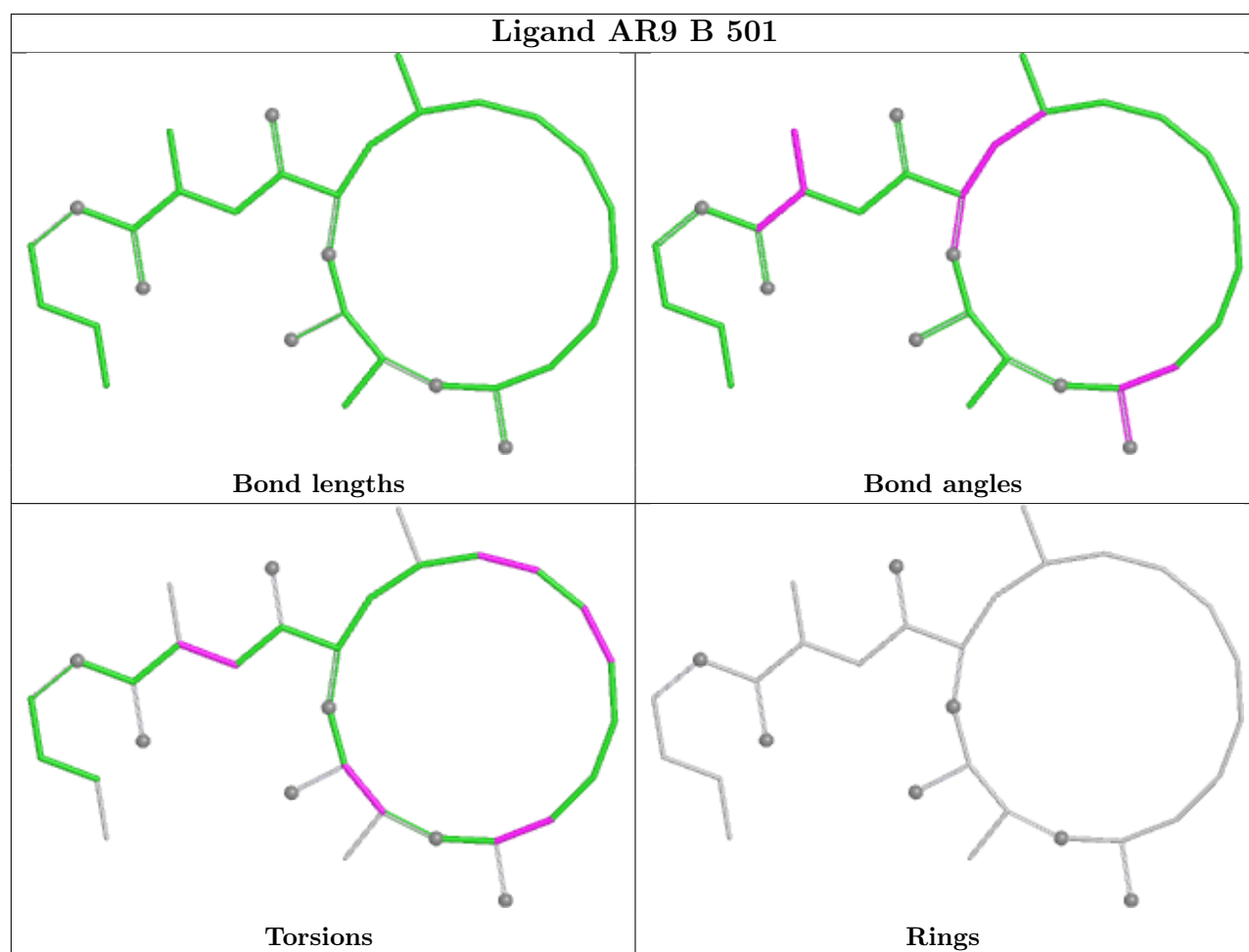
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	501	AR9	1	0
2	A	501	AR9	3	0
2	B	501	AR9	1	0

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.



Ligand AR9 A 501





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	377/402 (93%)	0.57	29 (7%)	19 21	28, 43, 74, 110	0
1	B	378/402 (94%)	0.75	55 (14%)	6 6	26, 44, 93, 125	0
1	C	381/402 (94%)	0.54	44 (11%)	9 10	28, 41, 75, 102	0
All	All	1136/1206 (94%)	0.62	128 (11%)	10 10	26, 42, 84, 125	0

All (128) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	312	VAL	7.2
1	B	314	THR	6.9
1	B	386	ILE	6.8
1	C	361	VAL	6.4
1	C	312	VAL	6.3
1	A	312	VAL	5.9
1	C	258	PRO	5.7
1	A	365	PHE	5.6
1	A	362	HIS	5.3
1	A	258	PRO	5.1
1	C	362	HIS	5.0
1	A	169	SER	4.9
1	C	272	ALA	4.8
1	A	157	ALA	4.8
1	C	313	ALA	4.7
1	B	267	LEU	4.7
1	A	259	ASP	4.5
1	A	313	ALA	4.5
1	C	159	PHE	4.4
1	B	315	SER	4.4
1	B	313	ALA	4.2
1	B	254	THR	4.2
1	B	256	LYS	4.1

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Mol	Chain	Res	Type	RSRZ
1	C	316	GLN	4.1
1	A	361	VAL	4.0
1	C	257	PHE	3.9
1	B	320	TYR	3.9
1	C	254	THR	3.9
1	C	365	PHE	3.8
1	B	258	PRO	3.8
1	C	160	PRO	3.8
1	B	319	CYS	3.7
1	B	316	GLN	3.7
1	C	158	GLY	3.6
1	B	157	ALA	3.6
1	A	68	TYR	3.6
1	A	363	ASP	3.6
1	B	361	VAL	3.6
1	B	273	GLY	3.5
1	A	309	VAL	3.5
1	B	270	TRP	3.5
1	B	262	TRP	3.4
1	B	318	ASP	3.4
1	C	268	VAL	3.4
1	A	49	HIS	3.3
1	C	273	GLY	3.3
1	C	168	ALA	3.3
1	C	46(P)	SER	3.3
1	B	251	ALA	3.3
1	B	272	ALA	3.3
1	A	267	LEU	3.2
1	C	267	LEU	3.2
1	C	379	MET	3.2
1	B	309	VAL	3.2
1	B	365	PHE	3.2
1	C	314	THR	3.2
1	B	257	PHE	3.2
1	A	314	THR	3.2
1	B	46(P)	SER	3.1
1	B	169	SER	3.1
1	B	276	PRO	3.1
1	B	317	ASP	3.1
1	B	277	TRP	3.1
1	C	169	SER	3.1
1	B	170	VAL	3.1

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Mol	Chain	Res	Type	RSRZ
1	C	256	LYS	3.1
1	C	380	GLU	3.0
1	B	268	VAL	3.0
1	B	250	ALA	2.9
1	B	308	PRO	2.9
1	A	311	ASP	2.9
1	C	360	HIS	2.9
1	C	315	SER	2.9
1	C	269	CYS	2.8
1	B	269	CYS	2.8
1	A	315	SER	2.8
1	C	55	GLN	2.8
1	C	317	ASP	2.8
1	A	272	ALA	2.8
1	C	321	LYS	2.8
1	B	278	ASN	2.7
1	B	49	HIS	2.7
1	A	360	HIS	2.7
1	C	319	CYS	2.7
1	C	49	HIS	2.7
1	B	359	CYS	2.7
1	B	263	LEU	2.6
1	A	64	ARG	2.6
1	A	170	VAL	2.6
1	B	247	SER	2.6
1	B	261	PHE	2.6
1	C	266	GLN	2.6
1	B	211	GLN	2.5
1	B	311	ASP	2.5
1	C	56	LEU	2.5
1	B	310	GLU	2.5
1	A	260	GLY	2.5
1	C	259	ASP	2.5
1	B	243	ALA	2.5
1	A	257	PHE	2.5
1	C	48(P)	VAL	2.4
1	C	306	LEU	2.4
1	B	93	VAL	2.4
1	A	269	CYS	2.4
1	B	362	HIS	2.4
1	C	145	HIS	2.4
1	A	340	GLY	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	316	GLN	2.2
1	C	271	GLN	2.2
1	B	321	LYS	2.2
1	A	317	ASP	2.2
1	C	311	ASP	2.2
1	C	359	CYS	2.2
1	A	380	GLU	2.2
1	C	309	VAL	2.2
1	B	255	GLU	2.2
1	C	157	ALA	2.2
1	B	112	GLY	2.2
1	B	279	ILE	2.1
1	C	318	ASP	2.1
1	B	275	THR	2.1
1	B	214	LYS	2.1
1	B	217	CYS	2.1
1	B	271	GLN	2.0
1	B	111	ASN	2.0
1	B	259	ASP	2.0
1	A	359	CYS	2.0
1	C	181	HIS	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	AR9	A	501	31/31	0.95	0.09	32,37,43,44	0
2	AR9	C	501	31/31	0.96	0.08	30,34,40,42	0

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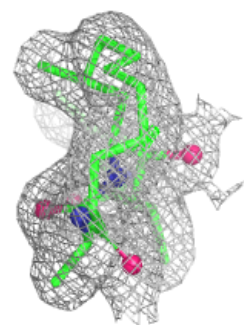
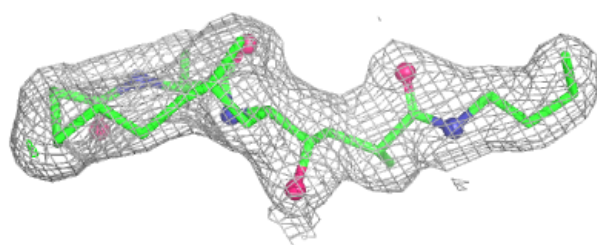
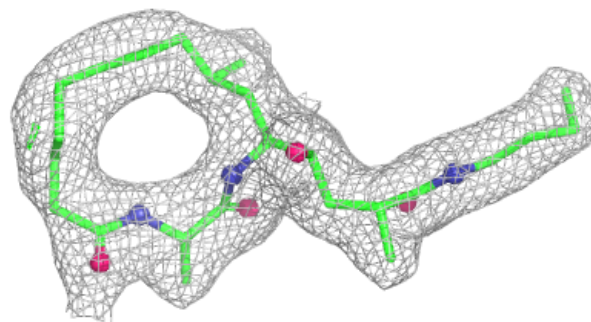
Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	AR9	B	501	31/31	0.97	0.08	30,36,46,48	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.

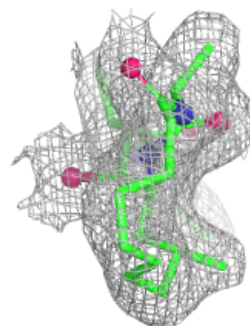
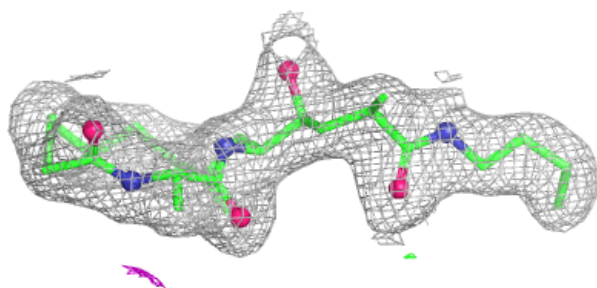
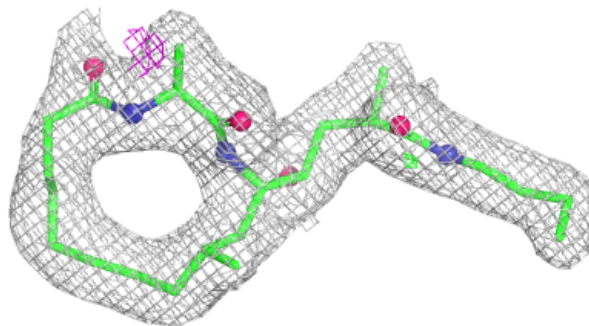
Electron density around AR9 A 501:

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

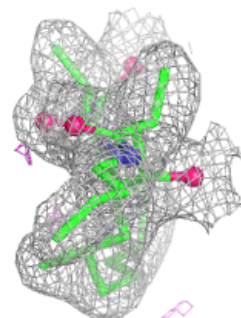
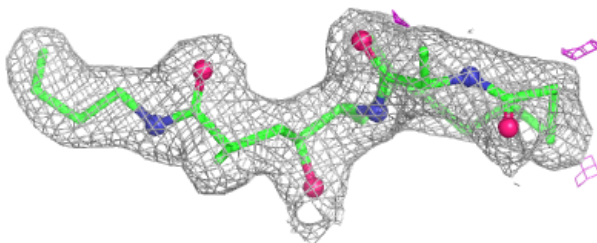
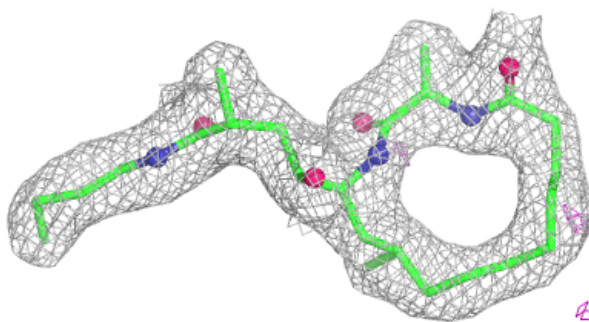


Electron density around AR9 C 501:

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

**Electron density around AR9 B 501:**

$2mF_o-DF_c$ (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.