



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 12, 2026 – 07:54 PM UTC

PDB ID : 4A16 / pdb_00004a16
Title : Structure of mouse Acetylcholinesterase complex with Huprine derivative
Authors : Carletti, E.; Colletier, J.P.; Nachon, F.; Weik, M.; Ronco, C.; Jean, L.; Renard, P.Y.
Deposited on : 2011-09-14
Resolution : 2.65 Å (reported)

This is a wwPDB X-ray Structure Validation Summary 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)
Xtrriage (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

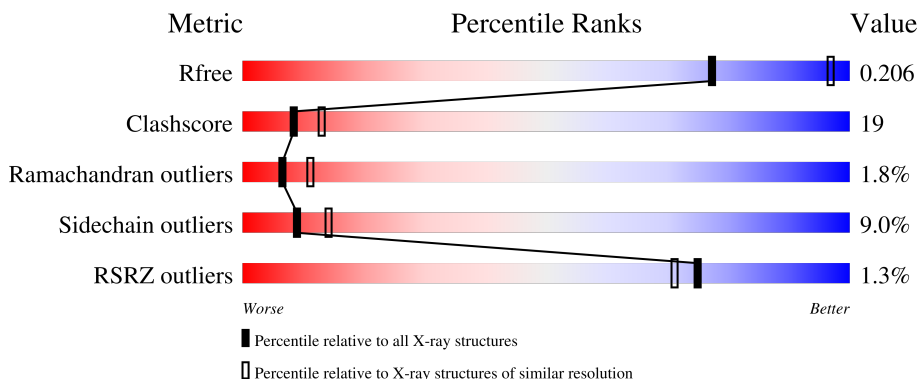
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.65 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	1110 (2.66-2.66)
Clashscore	190562	1141 (2.66-2.66)
Ramachandran outliers	187476	1126 (2.66-2.66)
Sidechain outliers	187428	1126 (2.66-2.66)
RSRZ outliers	180081	1110 (2.66-2.66)

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	545	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 75%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 20%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 2%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">2% 75% 20% . ..</p>
1	B	545	<div style="display: flex; align-items: center;"> <div style="width: 0%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 66%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 26%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 6%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 2%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">% 66% 26% 6% ..</p>
1	C	545	<div style="display: flex; align-items: center;"> <div style="width: 2%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 71%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 23%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 2%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">2% 71% 23% . ..</p>
1	D	545	<div style="display: flex; align-items: center;"> <div style="width: 0%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 63%; height: 10px; background-color: green; margin-right: 5px;"></div> <div style="width: 30%; height: 10px; background-color: yellow; margin-right: 5px;"></div> <div style="width: 5%; height: 10px; background-color: orange; margin-right: 5px;"></div> <div style="width: 2%; height: 10px; background-color: red; margin-right: 5px;"></div> <div style="width: 1%; height: 10px; background-color: grey;"></div> </div> <p style="margin-left: 20px;">% 63% 30% 5% ..</p>

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
3	SO4	A	1547	-	-	X	-
3	SO4	B	1550	-	-	X	-
4	CL	B	1551	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 19400 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 ACETYLCHOLINESTERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	541	Total 4236	C 2718	N 735	O 769	S 14	0	6	1
1	B	541	Total 4216	C 2705	N 732	O 765	S 14	0	3	1
1	C	541	Total 4202	C 2696	N 729	O 763	S 14	0	1	1
1	D	541	Total 4214	C 2704	N 730	O 766	S 14	0	3	1

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	544	ALA	-	expression tag	UNP P21836
A	545	THR	-	expression tag	UNP P21836
A	546	GLU	-	expression tag	UNP P21836
A	547	ALA	-	expression tag	UNP P21836
A	548	PRO	-	expression tag	UNP P21836
B	544	ALA	-	expression tag	UNP P21836
B	545	THR	-	expression tag	UNP P21836
B	546	GLU	-	expression tag	UNP P21836
B	547	ALA	-	expression tag	UNP P21836
B	548	PRO	-	expression tag	UNP P21836
C	544	ALA	-	expression tag	UNP P21836
C	545	THR	-	expression tag	UNP P21836
C	546	GLU	-	expression tag	UNP P21836
C	547	ALA	-	expression tag	UNP P21836
C	548	PRO	-	expression tag	UNP P21836
D	544	ALA	-	expression tag	UNP P21836
D	545	THR	-	expression tag	UNP P21836
D	546	GLU	-	expression tag	UNP P21836
D	547	ALA	-	expression tag	UNP P21836
D	548	PRO	-	expression tag	UNP P21836

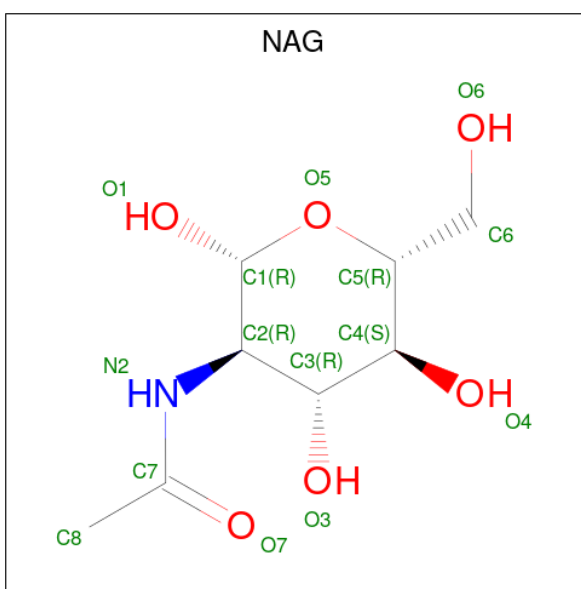


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total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

- Molecule 4 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	2	Total Cl 2 2	0	0
4	B	1	Total Cl 1 1	0	0
4	C	2	Total Cl 2 2	0	0

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



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

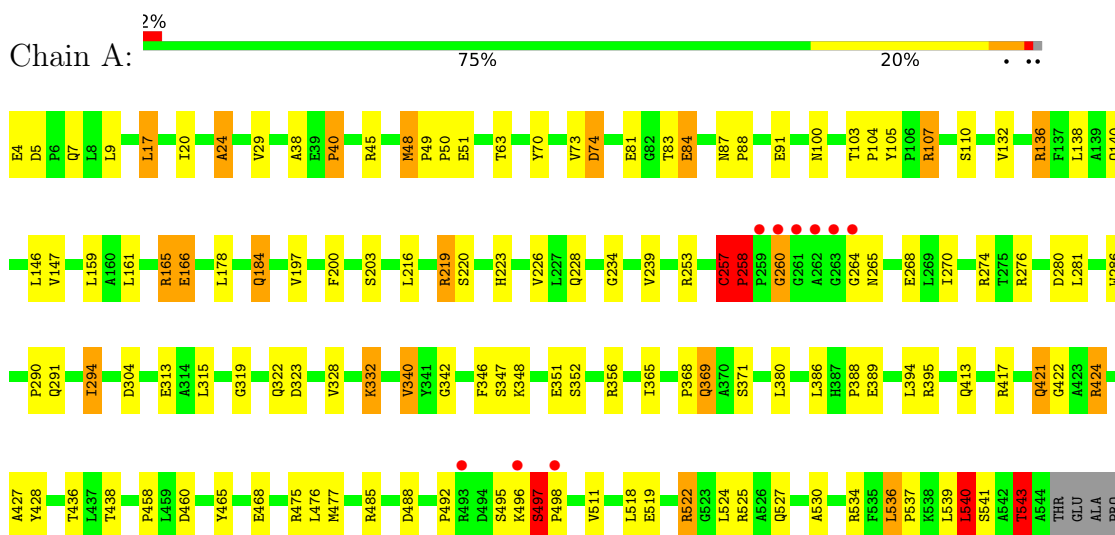
- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	663	Total O 663 663	0	0
6	B	503	Total O 503 503	0	0
6	C	621	Total O 621 621	0	0
6	D	536	Total O 536 536	0	0

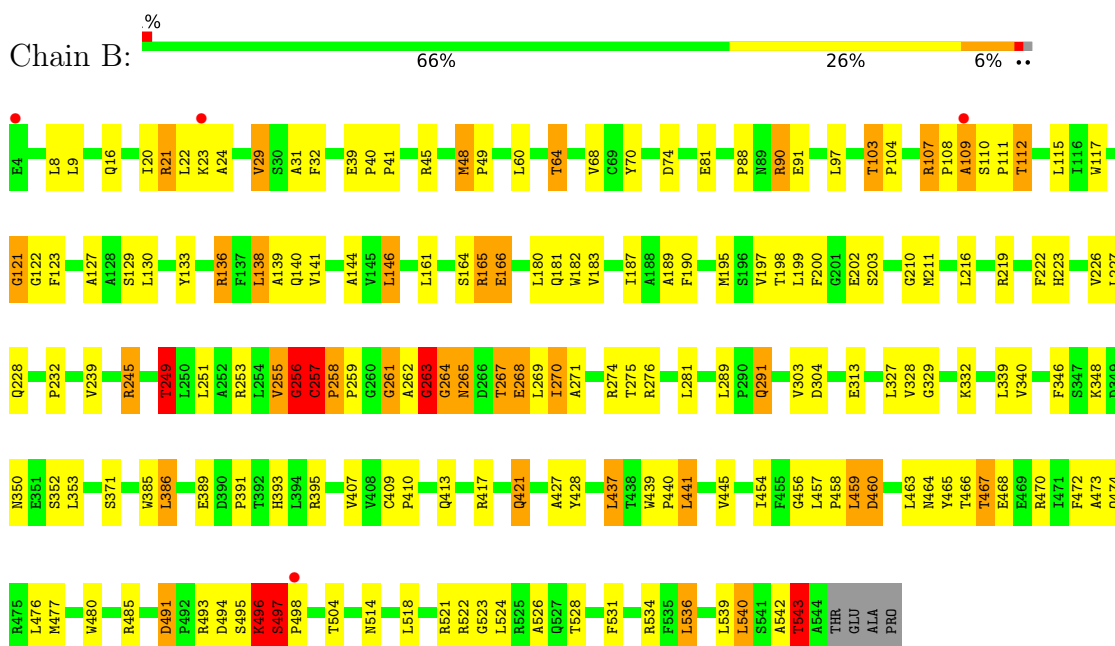
3 Residue-property plots [i](#)

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.

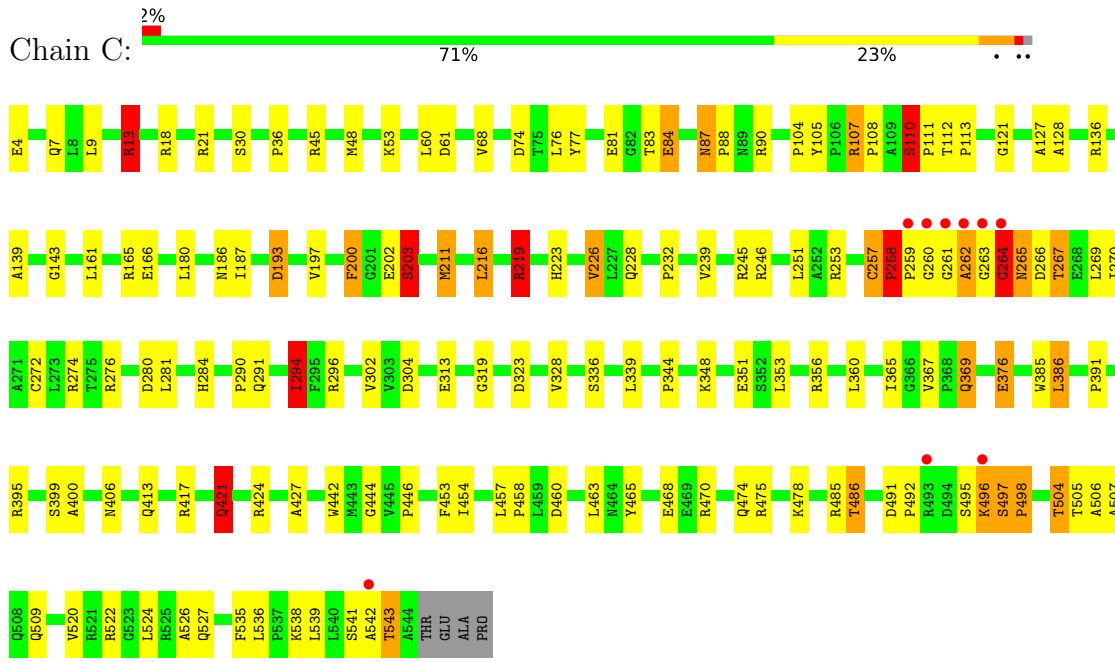
• Molecule 1: ACETYLCHOLINESTERASE



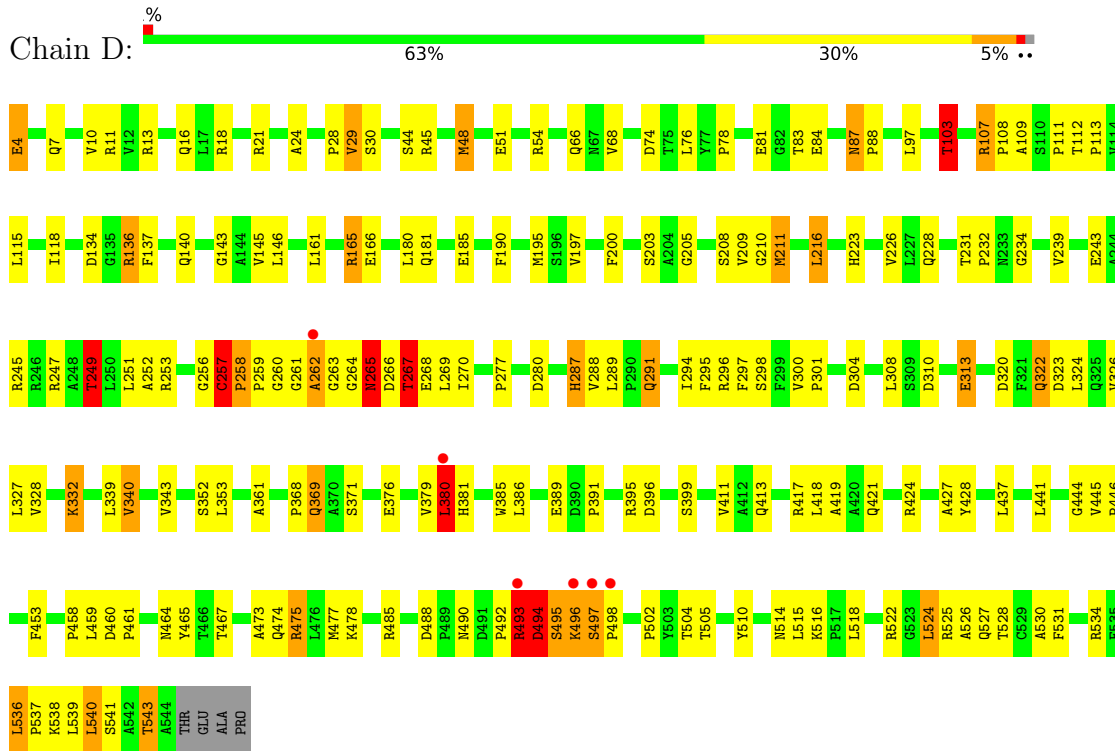
• Molecule 1: ACETYLCHOLINESTERASE



• Molecule 1: ACETYLCHOLINESTERASE



• Molecule 1: ACETYLCHOLINESTERASE



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	137.94Å 171.93Å 225.32Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.72 – 2.65 48.72 – 2.65	Depositor EDS
% Data completeness (in resolution range)	100.0 (48.72-2.65) 99.8 (48.72-2.65)	Depositor EDS
R_{merge}	0.01	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.67 (at 2.65Å)	Xtrriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.155 , 0.206 0.155 , 0.206	Depositor DCC
R_{free} test set	4658 reflections (3.00%)	wwPDB-VP
Wilson B-factor (Å ²)	53.0	Xtrriage
Anisotropy	0.096	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 51.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	19400	wwPDB-VP
Average B, all atoms (Å ²)	53.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.83% 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: SO4, NAG, CL, H34

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	1.26	5/4380 (0.1%)	1.25	20/5985 (0.3%)
1	B	1.23	9/4351 (0.2%)	1.30	24/5947 (0.4%)
1	C	1.30	9/4331 (0.2%)	1.33	31/5921 (0.5%)
1	D	1.32	8/4349 (0.2%)	1.36	31/5946 (0.5%)
All	All	1.28	31/17411 (0.2%)	1.31	106/23799 (0.4%)

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	1
1	B	0	1
1	C	0	3
All	All	0	5

The worst 5 of 31 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	258	PRO	CA-C	9.08	1.60	1.52
1	A	203	SER	CA-C	8.61	1.60	1.53
1	C	302	VAL	CA-CB	7.37	1.64	1.54
1	D	310	ASP	C-O	-7.20	1.17	1.24
1	B	271	ALA	CA-CB	-7.16	1.42	1.53

The worst 5 of 106 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	257	CYS	CA-C-N	-17.07	102.80	120.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	257	CYS	C-N-CA	-17.07	102.80	120.38
1	C	257	CYS	CA-C-N	-14.75	105.19	120.38
1	C	257	CYS	C-N-CA	-14.75	105.19	120.38
1	B	257	CYS	N-CA-C	9.84	131.55	109.81

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	257	CYS	Peptide
1	B	256	GLY	Peptide
1	C	257	CYS	Peptide
1	C	495	SER	Peptide
1	C	542	ALA	Peptide

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4236	0	4136	124	0
1	B	4216	0	4111	178	0
1	C	4202	0	4092	150	0
1	D	4214	0	4106	195	0
2	A	30	0	26	1	0
2	B	30	0	26	2	0
2	C	30	0	26	1	0
2	D	30	0	26	0	0
3	A	15	0	0	2	0
3	B	20	0	0	2	0
3	C	15	0	0	1	0
3	D	20	0	0	0	0
4	A	2	0	0	0	0
4	B	1	0	0	2	0
4	C	2	0	0	0	0
5	B	14	0	13	5	0
6	A	663	0	0	62	0
6	B	503	0	0	80	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	C	621	0	0	63	1
6	D	536	0	0	84	1
All	All	19400	0	16562	642	1

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 19.

The worst 5 of 642 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:492:PRO:HD2	6:C:2568:HOH:O	1.28	1.29
1:D:313:GLU:HG3	6:D:2366:HOH:O	1.30	1.28
1:D:44:SER:HB2	6:D:2064:HOH:O	1.33	1.27
1:B:262:ALA:HA	6:B:2277:HOH:O	1.20	1.27
1:D:258:PRO:HD2	6:D:2303:HOH:O	1.25	1.27

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:C:2024:HOH:O	6:D:2077:HOH:O[2_554]	2.19	0.01

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	545/545 (100%)	518 (95%)	21 (4%)	6 (1%)	11 19
1	B	542/545 (99%)	491 (91%)	34 (6%)	17 (3%)	3 5
1	C	540/545 (99%)	512 (95%)	21 (4%)	7 (1%)	9 16
1	D	542/545 (99%)	505 (93%)	28 (5%)	9 (2%)	7 12

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	2169/2180 (100%)	2026 (93%)	104 (5%)	39 (2%)	6	11

5 of 39 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	109	ALA
1	B	256	GLY
1	B	263	GLY
1	B	459	LEU
1	C	264	GLY

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	446/444 (100%)	406 (91%)	40 (9%)	9	14
1	B	443/444 (100%)	399 (90%)	44 (10%)	7	11
1	C	441/444 (99%)	407 (92%)	34 (8%)	12	20
1	D	443/444 (100%)	400 (90%)	43 (10%)	8	12
All	All	1773/1776 (100%)	1612 (91%)	161 (9%)	9	14

5 of 161 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	536	LEU
1	D	332	LYS
1	D	21	ARG
1	D	181[B]	GLN
1	D	421	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 36 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	291	GLN
1	D	509	GLN
1	D	317	ASN
1	D	387	HIS
1	B	499	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](#)

Of 24 ligands modelled in this entry, 5 are monoatomic - leaving 19 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	SO4	A	1547	-	4,4,4	0.25	0	6,6,6	0.34	0
3	SO4	D	1549	-	4,4,4	0.27	0	6,6,6	0.46	0
3	SO4	B	1549	-	4,4,4	0.45	0	6,6,6	0.31	0
2	H34	D	1545	-	34,34,34	2.81	16 (47%)	39,49,49	2.34	10 (25%)
2	H34	A	1545	-	34,34,34	2.54	17 (50%)	39,49,49	2.59	11 (28%)
2	H34	B	1545	-	34,34,34	3.23	17 (50%)	39,49,49	2.82	10 (25%)
3	SO4	C	1547	-	4,4,4	0.33	0	6,6,6	0.59	0
3	SO4	D	1546	-	4,4,4	0.30	0	6,6,6	1.06	1 (16%)
3	SO4	B	1550	-	4,4,4	0.33	0	6,6,6	0.57	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	SO4	C	1548	-	4,4,4	0.28	0	6,6,6	0.38	0
3	SO4	B	1548	-	4,4,4	0.26	0	6,6,6	0.18	0
3	SO4	A	1546	-	4,4,4	0.25	0	6,6,6	0.75	0
5	NAG	B	1546	-	14,14,15	1.18	1 (7%)	17,19,21	2.66	7 (41%)
3	SO4	C	1546	-	4,4,4	0.18	0	6,6,6	0.64	0
3	SO4	D	1548	-	4,4,4	0.23	0	6,6,6	0.40	0
2	H34	C	1545	-	34,34,34	3.55	15 (44%)	39,49,49	2.54	13 (33%)
3	SO4	B	1547	-	4,4,4	0.42	0	6,6,6	0.53	0
3	SO4	A	1548	-	4,4,4	0.34	0	6,6,6	0.24	0
3	SO4	D	1547	-	4,4,4	0.33	0	6,6,6	0.54	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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	NAG	B	1546	-	-	4/6/23/26	0/1/1/1
2	H34	D	1545	-	-	0/9/29/29	0/6/5/5
2	H34	C	1545	-	-	2/9/29/29	0/6/5/5
2	H34	A	1545	-	-	2/9/29/29	0/6/5/5
2	H34	B	1545	-	-	0/9/29/29	0/6/5/5

The worst 5 of 66 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	1545	H34	CAO-CAX	-13.64	1.36	1.51
2	C	1545	H34	NAQ-NAR	-9.73	1.16	1.32
2	D	1545	H34	CAO-CAX	-9.17	1.41	1.51
2	B	1545	H34	CAO-CAX	-8.86	1.41	1.51
2	A	1545	H34	CAY-CBC	-6.99	1.40	1.51

The worst 5 of 52 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1545	H34	CAY-CAX-NAS	-10.79	118.91	123.65
2	B	1545	H34	CAY-CAX-NAS	-9.74	119.37	123.65
2	B	1545	H34	NBD-NAR-NAQ	8.40	114.57	107.02
2	D	1545	H34	CAY-CAX-NAS	-7.65	120.29	123.65
2	C	1545	H34	NBD-NAR-NAQ	7.33	113.62	107.02

There are no chirality outliers.

5 of 8 torsion outliers are listed below:

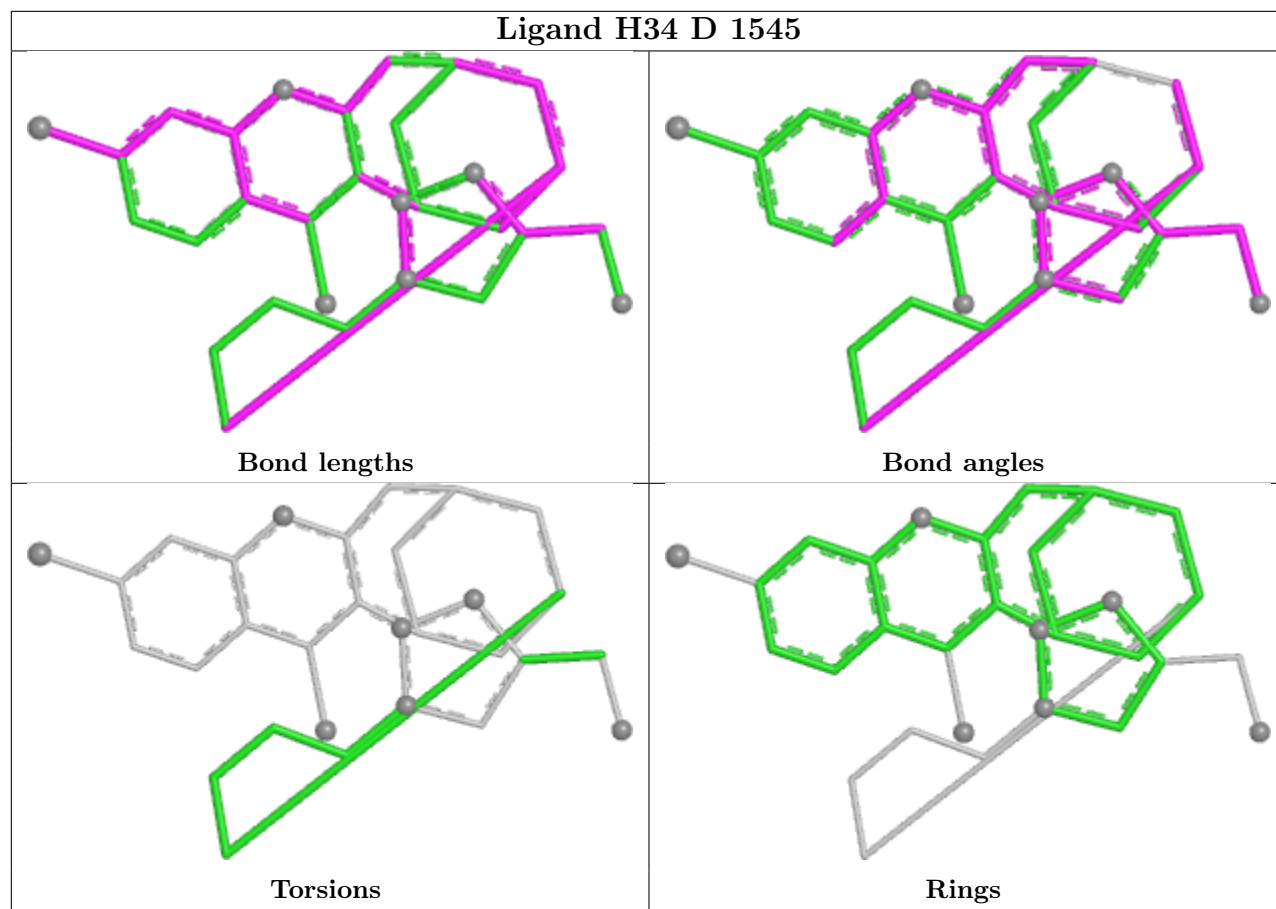
Mol	Chain	Res	Type	Atoms
2	A	1545	H34	OAB-CAI-CAW-CAH
2	A	1545	H34	OAB-CAI-CAW-NAQ
5	B	1546	NAG	C8-C7-N2-C2
5	B	1546	NAG	O7-C7-N2-C2
5	B	1546	NAG	O5-C5-C6-O6

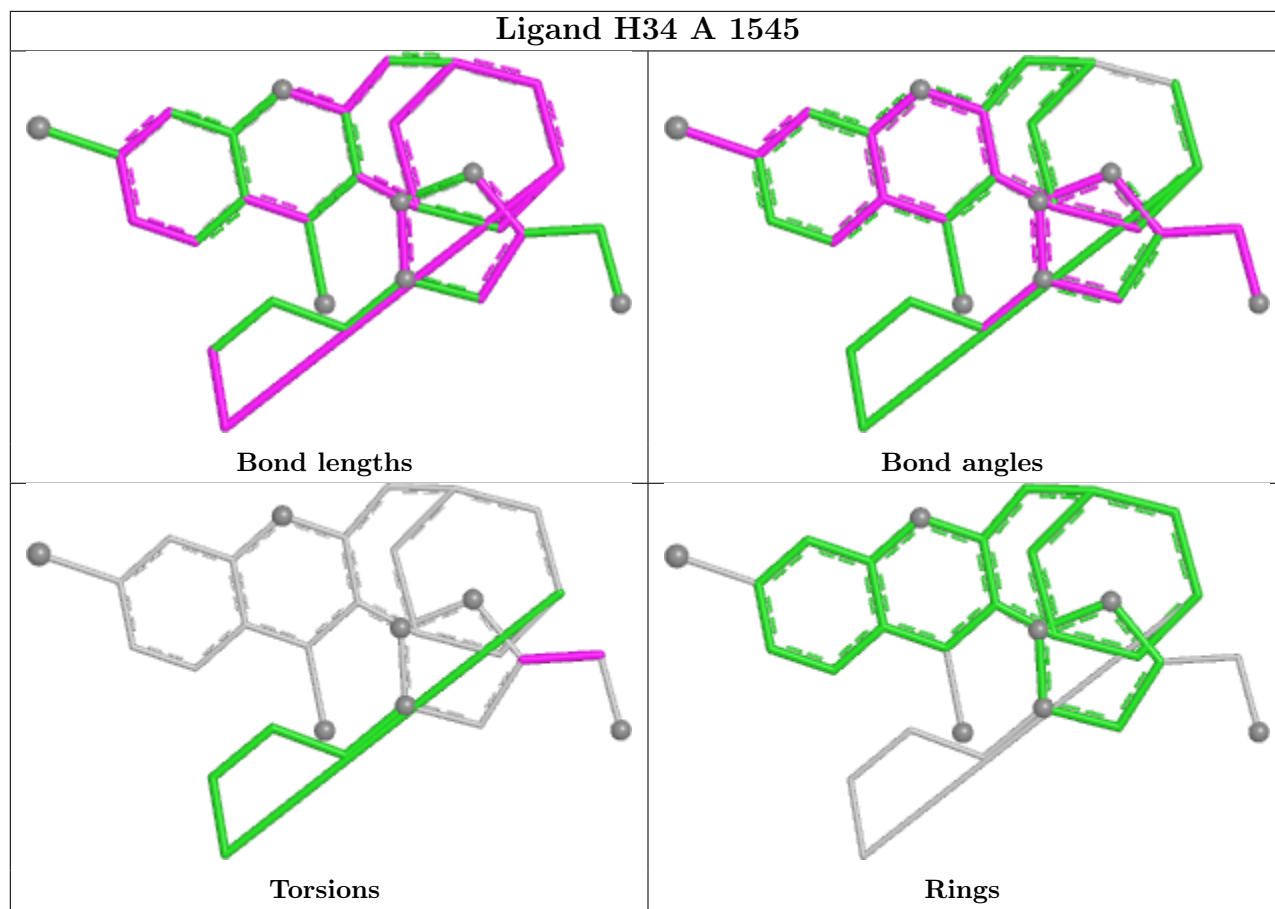
There are no ring outliers.

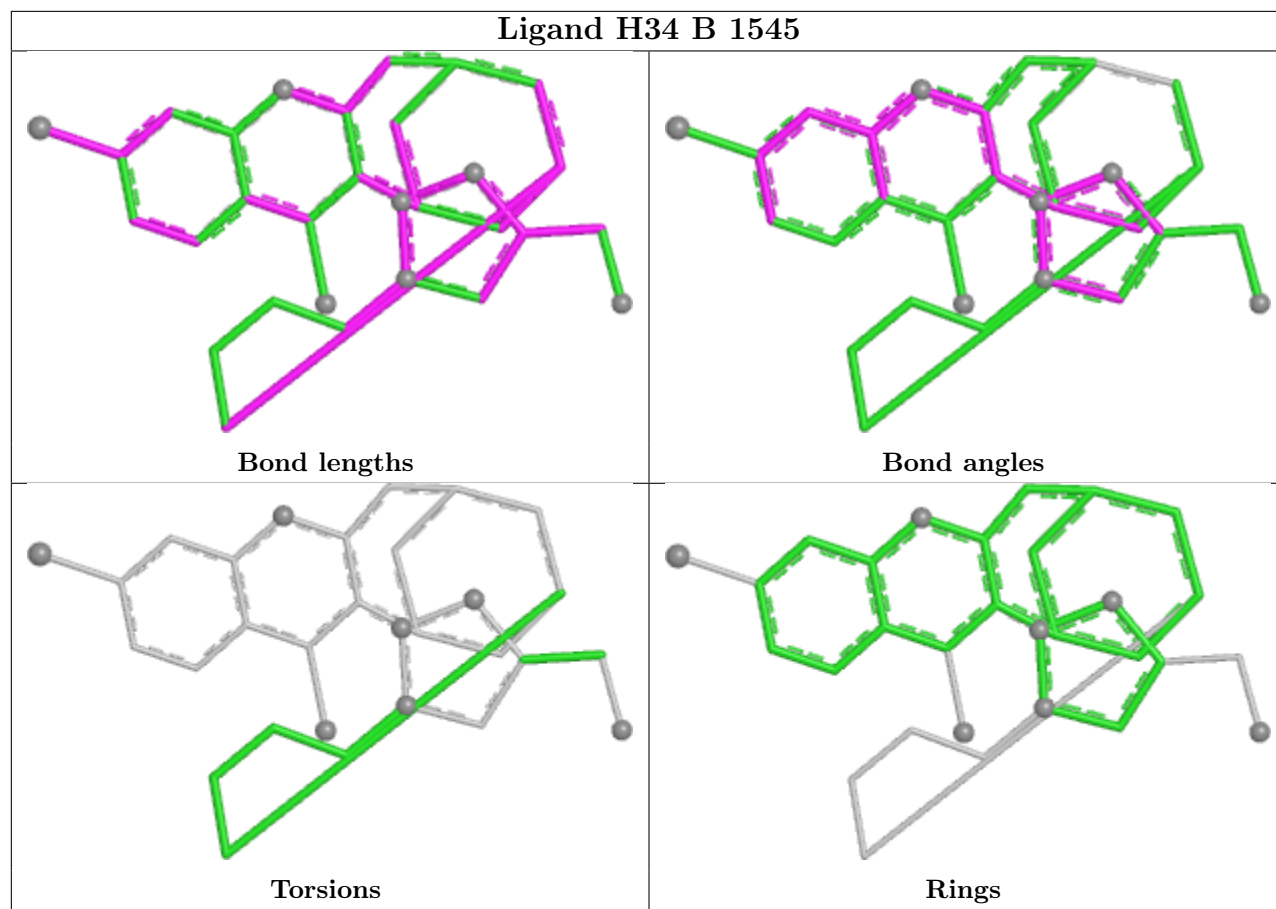
7 monomers are involved in 14 short contacts:

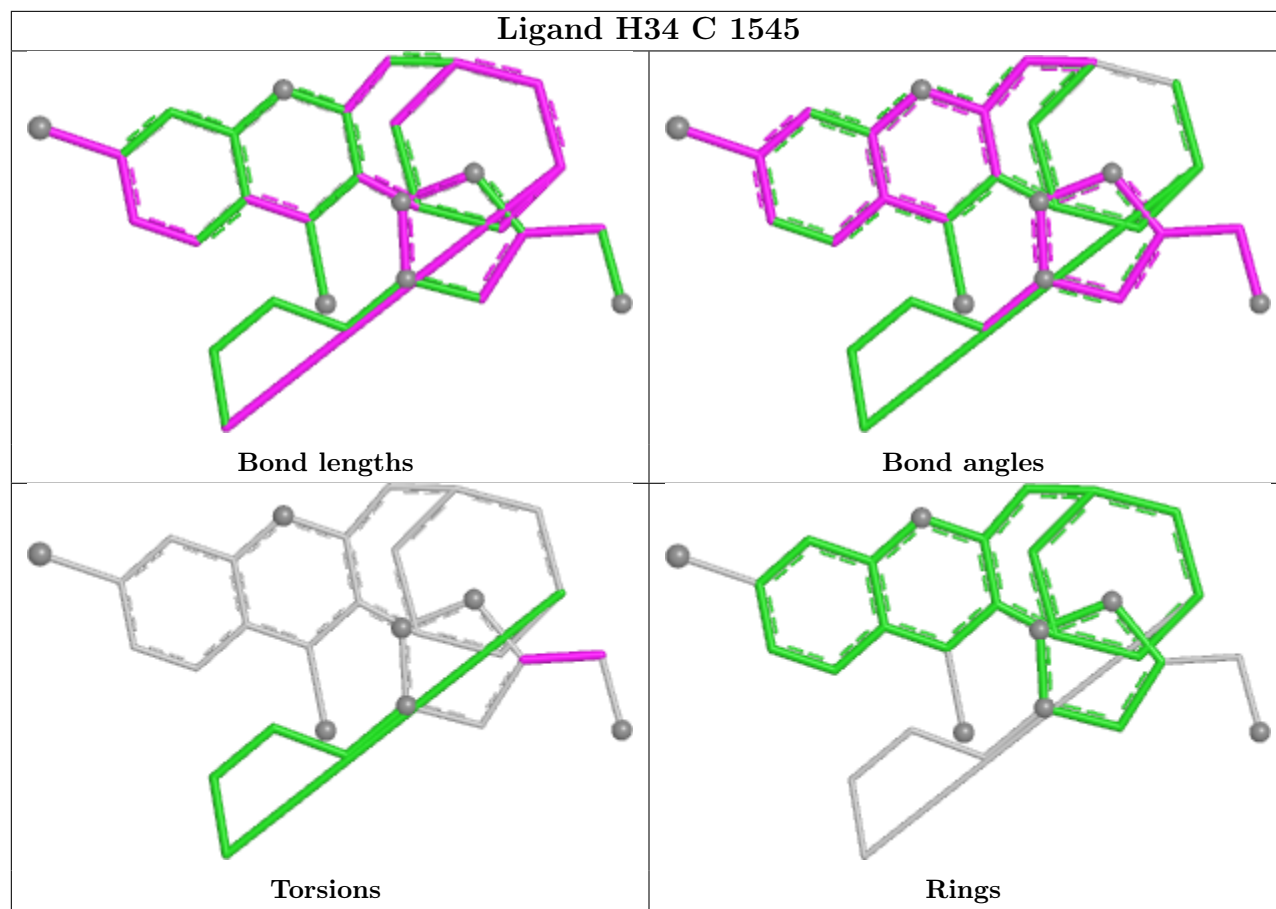
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1547	SO4	2	0
2	A	1545	H34	1	0
2	B	1545	H34	2	0
3	B	1550	SO4	2	0
3	C	1548	SO4	1	0
5	B	1546	NAG	5	0
2	C	1545	H34	1	0

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	541/545 (99%)	-0.88	9 (1%) 69 64	25, 45, 68, 117	7 (1%)
1	B	541/545 (99%)	-0.47	4 (0%) 84 82	31, 59, 94, 128	3 (0%)
1	C	541/545 (99%)	-0.84	9 (1%) 69 64	26, 45, 72, 115	2 (0%)
1	D	541/545 (99%)	-0.72	6 (1%) 78 75	25, 51, 81, 122	3 (0%)
All	All	2164/2180 (99%)	-0.73	28 (1%) 75 71	25, 49, 84, 128	15 (0%)

The worst 5 of 28 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	259	PRO	5.6
1	B	109	ALA	4.8
1	A	260	GLY	4.5
1	C	259	PRO	4.5
1	A	493	ARG	4.3

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

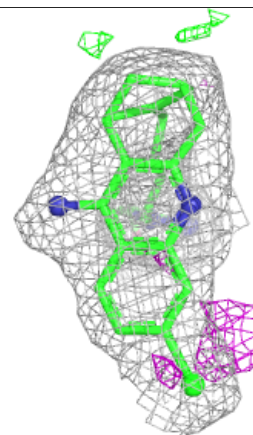
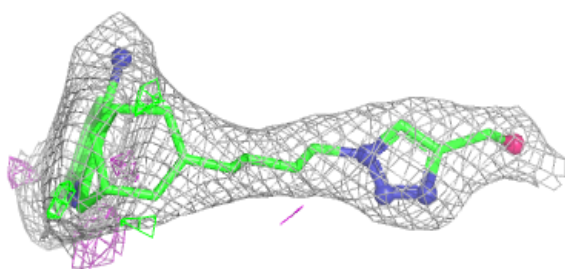
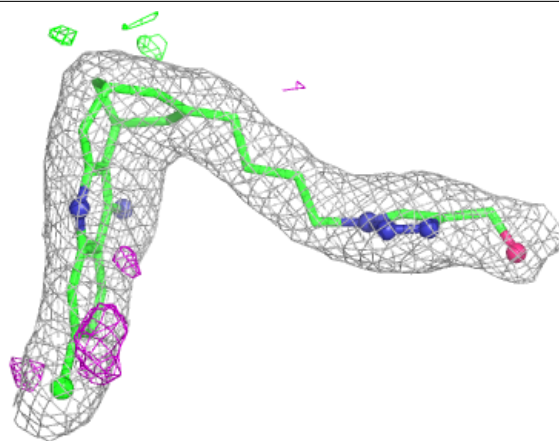
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	SO4	B	1548	5/5	0.73	0.16	211,211,211,211	0
5	NAG	B	1546	14/15	0.76	0.18	123,126,128,128	0
3	SO4	D	1549	5/5	0.83	0.12	138,138,139,140	0
4	CL	A	1550	1/1	0.87	0.10	103,103,103,103	0
3	SO4	C	1548	5/5	0.88	0.13	124,125,126,126	0
3	SO4	C	1547	5/5	0.88	0.09	119,120,121,121	0
3	SO4	B	1550	5/5	0.90	0.14	110,110,112,113	0
3	SO4	D	1548	5/5	0.92	0.11	114,115,116,116	0
3	SO4	A	1547	5/5	0.93	0.11	110,110,111,113	0
3	SO4	A	1548	5/5	0.93	0.10	114,115,116,117	0
3	SO4	B	1549	5/5	0.94	0.08	100,101,102,103	0
3	SO4	B	1547	5/5	0.95	0.10	81,82,83,83	0
4	CL	B	1551	1/1	0.95	0.06	94,94,94,94	0
3	SO4	D	1547	5/5	0.95	0.12	96,97,99,100	0
3	SO4	D	1546	5/5	0.96	0.09	70,72,73,74	0
3	SO4	C	1546	5/5	0.97	0.07	73,76,78,79	0
4	CL	C	1549	1/1	0.97	0.08	100,100,100,100	0
2	H34	B	1545	30/30	0.97	0.08	45,50,60,61	0
2	H34	D	1545	30/30	0.98	0.06	40,49,56,64	0
3	SO4	A	1546	5/5	0.98	0.06	69,70,71,75	0
2	H34	C	1545	30/30	0.98	0.06	40,44,47,52	0
4	CL	C	1550	1/1	0.98	0.07	69,69,69,69	0
4	CL	A	1549	1/1	0.98	0.07	75,75,75,75	0
2	H34	A	1545	30/30	0.99	0.05	34,39,43,48	0

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

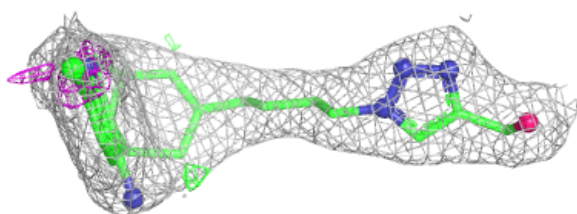
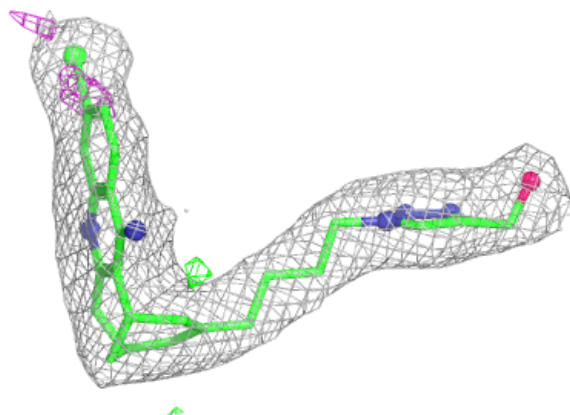
Electron density around H34 B 1545:

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

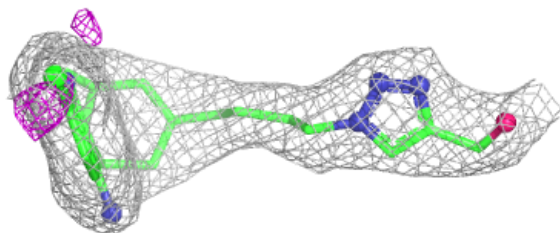
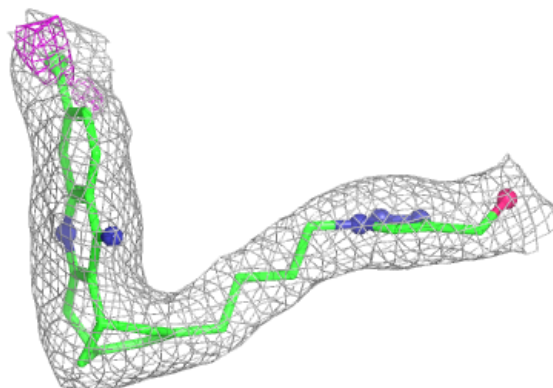


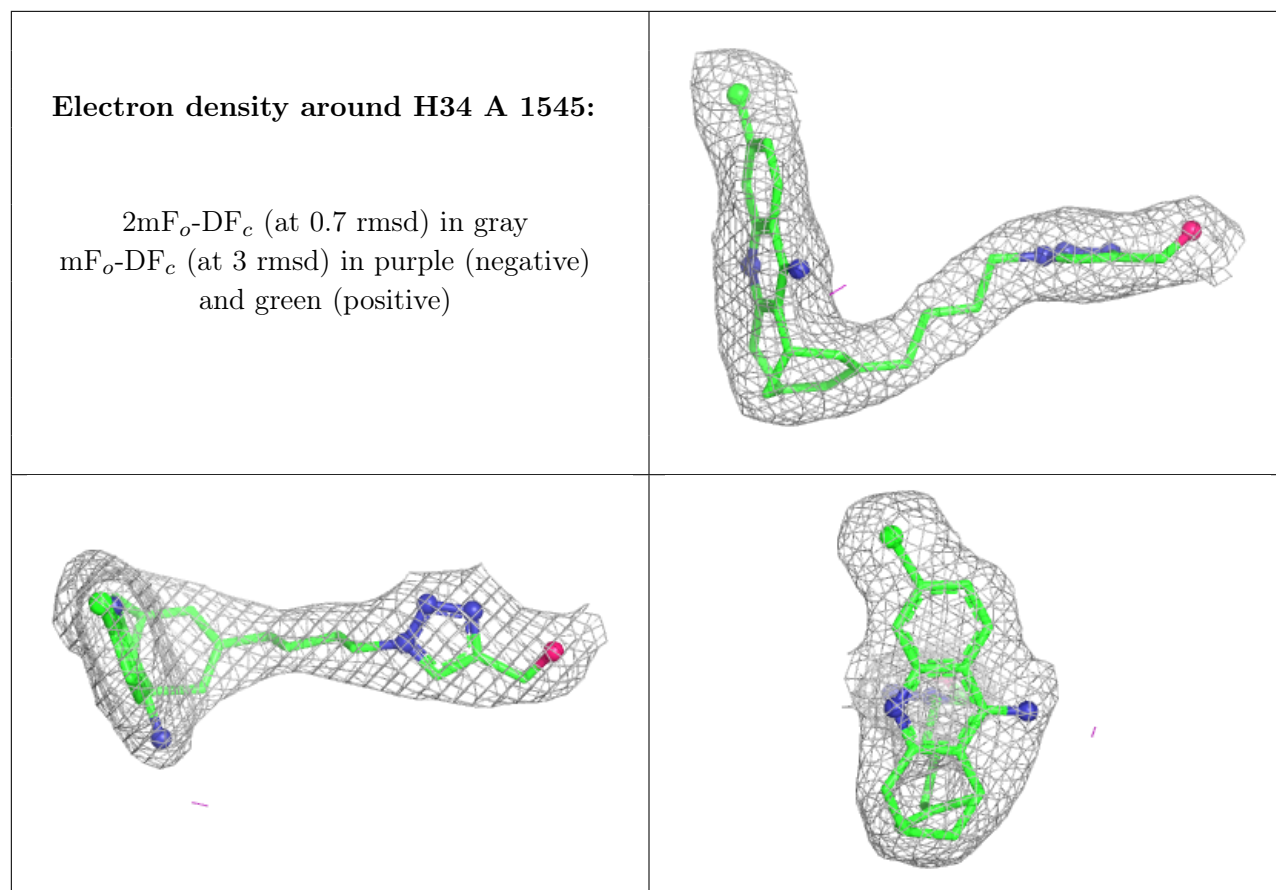
Electron density around H34 D 1545:

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

**Electron density around H34 C 1545:**

$2mF_o-DF_c$ (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.