Full wwPDB X-ray Structure Validation Report (i)

Nov 2, 2026 – 05:37 PM JST

PDB ID	:	9XJZ / pdb_00009xjz
Title	:	Crystal Structure of Nur77 LBD in complex with HTPA
Authors	:	Hong, W.B.; Lin, T.W.; Chen, X.Q.; Wu, Q.
Deposited on	:	2025-11-05
Resolution	:	2.08 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 (i) 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 (i)) were used in the production of this report:

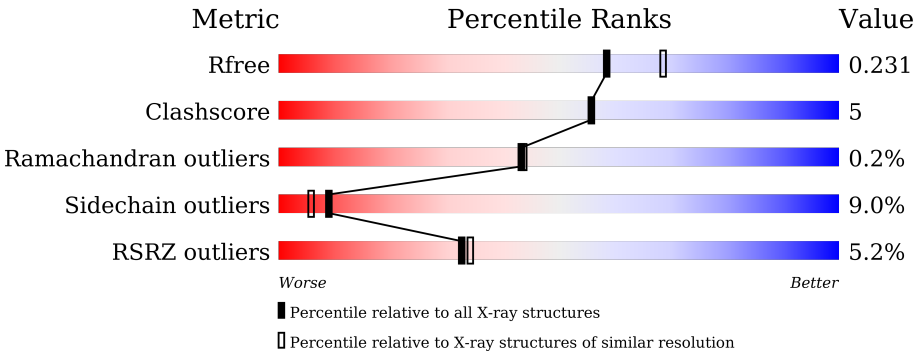
MolProbity	:	4-5-2 with Phenix2.2
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.2
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.51

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 2.08 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	8172 (2.10-2.06)
Clashscore	190562	8714 (2.10-2.06)
Ramachandran outliers	187476	8641 (2.10-2.06)
Sidechain outliers	187428	8642 (2.10-2.06)
RSRZ outliers	180081	8177 (2.10-2.06)

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 <=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	248	3% 79% 14%
1	B	248	6% 75% 14% 8%

2 Entry composition

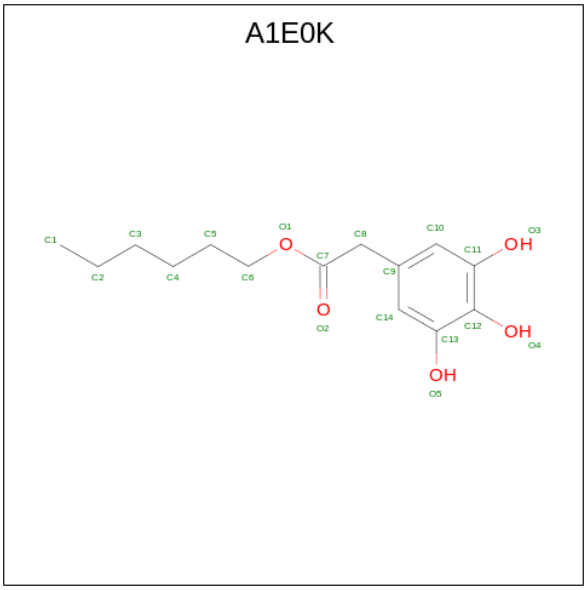
There are 4 unique types of molecules in this entry. The entry contains 3910 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Nuclear receptor subfamily 4immunitygroup A member 1.

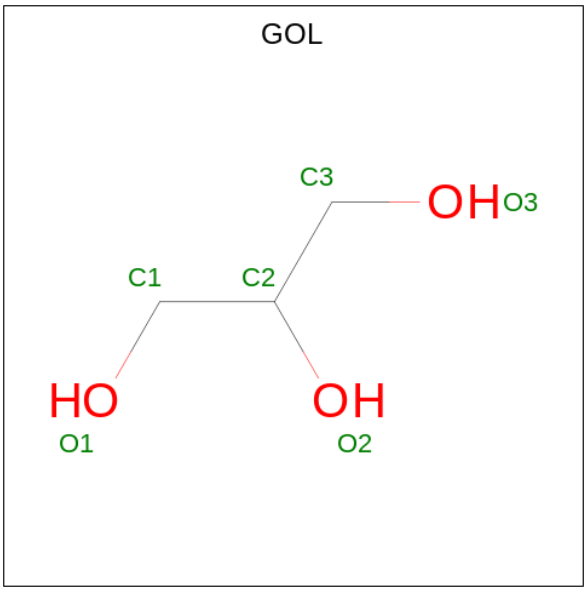
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	237	Total	C	N	O	S	0	0	0
			1859	1201	316	335	7			
1	B	227	Total	C	N	O	S	0	0	0
			1777	1149	300	321	7			

- Molecule 2 is hexyl 2-[3,4,5-tris(oxidanyl)phenyl]ethanoate (CCD ID: A1E0K) (formula: $C_{14}H_{20}O_5$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	O		0	0
			19	14	5			

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 6 3 3	0	0
3	A	1	Total C O 6 3 3	0	0
3	B	1	Total C O 6 3 3	0	0

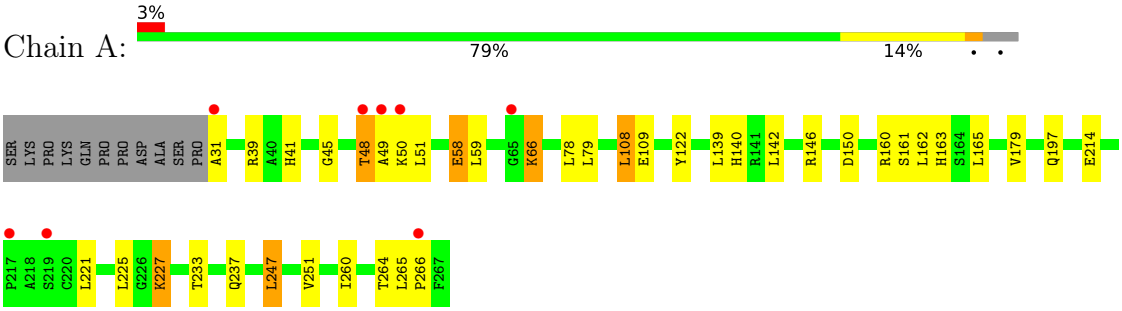
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	152	Total O 152 152	0	0
4	B	85	Total O 85 85	0	0

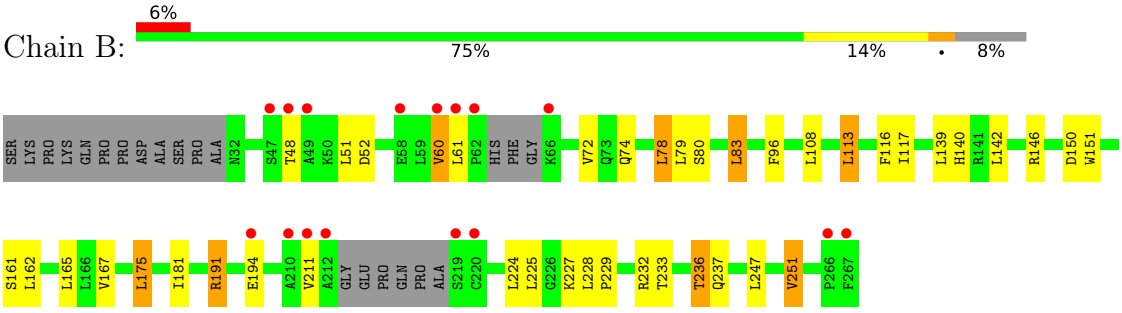
3 Residue-property plots (i)

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: Nuclear receptor subfamily 4immunitygroup A member 1



• Molecule 1: Nuclear receptor subfamily 4immunitygroup A member 1



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	74.30Å 76.25Å 128.60Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	32.17 – 2.08 32.17 – 2.08	Depositor EDS
% Data completeness (in resolution range)	99.8 (32.17-2.08) 99.8 (32.17-2.08)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	5.54 (at 2.08Å)	Xtriage
Refinement program	REFMAC 5.8.0430	Depositor
R, R_{free}	0.180 , 0.224 0.189 , 0.231	Depositor DCC
R_{free} test set	2263 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å^2)	23.6	Xtriage
Anisotropy	0.038	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 49.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	0.017 for k,h,-l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	3910	wwPDB-VP
Average B, all atoms (Å^2)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.08% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: GOL, A1E0K

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	0.74	0/1900	1.20	5/2576 (0.2%)
1	B	0.68	0/1812	1.19	8/2455 (0.3%)
All	All	0.71	0/3712	1.20	13/5031 (0.3%)

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
All	All	0	2

There are no bond length outliers.

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	233	THR	CA-CB-OG1	-8.89	96.27	109.60
1	B	232	ARG	CB-CA-C	-8.08	98.20	110.88
1	B	236	THR	CA-CB-OG1	-7.15	98.87	109.60
1	B	150	ASP	CB-CA-C	-6.13	97.39	110.32
1	A	58	GLU	CB-CG-CD	5.81	122.47	112.60
1	B	52	ASP	CA-CB-CG	5.75	118.34	112.60
1	A	108	LEU	CB-CG-CD1	5.39	126.86	110.70
1	A	237	GLN	CB-CA-C	-5.34	101.92	110.79
1	B	232	ARG	N-CA-CB	5.28	117.66	110.01
1	B	194	GLU	CB-CA-C	5.14	119.59	110.85
1	A	233	THR	CA-CB-OG1	-5.12	101.92	109.60
1	B	194	GLU	N-CA-CB	-5.04	102.70	110.16

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	251	VAL	N-CA-C	-5.00	105.09	109.19

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	160	ARG	Sidechain
1	B	146	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	1859	0	1903	18	0
1	B	1777	0	1815	18	0
2	A	19	0	0	2	0
3	A	12	0	16	2	0
3	B	6	0	8	0	0
4	A	152	0	0	3	0
4	B	85	0	0	1	0
All	All	3910	0	3742	35	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 5.

All (35) 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:A:45:GLY:HA3	3:A:302:GOL:H2	1.75	0.69
1:A:41:HIS:CE1	3:A:302:GOL:H31	2.30	0.66
1:A:161:SER:OG	1:A:227:LYS:HD2	1.94	0.66
1:B:191:ARG:HH21	1:B:191:ARG:CG	2.09	0.66
1:A:31:ALA:HB3	4:A:506:HOH:O	1.94	0.66
1:B:175:LEU:HD22	1:B:228:LEU:HD21	1.76	0.65
1:A:140:HIS:HD2	1:A:142:LEU:H	1.42	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:80:SER:HA	1:B:83:LEU:HD22	1.79	0.64
1:A:140:HIS:CD2	1:A:142:LEU:H	2.16	0.62
1:A:197:GLN:NE2	2:A:301:A1E0K:O4	2.33	0.61
1:B:161:SER:OG	1:B:227:LYS:NZ	2.35	0.59
1:B:191:ARG:HH21	1:B:191:ARG:HG2	1.68	0.58
1:A:66:LYS:CD	1:A:146:ARG:HH12	2.18	0.56
1:B:113:LEU:O	1:B:117:ILE:HG12	2.07	0.53
1:B:237:GLN:OE1	4:B:401:HOH:O	2.18	0.53
1:A:264:THR:O	1:A:266:PRO:HD3	2.11	0.49
1:B:191:ARG:CG	1:B:191:ARG:NH2	2.71	0.48
1:B:72:VAL:HG12	1:B:251:VAL:HG22	1.95	0.48
1:B:228:LEU:HB2	1:B:229:PRO:HD3	1.95	0.48
1:B:116:PHE:CD2	1:B:117:ILE:HD13	2.49	0.47
1:B:117:ILE:HD11	1:B:151:TRP:CZ2	2.49	0.47
1:A:179:VAL:HG22	2:A:301:A1E0K:O2	2.13	0.47
1:A:48:THR:O	1:A:49:ALA:C	2.57	0.47
1:A:66:LYS:HD3	1:A:146:ARG:HH12	1.79	0.47
1:B:74:GLN:HG2	1:B:78:LEU:HD22	1.97	0.46
1:A:214:GLU:HG2	4:A:447:HOH:O	2.16	0.44
1:A:48:THR:N	4:A:406:HOH:O	2.51	0.43
1:B:167:VAL:HG22	1:B:224:LEU:HD21	2.00	0.43
1:A:247:LEU:HD13	1:B:236:THR:HG23	2.00	0.43
1:B:96:PHE:HD1	1:B:181:ILE:HD11	1.84	0.43
1:A:66:LYS:HD3	1:A:146:ARG:NH1	2.35	0.42
1:B:60:VAL:HG21	1:B:142:LEU:HB3	2.01	0.41
1:A:109:GLU:HG2	1:A:260:ILE:HG12	2.02	0.41
1:B:247:LEU:HD23	1:B:247:LEU:HA	1.96	0.41
1:A:122:TYR:O	1:A:163:HIS:HE1	2.03	0.41

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	235/248 (95%)	231 (98%)	4 (2%)	0	100 100
1	B	221/248 (89%)	219 (99%)	1 (0%)	1 (0%)	24 21
All	All	456/496 (92%)	450 (99%)	5 (1%)	1 (0%)	43 44

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	211	VAL

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	204/214 (95%)	185 (91%)	19 (9%)	8 5
1	B	195/214 (91%)	178 (91%)	17 (9%)	9 6
All	All	399/428 (93%)	363 (91%)	36 (9%)	9 6

All (36) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	ARG
1	A	48	THR
1	A	50	LYS
1	A	51	LEU
1	A	58	GLU
1	A	59	LEU
1	A	66	LYS
1	A	78	LEU
1	A	79	LEU
1	A	108	LEU
1	A	139	LEU
1	A	150	ASP
1	A	162	LEU
1	A	165	LEU
1	A	221	LEU

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Mol	Chain	Res	Type
1	A	225	LEU
1	A	227	LYS
1	A	247	LEU
1	A	265	LEU
1	B	48	THR
1	B	51	LEU
1	B	60	VAL
1	B	61	LEU
1	B	78	LEU
1	B	79	LEU
1	B	83	LEU
1	B	108	LEU
1	B	113	LEU
1	B	139	LEU
1	B	140	HIS
1	B	162	LEU
1	B	165	LEU
1	B	175	LEU
1	B	191	ARG
1	B	225	LEU
1	B	251	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	140	HIS
1	A	163	HIS
1	A	188	GLN
1	A	237	GLN
1	B	188	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)

4 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	$\#\|Z\| > 2$
3	GOL	A	303	-	5,5,5	1.09	0	5,5,5	0.89	0
2	A1E0K	A	301	-	19,19,19	0.83	0	24,24,24	1.51	3 (12%)
3	GOL	B	301	-	5,5,5	0.60	0	5,5,5	0.68	0
3	GOL	A	302	-	5,5,5	0.52	0	5,5,5	1.97	2 (40%)

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	GOL	A	303	-	-	2/4/4/4	-
2	A1E0K	A	301	-	-	9/11/11/11	0/1/1/1
3	GOL	B	301	-	-	0/4/4/4	-
3	GOL	A	302	-	-	3/4/4/4	-

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	301	A1E0K	C14-C13-C12	-4.71	117.23	120.47
2	A	301	A1E0K	C13-C12-C11	3.55	121.77	119.51
3	A	302	GOL	O2-C2-C1	2.93	122.03	109.12
2	A	301	A1E0K	O5-C13-C12	2.44	124.20	117.90
3	A	302	GOL	O2-C2-C3	2.40	119.69	109.12

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	303	GOL	C1-C2-C3-O3
2	A	301	A1E0K	C8-C7-O1-C6
2	A	301	A1E0K	C4-C5-C6-O1
2	A	301	A1E0K	O2-C7-O1-C6
3	A	302	GOL	O2-C2-C3-O3
3	A	303	GOL	O2-C2-C3-O3
2	A	301	A1E0K	C2-C3-C4-C5
3	A	302	GOL	O1-C1-C2-O2
2	A	301	A1E0K	C7-C8-C9-C14
2	A	301	A1E0K	C7-C8-C9-C10
2	A	301	A1E0K	C3-C4-C5-C6
2	A	301	A1E0K	O1-C7-C8-C9
2	A	301	A1E0K	C1-C2-C3-C4
3	A	302	GOL	O1-C1-C2-C3

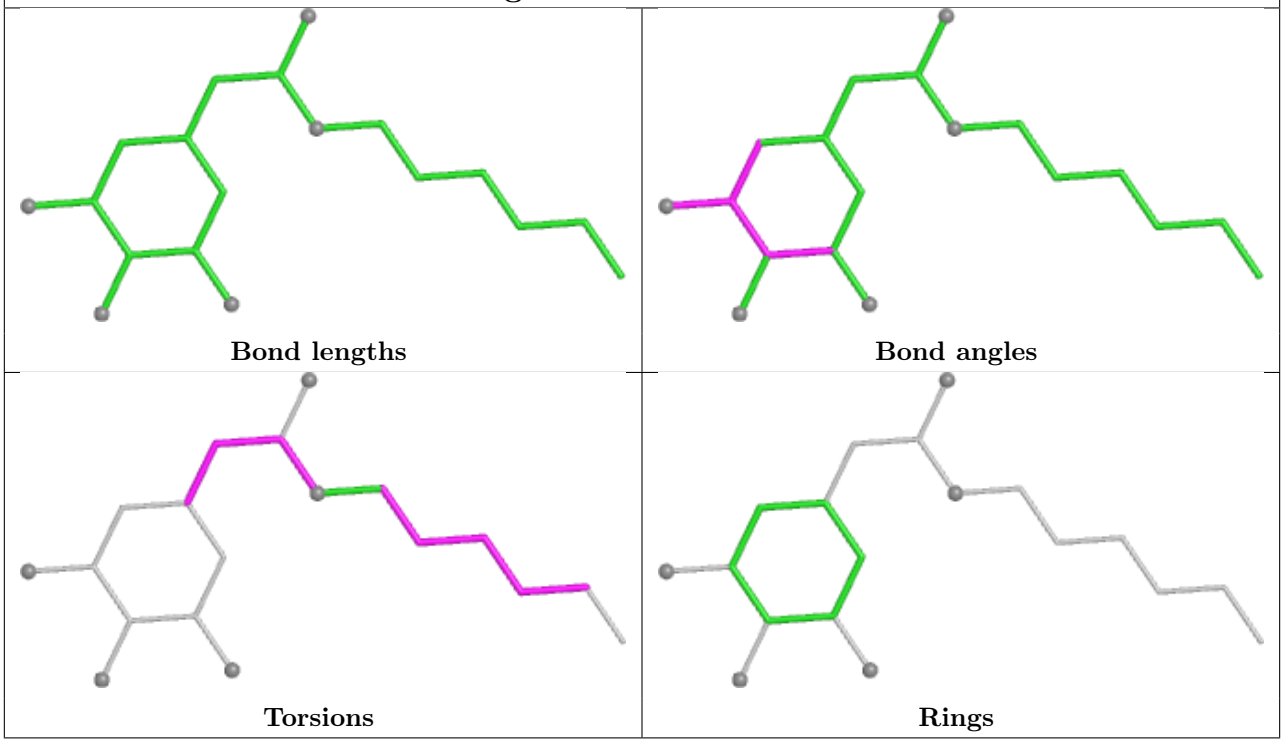
There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	301	A1E0K	2	0
3	A	302	GOL	2	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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand A1E0K A 301



5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95^{th} 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	237/248 (95%)	-0.13	8 (3%)	48	50	9, 22, 45, 76	1 (0%)
1	B	227/248 (91%)	0.35	16 (7%)	22	23	18, 30, 58, 86	0
All	All	464/496 (93%)	0.11	24 (5%)	33	34	9, 26, 56, 86	1 (0%)

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	212	ALA	6.0
1	A	65	GLY	6.0
1	B	62	PRO	5.1
1	B	60	VAL	4.5
1	A	31	ALA	4.2
1	A	49	ALA	4.0
1	B	211	VAL	3.6
1	B	61	LEU	3.5
1	B	219	SER	3.5
1	B	66	LYS	3.4
1	A	50	LYS	3.2
1	B	266	PRO	3.0
1	B	267	PHE	3.0
1	A	266	PRO	2.9
1	A	48	THR	2.9
1	A	219	SER	2.8
1	B	49	ALA	2.6
1	B	48	THR	2.6
1	A	217	PRO	2.5
1	B	210	ALA	2.4
1	B	220	CYS	2.4
1	B	47	SER	2.4
1	B	58	GLU	2.2
1	B	194	GLU	2.1

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)

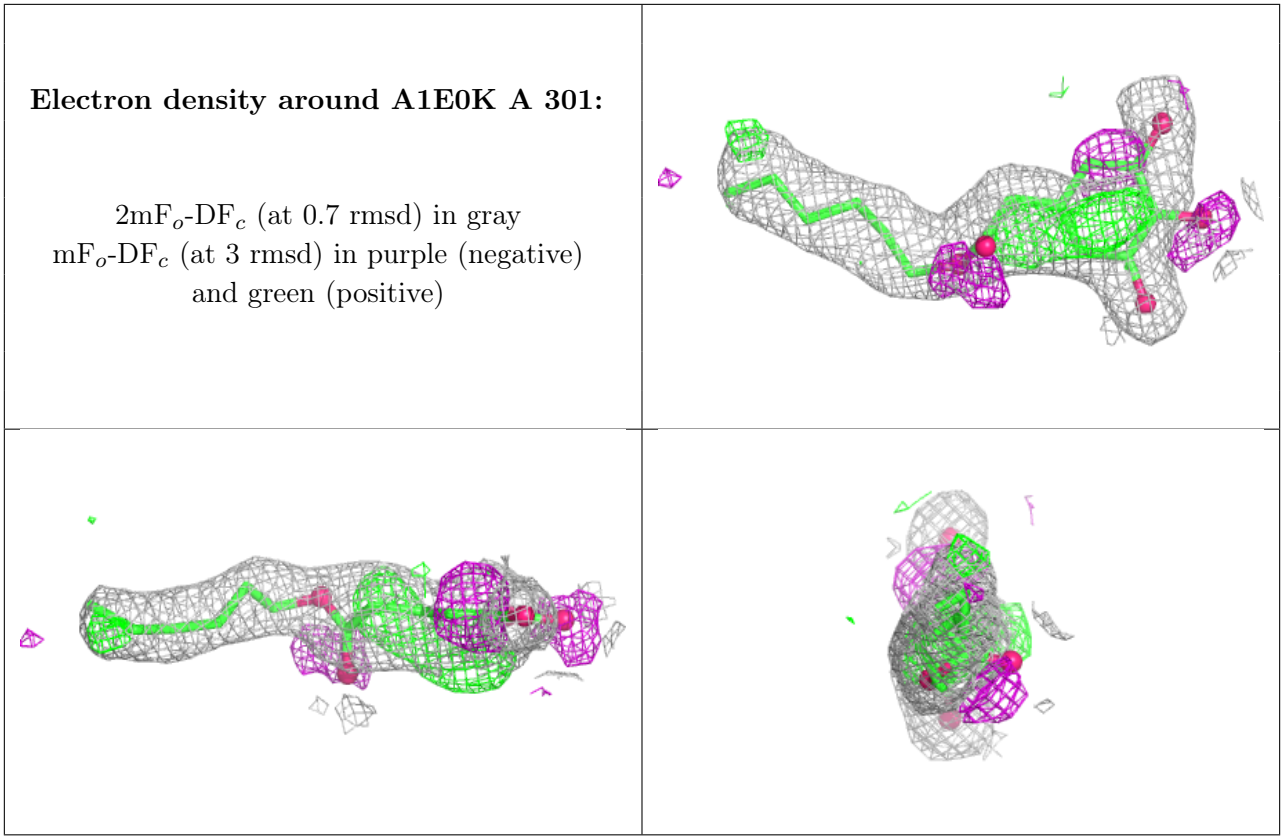
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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	A1E0K	A	301	19/19	0.85	0.23	24,47,72,79	0
3	GOL	A	303	6/6	0.92	0.10	22,33,35,44	0
3	GOL	A	302	6/6	0.96	0.06	20,21,22,23	0
3	GOL	B	301	6/6	0.96	0.08	23,27,30,31	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 A1E0K A 301:

$2mF_o$-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.