



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 28, 2023 – 03:53 AM EDT

PDB ID : 3IXK
Title : Potent beta-secretase 1 inhibitor
Authors : Borkakoti, N.; Lindberg, J.D.; Nystrom, S.
Deposited on : 2009-09-04
Resolution : 2.50 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35

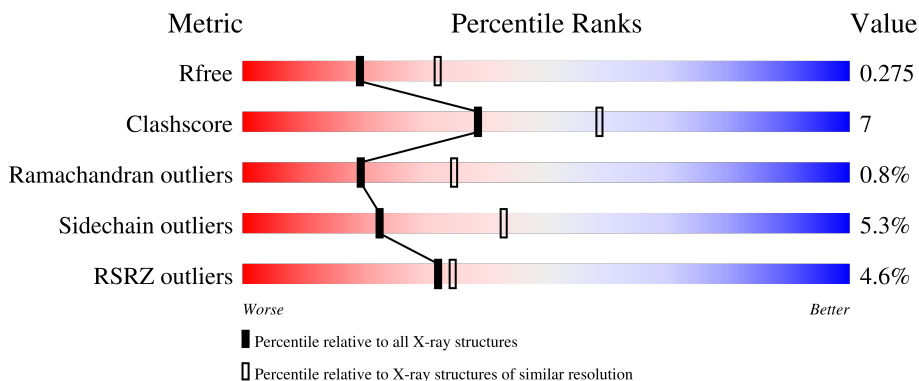
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	405	 3% 74% 16% • 8%
1	B	405	 3% 75% 15% • 8%
1	C	405	 6% 73% 16% • 8%

2 Entry composition [i](#)

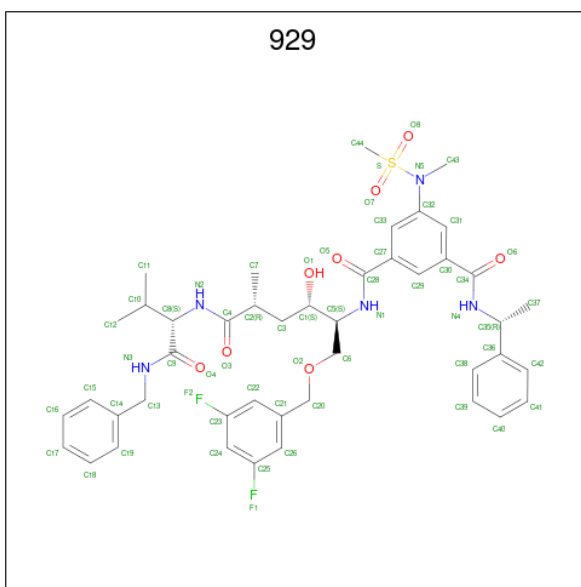
There are 3 unique types of molecules in this entry. The entry contains 9056 atoms, of which 0 are hydrogens and 0 are deuteriums.

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
			Total	C	N	O	S			
1	A	373	Total 2940	C 1882	N 489	O 555	S 14	0	0	0
1	B	373	Total 2940	C 1882	N 489	O 555	S 14	0	0	0
1	C	371	Total 2925	C 1874	N 486	O 551	S 14	0	0	0

- Molecule 2 is N-[(2S,3S,5R)-1-[(3,5-difluorophenyl)methoxy]-3-hydroxy-5-methyl-6-[[[(2S)-3-methyl-1-oxo-1-(phenylmethylamino)butan-2-yl]amino]-6-oxo-hexan-2-yl]-5-(methyl-methyl sulfonyl-amino)-N'-[(1R)-1-phenylethyl]benzene-1,3-dicarboxamide (three-letter code: 929) (formula: C₄₄H₅₃F₂N₅O₈S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	F	N	O			S
2	A	1	Total 60	C 44	F 2	N 5	O 8	S 1	0	0
2	B	1	Total 60	C 44	F 2	N 5	O 8	S 1	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	F	N	O			S
2	C	1	60	44	2	5	8	1	0	0

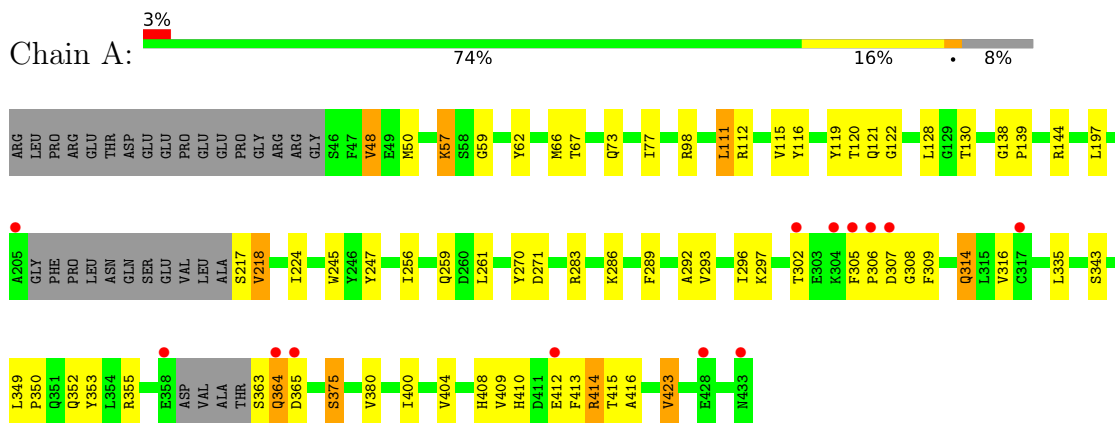
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	18	Total	O	0	0
			18	18		
3	B	25	Total	O	0	0
			25	25		
3	C	28	Total	O	0	0
			28	28		

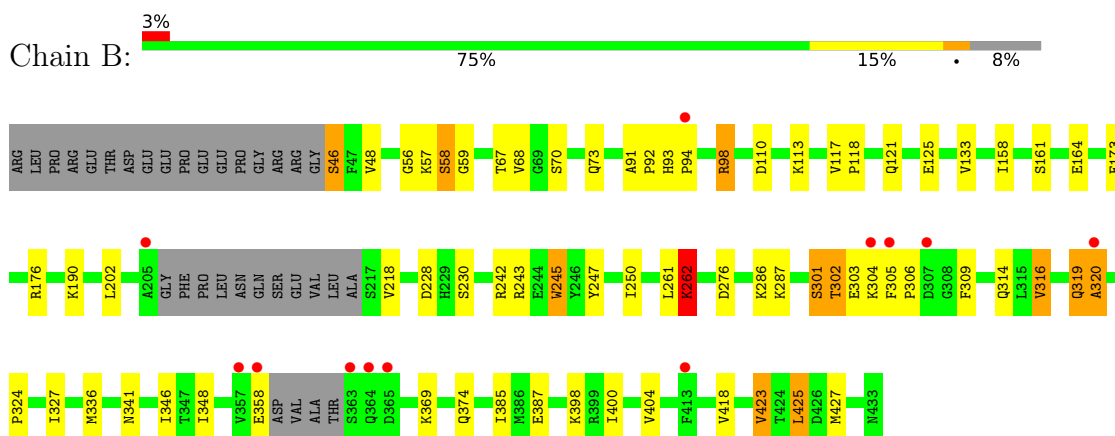
3 Residue-property plots [i](#)

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.

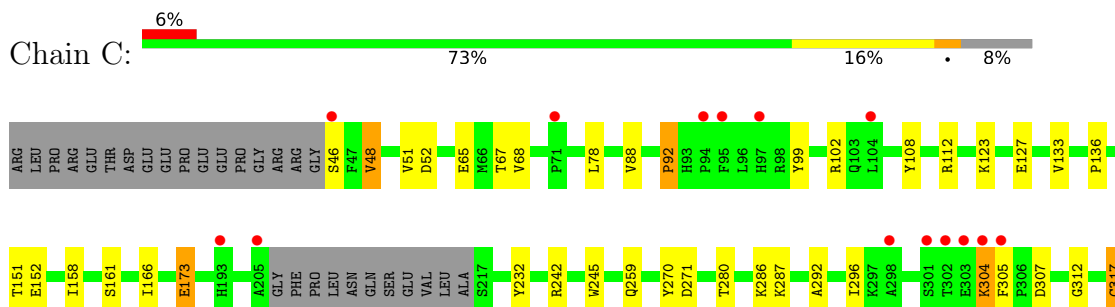
- Molecule 1: Beta-secretase 1

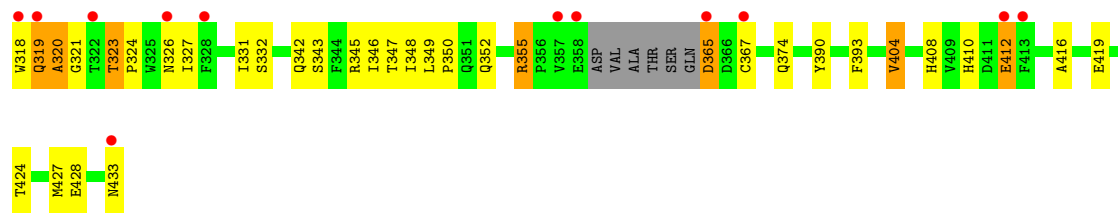


- Molecule 1: Beta-secretase 1



- 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	81.84Å 103.08Å 100.50Å 90.00° 103.32° 90.00°	Depositor
Resolution (Å)	40.26 – 2.50 40.26 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.7 (40.26-2.50) 99.7 (40.26-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.67 (at 2.51Å)	Xtrriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.229 , 0.282 0.224 , 0.275	Depositor DCC
R_{free} test set	2849 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å ²)	40.1	Xtrriage
Anisotropy	0.062	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 39.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	9056	wwPDB-VP
Average B, all atoms (Å ²)	38.0	wwPDB-VP

Xtrriage'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 i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section:
929

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	0.80	0/3014	0.99	5/4092 (0.1%)
1	B	0.79	2/3014 (0.1%)	0.98	2/4092 (0.0%)
1	C	0.76	0/2999	0.97	4/4072 (0.1%)
All	All	0.79	2/9027 (0.0%)	0.98	11/12256 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	113	LYS	CD-CE	6.88	1.68	1.51
1	B	113	LYS	CE-NZ	6.23	1.64	1.49

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	423	VAL	CB-CA-C	-8.06	96.09	111.40
1	A	414	ARG	NE-CZ-NH2	-6.95	116.83	120.30
1	C	112	ARG	NE-CZ-NH1	6.64	123.62	120.30
1	B	110	ASP	CB-CG-OD2	-6.53	112.42	118.30
1	C	48	VAL	CB-CA-C	-6.17	99.68	111.40
1	A	98	ARG	NE-CZ-NH1	6.09	123.35	120.30
1	C	112	ARG	NE-CZ-NH2	-6.00	117.30	120.30
1	A	355	ARG	NE-CZ-NH2	-5.92	117.34	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	111	LEU	CA-CB-CG	5.53	128.02	115.30
1	C	404	VAL	CG1-CB-CG2	-5.36	102.33	110.90
1	B	98	ARG	NE-CZ-NH2	-5.06	117.77	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	245	TRP	Peptide

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	2940	0	2849	39	0
1	B	2940	0	2849	43	0
1	C	2925	0	2838	49	0
2	A	60	0	53	4	0
2	B	60	0	53	4	0
2	C	60	0	53	0	0
3	A	18	0	0	1	0
3	B	25	0	0	1	0
3	C	28	0	0	5	0
All	All	9056	0	8695	131	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 (131) 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:C:355:ARG:HD2	3:C:524:HOH:O	1.51	1.09
1:B:46:SER:HB3	3:B:515:HOH:O	1.72	0.89
1:C:317:CYS:HG	1:C:367:CYS:HG	1.23	0.85
1:A:256:ILE:HD12	1:A:261:LEU:HD13	1.58	0.83

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:292:ALA:O	1:C:296:ILE:HG13	1.81	0.79
1:C:424:THR:HB	1:C:427:MET:HE2	1.63	0.78
1:B:261:LEU:O	1:B:262:LYS:HB2	1.82	0.77
1:C:304:LYS:HE2	1:C:305:PHE:H	1.49	0.75
1:B:319:GLN:NE2	1:B:319:GLN:H	1.86	0.71
1:C:424:THR:HB	1:C:427:MET:CE	2.18	0.71
1:C:342:GLN:C	1:C:427:MET:HE1	2.10	0.70
1:B:319:GLN:H	1:B:319:GLN:CD	1.94	0.70
1:B:302:THR:O	1:B:303:GLU:HG2	1.93	0.69
1:A:48:VAL:CG1	1:B:125:GLU:HB2	2.22	0.69
1:C:365:ASP:OD1	1:C:365:ASP:N	2.27	0.68
1:B:261:LEU:O	1:B:262:LYS:CB	2.40	0.67
1:A:50:MET:HG2	1:A:138:GLY:HA2	1.78	0.66
1:B:250:ILE:HG21	1:B:336:MET:CE	2.26	0.66
1:C:318:TRP:CE3	1:C:323:THR:HG23	2.30	0.66
1:C:349:LEU:HB3	1:C:350:PRO:HD2	1.79	0.64
1:A:292:ALA:O	1:A:296:ILE:HG13	1.98	0.64
1:B:242:ARG:HD2	1:B:250:ILE:HD11	1.81	0.62
1:A:350:PRO:HA	1:A:353:TYR:CE2	2.34	0.61
1:B:306:PRO:HB2	1:B:314:GLN:NE2	2.16	0.60
1:A:305:PHE:HD1	1:A:316:VAL:HG11	1.68	0.59
1:B:319:GLN:CD	1:B:319:GLN:N	2.57	0.57
1:C:428:GLU:HA	1:C:428:GLU:OE1	2.03	0.57
1:B:286:LYS:HG3	1:B:374:GLN:OE1	2.04	0.57
1:C:342:GLN:O	1:C:427:MET:HE1	2.06	0.56
1:C:408:HIS:CE1	1:C:416:ALA:H	2.23	0.56
1:A:256:ILE:HD12	1:A:261:LEU:CD1	2.34	0.55
1:A:308:GLY:HA3	1:A:314:GLN:HE21	1.71	0.55
1:C:78:LEU:HD23	1:C:166:ILE:HD12	1.90	0.54
1:A:283:ARG:CZ	1:A:375:SER:HB2	2.37	0.54
1:C:319:GLN:O	1:C:320:ALA:C	2.45	0.54
1:C:127:GLU:OE2	1:C:151:THR:HG21	2.08	0.54
1:C:173:GLU:O	1:C:173:GLU:HG3	2.07	0.53
1:A:349:LEU:H	1:A:352:GLN:NE2	2.07	0.53
1:A:365:ASP:HB2	3:A:513:HOH:O	2.09	0.53
1:B:68:VAL:HG12	1:B:133:VAL:HG22	1.90	0.53
1:C:404:VAL:HG21	3:C:523:HOH:O	2.07	0.53
1:A:115:VAL:HG22	1:A:116:TYR:N	2.24	0.53
1:B:305:PHE:HD1	1:B:316:VAL:HG11	1.74	0.52
1:C:158:ILE:HB	1:C:161:SER:HB3	1.90	0.52
1:B:67:THR:HA	1:B:73:GLN:O	2.10	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:343:SER:HB3	1:C:427:MET:CE	2.39	0.51
1:A:289:PHE:O	1:A:293:VAL:HG23	2.10	0.51
1:A:415:THR:HG22	1:A:416:ALA:O	2.11	0.51
1:C:151:THR:O	1:C:152:GLU:HG3	2.10	0.51
1:A:130:THR:OG1	1:A:144:ARG:NH1	2.43	0.51
1:A:62:TYR:CE2	1:A:218:VAL:HG13	2.46	0.50
1:C:304:LYS:HE2	1:C:305:PHE:N	2.23	0.50
1:B:93:HIS:CG	1:B:94:PRO:HD2	2.47	0.50
1:C:242:ARG:NH2	1:C:433:ASN:HD21	2.10	0.49
1:C:343:SER:HB3	1:C:427:MET:HE2	1.93	0.49
1:C:345:ARG:NH2	1:C:419:GLU:OE1	2.37	0.49
1:C:324:PRO:HB2	1:C:327:ILE:HG12	1.95	0.49
1:B:173:GLU:OE2	1:B:243:ARG:NH2	2.36	0.49
1:C:286:LYS:HG3	1:C:374:GLN:OE1	2.13	0.49
1:A:306:PRO:O	1:A:309:PHE:HB3	2.14	0.48
1:A:270:TYR:HA	1:A:271:ASP:HA	1.64	0.48
1:C:51:VAL:O	1:C:52:ASP:CB	2.62	0.48
1:A:293:VAL:O	1:A:297:LYS:HB2	2.14	0.48
1:A:308:GLY:CA	1:A:314:GLN:HE21	2.26	0.47
1:C:331:ILE:O	1:C:347:THR:HA	2.14	0.47
1:A:48:VAL:HG11	1:B:125:GLU:HB2	1.94	0.47
1:B:250:ILE:HG21	1:B:336:MET:HE3	1.96	0.47
1:C:102:ARG:HD2	1:C:108:TYR:CZ	2.50	0.47
1:C:404:VAL:HB	3:C:522:HOH:O	2.14	0.47
1:B:250:ILE:HG21	1:B:336:MET:HE1	1.97	0.47
1:A:119:TYR:HB3	2:A:500:929:H5	1.96	0.47
1:A:283:ARG:HB2	1:A:380:VAL:HB	1.97	0.47
1:A:413:PHE:CE2	1:A:414:ARG:HG3	2.51	0.46
1:B:346:ILE:HG22	1:B:418:VAL:HG22	1.97	0.46
1:A:247:TYR:HB3	1:A:400:ILE:HD11	1.98	0.46
1:B:117:VAL:HG22	1:B:176:ARG:HB2	1.98	0.46
1:C:319:GLN:O	1:C:321:GLY:N	2.49	0.46
1:C:319:GLN:HE21	1:C:319:GLN:HB2	1.62	0.46
1:C:232:TYR:CD1	1:C:390:TYR:CD2	3.03	0.46
1:A:59:GLY:O	2:A:500:929:H38	2.16	0.45
1:B:91:ALA:HB1	1:B:92:PRO:HD2	1.97	0.45
1:B:319:GLN:O	1:B:320:ALA:C	2.54	0.45
1:A:66:MET:SD	1:A:77:ILE:HG13	2.56	0.45
1:A:67:THR:HA	1:A:73:GLN:O	2.17	0.45
1:B:348:ILE:HG21	1:B:385:ILE:HD13	1.99	0.45
1:C:65:GLU:HG2	1:C:136:PRO:HG2	1.97	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:122:GLY:N	2:A:500:929:F2	2.40	0.45
2:A:500:929:O3	2:A:500:929:C9	2.59	0.45
1:B:250:ILE:CG2	1:B:336:MET:HE3	2.47	0.45
1:B:202:LEU:O	1:B:387:GLU:HA	2.17	0.45
1:A:57:LYS:N	1:A:57:LYS:HE2	2.32	0.44
1:C:88:VAL:O	1:C:88:VAL:HG23	2.17	0.44
1:C:46:SER:HA	3:C:514:HOH:O	2.18	0.44
1:C:332:SER:HA	1:C:346:ILE:O	2.18	0.44
1:C:270:TYR:HA	1:C:271:ASP:HA	1.73	0.44
1:B:228:ASP:OD1	1:B:230:SER:HB3	2.18	0.44
1:B:56:GLY:C	1:B:218:VAL:HG22	2.37	0.44
1:B:98:ARG:O	1:B:164:GLU:HG2	2.18	0.43
1:C:92:PRO:HD3	1:C:99:TYR:CZ	2.53	0.43
1:C:393:PHE:N	1:C:393:PHE:CD1	2.86	0.43
1:B:276:ASP:OD2	2:B:500:929:O1	2.30	0.43
1:B:306:PRO:O	1:B:309:PHE:HB3	2.18	0.43
1:B:336:MET:HE1	1:B:427:MET:HA	2.01	0.43
1:B:336:MET:HE3	1:B:336:MET:HB2	1.94	0.43
1:C:68:VAL:HG12	1:C:133:VAL:HG22	2.01	0.43
1:B:324:PRO:HB2	1:B:327:ILE:HG12	2.01	0.43
1:B:158:ILE:HB	1:B:161:SER:HB3	2.00	0.42
1:B:57:LYS:O	1:B:58:SER:C	2.56	0.42
1:A:305:PHE:CD1	1:A:316:VAL:HG11	2.51	0.42
1:C:67:THR:O	1:C:133:VAL:HA	2.20	0.42
1:A:121:GLN:O	1:A:121:GLN:HG3	2.20	0.41
1:A:111:LEU:HD12	1:A:128:LEU:HB3	2.02	0.41
1:A:119:TYR:O	1:A:120:THR:C	2.56	0.41
1:B:398:LYS:HB2	1:B:398:LYS:HE3	1.85	0.41
1:C:424:THR:HB	1:C:427:MET:HE3	2.01	0.41
1:B:247:TYR:HB3	1:B:400:ILE:HD11	2.01	0.41
1:B:301:SER:C	1:B:303:GLU:H	2.23	0.41
1:C:349:LEU:H	1:C:352:GLN:NE2	2.18	0.41
1:C:408:HIS:CE1	1:C:410:HIS:HB3	2.54	0.41
1:A:139:PRO:HD3	1:A:224:ILE:HD12	2.02	0.41
1:A:335:LEU:O	1:A:343:SER:HB2	2.20	0.41
1:B:118:PRO:HB2	2:B:500:929:H19	2.01	0.41
1:C:412:GLU:H	1:C:412:GLU:CD	2.24	0.41
1:A:197:LEU:HD23	1:A:197:LEU:C	2.41	0.41
1:B:59:GLY:HA2	2:B:500:929:H39	2.02	0.41
2:B:500:929:H5	2:B:500:929:H20	1.64	0.41
1:A:364:GLN:HE21	1:A:364:GLN:HB2	1.71	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:312:GLY:HA2	3:C:502:HOH:O	2.21	0.41
1:A:115:VAL:CG2	1:A:116:TYR:N	2.84	0.40
1:B:341:ASN:HA	1:B:423:VAL:HA	2.02	0.40
1:C:348:ILE:O	1:C:348:ILE:HG13	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	367/405 (91%)	355 (97%)	10 (3%)	2 (0%)	29	48
1	B	367/405 (91%)	352 (96%)	11 (3%)	4 (1%)	14	26
1	C	365/405 (90%)	340 (93%)	22 (6%)	3 (1%)	19	35
All	All	1099/1215 (90%)	1047 (95%)	43 (4%)	9 (1%)	19	35

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	320	ALA
1	B	302	THR
1	B	320	ALA
1	C	173	GLU
1	A	286	LYS
1	A	302	THR
1	B	425	LEU
1	B	262	LYS
1	C	92	PRO

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	319/346 (92%)	301 (94%)	18 (6%)	21	40
1	B	319/346 (92%)	301 (94%)	18 (6%)	21	40
1	C	317/346 (92%)	302 (95%)	15 (5%)	26	49
All	All	955/1038 (92%)	904 (95%)	51 (5%)	22	43

All (51) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	48	VAL
1	A	57	LYS
1	A	112	ARG
1	A	217	SER
1	A	218	VAL
1	A	245	TRP
1	A	259	GLN
1	A	307	ASP
1	A	314	GLN
1	A	363	SER
1	A	364	GLN
1	A	375	SER
1	A	404	VAL
1	A	408	HIS
1	A	409	VAL
1	A	410	HIS
1	A	412	GLU
1	A	423	VAL
1	B	46	SER
1	B	48	VAL
1	B	58	SER
1	B	70	SER
1	B	121	GLN
1	B	190	LYS
1	B	245	TRP
1	B	262	LYS

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Mol	Chain	Res	Type
1	B	287	LYS
1	B	301	SER
1	B	304	LYS
1	B	316	VAL
1	B	319	GLN
1	B	358	GLU
1	B	369	LYS
1	B	404	VAL
1	B	423	VAL
1	B	425	LEU
1	C	48	VAL
1	C	123	LYS
1	C	245	TRP
1	C	259	GLN
1	C	280	THR
1	C	287	LYS
1	C	304	LYS
1	C	307	ASP
1	C	317	CYS
1	C	319	GLN
1	C	323	THR
1	C	326	ASN
1	C	355	ARG
1	C	365	ASP
1	C	412	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	76	ASN
1	A	314	GLN
1	A	341	ASN
1	A	352	GLN
1	A	364	GLN
1	B	76	ASN
1	B	314	GLN
1	B	319	GLN
1	B	364	GLN
1	B	374	GLN
1	C	259	GLN
1	C	319	GLN
1	C	326	ASN

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Mol	Chain	Res	Type
1	C	341	ASN
1	C	352	GLN
1	C	408	HIS
1	C	433	ASN

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](#)

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	929	B	500	-	62,63,63	0.93	2 (3%)	83,88,88	1.49	13 (15%)
2	929	C	500	-	62,63,63	0.98	2 (3%)	83,88,88	1.57	13 (15%)
2	929	A	500	-	62,63,63	1.03	3 (4%)	83,88,88	2.04	23 (27%)

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	929	B	500	-	-	12/65/65/65	0/4/4/4
2	929	C	500	-	-	10/65/65/65	0/4/4/4
2	929	A	500	-	-	12/65/65/65	0/4/4/4

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	500	929	S-N5	-4.16	1.55	1.64
2	A	500	929	S-N5	-4.11	1.55	1.64
2	B	500	929	S-N5	-3.72	1.56	1.64
2	B	500	929	C44-S	-3.49	1.67	1.75
2	A	500	929	O8-S	3.43	1.48	1.43
2	C	500	929	C44-S	-3.16	1.68	1.75
2	A	500	929	C44-S	-2.65	1.69	1.75

All (49) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	500	929	C2-C4-N2	6.62	123.51	116.42
2	C	500	929	C1-C5-N1	5.52	120.56	109.92
2	B	500	929	C20-O2-C6	-4.64	102.12	112.67
2	B	500	929	C2-C4-N2	4.58	121.33	116.42
2	A	500	929	C29-C30-C31	4.41	124.94	119.63
2	A	500	929	O1-C1-C3	4.22	117.58	109.11
2	A	500	929	O8-S-N5	-4.13	102.11	107.08
2	C	500	929	C29-C30-C31	4.08	124.55	119.63
2	A	500	929	F1-C25-C26	3.86	123.77	118.25
2	A	500	929	C22-C23-C24	-3.84	118.67	123.52
2	A	500	929	O7-S-N5	3.71	111.55	107.08
2	C	500	929	C27-C33-C32	3.62	123.72	119.59
2	B	500	929	O3-C4-C2	-3.56	114.53	121.33
2	A	500	929	C30-C31-C32	-3.55	115.55	119.59
2	A	500	929	C8-C9-N3	3.36	122.20	116.41
2	A	500	929	C27-C33-C32	3.36	123.42	119.59
2	A	500	929	C7-C2-C3	-3.34	104.54	111.55
2	C	500	929	C11-C10-C12	3.24	119.66	110.59
2	C	500	929	O1-C1-C3	3.19	115.51	109.11
2	B	500	929	O4-C9-C8	-3.04	114.45	120.74
2	B	500	929	C1-C5-N1	2.99	115.69	109.92
2	A	500	929	C23-C24-C25	2.97	120.76	116.13
2	C	500	929	O6-C34-C30	-2.88	115.79	120.94
2	C	500	929	O6-C34-N4	2.79	127.59	122.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	500	929	C2-C3-C1	-2.76	109.86	114.74
2	C	500	929	F1-C25-C26	2.72	122.13	118.25
2	A	500	929	F2-C23-C22	2.70	122.11	118.25
2	C	500	929	C24-C25-C26	-2.63	120.19	123.52
2	A	500	929	C14-C13-N3	-2.56	107.56	113.05
2	A	500	929	C29-C27-C33	-2.54	116.58	119.63
2	B	500	929	C43-N5-S	2.50	121.92	117.86
2	A	500	929	O2-C6-C5	-2.47	103.82	108.85
2	C	500	929	C21-C26-C25	2.41	121.00	118.81
2	B	500	929	O8-S-C44	-2.34	105.30	108.44
2	A	500	929	F1-C25-C24	-2.29	114.98	118.25
2	C	500	929	C2-C4-N2	2.29	118.88	116.42
2	B	500	929	C11-C10-C8	2.28	117.61	111.16
2	A	500	929	O8-S-C44	-2.26	105.39	108.44
2	A	500	929	O3-C4-N2	-2.24	118.79	122.93
2	B	500	929	C10-C8-N2	2.22	116.93	111.43
2	B	500	929	C6-C5-N1	2.15	112.78	109.61
2	A	500	929	C21-C22-C23	2.12	120.74	118.81
2	C	500	929	O7-S-N5	2.12	109.63	107.08
2	B	500	929	C12-C10-C8	2.09	117.07	111.16
2	C	500	929	C29-C27-C33	-2.08	117.13	119.63
2	A	500	929	O4-C9-C8	-2.06	116.49	120.74
2	A	500	929	C7-C2-C4	2.05	112.72	109.42
2	B	500	929	C10-C8-C9	-2.01	106.34	111.38
2	B	500	929	C20-C21-C22	-2.01	115.50	120.29

There are no chirality outliers.

All (34) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	500	929	C31-C32-N5-S
2	A	500	929	C33-C32-N5-S
2	A	500	929	N1-C5-C6-O2
2	A	500	929	C1-C5-C6-O2
2	A	500	929	C7-C2-C3-C1
2	A	500	929	C4-C2-C3-C1
2	B	500	929	C31-C32-N5-S
2	B	500	929	C33-C32-N5-S
2	B	500	929	N1-C5-C6-O2
2	B	500	929	C7-C2-C3-C1
2	B	500	929	C4-C2-C3-C1
2	C	500	929	C31-C32-N5-S

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Mol	Chain	Res	Type	Atoms
2	C	500	929	C33-C32-N5-S
2	C	500	929	N1-C5-C6-O2
2	C	500	929	C4-C2-C3-C1
2	C	500	929	C12-C10-C8-C9
2	A	500	929	C12-C10-C8-N2
2	C	500	929	C12-C10-C8-N2
2	B	500	929	C12-C10-C8-N2
2	A	500	929	C11-C10-C8-N2
2	A	500	929	C12-C10-C8-C9
2	B	500	929	C12-C10-C8-C9
2	A	500	929	C11-C10-C8-C9
2	B	500	929	C11-C10-C8-N2
2	C	500	929	C11-C10-C8-N2
2	C	500	929	C11-C10-C8-C9
2	B	500	929	C11-C10-C8-C9
2	A	500	929	C21-C20-O2-C6
2	A	500	929	C5-C6-O2-C20
2	B	500	929	C5-C6-O2-C20
2	C	500	929	C7-C2-C3-C1
2	B	500	929	C33-C27-C28-N1
2	C	500	929	C33-C27-C28-N1
2	B	500	929	C33-C27-C28-O5

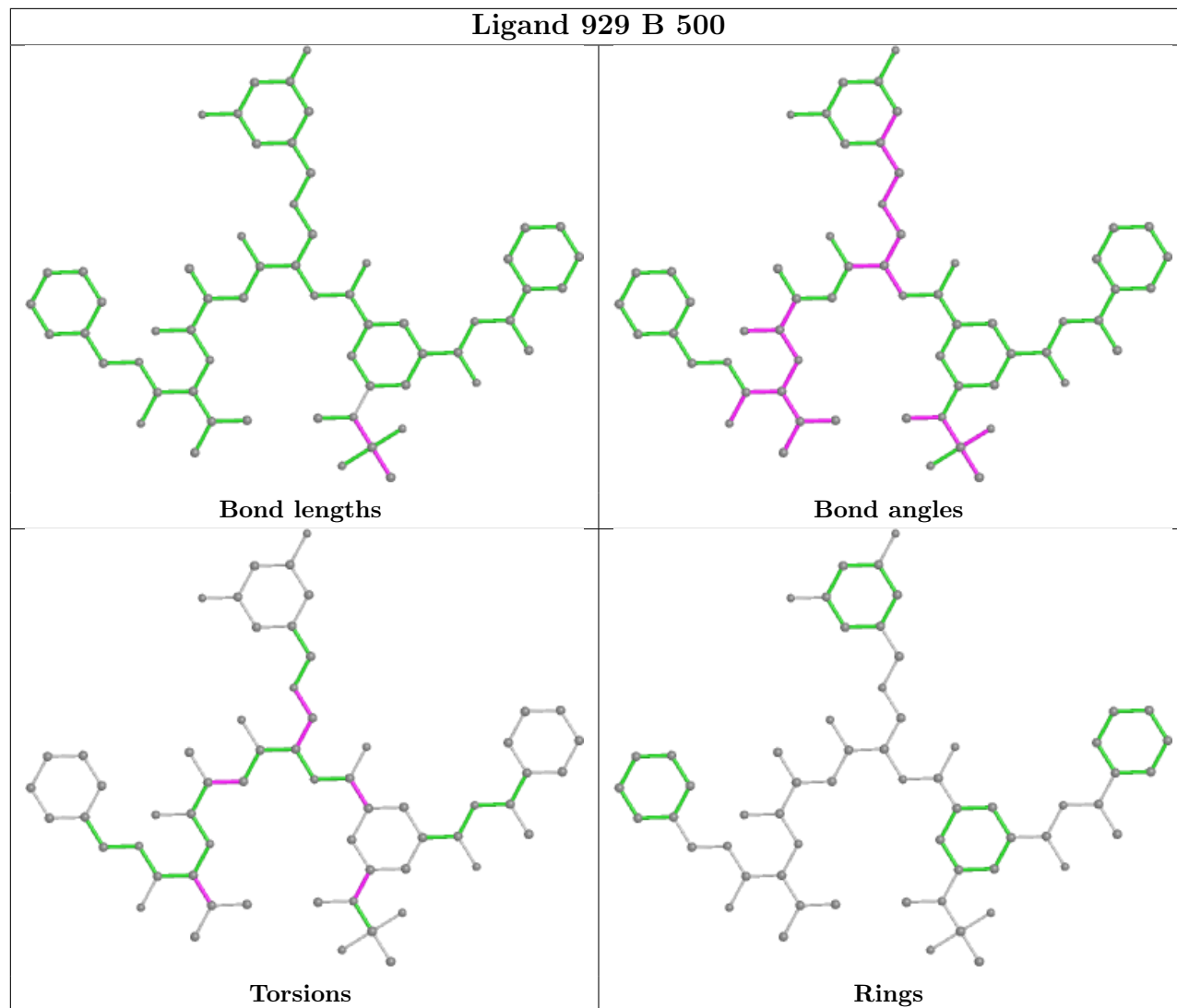
There are no ring outliers.

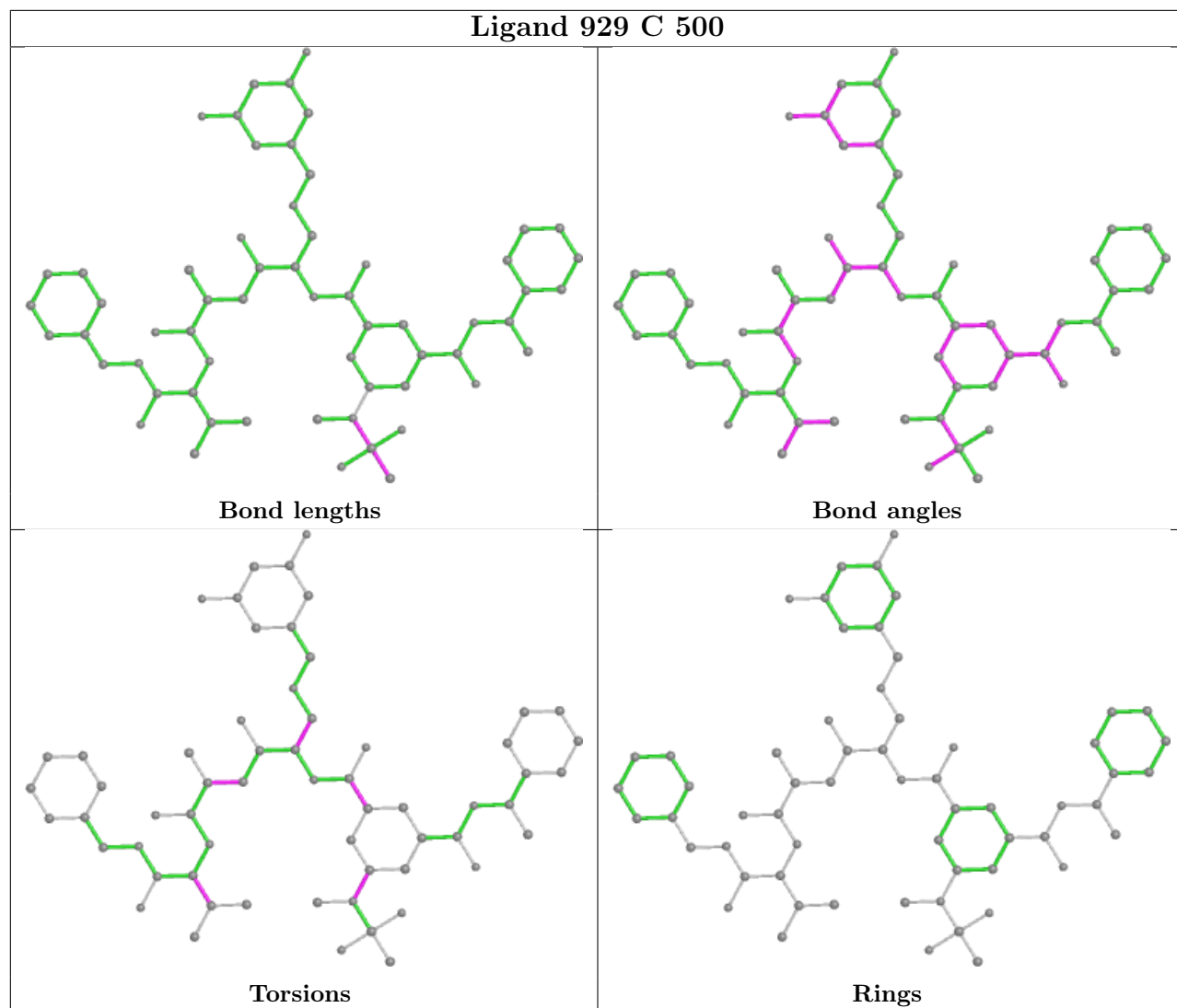
2 monomers are involved in 8 short contacts:

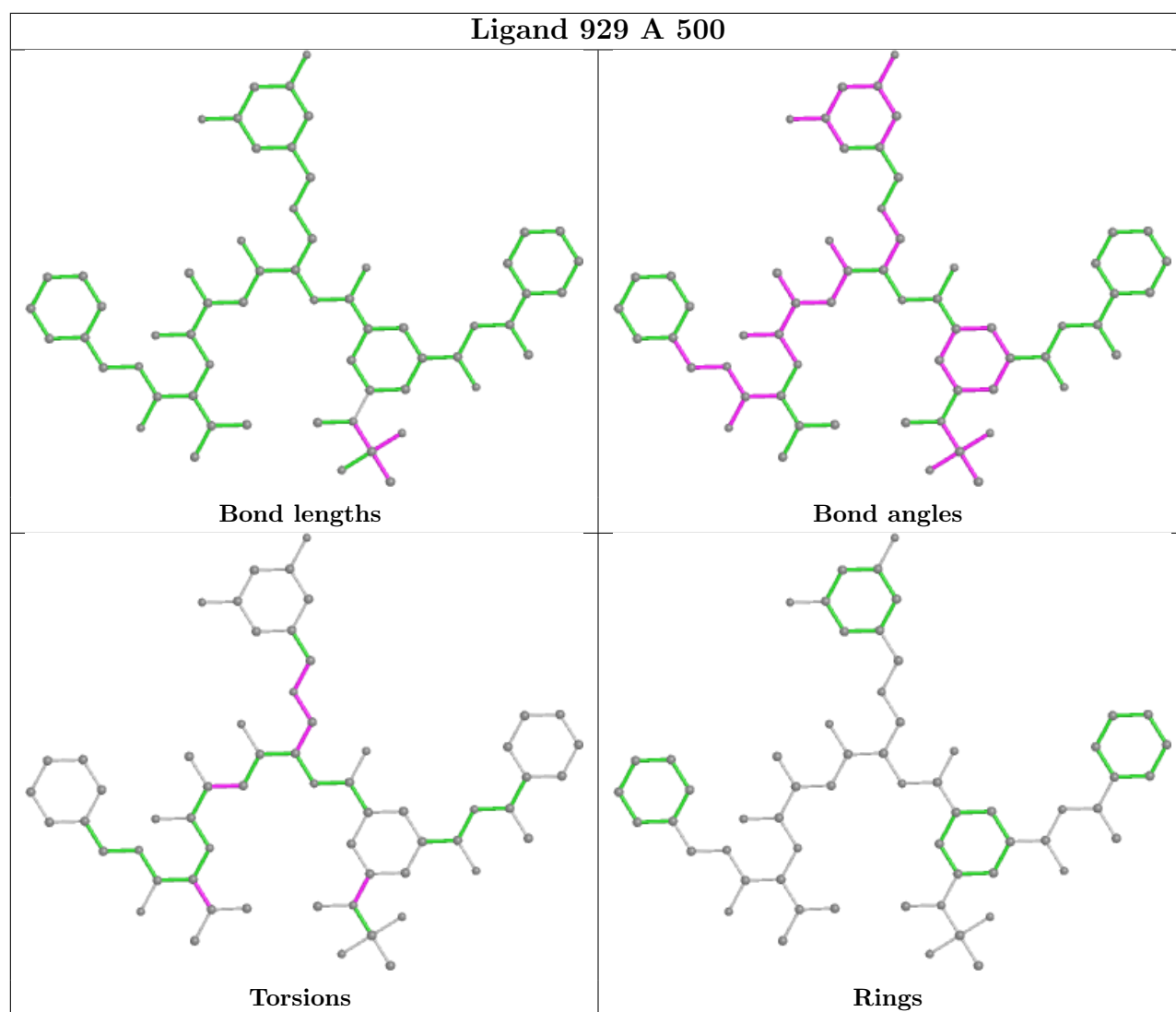
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	500	929	4	0
2	A	500	929	4	0

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 929 B 500







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	373/405 (92%)	0.14	13 (3%) 44 47	16, 35, 62, 83	0
1	B	373/405 (92%)	0.17	12 (3%) 47 51	19, 35, 59, 79	0
1	C	371/405 (91%)	0.21	26 (7%) 16 16	16, 36, 66, 80	0
All	All	1117/1215 (91%)	0.18	51 (4%) 32 34	16, 36, 63, 83	0

All (51) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	364	GLN	4.9
1	C	365	ASP	4.0
1	A	358	GLU	4.0
1	B	320	ALA	3.8
1	A	205	ALA	3.8
1	A	304	LYS	3.8
1	B	364	GLN	3.7
1	C	302	THR	3.7
1	A	433	ASN	3.6
1	C	104	LEU	3.6
1	C	358	GLU	3.5
1	B	304	LYS	3.4
1	B	307	ASP	3.2
1	B	358	GLU	3.1
1	C	301	SER	3.1
1	C	413	PHE	3.0
1	C	94	PRO	3.0
1	A	412	GLU	2.9
1	C	357	VAL	2.9
1	B	413	PHE	2.9
1	C	97	HIS	2.8
1	C	303	GLU	2.8
1	C	304	LYS	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	357	VAL	2.7
1	C	328	PHE	2.6
1	A	428	GLU	2.6
1	C	305	PHE	2.6
1	C	95	PHE	2.6
1	C	433	ASN	2.6
1	A	305	PHE	2.5
1	C	412	GLU	2.5
1	C	319	GLN	2.5
1	A	365	ASP	2.5
1	B	305	PHE	2.5
1	A	307	ASP	2.5
1	C	205	ALA	2.4
1	C	367	CYS	2.4
1	C	71	PRO	2.4
1	B	205	ALA	2.3
1	C	326	ASN	2.3
1	A	306	PRO	2.2
1	C	298	ALA	2.2
1	B	94	PRO	2.2
1	B	363	SER	2.2
1	A	317	CYS	2.2
1	C	46	SER	2.2
1	C	318	TRP	2.1
1	A	302	THR	2.1
1	C	322	THR	2.1
1	B	365	ASP	2.0
1	C	193	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 monosaccharides in this entry.

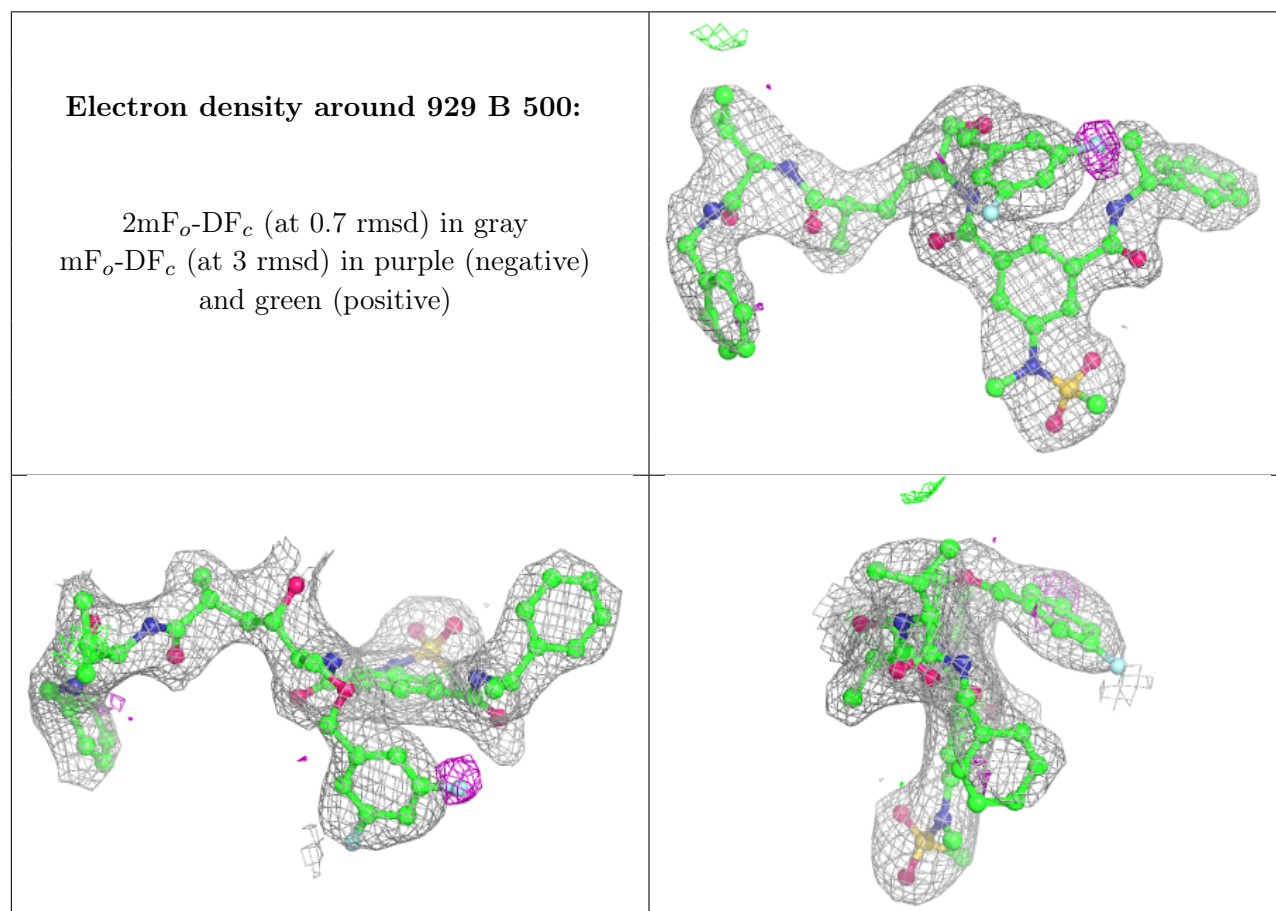
6.4 Ligands [i](#)

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.

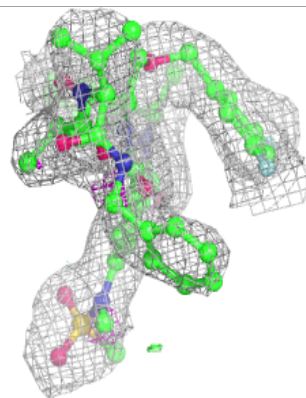
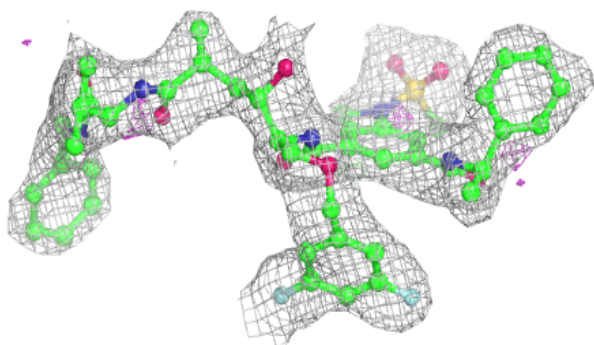
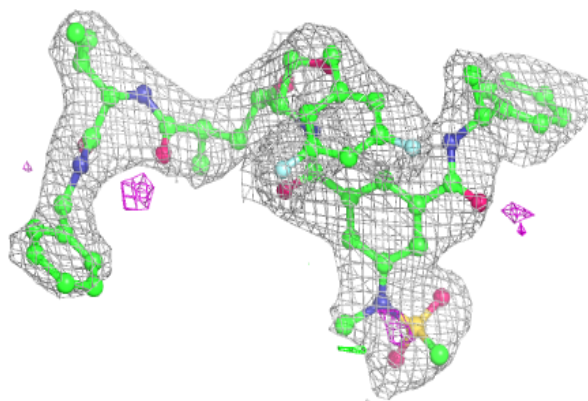
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	929	B	500	60/60	0.93	0.18	26,39,59,64	0
2	929	A	500	60/60	0.95	0.17	26,38,58,62	0
2	929	C	500	60/60	0.95	0.18	19,36,58,72	0

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.

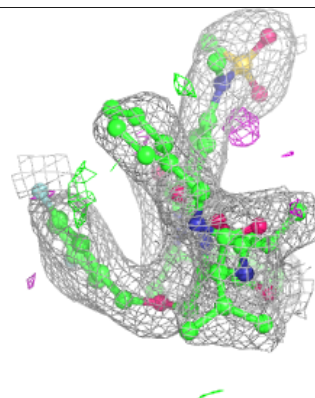
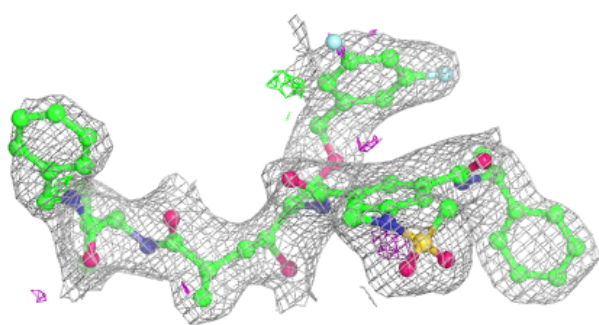
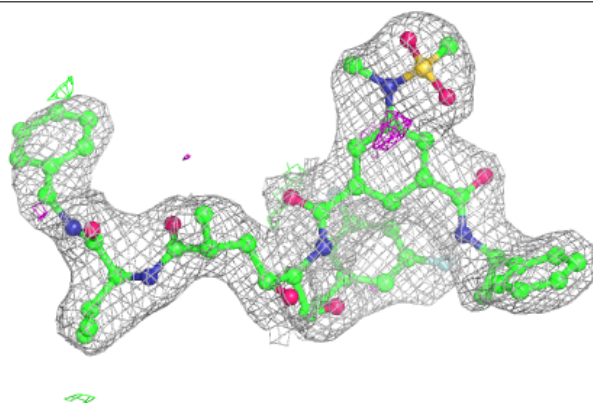


Electron density around 929 A 500:

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

**Electron density around 929 C 500:**

$2mF_o-DF_c$ (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.