



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2018 – 12:21 am GMT

PDB ID : 1EO7
Title : BACILLUS CIRCULANS STRAIN 251 CYCLODEXTRIN GLYCOSYL-TRANSFERASE IN COMPLEX WITH MALTOHEXAOSE
Authors : Uitdehaag, J.C.M.; Dijkstra, B.W.
Deposited on : 2000-03-22
Resolution : 2.48 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

A user guide is available at

<https://www.wwpdb.org/validation/2017/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 : 1.7.3 (157068), CSD as539be (2018)
Xtriage (Phenix) : 1.13
EDS : trunk30967
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Refmac : 5.8.0158
CCP4 : 7.0 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk30967

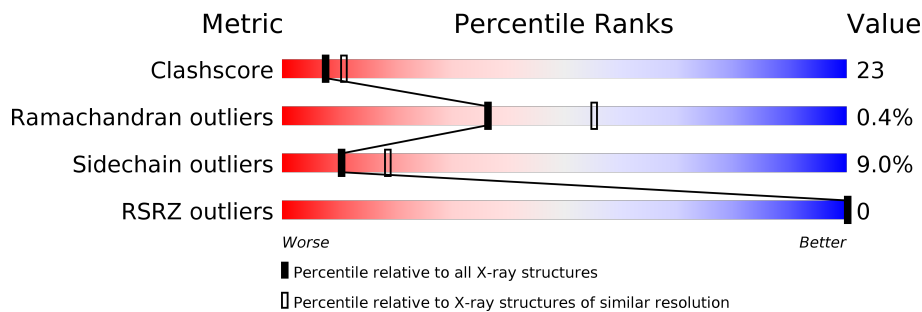
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.48 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))
Clashscore	122126	5860 (2.50-2.46)
Ramachandran outliers	120053	5763 (2.50-2.46)
Sidechain outliers	120020	5765 (2.50-2.46)
RSRZ outliers	108989	5026 (2.50-2.46)

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	686	

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	GLC	A	691	X	-	-	-

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 5585 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.

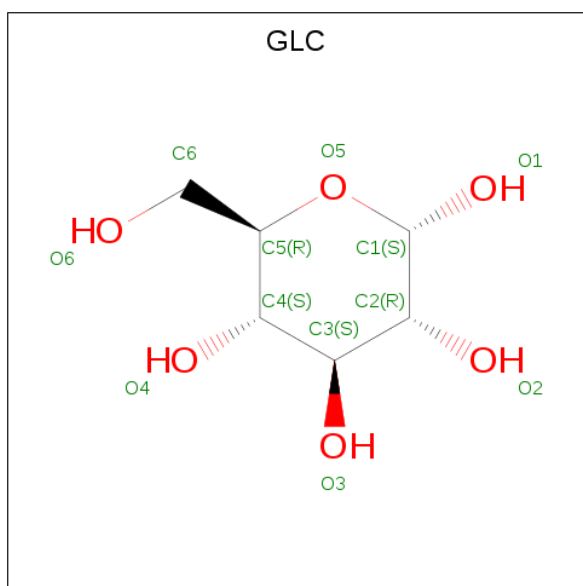
- Molecule 1 is a protein called PROTEIN (CYCLODEXTRIN GLYCOSYLTRANSFERASE).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	686	5257	3318	900	1024	15	0	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	229	ALA	ASP	ENGINEERED	UNP P43379
A	257	ALA	GLU	ENGINEERED	UNP P43379
A	400	SER	CYS	CONFLICT	UNP P43379

- Molecule 2 is ALPHA-D-GLUCOSE (three-letter code: GLC) (formula: C₆H₁₂O₆).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			11	6	5		
2	A	1	Total	C	O	0	0
			11	6	5		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 11 6 5	0	0
2	A	1	Total C O 11 6 5	0	0
2	A	1	Total C O 11 6 5	0	0
2	A	1	Total C O 12 6 6	0	0
2	A	1	Total C O 11 6 5	0	0
2	A	1	Total C O 11 6 5	0	0
2	A	1	Total C O 12 6 6	0	0
2	A	1	Total C O 11 6 5	0	0
2	A	1	Total C O 11 6 5	0	0
2	A	1	Total C O 11 6 5	0	0
2	A	1	Total C O 12 6 6	0	0
2	A	1	Total C O 11 6 5	0	0
2	A	1	Total C O 11 6 5	0	0
2	A	1	Total C O 12 6 6	0	0

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	3	Total Ca 3 3	0	0

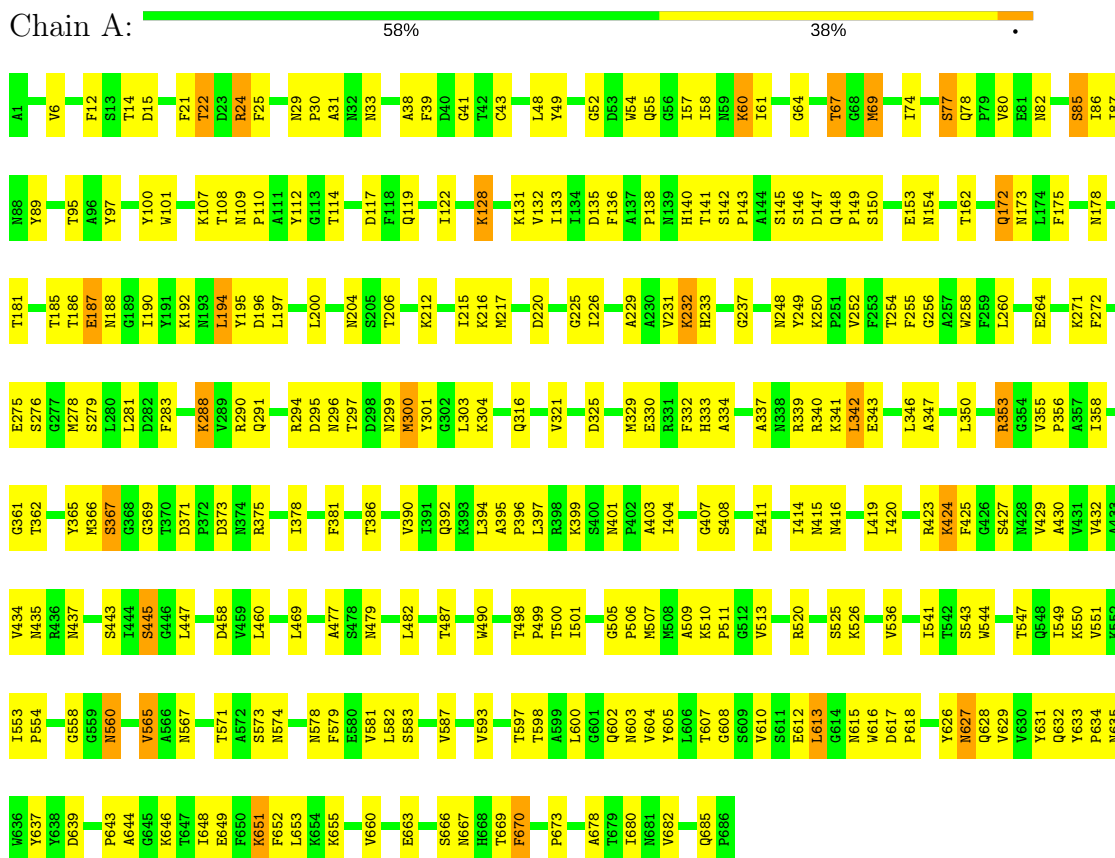
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	145	Total O 145 145	0	0

3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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: PROTEIN (CYCLODEXTRIN GLYCOSYLTRANSFERASE)



4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	111.65Å 109.02Å 64.68Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	7.00 – 2.48 78.00 – 2.48	Depositor EDS
% Data completeness (in resolution range)	91.0 (7.00-2.48) 88.3 (78.00-2.48)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.69 (at 2.48Å)	Xtrriage
Refinement program	TNT	Depositor
R, R_{free}	0.228 , 0.296 0.211 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å ²)	33.0	Xtrriage
Anisotropy	0.312	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 62.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.015 for k,h,-l	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	5585	wwPDB-VP
Average B, all atoms (Å ²)	42.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.16% 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: CA, GLC

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	0.36	0/5387	0.50	0/7343

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 [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	5257	0	5025	244	0
2	A	180	0	156	7	0
3	A	3	0	0	0	0
4	A	145	0	0	11	0
All	All	5585	0	5181	247	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 23.

All (247) 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:330:GLU:HG2	1:A:369:GLY:HA2	1.34	1.10
1:A:38:ALA:HB2	1:A:86:ILE:HD11	1.39	1.04
1:A:536:VAL:HG21	1:A:554:PRO:HG3	1.46	0.93
1:A:300:MET:HG3	1:A:419:LEU:HB2	1.50	0.92
1:A:231:VAL:HG11	1:A:256:GLY:HA3	1.56	0.87
1:A:560:ASN:ND2	1:A:578:ASN:HA	1.89	0.87
1:A:249:TYR:CD2	1:A:250:LYS:HG3	2.10	0.86
1:A:87:ILE:HD13	1:A:143:PRO:HG2	1.58	0.85
1:A:325:ASP:HA	1:A:329:MET:CE	2.06	0.85
1:A:583:SER:HB2	1:A:643:PRO:HG3	1.60	0.82
1:A:249:TYR:CE2	1:A:250:LYS:HG3	2.15	0.81
1:A:281:LEU:HD23	1:A:321:VAL:HB	1.62	0.81
1:A:330:GLU:HG2	1:A:369:GLY:CA	2.09	0.80
1:A:232:LYS:HG3	1:A:258:TRP:CE2	2.18	0.79
1:A:87:ILE:HD12	1:A:101:TRP:CZ3	2.18	0.78
1:A:142:SER:HB2	1:A:143:PRO:HD2	1.65	0.78
1:A:536:VAL:CG2	1:A:554:PRO:HG3	2.13	0.77
1:A:325:ASP:HA	1:A:329:MET:HE2	1.67	0.77
1:A:38:ALA:CB	1:A:86:ILE:HD11	2.16	0.76
1:A:87:ILE:HG21	1:A:89:TYR:CZ	2.21	0.75
1:A:12:PHE:CE2	1:A:133:ILE:HD11	2.21	0.74
1:A:260:LEU:HD22	1:A:264:GLU:HG2	1.70	0.74
1:A:408:SER:O	1:A:423:ARG:HA	1.87	0.74
1:A:350:LEU:HD21	1:A:358:ILE:HD11	1.72	0.72
1:A:87:ILE:CD1	1:A:143:PRO:HG2	2.19	0.72
1:A:397:LEU:HB3	1:A:404:ILE:HD13	1.72	0.72
1:A:290:ARG:HD2	1:A:329:MET:HE1	1.72	0.71
1:A:560:ASN:HD21	1:A:578:ASN:HA	1.56	0.70
1:A:60:LYS:HE3	1:A:381:PHE:CD1	2.27	0.69
1:A:325:ASP:HA	1:A:329:MET:HE3	1.74	0.69
1:A:339:ARG:O	1:A:343:GLU:HG3	1.92	0.69
1:A:435:ASN:HB2	1:A:482:LEU:HD23	1.75	0.69
1:A:520:ARG:HH11	1:A:520:ARG:HG2	1.57	0.69
1:A:520:ARG:HD3	1:A:547:THR:HG22	1.73	0.68
1:A:133:ILE:HG12	1:A:225:GLY:HA3	1.74	0.68
1:A:526:LYS:HD3	1:A:541:ILE:CG2	2.23	0.68
1:A:633:TYR:HA	1:A:635:ASN:N	2.09	0.68
1:A:447:LEU:HD23	1:A:477:ALA:HB3	1.76	0.67
1:A:24:ARG:HD2	1:A:375:ARG:O	1.93	0.67
1:A:605:TYR:CE1	1:A:655:LYS:HB2	2.30	0.66
1:A:583:SER:HB2	1:A:612:GLU:OE2	1.95	0.66
1:A:15:ASP:OD2	1:A:131:LYS:HE3	1.96	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:632:GLN:O	1:A:635:ASN:HB2	1.96	0.65
1:A:85:SER:OG	1:A:153:GLU:HG3	1.97	0.64
1:A:447:LEU:HD23	1:A:477:ALA:CB	2.27	0.64
1:A:394:LEU:O	1:A:397:LEU:HB2	1.97	0.64
1:A:445:SER:HA	1:A:479:ASN:ND2	2.12	0.64
1:A:148:GLN:HA	1:A:148:GLN:HE21	1.63	0.64
1:A:513:VAL:O	1:A:553:ILE:HG13	1.98	0.63
1:A:291:GLN:HG2	1:A:297:THR:OG1	1.99	0.63
1:A:633:TYR:HA	1:A:635:ASN:H	1.62	0.63
1:A:119:GLN:HG2	4:A:819:HOH:O	1.99	0.63
1:A:232:LYS:HG3	1:A:258:TRP:CD2	2.34	0.62
1:A:299:ASN:HB2	1:A:416:ASN:O	2.00	0.62
1:A:140:HIS:CD2	1:A:197:LEU:HD13	2.34	0.62
1:A:499:PRO:HB2	1:A:573:SER:HB3	1.80	0.62
1:A:587:VAL:HG13	1:A:644:ALA:HB2	1.82	0.62
1:A:651:LYS:HG2	1:A:663:GLU:HB3	1.82	0.62
1:A:386:THR:O	1:A:390:VAL:HG23	1.99	0.62
1:A:414:ILE:HG12	1:A:415:ASN:N	2.13	0.62
1:A:607:THR:HG23	1:A:616:TRP:CZ3	2.35	0.62
1:A:544:TRP:CZ3	1:A:549:ILE:HD13	2.34	0.61
2:A:695:GLC:H61	2:A:696:GLC:H5	1.82	0.61
1:A:195:TYR:CD1	2:A:694:GLC:H3	2.36	0.61
1:A:271:LYS:HE3	1:A:275:GLU:OE1	1.99	0.61
1:A:332:PHE:CE1	1:A:342:LEU:HA	2.36	0.61
1:A:612:GLU:C	1:A:613:LEU:HD23	2.20	0.61
1:A:212:LYS:O	1:A:215:ILE:HG22	2.01	0.60
1:A:347:ALA:HA	1:A:394:LEU:HD12	1.82	0.60
1:A:652:PHE:HE2	1:A:682:VAL:CG2	2.13	0.60
1:A:445:SER:HA	1:A:479:ASN:HD22	1.66	0.60
1:A:231:VAL:HG11	1:A:256:GLY:CA	2.29	0.60
1:A:290:ARG:CD	1:A:329:MET:HE1	2.31	0.60
1:A:435:ASN:HB2	1:A:482:LEU:CD2	2.33	0.59
1:A:288:LYS:HA	1:A:288:LYS:HE2	1.86	0.58
1:A:633:TYR:CG	1:A:634:PRO:HA	2.38	0.58
1:A:598:THR:HB	1:A:602:GLN:HB3	1.84	0.58
1:A:333:HIS:O	1:A:367:SER:HB3	2.02	0.58
1:A:631:TYR:HB2	1:A:637:TYR:HD1	1.68	0.58
1:A:140:HIS:NE2	1:A:197:LEU:HD13	2.19	0.57
1:A:60:LYS:HE3	1:A:381:PHE:CE1	2.39	0.57
2:A:692:GLC:O3	2:A:693:GLC:H1	2.04	0.57
1:A:15:ASP:CG	1:A:131:LYS:HE3	2.24	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:175:PHE:CD1	1:A:200:LEU:HD23	2.40	0.57
1:A:612:GLU:O	1:A:613:LEU:HD23	2.05	0.57
1:A:142:SER:HB2	1:A:143:PRO:CD	2.35	0.56
1:A:633:TYR:CA	1:A:635:ASN:H	2.19	0.56
1:A:260:LEU:HB2	1:A:283:PHE:HB3	1.88	0.56
1:A:526:LYS:HD3	1:A:541:ILE:HB	1.88	0.56
1:A:631:TYR:HB2	1:A:637:TYR:CD1	2.41	0.55
1:A:101:TRP:HA	1:A:141:THR:O	2.07	0.55
1:A:220:ASP:OD1	1:A:250:LYS:HE3	2.07	0.55
1:A:300:MET:HB2	1:A:415:ASN:O	2.06	0.55
1:A:136:PHE:C	1:A:138:PRO:HD3	2.27	0.55
1:A:148:GLN:HA	1:A:148:GLN:NE2	2.22	0.54
1:A:25:PHE:HB3	4:A:728:HOH:O	2.06	0.54
1:A:339:ARG:HG2	1:A:365:TYR:CE1	2.42	0.54
1:A:607:THR:HG23	1:A:616:TRP:CE3	2.43	0.54
1:A:395:ALA:HB3	1:A:396:PRO:HD3	1.90	0.54
1:A:511:PRO:HA	1:A:553:ILE:HB	1.89	0.54
1:A:353:ARG:HA	4:A:756:HOH:O	2.07	0.54
1:A:54:TRP:HA	1:A:57:ILE:HD12	1.90	0.54
1:A:673:PRO:CG	1:A:678:ALA:HB2	2.38	0.54
1:A:260:LEU:HB2	1:A:283:PHE:CB	2.38	0.54
1:A:505:GLY:HA2	1:A:506:PRO:C	2.28	0.53
1:A:673:PRO:HG3	1:A:678:ALA:HB2	1.91	0.53
1:A:605:TYR:CD1	1:A:655:LYS:HB2	2.44	0.53
1:A:178:ASN:O	1:A:192:LYS:HD3	2.08	0.53
1:A:185:THR:OG1	1:A:188:ASN:HB2	2.09	0.53
1:A:294:ARG:HB2	1:A:332:PHE:CE2	2.43	0.53
1:A:215:ILE:HD11	1:A:226:ILE:HD13	1.90	0.53
1:A:149:PRO:HA	1:A:154:ASN:ND2	2.24	0.52
1:A:181:THR:HB	1:A:192:LYS:HB2	1.92	0.52
1:A:204:ASN:OD1	1:A:206:THR:HB	2.09	0.52
1:A:339:ARG:HG2	1:A:365:TYR:CD1	2.43	0.52
1:A:649:GLU:HG2	1:A:667:ASN:HB3	1.90	0.52
1:A:593:VAL:HB	1:A:652:PHE:CZ	2.45	0.52
1:A:288:LYS:HA	1:A:288:LYS:CE	2.40	0.52
1:A:361:GLY:HA3	1:A:366:MET:SD	2.49	0.52
1:A:469:LEU:HB2	1:A:490:TRP:CE2	2.44	0.52
1:A:55:GLN:HA	1:A:58:ILE:HD12	1.92	0.52
1:A:304:LYS:HD2	1:A:411:GLU:CB	2.40	0.51
1:A:490:TRP:HA	4:A:794:HOH:O	2.10	0.51
1:A:652:PHE:HE2	1:A:682:VAL:HG23	1.75	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:560:ASN:HA	1:A:579:PHE:O	2.11	0.51
1:A:303:LEU:HD23	1:A:419:LEU:CD2	2.40	0.51
1:A:226:ILE:O	1:A:254:THR:HG23	2.11	0.51
1:A:593:VAL:HB	1:A:652:PHE:CE2	2.45	0.51
1:A:237:GLY:HA3	1:A:639:ASP:O	2.11	0.50
1:A:499:PRO:O	1:A:573:SER:HB2	2.11	0.50
1:A:61:ILE:CG2	1:A:128:LYS:HG3	2.41	0.50
1:A:248:ASN:OD1	1:A:510:LYS:HG2	2.12	0.50
1:A:401:ASN:HB3	1:A:404:ILE:HD12	1.93	0.50
1:A:187:GLU:HB2	1:A:626:TYR:CG	2.46	0.50
1:A:301:TYR:HE2	1:A:416:ASN:OD1	1.93	0.50
1:A:593:VAL:HA	1:A:682:VAL:O	2.11	0.50
1:A:61:ILE:HG22	1:A:128:LYS:HG3	1.91	0.50
1:A:48:LEU:HA	1:A:95:THR:OG1	2.11	0.50
1:A:334:ALA:HB3	1:A:337:ALA:HB2	1.93	0.50
1:A:232:LYS:HB2	4:A:802:HOH:O	2.10	0.50
1:A:520:ARG:NH1	1:A:520:ARG:HG2	2.24	0.50
1:A:48:LEU:HD23	1:A:95:THR:HG23	1.94	0.49
1:A:511:PRO:HB3	1:A:554:PRO:O	2.12	0.49
1:A:608:GLY:HA3	1:A:613:LEU:HD12	1.93	0.49
1:A:38:ALA:HB2	1:A:86:ILE:CD1	2.27	0.49
1:A:77:SER:HB3	4:A:735:HOH:O	2.12	0.49
1:A:303:LEU:HD23	1:A:419:LEU:HD22	1.94	0.49
1:A:602:GLN:HA	1:A:655:LYS:O	2.12	0.49
1:A:49:TYR:CE1	1:A:97:TYR:HA	2.47	0.49
1:A:233:HIS:HB3	4:A:753:HOH:O	2.11	0.49
1:A:603:ASN:HB2	4:A:786:HOH:O	2.13	0.49
1:A:136:PHE:CD2	1:A:138:PRO:HG3	2.47	0.49
1:A:232:LYS:HD2	1:A:258:TRP:NE1	2.28	0.49
1:A:186:THR:O	1:A:190:ILE:HG13	2.13	0.49
1:A:526:LYS:HD3	1:A:541:ILE:CB	2.43	0.49
1:A:38:ALA:CA	1:A:86:ILE:HD11	2.44	0.48
1:A:407:GLY:HA2	1:A:425:PHE:HB2	1.94	0.48
1:A:341:LYS:HG2	4:A:771:HOH:O	2.14	0.48
1:A:185:THR:O	1:A:188:ASN:HB3	2.13	0.48
1:A:12:PHE:HA	1:A:15:ASP:OD2	2.14	0.48
1:A:194:LEU:O	1:A:195:TYR:HB2	2.13	0.48
1:A:560:ASN:HD22	1:A:578:ASN:HA	1.74	0.48
1:A:100:TYR:CZ	2:A:691:GLC:H2	2.49	0.48
1:A:250:LYS:O	1:A:252:VAL:HG13	2.14	0.48
1:A:109:ASN:OD1	1:A:110:PRO:HD2	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:553:ILE:HD13	1:A:579:PHE:CZ	2.49	0.47
1:A:652:PHE:O	1:A:663:GLU:HB2	2.14	0.47
1:A:29:ASN:OD1	1:A:31:ALA:HB3	2.14	0.47
1:A:340:ARG:HA	1:A:343:GLU:OE1	2.14	0.47
1:A:403:ALA:O	1:A:407:GLY:HA3	2.14	0.47
1:A:30:PRO:HA	1:A:33:ASN:ND2	2.30	0.47
1:A:397:LEU:HB3	1:A:404:ILE:CD1	2.42	0.47
1:A:553:ILE:HD13	1:A:579:PHE:HZ	1.79	0.47
1:A:187:GLU:HB2	1:A:626:TYR:CD2	2.49	0.47
1:A:78:GLN:HG2	1:A:80:VAL:HG22	1.95	0.47
1:A:583:SER:HB3	1:A:646:LYS:NZ	2.30	0.47
1:A:114:THR:H	1:A:117:ASP:HB2	1.79	0.47
1:A:541:ILE:HG22	1:A:541:ILE:O	2.14	0.47
1:A:229:ALA:HB1	2:A:691:GLC:O1	2.15	0.46
1:A:610:VAL:HG22	1:A:648:ILE:HG21	1.96	0.46
1:A:627:ASN:OD1	1:A:628:GLN:HG3	2.16	0.46
2:A:695:GLC:C6	2:A:696:GLC:H5	2.44	0.46
1:A:74:ILE:HD11	1:A:132:VAL:HG22	1.96	0.46
1:A:100:TYR:CE2	2:A:691:GLC:H2	2.51	0.46
1:A:458:ASP:OD2	1:A:460:LEU:HB2	2.15	0.46
1:A:395:ALA:N	1:A:396:PRO:HD2	2.31	0.46
1:A:509:ALA:HA	1:A:582:LEU:HD12	1.98	0.46
1:A:612:GLU:CD	1:A:643:PRO:HG3	2.37	0.45
1:A:670:PHE:CD2	1:A:680:ILE:HG13	2.51	0.45
1:A:420:ILE:HA	1:A:432:VAL:O	2.16	0.45
1:A:407:GLY:HA2	1:A:424:LYS:O	2.17	0.45
1:A:12:PHE:HB3	1:A:355:VAL:HG11	1.99	0.45
1:A:255:PHE:CD2	1:A:321:VAL:HG21	2.52	0.45
1:A:526:LYS:HD3	1:A:541:ILE:HG21	1.95	0.45
1:A:558:GLY:HA2	1:A:581:VAL:O	2.17	0.45
1:A:69:MET:O	1:A:392:GLN:HA	2.17	0.44
1:A:14:THR:O	1:A:399:LYS:HE2	2.18	0.44
1:A:300:MET:HG3	1:A:419:LEU:CB	2.35	0.44
1:A:316:GLN:HB2	4:A:742:HOH:O	2.17	0.44
1:A:445:SER:CB	1:A:479:ASN:ND2	2.80	0.44
1:A:54:TRP:CE2	1:A:112:TYR:HB3	2.52	0.44
1:A:64:GLY:HA2	1:A:67:THR:HG23	1.99	0.44
1:A:276:SER:OG	1:A:278:MET:HG2	2.18	0.43
1:A:567:ASN:ND2	1:A:571:THR:HB	2.32	0.43
1:A:500:THR:HA	1:A:574:ASN:OD1	2.19	0.43
1:A:616:TRP:HZ3	1:A:651:LYS:HB2	1.84	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:604:VAL:HA	1:A:653:LEU:O	2.19	0.43
1:A:6:VAL:O	1:A:6:VAL:HG22	2.18	0.43
1:A:597:THR:HA	1:A:633:TYR:CZ	2.54	0.43
1:A:80:VAL:HA	1:A:107:LYS:O	2.19	0.43
1:A:143:PRO:HB3	1:A:196:ASP:OD2	2.18	0.43
1:A:434:VAL:HG22	1:A:487:THR:HG23	2.00	0.43
1:A:501:ILE:HD11	1:A:565:VAL:HG13	2.01	0.43
1:A:288:LYS:HB2	1:A:288:LYS:HE3	1.79	0.43
1:A:544:TRP:CE3	1:A:549:ILE:HD13	2.54	0.42
1:A:526:LYS:HA	1:A:544:TRP:CG	2.54	0.42
1:A:187:GLU:CD	1:A:626:TYR:HB3	2.39	0.42
1:A:330:GLU:HG2	1:A:369:GLY:C	2.39	0.42
1:A:437:ASN:HB3	4:A:713:HOH:O	2.19	0.42
1:A:342:LEU:HD11	1:A:362:THR:HG23	2.01	0.42
1:A:553:ILE:HA	1:A:554:PRO:HD3	1.87	0.42
1:A:617:ASP:OD1	1:A:618:PRO:HD2	2.19	0.42
1:A:587:VAL:CG1	1:A:644:ALA:HB2	2.49	0.42
1:A:22:THR:O	1:A:52:GLY:HA3	2.20	0.42
1:A:14:THR:O	1:A:399:LYS:HG2	2.20	0.42
1:A:469:LEU:HD11	1:A:477:ALA:HB1	2.01	0.42
1:A:175:PHE:CE1	1:A:200:LEU:HD23	2.55	0.42
1:A:615:ASN:O	1:A:616:TRP:HB2	2.19	0.42
1:A:429:VAL:HG12	1:A:430:ALA:N	2.35	0.42
1:A:507:MET:HB3	1:A:507:MET:HE3	1.88	0.42
1:A:543:SER:OG	1:A:550:LYS:HB2	2.20	0.42
1:A:272:PHE:O	1:A:276:SER:HB3	2.21	0.41
1:A:397:LEU:HD23	1:A:397:LEU:HA	1.85	0.41
1:A:172:GLN:O	1:A:173:ASN:HB2	2.21	0.41
1:A:249:TYR:CE2	1:A:250:LYS:HE3	2.55	0.41
1:A:294:ARG:HD2	1:A:332:PHE:O	2.21	0.41
1:A:673:PRO:HG2	1:A:678:ALA:HB2	2.02	0.41
1:A:215:ILE:HD11	1:A:226:ILE:CD1	2.50	0.41
1:A:378:ILE:HG23	1:A:378:ILE:O	2.19	0.41
1:A:87:ILE:HG21	1:A:89:TYR:CE2	2.53	0.41
1:A:39:PHE:CZ	1:A:41:GLY:HA2	2.56	0.41
1:A:612:GLU:OE2	1:A:643:PRO:HG3	2.21	0.41
1:A:583:SER:CB	1:A:643:PRO:HG3	2.41	0.41
1:A:342:LEU:HD22	1:A:365:TYR:CE1	2.55	0.41
1:A:663:GLU:HG2	1:A:685:GLN:HB2	2.03	0.40
1:A:295:ASP:O	1:A:296:ASN:HB3	2.21	0.40
1:A:48:LEU:HA	1:A:95:THR:HG1	1.86	0.40

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	684/686 (100%)	637 (93%)	44 (6%)	3 (0%)	36 55

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	629	VAL
1	A	22	THR
1	A	627	ASN

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	554/554 (100%)	504 (91%)	50 (9%)	10 19

All (50) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	21	PHE
1	A	24	ARG
1	A	43	CYS
1	A	60	LYS
1	A	67	THR

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Mol	Chain	Res	Type
1	A	69	MET
1	A	77	SER
1	A	82	ASN
1	A	85	SER
1	A	108	THR
1	A	122	ILE
1	A	128	LYS
1	A	135	ASP
1	A	145	SER
1	A	146	SER
1	A	147	ASP
1	A	150	SER
1	A	162	THR
1	A	172	GLN
1	A	187	GLU
1	A	194	LEU
1	A	216	LYS
1	A	217	MET
1	A	232	LYS
1	A	279	SER
1	A	288	LYS
1	A	300	MET
1	A	342	LEU
1	A	346	LEU
1	A	353	ARG
1	A	356	PRO
1	A	367	SER
1	A	371	ASP
1	A	373	ASP
1	A	424	LYS
1	A	427	SER
1	A	443	SER
1	A	445	SER
1	A	498	THR
1	A	525	SER
1	A	551	VAL
1	A	560	ASN
1	A	565	VAL
1	A	600	LEU
1	A	613	LEU
1	A	651	LYS
1	A	660	VAL

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Mol	Chain	Res	Type
1	A	666	SER
1	A	669	THR
1	A	670	PHE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	62	ASN
1	A	148	GLN
1	A	160	ASN
1	A	263	ASN
1	A	269	ASN
1	A	479	ASN
1	A	548	GLN
1	A	560	ASN
1	A	578	ASN
1	A	603	ASN
1	A	683	ASN

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 19 ligands modelled in this entry, 3 are monoatomic - leaving 16 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
2	GLC	A	691	2	11,11,12	0.60	0	15,15,17	3.11	5 (33%)
2	GLC	A	692	2	11,11,12	0.47	0	15,15,17	0.92	1 (6%)
2	GLC	A	693	2	11,11,12	0.45	0	15,15,17	0.79	0
2	GLC	A	694	2	11,11,12	0.36	0	15,15,17	0.87	1 (6%)
2	GLC	A	695	2	11,11,12	0.36	0	15,15,17	0.69	0
2	GLC	A	696	2	12,12,12	0.32	0	17,17,17	0.65	0
2	GLC	A	698	2	11,11,12	0.34	0	15,15,17	0.74	0
2	GLC	A	699	2	11,11,12	0.36	0	15,15,17	0.67	0
2	GLC	A	700	2	12,12,12	0.31	0	17,17,17	0.83	0
2	GLC	A	702	2	11,11,12	0.35	0	15,15,17	0.91	0
2	GLC	A	703	2	11,11,12	0.36	0	15,15,17	0.65	0
2	GLC	A	704	2	11,11,12	0.36	0	15,15,17	0.66	0
2	GLC	A	705	2	12,12,12	0.31	0	17,17,17	0.87	0
2	GLC	A	707	2	11,11,12	0.32	0	15,15,17	0.64	0
2	GLC	A	708	2	11,11,12	0.35	0	15,15,17	0.70	0
2	GLC	A	709	2	12,12,12	0.31	0	17,17,17	0.95	2 (11%)

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	GLC	A	691	2	1/1/4/5	0/2/18/22	0/1/1/1
2	GLC	A	692	2	-	0/2/18/22	0/1/1/1
2	GLC	A	693	2	-	0/2/18/22	0/1/1/1
2	GLC	A	694	2	-	0/2/18/22	0/1/1/1
2	GLC	A	695	2	-	0/2/18/22	0/1/1/1
2	GLC	A	696	2	-	0/2/22/22	0/1/1/1
2	GLC	A	698	2	-	0/2/18/22	0/1/1/1
2	GLC	A	699	2	-	0/2/18/22	0/1/1/1
2	GLC	A	700	2	-	0/2/22/22	0/1/1/1
2	GLC	A	702	2	-	0/2/18/22	0/1/1/1
2	GLC	A	703	2	-	0/2/18/22	0/1/1/1
2	GLC	A	704	2	-	0/2/18/22	0/1/1/1
2	GLC	A	705	2	-	0/2/22/22	0/1/1/1
2	GLC	A	707	2	-	0/2/18/22	0/1/1/1
2	GLC	A	708	2	-	0/2/18/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GLC	A	709	2	-	0/2/22/22	0/1/1/1

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	691	GLC	C4-C3-C2	-7.16	101.17	110.61
2	A	691	GLC	O2-C2-C1	-5.96	95.16	109.14
2	A	691	GLC	O5-C5-C4	-4.26	103.02	109.97
2	A	691	GLC	O3-C3-C2	-2.21	105.88	110.19
2	A	709	GLC	O5-C5-C4	2.02	113.39	109.69
2	A	709	GLC	C1-O5-C5	2.13	117.78	113.69
2	A	694	GLC	O5-C1-C2	2.24	114.34	110.31
2	A	692	GLC	O2-C2-C1	2.40	114.77	109.14
2	A	691	GLC	O2-C2-C3	4.86	119.08	110.04

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	691	GLC	C1

There are no torsion outliers.

There are no ring outliers.

6 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	691	GLC	3	0
2	A	692	GLC	1	0
2	A	693	GLC	1	0
2	A	694	GLC	1	0
2	A	695	GLC	2	0
2	A	696	GLC	2	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

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	686/686 (100%)	-0.19	0 100 100	29, 41, 54, 72	0

There are no RSRZ outliers to report.

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 carbohydrates 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, 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
2	GLC	A	691	11/12	0.76	0.28	12,14,20,21	0
2	GLC	A	698	11/12	0.81	0.24	38,38,42,45	0
2	GLC	A	709	12/12	0.82	0.17	51,53,62,65	0
2	GLC	A	702	11/12	0.84	0.20	65,66,71,74	0
2	GLC	A	705	12/12	0.84	0.25	62,64,72,100	0
2	GLC	A	693	11/12	0.87	0.13	47,49,54,57	0
2	GLC	A	703	11/12	0.90	0.16	61,61,66,69	0
2	GLC	A	700	12/12	0.91	0.13	39,40,46,49	0
2	GLC	A	694	11/12	0.91	0.14	49,50,55,59	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	GLC	A	699	11/12	0.92	0.16	41,43,48,51	0
2	GLC	A	708	11/12	0.92	0.15	47,49,54,56	0
2	GLC	A	695	11/12	0.92	0.14	49,51,56,59	0
2	GLC	A	704	11/12	0.93	0.15	59,61,66,69	0
2	GLC	A	696	12/12	0.93	0.14	50,51,59,61	0
2	GLC	A	707	11/12	0.94	0.15	46,46,51,54	0
3	CA	A	688	1/1	0.95	0.09	57,57,57,57	0
2	GLC	A	692	11/12	0.96	0.11	33,46,51,54	0
3	CA	A	690	1/1	0.96	0.14	52,52,52,52	0
3	CA	A	689	1/1	0.96	0.12	39,39,39,39	0

6.5 Other polymers [i](#)

There are no such residues in this entry.