



wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 1, 2016 – 04:18 PM GMT

PDB ID : 4EE3
Title : Crystal structure of human M340H-beta-1,4-galactosyltransferase-1 (M340H-B4GAL-T1) in complex with pentasaccharide
Authors : Ramakrishnan, B.; Qasba, P.K.
Deposited on : 2012-03-28
Resolution : 2.30 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
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk26865

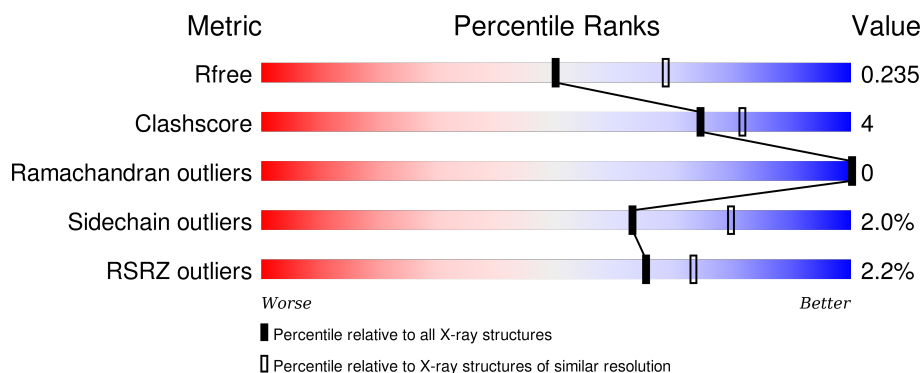
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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}	91344	3852 (2.30-2.30)
Clashscore	102246	4452 (2.30-2.30)
Ramachandran outliers	100387	4410 (2.30-2.30)
Sidechain outliers	100360	4409 (2.30-2.30)
RSRZ outliers	91569	3857 (2.30-2.30)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	287	<div> <div>2%</div> <div>83%</div> <div>11%</div> <div>5%</div> </div>
1	B	287	<div> <div>2%</div> <div>85%</div> <div>9%</div> <div>5%</div> </div>
1	C	287	<div> <div>2%</div> <div>84%</div> <div>10%</div> <div>5%</div> </div>

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
5	SO4	A	410	-	-	X	X
5	SO4	A	412	-	-	-	X
5	SO4	A	415	-	-	-	X
5	SO4	B	408	-	-	-	X
5	SO4	B	412	-	-	-	X
5	SO4	B	413	-	-	-	X
6	GOL	A	416	-	-	-	X
6	GOL	B	415	-	-	X	X
6	GOL	C	412	-	-	-	X

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 7573 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 Beta-1,4-galactosyltransferase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	273	Total	C	N	O	S	0	0	0
			2218	1420	386	401	11			
1	B	273	Total	C	N	O	S	0	0	0
			2218	1420	386	401	11			
1	C	273	Total	C	N	O	S	0	0	0
			2218	1420	386	401	11			

There are 51 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	112	ALA	-	EXPRESSION TAG	UNP P15291
A	113	SER	-	EXPRESSION TAG	UNP P15291
A	114	MET	-	EXPRESSION TAG	UNP P15291
A	115	THR	-	EXPRESSION TAG	UNP P15291
A	116	GLY	-	EXPRESSION TAG	UNP P15291
A	117	GLY	-	EXPRESSION TAG	UNP P15291
A	118	GLN	-	EXPRESSION TAG	UNP P15291
A	119	GLN	-	EXPRESSION TAG	UNP P15291
A	120	MET	-	EXPRESSION TAG	UNP P15291
A	121	GLY	-	EXPRESSION TAG	UNP P15291
A	122	ARG	-	EXPRESSION TAG	UNP P15291
A	123	GLY	-	EXPRESSION TAG	UNP P15291
A	124	SER	-	EXPRESSION TAG	UNP P15291
A	125	ALA	-	EXPRESSION TAG	UNP P15291
A	337	THR	ARG	ENGINEERED MUTATION	UNP P15291
A	338	THR	CYS	ENGINEERED MUTATION	UNP P15291
A	340	HIS	MET	ENGINEERED MUTATION	UNP P15291
B	112	ALA	-	EXPRESSION TAG	UNP P15291
B	113	SER	-	EXPRESSION TAG	UNP P15291
B	114	MET	-	EXPRESSION TAG	UNP P15291
B	115	THR	-	EXPRESSION TAG	UNP P15291
B	116	GLY	-	EXPRESSION TAG	UNP P15291
B	117	GLY	-	EXPRESSION TAG	UNP P15291

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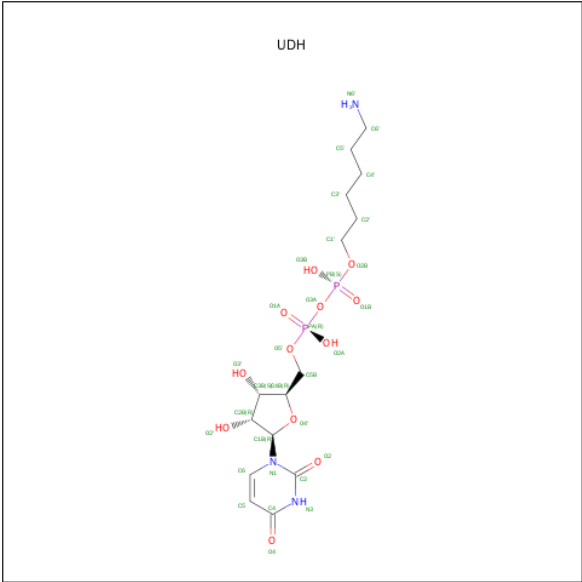
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Chain	Residue	Modelled	Actual	Comment	Reference
B	118	GLN	-	EXPRESSION TAG	UNP P15291
B	119	GLN	-	EXPRESSION TAG	UNP P15291
B	120	MET	-	EXPRESSION TAG	UNP P15291
B	121	GLY	-	EXPRESSION TAG	UNP P15291
B	122	ARG	-	EXPRESSION TAG	UNP P15291
B	123	GLY	-	EXPRESSION TAG	UNP P15291
B	124	SER	-	EXPRESSION TAG	UNP P15291
B	125	ALA	-	EXPRESSION TAG	UNP P15291
B	337	THR	ARG	ENGINEERED MUTATION	UNP P15291
B	338	THR	CYS	ENGINEERED MUTATION	UNP P15291
B	340	HIS	MET	ENGINEERED MUTATION	UNP P15291
C	112	ALA	-	EXPRESSION TAG	UNP P15291
C	113	SER	-	EXPRESSION TAG	UNP P15291
C	114	MET	-	EXPRESSION TAG	UNP P15291
C	115	THR	-	EXPRESSION TAG	UNP P15291
C	116	GLY	-	EXPRESSION TAG	UNP P15291
C	117	GLY	-	EXPRESSION TAG	UNP P15291
C	118	GLN	-	EXPRESSION TAG	UNP P15291
C	119	GLN	-	EXPRESSION TAG	UNP P15291
C	120	MET	-	EXPRESSION TAG	UNP P15291
C	121	GLY	-	EXPRESSION TAG	UNP P15291
C	122	ARG	-	EXPRESSION TAG	UNP P15291
C	123	GLY	-	EXPRESSION TAG	UNP P15291
C	124	SER	-	EXPRESSION TAG	UNP P15291
C	125	ALA	-	EXPRESSION TAG	UNP P15291
C	337	THR	ARG	ENGINEERED MUTATION	UNP P15291
C	338	THR	CYS	ENGINEERED MUTATION	UNP P15291
C	340	HIS	MET	ENGINEERED MUTATION	UNP P15291

- Molecule 2 is a polymer of unknown type called SUGAR (5-MER).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	5	Total	C	N	O	0	0
			62	34	2	26		
2	B	5	Total	C	N	O	0	0
			61	34	2	25		
2	C	5	Total	C	N	O	0	0
			62	34	2	26		

- Molecule 3 is 6-AMINOHEXYL-URIDINE-C1,5'-DIPHOSPHATE (three-letter code: UDH) (formula: C₁₅H₂₇N₃O₁₂P₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			32	15	3	12	2		
3	B	1	Total	C	N	O	P	0	0
			32	15	3	12	2		
3	C	1	Total	C	N	O	P	0	0
			32	15	3	12	2		

- Molecule 4 is MANGANESE (II) ION (three-letter code: MN) (formula: Mn).

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

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



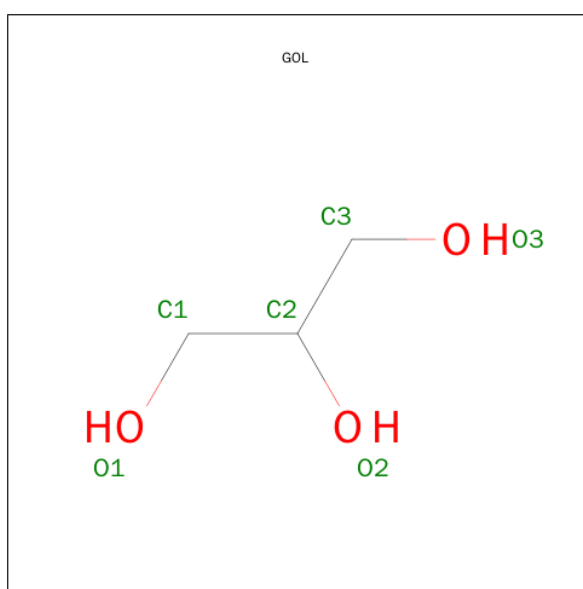
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		
5	A	1	Total	O	S	0	0
			5	4	1		
5	B	1	Total	O	S	0	0
			5	4	1		
5	B	1	Total	O	S	0	0
			5	4	1		
5	B	1	Total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

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

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



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

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	184	Total	O	0	0
			184	184		
7	B	186	Total	O	0	0
			186	186		

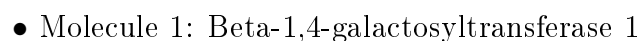
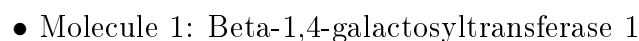
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	C	157	Total	O	0	0
			157	157		

i

- Molecule 1: Beta-1,4-galactosyltransferase 1



4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α , β , γ	107.61Å 195.16Å 143.69Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	36.31 – 2.30 36.31 – 2.30	Depositor EDS
% Data completeness (in resolution range)	90.8 (36.31-2.30) 90.8 (36.31-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.71 (at 2.31Å)	Xtriage
Refinement program	REFMAC 5.5.0110	Depositor
R, R_{free}	0.187 , 0.240 0.182 , 0.235	Depositor DCC
R_{free} test set	3388 reflections (5.87%)	DCC
Wilson B-factor (Å ²)	33.6	Xtriage
Anisotropy	0.106	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 38.9	EDS
Estimated twinning fraction	0.000 for 1/2*h-1/2*k,-3/2*h-1/2*k,-l 0.009 for 1/2*h+1/2*k,3/2*h-1/2*k,-l	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.35$	Xtriage
Outliers	0 of 60812 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7573	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtriage'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.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: GOL, BGC, NAG, MN, GAL, SO4, UDH

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	0.92	0/2280	0.90	4/3097 (0.1%)
1	B	0.94	0/2280	0.92	5/3097 (0.2%)
1	C	0.85	1/2280 (0.0%)	0.84	0/3097
All	All	0.90	1/6840 (0.0%)	0.89	9/9291 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	144	GLU	CG-CD	5.03	1.59	1.51

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	371	LEU	CB-CG-CD1	-6.70	99.61	111.00
1	A	150	ASP	CB-CG-OD2	6.61	124.25	118.30
1	B	204	ARG	NE-CZ-NH1	-6.41	117.10	120.30
1	B	166	ARG	NE-CZ-NH1	6.00	123.30	120.30
1	B	185	ARG	NE-CZ-NH2	-5.61	117.50	120.30

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	2218	0	2162	21	0
1	B	2218	0	2162	15	0
1	C	2218	0	2162	17	0
2	A	62	0	54	2	0
2	B	61	0	52	1	0
2	C	62	0	54	1	0
3	A	32	0	25	0	0
3	B	32	0	25	0	0
3	C	32	0	25	1	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
5	A	40	0	0	3	0
5	B	30	0	0	1	0
5	C	20	0	0	2	0
6	A	6	0	8	1	0
6	B	6	0	8	4	0
6	C	6	0	8	0	0
7	A	184	0	0	1	0
7	B	186	0	0	3	0
7	C	157	0	0	0	0
All	All	7573	0	6745	55	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 55 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)
6:B:415:GOL:H31	7:B:668:HOH:O	1.85	0.76
1:B:266:PRO:HG3	1:B:321:LEU:HD22	1.74	0.68
1:A:264:SER:N	5:A:413:SO4:O3	2.27	0.66
1:A:273:MET:CE	1:A:275:LYS:HE2	2.26	0.66
1:A:312:GLY:HA2	2:A:403:NAG:H83	1.80	0.63

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	271/287 (94%)	261 (96%)	10 (4%)	0	100	100
1	B	271/287 (94%)	265 (98%)	6 (2%)	0	100	100
1	C	271/287 (94%)	265 (98%)	6 (2%)	0	100	100
All	All	813/861 (94%)	791 (97%)	22 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	244/252 (97%)	241 (99%)	3 (1%)	78	89
1	B	244/252 (97%)	240 (98%)	4 (2%)	70	84
1	C	244/252 (97%)	236 (97%)	8 (3%)	45	61
All	All	732/756 (97%)	717 (98%)	15 (2%)	63	79

5 of 15 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	306	ASN
1	C	133	GLU
1	C	342	ARG
1	B	153	LEU
1	C	306	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	186	ASN
1	C	257	HIS
1	C	206	GLN
1	A	306	ASN
1	B	306	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 ⓘ

15 carbohydrates are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	BGC	A	401	2	12,12,12	0.66	0	17,17,17	1.09	1 (5%)
2	GAL	A	402	2	11,11,12	0.45	0	14,15,17	1.47	2 (14%)
2	NAG	A	403	2	14,14,15	0.79	0	15,19,21	1.81	2 (13%)
2	NAG	A	404	2	14,14,15	0.57	0	15,19,21	1.20	1 (6%)
2	GAL	A	405	2	11,11,12	0.81	0	14,15,17	2.41	3 (21%)
2	BGC	B	401	2	12,12,12	0.65	0	17,17,17	0.78	0
2	GAL	B	402	2	11,11,12	0.80	0	14,15,17	1.35	2 (14%)
2	NAG	B	403	2	14,14,15	0.85	1 (7%)	15,19,21	1.92	3 (20%)
2	NAG	B	404	2	14,14,15	0.80	0	15,19,21	2.37	6 (40%)
2	GAL	B	405	2	10,10,12	0.72	0	12,13,17	1.45	2 (16%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	BGC	C	401	2	12,12,12	0.71	0	17,17,17	1.74	5 (29%)
2	GAL	C	402	2	11,11,12	0.69	0	14,15,17	1.02	1 (7%)
2	NAG	C	403	2	14,14,15	0.72	0	15,19,21	1.39	2 (13%)
2	NAG	C	404	2	14,14,15	0.54	0	15,19,21	1.38	1 (6%)
2	GAL	C	405	2	11,11,12	0.68	0	14,15,17	1.24	1 (7%)

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
2	BGC	A	401	2	-	0/2/22/22	0/1/1/1
2	GAL	A	402	2	-	0/2/19/22	0/1/1/1
2	NAG	A	403	2	-	0/6/23/26	0/1/1/1
2	NAG	A	404	2	-	0/6/23/26	0/1/1/1
2	GAL	A	405	2	-	0/2/19/22	0/1/1/1
2	BGC	B	401	2	-	0/2/22/22	0/1/1/1
2	GAL	B	402	2	-	0/2/19/22	0/1/1/1
2	NAG	B	403	2	-	0/6/23/26	0/1/1/1
2	NAG	B	404	2	-	0/6/23/26	0/1/1/1
2	GAL	B	405	2	-	0/2/15/22	0/1/1/1
2	BGC	C	401	2	-	0/2/22/22	0/1/1/1
2	GAL	C	402	2	-	0/2/19/22	0/1/1/1
2	NAG	C	403	2	-	0/6/23/26	0/1/1/1
2	NAG	C	404	2	-	0/6/23/26	0/1/1/1
2	GAL	C	405	2	-	0/2/19/22	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	403	NAG	O5-C1	-2.41	1.39	1.43

The worst 5 of 32 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	405	GAL	C1-O5-C5	-5.48	105.29	112.25
2	C	401	BGC	C1-C2-C3	-4.16	104.25	110.43
2	C	403	NAG	C2-N2-C7	-3.52	118.52	123.04
2	A	402	GAL	C2-C3-C4	-3.37	105.33	111.04
2	B	402	GAL	C2-C3-C4	-3.33	105.39	111.04

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	403	NAG	2	0
2	B	403	NAG	1	0
2	C	403	NAG	1	0

5.6 Ligand geometry

Of 27 ligands modelled in this entry, 3 are monoatomic - leaving 24 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	UDH	A	406	4	25,33,33	1.38	1 (4%)	33,47,47	1.94	4 (12%)
5	SO4	A	408	-	4,4,4	0.15	0	6,6,6	0.29	0
5	SO4	A	409	-	4,4,4	0.12	0	6,6,6	0.41	0
5	SO4	A	410	-	4,4,4	0.23	0	6,6,6	0.73	0
5	SO4	A	411	-	4,4,4	0.17	0	6,6,6	0.61	0
5	SO4	A	412	-	4,4,4	1.79	2 (50%)	6,6,6	1.32	1 (16%)
5	SO4	A	413	-	4,4,4	0.37	0	6,6,6	0.34	0
5	SO4	A	414	-	4,4,4	0.08	0	6,6,6	0.30	0
5	SO4	A	415	-	4,4,4	0.24	0	6,6,6	0.41	0
6	GOL	A	416	-	5,5,5	0.62	0	5,5,5	1.18	0
3	UDH	B	406	4	25,33,33	1.04	1 (4%)	33,47,47	1.76	4 (12%)
5	SO4	B	408	-	4,4,4	0.37	0	6,6,6	0.75	0
5	SO4	B	409	-	4,4,4	0.32	0	6,6,6	0.64	0
5	SO4	B	410	-	4,4,4	0.28	0	6,6,6	0.86	0
5	SO4	B	411	-	4,4,4	0.14	0	6,6,6	0.14	0
5	SO4	B	412	-	4,4,4	0.22	0	6,6,6	0.87	0
5	SO4	B	413	-	4,4,4	0.11	0	6,6,6	0.52	0
6	GOL	B	415	-	5,5,5	0.48	0	5,5,5	1.27	1 (20%)
3	UDH	C	406	4	25,33,33	1.01	1 (4%)	33,47,47	1.62	5 (15%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	SO4	C	408	-	4,4,4	0.30	0	6,6,6	0.45	0
5	SO4	C	409	-	4,4,4	0.58	0	6,6,6	0.28	0
5	SO4	C	410	-	4,4,4	0.21	0	6,6,6	0.31	0
5	SO4	C	411	-	4,4,4	0.21	0	6,6,6	0.58	0
6	GOL	C	412	-	5,5,5	0.31	0	5,5,5	0.55	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
3	UDH	A	406	4	-	0/21/41/41	0/2/2/2
5	SO4	A	408	-	-	0/0/0/0	0/0/0/0
5	SO4	A	409	-	-	0/0/0/0	0/0/0/0
5	SO4	A	410	-	-	0/0/0/0	0/0/0/0
5	SO4	A	411	-	-	0/0/0/0	0/0/0/0
5	SO4	A	412	-	-	0/0/0/0	0/0/0/0
5	SO4	A	413	-	-	0/0/0/0	0/0/0/0
5	SO4	A	414	-	-	0/0/0/0	0/0/0/0
5	SO4	A	415	-	-	0/0/0/0	0/0/0/0
6	GOL	A	416	-	-	0/4/4/4	0/0/0/0
3	UDH	B	406	4	-	0/21/41/41	0/2/2/2
5	SO4	B	408	-	-	0/0/0/0	0/0/0/0
5	SO4	B	409	-	-	0/0/0/0	0/0/0/0
5	SO4	B	410	-	-	0/0/0/0	0/0/0/0
5	SO4	B	411	-	-	0/0/0/0	0/0/0/0
5	SO4	B	412	-	-	0/0/0/0	0/0/0/0
5	SO4	B	413	-	-	0/0/0/0	0/0/0/0
6	GOL	B	415	-	-	0/4/4/4	0/0/0/0
3	UDH	C	406	4	-	0/21/41/41	0/2/2/2
5	SO4	C	408	-	-	0/0/0/0	0/0/0/0
5	SO4	C	409	-	-	0/0/0/0	0/0/0/0
5	SO4	C	410	-	-	0/0/0/0	0/0/0/0
5	SO4	C	411	-	-	0/0/0/0	0/0/0/0
6	GOL	C	412	-	-	0/4/4/4	0/0/0/0

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	412	SO4	O3-S	2.29	1.55	1.47
5	A	412	SO4	O1-S	2.50	1.55	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	406	UDH	C6-N1	3.21	1.40	1.35
3	C	406	UDH	C6-N1	3.85	1.41	1.35
3	A	406	UDH	C6-N1	5.56	1.43	1.35

The worst 5 of 15 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	406	UDH	PB-O3A-PA	-4.19	120.97	132.73
3	A	406	UDH	PB-O3A-PA	-3.94	121.67	132.73
3	B	406	UDH	PB-O3A-PA	-3.03	124.23	132.73
3	B	406	UDH	C6-N1-C2	-2.82	116.71	121.28
3	A	406	UDH	O2B-PB-O1B	-2.67	99.26	109.62

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

8 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	410	SO4	2	0
5	A	413	SO4	1	0
6	A	416	GOL	1	0
5	B	410	SO4	1	0
6	B	415	GOL	4	0
3	C	406	UDH	1	0
5	C	409	SO4	1	0
5	C	411	SO4	1	0

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, 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	273/287 (95%)	-0.19	6 (2%) 65 73	17, 27, 48, 59	0
1	B	273/287 (95%)	-0.17	5 (1%) 71 78	15, 24, 40, 54	0
1	C	273/287 (95%)	-0.12	7 (2%) 59 68	20, 33, 55, 66	0
All	All	819/861 (95%)	-0.16	18 (2%) 65 73	15, 28, 50, 66	0

The worst 5 of 18 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	347	LYS	4.6
1	C	126	SER	3.9
1	B	126	SER	3.8
1	C	398	SER	3.7
1	A	347	LYS	3.0

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](#)

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
2	NAG	C	403	14/15	0.95	0.11	-0.24	38,43,45,46	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
2	NAG	B	403	14/15	0.96	0.10	-0.89	25,30,34,37	0
2	NAG	A	403	14/15	0.96	0.09	-0.94	34,37,40,40	0
2	BGC	C	401	12/12	0.92	0.24	-	68,71,74,77	0
2	NAG	C	404	14/15	0.86	0.30	-	78,81,86,93	0
2	BGC	A	401	12/12	0.87	0.19	-	49,54,58,61	0
2	GAL	A	402	11/12	0.95	0.17	-	38,49,55,60	0
2	GAL	A	405	11/12	0.69	0.54	-	91,95,97,97	0
2	GAL	B	405	10/12	0.84	0.64	-	85,90,93,95	0
2	GAL	C	405	11/12	0.61	0.58	-	99,103,106,107	0
2	GAL	C	402	11/12	0.91	0.24	-	55,66,70,72	0
2	NAG	A	404	14/15	0.90	0.27	-	67,70,75,84	0
2	GAL	B	402	11/12	0.96	0.17	-	39,44,51,52	0
2	NAG	B	404	14/15	0.90	0.31	-	55,60,65,76	0
2	BGC	B	401	12/12	0.91	0.22	-	49,54,58,58	0

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(\AA^2)	Q<0.9
5	SO4	B	412	5/5	0.89	0.30	8.62	77,77,80,80	0
5	SO4	A	412	5/5	0.73	0.24	4.59	36,39,51,56	0
5	SO4	A	410	5/5	0.93	0.20	3.64	73,75,76,76	0
5	SO4	B	408	5/5	0.95	0.23	3.62	49,52,55,58	0
5	SO4	A	415	5/5	0.83	0.19	3.34	90,92,94,95	0
6	GOL	A	416	6/6	0.93	0.21	3.01	41,49,51,52	0
6	GOL	C	412	6/6	0.88	0.21	2.62	58,63,64,68	0
5	SO4	B	413	5/5	0.88	0.27	2.54	89,89,91,92	0
6	GOL	B	415	6/6	0.90	0.22	2.17	32,42,44,46	0
5	SO4	C	410	5/5	0.80	0.32	1.53	98,99,99,100	0
5	SO4	B	410	5/5	0.85	0.20	1.45	66,69,71,75	0
5	SO4	C	411	5/5	0.90	0.21	1.39	86,86,87,89	0
5	SO4	A	409	5/5	0.94	0.13	0.39	59,61,62,66	0
5	SO4	C	408	5/5	0.98	0.10	-0.23	42,43,44,45	0
5	SO4	B	409	5/5	0.92	0.14	-0.23	77,80,81,82	0
3	UDH	B	406	32/32	0.98	0.13	-0.37	14,22,60,61	0
3	UDH	A	406	32/32	0.97	0.12	-0.46	22,27,58,64	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(\AA^2)	Q<0.9
3	UDH	C	406	32/32	0.97	0.12	-0.47	25,35,61,64	0
5	SO4	A	408	5/5	0.93	0.10	-1.49	82,83,84,85	0
4	MN	A	407	1/1	0.99	0.07	-2.09	31,31,31,31	0
4	MN	C	407	1/1	0.98	0.06	-5.02	36,36,36,36	0
5	SO4	A	413	5/5	0.79	0.33	-	93,93,95,95	0
5	SO4	C	409	5/5	0.69	0.43	-	80,83,84,85	0
5	SO4	B	411	5/5	0.95	0.27	-	81,82,83,84	0
4	MN	B	407	1/1	0.99	0.08	-	25,25,25,25	0
5	SO4	A	414	5/5	0.92	0.33	-	85,85,86,87	0
5	SO4	A	411	5/5	0.86	0.35	-	74,75,77,80	0

6.5 Other polymers [i](#)

There are no such residues in this entry.