



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 30, 2023 – 10:44 AM EDT

PDB ID : 3PF1
Title : E. coli FadL Asp348Ala mutant
Authors : Vandenberg, B.; Lepore, B.W.; Hearn, E.M.; Indic, M.; Patel, D.
Deposited on : 2010-10-27
Resolution : 2.70 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

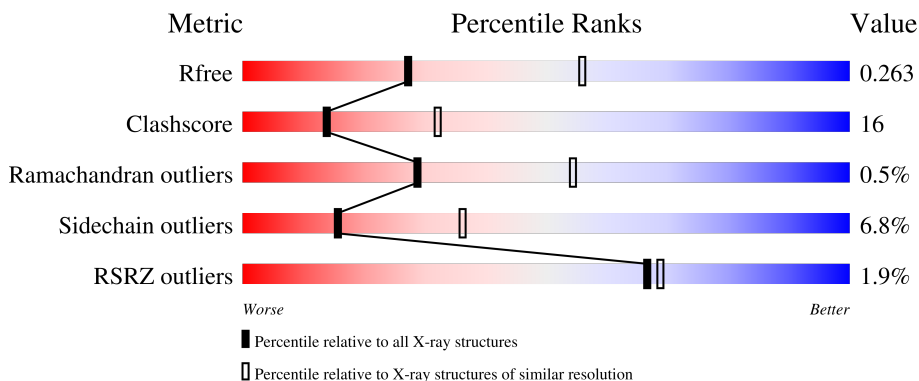
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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	424	
1	B	424	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	C8E	B	530	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 6855 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.

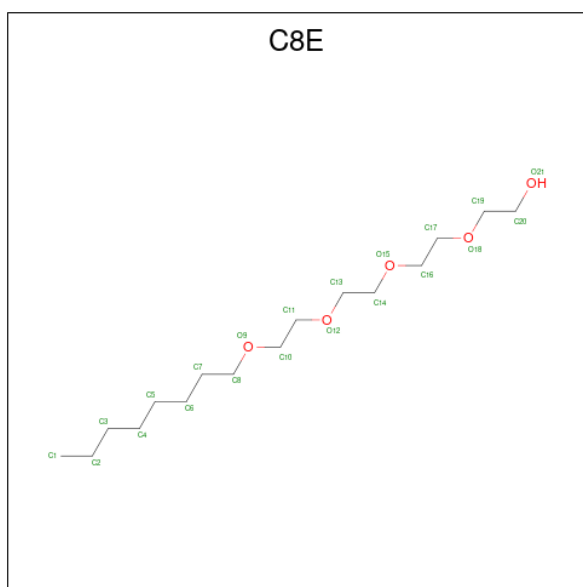
- Molecule 1 is a protein called Long-chain fatty acid transport protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	424	3279	2074	561	638	6	0	0	0
1	B	424	3279	2074	561	638	6	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

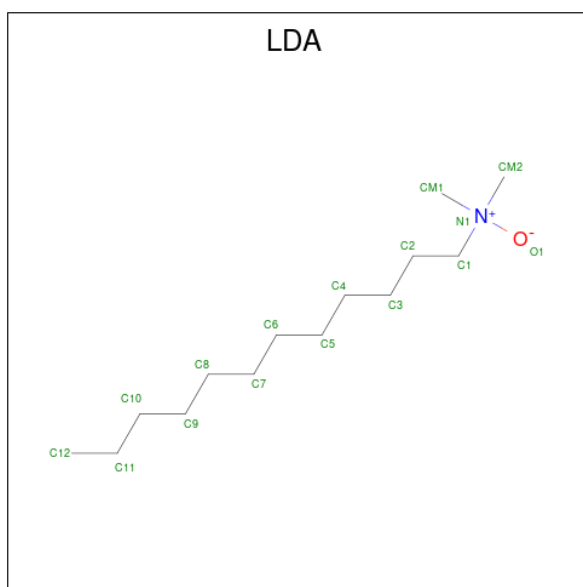
Chain	Residue	Modelled	Actual	Comment	Reference
A	348	ALA	ASP	engineered mutation	UNP P10384
A	422	HIS	-	expression tag	UNP P10384
A	423	HIS	-	expression tag	UNP P10384
A	424	HIS	-	expression tag	UNP P10384
B	348	ALA	ASP	engineered mutation	UNP P10384
B	422	HIS	-	expression tag	UNP P10384
B	423	HIS	-	expression tag	UNP P10384
B	424	HIS	-	expression tag	UNP P10384

- Molecule 2 is (HYDROXYETHYLOXY)TRI(ETHYLOXY)OCTANE (three-letter code: C8E) (formula: C₁₆H₃₄O₅).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			16	13	3		
2	A	1	Total	C	O	0	0
			21	16	5		
2	A	1	Total	C	O	0	0
			21	16	5		
2	A	1	Total	C	O	0	0
			9	6	3		
2	B	1	Total	C	O	0	0
			16	13	3		
2	B	1	Total	C	O	0	0
			21	16	5		
2	B	1	Total	C	O	0	0
			21	16	5		
2	B	1	Total	C	O	0	1
			63	48	15		

- Molecule 3 is LAURYL DIMETHYLAMINE-N-OXIDE (three-letter code: LDA) (formula: $C_{14}H_{31}NO$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C 4 4	0	0
3	A	1	Total C 10 10	0	0
3	B	1	Total C 5 5	0	0

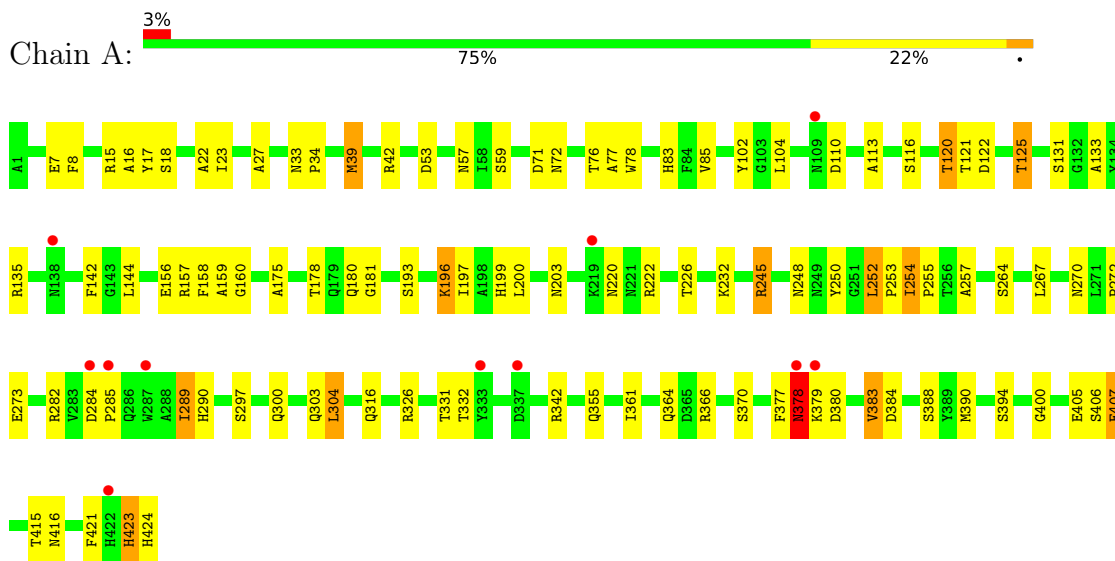
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	49	Total O 49 49	0	0
4	B	41	Total O 41 41	0	0

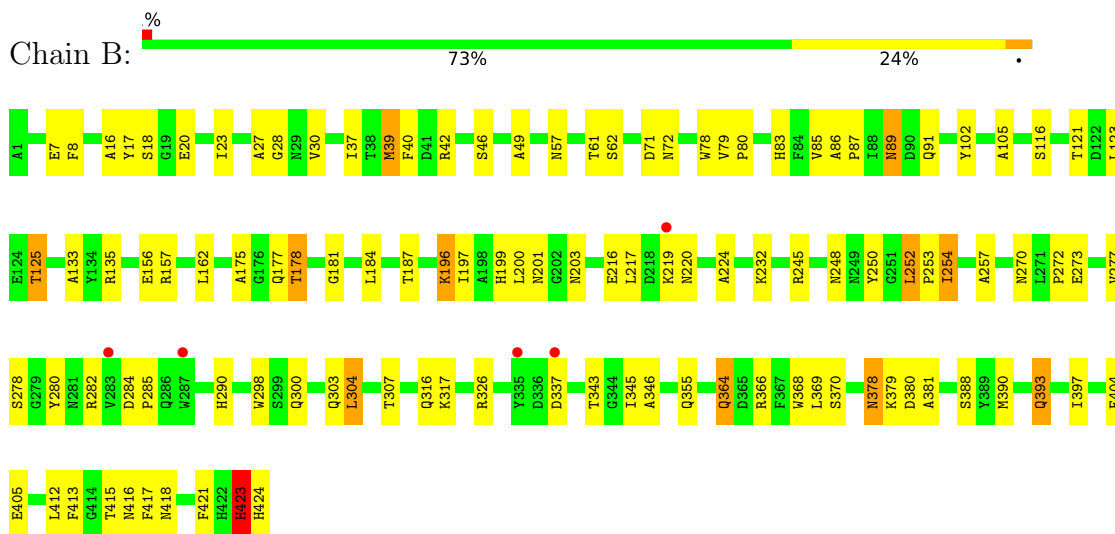
3 Residue-property plots

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: Long-chain fatty acid transport protein



- Molecule 1: Long-chain fatty acid transport protein



4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	62.88Å 145.97Å 151.24Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	41.48 – 2.70 41.48 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.8 (41.48-2.70) 97.0 (41.48-2.70)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	0.12	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.29 (at 2.69Å)	Xtrriage
Refinement program	PHENIX (phenix.refine: 1.5_2)	Depositor
R, R_{free}	0.210 , 0.273 0.198 , 0.263	Depositor DCC
R_{free} test set	1986 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å ²)	26.7	Xtrriage
Anisotropy	0.538	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 54.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.017 for -h,l,k	Xtrriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	6855	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.92% 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: C8E, LDA

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	0.43	0/3371	0.59	0/4590
1	B	0.44	0/3371	0.57	0/4590
All	All	0.43	0/6742	0.58	0/9180

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	3279	0	3055	98	0
1	B	3279	0	3055	110	0
2	A	67	0	103	16	0
2	B	121	0	195	34	0
3	A	14	0	26	0	0
3	B	5	0	9	0	0
4	A	49	0	0	0	0
4	B	41	0	0	0	0
All	All	6855	0	6443	209	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 16.

All (209) 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:178:THR:HG22	1:B:181:GLY:H	1.19	1.07
1:A:252:LEU:H	1:A:252:LEU:HD12	1.22	1.01
1:B:116:SER:HB2	2:B:530:C8E:H82	1.44	0.97
1:B:248:ASN:HD21	1:B:257:ALA:H	1.11	0.93
1:B:252:LEU:HD12	1:B:252:LEU:H	1.34	0.92
1:A:57:ASN:HD22	1:A:71:ASP:HA	1.35	0.90
1:A:253:PRO:HD2	2:A:509:C8E:H101	1.51	0.89
1:B:178:THR:CG2	1:B:181:GLY:H	1.87	0.88
1:B:78:TRP:HE1	2:B:535[B]:C8E:H142	1.40	0.86
1:B:42:ARG:HD2	1:B:421:PHE:O	1.76	0.84
1:B:156:GLU:HG2	1:B:196:LYS:HD2	1.60	0.84
1:A:248:ASN:HD21	1:A:257:ALA:H	1.26	0.82
1:B:197:ILE:HD13	2:B:530:C8E:H81	1.63	0.81
1:B:220:ASN:HB3	1:B:282:ARG:HB3	1.62	0.81
1:A:303:GLN:NE2	1:A:316:GLN:HE21	1.80	0.80
1:B:413:PHE:HB3	2:B:535[A]:C8E:H12	1.65	0.78
1:A:272:PRO:HA	1:A:300:GLN:HE21	1.47	0.77
1:B:39:MET:HE2	1:B:39:MET:HA	1.66	0.76
1:B:254:ILE:HB	2:B:530:C8E:H61	1.68	0.75
1:B:178:THR:HG22	1:B:181:GLY:N	1.99	0.75
1:B:57:ASN:HD22	1:B:71:ASP:HA	1.52	0.74
1:B:116:SER:HB2	2:B:530:C8E:C8	2.18	0.74
1:B:187:THR:HG21	2:B:520:C8E:H131	1.71	0.72
1:A:178:THR:HG22	1:A:180:GLN:N	2.04	0.72
1:B:272:PRO:HA	1:B:300:GLN:HE21	1.55	0.72
1:B:49:ALA:HB3	2:B:535[A]:C8E:H72	1.70	0.72
1:B:102:TYR:O	1:B:125:THR:HB	1.90	0.71
1:B:272:PRO:HA	1:B:300:GLN:NE2	2.06	0.71
1:A:272:PRO:HA	1:A:300:GLN:NE2	2.04	0.70
1:A:102:TYR:O	1:A:125:THR:HB	1.90	0.70
1:B:415:THR:HB	2:B:535[C]:C8E:H141	1.72	0.70
1:A:220:ASN:HB3	1:A:282:ARG:HB3	1.75	0.69
1:A:378:ASN:ND2	1:A:380:ASP:HB2	2.07	0.69
1:B:364:GLN:HE22	1:B:366:ARG:HH21	1.38	0.69
1:B:345:ILE:HG22	1:B:369:LEU:HD12	1.75	0.69
1:B:316:GLN:H	2:B:530:C8E:H162	1.58	0.68
1:A:178:THR:HG22	1:A:180:GLN:H	1.58	0.68
1:B:303:GLN:NE2	1:B:316:GLN:HE21	1.92	0.67
1:A:273:GLU:H	1:A:300:GLN:HE22	1.41	0.67
1:B:364:GLN:NE2	1:B:366:ARG:HH21	1.92	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:364:GLN:HE22	1:A:366:ARG:HH21	1.42	0.66
1:A:252:LEU:H	1:A:252:LEU:CD1	2.00	0.65
1:A:364:GLN:NE2	1:A:366:ARG:HH21	1.95	0.65
1:B:273:GLU:H	1:B:300:GLN:HE22	1.45	0.65
1:B:253:PRO:O	2:B:530:C8E:H102	1.98	0.63
1:A:304:LEU:HD21	2:A:505:C8E:H141	1.79	0.63
1:A:254:ILE:O	2:A:507:C8E:H12	1.98	0.62
1:B:135:ARG:NH2	1:B:216:GLU:OE2	2.33	0.62
1:A:232:LYS:HG2	1:A:270:ASN:HD22	1.64	0.61
1:A:378:ASN:HD21	1:A:380:ASP:HB2	1.64	0.61
1:A:57:ASN:ND2	1:A:71:ASP:HA	2.12	0.60
1:B:303:GLN:HE22	1:B:316:GLN:HE21	1.48	0.60
1:A:252:LEU:HD12	1:A:252:LEU:N	2.04	0.59
1:A:273:GLU:H	1:A:300:GLN:NE2	1.99	0.59
1:A:355:GLN:HB3	1:B:355:GLN:HB3	1.85	0.59
1:A:156:GLU:OE1	1:A:196:LYS:HE3	2.03	0.58
1:B:232:LYS:HG2	1:B:270:ASN:HD22	1.68	0.58
1:B:303:GLN:HE22	1:B:316:GLN:NE2	2.02	0.58
1:A:16:ALA:O	1:A:326:ARG:NH2	2.37	0.58
1:B:80:PRO:HB2	2:B:535[C]:C8E:H31	1.85	0.57
1:A:303:GLN:HE22	1:A:316:GLN:HE21	1.53	0.56
1:A:200:LEU:HB3	2:A:505:C8E:H41	1.86	0.56
1:B:415:THR:HB	2:B:535[A]:C8E:H52	1.87	0.56
1:B:16:ALA:O	1:B:326:ARG:NH2	2.39	0.55
1:B:156:GLU:CD	1:B:196:LYS:HE3	2.27	0.55
1:A:232:LYS:HG2	1:A:270:ASN:ND2	2.22	0.55
1:A:250:TYR:HB2	1:A:252:LEU:HD11	1.88	0.55
1:B:78:TRP:HE1	2:B:535[B]:C8E:C14	2.17	0.55
1:B:248:ASN:ND2	1:B:257:ALA:H	1.93	0.55
1:B:156:GLU:OE1	1:B:196:LYS:HE3	2.08	0.54
1:B:378:ASN:O	1:B:380:ASP:N	2.40	0.54
1:A:34:PRO:HB3	1:A:131:SER:HB3	1.89	0.54
1:B:200:LEU:HB3	2:B:506:C8E:H42	1.88	0.54
1:B:248:ASN:HD21	1:B:257:ALA:N	1.94	0.54
1:B:413:PHE:HB3	2:B:535[B]:C8E:H202	1.89	0.54
1:B:378:ASN:C	1:B:380:ASP:H	2.10	0.54
1:A:364:GLN:HE21	1:A:366:ARG:HE	1.55	0.54
1:A:175:ALA:O	1:A:181:GLY:HA3	2.08	0.54
1:A:199:HIS:C	1:A:200:LEU:HD12	2.27	0.54
1:B:18:SER:OG	1:B:290:HIS:HD2	1.91	0.54
1:B:412:LEU:N	1:B:412:LEU:HD12	2.23	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:159:ALA:O	1:A:193:SER:HA	2.08	0.54
1:A:423:HIS:CE1	1:A:424:HIS:HB3	2.43	0.54
1:A:16:ALA:HB2	1:A:370:SER:OG	2.08	0.53
1:A:116:SER:HB2	2:A:507:C8E:H131	1.90	0.53
1:B:16:ALA:HB2	1:B:370:SER:OG	2.08	0.53
1:A:197:ILE:HD13	2:A:507:C8E:H131	1.90	0.53
1:A:42:ARG:HD2	1:A:421:PHE:O	2.07	0.53
1:B:413:PHE:HB3	2:B:535[C]:C8E:H202	1.90	0.53
1:B:250:TYR:HB2	1:B:252:LEU:HD11	1.89	0.53
1:A:316:GLN:H	2:A:507:C8E:H61	1.74	0.53
1:A:400:GLY:HA3	2:A:509:C8E:H162	1.91	0.53
1:A:57:ASN:HD22	1:A:71:ASP:CA	2.15	0.53
1:A:407:GLU:O	1:A:407:GLU:HG2	2.09	0.52
1:B:417:PHE:CD1	2:B:535[A]:C8E:H142	2.45	0.52
1:B:232:LYS:HG2	1:B:270:ASN:ND2	2.23	0.52
1:A:289:ILE:CD1	1:A:331:THR:HG22	2.39	0.52
1:B:343:THR:HG22	1:B:370:SER:O	2.09	0.52
1:B:252:LEU:HD12	1:B:252:LEU:N	2.15	0.52
1:A:282:ARG:HD2	1:A:284:ASP:O	2.10	0.52
1:A:22:ALA:C	1:A:23:ILE:HD13	2.30	0.51
1:A:423:HIS:ND1	1:A:424:HIS:HB3	2.25	0.51
1:B:8:PHE:O	1:B:83:HIS:HE1	1.93	0.51
1:B:162:LEU:CB	2:B:530:C8E:H32	2.41	0.51
1:A:77:ALA:HB1	2:A:508:C8E:H41	1.93	0.51
1:B:42:ARG:HB3	1:B:423:HIS:HA	1.92	0.51
1:B:61:THR:HG22	1:B:62:SER:O	2.11	0.51
1:B:415:THR:CB	2:B:535[A]:C8E:H52	2.40	0.51
1:A:159:ALA:O	1:A:193:SER:O	2.29	0.50
1:A:197:ILE:HD13	2:A:507:C8E:C13	2.41	0.50
1:B:162:LEU:HD12	2:B:530:C8E:H42	1.93	0.50
1:B:345:ILE:HG22	1:B:369:LEU:CD1	2.42	0.50
1:A:121:THR:OG1	1:A:157:ARG:NH2	2.45	0.49
1:B:162:LEU:HD13	2:B:530:C8E:H51	1.94	0.49
1:B:40:PHE:CD2	1:B:85:VAL:HG11	2.48	0.49
1:B:30:VAL:HG21	1:B:85:VAL:CG2	2.42	0.49
1:A:39:MET:CE	1:A:39:MET:HA	2.42	0.48
1:B:364:GLN:O	1:B:366:ARG:HG3	2.13	0.48
1:B:397:ILE:HB	1:B:404:PHE:HB2	1.94	0.48
1:B:162:LEU:HB2	2:B:530:C8E:H32	1.96	0.48
1:A:27:ALA:HB1	1:A:85:VAL:HG23	1.96	0.48
1:B:17:TYR:HA	1:B:20:GLU:OE1	2.14	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:254:ILE:HB	2:B:530:C8E:C6	2.41	0.48
1:A:7:GLU:CD	1:A:7:GLU:N	2.68	0.48
1:A:361:ILE:HG12	1:A:361:ILE:O	2.14	0.48
1:A:116:SER:HA	1:A:158:PHE:O	2.14	0.47
1:B:254:ILE:CB	2:B:530:C8E:H72	2.44	0.47
1:B:423:HIS:ND1	1:B:424:HIS:N	2.63	0.47
1:B:254:ILE:HA	2:B:530:C8E:H72	1.96	0.47
1:A:303:GLN:HE22	1:A:316:GLN:NE2	2.10	0.47
1:A:394:SER:HA	1:A:406:SER:O	2.14	0.47
1:B:23:ILE:HD12	1:B:280:TYR:CD1	2.49	0.47
1:A:133:ALA:HA	1:A:142:PHE:O	2.14	0.47
1:B:105:ALA:HA	1:B:121:THR:O	2.15	0.47
1:B:304:LEU:HD21	2:B:506:C8E:H141	1.96	0.47
1:A:7:GLU:HA	1:A:17:TYR:OH	2.14	0.47
1:B:57:ASN:ND2	1:B:72:ASN:H	2.13	0.47
1:B:378:ASN:O	1:B:378:ASN:OD1	2.33	0.47
1:A:120:THR:HG23	1:A:122:ASP:OD1	2.15	0.46
1:B:381:ALA:HA	1:B:418:ASN:O	2.14	0.46
1:A:110:ASP:OD2	1:A:110:ASP:N	2.49	0.46
1:A:284:ASP:OD1	1:A:285:PRO:HD2	2.15	0.46
1:A:316:GLN:H	2:A:507:C8E:C6	2.29	0.46
1:A:378:ASN:C	1:A:380:ASP:H	2.19	0.46
1:A:77:ALA:HB2	2:A:508:C8E:H22	1.98	0.46
1:A:157:ARG:HB3	1:A:197:ILE:HD11	1.98	0.46
1:A:102:TYR:CZ	1:A:272:PRO:HD2	2.51	0.46
1:A:378:ASN:O	1:A:379:LYS:HB2	2.15	0.46
1:A:400:GLY:HA3	2:A:509:C8E:C16	2.46	0.45
1:B:364:GLN:HE21	1:B:366:ARG:HE	1.64	0.45
1:B:413:PHE:CB	2:B:535[C]:C8E:H202	2.46	0.45
1:B:224:ALA:O	1:B:277:VAL:HA	2.16	0.45
1:B:282:ARG:HG3	1:B:284:ASP:O	2.17	0.45
1:A:8:PHE:O	1:A:83:HIS:HE1	2.00	0.45
1:A:284:ASP:CG	1:A:285:PRO:HD2	2.38	0.44
1:B:378:ASN:C	1:B:380:ASP:N	2.71	0.44
1:A:78:TRP:H	2:A:508:C8E:H112	1.82	0.44
1:B:27:ALA:HB1	1:B:85:VAL:HG23	1.98	0.44
1:B:121:THR:OG1	1:B:157:ARG:NH2	2.50	0.44
2:A:508:C8E:H41	2:A:508:C8E:H71	1.68	0.44
1:A:289:ILE:HD13	1:A:331:THR:HG22	1.99	0.44
1:A:290:HIS:HE1	1:A:332:THR:OG1	2.00	0.44
1:B:175:ALA:O	1:B:178:THR:HB	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:102:TYR:CE1	1:A:272:PRO:HD2	2.53	0.43
1:B:199:HIS:NE2	1:B:201:ASN:OD1	2.47	0.43
1:B:30:VAL:HG21	1:B:85:VAL:HG22	2.00	0.43
1:B:252:LEU:HB2	1:B:254:ILE:HG23	1.99	0.43
1:B:284:ASP:CG	1:B:285:PRO:HD2	2.38	0.43
1:A:33:ASN:HB2	1:A:226:THR:HG21	1.99	0.43
1:B:37:ILE:HB	1:B:133:ALA:HB3	2.00	0.43
1:A:23:ILE:HD13	1:A:23:ILE:N	2.33	0.43
1:A:273:GLU:HG2	1:A:297:SER:HB2	2.00	0.43
1:B:28:GLY:HA2	1:B:83:HIS:CG	2.53	0.43
1:B:89:ASN:HB3	1:B:91:GLN:H	1.83	0.43
1:A:377:PHE:CE1	1:A:383:VAL:HG12	2.54	0.43
1:B:18:SER:OG	1:B:290:HIS:CD2	2.71	0.43
1:B:364:GLN:HG3	1:B:393:GLN:O	2.19	0.43
2:B:535[A]:C8E:H41	2:B:535[A]:C8E:H13	1.72	0.43
2:B:535[B]:C8E:H141	2:B:535[B]:C8E:H171	1.68	0.43
1:B:317:LYS:HZ3	2:B:506:C8E:C16	2.31	0.43
1:B:7:GLU:HA	1:B:17:TYR:OH	2.19	0.43
1:A:355:GLN:CB	1:B:355:GLN:HB3	2.48	0.42
1:A:200:LEU:HD12	1:A:200:LEU:N	2.33	0.42
1:A:370:SER:HB3	1:A:388:SER:OG	2.18	0.42
1:A:53:ASP:OD2	1:A:76:THR:HG22	2.19	0.42
1:A:267:LEU:C	1:A:267:LEU:HD23	2.40	0.42
1:B:23:ILE:HD12	1:B:280:TYR:HD1	1.85	0.42
1:A:316:GLN:H	2:A:507:C8E:C7	2.32	0.42
1:B:123:LEU:HD22	2:B:506:C8E:H111	2.02	0.42
1:A:113:ALA:O	1:A:160:GLY:HA3	2.20	0.42
1:B:272:PRO:HG2	1:B:298:TRP:CE3	2.55	0.41
1:B:370:SER:HB3	1:B:388:SER:OG	2.20	0.41
1:A:59:SER:OG	1:A:405:GLU:HB3	2.21	0.41
1:A:157:ARG:HA	1:A:157:ARG:HD3	1.91	0.41
1:A:254:ILE:HD13	1:A:254:ILE:HG21	1.77	0.41
1:A:384:ASP:O	1:A:415:THR:HA	2.20	0.41
1:B:79:VAL:HA	1:B:80:PRO:HD3	1.82	0.41
1:B:157:ARG:HB3	1:B:197:ILE:HD11	2.03	0.41
1:A:15:ARG:HG3	1:A:342:ARG:HD3	2.03	0.41
1:B:346:ALA:HB3	1:B:368:TRP:HB2	2.03	0.41
1:A:245:ARG:H	1:A:245:ARG:CZ	2.34	0.41
1:B:86:ALA:HA	1:B:87:PRO:HD3	1.90	0.41
1:B:254:ILE:HB	2:B:530:C8E:H72	2.02	0.40
1:B:316:GLN:H	2:B:530:C8E:C16	2.30	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:18:SER:OG	1:A:290:HIS:HD2	2.03	0.40
1:A:378:ASN:ND2	1:A:378:ASN:O	2.43	0.40
1:B:46:SER:HB3	1:B:83:HIS:HB2	2.02	0.40
1:A:254:ILE:HG13	1:A:255:PRO:O	2.22	0.40
1:A:15:ARG:O	1:A:16:ALA:HB3	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	422/424 (100%)	402 (95%)	19 (4%)	1 (0%)	47	73
1	B	422/424 (100%)	404 (96%)	15 (4%)	3 (1%)	22	46
All	All	844/848 (100%)	806 (96%)	34 (4%)	4 (0%)	29	54

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	378	ASN
1	A	378	ASN
1	B	379	LYS
1	B	423	HIS

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	333/333 (100%)	311 (93%)	22 (7%)	16	38
1	B	333/333 (100%)	310 (93%)	23 (7%)	15	35
All	All	666/666 (100%)	621 (93%)	45 (7%)	16	36

All (45) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	MET
1	A	72	ASN
1	A	104	LEU
1	A	120	THR
1	A	125	THR
1	A	135	ARG
1	A	144	LEU
1	A	196	LYS
1	A	203	ASN
1	A	222	ARG
1	A	245	ARG
1	A	252	LEU
1	A	254	ILE
1	A	264	SER
1	A	289	ILE
1	A	304	LEU
1	A	378	ASN
1	A	383	VAL
1	A	390	MET
1	A	407	GLU
1	A	416	ASN
1	A	423	HIS
1	B	39	MET
1	B	89	ASN
1	B	125	THR
1	B	177	GLN
1	B	178	THR
1	B	184	LEU
1	B	196	LYS
1	B	203	ASN
1	B	217	LEU
1	B	219	LYS
1	B	245	ARG
1	B	252	LEU
1	B	254	ILE

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Mol	Chain	Res	Type
1	B	278	SER
1	B	304	LEU
1	B	307	THR
1	B	337	ASP
1	B	364	GLN
1	B	390	MET
1	B	393	GLN
1	B	405	GLU
1	B	416	ASN
1	B	423	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (38) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	29	ASN
1	A	57	ASN
1	A	72	ASN
1	A	81	ASN
1	A	83	HIS
1	A	127	ASN
1	A	129	ASN
1	A	248	ASN
1	A	270	ASN
1	A	281	ASN
1	A	290	HIS
1	A	300	GLN
1	A	302	GLN
1	A	303	GLN
1	A	364	GLN
1	A	378	ASN
1	A	398	ASN
1	A	416	ASN
1	A	418	ASN
1	B	4	GLN
1	B	57	ASN
1	B	81	ASN
1	B	83	HIS
1	B	89	ASN
1	B	127	ASN
1	B	129	ASN
1	B	248	ASN
1	B	270	ASN

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Mol	Chain	Res	Type
1	B	281	ASN
1	B	290	HIS
1	B	300	GLN
1	B	302	GLN
1	B	303	GLN
1	B	356	ASN
1	B	364	GLN
1	B	416	ASN
1	B	418	ASN
1	B	424	HIS

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](#)

13 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	C8E	A	505	-	15,15,20	0.39	0	14,14,19	0.41	0
3	LDA	B	510	-	4,4,15	0.41	0	3,3,17	0.32	0
2	C8E	A	509	-	8,8,20	0.46	0	7,7,19	0.21	0
2	C8E	B	530	-	20,20,20	0.42	0	19,19,19	0.33	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	C8E	A	507	-	20,20,20	0.37	0	19,19,19	0.45	0
2	C8E	B	506	-	15,15,20	0.42	0	14,14,19	0.40	0
3	LDA	A	525	-	9,9,15	0.42	0	8,8,17	0.54	0
3	LDA	A	515	-	3,3,15	0.45	0	2,2,17	0.51	0
2	C8E	B	535[B]	-	20,20,20	0.37	0	19,19,19	0.44	0
2	C8E	B	520	-	20,20,20	0.39	0	19,19,19	0.42	0
2	C8E	B	535[C]	-	20,20,20	0.38	0	19,19,19	0.44	0
2	C8E	B	535[A]	-	20,20,20	0.39	0	19,19,19	0.34	0
2	C8E	A	508	-	20,20,20	0.40	0	19,19,19	0.36	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	C8E	A	505	-	-	11/13/13/18	-
3	LDA	B	510	-	-	0/2/2/13	-
2	C8E	A	509	-	-	5/6/6/18	-
2	C8E	B	530	-	-	10/18/18/18	-
2	C8E	A	507	-	-	12/18/18/18	-
2	C8E	B	506	-	-	11/13/13/18	-
3	LDA	A	525	-	-	0/7/7/13	-
3	LDA	A	515	-	-	0/1/1/13	-
2	C8E	B	535[B]	-	-	13/18/18/18	-
2	C8E	B	520	-	-	12/18/18/18	-
2	C8E	B	535[C]	-	-	9/18/18/18	-
2	C8E	B	535[A]	-	-	14/18/18/18	-
2	C8E	A	508	-	-	15/18/18/18	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (112) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	530	C8E	C2-C3-C4-C5
2	A	507	C8E	O12-C13-C14-O15

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Mol	Chain	Res	Type	Atoms
2	A	509	C8E	O12-C13-C14-O15
2	A	507	C8E	O9-C10-C11-O12
2	B	535[B]	C8E	O15-C16-C17-O18
2	B	520	C8E	O12-C13-C14-O15
2	B	535[C]	C8E	O18-C19-C20-O21
2	A	508	C8E	C4-C5-C6-C7
2	A	508	C8E	O9-C10-C11-O12
2	A	508	C8E	O12-C13-C14-O15
2	B	506	C8E	O12-C13-C14-O15
2	A	507	C8E	O18-C19-C20-O21
2	B	535[B]	C8E	O18-C19-C20-O21
2	B	535[A]	C8E	O12-C13-C14-O15
2	A	507	C8E	C3-C4-C5-C6
2	B	530	C8E	C6-C7-C8-O9
2	A	505	C8E	C6-C7-C8-O9
2	A	507	C8E	C16-C17-O18-C19
2	B	535[A]	C8E	O18-C19-C20-O21
2	B	535[A]	C8E	C2-C3-C4-C5
2	A	505	C8E	C4-C5-C6-C7
2	A	508	C8E	O18-C19-C20-O21
2	B	530	C8E	O18-C19-C20-O21
2	B	535[C]	C8E	C6-C7-C8-O9
2	B	506	C8E	C6-C7-C8-O9
2	B	506	C8E	C3-C4-C5-C6
2	B	535[B]	C8E	C5-C6-C7-C8
2	B	520	C8E	O9-C10-C11-O12
2	B	530	C8E	C4-C5-C6-C7
2	B	520	C8E	O18-C19-C20-O21
2	B	520	C8E	C3-C4-C5-C6
2	A	508	C8E	C5-C6-C7-C8
2	B	506	C8E	C4-C5-C6-C7
2	B	520	C8E	C6-C7-C8-O9
2	B	530	C8E	C5-C6-C7-C8
2	B	535[B]	C8E	C4-C5-C6-C7
2	B	535[C]	C8E	C5-C6-C7-C8
2	B	535[B]	C8E	C17-C16-O15-C14
2	A	507	C8E	C2-C3-C4-C5
2	A	507	C8E	C1-C2-C3-C4
2	B	535[B]	C8E	C3-C4-C5-C6
2	B	520	C8E	O15-C16-C17-O18
2	B	535[B]	C8E	O9-C10-C11-O12
2	B	535[B]	C8E	C6-C7-C8-O9

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Mol	Chain	Res	Type	Atoms
2	A	505	C8E	C2-C3-C4-C5
2	B	530	C8E	C17-C16-O15-C14
2	B	535[A]	C8E	C1-C2-C3-C4
2	B	535[B]	C8E	C16-C17-O18-C19
2	A	505	C8E	O12-C13-C14-O15
2	B	535[B]	C8E	C1-C2-C3-C4
2	B	535[C]	C8E	C20-C19-O18-C17
2	B	530	C8E	C20-C19-O18-C17
2	A	507	C8E	C10-C11-O12-C13
2	B	530	C8E	C14-C13-O12-C11
2	B	535[B]	C8E	C10-C11-O12-C13
2	A	508	C8E	C10-C11-O12-C13
2	B	530	C8E	C13-C14-O15-C16
2	B	506	C8E	C13-C14-O15-C16
2	B	520	C8E	C14-C13-O12-C11
2	B	535[A]	C8E	C13-C14-O15-C16
2	A	509	C8E	C13-C14-O15-C16
2	B	506	C8E	C11-C10-O9-C8
2	B	535[C]	C8E	C1-C2-C3-C4
2	A	505	C8E	C14-C13-O12-C11
2	B	520	C8E	C17-C16-O15-C14
2	B	535[C]	C8E	C3-C4-C5-C6
2	A	509	C8E	O9-C10-C11-O12
2	B	506	C8E	C7-C8-O9-C10
2	A	509	C8E	C17-C16-O15-C14
2	B	535[A]	C8E	C14-C13-O12-C11
2	B	535[B]	C8E	C14-C13-O12-C11
2	A	508	C8E	C16-C17-O18-C19
2	A	508	C8E	C6-C7-C8-O9
2	B	506	C8E	C14-C13-O12-C11
2	B	520	C8E	C13-C14-O15-C16
2	B	520	C8E	C7-C8-O9-C10
2	A	508	C8E	C2-C3-C4-C5
2	B	520	C8E	C16-C17-O18-C19
2	A	505	C8E	C7-C8-O9-C10
2	B	535[A]	C8E	C20-C19-O18-C17
2	B	535[A]	C8E	C3-C4-C5-C6
2	A	507	C8E	C7-C8-O9-C10
2	B	535[A]	C8E	C10-C11-O12-C13
2	A	508	C8E	C14-C13-O12-C11
2	A	505	C8E	C1-C2-C3-C4
2	A	505	C8E	C11-C10-O9-C8

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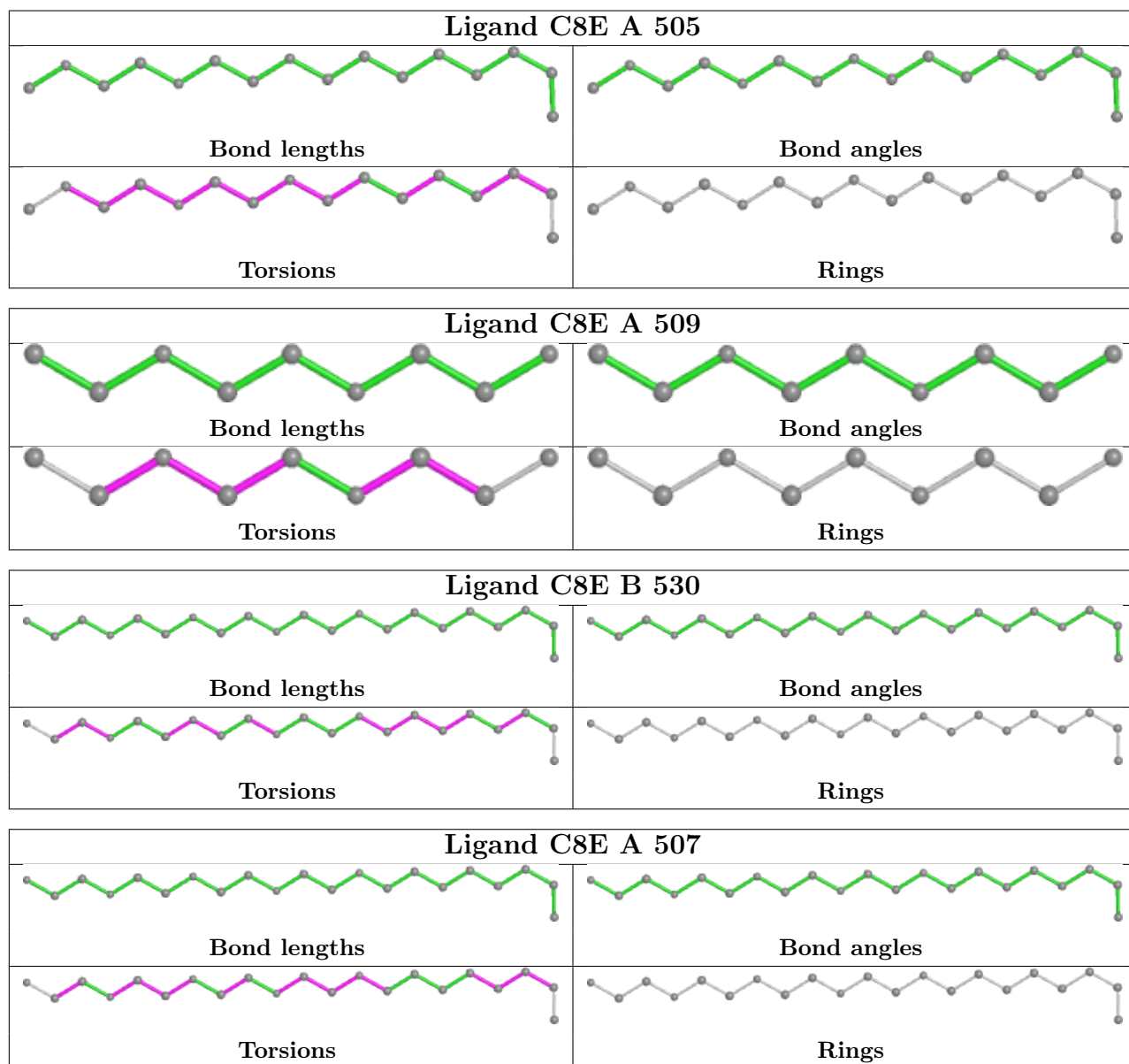
Mol	Chain	Res	Type	Atoms
2	B	535[A]	C8E	C4-C5-C6-C7
2	A	508	C8E	C20-C19-O18-C17
2	B	520	C8E	C1-C2-C3-C4
2	A	508	C8E	C13-C14-O15-C16
2	B	506	C8E	C1-C2-C3-C4
2	A	505	C8E	C13-C14-O15-C16
2	A	507	C8E	O15-C16-C17-O18
2	B	535[A]	C8E	C7-C8-O9-C10
2	B	535[C]	C8E	C7-C8-O9-C10
2	B	535[A]	C8E	O15-C16-C17-O18
2	B	535[B]	C8E	C7-C8-O9-C10
2	A	507	C8E	C11-C10-O9-C8
2	A	508	C8E	O15-C16-C17-O18
2	A	505	C8E	O9-C10-C11-O12
2	B	535[A]	C8E	O9-C10-C11-O12
2	B	535[C]	C8E	O9-C10-C11-O12
2	B	535[A]	C8E	C6-C7-C8-O9
2	B	535[C]	C8E	C16-C17-O18-C19
2	B	506	C8E	O9-C10-C11-O12
2	A	508	C8E	C7-C8-O9-C10
2	A	505	C8E	C10-C11-O12-C13
2	B	506	C8E	C10-C11-O12-C13
2	B	530	C8E	C7-C8-O9-C10
2	A	509	C8E	C10-C11-O12-C13
2	A	508	C8E	C1-C2-C3-C4
2	A	507	C8E	C17-C16-O15-C14

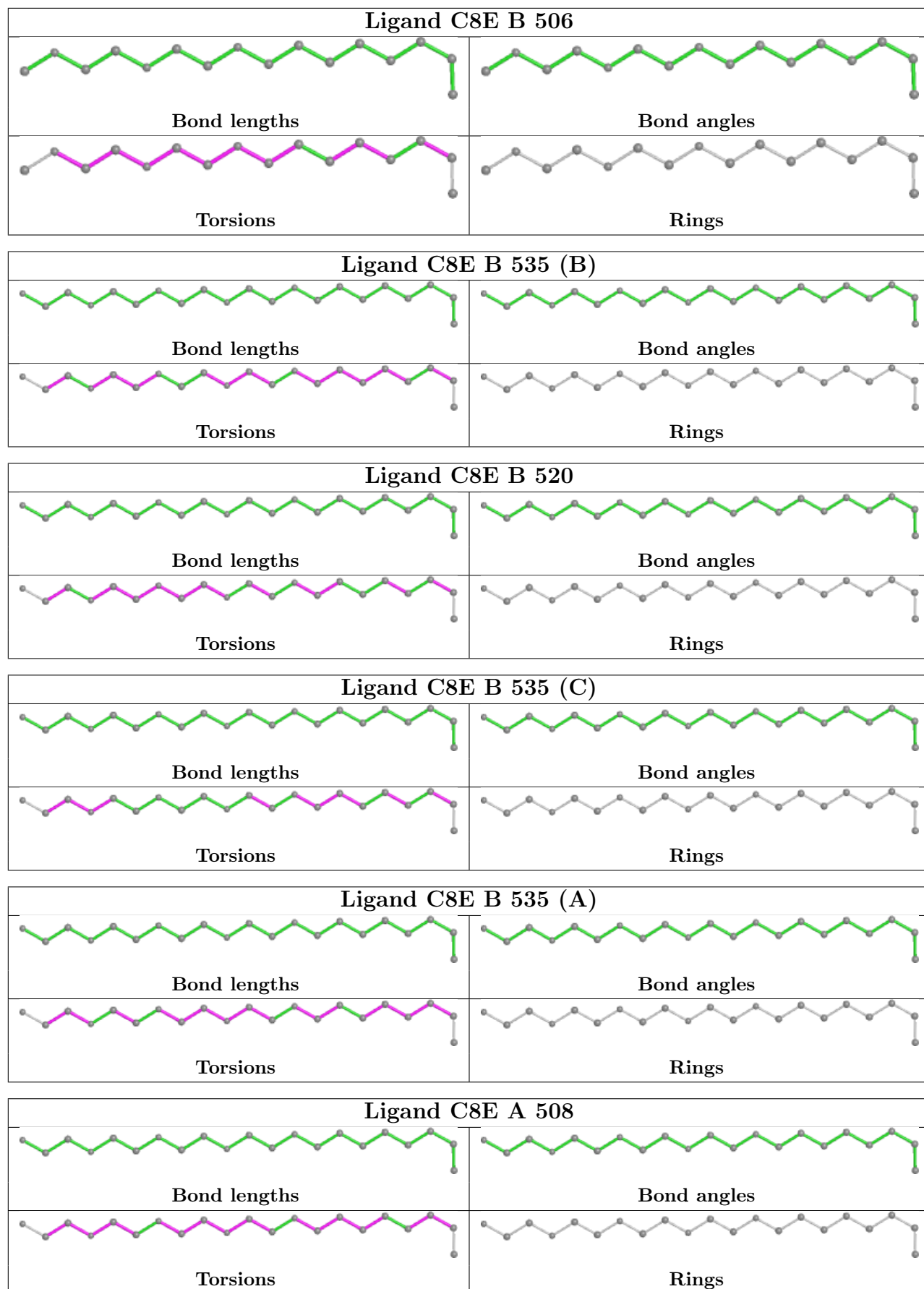
There are no ring outliers.

10 monomers are involved in 50 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	505	C8E	2	0
2	A	509	C8E	3	0
2	B	530	C8E	15	0
2	A	507	C8E	7	0
2	B	506	C8E	4	0
2	B	535[B]	C8E	4	0
2	B	520	C8E	1	0
2	B	535[C]	C8E	4	0
2	B	535[A]	C8E	6	0
2	A	508	C8E	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	424/424 (100%)	-0.18	11 (2%) 56 57	9, 29, 53, 93	0
1	B	424/424 (100%)	-0.22	5 (1%) 79 80	11, 29, 53, 82	0
All	All	848/848 (100%)	-0.20	16 (1%) 66 69	9, 29, 53, 93	0

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	283	VAL	3.5
1	A	378	ASN	3.0
1	A	219	LYS	2.8
1	B	335	TYR	2.6
1	A	285	PRO	2.5
1	B	219	LYS	2.3
1	A	287	TRP	2.3
1	B	287	TRP	2.2
1	A	379	LYS	2.2
1	A	284	ASP	2.2
1	A	337	ASP	2.1
1	A	422	HIS	2.1
1	A	109	ASN	2.1
1	B	337	ASP	2.1
1	A	138	ASN	2.1
1	A	333	TYR	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](#)

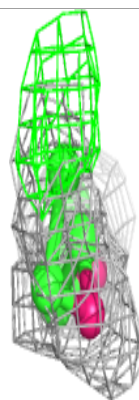
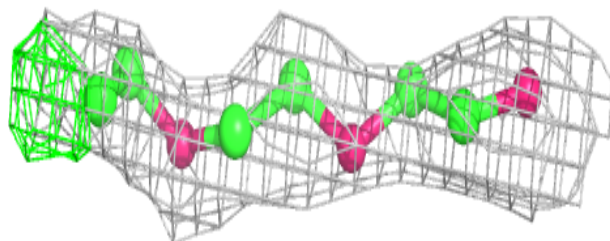
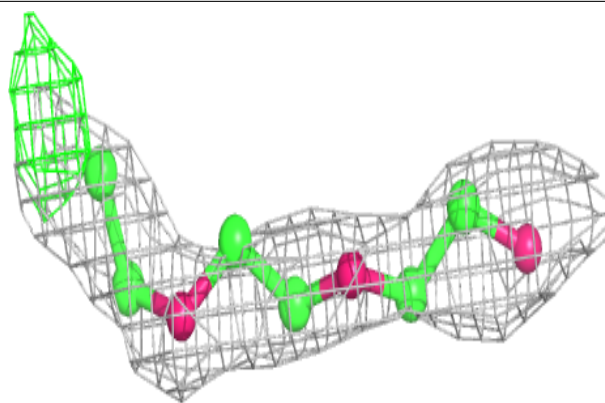
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	C8E	A	509	9/21	0.67	0.38	49,63,70,70	0
2	C8E	B	530	21/21	0.83	0.35	46,67,86,90	0
2	C8E	A	508	21/21	0.85	0.24	33,62,69,69	0
2	C8E	B	535[A]	21/21	0.86	0.50	0,17,38,40	21
2	C8E	B	535[B]	21/21	0.86	0.50	10,34,40,40	21
2	C8E	B	535[C]	21/21	0.86	0.50	0,25,39,41	21
3	LDA	B	510	5/16	0.87	0.19	30,33,37,38	0
2	C8E	B	520	21/21	0.88	0.36	34,63,100,101	0
2	C8E	A	507	21/21	0.88	0.28	47,61,71,71	0
3	LDA	A	515	4/16	0.89	0.21	12,20,22,25	0
3	LDA	A	525	10/16	0.92	0.18	16,22,28,34	0
2	C8E	B	506	16/21	0.94	0.20	18,32,47,49	0
2	C8E	A	505	16/21	0.95	0.19	18,30,58,59	0

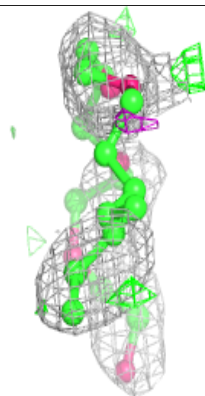
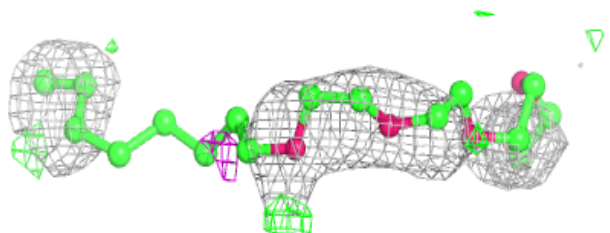
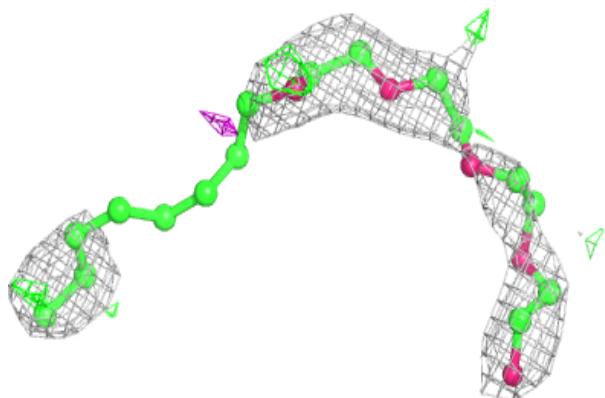
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around C8E A 509:

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

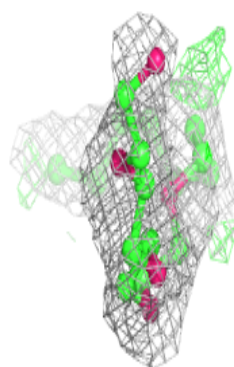
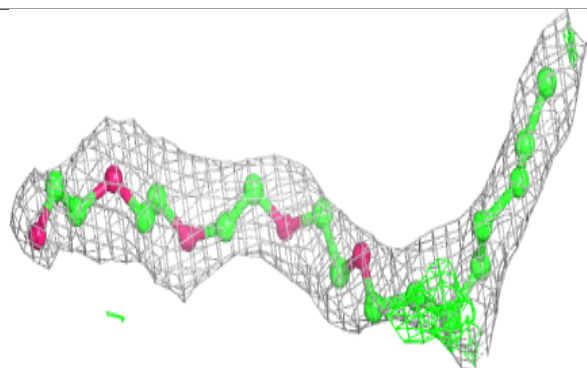
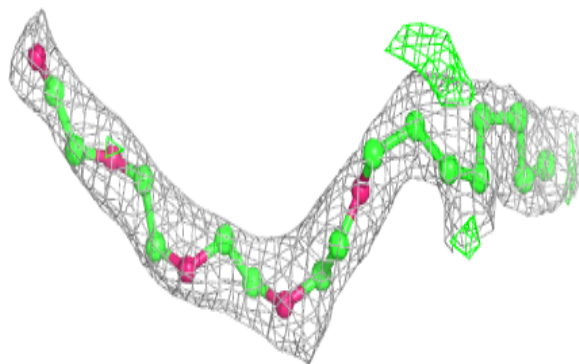
**Electron density around C8E B 530:**

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

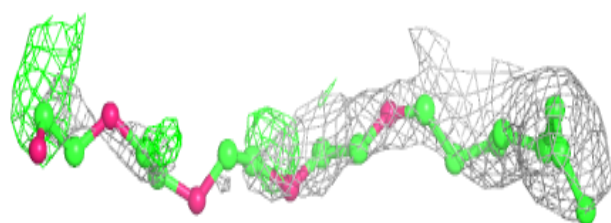
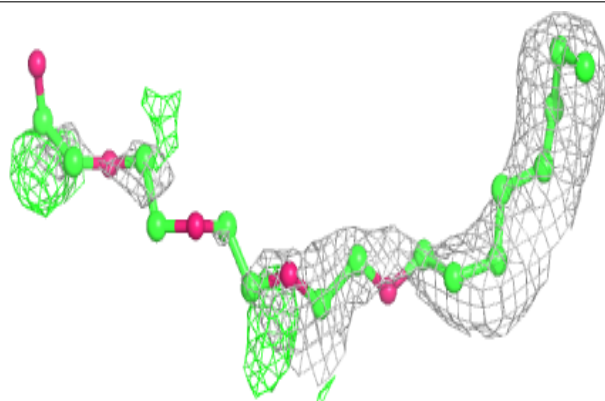


Electron density around C8E A 508:

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

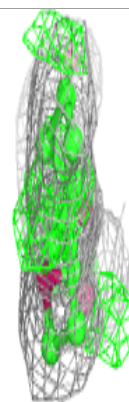
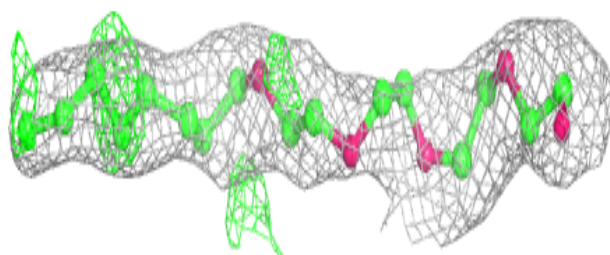
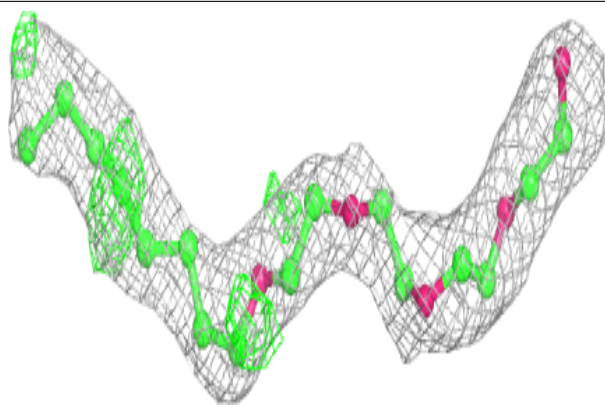
**Electron density around C8E B 535 (A):**

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and green (positive)

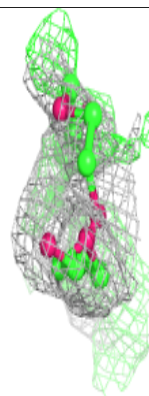
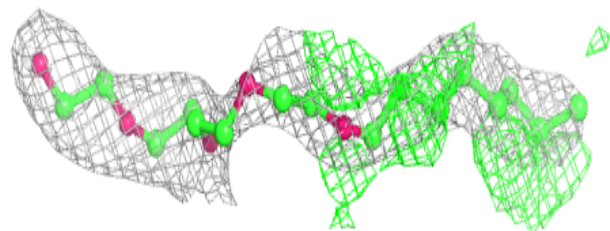
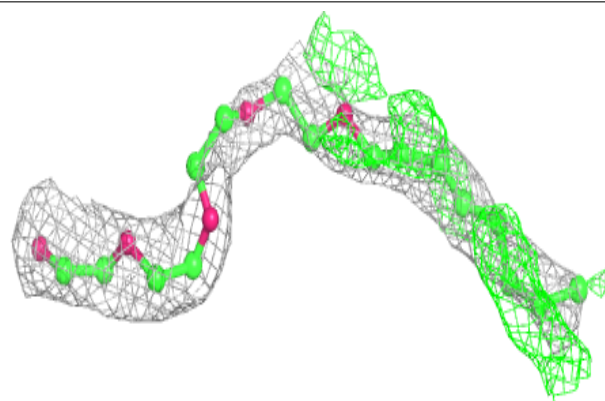


Electron density around C8E B 535 (B):

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

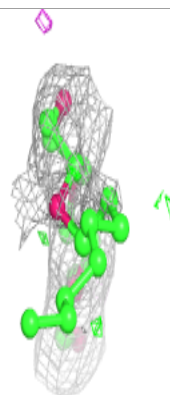
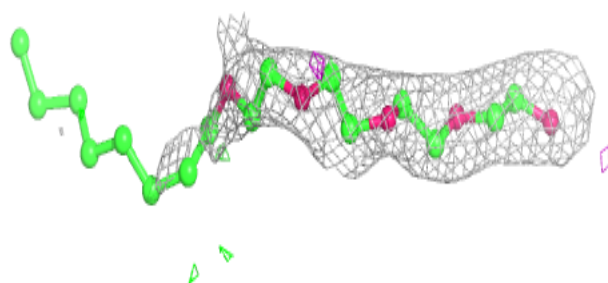
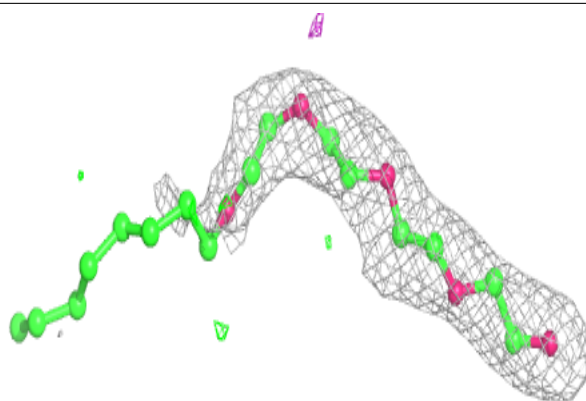
**Electron density around C8E B 535 (C):**

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and green (positive)

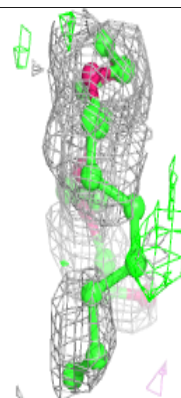
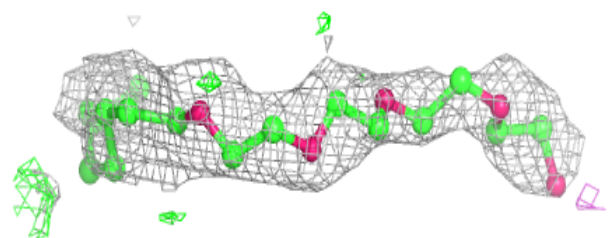
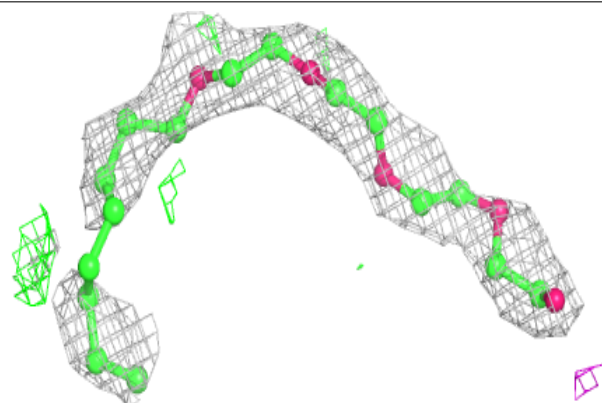


Electron density around C8E B 520:

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

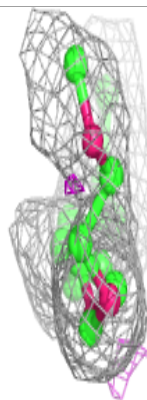
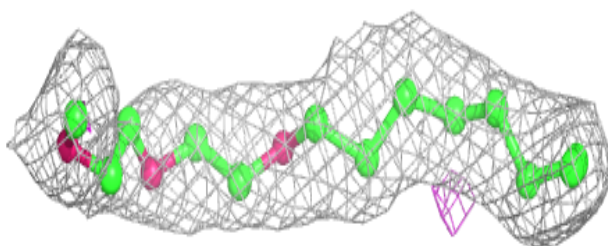
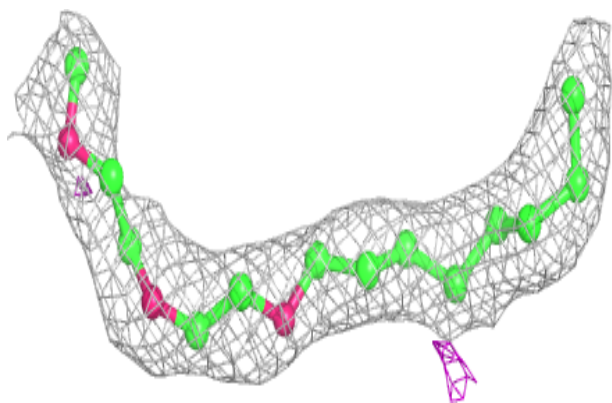
**Electron density around C8E A 507:**

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

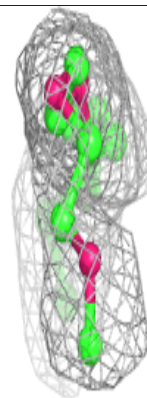
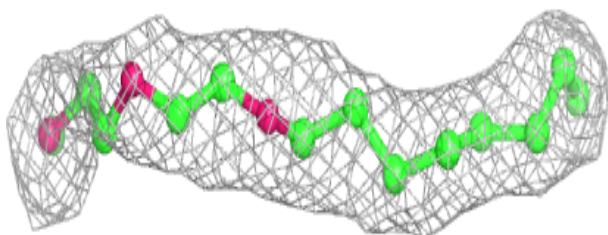
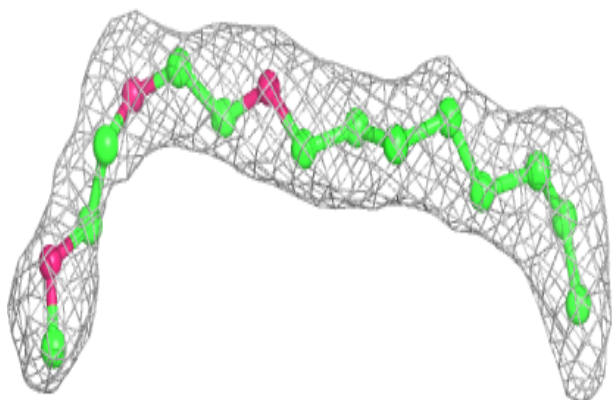


Electron density around C8E B 506:

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

**Electron density around C8E A 505:**

$2mF_o-DF_c$ (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.