



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 7, 2020 – 03:15 AM BST

PDB ID : 6MVD
Title : Crystal structure of Lecithin:cholesterol acyltransferase (LCAT) in complex with isopropyl dodec-11-enylfluorophosphate (IDFP) and a small molecule activator
Authors : Manthei, K.A.; Chang, L.; Tesmer, J.J.G.
Deposited on : 2018-10-25
Resolution : 3.10 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The 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 : 2.13.1
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) : 2.13.1

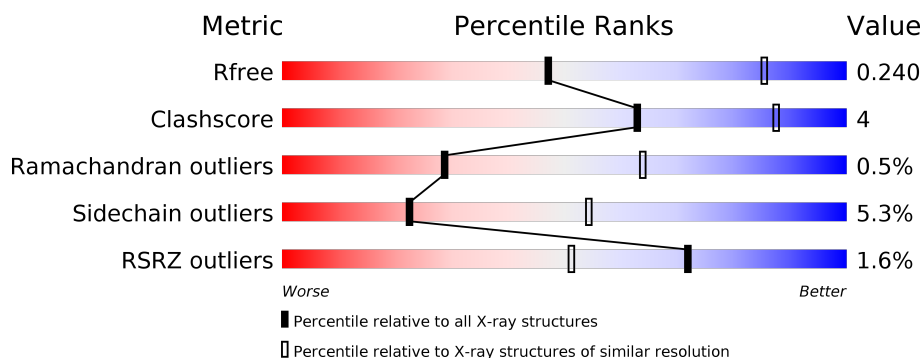
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.10 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1094 (3.10-3.10)
Clashscore	141614	1184 (3.10-3.10)
Ramachandran outliers	138981	1141 (3.10-3.10)
Sidechain outliers	138945	1141 (3.10-3.10)
RSRZ outliers	127900	1067 (3.10-3.10)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on 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	383	<div> <div>%</div> <div> <div></div> <div>82%</div> <div>15%</div> <div>..</div> </div> </div>
1	B	383	<div> <div>2%</div> <div> <div></div> <div>83%</div> <div>12%</div> <div>..</div> </div> </div>

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	NAG	A	501	-	-	-	X
2	NAG	A	503	-	-	-	X
2	NAG	B	501	-	-	-	X

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 6181 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 Phosphatidylcholine-sterol acyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	376	Total	C	N	O	S	0	0	0
			3019	1955	509	540	15			
1	B	368	Total	C	N	O	S	0	0	0
			2959	1919	498	527	15			

There are 12 discrepancies between the modelled and reference sequences:

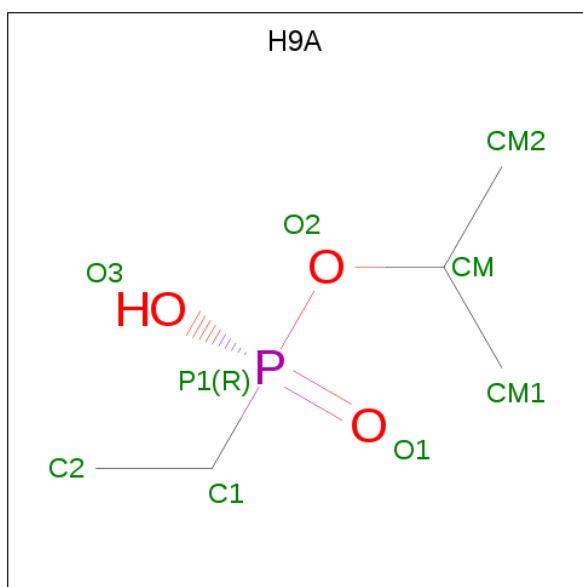
Chain	Residue	Modelled	Actual	Comment	Reference
A	398	HIS	-	expression tag	UNP P04180
A	399	HIS	-	expression tag	UNP P04180
A	400	HIS	-	expression tag	UNP P04180
A	401	HIS	-	expression tag	UNP P04180
A	402	HIS	-	expression tag	UNP P04180
A	403	HIS	-	expression tag	UNP P04180
B	398	HIS	-	expression tag	UNP P04180
B	399	HIS	-	expression tag	UNP P04180
B	400	HIS	-	expression tag	UNP P04180
B	401	HIS	-	expression tag	UNP P04180
B	402	HIS	-	expression tag	UNP P04180
B	403	HIS	-	expression tag	UNP P04180

- Molecule 2 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: C₈H₁₅NO₆).



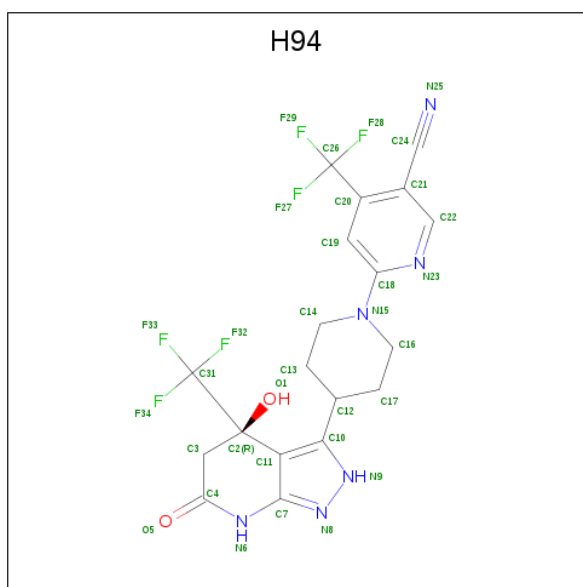
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 3 is propan-2-yl hydrogen (R)-ethylphosphonate (three-letter code: H9A) (formula: $C_5H_{13}O_3P$).



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

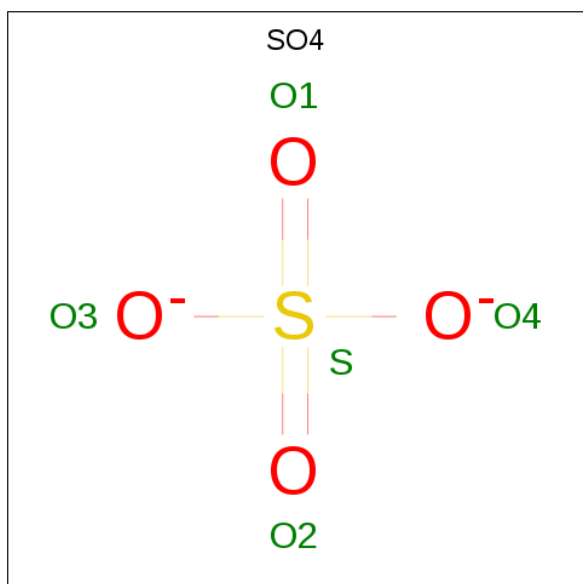
- Molecule 4 is 6-{4-[(4R)-4-hydroxy-6-oxo-4-(trifluoromethyl)-4,5,6,7-tetrahydro-2H-pyrazolo[3,4-b]pyridin-3-yl]piperidin-1-yl}-4-(trifluoromethyl)pyridine-3-carbonitrile (three-letter code: H94) (formula: C₁₉H₁₆F₆N₆O₂).



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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	F	N	O	0	0
			33	19	6	6	2		

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

- Molecule 6 is NICKEL (II) ION (three-letter code: NI) (formula: Ni).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	Ni	0	0
			1	1		

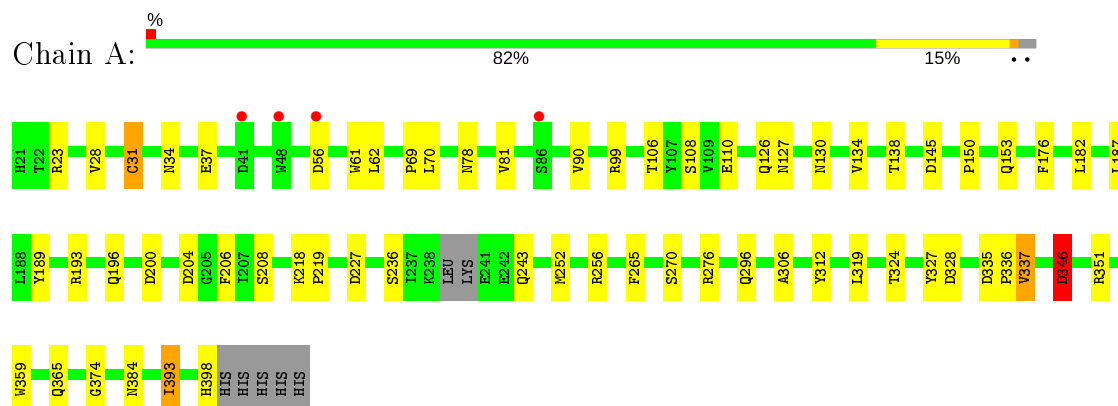
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	16	Total 16	O 16	0	0
7	B	4	Total 4	O 4	0	0

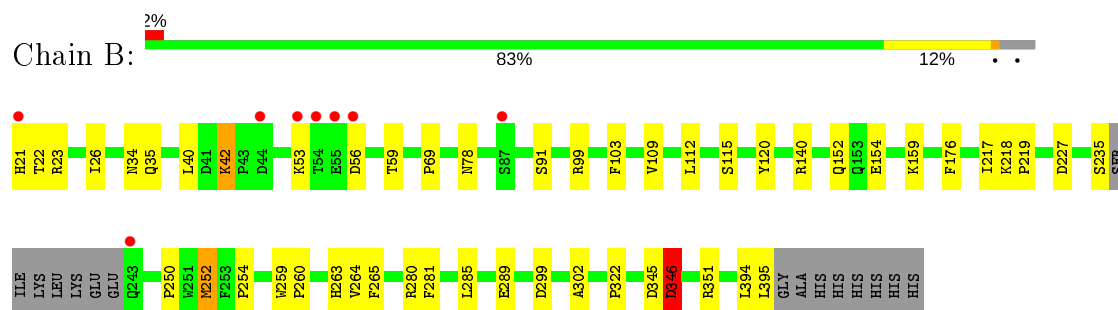
3 Residue-property plots [i](#)

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: Phosphatidylcholine-sterol acyltransferase



- Molecule 1: Phosphatidylcholine-sterol acyltransferase



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	134.70Å 106.38Å 117.82Å 90.00° 125.45° 90.00°	Depositor
Resolution (Å)	28.80 – 3.10 28.78 – 3.10	Depositor EDS
% Data completeness (in resolution range)	87.3 (28.80-3.10) 87.4 (28.78-3.10)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.35 (at 3.11Å)	Xtriage
Refinement program	REFMAC 5.8.0230	Depositor
R, R_{free}	0.193 , 0.239 0.198 , 0.240	Depositor DCC
R_{free} test set	1145 reflections (5.31%)	wwPDB-VP
Wilson B-factor (Å ²)	71.0	Xtriage
Anisotropy	0.156	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 64.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.005 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	6181	wwPDB-VP
Average B, all atoms (Å ²)	73.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.80% 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: H9A, SO4, H94, NAG, NI

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	0.45	0/3114	0.64	0/4248
1	B	0.44	0/3053	0.61	0/4167
All	All	0.45	0/6167	0.62	0/8415

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	A	0	2
1	B	0	1
All	All	0	3

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	193	ARG	Sidechain
1	A	351	ARG	Sidechain
1	B	280	ARG	Sidechain

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	3019	0	2923	27	0
1	B	2959	0	2868	25	0
2	A	42	0	39	0	0
2	B	28	0	26	0	0
3	A	8	0	0	0	0
3	B	8	0	0	0	0
4	A	33	0	0	1	0
4	B	33	0	0	1	0
5	A	20	0	0	0	0
5	B	10	0	0	0	0
6	A	1	0	0	0	0
7	A	16	0	0	0	0
7	B	4	0	0	0	0
All	All	6181	0	5856	52	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 4.

All (52) 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:345:ASP:O	1:B:346:ASP:HB3	1.71	0.89
1:A:81:VAL:HB	1:A:90:VAL:HG13	1.66	0.78
1:B:23:ARG:NH1	1:B:394:LEU:O	2.22	0.73
1:A:37:GLU:OE1	1:A:99:ARG:NH1	2.23	0.71
1:A:312:TYR:CD1	1:A:393:ILE:HD13	2.27	0.70
1:A:81:VAL:HB	1:A:90:VAL:CG1	2.25	0.66
1:A:23:ARG:HD3	1:A:204:ASP:OD2	1.97	0.64
1:A:31:CYS:HB3	1:A:182:LEU:HD22	1.80	0.64
1:A:106:THR:O	1:A:110:GLU:HG3	1.98	0.62
1:A:327:TYR:CZ	1:A:336:PRO:HG3	2.36	0.60
1:B:26:ILE:HA	1:B:140:ARG:O	2.02	0.59
1:A:319:LEU:HD21	1:A:374:GLY:HA2	1.85	0.57
1:B:219:PRO:CG	1:B:252:MET:HG2	2.34	0.57
1:A:265:PHE:O	1:A:324:THR:HA	2.11	0.51
1:A:365:GLN:N	1:A:365:GLN:OE1	2.41	0.51
1:A:196:GLN:NE2	1:A:200:ASP:OD1	2.40	0.49
1:A:218:LYS:N	1:A:219:PRO:CD	2.75	0.49
1:A:256:ARG:HH21	1:A:276:ARG:HG2	1.77	0.49
1:B:260:PRO:HD3	1:B:351:ARG:NH2	2.27	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:42:LYS:HE3	1:B:78:ASN:OD1	2.13	0.48
1:B:260:PRO:HD3	1:B:351:ARG:HH21	1.79	0.48
1:B:35:GLN:HE21	1:B:112:LEU:C	2.17	0.48
1:B:103:PHE:CE2	1:B:159:LYS:HB3	2.48	0.48
1:A:328:ASP:HB3	1:A:337:VAL:HG21	1.96	0.47
1:B:281:PHE:CZ	1:B:285:LEU:HD11	2.49	0.47
1:B:40:LEU:O	1:B:53:LYS:HA	2.14	0.47
1:B:289:GLU:HA	1:B:289:GLU:OE2	2.14	0.47
1:A:145:ASP:O	1:A:153:GLN:NE2	2.47	0.47
1:A:134:VAL:N	1:A:138:THR:OG1	2.49	0.46
1:B:299:ASP:HA	1:B:302:ALA:HB2	1.97	0.46
1:A:346:ASP:OD1	1:A:346:ASP:C	2.55	0.45
1:B:217:ILE:HD13	1:B:265:PHE:HD1	1.82	0.44
1:A:150:PRO:HB3	1:A:189:TYR:CD2	2.52	0.44
1:B:254:PRO:HB3	1:B:259:TRP:CE3	2.53	0.44
1:B:219:PRO:HG3	1:B:252:MET:HG2	2.00	0.43
1:B:217:ILE:HG21	1:B:322:PRO:HB2	2.00	0.43
1:B:263:HIS:CD2	1:B:263:HIS:C	2.91	0.43
1:A:312:TYR:CD1	1:A:393:ILE:CD1	3.01	0.42
1:A:61:TRP:HA	1:A:62:LEU:HA	1.80	0.42
1:A:78:ASN:ND2	4:A:505:H94:O5	2.53	0.41
1:B:263:HIS:CD2	1:B:264:VAL:N	2.88	0.41
1:A:187:LEU:HA	1:A:187:LEU:HD23	1.93	0.41
1:B:218:LYS:N	1:B:219:PRO:CD	2.83	0.41
1:B:69:PRO:HB2	4:B:504:H94:F27	2.10	0.41
1:A:28:VAL:HG21	1:A:187:LEU:HD21	2.03	0.41
1:A:306:ALA:HB2	1:A:359:TRP:CD1	2.55	0.41
1:B:21:HIS:ND1	1:B:22:THR:HG23	2.35	0.41
1:B:252:MET:N	1:B:252:MET:SD	2.91	0.41
1:B:109:VAL:O	1:B:120:TYR:HB3	2.21	0.41
1:B:217:ILE:CD1	1:B:265:PHE:CD1	3.04	0.40
1:A:126:GLN:NE2	1:A:130:ASN:OD1	2.55	0.40
1:A:69:PRO:O	1:A:70:LEU:HB2	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	372/383 (97%)	353 (95%)	18 (5%)	1 (0%)	41	73
1	B	364/383 (95%)	335 (92%)	26 (7%)	3 (1%)	19	54
All	All	736/766 (96%)	688 (94%)	44 (6%)	4 (0%)	29	64

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	346	ASP
1	A	346	ASP
1	B	59	THR
1	B	250	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	325/332 (98%)	305 (94%)	20 (6%)	18	49
1	B	319/332 (96%)	305 (96%)	14 (4%)	28	61
All	All	644/664 (97%)	610 (95%)	34 (5%)	22	54

All (34) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	31	CYS
1	A	34	ASN

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Mol	Chain	Res	Type
1	A	56	ASP
1	A	108	SER
1	A	127	ASN
1	A	176	PHE
1	A	206	PHE
1	A	208	SER
1	A	227	ASP
1	A	236	SER
1	A	243	GLN
1	A	252	MET
1	A	270	SER
1	A	296	GLN
1	A	335	ASP
1	A	337	VAL
1	A	346	ASP
1	A	384	ASN
1	A	393	ILE
1	A	398	HIS
1	B	34	ASN
1	B	42	LYS
1	B	56	ASP
1	B	91	SER
1	B	99	ARG
1	B	115	SER
1	B	152	GLN
1	B	154	GLU
1	B	176	PHE
1	B	227	ASP
1	B	235	SER
1	B	252	MET
1	B	346	ASP
1	B	395	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	296	GLN
1	B	35	GLN
1	B	228	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 16 ligands modelled in this entry, 1 is monoatomic - leaving 15 for Mogul analysis.

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$
3	H9A	B	503	1	4,7,8	2.59	1 (25%)	3,8,11	0.88	0
4	H94	B	504	-	33,36,36	2.12	6 (18%)	41,57,57	2.28	13 (31%)
4	H94	A	505	-	33,36,36	2.23	5 (15%)	41,57,57	2.17	9 (21%)
5	SO4	B	506	-	4,4,4	0.40	0	6,6,6	0.23	0
2	NAG	A	503	1	14,14,15	0.83	0	17,19,21	1.57	3 (17%)
5	SO4	A	506	-	4,4,4	0.44	0	6,6,6	0.37	0
2	NAG	B	502	1	14,14,15	0.58	0	17,19,21	2.10	4 (23%)
3	H9A	A	504	1	4,7,8	2.25	1 (25%)	3,8,11	0.74	0
2	NAG	A	501	1	14,14,15	0.52	0	17,19,21	1.44	3 (17%)
5	SO4	A	507	-	4,4,4	0.34	0	6,6,6	0.16	0
2	NAG	B	501	1	14,14,15	0.59	0	17,19,21	1.38	3 (17%)
5	SO4	A	508	-	4,4,4	0.47	0	6,6,6	0.41	0
5	SO4	A	509	-	4,4,4	0.42	0	6,6,6	0.26	0
2	NAG	A	502	1	14,14,15	0.41	0	17,19,21	1.12	1 (5%)
5	SO4	B	505	-	4,4,4	0.47	0	6,6,6	0.32	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
3	H9A	B	503	1	-	0/2/6/8	-
4	H94	B	504	-	-	2/21/50/50	0/4/4/4
4	H94	A	505	-	-	3/21/50/50	0/4/4/4
2	NAG	A	503	1	-	3/6/23/26	0/1/1/1
2	NAG	B	502	1	-	3/6/23/26	0/1/1/1
3	H9A	A	504	1	-	0/2/6/8	-
2	NAG	A	501	1	-	2/6/23/26	0/1/1/1
2	NAG	B	501	1	-	2/6/23/26	0/1/1/1
2	NAG	A	502	1	-	2/6/23/26	0/1/1/1

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	505	H94	C21-C24	-10.62	1.28	1.44
4	B	504	H94	C21-C24	-10.11	1.29	1.44
3	B	503	H9A	O2-CM	-5.02	1.39	1.45
4	A	505	H94	C2-C11	-4.67	1.47	1.53
3	A	504	H9A	O2-CM	-4.11	1.40	1.45
4	B	504	H94	C7-N6	-3.20	1.34	1.38
4	B	504	H94	C2-C11	-2.41	1.50	1.53
4	B	504	H94	C18-N15	2.29	1.42	1.37
4	B	504	H94	C26-C20	2.21	1.55	1.50
4	B	504	H94	N8-N9	2.15	1.41	1.37
4	A	505	H94	C11-C7	-2.13	1.37	1.40
4	A	505	H94	C3-C4	2.11	1.52	1.50
4	A	505	H94	C7-N6	-2.05	1.35	1.38

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	505	H94	F34-C31-C2	-6.91	106.11	112.07
4	B	504	H94	C3-C4-N6	6.25	122.95	116.49
4	A	505	H94	C3-C4-N6	5.58	122.27	116.49
4	B	504	H94	F33-C31-C2	-5.31	107.49	112.07
2	B	502	NAG	C2-N2-C7	4.70	129.60	122.90
2	B	502	NAG	C8-C7-N2	4.42	123.58	116.10
4	B	504	H94	C7-N6-C4	-4.42	119.96	124.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	504	H94	C14-N15-C18	-4.30	110.41	120.39
2	A	503	NAG	C4-C3-C2	4.14	117.09	111.02
4	B	504	H94	C16-N15-C18	-4.01	111.08	120.39
4	B	504	H94	O5-C4-C3	-3.97	116.27	122.56
4	A	505	H94	C7-N6-C4	-3.90	120.47	124.24
2	A	501	NAG	C4-C3-C2	3.70	116.44	111.02
4	B	504	H94	F34-C31-C2	-3.54	109.02	112.07
4	A	505	H94	C13-C14-N15	-3.33	104.24	111.10
2	A	503	NAG	C1-O5-C5	-3.33	107.68	112.19
4	A	505	H94	O5-C4-C3	-3.24	117.42	122.56
4	B	504	H94	C14-C13-C12	2.78	114.33	111.04
4	A	505	H94	C16-N15-C18	-2.73	114.04	120.39
4	A	505	H94	F29-C26-C20	-2.70	107.99	112.70
2	B	501	NAG	O5-C5-C6	2.69	111.43	107.20
4	A	505	H94	C17-C12-C10	-2.69	107.58	111.44
4	A	505	H94	C21-C24-N25	-2.63	173.54	177.88
2	B	502	NAG	O7-C7-N2	-2.56	117.24	121.95
2	A	501	NAG	C3-C4-C5	2.52	114.74	110.24
2	B	502	NAG	C6-C5-C4	2.52	118.90	113.00
4	B	504	H94	C19-C18-N23	-2.43	118.52	122.73
4	B	504	H94	C22-N23-C18	2.39	121.66	117.30
2	B	501	NAG	C1-O5-C5	-2.34	109.02	112.19
2	B	501	NAG	O5-C1-C2	2.28	114.88	111.29
4	B	504	H94	C20-C21-C24	2.19	124.67	122.26
4	B	504	H94	C13-C12-C10	-2.16	108.33	111.44
2	A	503	NAG	C6-C5-C4	2.11	117.95	113.00
2	A	501	NAG	C1-O5-C5	2.11	115.05	112.19
4	B	504	H94	C19-C20-C21	-2.08	115.78	119.42
2	A	502	NAG	C4-C3-C2	-2.05	108.01	111.02

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	501	NAG	C1-C2-N2-C7
2	B	502	NAG	C8-C7-N2-C2
2	B	502	NAG	O7-C7-N2-C2
2	A	501	NAG	O5-C5-C6-O6
2	A	501	NAG	C4-C5-C6-O6
4	B	504	H94	N23-C18-N15-C14
4	A	505	H94	N23-C18-N15-C14
4	B	504	H94	C19-C18-N15-C14

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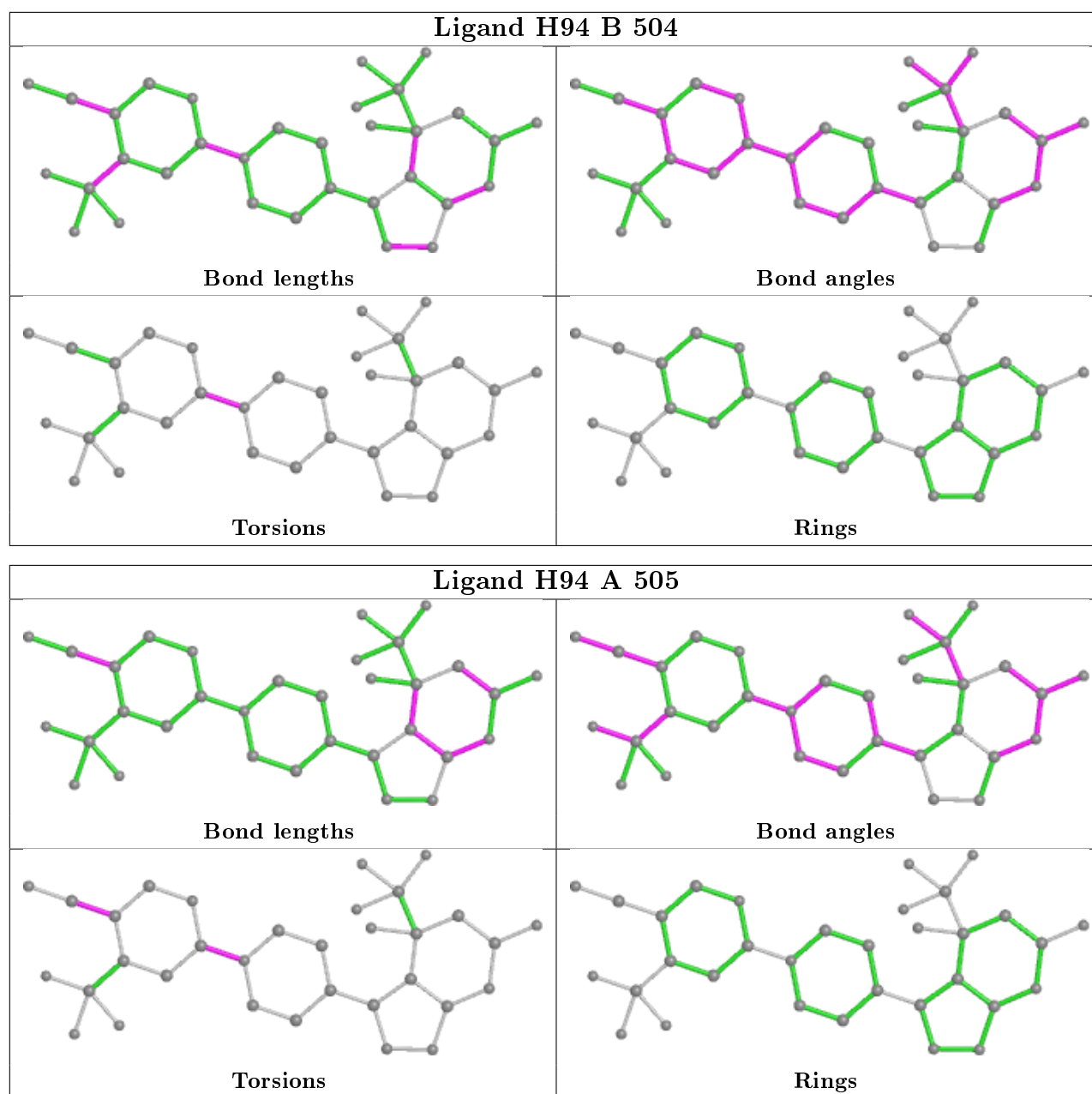
Mol	Chain	Res	Type	Atoms
2	A	502	NAG	C4-C5-C6-O6
2	A	503	NAG	C4-C5-C6-O6
4	A	505	H94	C20-C21-C24-N25
2	B	502	NAG	C1-C2-N2-C7
4	A	505	H94	C19-C18-N15-C14
2	B	501	NAG	C3-C2-N2-C7
2	A	503	NAG	C1-C2-N2-C7
2	A	503	NAG	O5-C5-C6-O6
2	A	502	NAG	O5-C5-C6-O6

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	504	H94	1	0
4	A	505	H94	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



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	376/383 (98%)	-0.25	4 (1%) 80 64	38, 62, 94, 117	0
1	B	368/383 (96%)	-0.11	8 (2%) 62 41	47, 79, 112, 142	0
All	All	744/766 (97%)	-0.18	12 (1%) 72 51	38, 72, 103, 142	0

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	55	GLU	3.2
1	B	44	ASP	3.0
1	B	56	ASP	2.9
1	B	21	HIS	2.9
1	A	56	ASP	2.9
1	A	48	TRP	2.5
1	B	243	GLN	2.5
1	B	87	SER	2.4
1	B	54	THR	2.3
1	A	86	SER	2.2
1	A	41	ASP	2.2
1	B	53	LYS	2.2

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 ⓘ

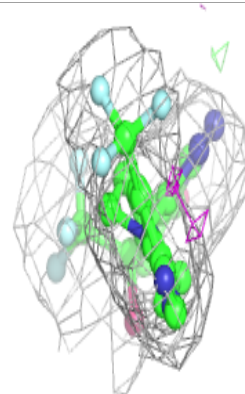
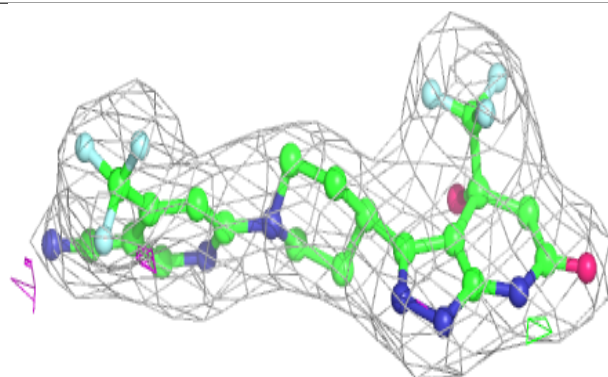
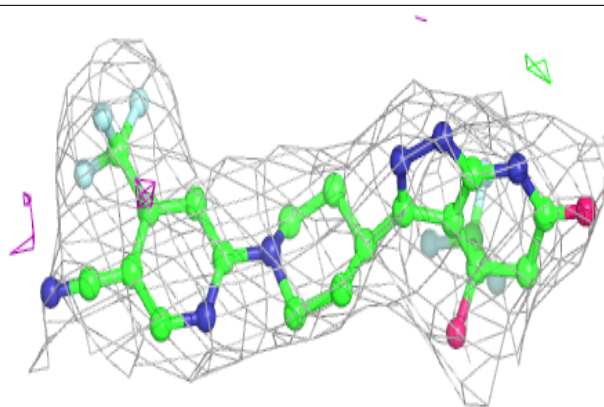
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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	NAG	B	501	14/15	0.61	0.46	115,131,138,141	0
2	NAG	A	503	14/15	0.69	0.45	88,102,110,111	0
5	SO4	A	509	5/5	0.76	0.28	116,117,122,127	0
2	NAG	B	502	14/15	0.80	0.30	96,100,102,102	0
2	NAG	A	501	14/15	0.80	0.48	96,107,109,111	0
2	NAG	A	502	14/15	0.85	0.21	97,102,112,117	0
5	SO4	B	506	5/5	0.86	0.32	130,133,134,137	0
5	SO4	A	507	5/5	0.90	0.45	134,135,137,139	0
4	H94	A	505	33/33	0.93	0.21	66,75,78,79	0
5	SO4	B	505	5/5	0.93	0.20	102,103,109,110	0
5	SO4	A	506	5/5	0.95	0.13	86,90,93,93	0
5	SO4	A	508	5/5	0.96	0.20	83,85,86,88	0
4	H94	B	504	33/33	0.96	0.16	71,74,85,86	0
6	NI	A	510	1/1	0.97	0.11	60,60,60,60	0
3	H9A	A	504	8/9	0.98	0.20	27,34,42,44	0
3	H9A	B	503	8/9	0.99	0.23	33,45,52,55	0

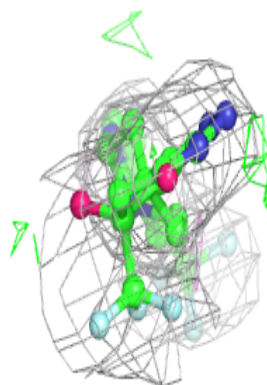
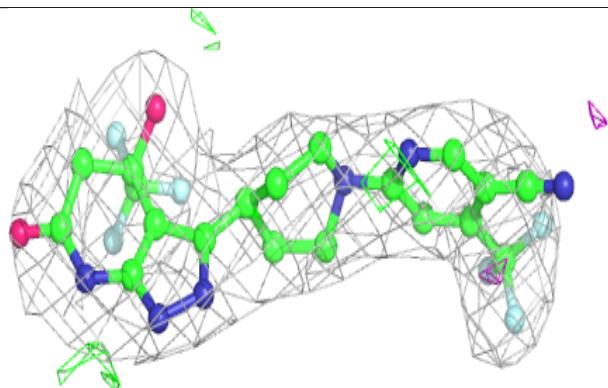
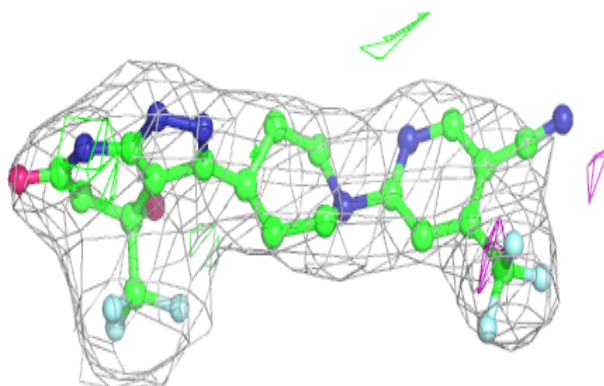
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around H94 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)

**Electron density around H94 B 504:**

$2mF_o-DF_c$ (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.