



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 20, 2026 – 07:10 PM UTC

PDB ID : 4UDJ / pdb_00004udj
Title : Crystal structure of b-1,4-mannopyranosyl-chitobiose phosphorylase at 1.60 Angstrom in complex with beta-D-mannopyranose and inorganic phosphate
Authors : Ladeveze, S.; Cioci, G.; Potocki-Veronese, G.; Tranier, S.; Mourey, L.
Deposited on : 2014-12-10
Resolution : 1.94 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

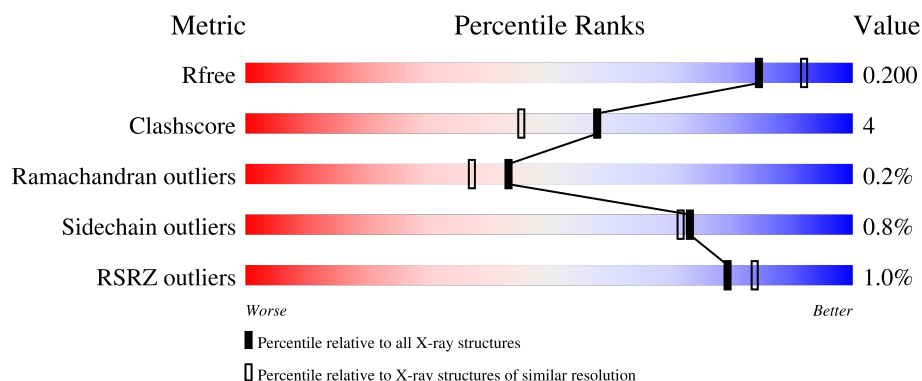
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.94 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	1452 (1.94-1.94)
Clashscore	190562	1494 (1.94-1.94)
Ramachandran outliers	187476	1479 (1.94-1.94)
Sidechain outliers	187428	1479 (1.94-1.94)
RSRZ outliers	180081	1453 (1.94-1.94)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	347	
1	B	347	
1	C	347	
1	D	347	
1	E	347	

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Mol	Chain	Length	Quality of chain
1	F	347	% 81%10%8%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 17342 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 UHGB_MP.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	320	Total	C	N	O	S	0	13	0
			2669	1722	450	480	17			
1	B	321	Total	C	N	O	S	0	10	0
			2652	1714	444	477	17			
1	C	320	Total	C	N	O	S	0	9	0
			2627	1698	437	475	17			
1	D	320	Total	C	N	O	S	0	12	0
			2666	1719	449	481	17			
1	E	321	Total	C	N	O	S	0	11	0
			2664	1719	448	480	17			
1	F	320	Total	C	N	O	S	0	10	0
			2647	1709	443	478	17			

There are 120 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	expression tag	UNP D9ZDQ9
A	-18	GLY	-	expression tag	UNP D9ZDQ9
A	-17	SER	-	expression tag	UNP D9ZDQ9
A	-16	SER	-	expression tag	UNP D9ZDQ9
A	-15	HIS	-	expression tag	UNP D9ZDQ9
A	-14	HIS	-	expression tag	UNP D9ZDQ9
A	-13	HIS	-	expression tag	UNP D9ZDQ9
A	-12	HIS	-	expression tag	UNP D9ZDQ9
A	-11	HIS	-	expression tag	UNP D9ZDQ9
A	-10	HIS	-	expression tag	UNP D9ZDQ9
A	-9	SER	-	expression tag	UNP D9ZDQ9
A	-8	SER	-	expression tag	UNP D9ZDQ9
A	-7	GLY	-	expression tag	UNP D9ZDQ9
A	-6	LEU	-	expression tag	UNP D9ZDQ9
A	-5	VAL	-	expression tag	UNP D9ZDQ9
A	-4	PRO	-	expression tag	UNP D9ZDQ9
A	-3	ARG	-	expression tag	UNP D9ZDQ9

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP D9ZDQ9
A	-1	SER	-	expression tag	UNP D9ZDQ9
A	0	HIS	-	expression tag	UNP D9ZDQ9
B	-19	MET	-	expression tag	UNP D9ZDQ9
B	-18	GLY	-	expression tag	UNP D9ZDQ9
B	-17	SER	-	expression tag	UNP D9ZDQ9
B	-16	SER	-	expression tag	UNP D9ZDQ9
B	-15	HIS	-	expression tag	UNP D9ZDQ9
B	-14	HIS	-	expression tag	UNP D9ZDQ9
B	-13	HIS	-	expression tag	UNP D9ZDQ9
B	-12	HIS	-	expression tag	UNP D9ZDQ9
B	-11	HIS	-	expression tag	UNP D9ZDQ9
B	-10	HIS	-	expression tag	UNP D9ZDQ9
B	-9	SER	-	expression tag	UNP D9ZDQ9
B	-8	SER	-	expression tag	UNP D9ZDQ9
B	-7	GLY	-	expression tag	UNP D9ZDQ9
B	-6	LEU	-	expression tag	UNP D9ZDQ9
B	-5	VAL	-	expression tag	UNP D9ZDQ9
B	-4	PRO	-	expression tag	UNP D9ZDQ9
B	-3	ARG	-	expression tag	UNP D9ZDQ9
B	-2	GLY	-	expression tag	UNP D9ZDQ9
B	-1	SER	-	expression tag	UNP D9ZDQ9
B	0	HIS	-	expression tag	UNP D9ZDQ9
C	-19	MET	-	expression tag	UNP D9ZDQ9
C	-18	GLY	-	expression tag	UNP D9ZDQ9
C	-17	SER	-	expression tag	UNP D9ZDQ9
C	-16	SER	-	expression tag	UNP D9ZDQ9
C	-15	HIS	-	expression tag	UNP D9ZDQ9
C	-14	HIS	-	expression tag	UNP D9ZDQ9
C	-13	HIS	-	expression tag	UNP D9ZDQ9
C	-12	HIS	-	expression tag	UNP D9ZDQ9
C	-11	HIS	-	expression tag	UNP D9ZDQ9
C	-10	HIS	-	expression tag	UNP D9ZDQ9
C	-9	SER	-	expression tag	UNP D9ZDQ9
C	-8	SER	-	expression tag	UNP D9ZDQ9
C	-7	GLY	-	expression tag	UNP D9ZDQ9
C	-6	LEU	-	expression tag	UNP D9ZDQ9
C	-5	VAL	-	expression tag	UNP D9ZDQ9
C	-4	PRO	-	expression tag	UNP D9ZDQ9
C	-3	ARG	-	expression tag	UNP D9ZDQ9
C	-2	GLY	-	expression tag	UNP D9ZDQ9
C	-1	SER	-	expression tag	UNP D9ZDQ9

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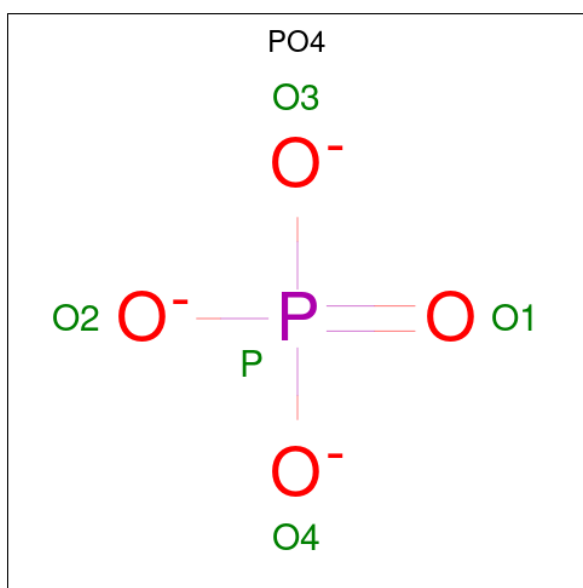
Chain	Residue	Modelled	Actual	Comment	Reference
C	0	HIS	-	expression tag	UNP D9ZDQ9
D	-19	MET	-	expression tag	UNP D9ZDQ9
D	-18	GLY	-	expression tag	UNP D9ZDQ9
D	-17	SER	-	expression tag	UNP D9ZDQ9
D	-16	SER	-	expression tag	UNP D9ZDQ9
D	-15	HIS	-	expression tag	UNP D9ZDQ9
D	-14	HIS	-	expression tag	UNP D9ZDQ9
D	-13	HIS	-	expression tag	UNP D9ZDQ9
D	-12	HIS	-	expression tag	UNP D9ZDQ9
D	-11	HIS	-	expression tag	UNP D9ZDQ9
D	-10	HIS	-	expression tag	UNP D9ZDQ9
D	-9	SER	-	expression tag	UNP D9ZDQ9
D	-8	SER	-	expression tag	UNP D9ZDQ9
D	-7	GLY	-	expression tag	UNP D9ZDQ9
D	-6	LEU	-	expression tag	UNP D9ZDQ9
D	-5	VAL	-	expression tag	UNP D9ZDQ9
D	-4	PRO	-	expression tag	UNP D9ZDQ9
D	-3	ARG	-	expression tag	UNP D9ZDQ9
D	-2	GLY	-	expression tag	UNP D9ZDQ9
D	-1	SER	-	expression tag	UNP D9ZDQ9
D	0	HIS	-	expression tag	UNP D9ZDQ9
E	-19	MET	-	expression tag	UNP D9ZDQ9
E	-18	GLY	-	expression tag	UNP D9ZDQ9
E	-17	SER	-	expression tag	UNP D9ZDQ9
E	-16	SER	-	expression tag	UNP D9ZDQ9
E	-15	HIS	-	expression tag	UNP D9ZDQ9
E	-14	HIS	-	expression tag	UNP D9ZDQ9
E	-13	HIS	-	expression tag	UNP D9ZDQ9
E	-12	HIS	-	expression tag	UNP D9ZDQ9
E	-11	HIS	-	expression tag	UNP D9ZDQ9
E	-10	HIS	-	expression tag	UNP D9ZDQ9
E	-9	SER	-	expression tag	UNP D9ZDQ9
E	-8	SER	-	expression tag	UNP D9ZDQ9
E	-7	GLY	-	expression tag	UNP D9ZDQ9
E	-6	LEU	-	expression tag	UNP D9ZDQ9
E	-5	VAL	-	expression tag	UNP D9ZDQ9
E	-4	PRO	-	expression tag	UNP D9ZDQ9
E	-3	ARG	-	expression tag	UNP D9ZDQ9
E	-2	GLY	-	expression tag	UNP D9ZDQ9
E	-1	SER	-	expression tag	UNP D9ZDQ9
E	0	HIS	-	expression tag	UNP D9ZDQ9
F	-19	MET	-	expression tag	UNP D9ZDQ9

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Chain	Residue	Modelled	Actual	Comment	Reference
F	-18	GLY	-	expression tag	UNP D9ZDQ9
F	-17	SER	-	expression tag	UNP D9ZDQ9
F	-16	SER	-	expression tag	UNP D9ZDQ9
F	-15	HIS	-	expression tag	UNP D9ZDQ9
F	-14	HIS	-	expression tag	UNP D9ZDQ9
F	-13	HIS	-	expression tag	UNP D9ZDQ9
F	-12	HIS	-	expression tag	UNP D9ZDQ9
F	-11	HIS	-	expression tag	UNP D9ZDQ9
F	-10	HIS	-	expression tag	UNP D9ZDQ9
F	-9	SER	-	expression tag	UNP D9ZDQ9
F	-8	SER	-	expression tag	UNP D9ZDQ9
F	-7	GLY	-	expression tag	UNP D9ZDQ9
F	-6	LEU	-	expression tag	UNP D9ZDQ9
F	-5	VAL	-	expression tag	UNP D9ZDQ9
F	-4	PRO	-	expression tag	UNP D9ZDQ9
F	-3	ARG	-	expression tag	UNP D9ZDQ9
F	-2	GLY	-	expression tag	UNP D9ZDQ9
F	-1	SER	-	expression tag	UNP D9ZDQ9
F	0	HIS	-	expression tag	UNP D9ZDQ9

- Molecule 2 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).



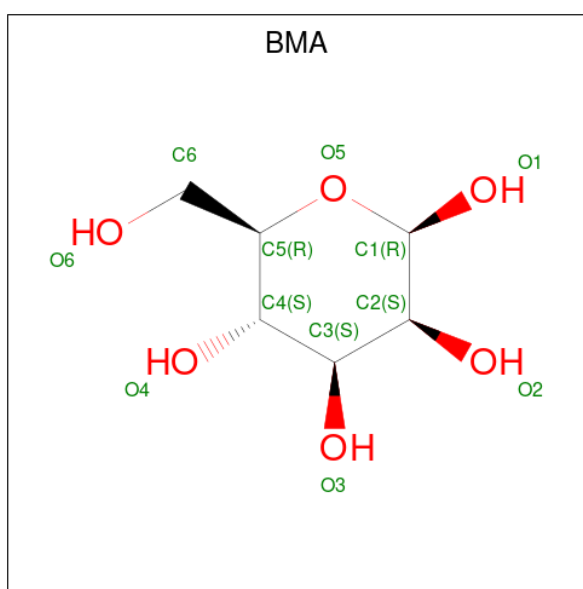
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	P	0	0
			5	4	1		
2	B	1	Total	O	P	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	C	1	Total	O	P	0	0
			5	4	1		
2	D	1	Total	O	P	0	0
			5	4	1		
2	E	1	Total	O	P	0	0
			5	4	1		
2	F	1	Total	O	P	0	0
			5	4	1		

- Molecule 3 is beta-D-mannopyranose (CCD ID: BMA) (formula: $C_6H_{12}O_6$).

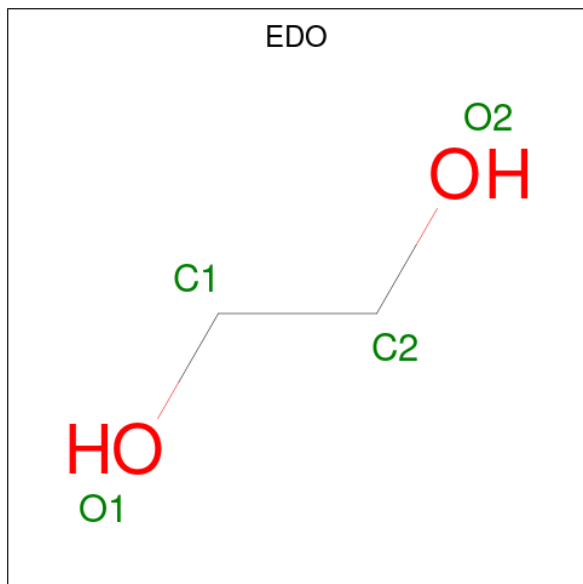


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			12	6	6		
3	B	1	Total	C	O	0	0
			12	6	6		
3	C	1	Total	C	O	0	0
			12	6	6		
3	D	1	Total	C	O	0	0
			12	6	6		
3	E	1	Total	C	O	0	0
			12	6	6		
3	F	1	Total	C	O	0	0
			12	6	6		

- Molecule 4 is POTASSIUM ION (CCD ID: K) (formula: K).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	3	Total K 3 3	0	0
4	B	1	Total K 1 1	0	0
4	C	1	Total K 1 1	0	0
4	D	1	Total K 1 1	0	0
4	E	1	Total K 1 1	0	0
4	F	1	Total K 1 1	0	0

- Molecule 5 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



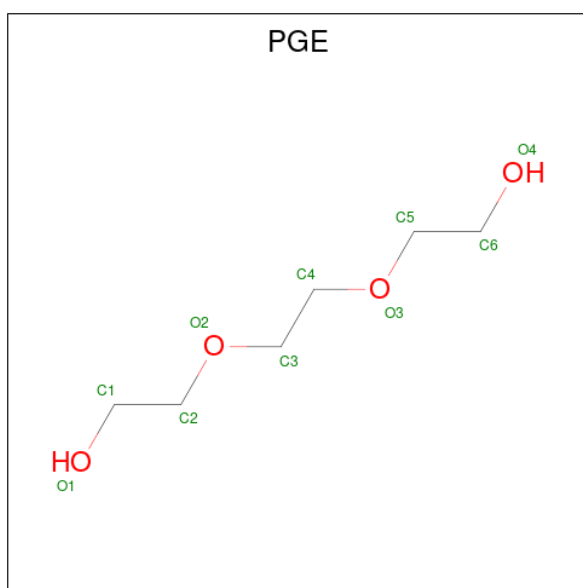
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	B	1	Total C O 4 2 2	0	0
5	C	1	Total C O 4 2 2	0	0
5	D	1	Total C O 4 2 2	0	0
5	D	1	Total C O 4 2 2	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	D	1	Total	C	O	0	0
			4	2	2		
5	E	1	Total	C	O	0	0
			4	2	2		
5	E	1	Total	C	O	0	0
			4	2	2		
5	F	1	Total	C	O	0	0
			4	2	2		
5	F	1	Total	C	O	0	0
			4	2	2		

- Molecule 6 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: $C_6H_{14}O_4$).



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

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	C	1	Total	C	O	0	0
			10	6	4		
6	D	1	Total	C	O	0	0
			10	6	4		
6	F	1	Total	C	O	0	0
			10	6	4		

- Molecule 7 is water.

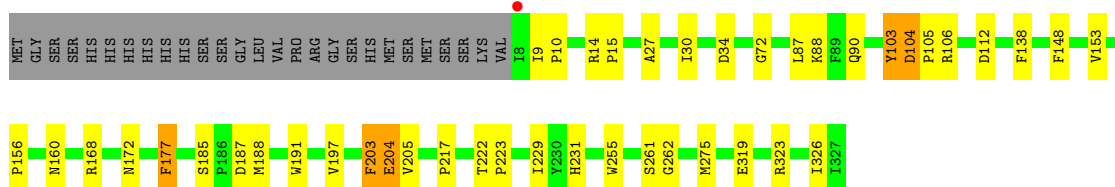
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	205	Total	O	0	0
			205	205		
7	B	222	Total	O	0	0
			222	222		
7	C	225	Total	O	0	0
			225	225		
7	D	172	Total	O	0	0
			172	172		
7	E	207	Total	O	0	0
			207	207		
7	F	142	Total	O	0	0
			142	142		

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.

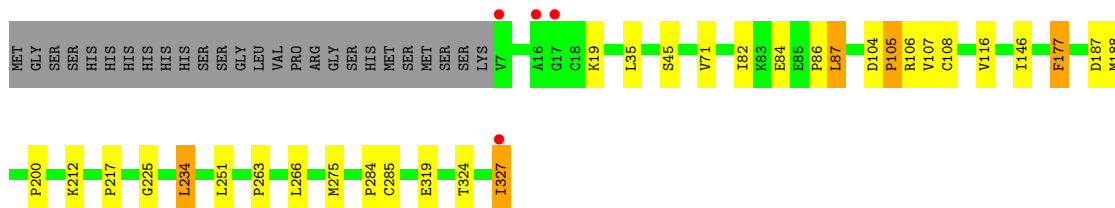
• Molecule 1: UHGB_MP

Chain A: 



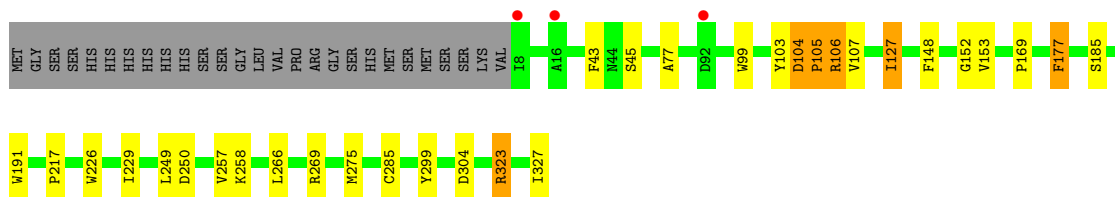
• Molecule 1: UHGB_MP

Chain B: 



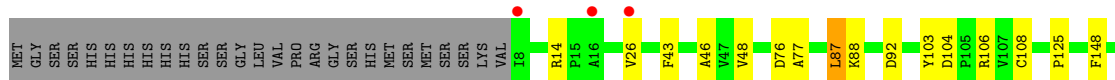
• Molecule 1: UHGB_MP

Chain C: 



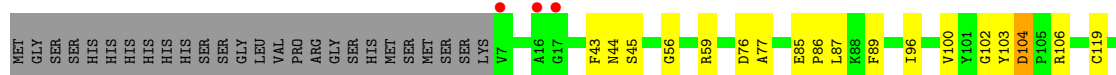
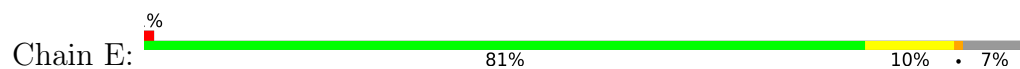
• Molecule 1: UHGB_MP

Chain D: 

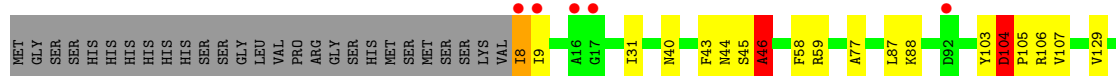
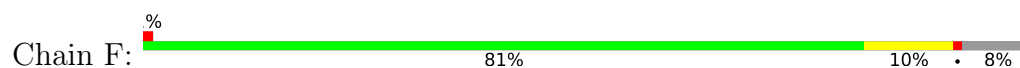




• Molecule 1: UHGB_MP



• Molecule 1: UHGB_MP



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	83.88Å 140.84Å 168.75Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	108.13 – 1.94 108.13 – 1.94	Depositor EDS
% Data completeness (in resolution range)	99.7 (108.13-1.94) 99.7 (108.13-1.94)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.80 (at 1.94Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, R_{free}	0.150 , 0.193 0.163 , 0.200	Depositor DCC
R_{free} test set	7430 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	17.2	Xtriage
Anisotropy	0.183	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 39.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	17342	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.89% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: EDO, BMA, PGE, K, 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	1.29	14/2765 (0.5%)	1.08	10/3768 (0.3%)
1	B	1.27	8/2745 (0.3%)	1.06	4/3742 (0.1%)
1	C	1.23	5/2726 (0.2%)	1.07	8/3716 (0.2%)
1	D	1.19	6/2757 (0.2%)	1.02	2/3758 (0.1%)
1	E	1.17	3/2757 (0.1%)	1.02	4/3758 (0.1%)
1	F	1.16	5/2740 (0.2%)	1.03	5/3735 (0.1%)
All	All	1.22	41/16490 (0.2%)	1.05	33/22477 (0.1%)

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	D	0	3
1	F	0	1
All	All	0	4

The worst 5 of 41 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	87	LEU	C-N	-10.76	1.18	1.33
1	A	168	ARG	C-O	-7.13	1.15	1.24
1	F	168	ARG	C-O	-6.94	1.16	1.24
1	C	177	PHE	C-O	-6.84	1.15	1.23
1	D	48	VAL	C-O	6.69	1.29	1.24

The worst 5 of 33 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	216	GLY	CA-C-N	7.16	127.58	119.92
1	E	216	GLY	C-N-CA	7.16	127.58	119.92
1	B	327	ILE	CB-CA-C	-7.07	97.45	111.60
1	B	86	PRO	CA-C-N	6.44	129.99	120.90
1	B	86	PRO	C-N-CA	6.44	129.99	120.90

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	193[A]	ARG	Mainchain
1	D	193[B]	ARG	Mainchain
1	D	46[A]	ALA	Mainchain
1	F	46[B]	ALA	Mainchain

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	2669	0	2529	25	0
1	B	2652	0	2516	16	0
1	C	2627	0	2485	28	0
1	D	2666	0	2522	21	0
1	E	2664	0	2524	22	0
1	F	2647	0	2504	29	0
2	A	5	0	0	1	0
2	B	5	0	0	1	0
2	C	5	0	0	1	0
2	D	5	0	0	1	0
2	E	5	0	0	1	0
2	F	5	0	0	1	0
3	A	12	0	12	1	0
3	B	12	0	12	1	0
3	C	12	0	11	1	0
3	D	12	0	12	1	0
3	E	12	0	12	1	0
3	F	12	0	12	2	0
4	A	3	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
4	E	1	0	0	0	0
4	F	1	0	0	0	0
5	A	8	0	12	1	0
5	B	4	0	6	0	0
5	C	4	0	6	1	0
5	D	12	0	18	0	0
5	E	8	0	12	0	0
5	F	8	0	12	0	0
6	A	30	0	42	2	0
6	B	30	0	42	1	0
6	C	10	0	14	0	0
6	D	10	0	14	0	0
6	F	10	0	14	0	0
7	A	205	0	0	1	0
7	B	222	0	0	0	0
7	C	225	0	0	3	0
7	D	172	0	0	0	0
7	E	207	0	0	1	0
7	F	142	0	0	3	0
All	All	17342	0	15343	141	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 4.

The worst 5 of 141 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)
2:C:328:PO4:O4	3:C:329:BMA:H1	1.64	0.96
2:E:328:PO4:O4	3:E:329:BMA:H1	1.69	0.90
2:F:328:PO4:O1	3:F:329:BMA:H1	1.78	0.82
2:B:328:PO4:O3	3:B:329:BMA:H1	1.80	0.81
2:D:328:PO4:O1	3:D:329:BMA:H1	1.80	0.81

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	331/347 (95%)	311 (94%)	20 (6%)	0	100	100
1	B	329/347 (95%)	309 (94%)	20 (6%)	0	100	100
1	C	327/347 (94%)	308 (94%)	19 (6%)	0	100	100
1	D	330/347 (95%)	311 (94%)	19 (6%)	0	100	100
1	E	330/347 (95%)	313 (95%)	15 (4%)	2 (1%)	21	11
1	F	328/347 (94%)	311 (95%)	13 (4%)	4 (1%)	10	3
All	All	1975/2082 (95%)	1863 (94%)	106 (5%)	6 (0%)	43	30

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	F	44[A]	ASN
1	F	44[B]	ASN
1	F	104[A]	ASP
1	F	104[B]	ASP
1	E	104[A]	ASP

5.3.2 Protein sidechains

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	286/298 (96%)	285 (100%)	1 (0%)	86	86
1	B	284/298 (95%)	280 (99%)	4 (1%)	59	52
1	C	281/298 (94%)	280 (100%)	1 (0%)	84	84

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	285/298 (96%)	281 (99%)	4 (1%)	59	52
1	E	285/298 (96%)	284 (100%)	1 (0%)	84	84
1	F	283/298 (95%)	280 (99%)	3 (1%)	65	60
All	All	1704/1788 (95%)	1690 (99%)	14 (1%)	73	71

5 of 14 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	26[B]	VAL
1	D	87	LEU
1	F	40	ASN
1	F	8	ILE
1	F	9	ILE

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	D	172	ASN
1	E	40	ASN
1	F	280	ASN
1	E	174	HIS
1	F	172	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 40 ligands modelled in this entry, 8 are monoatomic - leaving 32 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$
5	EDO	F	579	-	3,3,3	0.48	0	2,2,2	0.29	0
5	EDO	E	579	-	3,3,3	0.42	0	2,2,2	0.39	0
6	PGE	B	599	-	9,9,9	0.45	0	8,8,8	0.58	0
5	EDO	A	569	-	3,3,3	0.55	0	2,2,2	0.26	0
5	EDO	F	569	-	3,3,3	0.44	0	2,2,2	0.25	0
5	EDO	D	588	-	3,3,3	0.38	0	2,2,2	0.54	0
2	PO4	C	328	-	4,4,4	1.54	1 (25%)	6,6,6	0.31	0
2	PO4	B	328	-	4,4,4	1.10	0	6,6,6	0.81	0
6	PGE	A	608	-	9,9,9	0.93	0	8,8,8	0.63	0
3	BMA	B	329	-	12,12,12	1.00	0	17,17,17	2.37	8 (47%)
3	BMA	A	329	-	12,12,12	0.96	1 (8%)	17,17,17	2.23	8 (47%)
5	EDO	D	584	-	3,3,3	0.43	0	2,2,2	0.28	0
5	EDO	C	594	-	3,3,3	0.58	0	2,2,2	0.58	0
3	BMA	C	329	-	12,12,12	1.36	1 (8%)	17,17,17	2.23	6 (35%)
6	PGE	B	596	-	9,9,9	0.53	0	8,8,8	0.49	0
6	PGE	D	587	-	9,9,9	0.45	0	8,8,8	0.29	0
5	EDO	E	580	-	3,3,3	0.28	0	2,2,2	0.85	0
5	EDO	B	598	-	3,3,3	0.24	0	2,2,2	0.56	0
5	EDO	D	583	-	3,3,3	0.37	0	2,2,2	0.59	0
2	PO4	A	328	-	4,4,4	1.05	0	6,6,6	0.82	0
3	BMA	D	329	-	12,12,12	1.09	1 (8%)	17,17,17	2.01	5 (29%)
3	BMA	F	329	-	12,12,12	0.83	0	17,17,17	1.88	5 (29%)
6	PGE	B	600	-	9,9,9	0.51	0	8,8,8	0.60	0
2	PO4	F	328	-	4,4,4	1.29	0	6,6,6	0.88	0
6	PGE	A	604	-	9,9,9	0.48	0	8,8,8	0.63	0
6	PGE	C	592	-	9,9,9	0.49	0	8,8,8	0.69	0
5	EDO	A	348	-	3,3,3	0.55	0	2,2,2	0.20	0
2	PO4	E	328	-	4,4,4	1.14	0	6,6,6	1.32	1 (16%)
6	PGE	A	602	-	9,9,9	0.54	0	8,8,8	0.79	0
3	BMA	E	329	-	12,12,12	1.04	1 (8%)	17,17,17	2.06	8 (47%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	PO4	D	328	-	4,4,4	1.25	1 (25%)	6,6,6	1.18	0
6	PGE	F	580	-	9,9,9	0.49	0	8,8,8	0.54	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	F	579	-	-	0/1/1/1	-
5	EDO	E	579	-	-	1/1/1/1	-
6	PGE	B	599	-	-	5/7/7/7	-
5	EDO	A	569	-	-	1/1/1/1	-
5	EDO	F	569	-	-	1/1/1/1	-
5	EDO	D	588	-	-	1/1/1/1	-
6	PGE	A	608	-	-	3/7/7/7	-
3	BMA	B	329	-	-	0/2/22/22	0/1/1/1
3	BMA	A	329	-	-	2/2/22/22	0/1/1/1
5	EDO	D	584	-	-	1/1/1/1	-
5	EDO	C	594	-	-	0/1/1/1	-
3	BMA	C	329	-	-	0/2/22/22	0/1/1/1
6	PGE	B	596	-	-	6/7/7/7	-
6	PGE	D	587	-	-	4/7/7/7	-
5	EDO	E	580	-	-	0/1/1/1	-
5	EDO	B	598	-	-	1/1/1/1	-
5	EDO	D	583	-	-	1/1/1/1	-
3	BMA	D	329	-	-	0/2/22/22	0/1/1/1
3	BMA	F	329	-	-	2/2/22/22	0/1/1/1
6	PGE	B	600	-	-	5/7/7/7	-
6	PGE	A	604	-	-	3/7/7/7	-
6	PGE	C	592	-	-	4/7/7/7	-
5	EDO	A	348	-	-	0/1/1/1	-
6	PGE	A	602	-	-	3/7/7/7	-
3	BMA	E	329	-	-	0/2/22/22	0/1/1/1
6	PGE	F	580	-	-	4/7/7/7	-

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	329	BMA	C1-C2	2.88	1.59	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	328	PO4	P-O2	-2.76	1.46	1.54
3	D	329	BMA	C1-C2	2.55	1.58	1.52
3	A	329	BMA	C1-C2	2.29	1.57	1.52
3	E	329	BMA	C3-C2	2.06	1.57	1.52

The worst 5 of 41 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	329	BMA	O2-C2-C1	5.23	121.31	109.25
3	C	329	BMA	O5-C1-C2	5.18	119.41	110.30
3	B	329	BMA	O2-C2-C1	4.98	120.74	109.25
3	C	329	BMA	O2-C2-C1	4.74	120.19	109.25
3	D	329	BMA	O2-C2-C1	4.42	119.45	109.25

There are no chirality outliers.

5 of 48 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	599	PGE	C6-C5-O3-C4
6	F	580	PGE	O2-C3-C4-O3
6	A	604	PGE	O2-C3-C4-O3
6	B	599	PGE	O2-C3-C4-O3
6	B	596	PGE	O2-C3-C4-O3

There are no ring outliers.

16 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	599	PGE	1	0
2	C	328	PO4	1	0
2	B	328	PO4	1	0
6	A	608	PGE	2	0
3	B	329	BMA	1	0
3	A	329	BMA	1	0
5	C	594	EDO	1	0
3	C	329	BMA	1	0
2	A	328	PO4	1	0
3	D	329	BMA	1	0
3	F	329	BMA	2	0
2	F	328	PO4	1	0
5	A	348	EDO	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	328	PO4	1	0
3	E	329	BMA	1	0
2	D	328	PO4	1	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	B	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	B	87:LEU	C	88:LYS	N	1.18

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	320/347 (92%)	-0.52	1 (0%) 90 93	5, 14, 27, 46	13 (4%)
1	B	321/347 (92%)	-0.49	4 (1%) 76 81	5, 15, 29, 45	10 (3%)
1	C	320/347 (92%)	-0.55	3 (0%) 81 85	5, 14, 30, 48	9 (2%)
1	D	320/347 (92%)	-0.33	3 (0%) 81 85	7, 20, 34, 48	12 (3%)
1	E	321/347 (92%)	-0.32	4 (1%) 76 81	8, 19, 33, 44	11 (3%)
1	F	320/347 (92%)	-0.21	5 (1%) 70 77	8, 22, 40, 56	10 (3%)
All	All	1922/2082 (92%)	-0.40	20 (1%) 79 84	5, 17, 33, 56	65 (3%)

The worst 5 of 20 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	8	ILE	4.1
1	C	8	ILE	4.1
1	F	8	ILE	3.6
1	B	7	VAL	3.2
1	B	17	GLY	3.1

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
6	PGE	A	608	10/10	0.77	0.19	36,47,54,54	0
6	PGE	B	600	10/10	0.78	0.16	49,56,64,65	0
6	PGE	F	580	10/10	0.78	0.17	47,57,60,61	0
5	EDO	A	348	4/4	0.79	0.18	53,56,56,59	0
6	PGE	B	596	10/10	0.79	0.17	55,61,70,72	0
5	EDO	E	580	4/4	0.81	0.18	39,41,47,48	0
5	EDO	E	579	4/4	0.82	0.15	45,47,48,49	0
6	PGE	A	604	10/10	0.83	0.16	39,43,61,68	0
5	EDO	B	598	4/4	0.84	0.16	40,44,45,46	0
5	EDO	D	584	4/4	0.86	0.16	50,52,55,59	0
5	EDO	F	579	4/4	0.87	0.20	46,48,51,55	0
6	PGE	D	587	10/10	0.87	0.12	44,45,53,54	0
3	BMA	B	329	12/12	0.87	0.10	22,30,33,36	0
6	PGE	B	599	10/10	0.88	0.13	46,50,60,66	0
5	EDO	F	569	4/4	0.88	0.13	41,44,44,46	0
5	EDO	C	594	4/4	0.88	0.16	39,42,43,45	0
6	PGE	A	602	10/10	0.88	0.12	34,42,60,65	0
4	K	A	333	1/1	0.89	0.38	61,61,61,61	0
4	K	C	333	1/1	0.89	0.43	60,60,60,60	0
3	BMA	D	329	12/12	0.89	0.10	24,28,30,33	0
5	EDO	D	588	4/4	0.89	0.15	50,51,52,53	0
6	PGE	C	592	10/10	0.90	0.11	32,38,43,44	0
3	BMA	F	329	12/12	0.90	0.08	24,30,32,34	0
5	EDO	A	569	4/4	0.90	0.12	42,43,44,47	0
5	EDO	D	583	4/4	0.91	0.10	32,35,37,42	0
3	BMA	E	329	12/12	0.92	0.07	21,24,26,27	0
4	K	B	333	1/1	0.92	0.23	61,61,61,61	0
3	BMA	A	329	12/12	0.92	0.08	19,23,25,29	0
4	K	F	333	1/1	0.92	0.38	64,64,64,64	0
4	K	D	333	1/1	0.93	0.23	56,56,56,56	0
4	K	E	333	1/1	0.95	0.23	57,57,57,57	0
3	BMA	C	329	12/12	0.95	0.06	20,21,23,23	0
4	K	A	607	1/1	0.98	0.20	44,44,44,44	0
2	PO4	B	328	5/5	0.99	0.03	12,12,14,14	0
4	K	A	606	1/1	0.99	0.17	36,36,36,36	0
2	PO4	C	328	5/5	0.99	0.03	11,12,12,13	0
2	PO4	F	328	5/5	0.99	0.03	13,15,16,16	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	PO4	E	328	5/5	1.00	0.02	13,13,15,15	0
2	PO4	A	328	5/5	1.00	0.02	10,10,11,12	0
2	PO4	D	328	5/5	1.00	0.03	14,14,15,16	0

6.5 Other polymers [i](#)

There are no such residues in this entry.