



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 07:28 PM UTC

PDB ID : 1YAH / pdb_00001yah
Title : Crystal Structure of Human Liver Carboxylesterase complexed to Ethyl Acetate;
A Fatty Acid Ethyl Ester Analogue
Authors : Fleming, C.D.; Bencahrit, S.; Edwards, C.C.; Hyatt, J.L.; Morton, C.L.;
Howard-Williams, E.L.; Potter, P.M.; Redinbo, M.R.
Deposited on : 2004-12-17
Resolution : 3.00 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

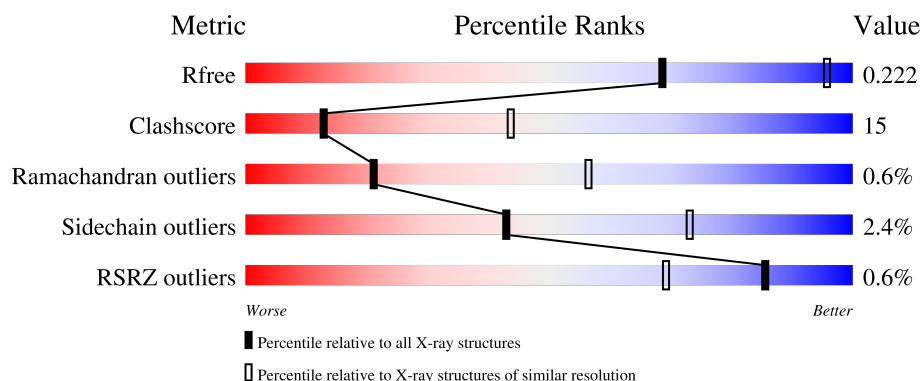
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (3.00-3.00)

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	532	% 68% 29% .
1	B	532	% 68% 30% .
1	C	532	72% 26% .

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
4	SO4	C	1382	-	-	-	X

2 Entry composition [i](#)

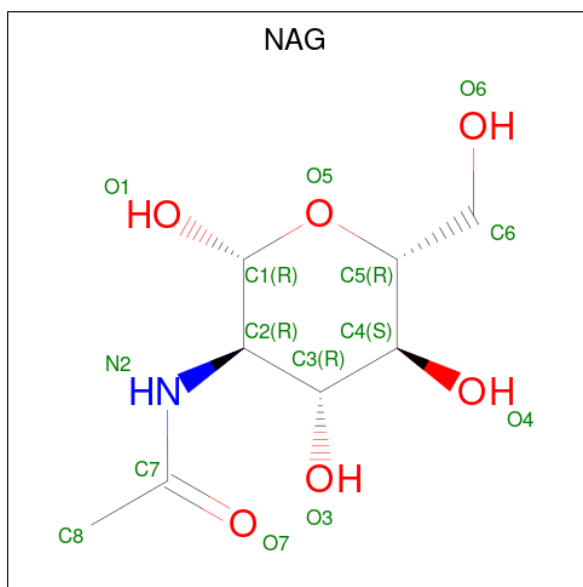
There are 6 unique types of molecules in this entry. The entry contains 12981 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 CES1 protein.

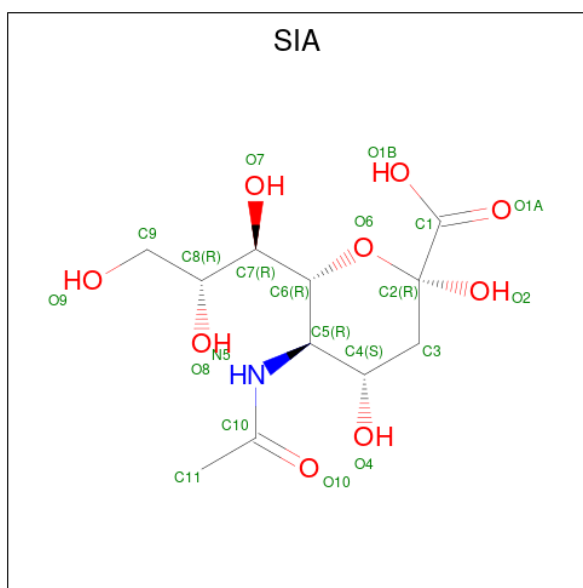
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	532	Total	C	N	O	S	0	0	0
			4130	2662	685	763	20			
1	B	532	Total	C	N	O	S	0	0	0
			4130	2662	685	763	20			
1	C	532	Total	C	N	O	S	0	0	0
			4131	2662	685	764	20			

- Molecule 2 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



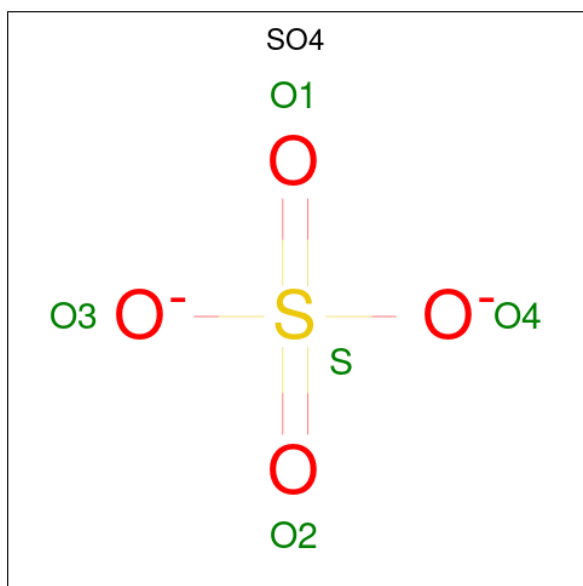
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 3 is N-acetyl-alpha-neuraminic acid (CCD ID: SIA) (formula: $C_{11}H_{19}NO_9$).



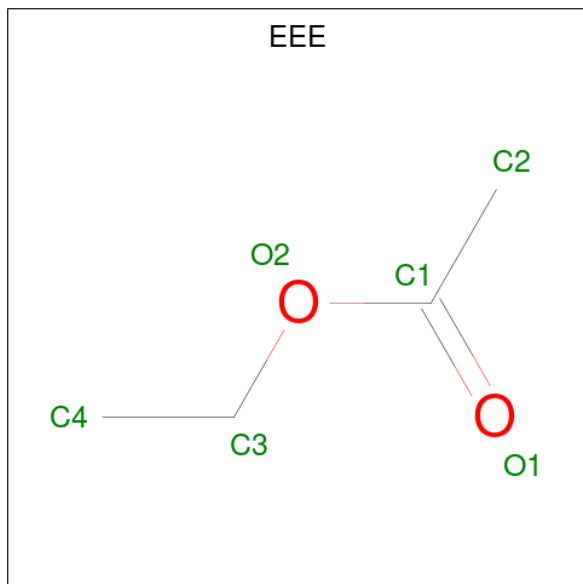
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			21	11	1	9		
3	A	1	Total	C	N	O	0	1
			21	11	1	9		
3	B	1	Total	C	N	O	0	0
			21	11	1	9		

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O_4S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total O S 5 4 1	0	0
4	A	1	Total O S 5 4 1	0	0
4	B	1	Total O S 5 4 1	0	0
4	C	1	Total O S 5 4 1	0	0
4	C	1	Total O S 5 4 1	0	0
4	C	1	Total O S 5 4 1	0	0

- Molecule 5 is ETHYL ACETATE (CCD ID: EEE) (formula: $C_4H_8O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 6 4 2	0	0
5	A	1	Total C O 6 4 2	0	0
5	B	1	Total C O 6 4 2	0	0
5	B	1	Total C O 6 4 2	0	0
5	C	1	Total C O 6 4 2	0	0
5	C	1	Total C O 6 4 2	0	0

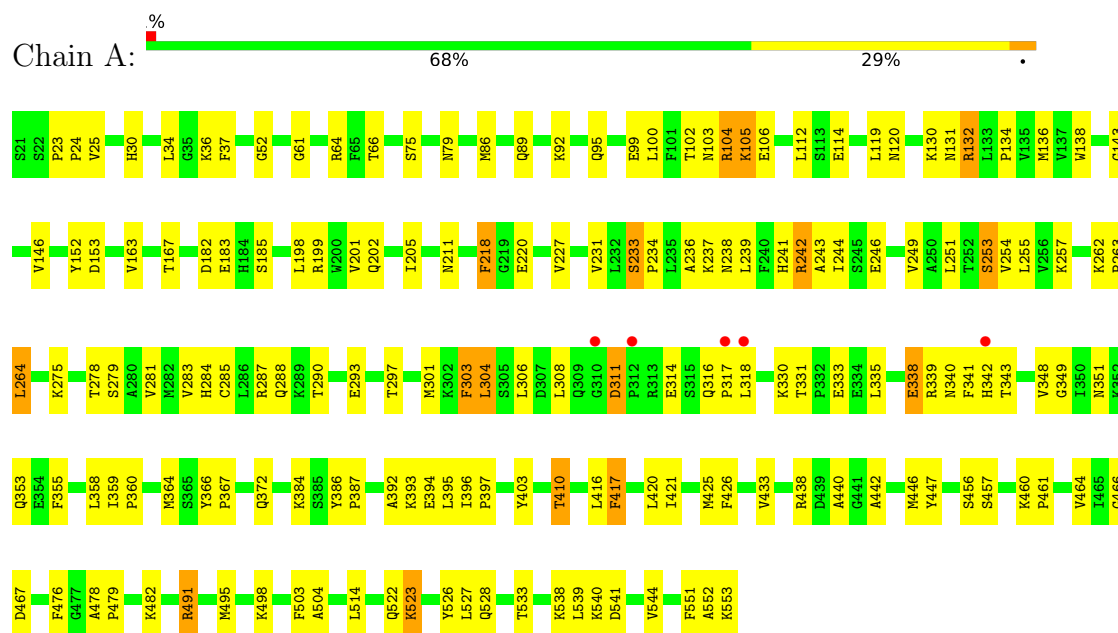
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	145	Total 145	O 145	0	0
6	B	127	Total 127	O 127	0	0
6	C	147	Total 147	O 147	0	0

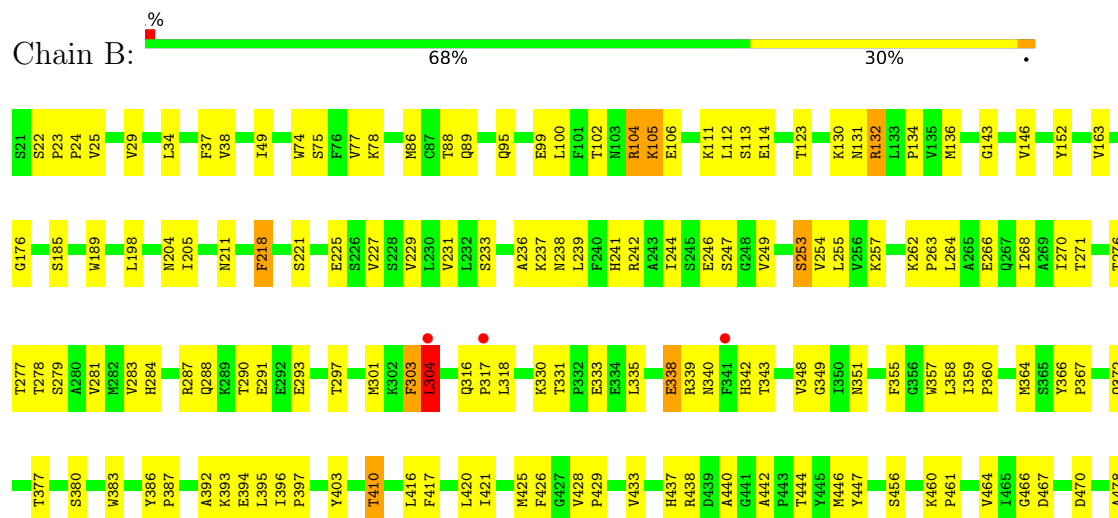
3 Residue-property plots

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: CES1 protein



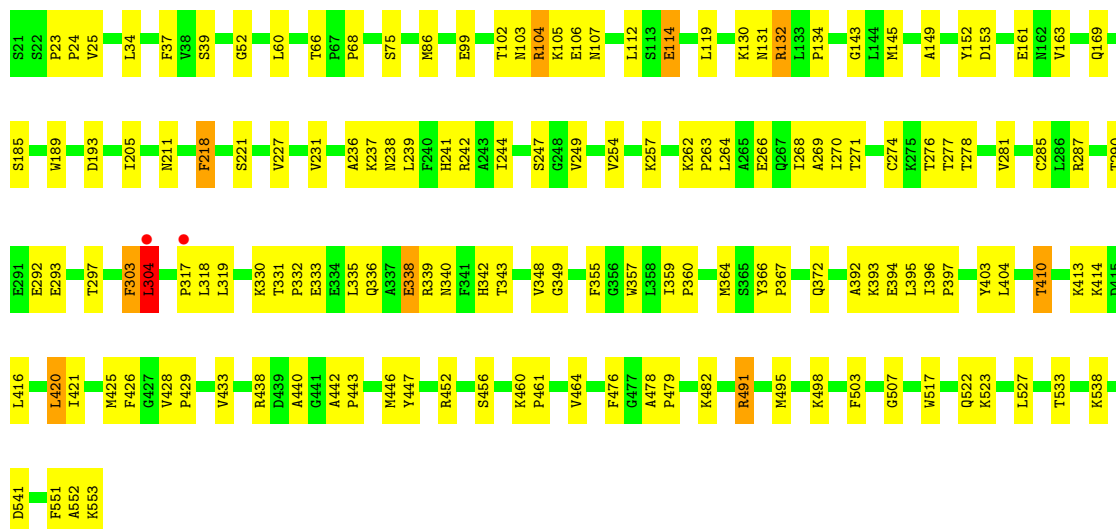
• Molecule 1: CES1 protein





• Molecule 1: CES1 protein

Chain C: 72% 26% .



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	55.50Å 181.15Å 203.01Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.87 – 3.00 48.87 – 3.00	Depositor EDS
% Data completeness (in resolution range)	99.7 (48.87-3.00) 99.7 (48.87-3.00)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	0.14	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.80 (at 3.01Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.190 , 0.229 0.183 , 0.222	Depositor DCC
R_{free} test set	2968 reflections (7.06%)	wwPDB-VP
Wilson B-factor (Å ²)	48.1	Xtriage
Anisotropy	0.617	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 55.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	12981	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.47% 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: SIA, EEE, SO4, NAG

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	0.46	0/4236	0.93	16/5754 (0.3%)
1	B	0.46	0/4236	0.93	8/5754 (0.1%)
1	C	0.46	0/4237	0.95	10/5754 (0.2%)
All	All	0.46	0/12709	0.94	34/17262 (0.2%)

There are no bond length outliers.

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	303	PHE	N-CA-C	11.93	127.62	113.18
1	B	303	PHE	N-CA-C	11.88	127.58	113.20
1	A	303	PHE	N-CA-C	10.43	125.81	113.18
1	B	304	LEU	N-CA-C	-9.15	102.50	114.31
1	A	304	LEU	N-CA-C	-8.44	103.17	113.97
1	C	75	SER	N-CA-C	8.32	121.47	111.82
1	B	75	SER	N-CA-C	8.07	121.18	111.82
1	C	304	LEU	N-CA-C	-7.50	104.36	113.97
1	C	114	GLU	N-CA-C	-7.49	103.61	112.89
1	A	75	SER	N-CA-C	6.63	120.58	112.23
1	C	552	ALA	N-CA-C	-6.37	105.56	113.15
1	B	303	PHE	CB-CA-C	-6.16	98.41	110.11
1	A	114	GLU	N-CA-C	-6.09	105.34	112.89
1	B	114	GLU	N-CA-C	-6.08	104.58	112.23
1	A	552	ALA	N-CA-C	-6.06	105.94	113.15
1	B	233	SER	N-CA-C	5.97	117.33	109.93
1	A	303	PHE	CB-CA-C	-5.95	98.12	109.95
1	A	61	GLY	CA-C-N	5.74	125.41	119.56
1	A	61	GLY	C-N-CA	5.74	125.41	119.56
1	C	303	PHE	CB-CA-C	-5.63	98.75	109.95
1	B	552	ALA	N-CA-C	-5.58	106.51	113.15

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	366	TYR	CA-C-N	5.35	126.52	119.84
1	C	366	TYR	C-N-CA	5.35	126.52	119.84
1	A	311	ASP	CA-C-N	5.33	125.15	119.28
1	A	311	ASP	C-N-CA	5.33	125.15	119.28
1	C	304	LEU	N-CA-CB	-5.32	103.28	110.67
1	B	304	LEU	N-CA-CB	-5.30	103.86	110.90
1	A	366	TYR	CA-C-N	5.29	126.45	119.84
1	A	366	TYR	C-N-CA	5.29	126.45	119.84
1	A	233	SER	CA-C-N	5.22	124.72	119.19
1	A	233	SER	C-N-CA	5.22	124.72	119.19
1	A	304	LEU	N-CA-CB	-5.15	103.52	110.67
1	C	507	GLY	N-CA-C	-5.07	107.10	114.90
1	A	417	PHE	N-CA-C	-5.05	105.85	111.36

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	4130	0	4130	131	0
1	B	4130	0	4131	127	0
1	C	4131	0	4131	118	0
2	A	14	0	13	0	0
2	B	14	0	13	0	0
2	C	14	0	13	0	0
3	A	42	0	19	4	0
3	B	21	0	18	0	0
4	A	10	0	0	0	0
4	B	5	0	0	0	0
4	C	15	0	0	0	0
5	A	12	0	16	0	0
5	B	12	0	16	0	0
5	C	12	0	16	0	0
6	A	145	0	0	20	0
6	B	127	0	0	8	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	C	147	0	0	11	0
All	All	12981	0	12516	378	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 15.

All (378) 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:B:491:ARG:HH11	1:B:491:ARG:HB2	1.17	1.06
1:C:491:ARG:HH11	1:C:491:ARG:HB2	1.26	1.00
1:A:491:ARG:HH11	1:A:491:ARG:HB2	1.27	0.97
1:B:290:THR:OG1	1:B:293:GLU:HG3	1.76	0.85
1:C:290:THR:OG1	1:C:293:GLU:HG3	1.78	0.83
1:B:532:ASN:HB3	6:B:7002:HOH:O	1.78	0.82
1:A:290:THR:OG1	1:A:293:GLU:HG3	1.81	0.81
1:A:338:GLU:HG2	1:A:340:ASN:H	1.47	0.79
1:C:343:THR:HA	6:C:7006:HOH:O	1.82	0.79
1:C:134:PRO:HG2	1:C:163:VAL:HG12	1.66	0.78
1:C:338:GLU:HG2	1:C:340:ASN:H	1.50	0.77
1:B:491:ARG:HB2	1:B:491:ARG:NH1	1.97	0.76
1:A:491:ARG:HB2	1:A:491:ARG:NH1	2.01	0.75
1:C:456:SER:HB3	1:C:460:LYS:HD3	1.70	0.74
1:B:338:GLU:HG2	1:B:340:ASN:H	1.52	0.74
1:B:134:PRO:HG2	1:B:163:VAL:HG12	1.70	0.74
1:C:491:ARG:HB2	1:C:491:ARG:NH1	2.03	0.73
1:B:410:THR:HG21	6:B:7253:HOH:O	1.88	0.73
1:C:303:PHE:O	1:C:317:PRO:O	2.06	0.73
1:A:134:PRO:HG2	1:A:163:VAL:HG12	1.72	0.72
1:C:242:ARG:HH11	1:C:242:ARG:HG2	1.53	0.72
1:C:349:GLY:HA3	1:C:447:TYR:CE1	2.25	0.71
1:C:86:MET:HE3	1:C:112:LEU:HD21	1.73	0.69
1:A:353:GLN:HA	6:A:7118:HOH:O	1.92	0.69
1:A:303:PHE:O	1:A:317:PRO:O	2.11	0.69
1:B:303:PHE:O	1:B:317:PRO:O	2.11	0.68
1:B:25:VAL:HG22	1:B:34:LEU:HD23	1.74	0.68
1:B:242:ARG:HG2	1:B:242:ARG:HH11	1.56	0.68
1:C:132:ARG:HB3	1:C:211:ASN:HB2	1.74	0.68
1:C:25:VAL:HG22	1:C:34:LEU:HD23	1.74	0.68
1:A:308:LEU:HB2	6:A:7084:HOH:O	1.93	0.68
1:C:23:PRO:HB2	1:C:34:LEU:HD21	1.76	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:24:PRO:HG3	1:A:37:PHE:CZ	2.28	0.68
1:A:359:ILE:HB	1:A:360:PRO:HD3	1.74	0.68
1:C:24:PRO:HG3	1:C:37:PHE:CE1	2.29	0.67
1:A:242:ARG:HG2	1:A:242:ARG:HH11	1.59	0.67
1:C:24:PRO:HG3	1:C:37:PHE:CZ	2.30	0.67
1:B:456:SER:HB3	1:B:460:LYS:HD3	1.76	0.67
1:B:438:ARG:HD2	1:B:522:GLN:HE21	1.60	0.67
1:A:23:PRO:HB2	1:A:34:LEU:HD21	1.76	0.66
1:B:24:PRO:HG3	1:B:37:PHE:CZ	2.30	0.66
1:C:130:LYS:HE2	6:C:7245:HOH:O	1.95	0.66
1:A:25:VAL:HG22	1:A:34:LEU:HD23	1.77	0.65
1:B:425:MET:HE3	1:B:426:PHE:HE1	1.59	0.65
1:A:131:ASN:C	1:A:132:ARG:HD2	2.21	0.65
1:A:283:VAL:O	1:A:287:ARG:HG3	1.97	0.65
1:B:23:PRO:HB2	1:B:34:LEU:HD21	1.78	0.65
1:A:456:SER:HB3	1:A:460:LYS:HD3	1.76	0.64
1:B:491:ARG:HH11	1:B:491:ARG:CB	2.02	0.64
1:A:236:ALA:HA	1:A:239:LEU:HD12	1.80	0.64
1:A:106:GLU:HB3	6:A:7193:HOH:O	1.97	0.64
1:B:349:GLY:HA3	1:B:447:TYR:CE1	2.33	0.64
1:B:421:ILE:HG22	1:B:425:MET:HE2	1.79	0.64
1:B:111:LYS:HG3	6:B:7064:HOH:O	1.97	0.64
1:A:262:LYS:HB3	1:A:263:PRO:HD3	1.79	0.63
1:C:339:ARG:HG2	1:C:440:ALA:HA	1.79	0.62
1:C:495:MET:HE1	1:C:533:THR:OG1	1.98	0.62
1:B:425:MET:HE3	1:B:426:PHE:CE1	2.35	0.62
1:A:241:HIS:C	1:A:242:ARG:HG3	2.24	0.62
1:C:304:LEU:O	1:C:364:MET:HG2	1.99	0.62
1:A:396:ILE:HB	1:A:397:PRO:HD3	1.83	0.61
1:B:359:ILE:HB	1:B:360:PRO:HD3	1.83	0.61
1:B:527:LEU:HD11	1:B:533:THR:HG22	1.83	0.61
1:C:241:HIS:C	1:C:242:ARG:HG3	2.24	0.61
1:B:24:PRO:HG3	1:B:37:PHE:CE1	2.35	0.60
1:A:52:GLY:O	3:A:1180:SIA:H91	2.01	0.60
1:A:425:MET:HE3	1:A:426:PHE:HE1	1.64	0.60
1:C:242:ARG:HH11	1:C:242:ARG:CG	2.15	0.60
1:A:438:ARG:HD2	1:A:522:GLN:HE21	1.66	0.60
1:B:438:ARG:HD2	1:B:522:GLN:NE2	2.17	0.60
1:B:403:TYR:CG	1:B:420:LEU:HD23	2.37	0.59
1:B:241:HIS:C	1:B:242:ARG:HG3	2.27	0.59
1:B:339:ARG:HG2	1:B:440:ALA:HA	1.85	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:241:HIS:O	1:A:242:ARG:HG3	2.02	0.59
1:A:438:ARG:HD2	1:A:522:GLN:NE2	2.18	0.59
1:A:242:ARG:HH11	1:A:242:ARG:CG	2.15	0.59
1:A:425:MET:HE3	1:A:426:PHE:CE1	2.38	0.59
1:A:283:VAL:HG12	1:A:287:ARG:NH1	2.18	0.58
1:A:339:ARG:HG2	1:A:440:ALA:HA	1.86	0.58
1:C:342:HIS:HD2	6:C:7129:HOH:O	1.86	0.58
1:A:132:ARG:NH1	6:A:7004:HOH:O	2.37	0.58
1:B:236:ALA:HA	1:B:239:LEU:HD12	1.86	0.58
1:C:237:LYS:HE3	1:C:342:HIS:HB2	1.86	0.58
1:C:357:TRP:O	1:C:360:PRO:HD2	2.04	0.57
1:B:372:GLN:HB2	1:B:410:THR:HB	1.86	0.57
1:B:478:ALA:N	1:B:479:PRO:CD	2.68	0.57
1:C:396:ILE:HB	1:C:397:PRO:HD3	1.85	0.57
1:C:372:GLN:HB2	1:C:410:THR:HB	1.86	0.57
1:B:392:ALA:HB3	1:B:395:LEU:HG	1.86	0.57
1:A:495:MET:HE1	1:A:533:THR:OG1	2.05	0.57
1:C:527:LEU:HD11	1:C:533:THR:HG22	1.86	0.57
1:C:131:ASN:C	1:C:132:ARG:HD2	2.31	0.56
1:A:100:LEU:HD13	1:A:358:LEU:CD1	2.35	0.56
1:A:102:THR:OG1	1:A:104:ARG:HG2	2.05	0.56
1:B:279:SER:O	1:B:283:VAL:HG23	2.05	0.56
1:B:105:LYS:HZ3	1:B:106:GLU:HG2	1.71	0.56
1:A:143:GLY:O	1:A:318:LEU:HD22	2.05	0.56
1:A:461:PRO:HG2	1:A:464:VAL:HG23	1.87	0.56
1:B:237:LYS:HE3	1:B:342:HIS:HB2	1.88	0.56
1:C:359:ILE:HB	1:C:360:PRO:HD3	1.87	0.56
1:C:438:ARG:HD2	1:C:522:GLN:HE21	1.71	0.56
1:B:262:LYS:HB3	1:B:263:PRO:HD3	1.88	0.55
1:B:355:PHE:CE1	1:B:360:PRO:HG3	2.40	0.55
1:C:236:ALA:HA	1:C:239:LEU:HD12	1.89	0.55
1:C:262:LYS:HB3	1:C:263:PRO:HD3	1.88	0.55
1:C:403:TYR:O	1:C:416:LEU:HD13	2.06	0.55
1:A:264:LEU:HB2	6:A:7205:HOH:O	2.06	0.55
1:C:343:THR:HB	1:C:442:ALA:HB2	1.87	0.55
1:A:433:VAL:HG22	6:A:7356:HOH:O	2.06	0.55
1:B:396:ILE:HB	1:B:397:PRO:HD3	1.88	0.55
1:B:304:LEU:O	1:B:364:MET:HG2	2.06	0.55
1:B:403:TYR:O	1:B:416:LEU:HD13	2.07	0.55
1:C:104:ARG:NH1	1:C:153:ASP:HB2	2.22	0.55
1:C:285:CYS:HB2	6:C:7142:HOH:O	2.07	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:105:LYS:HG3	6:A:7113:HOH:O	2.07	0.55
3:A:1180:SIA:O4	3:A:1180:SIA:H113	2.08	0.54
1:B:77:VAL:HB	6:B:7326:HOH:O	2.06	0.54
1:B:421:ILE:CG2	1:B:425:MET:HE2	2.38	0.54
1:A:523:LYS:HE3	6:A:7270:HOH:O	2.07	0.54
1:C:461:PRO:HG2	1:C:464:VAL:HG23	1.90	0.54
1:C:241:HIS:O	1:C:242:ARG:HG3	2.08	0.54
1:A:478:ALA:N	1:A:479:PRO:CD	2.71	0.54
1:B:86:MET:HE3	1:B:112:LEU:HD21	1.90	0.54
1:C:130:LYS:HD3	1:C:132:ARG:HD3	1.90	0.54
1:A:355:PHE:CE1	1:A:360:PRO:HG3	2.43	0.54
1:B:348:VAL:O	1:B:446:MET:HA	2.07	0.54
1:A:227:VAL:O	1:A:231:VAL:HG23	2.07	0.53
1:A:24:PRO:HG3	1:A:37:PHE:CE1	2.43	0.53
1:A:372:GLN:HB2	1:A:410:THR:HB	1.89	0.53
1:A:349:GLY:HA3	1:A:447:TYR:CE1	2.43	0.53
1:B:316:GLN:HB2	6:B:7285:HOH:O	2.09	0.53
1:A:403:TYR:CG	1:A:420:LEU:HD23	2.43	0.53
1:B:242:ARG:HH11	1:B:242:ARG:CG	2.22	0.53
1:C:421:ILE:CG2	1:C:425:MET:HE2	2.37	0.53
1:B:377:THR:O	1:B:380:SER:HB3	2.09	0.53
1:C:106:GLU:HG3	1:C:106:GLU:O	2.08	0.53
1:B:333:GLU:CD	1:B:333:GLU:H	2.17	0.52
1:B:131:ASN:C	1:B:132:ARG:HD2	2.34	0.52
1:A:403:TYR:O	1:A:416:LEU:HD13	2.10	0.52
1:A:262:LYS:HE3	1:A:279:SER:OG	2.09	0.52
1:C:290:THR:HG23	1:C:293:GLU:OE2	2.08	0.52
1:B:25:VAL:CG2	1:B:34:LEU:HD23	2.38	0.52
1:B:100:LEU:HD13	1:B:358:LEU:CD1	2.39	0.52
1:B:266:GLU:O	1:B:270:ILE:HG13	2.10	0.52
1:B:283:VAL:HG12	1:B:287:ARG:NH1	2.24	0.52
1:A:522:GLN:NE2	1:A:522:GLN:HA	2.25	0.52
1:B:495:MET:HE1	1:B:533:THR:OG1	2.10	0.52
1:B:498:LYS:HB3	1:B:514:LEU:HD11	1.92	0.52
1:A:242:ARG:CG	1:A:242:ARG:NH1	2.73	0.51
1:B:113:SER:HB2	1:C:277:THR:HG21	1.91	0.51
1:A:198:LEU:HB3	1:A:239:LEU:HB3	1.93	0.51
1:C:348:VAL:O	1:C:446:MET:HA	2.11	0.51
1:A:79:ASN:HB2	3:A:1180:SIA:C1	2.41	0.51
1:A:392:ALA:HB3	1:A:395:LEU:HG	1.93	0.51
1:A:491:ARG:HD2	6:A:7229:HOH:O	2.11	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:268:ILE:HG12	1:B:301:MET:HE2	1.92	0.51
1:B:403:TYR:CE2	1:B:420:LEU:HA	2.46	0.51
1:A:341:PHE:HD1	6:A:7337:HOH:O	1.93	0.51
1:B:105:LYS:NZ	1:B:106:GLU:HG2	2.26	0.51
1:B:357:TRP:O	1:B:360:PRO:HD2	2.10	0.51
1:A:237:LYS:HE3	1:A:342:HIS:HB2	1.94	0.50
1:A:461:PRO:HG2	1:A:464:VAL:CG2	2.40	0.50
1:B:271:THR:HG22	1:B:297:THR:HG23	1.92	0.50
1:C:443:PRO:HD3	6:C:7250:HOH:O	2.11	0.50
1:A:130:LYS:HD3	1:A:132:ARG:HD3	1.94	0.50
1:B:38:VAL:HG21	1:B:49:ILE:HD12	1.93	0.50
1:C:551:PHE:C	1:C:553:LYS:H	2.18	0.50
1:B:95:GLN:O	1:B:99:GLU:HG3	2.12	0.49
1:B:283:VAL:O	1:B:287:ARG:HG3	2.11	0.49
1:B:330:LYS:HG3	1:B:335:LEU:HG	1.93	0.49
1:C:102:THR:OG1	1:C:104:ARG:HG2	2.11	0.49
1:A:297:THR:O	1:A:301:MET:HG2	2.12	0.49
1:C:189:TRP:HH2	6:C:7392:HOH:O	1.95	0.49
1:A:275:LYS:HB2	6:A:7218:HOH:O	2.12	0.49
1:B:343:THR:HB	1:B:442:ALA:HB2	1.94	0.49
1:C:421:ILE:HG22	1:C:425:MET:HE2	1.94	0.49
1:A:284:HIS:O	1:A:288:GLN:HG2	2.12	0.49
1:A:491:ARG:HH11	1:A:491:ARG:CB	2.12	0.49
1:B:284:HIS:O	1:B:288:GLN:HG2	2.11	0.49
1:A:120:ASN:HB2	1:A:167:THR:OG1	2.12	0.49
1:A:330:LYS:HG3	1:A:335:LEU:HG	1.94	0.49
1:A:417:PHE:O	1:A:420:LEU:HB3	2.13	0.49
1:C:394:GLU:OE2	1:C:553:LYS:HE3	2.13	0.49
1:C:478:ALA:N	1:C:479:PRO:CD	2.76	0.49
1:A:348:VAL:O	1:A:446:MET:HA	2.13	0.49
1:B:355:PHE:CD1	1:B:360:PRO:HG3	2.48	0.48
1:C:103:ASN:HB3	6:C:7088:HOH:O	2.12	0.48
1:A:526:TYR:CE2	1:A:539:LEU:HB2	2.48	0.48
1:B:394:GLU:OE2	1:B:553:LYS:HE3	2.14	0.48
1:B:461:PRO:HG2	1:B:464:VAL:HG23	1.95	0.48
1:A:353:GLN:O	1:A:467:ASP:HA	2.14	0.48
1:B:403:TYR:CD1	1:B:420:LEU:HD23	2.49	0.48
1:C:403:TYR:CE2	1:C:420:LEU:HA	2.49	0.48
1:B:143:GLY:O	1:B:318:LEU:HD22	2.13	0.48
1:B:331:THR:HB	1:B:333:GLU:OE1	2.13	0.48
1:B:551:PHE:C	1:B:553:LYS:H	2.20	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:218:PHE:CB	1:C:244:ILE:HB	2.44	0.48
1:C:266:GLU:O	1:C:270:ILE:HG13	2.13	0.48
1:C:438:ARG:HD2	1:C:522:GLN:NE2	2.29	0.48
1:C:119:LEU:HD12	1:C:119:LEU:O	2.14	0.48
1:C:330:LYS:HG3	1:C:335:LEU:HG	1.96	0.48
1:A:237:LYS:O	1:A:238:ASN:HB2	2.14	0.47
3:A:1180:SIA:H7	6:A:7056:HOH:O	2.14	0.47
1:B:102:THR:OG1	1:B:104:ARG:HG2	2.13	0.47
1:B:349:GLY:HA3	1:B:447:TYR:CZ	2.48	0.47
1:B:198:LEU:HB3	1:B:239:LEU:HB3	1.96	0.47
1:A:403:TYR:CE2	1:A:420:LEU:HA	2.49	0.47
1:B:257:LYS:HE3	1:B:318:LEU:O	2.14	0.47
1:B:522:GLN:NE2	1:B:522:GLN:HA	2.30	0.47
1:C:103:ASN:ND2	1:C:476:PHE:HB3	2.29	0.47
1:A:218:PHE:CB	1:A:244:ILE:HB	2.45	0.47
1:B:218:PHE:CB	1:B:244:ILE:HB	2.44	0.47
1:C:105:LYS:NZ	1:C:106:GLU:HG2	2.29	0.47
1:A:132:ARG:HB3	1:A:211:ASN:HB2	1.97	0.47
1:A:331:THR:HB	1:A:333:GLU:OE1	2.15	0.47
1:B:227:VAL:O	1:B:231:VAL:HG23	2.15	0.47
1:A:257:LYS:HE3	1:A:318:LEU:O	2.15	0.46
1:A:551:PHE:C	1:A:553:LYS:H	2.24	0.46
1:B:132:ARG:HB3	1:B:211:ASN:HB2	1.96	0.46
1:B:351:ASN:HB3	1:B:466:GLY:O	2.15	0.46
1:C:143:GLY:O	1:C:318:LEU:HD22	2.15	0.46
1:A:95:GLN:O	1:A:99:GLU:HG3	2.16	0.46
1:A:304:LEU:O	1:A:364:MET:HG2	2.14	0.46
1:A:23:PRO:HA	1:A:24:PRO:HD3	1.79	0.46
1:A:105:LYS:HA	1:A:482:LYS:HG2	1.96	0.46
1:A:498:LYS:HB3	1:A:514:LEU:HD11	1.96	0.46
1:A:152:TYR:N	1:A:152:TYR:CD1	2.84	0.46
1:C:428:VAL:HB	1:C:429:PRO:HD3	1.96	0.46
1:C:522:GLN:NE2	1:C:522:GLN:HA	2.31	0.46
1:A:25:VAL:CG2	1:A:34:LEU:HD23	2.45	0.46
1:A:278:THR:OG1	1:A:281:VAL:HG23	2.16	0.46
1:B:447:TYR:C	1:B:447:TYR:CD2	2.93	0.46
1:A:386:TYR:N	1:A:387:PRO:HD2	2.31	0.46
1:B:386:TYR:N	1:B:387:PRO:HD2	2.30	0.46
1:C:257:LYS:HE3	1:C:318:LEU:O	2.16	0.46
1:A:89:GLN:OE1	1:A:146:VAL:HB	2.15	0.46
1:A:421:ILE:HG22	1:A:425:MET:HE2	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:242:ARG:HD3	1:C:503:PHE:O	2.16	0.46
1:C:318:LEU:HD12	1:C:318:LEU:C	2.41	0.46
1:C:403:TYR:CG	1:C:420:LEU:HD23	2.51	0.46
1:C:339:ARG:CG	1:C:440:ALA:HA	2.44	0.46
1:B:221:SER:HA	1:B:247:SER:O	2.16	0.46
1:A:92:LYS:HA	6:A:7195:HOH:O	2.16	0.45
1:C:355:PHE:CE1	1:C:360:PRO:HG3	2.51	0.45
1:C:227:VAL:O	1:C:231:VAL:HG23	2.16	0.45
1:B:205:ILE:HD12	1:B:205:ILE:HA	1.81	0.45
1:C:66:THR:HG22	1:C:287:ARG:HH21	1.81	0.45
1:A:527:LEU:HD11	1:A:533:THR:HG22	1.98	0.45
1:C:269:ALA:O	1:C:274:CYS:HB2	2.16	0.45
1:C:392:ALA:HB3	1:C:395:LEU:HG	1.99	0.45
1:B:542:LYS:HB3	6:B:7156:HOH:O	2.17	0.45
1:C:23:PRO:HA	1:C:24:PRO:HD3	1.76	0.45
1:C:425:MET:HE3	1:C:426:PHE:HE1	1.81	0.45
1:B:527:LEU:HD11	1:B:533:THR:CG2	2.45	0.45
1:B:89:GLN:OE1	1:B:146:VAL:HB	2.17	0.45
1:A:201:VAL:HG13	1:A:205:ILE:HB	1.99	0.45
1:C:242:ARG:CG	1:C:242:ARG:NH1	2.74	0.45
1:A:202:GLN:HB3	6:A:7003:HOH:O	2.17	0.45
1:B:242:ARG:CG	1:B:242:ARG:NH1	2.79	0.45
1:C:333:GLU:CD	1:C:333:GLU:H	2.24	0.45
1:A:119:LEU:HD12	1:A:119:LEU:C	2.42	0.44
1:B:123:THR:HG23	1:B:123:THR:O	2.15	0.44
1:C:452:ARG:HD2	1:C:464:VAL:O	2.16	0.44
1:C:461:PRO:HG2	1:C:464:VAL:CG2	2.47	0.44
1:A:242:ARG:HD3	1:A:503:PHE:O	2.16	0.44
1:A:394:GLU:OE2	1:A:553:LYS:HE3	2.18	0.44
1:A:199:ARG:NH1	1:A:199:ARG:HG2	2.32	0.44
1:C:393:LYS:HA	1:C:396:ILE:HG12	2.00	0.44
1:A:285:CYS:HB2	6:A:7054:HOH:O	2.18	0.44
1:B:278:THR:OG1	1:B:281:VAL:HG23	2.17	0.44
1:B:420:LEU:HD22	1:B:547:TRP:HZ2	1.82	0.44
1:C:25:VAL:CG2	1:C:34:LEU:HD23	2.43	0.44
1:C:221:SER:HA	1:C:247:SER:O	2.17	0.44
1:C:355:PHE:CD1	1:C:360:PRO:HG3	2.53	0.44
1:A:338:GLU:HG2	1:A:339:ARG:N	2.31	0.44
1:B:495:MET:O	1:B:498:LYS:HB2	2.17	0.44
1:A:253:SER:O	1:A:255:LEU:N	2.50	0.44
1:A:138:TRP:HH2	1:A:220:GLU:HB2	1.83	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:246:GLU:HG2	1:A:447:TYR:OH	2.18	0.44
1:C:538:LYS:HB3	1:C:541:ASP:HB2	1.99	0.44
1:B:29:VAL:HG23	1:B:204:ASN:OD1	2.18	0.44
1:B:428:VAL:HB	1:B:429:PRO:HD3	2.00	0.44
1:C:161:GLU:OE2	1:C:498:LYS:HG2	2.17	0.43
1:C:414:LYS:HD3	6:C:7049:HOH:O	2.18	0.43
1:A:351:ASN:HB3	1:A:466:GLY:O	2.18	0.43
1:C:349:GLY:HA3	1:C:447:TYR:CD1	2.53	0.43
1:A:218:PHE:HB2	1:A:244:ILE:HB	2.00	0.43
1:A:279:SER:O	1:A:283:VAL:HG23	2.19	0.43
1:B:467:ASP:N	1:B:470:ASP:OD2	2.51	0.43
1:A:333:GLU:H	1:A:333:GLU:CD	2.26	0.43
1:A:540:LYS:O	1:A:544:VAL:HG23	2.19	0.43
1:B:152:TYR:CD1	1:B:152:TYR:N	2.86	0.43
1:B:249:VAL:HB	1:B:433:VAL:HG21	2.01	0.43
1:B:366:TYR:HA	1:B:367:PRO:HD3	1.81	0.43
1:A:233:SER:HA	1:A:234:PRO:HD3	1.79	0.43
1:C:119:LEU:HD12	1:C:119:LEU:C	2.44	0.43
1:C:338:GLU:HG2	1:C:339:ARG:N	2.34	0.43
1:B:176:GLY:HA2	1:B:189:TRP:HB2	2.01	0.43
1:C:447:TYR:HB3	1:C:517:TRP:CZ2	2.53	0.43
1:A:119:LEU:HD12	1:A:119:LEU:O	2.19	0.43
1:B:130:LYS:HD3	1:B:132:ARG:HD3	2.01	0.43
1:B:318:LEU:C	1:B:318:LEU:HD12	2.44	0.43
1:B:393:LYS:HA	1:B:396:ILE:HG12	2.01	0.43
1:C:237:LYS:O	1:C:238:ASN:HB2	2.19	0.43
1:A:30:HIS:HD2	6:A:7057:HOH:O	2.01	0.42
1:A:339:ARG:CG	1:A:440:ALA:HA	2.48	0.42
1:A:343:THR:HB	1:A:442:ALA:HB2	2.00	0.42
1:C:249:VAL:HB	1:C:433:VAL:HG21	2.01	0.42
1:C:404:LEU:HD13	1:C:413:LYS:HB3	2.00	0.42
1:A:86:MET:HE3	1:A:112:LEU:HD21	2.01	0.42
1:A:105:LYS:NZ	1:A:106:GLU:HG2	2.34	0.42
1:A:182:ASP:HB2	1:A:183:GLU:OE2	2.19	0.42
1:B:225:GLU:O	1:B:229:VAL:HG23	2.19	0.42
1:B:417:PHE:O	1:B:420:LEU:HB3	2.19	0.42
1:C:145:MET:HE2	1:C:303:PHE:CD1	2.55	0.42
1:A:64:ARG:O	1:A:66:THR:HG23	2.19	0.42
1:A:526:TYR:CE1	1:A:528:GLN:HG2	2.55	0.42
1:A:538:LYS:HB3	1:A:541:ASP:HB2	2.01	0.42
1:B:86:MET:HG3	1:B:112:LEU:HD23	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:105:LYS:HA	1:C:482:LYS:HG2	2.02	0.42
1:A:311:ASP:HB3	1:A:314:GLU:OE1	2.19	0.42
1:C:527:LEU:HD11	1:C:533:THR:CG2	2.49	0.42
1:A:355:PHE:CD1	1:A:360:PRO:HG3	2.54	0.42
1:C:39:SER:HA	6:C:7274:HOH:O	2.18	0.42
1:C:276:THR:O	1:C:277:THR:C	2.61	0.42
1:A:457:SER:HA	6:A:7168:HOH:O	2.18	0.42
1:B:538:LYS:HB3	1:B:541:ASP:HB2	2.02	0.42
1:B:276:THR:O	1:B:277:THR:C	2.63	0.42
1:C:149:ALA:HB2	1:C:169:GLN:HG3	2.01	0.42
1:C:218:PHE:HB2	1:C:244:ILE:HB	2.02	0.42
1:C:331:THR:HB	1:C:333:GLU:OE1	2.20	0.42
1:B:540:LYS:O	1:B:544:VAL:HG23	2.20	0.41
1:A:104:ARG:NH1	1:A:153:ASP:HB2	2.34	0.41
1:B:461:PRO:HG2	1:B:464:VAL:CG2	2.49	0.41
1:C:99:GLU:HG2	1:C:107:ASN:OD1	2.21	0.41
1:C:364:MET:HE2	1:C:364:MET:HB3	1.94	0.41
1:A:103:ASN:ND2	1:A:476:PHE:HB3	2.35	0.41
1:A:249:VAL:HG23	1:A:251:LEU:H	1.85	0.41
1:B:136:MET:HB3	1:B:218:PHE:CE1	2.54	0.41
1:B:447:TYR:HB3	1:B:517:TRP:CZ2	2.55	0.41
1:C:86:MET:HG3	1:C:112:LEU:HD23	2.02	0.41
1:B:237:LYS:O	1:B:238:ASN:HB2	2.19	0.41
1:B:253:SER:O	1:B:255:LEU:N	2.53	0.41
1:A:538:LYS:HD2	6:A:7343:HOH:O	2.20	0.41
1:B:383:TRP:O	1:B:386:TYR:HB2	2.21	0.41
1:B:437:HIS:HD2	1:B:444:THR:OG1	2.04	0.41
1:A:36:LYS:NZ	6:A:7115:HOH:O	2.54	0.41
1:B:105:LYS:HA	1:B:482:LYS:HG2	2.02	0.41
1:B:297:THR:O	1:B:301:MET:HG2	2.21	0.41
1:C:268:ILE:HD11	1:C:319:LEU:CD2	2.51	0.41
1:C:357:TRP:C	1:C:360:PRO:HD2	2.45	0.41
1:A:227:VAL:CG1	1:A:243:ALA:HB1	2.51	0.41
1:B:23:PRO:HD2	6:B:7308:HOH:O	2.21	0.41
1:B:23:PRO:HA	1:B:24:PRO:HD3	1.86	0.41
1:B:218:PHE:HB2	1:B:244:ILE:HB	2.03	0.41
1:B:246:GLU:HG2	1:B:447:TYR:OH	2.21	0.41
1:B:338:GLU:HG2	1:B:339:ARG:N	2.36	0.41
1:C:152:TYR:CD1	1:C:152:TYR:N	2.89	0.41
1:C:278:THR:OG1	1:C:281:VAL:HG23	2.21	0.41
1:C:349:GLY:HA3	1:C:447:TYR:CZ	2.56	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:291:GLU:HG2	6:B:7324:HOH:O	2.20	0.41
1:C:271:THR:HG22	1:C:297:THR:HG23	2.04	0.41
1:B:74:TRP:CD2	1:B:78:LYS:HE2	2.56	0.40
1:C:130:LYS:HA	6:C:7199:HOH:O	2.21	0.40
1:C:332:PRO:O	1:C:336:GLN:HG2	2.20	0.40
1:A:306:LEU:HD11	1:A:384:LYS:O	2.22	0.40
1:B:22:SER:O	1:B:23:PRO:C	2.64	0.40
1:C:68:PRO:HB3	1:C:193:ASP:OD1	2.22	0.40
1:A:205:ILE:HD12	1:A:205:ILE:HA	1.88	0.40
1:A:316:GLN:HA	1:A:316:GLN:NE2	2.35	0.40
1:A:393:LYS:HA	1:A:396:ILE:HG12	2.04	0.40
1:C:86:MET:HE3	1:C:112:LEU:CD2	2.47	0.40
1:C:292:GLU:HG3	6:C:7233:HOH:O	2.21	0.40
1:C:60:LEU:CD2	1:C:114:GLU:HB2	2.51	0.40
1:A:104:ARG:O	1:A:482:LYS:HE3	2.22	0.40
1:A:136:MET:HE3	1:A:504:ALA:HB2	2.04	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	530/532 (100%)	500 (94%)	26 (5%)	4 (1%)	16	50
1	B	530/532 (100%)	492 (93%)	35 (7%)	3 (1%)	21	56
1	C	530/532 (100%)	498 (94%)	29 (6%)	3 (1%)	21	56
All	All	1590/1596 (100%)	1490 (94%)	90 (6%)	10 (1%)	21	56

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	185	SER

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Mol	Chain	Res	Type
1	A	254	VAL
1	B	254	VAL
1	A	253	SER
1	B	253	SER
1	C	185	SER
1	C	254	VAL
1	B	185	SER
1	C	367	PRO
1	A	367	PRO

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	448/448 (100%)	438 (98%)	10 (2%)	45	74
1	B	448/448 (100%)	437 (98%)	11 (2%)	42	72
1	C	448/448 (100%)	437 (98%)	11 (2%)	42	72
All	All	1344/1344 (100%)	1312 (98%)	32 (2%)	43	73

All (32) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	104	ARG
1	A	105	LYS
1	A	132	ARG
1	A	218	PHE
1	A	242	ARG
1	A	264	LEU
1	A	338	GLU
1	A	410	THR
1	A	491	ARG
1	A	523	LYS
1	B	88	THR
1	B	104	ARG
1	B	105	LYS

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Mol	Chain	Res	Type
1	B	132	ARG
1	B	218	PHE
1	B	264	LEU
1	B	304	LEU
1	B	338	GLU
1	B	410	THR
1	B	491	ARG
1	B	523	LYS
1	C	104	ARG
1	C	132	ARG
1	C	205	ILE
1	C	218	PHE
1	C	264	LEU
1	C	304	LEU
1	C	338	GLU
1	C	410	THR
1	C	420	LEU
1	C	491	ARG
1	C	523	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	69	GLN
1	A	436	ASN
1	A	516	HIS
1	A	522	GLN
1	A	528	GLN
1	A	534	GLN
1	A	537	GLN
1	B	107	ASN
1	B	131	ASN
1	B	450	GLN
1	B	516	HIS
1	B	522	GLN
1	B	528	GLN
1	B	534	GLN
1	B	537	GLN
1	C	69	GLN
1	C	131	ASN
1	C	516	HIS
1	C	522	GLN

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Mol	Chain	Res	Type
1	C	528	GLN
1	C	534	GLN
1	C	537	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](#)

18 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	NAG	A	1179	1	14,14,15	0.82	0	17,19,21	1.24	2 (11%)
5	EEE	A	1	-	5,5,5	1.39	1 (20%)	5,5,5	1.58	2 (40%)
5	EEE	B	2	-	5,5,5	1.25	1 (20%)	5,5,5	1.47	1 (20%)
3	SIA	A	1180	-	21,21,21	1.13	1 (4%)	24,31,31	1.11	3 (12%)
4	SO4	A	1183	-	4,4,4	0.39	0	6,6,6	0.17	0
4	SO4	C	1381	-	4,4,4	0.41	0	6,6,6	0.09	0
4	SO4	C	1382	-	4,4,4	0.43	0	6,6,6	0.10	0
3	SIA	B	1280	-	21,21,21	1.11	2 (9%)	24,31,31	1.20	3 (12%)
4	SO4	B	1281	-	4,4,4	0.42	0	6,6,6	0.11	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	EEE	C	3	-	5,5,5	1.34	1 (20%)	5,5,5	1.47	1 (20%)
5	EEE	C	1383	-	5,5,5	1.44	1 (20%)	5,5,5	1.43	0
2	NAG	B	1279	1	14,14,15	0.63	0	17,19,21	0.66	0
2	NAG	C	1379	1	14,14,15	0.65	0	17,19,21	0.77	1 (5%)
4	SO4	C	1380	-	4,4,4	0.41	0	6,6,6	0.10	0
4	SO4	A	1182	-	4,4,4	0.46	0	6,6,6	0.16	0
5	EEE	A	11	-	5,5,5	1.44	1 (20%)	5,5,5	1.44	0
5	EEE	B	1282	-	5,5,5	1.46	1 (20%)	5,5,5	1.41	0

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	NAG	A	1179	1	-	4/6/23/26	0/1/1/1
5	EEE	A	1	-	-	2/3/3/3	-
5	EEE	B	2	-	-	2/3/3/3	-
3	SIA	A	1180	-	-	9/20/38/38	0/1/1/1
5	EEE	C	3	-	-	2/3/3/3	-
5	EEE	C	1383	-	-	2/3/3/3	-
3	SIA	B	1280	-	-	8/20/38/38	0/1/1/1
2	NAG	B	1279	1	-	3/6/23/26	0/1/1/1
2	NAG	C	1379	1	-	4/6/23/26	0/1/1/1
5	EEE	A	11	-	-	2/3/3/3	-
5	EEE	B	1282	-	-	2/3/3/3	-

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1180	SIA	C6-C5	2.31	1.56	1.53
5	B	1282	EEE	O2-C1	2.25	1.44	1.33
5	A	11	EEE	O2-C1	2.24	1.44	1.33
5	C	1383	EEE	O2-C1	2.20	1.44	1.33
5	A	1	EEE	O2-C1	2.14	1.43	1.33
5	C	3	EEE	O2-C1	2.13	1.43	1.33
5	B	2	EEE	O2-C1	2.06	1.43	1.33
3	B	1280	SIA	C7-C6	2.04	1.55	1.52
3	B	1280	SIA	C6-C5	2.03	1.56	1.53

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1179	NAG	C4-C3-C2	3.54	116.21	111.02
3	B	1280	SIA	O1A-C1-C2	-3.21	118.49	123.85
3	A	1180	SIA	O1A-C1-C2	-3.14	118.61	123.85
3	B	1280	SIA	O6-C6-C7	2.56	110.65	106.65
2	A	1179	NAG	C2-N2-C7	-2.44	119.63	122.90
2	C	1379	NAG	C2-N2-C7	-2.32	119.79	122.90
5	A	1	EEE	O1-C1-C2	-2.21	116.93	124.77
5	A	1	EEE	O2-C1-C2	2.17	121.58	112.38
3	A	1180	SIA	C9-C8-C7	-2.12	107.84	112.17
5	B	2	EEE	O1-C1-C2	-2.11	117.28	124.77
3	B	1280	SIA	C3-C2-C1	-2.06	109.02	112.84
5	C	3	EEE	O1-C1-C2	-2.05	117.50	124.77
3	A	1180	SIA	C3-C2-C1	-2.00	109.12	112.84

There are no chirality outliers.

All (40) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1179	NAG	C8-C7-N2-C2
2	A	1179	NAG	O7-C7-N2-C2
2	B	1279	NAG	C3-C2-N2-C7
2	B	1279	NAG	C8-C7-N2-C2
2	B	1279	NAG	O7-C7-N2-C2
2	C	1379	NAG	C8-C7-N2-C2
2	C	1379	NAG	O7-C7-N2-C2
3	A	1180	SIA	C5-C6-C7-C8
3	A	1180	SIA	C5-C6-C7-O7
3	A	1180	SIA	O6-C6-C7-C8
3	A	1180	SIA	O6-C6-C7-O7
3	A	1180	SIA	C11-C10-N5-C5
3	A	1180	SIA	O10-C10-N5-C5
3	B	1280	SIA	C4-C5-N5-C10
3	B	1280	SIA	C5-C6-C7-C8
3	B	1280	SIA	C5-C6-C7-O7
3	B	1280	SIA	O6-C6-C7-C8
3	B	1280	SIA	O6-C6-C7-O7
3	B	1280	SIA	C11-C10-N5-C5
3	B	1280	SIA	O10-C10-N5-C5
2	A	1179	NAG	O5-C5-C6-O6
2	A	1179	NAG	C4-C5-C6-O6
2	C	1379	NAG	O5-C5-C6-O6

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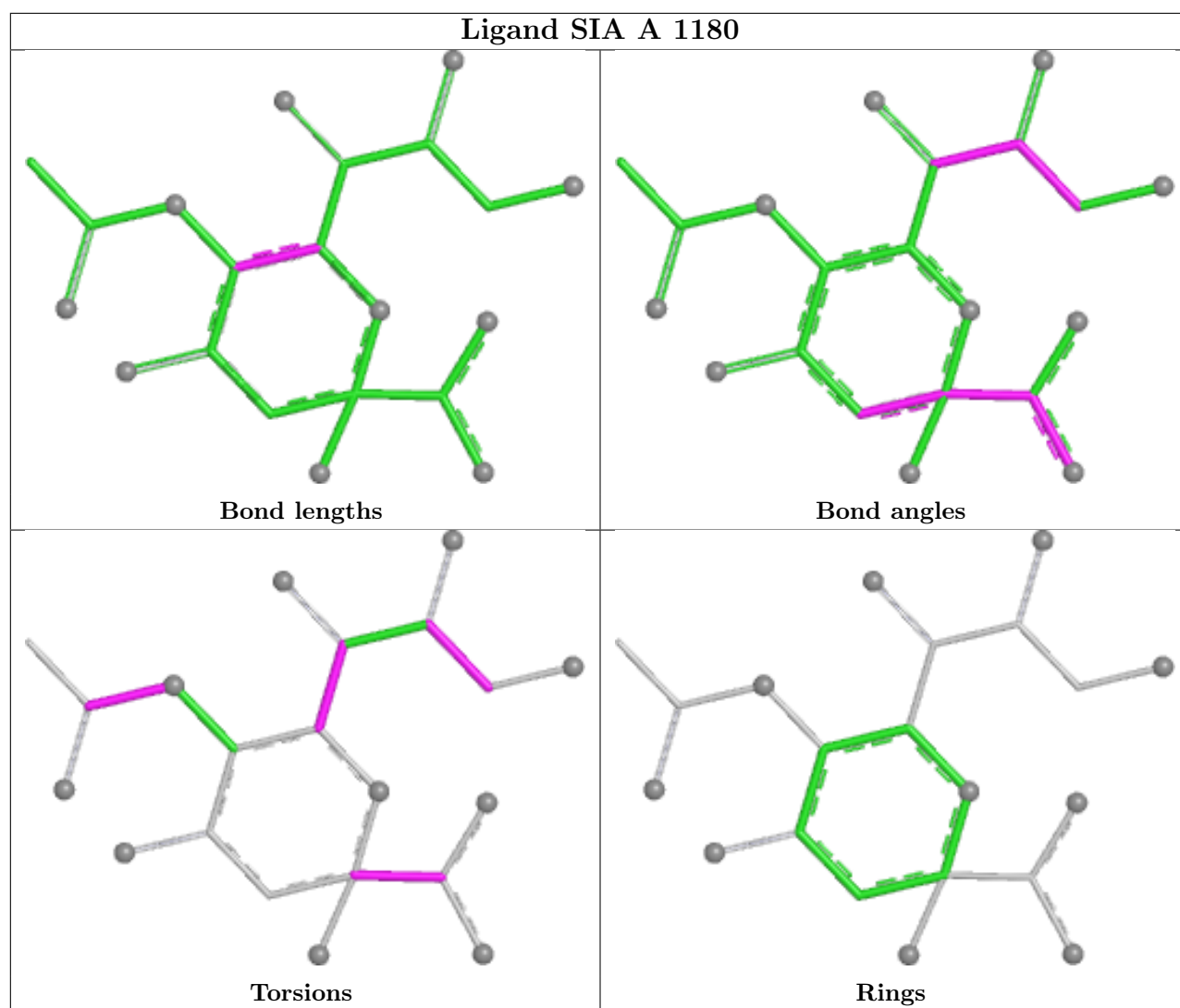
Mol	Chain	Res	Type	Atoms
5	A	1	EEE	C2-C1-O2-C3
5	A	11	EEE	C2-C1-O2-C3
5	B	2	EEE	C2-C1-O2-C3
5	B	1282	EEE	C2-C1-O2-C3
5	C	3	EEE	C2-C1-O2-C3
5	C	1383	EEE	C2-C1-O2-C3
5	A	1	EEE	O1-C1-O2-C3
5	A	11	EEE	O1-C1-O2-C3
5	B	1282	EEE	O1-C1-O2-C3
5	C	3	EEE	O1-C1-O2-C3
5	B	2	EEE	O1-C1-O2-C3
5	C	1383	EEE	O1-C1-O2-C3
3	A	1180	SIA	C7-C8-C9-O9
2	C	1379	NAG	C4-C5-C6-O6
3	A	1180	SIA	O8-C8-C9-O9
3	B	1280	SIA	C6-C5-N5-C10
3	A	1180	SIA	O1B-C1-C2-O6

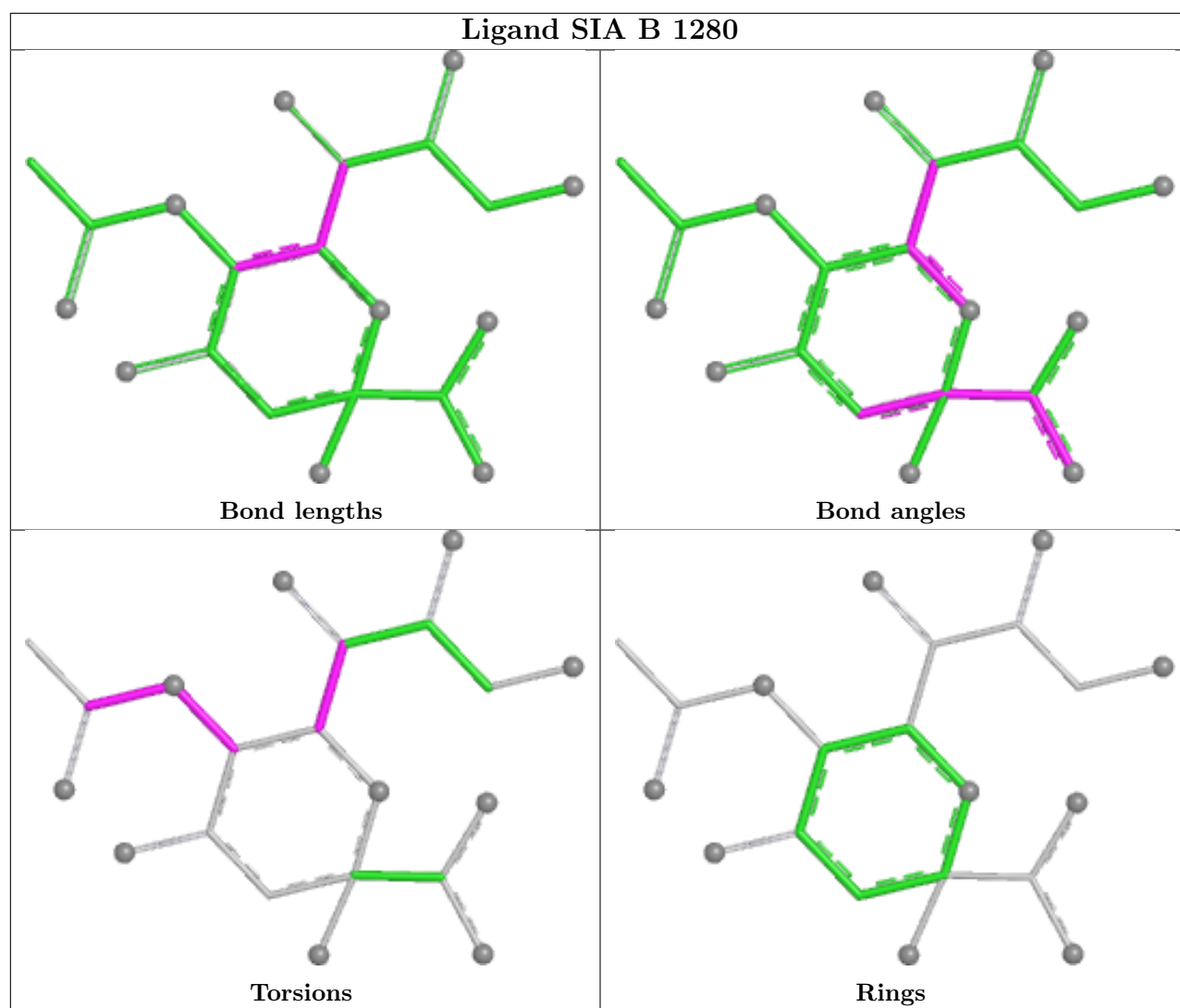
There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1180	SIA	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.





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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	532/532 (100%)	-0.35	5 (0%) 81 61	22, 40, 78, 98	0
1	B	532/532 (100%)	-0.40	3 (0%) 85 69	24, 42, 79, 95	0
1	C	532/532 (100%)	-0.32	2 (0%) 88 76	22, 40, 74, 96	0
All	All	1596/1596 (100%)	-0.36	10 (0%) 85 69	22, 40, 77, 98	0

All (10) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	317	PRO	4.5
1	A	318	LEU	2.9
1	A	310	GLY	2.9
1	A	342	HIS	2.8
1	B	341	PHE	2.5
1	C	304	LEU	2.4
1	A	312	PRO	2.4
1	B	304	LEU	2.3
1	C	317	PRO	2.2
1	B	317	PRO	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 ⓘ

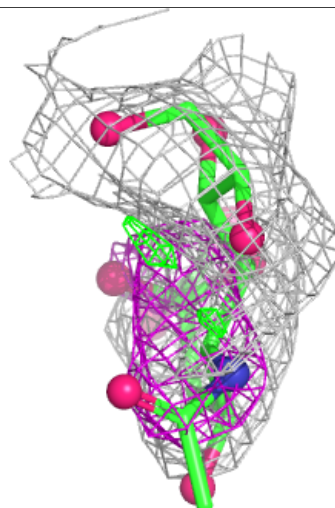
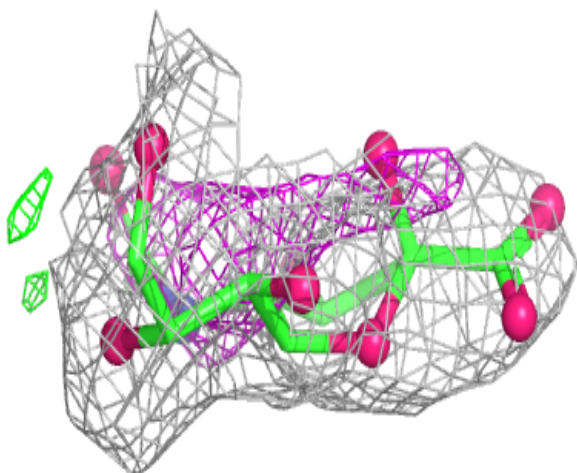
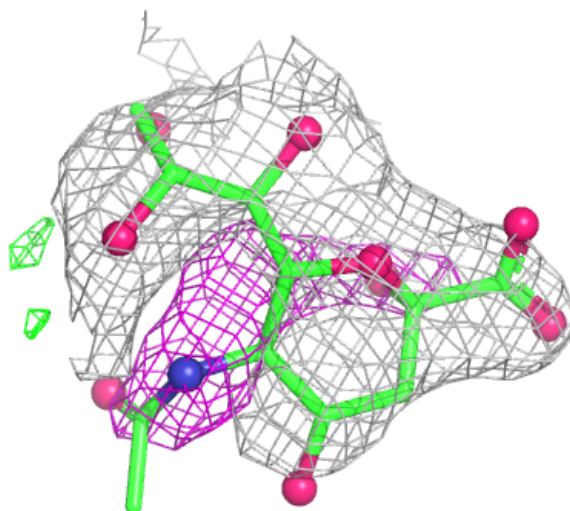
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	EEE	B	1282	6/6	0.29	0.36	57,60,61,62	0
5	EEE	A	11	6/6	0.34	0.35	54,57,58,59	0
5	EEE	C	1383	6/6	0.40	0.37	36,39,41,41	0
2	NAG	A	1179	14/15	0.58	0.15	66,75,78,78	0
3	SIA	A	1180	21/21	0.65	0.19	72,85,88,89	0
3	SIA	A	1181[C]	21/21	0.66	0.20	62,72,75,76	0
3	SIA	B	1280	21/21	0.67	0.18	65,74,78,81	0
2	NAG	C	1379	14/15	0.72	0.13	72,73,79,80	0
4	SO4	C	1382	5/5	0.77	0.41	119,119,120,120	0
5	EEE	B	2	6/6	0.78	0.27	55,58,58,59	0
5	EEE	A	1	6/6	0.78	0.25	51,57,59,61	0
2	NAG	B	1279	14/15	0.78	0.12	74,76,78,78	0
4	SO4	C	1380	5/5	0.81	0.37	123,124,124,125	0
5	EEE	C	3	6/6	0.83	0.20	48,52,52,53	0
4	SO4	A	1183	5/5	0.84	0.33	108,109,109,110	0
4	SO4	B	1281	5/5	0.87	0.47	120,121,122,122	0
4	SO4	C	1381	5/5	0.89	0.39	108,109,109,110	0
4	SO4	A	1182	5/5	0.90	0.50	109,111,112,112	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.

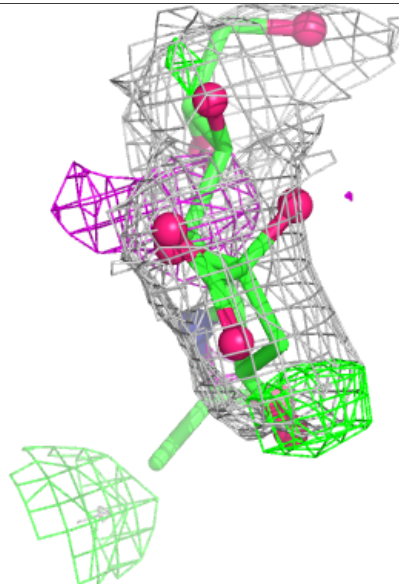
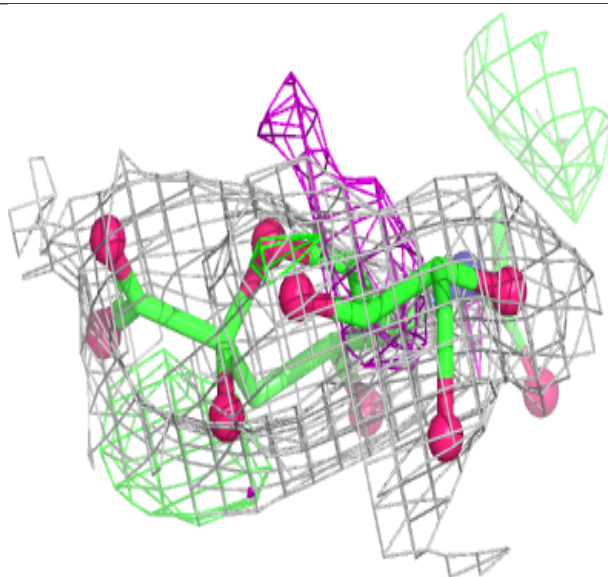
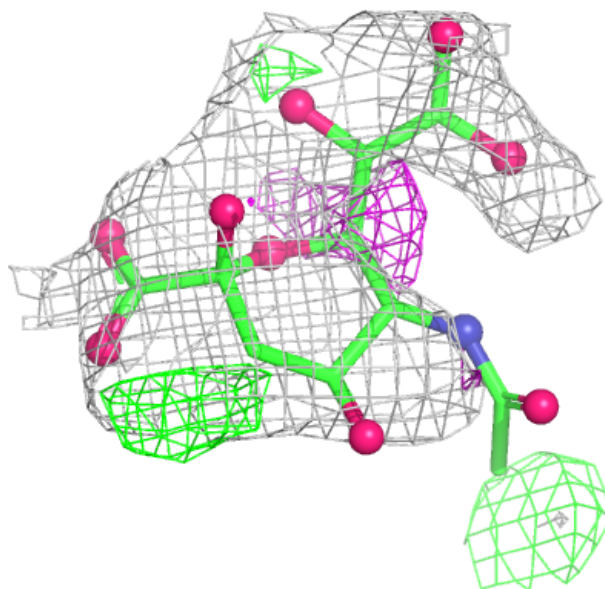
Electron density around SIA A 1180:

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



Electron density around SIA B 1280:

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



6.5 Other polymers ⓘ

There are no such residues in this entry.