



# wwPDB X-ray Structure Validation Summary Report

Jan 3, 2024 – 02:58 pm GMT

PDB ID : 5FIP  
Title : Discovery and characterization of a novel thermostable and highly halotolerant GH5 cellulase from an Icelandic hot spring isolate  
Authors : Zarafeta, D.; Kissas, D.; Sayer, C.; Gudbergsdottir, S.R.; Ladoukakis, E.; Isupov, M.N.; Chatziioannou, A.; Peng, X.; Littlechild, J.A.; Skretas, G.; Kolisis, F.N.  
Deposited on : 2015-10-01  
Resolution : 1.88 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](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>.

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The following versions of software and data (see [references](#) ①) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtrriage (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

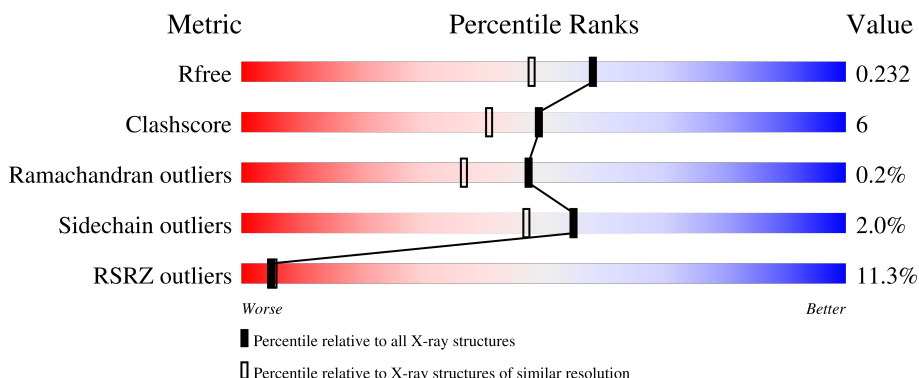
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

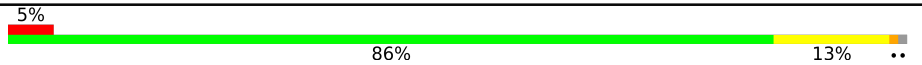
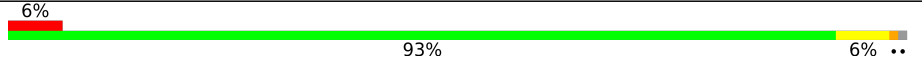


The reported resolution of this entry is 1.88 Å.

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	9470 (1.90-1.86)
Clashscore	141614	10282 (1.90-1.86)
Ramachandran outliers	138981	10152 (1.90-1.86)
Sidechain outliers	138945	10152 (1.90-1.86)
RSRZ outliers	127900	9303 (1.90-1.86)

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	334	
1	B	334	
1	C	334	
1	D	334	

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	PEG	A	1386	-	-	X	-
5	IPA	A	1395	-	-	X	-
5	IPA	B	1394	-	-	X	-
5	IPA	B	1395	-	-	X	-
5	IPA	C	1384	-	-	X	-
5	IPA	D	1391	-	-	X	-

## 2 Entry composition [i](#)

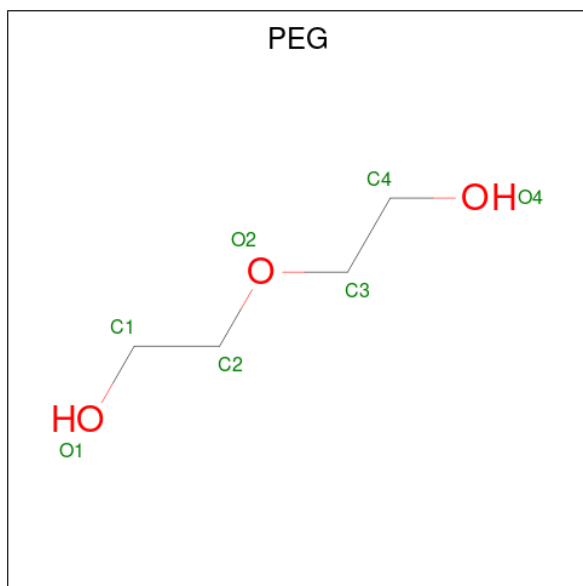
There are 9 unique types of molecules in this entry. The entry contains 11615 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 GH5 CELLULASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	331	Total 2715	C 1736	N 454	O 516	S 9	0	20	0
1	B	332	Total 2711	C 1737	N 454	O 511	S 9	0	19	0
1	C	331	Total 2677	C 1710	N 449	O 510	S 8	0	14	0
1	D	328	Total 2648	C 1690	N 450	O 499	S 9	0	10	0

- Molecule 2 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



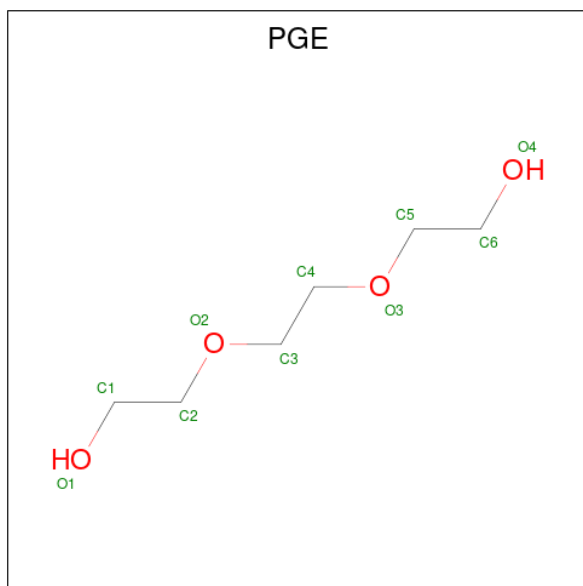
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
2	A	1	Total 7	C 4	O 3	0	0
2	A	1	Total 7	C 4	O 3	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			7	4	3		
2	A	1	Total	C	O	0	0
			7	4	3		
2	A	1	Total	C	O	0	0
			7	4	3		
2	A	1	Total	C	O	0	0
			7	4	3		
2	B	1	Total	C	O	0	0
			7	4	3		
2	B	1	Total	C	O	0	0
			7	4	3		
2	C	1	Total	C	O	0	0
			7	4	3		
2	D	1	Total	C	O	0	0
			7	4	3		

- Molecule 3 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>4</sub>).



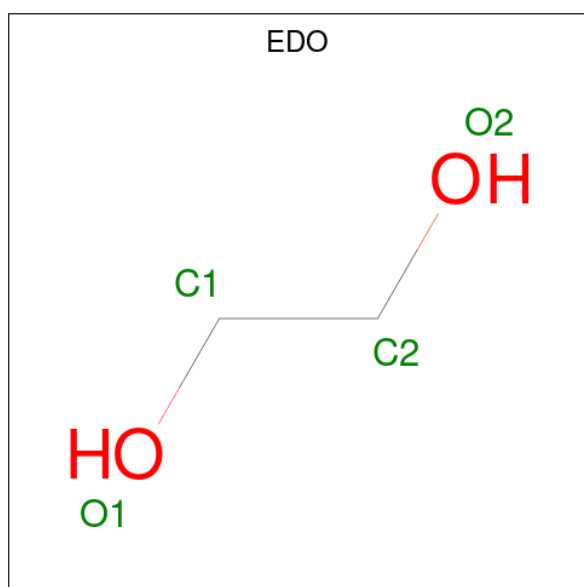
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			10	6	4		
3	A	1	Total	C	O	0	0
			10	6	4		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	O	0	0
			10	6	4		
3	C	1	Total	C	O	0	0
			10	6	4		

- Molecule 4 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



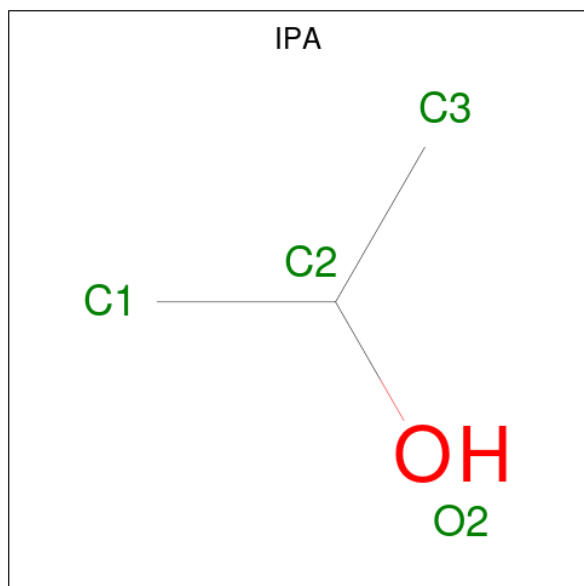
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	A	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		
4	B	1	Total	C	O	0	0
			4	2	2		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	B	1	Total C O 4 2 2	0	0
4	C	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0
4	D	1	Total C O 4 2 2	0	0

- Molecule 5 is ISOPROPYL ALCOHOL (three-letter code: IPA) (formula: C<sub>3</sub>H<sub>8</sub>O).



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

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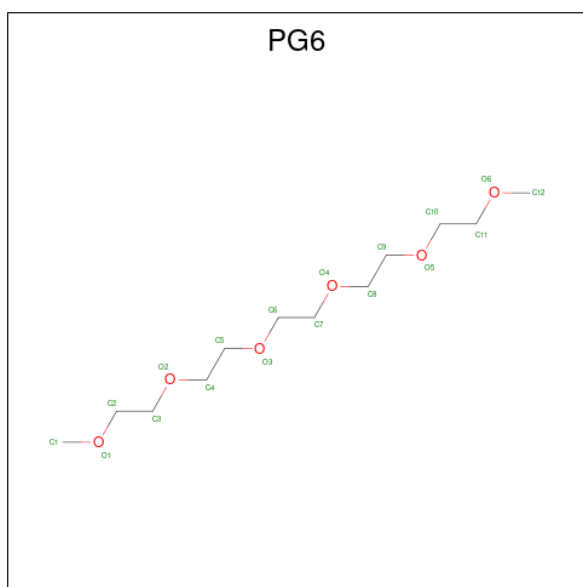
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	0	0
			4	3	1		
5	B	1	Total	C	O	0	0
			4	3	1		
5	B	1	Total	C	O	0	0
			4	3	1		
5	B	1	Total	C	O	0	0
			4	3	1		
5	B	1	Total	C	O	0	0
			4	3	1		
5	C	1	Total	C	O	0	0
			4	3	1		
5	D	1	Total	C	O	0	0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

- Molecule 6 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

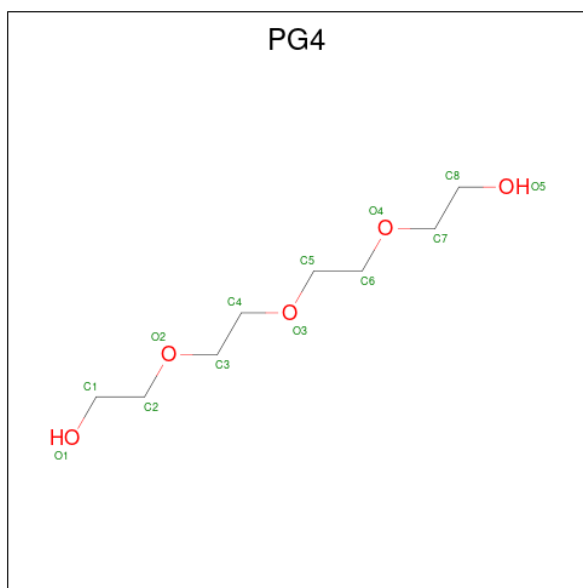
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	3	Total	Cl	0	0
			3	3		
6	B	2	Total	Cl	0	0
			2	2		
6	C	1	Total	Cl	0	0
			1	1		
6	D	1	Total	Cl	0	0
			1	1		

- Molecule 7 is 1-(2-METHOXY-ETHOXY)-2-{2-[2-(2-METHOXY-ETHOXY)-ETHOXY]-ETHANE (three-letter code: PG6) (formula: C<sub>12</sub>H<sub>26</sub>O<sub>6</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	B	1	Total	C	O	0	0
			18	12	6		

- Molecule 8 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula:  $C_8H_{18}O_5$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	D	1	Total	C	O	0	0
			13	8	5		

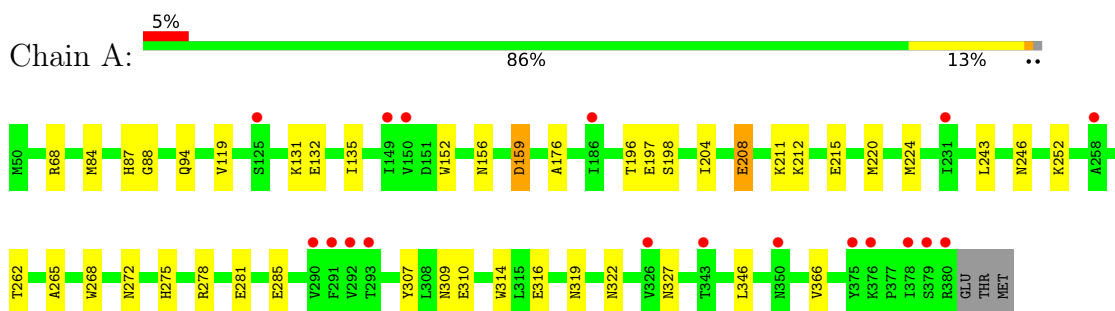
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	206	Total 206	O 206	0	0
9	B	196	Total 196	O 196	0	0
9	C	94	Total 94	O 94	0	0
9	D	89	Total 89	O 89	0	0

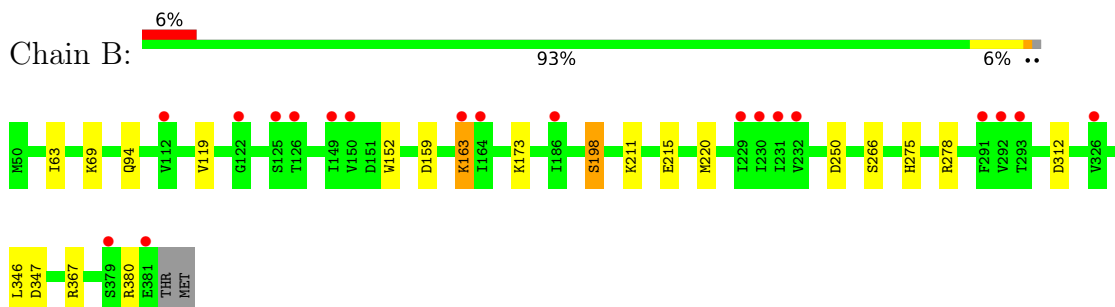
### 3 Residue-property plots [i](#)

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.

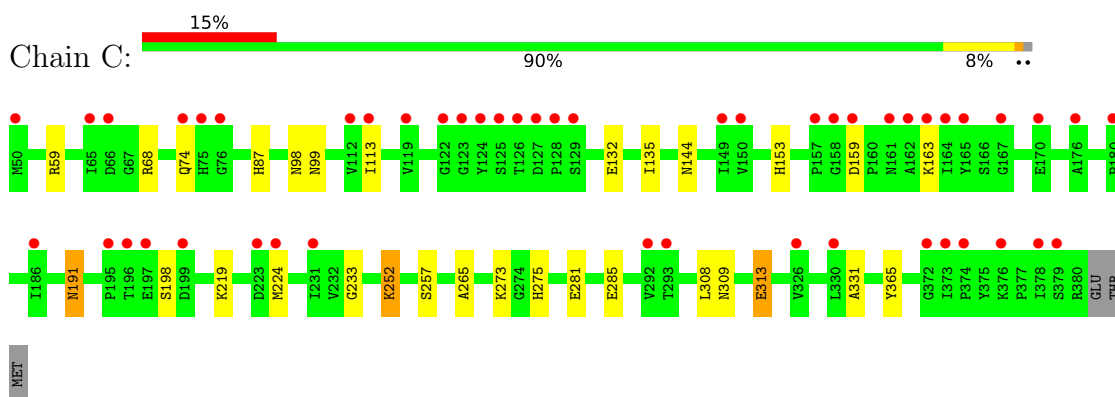
- Molecule 1: GH5 CELLULASE



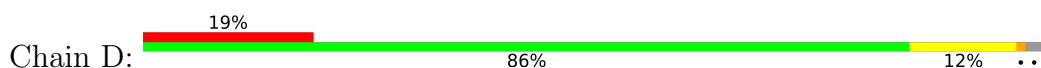
- Molecule 1: GH5 CELLULASE

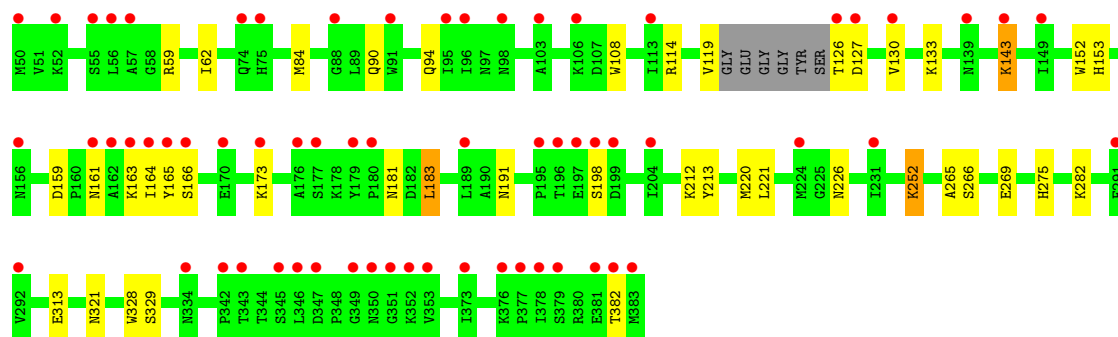


- Molecule 1: GH5 CELLULASE



- Molecule 1: GH5 CELLULASE





## 4 Data and refinement statistics i

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	107.34Å 137.45Å 121.34Å 90.00° 114.44° 90.00°	Depositor
Resolution (Å)	36.38 – 1.88 36.38 – 1.88	Depositor EDS
% Data completeness (in resolution range)	97.4 (36.38-1.88) 97.4 (36.38-1.88)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.78 (at 1.88Å)	Xtrriage
Refinement program	REFMAC 5.8.0131	Depositor
R, $R_{free}$	0.193 , 0.234 0.192 , 0.232	Depositor DCC
$R_{free}$ test set	6406 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	32.3	Xtrriage
Anisotropy	0.389	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 62.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.017 for h,-k,-h-l	Xtrriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	11615	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	43.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.00% 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: IPA, EDO, PGE, CL, PG6, PEG, PG4

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	0.68	1/2841 (0.0%)	0.73	1/3855 (0.0%)
1	B	0.69	0/2833	0.74	5/3843 (0.1%)
1	C	0.55	0/2784	0.71	0/3781
1	D	0.57	0/2742	0.69	1/3720 (0.0%)
All	All	0.62	1/11200 (0.0%)	0.72	7/15199 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	208	GLU	CD-OE2	-5.18	1.20	1.25

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	312	ASP	CB-CG-OD1	6.58	124.22	118.30
1	B	278	ARG	NE-CZ-NH2	-6.58	117.01	120.30
1	B	278	ARG	NE-CZ-NH1	6.55	123.58	120.30
1	B	347	ASP	CB-CG-OD1	5.86	123.57	118.30
1	A	159	ASP	CB-CG-OD1	5.70	123.43	118.30

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	A	2715	0	2706	50	0
1	B	2711	0	2722	16	0
1	C	2677	0	2656	22	0
1	D	2648	0	2630	33	0
2	A	49	0	70	14	0
2	B	14	0	20	1	0
2	C	7	0	10	0	0
2	D	7	0	10	0	0
3	A	20	0	28	4	0
3	B	10	0	14	0	0
3	C	10	0	14	1	0
4	A	16	0	24	0	0
4	B	32	0	48	0	0
4	C	4	0	6	0	0
4	D	20	0	30	0	0
5	A	8	0	16	6	0
5	B	24	0	48	10	0
5	C	4	0	8	5	0
5	D	16	0	32	13	0
6	A	3	0	0	1	0
6	B	2	0	0	1	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
7	B	18	0	26	3	0
8	D	13	0	18	0	0
9	A	206	0	0	14	0
9	B	196	0	0	4	0
9	C	94	0	0	2	0
9	D	89	0	0	3	0
All	All	11615	0	11136	130	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 6.

The worst 5 of 130 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:132[A]:GLU:OE1	9:A:2075:HOH:O	1.59	1.18
9:A:2023:HOH:O	1:C:313[B]:GLU:OE1	1.62	1.17
1:C:309[B]:ASN:OD1	9:C:2074:HOH:O	1.62	1.16
1:A:132[A]:GLU:CD	9:A:2075:HOH:O	1.80	1.15
1:A:197[B]:GLU:OE2	6:A:1397:CL:CL	2.13	1.04



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	349/334 (104%)	340 (97%)	9 (3%)	0	100	100
1	B	349/334 (104%)	336 (96%)	13 (4%)	0	100	100
1	C	343/334 (103%)	331 (96%)	11 (3%)	1 (0%)	41	30
1	D	334/334 (100%)	321 (96%)	11 (3%)	2 (1%)	25	14
All	All	1375/1336 (103%)	1328 (97%)	44 (3%)	3 (0%)	47	37

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	163	LYS
1	C	191	ASN
1	D	152	TRP

### 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	299/282 (106%)	299 (100%)	0	100	100
1	B	299/282 (106%)	294 (98%)	5 (2%)	60	54
1	C	293/282 (104%)	284 (97%)	9 (3%)	40	29
1	D	289/282 (102%)	275 (95%)	14 (5%)	25	14

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	1180/1128 (105%)	1152 (98%)	28 (2%)	55 39

5 of 28 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	90	GLN
1	D	382	THR
1	D	133	LYS
1	D	220	MET
1	D	126	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	275	HIS
1	C	98	ASN
1	C	275	HIS
1	C	99	ASN
1	A	275	HIS

### 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 55 ligands modelled in this entry, 7 are monoatomic - leaving 48 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
7	PG6	B	1393	-	17,17,17	0.57	0	16,16,16	0.40	0
5	IPA	B	1396	-	3,3,3	0.50	0	3,3,3	0.47	0
2	PEG	A	1385	-	6,6,6	0.39	0	5,5,5	0.38	0
5	IPA	B	1397	-	3,3,3	0.47	0	3,3,3	0.19	0
4	EDO	B	1387	-	3,3,3	0.39	0	2,2,2	0.50	0
2	PEG	B	1383	-	6,6,6	0.47	0	5,5,5	0.32	0
5	IPA	B	1395	-	3,3,3	0.48	0	3,3,3	0.79	0
5	IPA	B	1399	-	3,3,3	0.38	0	3,3,3	0.72	0
4	EDO	D	1387	-	3,3,3	0.46	0	2,2,2	0.50	0
4	EDO	A	1390	-	3,3,3	0.47	0	2,2,2	0.37	0
8	PG4	D	1390	-	12,12,12	0.45	0	11,11,11	0.26	0
5	IPA	A	1395	-	3,3,3	0.28	0	3,3,3	0.64	0
4	EDO	D	1388	-	3,3,3	0.49	0	2,2,2	0.39	0
3	PGE	A	1388	-	9,9,9	0.61	0	8,8,8	0.55	0
3	PGE	B	1384	-	9,9,9	0.53	0	8,8,8	0.35	0
4	EDO	A	1393	-	3,3,3	0.57	0	2,2,2	0.37	0
3	PGE	A	1389	-	9,9,9	0.58	0	8,8,8	0.89	0
2	PEG	A	1383	-	6,6,6	0.35	0	5,5,5	0.56	0
4	EDO	D	1386	-	3,3,3	0.41	0	2,2,2	0.45	0
5	IPA	D	1391	-	3,3,3	0.89	0	3,3,3	0.65	0
2	PEG	A	1387	-	6,6,6	0.76	0	5,5,5	0.70	0
4	EDO	A	1392	-	3,3,3	0.42	0	2,2,2	0.41	0
4	EDO	B	1385	-	3,3,3	0.46	0	2,2,2	0.24	0
5	IPA	B	1398	-	3,3,3	0.56	0	3,3,3	0.17	0
5	IPA	D	1394	-	3,3,3	0.41	0	3,3,3	0.75	0
4	EDO	B	1392	-	3,3,3	0.41	0	2,2,2	0.56	0
4	EDO	B	1388	-	3,3,3	0.37	0	2,2,2	0.59	0
4	EDO	D	1389	-	3,3,3	0.39	0	2,2,2	0.48	0
5	IPA	B	1394	-	3,3,3	0.45	0	3,3,3	0.63	0
5	IPA	C	1384	-	3,3,3	0.43	0	3,3,3	0.86	0
3	PGE	C	1382	-	9,9,9	0.56	0	8,8,8	0.52	0
2	PEG	A	1382	-	6,6,6	0.43	0	5,5,5	0.45	0
2	PEG	A	1384	-	6,6,6	0.39	0	5,5,5	0.40	0
4	EDO	B	1391	-	3,3,3	0.44	0	2,2,2	0.48	0
2	PEG	B	1382	-	6,6,6	0.48	0	5,5,5	0.25	0
4	EDO	B	1389	-	3,3,3	0.53	0	2,2,2	0.32	0
4	EDO	D	1385	-	3,3,3	0.44	0	2,2,2	0.25	0
5	IPA	D	1393	-	3,3,3	0.48	0	3,3,3	0.37	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	IPA	A	1394	-	3,3,3	0.55	0	3,3,3	0.52	0
2	PEG	A	1386	-	6,6,6	0.28	0	5,5,5	0.81	0
2	PEG	C	1381	-	6,6,6	0.43	0	5,5,5	0.28	0
5	IPA	D	1392	-	3,3,3	0.54	0	3,3,3	0.20	0
2	PEG	D	1384	-	6,6,6	0.48	0	5,5,5	0.39	0
4	EDO	C	1383	-	3,3,3	0.44	0	2,2,2	0.51	0
2	PEG	A	1381	-	6,6,6	0.45	0	5,5,5	0.31	0
4	EDO	A	1391	-	3,3,3	0.47	0	2,2,2	0.13	0
4	EDO	B	1386	-	3,3,3	0.51	0	2,2,2	0.34	0
4	EDO	B	1390	-	3,3,3	0.56	0	2,2,2	0.14	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
7	PG6	B	1393	-	-	9/15/15/15	-
2	PEG	A	1385	-	-	0/4/4/4	-
4	EDO	B	1387	-	-	1/1/1/1	-
2	PEG	B	1383	-	-	2/4/4/4	-
4	EDO	D	1387	-	-	0/1/1/1	-
4	EDO	A	1390	-	-	1/1/1/1	-
8	PG4	D	1390	-	-	2/10/10/10	-
4	EDO	D	1388	-	-	1/1/1/1	-
3	PGE	A	1388	-	-	6/7/7/7	-
3	PGE	B	1384	-	-	6/7/7/7	-
4	EDO	A	1393	-	-	1/1/1/1	-
3	PGE	A	1389	-	-	5/7/7/7	-
2	PEG	A	1383	-	-	3/4/4/4	-
4	EDO	D	1386	-	-	0/1/1/1	-
2	PEG	A	1387	-	-	3/4/4/4	-
4	EDO	A	1392	-	-	1/1/1/1	-
4	EDO	B	1385	-	-	1/1/1/1	-
4	EDO	B	1392	-	-	0/1/1/1	-
4	EDO	B	1388	-	-	1/1/1/1	-
4	EDO	D	1389	-	-	1/1/1/1	-
3	PGE	C	1382	-	-	4/7/7/7	-
2	PEG	A	1382	-	-	3/4/4/4	-
2	PEG	A	1384	-	-	2/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	EDO	B	1391	-	-	1/1/1/1	-
2	PEG	B	1382	-	-	1/4/4/4	-
4	EDO	B	1389	-	-	0/1/1/1	-
4	EDO	D	1385	-	-	1/1/1/1	-
2	PEG	A	1386	-	-	4/4/4/4	-
2	PEG	C	1381	-	-	2/4/4/4	-
2	PEG	D	1384	-	-	2/4/4/4	-
4	EDO	C	1383	-	-	1/1/1/1	-
2	PEG	A	1381	-	-	1/4/4/4	-
4	EDO	A	1391	-	-	1/1/1/1	-
4	EDO	B	1386	-	-	1/1/1/1	-
4	EDO	B	1390	-	-	1/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 69 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	1382	PGE	C1-C2-O2-C3
7	B	1393	PG6	O1-C2-C3-O2
7	B	1393	PG6	O4-C8-C9-O5
3	B	1384	PGE	O2-C3-C4-O3
3	A	1388	PGE	O2-C3-C4-O3

There are no ring outliers.

20 monomers are involved in 57 short contacts:

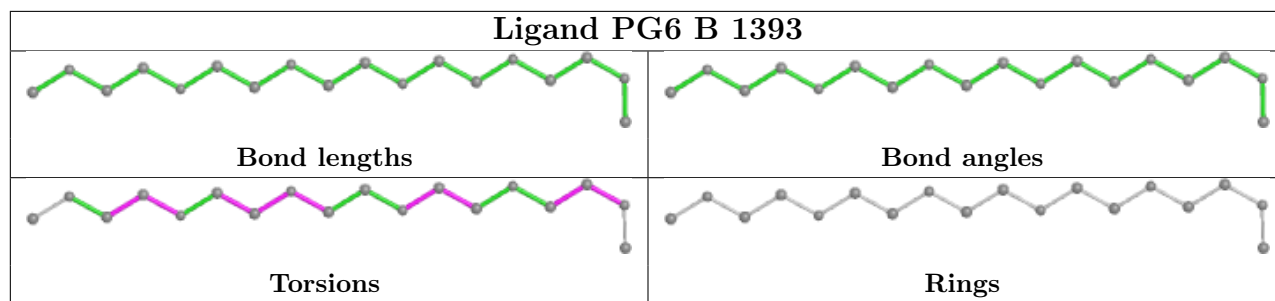
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	1393	PG6	3	0
5	B	1397	IPA	1	0
2	B	1383	PEG	1	0
5	B	1395	IPA	5	0
5	A	1395	IPA	6	0
3	A	1388	PGE	1	0
3	A	1389	PGE	3	0
5	D	1391	IPA	8	0
2	A	1387	PEG	2	0
5	D	1394	IPA	2	0
5	B	1394	IPA	4	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	1384	IPA	5	0
3	C	1382	PGE	1	0
2	A	1382	PEG	3	0
2	A	1384	PEG	2	0
2	B	1382	PEG	1	0
5	D	1393	IPA	2	0
2	A	1386	PEG	5	0
5	D	1392	IPA	1	0
2	A	1381	PEG	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	331/334 (99%)	0.10	18 (5%) 25 27	19, 33, 53, 72	0
1	B	332/334 (99%)	0.04	19 (5%) 23 25	20, 30, 53, 93	0
1	C	331/334 (99%)	0.56	49 (14%) 2 2	29, 45, 80, 110	0
1	D	328/334 (98%)	0.84	64 (19%) 1 1	23, 51, 93, 132	0
All	All	1322/1336 (98%)	0.38	150 (11%) 5 5	19, 39, 74, 132	0

The worst 5 of 150 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	126	THR	6.5
1	D	383	MET	6.1
1	C	50	MET	5.7
1	D	349	GLY	5.7
1	D	197	GLU	5.3

### 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 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( $\text{\AA}^2$ )	Q<0.9
4	EDO	A	1390	4/4	0.66	0.19	75,77,80,82	0
4	EDO	D	1388	4/4	0.66	0.23	71,79,79,81	0
4	EDO	B	1389	4/4	0.68	0.22	63,72,72,78	0
3	PGE	B	1384	10/10	0.70	0.21	68,77,85,85	0
2	PEG	A	1387	7/7	0.71	0.17	36,47,57,61	0
4	EDO	A	1391	4/4	0.72	0.25	59,59,66,81	0
2	PEG	B	1382	7/7	0.73	0.18	63,66,77,78	0
4	EDO	D	1387	4/4	0.74	0.18	45,58,65,72	0
4	EDO	B	1386	4/4	0.75	0.14	60,67,69,70	0
4	EDO	A	1392	4/4	0.76	0.17	72,80,82,91	0
2	PEG	A	1386	7/7	0.78	0.23	40,49,72,80	0
2	PEG	C	1381	7/7	0.81	0.12	59,61,64,68	0
5	IPA	D	1391	4/4	0.81	0.15	29,29,37,51	0
5	IPA	A	1394	4/4	0.82	0.30	37,47,51,53	4
4	EDO	A	1393	4/4	0.83	0.15	49,51,68,74	0
3	PGE	C	1382	10/10	0.84	0.16	43,51,64,71	0
4	EDO	C	1383	4/4	0.84	0.13	50,53,59,63	0
2	PEG	D	1384	7/7	0.85	0.17	52,70,76,79	0
4	EDO	D	1385	4/4	0.85	0.20	49,56,62,63	0
2	PEG	B	1383	7/7	0.86	0.25	58,62,69,83	0
5	IPA	D	1393	4/4	0.86	0.18	37,45,53,62	0
4	EDO	B	1391	4/4	0.87	0.38	70,71,73,78	0
4	EDO	B	1392	4/4	0.87	0.12	55,61,62,75	0
3	PGE	A	1388	10/10	0.87	0.10	50,60,69,70	0
3	PGE	A	1389	10/10	0.88	0.14	34,50,59,62	0
4	EDO	B	1385	4/4	0.88	0.20	43,60,64,73	0
4	EDO	B	1390	4/4	0.88	0.17	42,62,62,74	0
4	EDO	D	1386	4/4	0.89	0.11	53,59,64,64	0
2	PEG	A	1385	7/7	0.89	0.12	57,72,77,84	0
2	PEG	A	1384	7/7	0.90	0.14	49,59,67,78	0
5	IPA	D	1392	4/4	0.90	0.11	49,55,57,59	0
2	PEG	A	1381	7/7	0.90	0.15	31,49,53,57	0
6	CL	A	1400	1/1	0.91	0.13	59,59,59,59	1
7	PG6	B	1393	18/18	0.91	0.09	44,52,78,78	0
5	IPA	B	1398	4/4	0.92	0.13	50,57,74,78	0
4	EDO	B	1387	4/4	0.92	0.08	46,52,57,65	0
4	EDO	B	1388	4/4	0.92	0.14	37,47,50,61	0
4	EDO	D	1389	4/4	0.92	0.12	58,62,64,75	0
2	PEG	A	1383	7/7	0.92	0.17	45,49,58,72	0
6	CL	C	1385	1/1	0.92	0.06	56,56,56,56	1
5	IPA	B	1396	4/4	0.92	0.14	48,49,50,67	0
5	IPA	B	1394	4/4	0.93	0.10	19,29,29,42	0
6	CL	A	1396	1/1	0.93	0.06	53,53,53,53	0

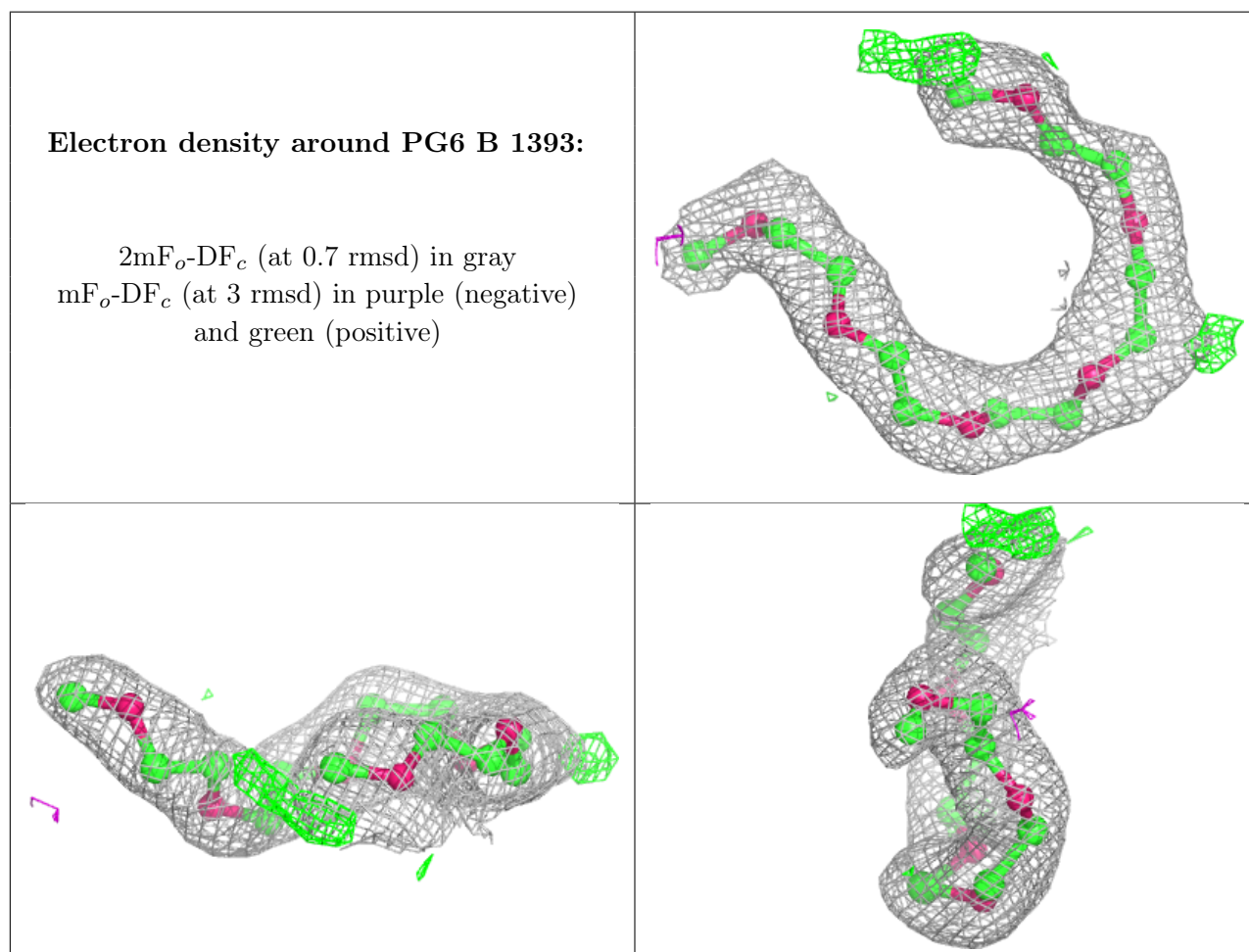
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	CL	A	1397	1/1	0.93	0.07	30,30,30,30	1
5	IPA	D	1394	4/4	0.94	0.11	38,41,44,46	0
5	IPA	B	1395	4/4	0.94	0.11	26,35,41,41	0
5	IPA	A	1395	4/4	0.94	0.16	22,23,27,42	0
8	PG4	D	1390	13/13	0.94	0.14	43,51,61,63	0
5	IPA	B	1397	4/4	0.95	0.09	42,46,54,61	0
5	IPA	C	1384	4/4	0.95	0.13	31,33,36,37	0
6	CL	D	1395	1/1	0.96	0.09	52,52,52,52	1
5	IPA	B	1399	4/4	0.97	0.26	33,36,40,45	0
6	CL	B	1400	1/1	0.98	0.03	47,47,47,47	0
6	CL	B	1401	1/1	0.98	0.13	39,39,39,39	1
2	PEG	A	1382	7/7	0.98	0.08	26,31,45,48	7

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.