



wwPDB EM Validation Summary Report i

Jan 11, 2026 – 01:02 AM JST

PDB ID : 9JG1 / pdb_00009jg1
EMDB ID : EMD-61447
Title : Cryo-EM structure of Adriforant-bound Histamine receptor 4 H4R at inactive state
Authors : Jin, S.S.; Zhang, H.; Jiang, Y.
Deposited on : 2024-09-05
Resolution : 3.62 Å(reported)

This is a wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : **FAILED**
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4-5-2 with Phenix2.0
buster-report : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics : **NOT EXECUTED**
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.47

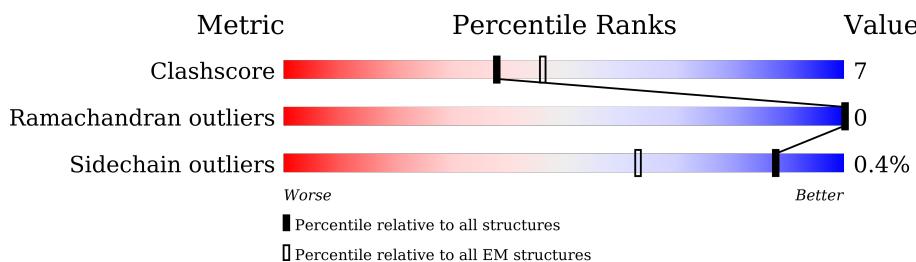
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

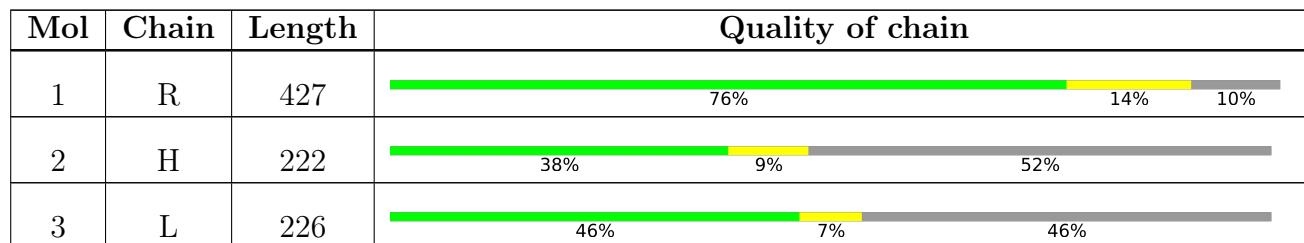
The reported resolution of this entry is 3.62 Å.

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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	A1EBW	R	701	-	-	X	-

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 4730 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Histamine H4 receptor, Soluble cytochrome b562.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	R	386	3026	1996	494	525	11	0	0

There are 37 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
R	378	ALA	-	linker	UNP Q9H3N8
R	379	ARG	-	linker	UNP Q9H3N8
R	380	ARG	-	linker	UNP Q9H3N8
R	381	GLN	-	linker	UNP Q9H3N8
R	382	LEU	-	linker	UNP Q9H3N8
R	389	TRP	MET	conflict	UNP P0ABE7
R	484	ILE	HIS	conflict	UNP P0ABE7
R	488	LEU	-	linker	UNP P0ABE7
R	489	GLU	-	linker	UNP P0ABE7
R	490	ARG	-	linker	UNP P0ABE7
R	491	ALA	-	linker	UNP P0ABE7
R	492	ARG	-	linker	UNP P0ABE7
R	493	SER	-	linker	UNP P0ABE7
R	494	THR	-	linker	UNP P0ABE7
R	495	LEU	-	linker	UNP P0ABE7
R	576	PHE	-	expression tag	UNP Q9H3N8
R	577	LEU	-	expression tag	UNP Q9H3N8
R	578	LYS	-	expression tag	UNP Q9H3N8
R	579	ILE	-	expression tag	UNP Q9H3N8
R	580	PHE	-	expression tag	UNP Q9H3N8
R	581	CYS	-	expression tag	UNP Q9H3N8
R	582	ILE	-	expression tag	UNP Q9H3N8
R	583	LYS	-	expression tag	UNP Q9H3N8
R	584	LYS	-	expression tag	UNP Q9H3N8
R	585	GLN	-	expression tag	UNP Q9H3N8
R	586	PRO	-	expression tag	UNP Q9H3N8
R	587	LEU	-	expression tag	UNP Q9H3N8
R	588	PRO	-	expression tag	UNP Q9H3N8

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Chain	Residue	Modelled	Actual	Comment	Reference
R	589	SER	-	expression tag	UNP Q9H3N8
R	590	GLN	-	expression tag	UNP Q9H3N8
R	591	HIS	-	expression tag	UNP Q9H3N8
R	592	SER	-	expression tag	UNP Q9H3N8
R	593	ARG	-	expression tag	UNP Q9H3N8
R	594	SER	-	expression tag	UNP Q9H3N8
R	595	VAL	-	expression tag	UNP Q9H3N8
R	596	SER	-	expression tag	UNP Q9H3N8
R	597	SER	-	expression tag	UNP Q9H3N8

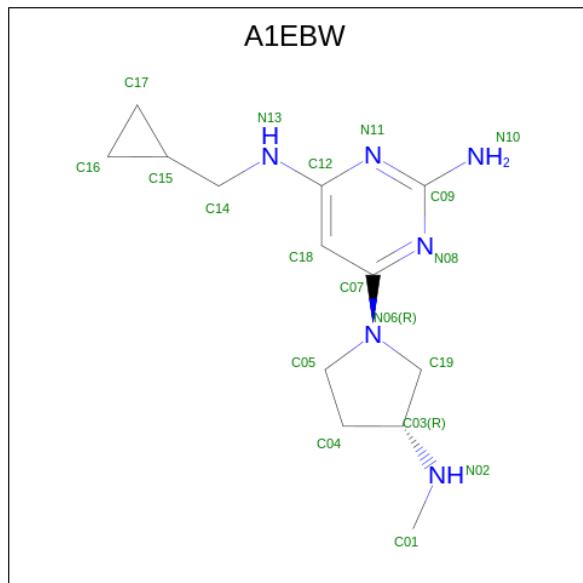
- Molecule 2 is a protein called anti-BRIL Fab Heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	H	106	Total	C	N	O	S	0	0
			787	494	131	159	3		

- Molecule 3 is a protein called anti-BRIL Fab Light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	L	121	Total	C	N	O	S	0	0
			898	573	152	170	3		

- Molecule 4 is Adriforant (CCD ID: A1EBW) (formula: $C_{13}H_{22}N_6$) (labeled as "Ligand of Interest" by depositor).



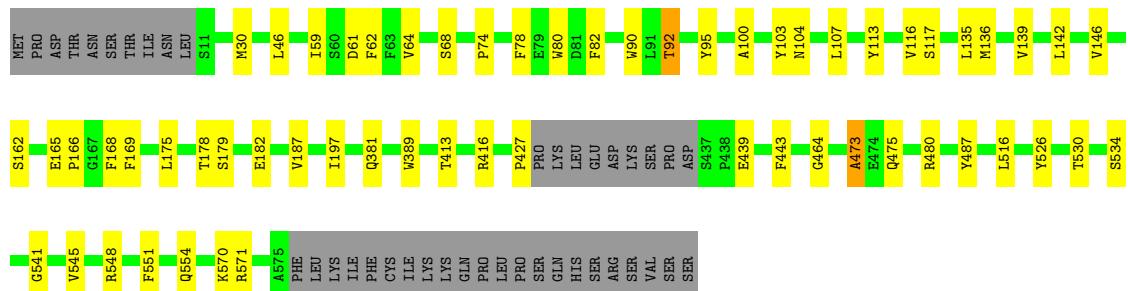
Mol	Chain	Residues	Atoms			AltConf
4	R	1	Total	C	N	0
			19	13	6	

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. 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. 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.

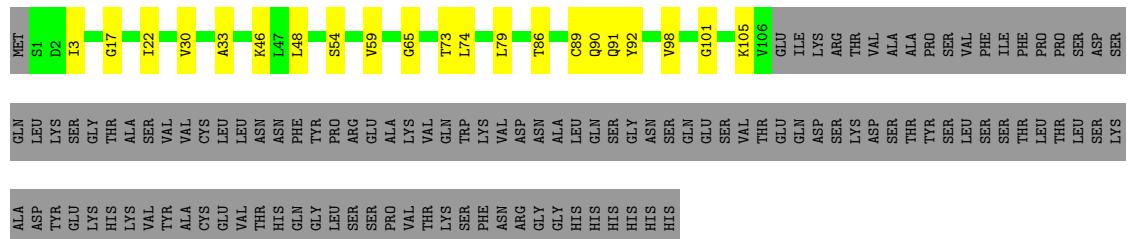
- Molecule 1: Histamine H4 receptor, Soluble cytochrome b562

Chain R: 76% 14% 10%

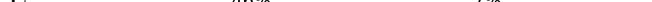


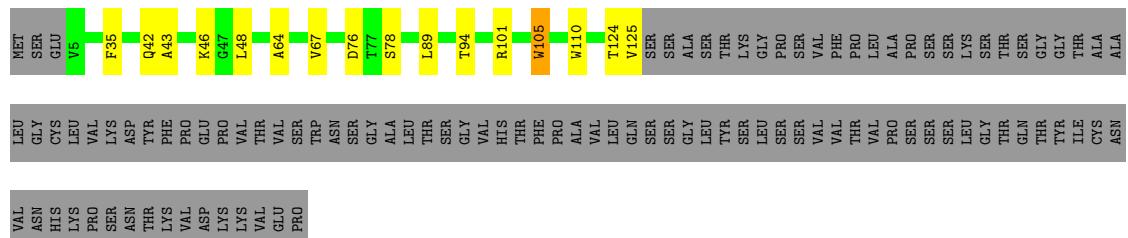
- Molecule 2: anti-BRIL Fab Heavy chain

Chain H: 38% **9%** 52%



- Molecule 3: anti-BRIL Fab Light chain

Chain L:  46% 7% 46%



4 Experimental information i

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	132359	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TECNAI ARCTICA	Depositor
Voltage (kV)	50	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor

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: A1EBW

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	R	0.28	1/3107 (0.0%)	0.53	5/4244 (0.1%)
2	H	0.26	0/804	0.61	1/1094 (0.1%)
3	L	0.25	0/924	0.67	2/1261 (0.2%)
All	All	0.27	1/4835 (0.0%)	0.57	8/6599 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	R	541	GLY	C-N	5.10	1.38	1.33

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	R	541	GLY	CA-C-N	-6.69	114.01	120.83
1	R	541	GLY	C-N-CA	-6.69	114.01	120.83
1	R	464	GLY	N-CA-C	-6.08	106.85	115.43
1	R	413	THR	N-CA-C	-5.33	105.37	111.07
3	L	105	TRP	CA-C-N	-5.25	114.17	119.83

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [\(i\)](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	R	3026	0	2965	45	0
2	H	787	0	751	13	0
3	L	898	0	825	9	0
4	R	19	0	0	12	0
All	All	4730	0	4541	67	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 7.

The worst 5 of 67 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:R:95:TYR:HB3	4:R:701:A1EBW:N13	1.61	1.14
1:R:95:TYR:HB3	4:R:701:A1EBW:C14	1.95	0.96
2:H:30:VAL:CG1	2:H:33:ALA:HB3	1.98	0.93
1:R:554:GLN:HG2	4:R:701:A1EBW:C04	2.13	0.78
1:R:68:SER:HA	1:R:90:TRP:HE1	1.55	0.72

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 PDB entries followed by that with respect to all EM entries.

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	R	382/427 (90%)	370 (97%)	12 (3%)	0	100 100
2	H	104/222 (47%)	101 (97%)	3 (3%)	0	100 100
3	L	119/226 (53%)	116 (98%)	3 (2%)	0	100 100
All	All	605/875 (69%)	587 (97%)	18 (3%)	0	100 100

There are no Ramachandran outliers to report.

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 PDB entries followed by that with respect to all EM entries.

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	R	309/376 (82%)	308 (100%)	1 (0%)	91 96
2	H	86/196 (44%)	85 (99%)	1 (1%)	67 82
3	L	88/187 (47%)	88 (100%)	0	100 100
All	All	483/759 (64%)	481 (100%)	2 (0%)	88 94

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	R	92	THR
2	H	46	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 13 such sidechains are listed below:

Mol	Chain	Res	Type
1	R	573	GLN
2	H	4	GLN
3	L	42	GLN
2	H	90	GLN
2	H	102	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)

1 ligand is 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
4	A1EBW	R	701	-	21,21,21	4.58	8 (38%)	22,29,29	4.09	11 (50%)

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
4	A1EBW	R	701	-	-	4/9/22/22	0/3/3/3

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	R	701	A1EBW	C04-C03	-10.51	1.25	1.52
4	R	701	A1EBW	C19-N06	-8.82	1.35	1.46
4	R	701	A1EBW	C09-N10	8.40	1.50	1.33
4	R	701	A1EBW	C19-C03	6.90	1.66	1.53
4	R	701	A1EBW	C12-N13	6.86	1.46	1.36

The worst 5 of 11 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	R	701	A1EBW	N08-C07-N06	11.31	129.24	116.55
4	R	701	A1EBW	C18-C07-N06	-8.38	112.33	122.29
4	R	701	A1EBW	C09-N08-C07	6.85	121.58	116.73
4	R	701	A1EBW	N10-C09-N08	4.94	124.94	117.25
4	R	701	A1EBW	N13-C12-N11	4.55	124.09	116.43

There are no chirality outliers.

All (4) torsion outliers are listed below:

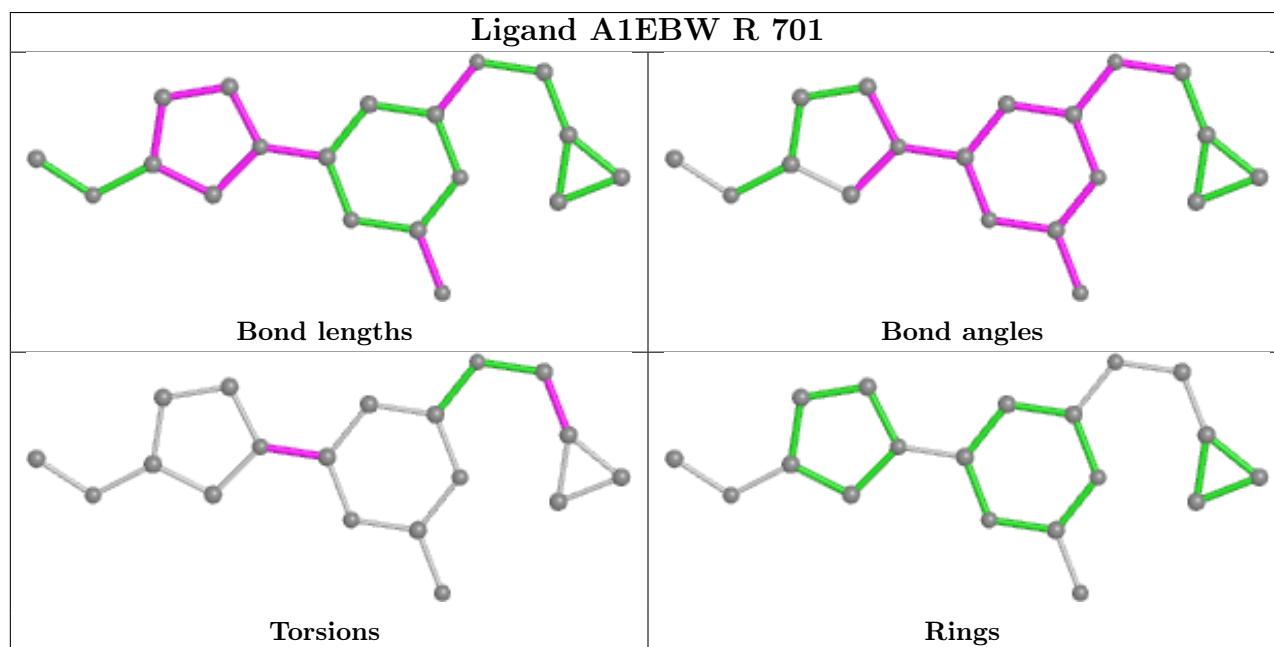
Mol	Chain	Res	Type	Atoms
4	R	701	A1EBW	N13-C14-C15-C16
4	R	701	A1EBW	C18-C07-N06-C05
4	R	701	A1EBW	N08-C07-N06-C05
4	R	701	A1EBW	N13-C14-C15-C17

There are no ring outliers.

1 monomer is involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	R	701	A1EBW	12	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.