



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2024 – 06:05 AM EDT

PDB ID : 4IA6  
Title : Hydratase from lactobacillus acidophilus in a ligand bound form (LA LAH)  
Authors : Khoshnevis, S.; Neumann, P.; Ficner, R.  
Deposited on : 2012-12-06  
Resolution : 1.80 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

---

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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) : 2.36

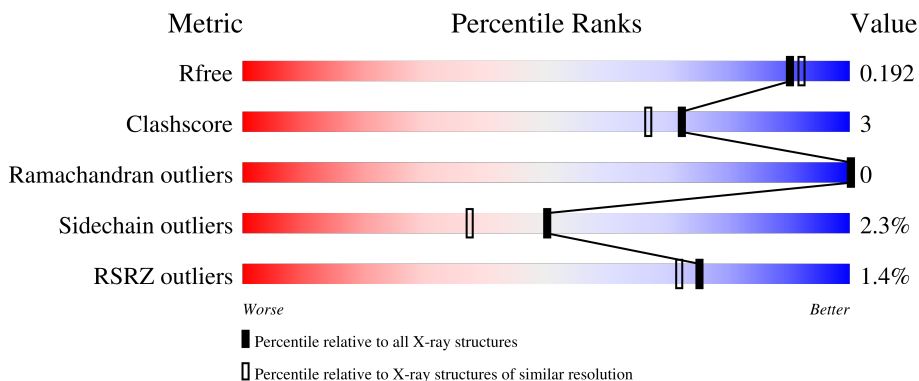
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 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	5950 (1.80-1.80)
Clashscore	141614	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)
RSRZ outliers	127900	5850 (1.80-1.80)

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  $\geq 3$ , 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	591	 92% 6% ••
1	B	591	 87% 7% • 6%

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	MRD	A	601[A]	-	-	X	-
4	GOL	A	607[A]	-	-	-	X
4	GOL	A	607[B]	-	-	-	X

## 2 Entry composition [i](#)

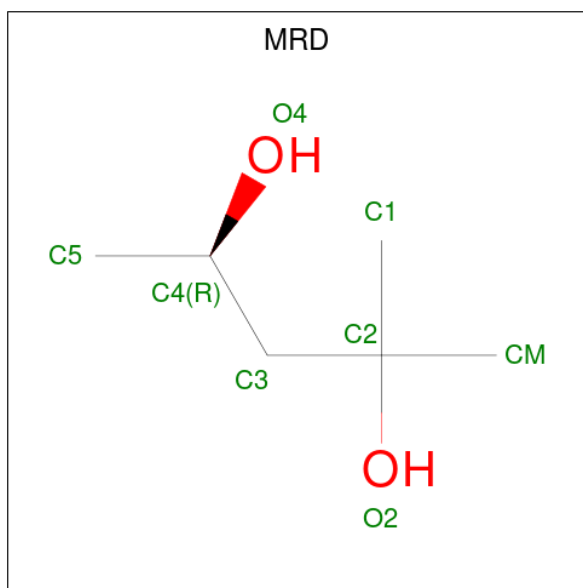
There are 12 unique types of molecules in this entry. The entry contains 10974 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Myosin-crossreactive antigen.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	579	Total 4750	C 3031	N 782	O 912	S 25	0	8	0
1	B	558	Total 4581	C 2928	N 753	O 877	S 23	0	6	0

- Molecule 2 is (4R)-2-METHYLPENTANE-2,4-DIOL (three-letter code: MRD) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
2	A	1	Total 8	C 6	O 2	0	1

- Molecule 3 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>2</sub>).



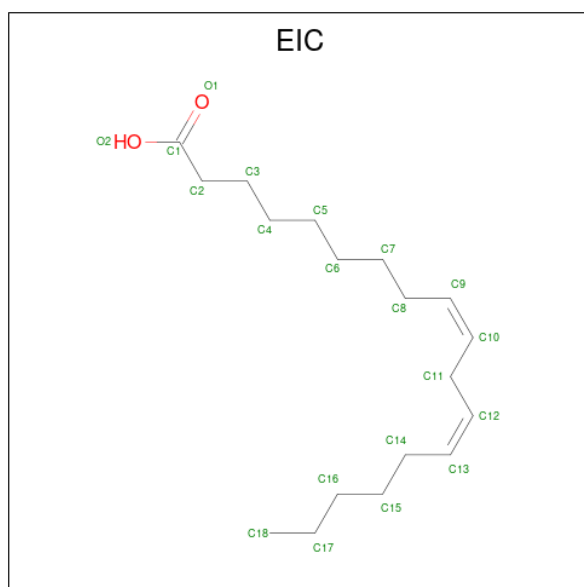
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 8 6 2	0	1
3	A	1	Total C O 8 6 2	0	0
3	A	1	Total C O 8 6 2	0	0
3	B	1	Total C O 8 6 2	0	0
3	B	1	Total C O 8 6 2	0	1

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 6 3 3	0	0
4	A	1	Total C O 6 3 3	0	0
4	A	1	Total C O 12 6 6	0	1
4	A	1	Total C O 12 6 6	0	1
4	A	1	Total C O 6 3 3	0	0
4	A	1	Total C O 6 3 3	0	0
4	B	1	Total C O 6 3 3	0	0
4	B	1	Total C O 6 3 3	0	0
4	B	1	Total C O 6 3 3	0	0
4	B	1	Total C O 6 3 3	0	0

- Molecule 5 is LINOLEIC ACID (three-letter code: EIC) (formula:  $C_{18}H_{32}O_2$ ).

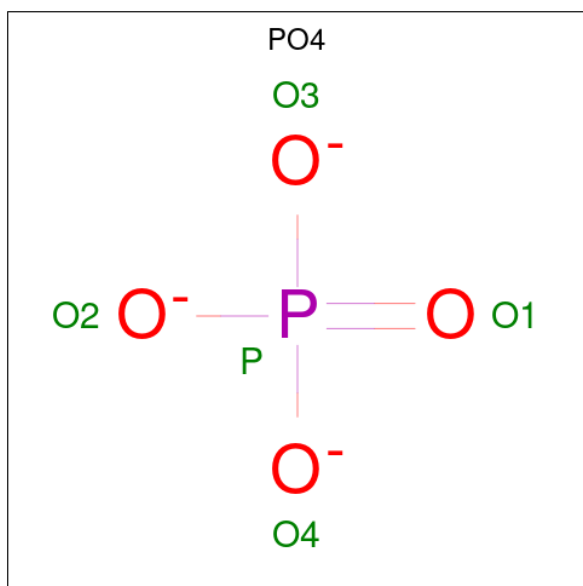


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 20 18 2	0	0

- Molecule 6 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	2	Total	Na	0	0
			2	2		

- Molecule 7 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



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

- Molecule 8 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: C<sub>6</sub>H<sub>13</sub>NO<sub>4</sub>S).



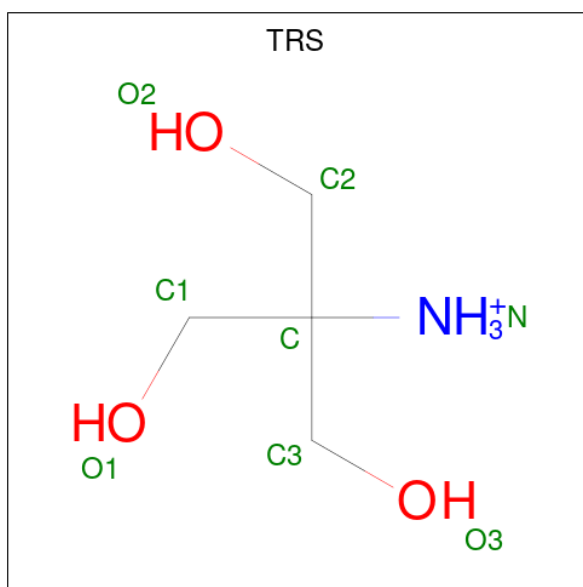
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
8	A	1	12	6	1	4	1	0	0
8	B	1	12	6	1	4	1	0	0
8	B	1	12	6	1	4	1	0	0

- Molecule 9 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	1	Total 1 K	0	0
9	B	1	Total 1 K	0	0

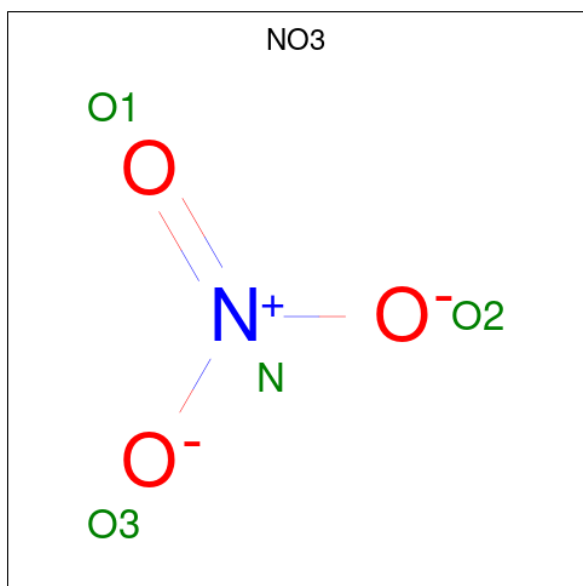
- Molecule 10 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (three-letter code: TRS) (formula: C<sub>4</sub>H<sub>12</sub>NO<sub>3</sub>).





Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
			Total	C	N			O
10	B	1	8	4	1	3	0	0

- Molecule 11 is NITRATE ION (three-letter code: NO3) (formula: NO<sub>3</sub>).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf	
			Total	N			O
11	B	1	4	1	3	0	0

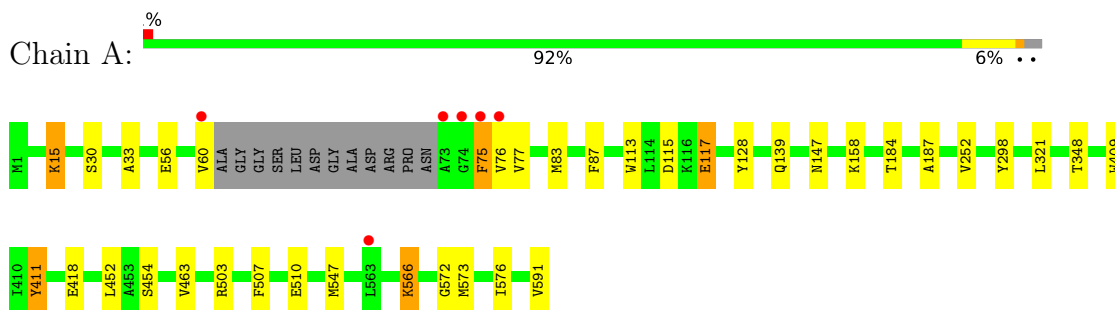
- Molecule 12 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
12	A	700	Total 717	O 717	0	17
12	B	689	Total 714	O 714	0	25

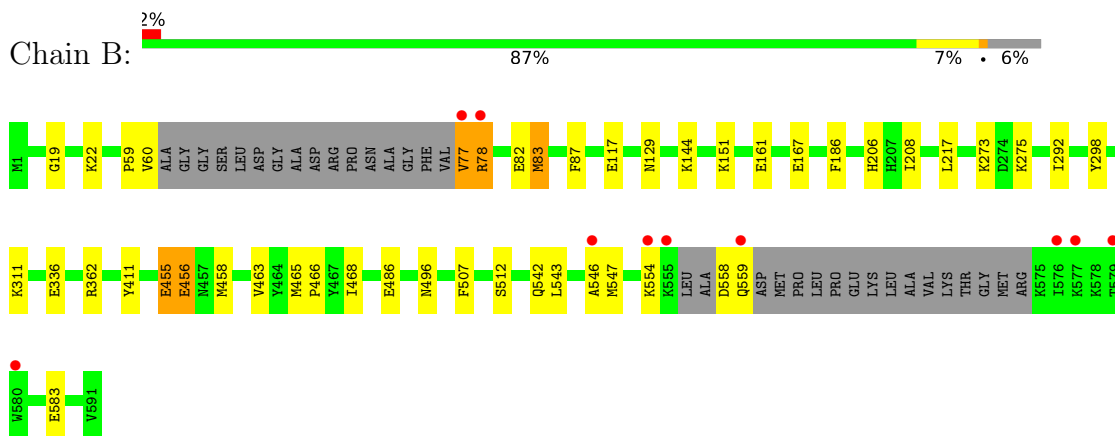
### 3 Residue-property plots [i](#)

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: Myosin-crossreactive antigen



- Molecule 1: Myosin-crossreactive antigen



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	165.10Å 77.74Å 104.81Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.73 – 1.80 48.72 – 1.78	Depositor EDS
% Data completeness (in resolution range)	97.6 (48.73-1.80) 96.2 (48.72-1.78)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.73 (at 1.78Å)	Xtrriage
Refinement program	PHENIX 1.8.1_1168	Depositor
R, $R_{free}$	0.154 , 0.192 0.154 , 0.192	Depositor DCC
$R_{free}$ test set	6148 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	16.4	Xtrriage
Anisotropy	0.320	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 58.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	10974	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.87% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NA, NO3, TRS, MES, EIC, K, MPD, MRD, GOL, PO4

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	0.59	0/4872	0.65	0/6599
1	B	0.60	0/4698	0.66	0/6365
All	All	0.59	0/9570	0.66	0/12964

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4750	0	4593	30	0
1	B	4581	0	4402	31	0
2	A	8	0	14	6	0
3	A	24	0	42	2	0
3	B	16	0	28	2	0
4	A	48	0	64	4	0
4	B	24	0	32	3	0
5	A	20	0	32	1	0
6	A	2	0	0	0	0
7	A	10	0	0	0	0
7	B	10	0	0	1	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	A	12	0	12	0	0
8	B	24	0	24	0	0
9	A	1	0	0	0	0
9	B	1	0	0	0	0
10	B	8	0	12	0	0
11	B	4	0	0	0	0
12	A	717	0	0	8	0
12	B	714	0	0	4	2
All	All	10974	0	9255	64	2

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 3.

All (64) 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:411:TYR:HB2	2:A:601[A]:MRD:H5C2	1.59	0.85
1:A:15:LYS:NZ	1:B:117:GLU:OE2	2.15	0.80
1:A:184:THR:O	2:A:601[A]:MRD:HMC1	1.86	0.76
1:B:208[A]:ILE:HG21	1:B:546:ALA:HA	1.67	0.75
1:B:82:GLU:OE2	3:B:601:MPD:HM3	1.88	0.72
1:B:554:LYS:O	1:B:559:GLN:NE2	2.23	0.70
1:A:75:PHE:HE2	1:A:77:VAL:HG22	1.58	0.69
1:A:147[B]:ASN:ND2	12:A:1348:HOH:O	2.26	0.69
2:A:601[A]:MRD:HMC2	2:A:601[A]:MRD:H5C3	1.76	0.68
7:B:612:PO4:O2	12:B:1085:HOH:O	2.14	0.64
1:A:115:ASP:OD1	12:A:1014:HOH:O	2.15	0.63
1:B:456:GLU:H	1:B:456:GLU:CD	2.03	0.62
2:A:601[A]:MRD:HMC3	12:A:1023:HOH:O	1.99	0.61
1:B:554:LYS:HB2	1:B:559:GLN:HG2	1.83	0.60
1:B:82:GLU:HG3	1:B:217:LEU:HD22	1.83	0.60
1:A:75:PHE:CE2	1:A:77:VAL:HG22	2.36	0.59
1:B:186:PHE:HE1	3:B:601:MPD:HM2	1.67	0.58
1:B:273:LYS:HD2	1:B:275:LYS:HE2	1.84	0.58
1:A:76:VAL:HG22	1:A:348:THR:HG23	1.86	0.58
1:A:33:ALA:H	4:A:607[A]:GOL:C1	2.18	0.57
1:A:418:GLU:OE1	12:A:1187:HOH:O	2.18	0.55
1:B:167:GLU:OE2	4:B:605:GOL:H2	2.06	0.55
1:B:311:LYS:NZ	1:B:336:GLU:OE2	2.40	0.55
1:A:113:TRP:O	1:A:117[A]:GLU:HG2	2.08	0.53
1:A:158:LYS:HD3	1:B:583:GLU:HG2	1.93	0.51

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:59:PRO:O	1:B:60:VAL:HB	2.08	0.51
1:A:30:SER:OG	1:A:56:GLU:OE1	2.21	0.50
1:A:187:ALA:HB2	3:A:602[B]:MPD:H32	1.94	0.50
1:A:187:ALA:HB2	2:A:601[A]:MRD:H3C1	1.95	0.49
1:B:455:GLU:HG2	12:B:1064:HOH:O	2.13	0.48
1:B:496:ASN:HD22	4:B:609:GOL:H12	1.78	0.48
12:A:942:HOH:O	1:B:117:GLU:HG3	2.14	0.48
1:B:77:VAL:HG22	1:B:78:ARG:N	2.29	0.48
1:A:298:TYR:CD1	1:A:463:VAL:HG22	2.49	0.47
1:B:83[B]:MET:HG2	1:B:87:PHE:CD2	2.49	0.47
1:B:82:GLU:H	1:B:82:GLU:CD	2.19	0.46
1:B:206:HIS:HA	1:B:542:GLN:OE1	2.15	0.46
1:A:411:TYR:HB2	3:A:602[B]:MPD:H11	1.97	0.46
1:A:573:MET:CE	1:A:591:VAL:HG11	2.46	0.46
1:A:76:VAL:HB	1:A:463:VAL:HG21	1.98	0.46
1:B:78:ARG:HB2	12:B:1387:HOH:O	2.16	0.46
1:B:455:GLU:HG2	1:B:455:GLU:H	1.56	0.45
1:B:298:TYR:CD1	1:B:463:VAL:HG22	2.52	0.45
1:A:87:PHE:CG	1:A:510:GLU:HB2	2.51	0.45
1:B:512:SER:OG	4:B:609:GOL:H12	2.16	0.45
1:A:573:MET:HE1	1:A:591:VAL:HG11	1.99	0.44
1:B:292:ILE:HD12	1:B:468:ILE:HD12	2.00	0.43
1:A:454[A]:SER:HB2	4:A:612:GOL:H11	1.99	0.43
1:B:19:GLY:O	1:B:22:LYS:HG2	2.19	0.43
1:A:503:ARG:HE	4:A:606[A]:GOL:H2	1.83	0.43
1:A:139:GLN:NE2	12:A:1255[B]:HOH:O	2.52	0.43
1:B:455:GLU:HA	1:B:458:MET:O	2.19	0.42
1:A:566:LYS:HG3	12:A:1248[A]:HOH:O	2.19	0.42
2:A:601[A]:MRD:H5C1	12:A:732:HOH:O	2.20	0.42
1:B:129:ASN:ND2	12:B:1212:HOH:O	2.43	0.42
1:A:452:LEU:HD23	1:A:452:LEU:HA	1.89	0.42
1:A:572:GLY:O	1:A:576:ILE:HG13	2.20	0.42
1:B:83[B]:MET:HG2	1:B:87:PHE:CE2	2.55	0.41
1:B:543:LEU:O	1:B:547:MET:HG3	2.20	0.41
1:A:33:ALA:H	4:A:607[A]:GOL:H11	1.85	0.41
1:A:76:VAL:HG13	1:A:409:TRP:CZ3	2.56	0.40
5:A:608:EIC:H131	5:A:608:EIC:H161	1.63	0.40
1:A:252:VAL:HB	1:A:321:LEU:HD21	2.04	0.40
1:B:465:MET:HA	1:B:466:PRO:HD2	1.99	0.40

All (2) 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)
12:B:1325:HOH:O	12:B:1325:HOH:O[2_465]	2.05	0.15
12:B:1267:HOH:O	12:B:1267:HOH:O[2_465]	2.13	0.07

### 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	583/591 (99%)	571 (98%)	12 (2%)	0	100	100
1	B	556/591 (94%)	547 (98%)	9 (2%)	0	100	100
All	All	1139/1182 (96%)	1118 (98%)	21 (2%)	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 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	519/518 (100%)	507 (98%)	12 (2%)	50	37
1	B	499/518 (96%)	484 (97%)	15 (3%)	41	27
All	All	1018/1036 (98%)	991 (97%)	27 (3%)	50	31

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	15	LYS
1	A	60	VAL

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Res	Type
1	A	75	PHE
1	A	83	MET
1	A	117[A]	GLU
1	A	117[B]	GLU
1	A	128	TYR
1	A	411	TYR
1	A	507	PHE
1	A	547[A]	MET
1	A	547[B]	MET
1	A	566	LYS
1	B	77	VAL
1	B	78	ARG
1	B	83[A]	MET
1	B	83[B]	MET
1	B	144	LYS
1	B	151	LYS
1	B	161	GLU
1	B	362	ARG
1	B	411[A]	TYR
1	B	411[B]	TYR
1	B	455	GLU
1	B	456	GLU
1	B	486	GLU
1	B	507	PHE
1	B	558	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 32 ligands modelled in this entry, 4 are monoatomic - leaving 28 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	MPD	B	601	-	7,7,7	0.31	0	9,10,10	0.77	1 (11%)
8	MES	A	615	-	12,12,12	2.07	1 (8%)	14,16,16	2.33	5 (35%)
5	EIC	A	608	-	19,19,19	1.60	4 (21%)	19,19,19	1.11	1 (5%)
4	GOL	B	604	-	5,5,5	0.35	0	5,5,5	0.47	0
11	NO3	B	610	-	1,3,3	3.68	1 (100%)	0,3,3	-	-
3	MPD	A	611	-	7,7,7	0.36	0	9,10,10	0.42	0
4	GOL	A	607[A]	-	5,5,5	0.40	0	5,5,5	0.82	0
7	PO4	B	612	-	4,4,4	1.03	0	6,6,6	0.76	0
7	PO4	A	616	-	4,4,4	0.91	0	6,6,6	0.37	0
4	GOL	A	606[B]	-	5,5,5	0.50	0	5,5,5	0.63	0
10	TRS	B	607	-	7,7,7	0.37	0	9,9,9	0.45	0
4	GOL	B	606	-	5,5,5	0.34	0	5,5,5	0.24	0
3	MPD	A	602[B]	-	7,7,7	0.28	0	9,10,10	0.17	0
8	MES	B	602	-	12,12,12	1.81	1 (8%)	14,16,16	2.15	3 (21%)
7	PO4	A	610	-	4,4,4	0.84	0	6,6,6	0.51	0
4	GOL	B	605	-	5,5,5	0.32	0	5,5,5	0.45	0
4	GOL	A	612	-	5,5,5	0.42	0	5,5,5	0.42	0
4	GOL	A	613	-	5,5,5	0.50	0	5,5,5	1.05	0
4	GOL	A	605	-	5,5,5	0.35	0	5,5,5	0.50	0
3	MPD	B	611[B]	-	7,7,7	0.24	0	9,10,10	0.52	0
2	MRD	A	601[A]	-	7,7,7	0.52	0	9,10,10	0.74	0
4	GOL	A	606[A]	-	5,5,5	0.34	0	5,5,5	0.39	0
4	GOL	A	604	-	5,5,5	0.42	0	5,5,5	0.37	0
8	MES	B	603	-	12,12,12	2.05	1 (8%)	14,16,16	2.14	7 (50%)
3	MPD	A	603	-	7,7,7	0.24	0	9,10,10	0.86	0
4	GOL	A	607[B]	-	5,5,5	0.29	0	5,5,5	0.55	0
7	PO4	B	608	-	4,4,4	0.88	0	6,6,6	0.51	0
4	GOL	B	609	-	5,5,5	0.53	0	5,5,5	0.79	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
3	MPD	B	601	-	-	0/5/5/5	-
8	MES	A	615	-	-	4/6/14/14	0/1/1/1
5	EIC	A	608	-	-	11/17/17/17	-
4	GOL	B	604	-	-	4/4/4/4	-
3	MPD	A	611	-	-	0/5/5/5	-
4	GOL	A	607[A]	-	-	2/4/4/4	-
4	GOL	A	606[B]	-	-	2/4/4/4	-
10	TRS	B	607	-	-	3/9/9/9	-
4	GOL	B	606	-	-	2/4/4/4	-
3	MPD	A	602[B]	-	-	2/5/5/5	-
8	MES	B	602	-	-	2/6/14/14	0/1/1/1
4	GOL	B	605	-	-	2/4/4/4	-
4	GOL	A	612	-	-	0/4/4/4	-
4	GOL	A	613	-	-	2/4/4/4	-
4	GOL	A	605	-	-	4/4/4/4	-
3	MPD	B	611[B]	-	-	1/5/5/5	-
2	MRD	A	601[A]	-	-	4/5/5/5	-
4	GOL	A	606[A]	-	-	2/4/4/4	-
4	GOL	A	604	-	-	4/4/4/4	-
8	MES	B	603	-	-	5/6/14/14	0/1/1/1
3	MPD	A	603	-	-	4/5/5/5	-
4	GOL	A	607[B]	-	-	4/4/4/4	-
4	GOL	B	609	-	-	2/4/4/4	-

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	B	603	MES	C8-S	-6.83	1.67	1.77
8	A	615	MES	C8-S	-6.82	1.67	1.77
8	B	602	MES	C8-S	-6.08	1.68	1.77
5	A	608	EIC	O1-C1	4.84	1.38	1.22
11	B	610	NO3	O1-N	3.68	1.41	1.24
5	A	608	EIC	C10-C9	3.07	1.49	1.31
5	A	608	EIC	C13-C12	2.95	1.48	1.31
5	A	608	EIC	O2-C1	2.06	1.37	1.30

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	A	615	MES	C5-N4-C3	5.06	120.22	108.83
8	B	602	MES	C5-N4-C3	4.51	118.97	108.83
8	B	602	MES	O1S-S-C8	4.28	112.06	106.92
8	B	602	MES	C7-N4-C5	3.93	121.28	111.23
8	B	603	MES	O1S-S-C8	3.73	111.40	106.92
8	A	615	MES	C7-N4-C3	3.43	120.02	111.23
8	A	615	MES	C7-N4-C5	3.25	119.55	111.23
8	B	603	MES	C5-N4-C3	3.14	115.91	108.83
8	A	615	MES	C2-C3-N4	-3.00	105.55	110.10
8	A	615	MES	O1S-S-C8	2.90	110.41	106.92
8	B	603	MES	C7-N4-C3	2.70	118.15	111.23
8	B	603	MES	C6-C5-N4	-2.63	106.12	110.10
5	A	608	EIC	C3-C2-C1	-2.62	107.87	114.47
8	B	603	MES	C7-N4-C5	2.32	117.17	111.23
8	B	603	MES	O2S-S-C8	2.32	109.70	106.92
8	B	603	MES	O3S-S-C8	2.17	109.27	105.77
3	B	601	MPD	CM-C2-C1	-2.08	106.24	110.57

There are no chirality outliers.

All (66) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601[A]	MRD	C2-C3-C4-O4
2	A	601[A]	MRD	C2-C3-C4-C5
3	A	603	MPD	C2-C3-C4-O4
3	A	603	MPD	C2-C3-C4-C5
4	A	604	GOL	O1-C1-C2-C3
4	A	605	GOL	O1-C1-C2-C3
4	A	606[A]	GOL	O1-C1-C2-C3
4	A	606[B]	GOL	O1-C1-C2-C3
4	A	613	GOL	C1-C2-C3-O3
4	B	605	GOL	O1-C1-C2-C3
4	B	606	GOL	O1-C1-C2-C3
4	B	609	GOL	O1-C1-C2-O2
4	B	609	GOL	O1-C1-C2-C3
8	A	615	MES	C8-C7-N4-C3
8	A	615	MES	C7-C8-S-O2S
8	B	602	MES	C8-C7-N4-C5
8	B	603	MES	C8-C7-N4-C3
8	B	603	MES	C7-C8-S-O2S
8	B	603	MES	C7-C8-S-O3S

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms
10	B	607	TRS	C1-C-C2-O2
10	B	607	TRS	C3-C-C2-O2
10	B	607	TRS	N-C-C2-O2
4	A	604	GOL	O1-C1-C2-O2
4	A	613	GOL	O2-C2-C3-O3
4	B	606	GOL	O1-C1-C2-O2
4	A	604	GOL	C1-C2-C3-O3
4	A	605	GOL	C1-C2-C3-O3
4	A	607[A]	GOL	O1-C1-C2-C3
4	A	607[B]	GOL	O1-C1-C2-C3
4	A	607[B]	GOL	C1-C2-C3-O3
4	B	604	GOL	O1-C1-C2-C3
4	B	604	GOL	C1-C2-C3-O3
4	A	604	GOL	O2-C2-C3-O3
4	A	605	GOL	O1-C1-C2-O2
4	A	606[A]	GOL	O1-C1-C2-O2
5	A	608	EIC	C3-C4-C5-C6
8	A	615	MES	C7-C8-S-O3S
4	A	606[B]	GOL	O1-C1-C2-O2
4	B	604	GOL	O2-C2-C3-O3
5	A	608	EIC	C6-C7-C8-C9
5	A	608	EIC	C11-C10-C9-C8
8	B	603	MES	C8-C7-N4-C5
4	A	607[B]	GOL	O1-C1-C2-O2
4	B	604	GOL	O1-C1-C2-O2
4	B	605	GOL	O1-C1-C2-O2
3	A	603	MPD	O2-C2-C3-C4
4	A	607[B]	GOL	O2-C2-C3-O3
5	A	608	EIC	C1-C2-C3-C4
3	A	602[B]	MPD	C2-C3-C4-C5
3	B	611[B]	MPD	C2-C3-C4-C5
5	A	608	EIC	C15-C16-C17-C18
8	A	615	MES	C7-C8-S-O1S
8	B	603	MES	C7-C8-S-O1S
2	A	601[A]	MRD	CM-C2-C3-C4
3	A	603	MPD	CM-C2-C3-C4
5	A	608	EIC	C4-C5-C6-C7
5	A	608	EIC	C10-C11-C12-C13
5	A	608	EIC	O2-C1-C2-C3
5	A	608	EIC	O1-C1-C2-C3
5	A	608	EIC	C14-C15-C16-C17
2	A	601[A]	MRD	O2-C2-C3-C4

*Continued on next page...*

*Continued from previous page...*

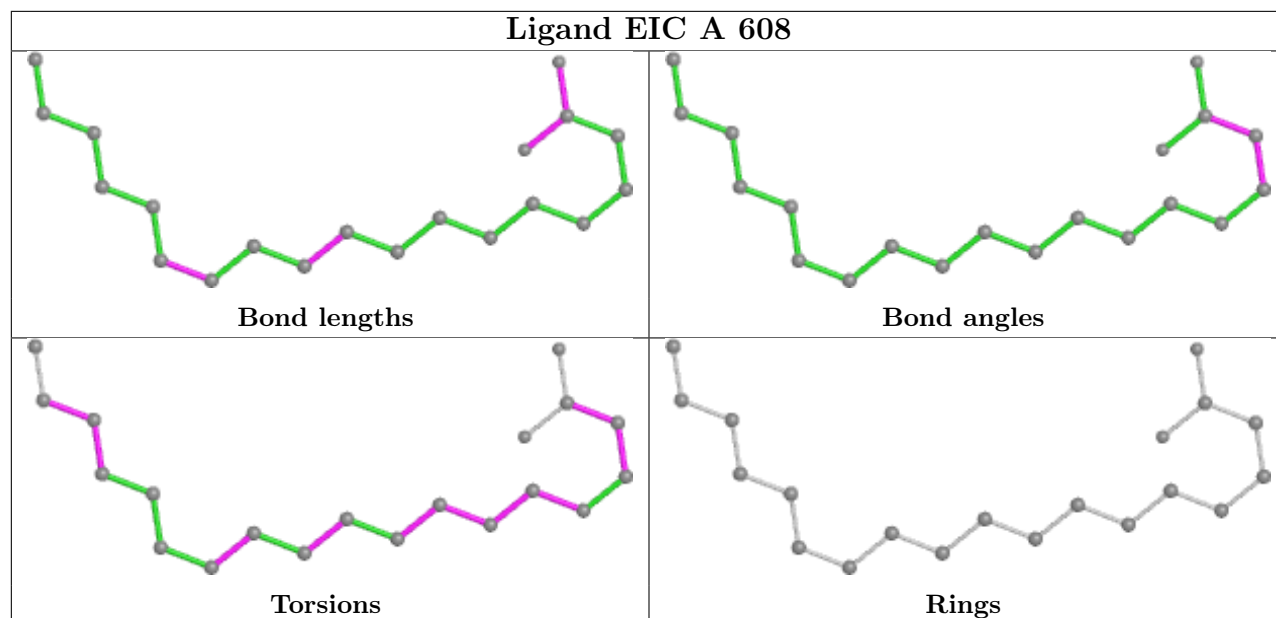
Mol	Chain	Res	Type	Atoms
4	A	605	GOL	O2-C2-C3-O3
4	A	607[A]	GOL	O1-C1-C2-O2
8	B	602	MES	C7-C8-S-O2S
3	A	602[B]	MPD	C2-C3-C4-O4
5	A	608	EIC	C5-C6-C7-C8

There are no ring outliers.

10 monomers are involved in 19 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	601	MPD	2	0
5	A	608	EIC	1	0
4	A	607[A]	GOL	2	0
7	B	612	PO4	1	0
3	A	602[B]	MPD	2	0
4	B	605	GOL	1	0
4	A	612	GOL	1	0
2	A	601[A]	MRD	6	0
4	A	606[A]	GOL	1	0
4	B	609	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 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	579/591 (97%)	-0.50	6 (1%) 82 80	8, 16, 35, 87	0
1	B	558/591 (94%)	-0.45	10 (1%) 68 64	8, 15, 40, 78	2 (0%)
All	All	1137/1182 (96%)	-0.48	16 (1%) 75 72	8, 16, 37, 87	2 (0%)

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	74	GLY	8.1
1	A	75	PHE	7.4
1	A	60	VAL	7.2
1	A	563	LEU	3.5
1	B	576	ILE	3.3
1	B	546	ALA	3.3
1	B	555	LYS	3.2
1	A	76	VAL	3.2
1	B	559	GLN	2.8
1	B	579	THR	2.7
1	B	77	VAL	2.6
1	B	78	ARG	2.4
1	B	554	LYS	2.4
1	B	577	LYS	2.1
1	A	73	ALA	2.0
1	B	580	TRP	2.0

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

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



### 6.3 Carbohydrates [i](#)

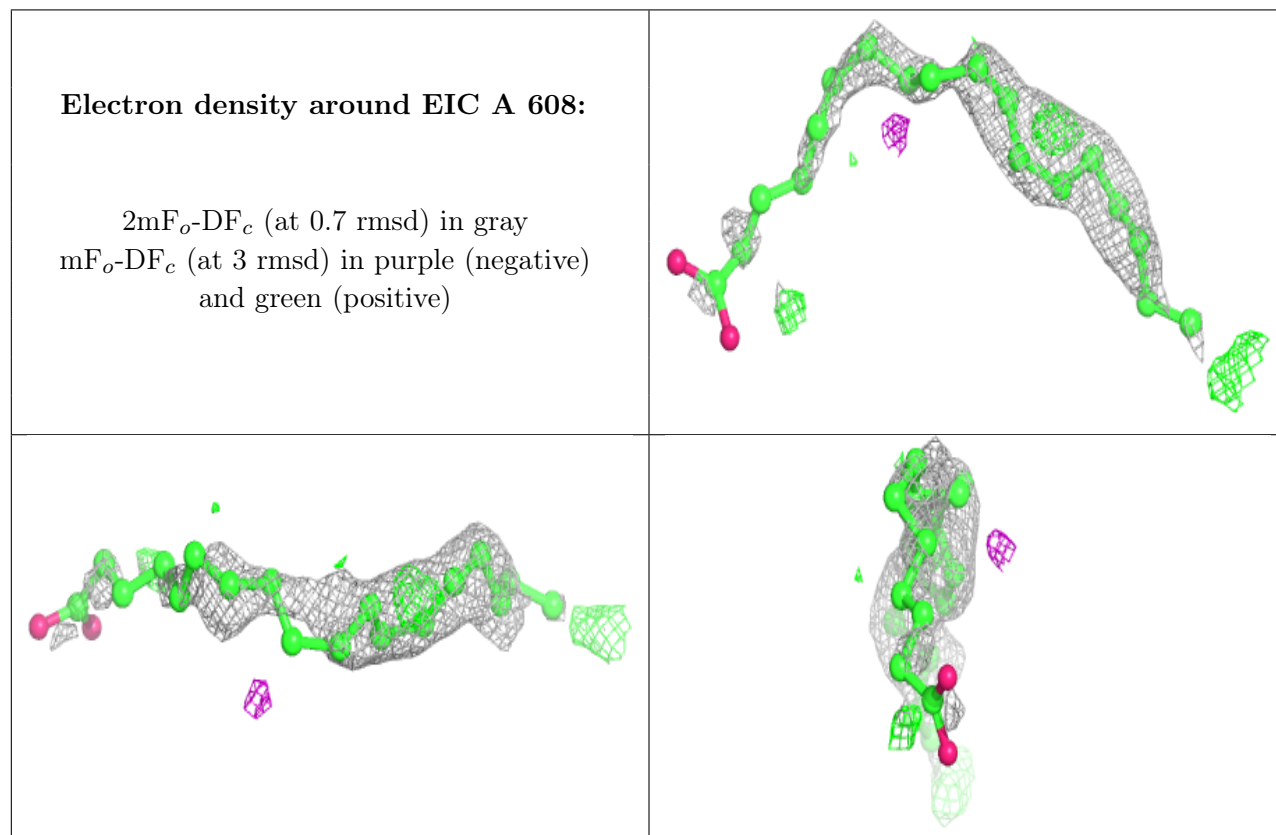
There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
4	GOL	A	607[A]	6/6	0.45	0.78	28,30,36,37	6
4	GOL	A	607[B]	6/6	0.45	0.78	38,42,43,43	6
4	GOL	B	605	6/6	0.63	0.21	45,48,49,51	0
4	GOL	B	604	6/6	0.69	0.18	42,47,50,54	6
5	EIC	A	608	20/20	0.71	0.28	35,54,75,77	0
4	GOL	A	606[B]	6/6	0.73	0.27	3,21,23,25	6
4	GOL	A	606[A]	6/6	0.73	0.27	5,21,23,24	6
4	GOL	A	604	6/6	0.74	0.25	45,45,47,51	0
4	GOL	B	606	6/6	0.77	0.19	47,48,48,48	6
7	PO4	B	608	5/5	0.77	0.18	43,49,50,50	5
4	GOL	A	613	6/6	0.78	0.24	22,23,25,33	6
7	PO4	A	610	5/5	0.80	0.20	68,70,71,72	5
2	MRD	A	601[A]	8/8	0.81	0.18	8,17,18,22	8
4	GOL	A	605	6/6	0.82	0.16	41,44,46,49	0
8	MES	A	615	12/12	0.82	0.21	32,35,42,43	12
11	NO3	B	610	4/4	0.83	0.14	45,47,48,49	0
8	MES	B	603	12/12	0.85	0.19	38,42,53,55	12
3	MPD	A	602[B]	8/8	0.85	0.17	10,16,17,20	8
4	GOL	B	609	6/6	0.88	0.16	21,25,31,33	0
3	MPD	B	601	8/8	0.90	0.19	6,15,17,23	8
10	TRS	B	607	8/8	0.90	0.23	44,46,50,50	0
7	PO4	A	616	5/5	0.90	0.21	49,51,53,54	5
3	MPD	B	611[B]	8/8	0.91	0.18	3,11,12,13	8
4	GOL	A	612	6/6	0.91	0.14	20,22,27,28	6
3	MPD	A	611	8/8	0.91	0.14	18,22,23,24	8
3	MPD	A	603	8/8	0.93	0.16	9,19,21,24	8
6	NA	A	614	1/1	0.96	0.11	28,28,28,28	0
8	MES	B	602	12/12	0.97	0.10	9,16,24,26	12
7	PO4	B	612	5/5	0.97	0.09	14,14,26,28	5
6	NA	A	609	1/1	0.99	0.07	22,22,22,22	0
9	K	A	617	1/1	0.99	0.05	15,15,15,15	0
9	K	B	613	1/1	1.00	0.07	11,11,11,11	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.



## 6.5 Other polymers [i](#)

There are no such residues in this entry.