



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 05:22 PM UTC

PDB ID : 1X3W / pdb_00001x3w
Title : Structure of a peptide:N-glycanase-Rad23 complex
Authors : Lee, J.-H.; Choi, J.M.; Lee, C.; Yi, K.J.; Cho, Y.
Deposited on : 2005-05-11
Resolution : 3.00 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 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

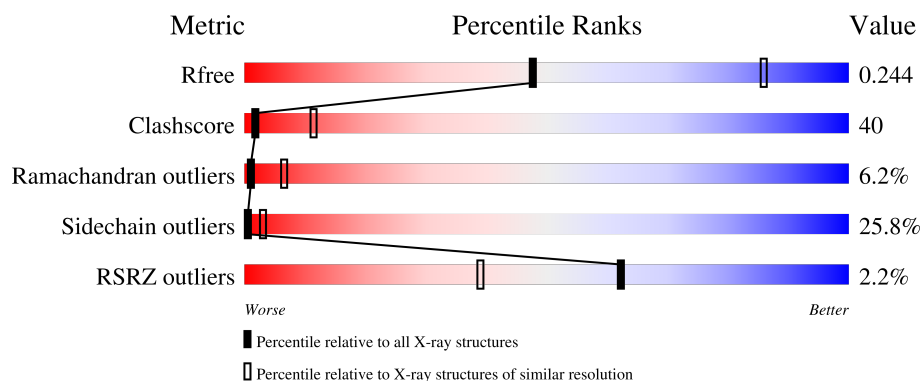
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (3.00-3.00)

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	335	4% 33% 43% 17% . .
2	B	72	4% 22% 35% 21% . 21%
3	C	2	50% 50%
3	D	2	100%
3	E	2	50% 50%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 3187 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 peptide:N-glycanase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	320	Total	C	N	O	S	Se	0	0	0
			2665	1698	456	494	14	3			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	18	MSE	MET	modified residue	UNP Q02890
A	140	MSE	MET	modified residue	UNP Q02890
A	255	MSE	MET	modified residue	UNP Q02890

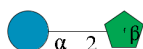
- Molecule 2 is a protein called UV excision repair protein RAD23.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	57	Total	C	N	O	Se	0	0	0
			435	276	73	84	2			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	295	MSE	MET	modified residue	UNP P32628
B	304	MSE	MET	modified residue	UNP P32628

- Molecule 3 is an oligosaccharide called beta-D-fructofuranose-(2-1)-alpha-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
3	C	2	Total	C	O	0	0	0
			23	12	11			

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
3	D	2	Total	C	O	0	0	0
			23	12	11			
3	E	2	Total	C	O	0	0	0
			23	12	11			

- Molecule 4 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Zn	0	0
			1	1		

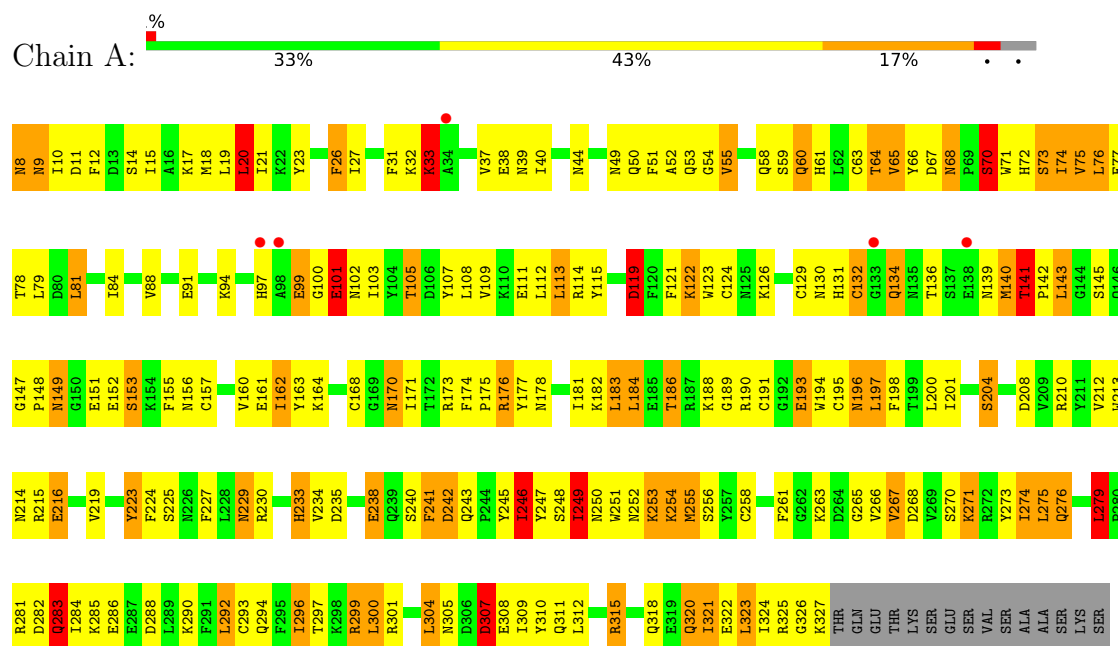
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	17	Total	O	0	0
			17	17		

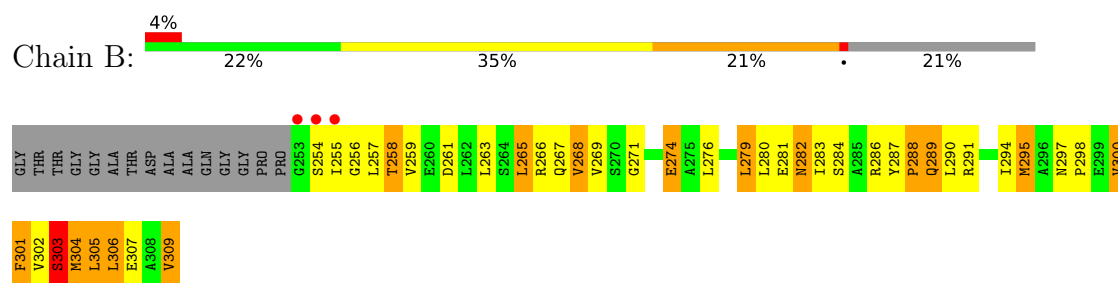
3 Residue-property plots [i](#)

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: peptide:N-glycanase



- Molecule 2: UV excision repair protein RAD23



- Molecule 3: beta-D-fructofuranose-(2-1)-alpha-D-glucopyranose



- Molecule 3: beta-D-fructofuranose-(2-1)-alpha-D-glucopyranose

Chain D:  100%

GLC1
FRU2

- Molecule 3: beta-D-fructofuranose-(2-1)-alpha-D-glucopyranose

Chain E:  50%  50%

GLC1
FRU2

4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	129.24Å 129.24Å 128.49Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 3.00 20.00 – 3.00	Depositor EDS
% Data completeness (in resolution range)	94.8 (20.00-3.00) 94.4 (20.00-3.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.50 (at 2.98Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.244 , 0.274 0.251 , 0.244	Depositor DCC
R_{free} test set	1210 reflections (4.81%)	wwPDB-VP
Wilson B-factor (Å ²)	61.5	Xtriage
Anisotropy	0.041	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 47.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.40$, $\langle L^2 \rangle = 0.23$	Xtriage
Estimated twinning fraction	0.087 for -h,-k,l	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	3187	wwPDB-VP
Average B, all atoms (Å ²)	75.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.32% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, GLC, FRU

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	0.89	7/2726 (0.3%)	1.13	24/3674 (0.7%)
2	B	1.02	2/439 (0.5%)	1.08	0/593
All	All	0.91	9/3165 (0.3%)	1.13	24/4267 (0.6%)

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	140	MSE	SE-CE	-6.12	1.77	1.95
1	A	255	MSE	SE-CE	-5.83	1.77	1.95
1	A	140	MSE	CG-SE	-5.57	1.78	1.95
1	A	255	MSE	CG-SE	-5.50	1.78	1.95
2	B	295	MSE	SE-CE	-5.43	1.79	1.95
1	A	307	ASP	CA-C	-5.41	1.47	1.52
1	A	18	MSE	CG-SE	-5.15	1.80	1.95
2	B	295	MSE	CG-SE	-5.13	1.80	1.95
1	A	68	ASN	CA-C	-5.04	1.46	1.52

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	238	GLU	N-CA-C	-8.83	97.21	110.28
1	A	283	GLN	N-CA-C	-7.84	101.63	112.30
1	A	155	PHE	CA-C-N	-7.32	112.67	122.85
1	A	155	PHE	C-N-CA	-7.32	112.67	122.85
1	A	322	GLU	N-CA-C	-7.26	104.55	113.41
1	A	279	LEU	CA-C-N	6.42	127.86	119.84
1	A	279	LEU	C-N-CA	6.42	127.86	119.84
1	A	249	ILE	N-CA-C	6.26	117.62	111.67
1	A	307	ASP	N-CA-C	-6.24	103.76	112.12
1	A	241	PHE	CA-C-N	-6.23	114.68	123.03

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	241	PHE	C-N-CA	-6.23	114.68	123.03
1	A	186	THR	N-CA-C	-6.16	101.16	110.28
1	A	153	SER	N-CA-C	-6.16	105.92	113.50
1	A	304	LEU	N-CA-C	5.79	117.77	110.24
1	A	248	SER	CA-C-N	-5.78	115.75	122.63
1	A	248	SER	C-N-CA	-5.78	115.75	122.63
1	A	141	THR	CA-C-N	5.76	127.04	119.84
1	A	141	THR	C-N-CA	5.76	127.04	119.84
1	A	68	ASN	CB-CA-C	-5.60	103.06	110.34
1	A	126	LYS	N-CA-C	-5.24	102.41	110.32
1	A	101	GLU	N-CA-C	5.18	114.97	108.45
1	A	242	ASP	CA-C-N	-5.16	117.17	122.85
1	A	242	ASP	C-N-CA	-5.16	117.17	122.85
1	A	230	ARG	N-CA-C	-5.15	100.32	108.14

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2665	0	2576	194	0
2	B	435	0	446	63	0
3	C	23	0	21	2	0
3	D	23	0	21	0	0
3	E	23	0	21	1	0
4	A	1	0	0	0	0
5	A	17	0	0	2	0
All	All	3187	0	3085	251	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 40.

All (251) 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:B:258:THR:HG22	2:B:287:TYR:OH	1.35	1.24
1:A:176:ARG:HG2	1:A:176:ARG:HH11	1.09	1.08
1:A:214:ASN:ND2	1:A:255:MSE:HG2	1.69	1.06
1:A:143:LEU:CD2	1:A:164:LYS:HB2	1.91	1.00
1:A:8:ASN:HD22	1:A:9:ASN:H	1.07	1.00
1:A:214:ASN:HD21	1:A:255:MSE:CG	1.74	0.99
1:A:214:ASN:HD21	1:A:255:MSE:HG2	0.84	0.97
1:A:299:ARG:HG3	1:A:299:ARG:HH11	1.28	0.94
2:B:258:THR:HG22	2:B:287:TYR:HH	1.14	0.93
1:A:198:PHE:HA	1:A:201:ILE:HD12	1.53	0.89
2:B:301:PHE:CE2	2:B:305:LEU:HD21	2.10	0.87
1:A:176:ARG:HG2	1:A:176:ARG:NH1	1.90	0.86
1:A:225:SER:O	1:A:229:ASN:HA	1.77	0.83
1:A:265:GLY:HA2	1:A:297:THR:HG22	1.61	0.83
1:A:190:ARG:O	1:A:194:TRP:HB2	1.78	0.82
1:A:143:LEU:HD21	1:A:164:LYS:HB2	1.60	0.82
1:A:64:THR:O	1:A:66:TYR:N	2.13	0.81
1:A:12:PHE:HA	1:A:15:ILE:HG22	1.63	0.80
1:A:246:ILE:HG22	1:A:247:TYR:N	1.95	0.80
1:A:168:CYS:SG	1:A:170:ASN:HB2	2.23	0.78
1:A:325:ARG:HH11	2:B:263:LEU:HD23	1.48	0.78
2:B:302:VAL:HA	2:B:305:LEU:HD22	1.64	0.77
1:A:181:ILE:O	1:A:184:LEU:HB2	1.87	0.75
1:A:59:SER:O	1:A:63:CYS:HB2	1.88	0.74
1:A:176:ARG:HH11	1:A:176:ARG:CG	1.94	0.74
1:A:233:HIS:O	1:A:241:PHE:O	2.05	0.73
1:A:8:ASN:HB3	2:B:295:MSE:HE2	1.71	0.73
1:A:55:VAL:HG21	1:A:292:LEU:HD13	1.69	0.73
2:B:297:ASN:HB3	2:B:300:VAL:HG12	1.72	0.71
1:A:74:ILE:O	1:A:78:THR:HG23	1.90	0.71
1:A:183:LEU:HD21	1:A:193:GLU:HB2	1.71	0.70
1:A:235:ASP:O	1:A:238:GLU:O	2.10	0.70
2:B:301:PHE:O	2:B:305:LEU:HD13	1.92	0.69
2:B:258:THR:HG23	2:B:261:ASP:HB2	1.75	0.69
1:A:143:LEU:HD23	1:A:164:LYS:HB2	1.75	0.68
1:A:197:LEU:HD22	1:A:201:ILE:HD11	1.75	0.68
1:A:54:GLY:O	1:A:58:GLN:HG3	1.93	0.68
1:A:320:GLN:CA	1:A:320:GLN:HE21	2.06	0.68
1:A:129:CYS:H	1:A:136:THR:HG23	1.59	0.67
1:A:149:ASN:HB3	1:A:173:ARG:HH12	1.58	0.67
1:A:299:ARG:HG3	1:A:299:ARG:NH1	2.04	0.67
1:A:214:ASN:OD1	1:A:216:GLU:HG2	1.95	0.67

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:320:GLN:HA	1:A:320:GLN:NE2	2.08	0.67
1:A:61:HIS:CD2	1:A:65:VAL:HG21	2.30	0.67
1:A:197:LEU:HD22	1:A:201:ILE:CD1	2.26	0.65
1:A:213:TRP:HA	1:A:219:VAL:HG12	1.79	0.65
2:B:301:PHE:CD2	2:B:305:LEU:HD21	2.32	0.65
2:B:294:ILE:HG12	2:B:301:PHE:HD1	1.62	0.64
1:A:8:ASN:ND2	1:A:9:ASN:H	1.89	0.63
1:A:66:TYR:HD2	1:A:200:LEU:HB2	1.63	0.63
2:B:276:LEU:HD23	2:B:276:LEU:O	1.99	0.63
1:A:67:ASP:HA	1:A:72:HIS:HE2	1.64	0.63
2:B:301:PHE:HE2	2:B:305:LEU:HD21	1.60	0.63
1:A:245:TYR:CD1	1:A:246:ILE:N	2.66	0.63
1:A:268:ASP:OD1	1:A:281:ARG:NH2	2.32	0.62
2:B:281:GLU:O	2:B:284:SER:N	2.27	0.62
1:A:307:ASP:O	1:A:308:GLU:C	2.42	0.62
1:A:12:PHE:HA	1:A:15:ILE:CG2	2.28	0.61
1:A:156:ASN:O	1:A:178:ASN:N	2.32	0.61
1:A:8:ASN:CB	2:B:295:MSE:HE2	2.29	0.61
1:A:76:LEU:O	1:A:81:LEU:HD11	2.01	0.61
1:A:247:TYR:CB	1:A:255:MSE:HE1	2.30	0.60
1:A:320:GLN:HE21	1:A:320:GLN:HA	1.65	0.60
2:B:301:PHE:C	2:B:301:PHE:HD2	2.10	0.59
1:A:99:GLU:O	1:A:101:GLU:HB2	2.02	0.59
1:A:37:VAL:O	1:A:40:ILE:HG13	2.01	0.59
1:A:105:THR:O	1:A:108:LEU:HB3	2.03	0.59
1:A:224:PHE:C	1:A:224:PHE:CD2	2.80	0.59
1:A:129:CYS:HB2	1:A:140:MSE:SE	2.53	0.58
1:A:301:ARG:NH2	1:A:312:LEU:HB3	2.18	0.58
1:A:152:GLU:OE1	1:A:160:VAL:HG21	2.04	0.58
2:B:301:PHE:CD2	2:B:301:PHE:C	2.82	0.58
1:A:225:SER:O	1:A:229:ASN:CA	2.51	0.58
1:A:266:VAL:H	1:A:297:THR:HG22	1.69	0.58
1:A:103:ILE:HG13	1:A:107:TYR:HE2	1.69	0.57
1:A:143:LEU:CD2	1:A:164:LYS:CB	2.77	0.57
1:A:245:TYR:O	1:A:246:ILE:C	2.46	0.56
2:B:298:PRO:O	2:B:301:PHE:HB3	2.04	0.56
2:B:276:LEU:O	2:B:280:LEU:HB2	2.04	0.56
1:A:31:PHE:HB3	1:A:309:ILE:HD11	1.88	0.56
1:A:72:HIS:ND1	1:A:204:SER:HA	2.20	0.56
1:A:320:GLN:CA	1:A:320:GLN:NE2	2.67	0.56
2:B:303:SER:O	2:B:306:LEU:HD12	2.06	0.55

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:216:GLU:OE1	1:A:256:SER:N	2.40	0.55
1:A:111:GLU:O	1:A:112:LEU:C	2.48	0.55
1:A:23:TYR:HA	2:B:306:LEU:HD23	1.87	0.55
1:A:114:ARG:NH2	1:A:119:ASP:OD2	2.39	0.55
2:B:303:SER:C	2:B:305:LEU:H	2.15	0.55
1:A:254:LYS:HD3	5:A:1011:HOH:O	2.05	0.55
1:A:68:ASN:C	1:A:72:HIS:HD2	2.14	0.55
1:A:296:ILE:O	1:A:300:LEU:HB2	2.05	0.55
2:B:303:SER:O	2:B:305:LEU:N	2.39	0.55
2:B:255:ILE:HG23	2:B:256:GLY:N	2.22	0.54
1:A:325:ARG:NH1	2:B:263:LEU:HD23	2.19	0.54
1:A:51:PHE:CB	1:A:283:GLN:HB2	2.38	0.54
1:A:258:CYS:HB2	1:A:270:SER:HA	1.90	0.54
1:A:266:VAL:H	1:A:297:THR:CG2	2.21	0.54
2:B:280:LEU:C	2:B:283:ILE:HG22	2.33	0.54
1:A:26:PHE:C	1:A:26:PHE:CD2	2.82	0.53
1:A:265:GLY:CA	1:A:297:THR:HG22	2.35	0.53
1:A:101:GLU:OE1	1:A:102:ASN:N	2.35	0.53
1:A:254:LYS:HB3	1:A:279:LEU:HD21	1.91	0.53
1:A:130:ASN:O	1:A:131:HIS:C	2.50	0.53
1:A:256:SER:O	1:A:281:ARG:HD2	2.09	0.53
1:A:66:TYR:CD2	1:A:200:LEU:HB2	2.44	0.52
2:B:284:SER:C	2:B:286:ARG:N	2.67	0.52
1:A:123:TRP:HA	1:A:194:TRP:CZ3	2.44	0.52
1:A:214:ASN:ND2	1:A:255:MSE:HE2	2.24	0.52
1:A:225:SER:HA	5:A:1006:HOH:O	2.09	0.52
2:B:265:LEU:HA	2:B:279:LEU:HD11	1.92	0.52
2:B:255:ILE:HG23	2:B:256:GLY:H	1.73	0.52
1:A:124:CYS:HB2	1:A:188:LYS:HB2	1.91	0.52
2:B:258:THR:HG23	2:B:261:ASP:CB	2.39	0.51
1:A:216:GLU:HG3	1:A:254:LYS:O	2.11	0.51
1:A:122:LYS:O	1:A:188:LYS:HA	2.10	0.51
1:A:103:ILE:HG13	1:A:107:TYR:CE2	2.45	0.51
1:A:250:ASN:N	1:A:250:ASN:HD22	2.07	0.50
3:C:1:GLC:HO6	3:C:2:FRU:HO6	1.57	0.50
2:B:284:SER:C	2:B:286:ARG:H	2.18	0.50
1:A:131:HIS:C	1:A:131:HIS:ND1	2.69	0.50
2:B:281:GLU:HG2	2:B:282:ASN:N	2.27	0.50
2:B:282:ASN:HD21	2:B:286:ARG:HH21	1.58	0.50
1:A:214:ASN:HD22	1:A:255:MSE:HE2	1.77	0.50
3:C:1:GLC:O6	3:C:2:FRU:O6	2.28	0.50

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:275:LEU:O	1:A:276:GLN:CB	2.59	0.50
1:A:214:ASN:ND2	1:A:255:MSE:SE	2.95	0.50
1:A:160:VAL:HA	1:A:175:PRO:HA	1.93	0.49
1:A:323:LEU:O	1:A:326:GLY:N	2.45	0.49
1:A:32:LYS:HG3	1:A:33:LYS:N	2.27	0.49
1:A:84:ILE:O	1:A:88:VAL:HG23	2.12	0.49
2:B:294:ILE:HG12	2:B:301:PHE:CD1	2.44	0.49
1:A:268:ASP:OD2	1:A:268:ASP:C	2.56	0.49
2:B:306:LEU:O	2:B:309:VAL:HB	2.13	0.49
1:A:149:ASN:HB3	1:A:173:ARG:NH1	2.26	0.49
1:A:273:TYR:O	1:A:275:LEU:N	2.45	0.49
2:B:276:LEU:HD23	2:B:276:LEU:C	2.38	0.49
2:B:287:TYR:HB3	2:B:289:GLN:HE22	1.79	0.48
1:A:8:ASN:HD22	1:A:9:ASN:N	1.92	0.48
1:A:32:LYS:C	1:A:33:LYS:HG3	2.38	0.48
1:A:263:LYS:O	1:A:300:LEU:HD22	2.13	0.48
1:A:79:LEU:HD11	1:A:201:ILE:HG23	1.95	0.48
2:B:274:GLU:H	2:B:274:GLU:CD	2.21	0.48
1:A:12:PHE:CA	1:A:15:ILE:HG22	2.39	0.48
1:A:121:PHE:HD1	1:A:194:TRP:CE3	2.32	0.48
1:A:247:TYR:HB3	1:A:255:MSE:CE	2.43	0.48
1:A:108:LEU:HG	1:A:112:LEU:HD23	1.96	0.48
2:B:279:LEU:O	2:B:283:ILE:HG22	2.14	0.48
1:A:109:VAL:HG21	1:A:223:TYR:CE1	2.49	0.48
1:A:162:ILE:HD12	1:A:163:TYR:N	2.28	0.48
1:A:210:ARG:NH2	1:A:267:VAL:HG11	2.28	0.47
2:B:269:VAL:HG22	2:B:276:LEU:HD12	1.96	0.47
2:B:289:GLN:H	2:B:289:GLN:CD	2.21	0.47
1:A:52:ALA:O	1:A:55:VAL:HG22	2.14	0.47
1:A:225:SER:O	1:A:229:ASN:N	2.47	0.47
1:A:305:ASN:OD1	1:A:305:ASN:C	2.58	0.47
1:A:72:HIS:O	1:A:75:VAL:HG13	2.14	0.47
1:A:245:TYR:O	1:A:247:TYR:N	2.47	0.47
1:A:315:ARG:O	1:A:315:ARG:HG2	2.11	0.47
1:A:157:CYS:HB2	1:A:177:TYR:HD1	1.79	0.47
2:B:268:VAL:HG11	2:B:279:LEU:HD12	1.97	0.47
1:A:301:ARG:HG2	1:A:304:LEU:HD12	1.96	0.47
1:A:61:HIS:O	1:A:65:VAL:HG23	2.15	0.46
1:A:321:ILE:HD13	2:B:267:GLN:HB2	1.97	0.46
1:A:183:LEU:HD21	1:A:193:GLU:CB	2.42	0.46
1:A:183:LEU:CD2	1:A:193:GLU:HB2	2.42	0.46

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:297:ASN:OD1	2:B:300:VAL:HB	2.16	0.46
1:A:33:LYS:NZ	1:A:33:LYS:HB2	2.31	0.46
1:A:271:LYS:HB3	1:A:271:LYS:HE2	1.50	0.46
2:B:302:VAL:O	2:B:305:LEU:HB2	2.16	0.46
1:A:182:LYS:C	1:A:184:LEU:H	2.24	0.46
1:A:189:GLY:HA3	1:A:193:GLU:CG	2.46	0.46
1:A:301:ARG:HG2	1:A:304:LEU:CD1	2.45	0.46
1:A:140:MSE:HE3	1:A:163:TYR:HB3	1.97	0.46
1:A:149:ASN:H	1:A:152:GLU:CG	2.29	0.46
1:A:59:SER:OG	1:A:60:GLN:N	2.49	0.46
1:A:114:ARG:HG3	1:A:115:TYR:N	2.30	0.46
1:A:247:TYR:O	1:A:251:TRP:HB2	2.16	0.46
2:B:276:LEU:HD23	2:B:280:LEU:HB2	1.98	0.46
1:A:250:ASN:N	1:A:250:ASN:ND2	2.64	0.45
1:A:261:PHE:CD1	1:A:261:PHE:N	2.84	0.45
1:A:249:ILE:CD1	1:A:250:ASN:ND2	2.80	0.45
1:A:68:ASN:HB3	1:A:70:SER:OG	2.16	0.45
1:A:156:ASN:HB3	1:A:178:ASN:HB2	1.98	0.45
1:A:162:ILE:HD13	1:A:171:ILE:HG23	1.98	0.45
2:B:280:LEU:HD11	2:B:301:PHE:CZ	2.51	0.45
1:A:72:HIS:O	1:A:76:LEU:HD23	2.16	0.45
1:A:214:ASN:ND2	1:A:255:MSE:CG	2.52	0.45
1:A:141:THR:HA	1:A:142:PRO:HD2	1.72	0.45
2:B:287:TYR:O	2:B:288:PRO:C	2.58	0.45
1:A:11:ASP:OD2	1:A:14:SER:HB3	2.15	0.45
2:B:265:LEU:HA	2:B:279:LEU:CD1	2.46	0.45
1:A:266:VAL:O	1:A:293:CYS:HB3	2.18	0.44
1:A:162:ILE:CD1	1:A:171:ILE:HG23	2.47	0.44
1:A:200:LEU:O	1:A:201:ILE:C	2.60	0.44
2:B:290:LEU:O	2:B:291:ARG:C	2.59	0.44
1:A:198:PHE:CA	1:A:201:ILE:HD12	2.36	0.44
1:A:307:ASP:O	1:A:310:TYR:N	2.50	0.44
1:A:318:GLN:NE2	2:B:271:GLY:HA3	2.32	0.44
1:A:143:LEU:HD13	1:A:143:LEU:HA	1.72	0.44
2:B:258:THR:CG2	2:B:261:ASP:OD2	2.65	0.44
1:A:123:TRP:HA	1:A:194:TRP:HZ3	1.83	0.43
1:A:19:LEU:O	1:A:20:LEU:C	2.61	0.43
1:A:38:GLU:O	1:A:39:ASN:C	2.61	0.43
1:A:71:TRP:CG	1:A:181:ILE:HD11	2.53	0.43
1:A:73:SER:O	1:A:74:ILE:C	2.61	0.43
1:A:182:LYS:C	1:A:184:LEU:N	2.77	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:280:LEU:HA	2:B:283:ILE:CG2	2.49	0.43
1:A:247:TYR:HB3	1:A:255:MSE:HE1	2.00	0.43
1:A:321:ILE:HA	1:A:324:ILE:HG22	2.01	0.43
1:A:76:LEU:CD1	1:A:81:LEU:HD21	2.49	0.43
2:B:269:VAL:HG22	2:B:276:LEU:CD1	2.49	0.43
1:A:32:LYS:HG3	1:A:33:LYS:H	1.84	0.43
1:A:176:ARG:NH1	1:A:176:ARG:CG	2.61	0.43
1:A:251:TRP:O	1:A:252:ASN:HB2	2.18	0.43
1:A:301:ARG:NH2	1:A:312:LEU:CB	2.82	0.43
1:A:49:ASN:OD1	1:A:51:PHE:N	2.51	0.43
1:A:143:LEU:HD21	1:A:164:LYS:CB	2.41	0.42
1:A:281:ARG:HG2	1:A:286:GLU:OE2	2.19	0.42
1:A:134:GLN:O	1:A:136:THR:HG22	2.19	0.42
2:B:301:PHE:O	2:B:305:LEU:CD1	2.66	0.42
1:A:71:TRP:CD1	1:A:181:ILE:HD11	2.54	0.42
1:A:241:PHE:CD2	1:A:242:ASP:HB2	2.54	0.42
1:A:216:GLU:HB2	1:A:253:LYS:HE2	2.02	0.42
1:A:49:ASN:OD1	1:A:50:GLN:N	2.53	0.41
1:A:161:GLU:OE2	1:A:190:ARG:NH2	2.40	0.41
2:B:303:SER:C	2:B:305:LEU:N	2.78	0.41
1:A:113:LEU:HA	1:A:113:LEU:HD13	1.62	0.41
1:A:249:ILE:HD11	1:A:250:ASN:ND2	2.36	0.41
2:B:255:ILE:CG2	2:B:256:GLY:H	2.34	0.41
1:A:71:TRP:O	1:A:72:HIS:C	2.62	0.41
2:B:297:ASN:HA	2:B:298:PRO:HD2	1.83	0.41
1:A:12:PHE:CZ	2:B:281:GLU:HA	2.56	0.41
1:A:111:GLU:C	1:A:113:LEU:N	2.78	0.41
1:A:147:GLY:HA2	1:A:148:PRO:HD3	1.85	0.41
1:A:174:PHE:CZ	1:A:176:ARG:NH1	2.88	0.41
1:A:178:ASN:ND2	3:E:1:GLC:H5	2.35	0.41
1:A:215:ARG:HB3	1:A:216:GLU:OE2	2.20	0.41
1:A:285:LYS:HB2	1:A:288:ASP:OD2	2.21	0.41
2:B:289:GLN:CD	2:B:289:GLN:N	2.79	0.41
1:A:50:GLN:O	1:A:53:GLN:HB2	2.20	0.40
1:A:77:GLU:OE1	1:A:77:GLU:HA	2.21	0.40
2:B:302:VAL:O	2:B:303:SER:C	2.64	0.40
2:B:306:LEU:HD12	2:B:306:LEU:H	1.85	0.40
1:A:17:LYS:O	1:A:21:ILE:HD12	2.21	0.40
1:A:189:GLY:O	1:A:194:TRP:CE3	2.74	0.40
1:A:309:ILE:HG23	1:A:310:TYR:N	2.35	0.40
1:A:103:ILE:HB	1:A:227:PHE:CD1	2.57	0.40

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:216:GLU:OE2	1:A:216:GLU:N	2.55	0.40
1:A:195:CYS:O	1:A:196:ASN:C	2.65	0.40
1:A:266:VAL:N	1:A:297:THR:HG22	2.36	0.40
2:B:279:LEU:C	2:B:279:LEU:CD2	2.94	0.40

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	318/335 (95%)	241 (76%)	60 (19%)	17 (5%)	1	9
2	B	55/72 (76%)	27 (49%)	22 (40%)	6 (11%)	0	1
All	All	373/407 (92%)	268 (72%)	82 (22%)	23 (6%)	1	6

All (23) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	33	LYS
1	A	65	VAL
1	A	97	HIS
1	A	246	ILE
1	A	276	GLN
2	B	254	SER
1	A	132	CYS
2	B	259	VAL
2	B	303	SER
2	B	304	MSE
1	A	9	ASN
1	A	119	ASP
1	A	274	ILE
1	A	282	ASP

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
2	B	307	GLU
1	A	94	LYS
1	A	196	ASN
1	A	229	ASN
1	A	20	LEU
1	A	70	SER
2	B	288	PRO
1	A	100	GLY
1	A	284	ILE

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	296/306 (97%)	223 (75%)	73 (25%)	1	4
2	B	49/54 (91%)	33 (67%)	16 (33%)	0	1
All	All	345/360 (96%)	256 (74%)	89 (26%)	0	3

All (89) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	8	ASN
1	A	10	ILE
1	A	20	LEU
1	A	26	PHE
1	A	27	ILE
1	A	33	LYS
1	A	44	ASN
1	A	55	VAL
1	A	60	GLN
1	A	64	THR
1	A	70	SER
1	A	73	SER
1	A	74	ILE
1	A	75	VAL

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	76	LEU
1	A	81	LEU
1	A	91	GLU
1	A	99	GLU
1	A	101	GLU
1	A	105	THR
1	A	113	LEU
1	A	119	ASP
1	A	122	LYS
1	A	132	CYS
1	A	134	GLN
1	A	139	ASN
1	A	141	THR
1	A	143	LEU
1	A	145	SER
1	A	149	ASN
1	A	151	GLU
1	A	153	SER
1	A	162	ILE
1	A	170	ASN
1	A	176	ARG
1	A	183	LEU
1	A	184	LEU
1	A	186	THR
1	A	191	CYS
1	A	193	GLU
1	A	197	LEU
1	A	204	SER
1	A	208	ASP
1	A	212	VAL
1	A	216	GLU
1	A	223	TYR
1	A	233	HIS
1	A	234	VAL
1	A	240	SER
1	A	243	GLN
1	A	246	ILE
1	A	249	ILE
1	A	253	LYS
1	A	254	LYS
1	A	267	VAL
1	A	271	LYS

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	274	ILE
1	A	275	LEU
1	A	279	LEU
1	A	283	GLN
1	A	290	LYS
1	A	292	LEU
1	A	294	GLN
1	A	296	ILE
1	A	299	ARG
1	A	300	LEU
1	A	307	ASP
1	A	311	GLN
1	A	315	ARG
1	A	320	GLN
1	A	321	ILE
1	A	323	LEU
1	A	327	LYS
2	B	257	LEU
2	B	258	THR
2	B	265	LEU
2	B	266	ARG
2	B	268	VAL
2	B	274	GLU
2	B	279	LEU
2	B	282	ASN
2	B	289	GLN
2	B	300	VAL
2	B	301	PHE
2	B	303	SER
2	B	304	MSE
2	B	305	LEU
2	B	306	LEU
2	B	309	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	8	ASN
1	A	39	ASN
1	A	61	HIS
1	A	97	HIS
1	A	102	ASN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	118	GLN
1	A	146	GLN
1	A	149	ASN
1	A	178	ASN
1	A	218	HIS
1	A	226	ASN
1	A	239	GLN
1	A	243	GLN
1	A	250	ASN
1	A	318	GLN
1	A	320	GLN

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 ⓘ

6 monosaccharides 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	$\# Z > 2$
3	GLC	C	1	3	11,11,12	0.81	0	15,15,17	1.18	2 (13%)
3	FRU	C	2	3	11,12,12	0.84	0	10,18,18	0.85	0
3	GLC	D	1	3	11,11,12	0.59	0	15,15,17	1.48	1 (6%)
3	FRU	D	2	3	11,12,12	1.06	1 (9%)	10,18,18	0.78	0
3	GLC	E	1	3	11,11,12	0.42	0	15,15,17	1.24	3 (20%)
3	FRU	E	2	3	11,12,12	0.67	0	10,18,18	1.02	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	GLC	C	1	3	-	2/2/19/22	0/1/1/1
3	FRU	C	2	3	-	5/5/24/24	0/1/1/1
3	GLC	D	1	3	-	0/2/19/22	0/1/1/1
3	FRU	D	2	3	-	0/5/24/24	0/1/1/1
3	GLC	E	1	3	-	0/2/19/22	0/1/1/1
3	FRU	E	2	3	-	3/5/24/24	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	2	FRU	O2-C2	3.00	1.45	1.40

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	1	GLC	C1-O5-C5	5.14	119.07	112.19
3	E	1	GLC	C1-O5-C5	2.45	115.47	112.19
3	C	1	GLC	O3-C3-C4	2.25	115.67	110.38
3	E	1	GLC	C1-C2-C3	2.16	112.79	109.64
3	C	1	GLC	C1-C2-C3	-2.08	106.61	109.64
3	E	1	GLC	C3-C4-C5	-2.00	106.60	110.23

There are no chirality outliers.

All (10) torsion outliers are listed below:

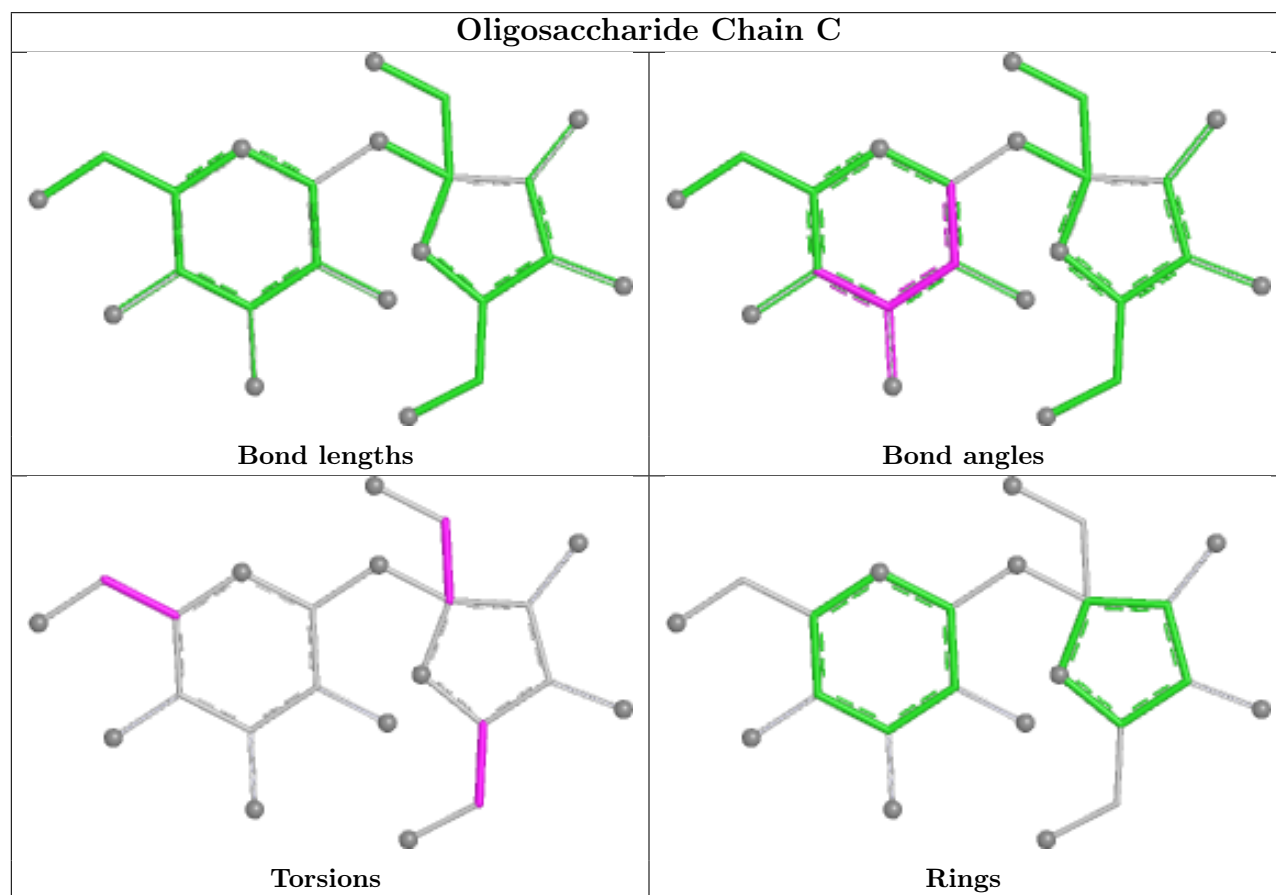
Mol	Chain	Res	Type	Atoms
3	C	2	FRU	O1-C1-C2-C3
3	C	2	FRU	O1-C1-C2-O2
3	C	2	FRU	O1-C1-C2-O5
3	E	2	FRU	O1-C1-C2-C3
3	E	2	FRU	O1-C1-C2-O2
3	E	2	FRU	O1-C1-C2-O5
3	C	2	FRU	C4-C5-C6-O6
3	C	2	FRU	O5-C5-C6-O6
3	C	1	GLC	C4-C5-C6-O6
3	C	1	GLC	O5-C5-C6-O6

There are no ring outliers.

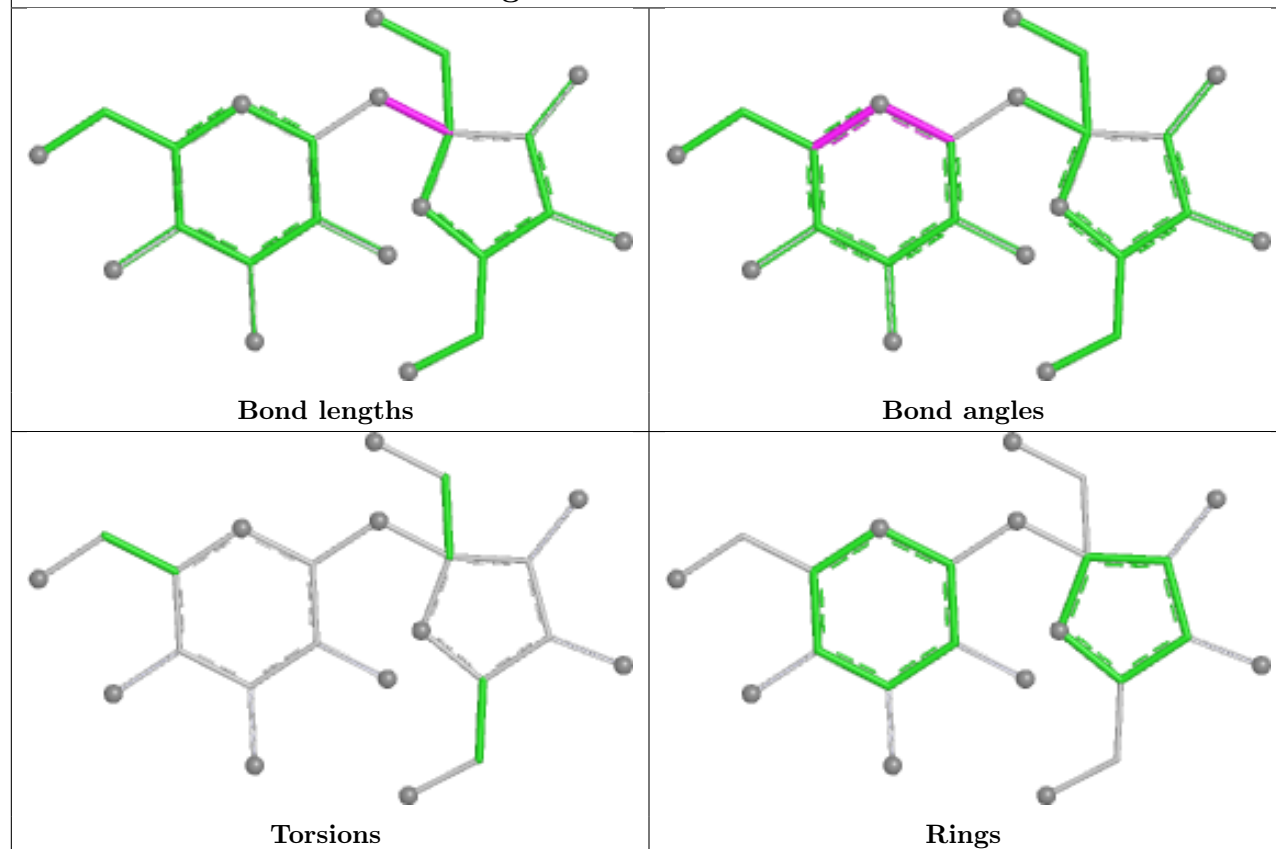
3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	E	1	GLC	1	0
3	C	1	GLC	2	0
3	C	2	FRU	2	0

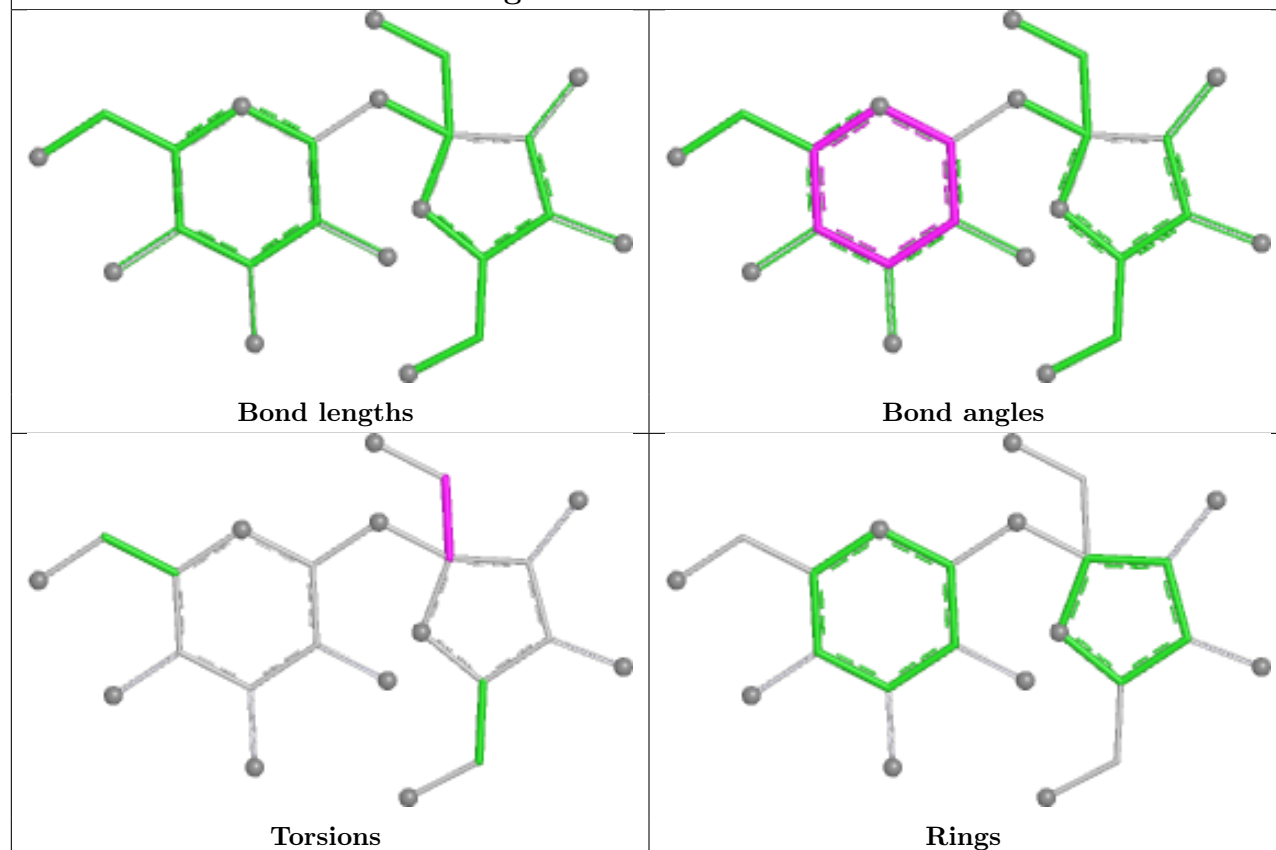
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



Oligosaccharide Chain D



Oligosaccharide Chain E



5.6 Ligand geometry

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

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	317/335 (94%)	-0.34	5 (1%) 70 47	41, 69, 110, 116	0
2	B	55/72 (76%)	-0.15	3 (5%) 30 15	56, 79, 115, 116	0
All	All	372/407 (91%)	-0.31	8 (2%) 62 39	41, 71, 113, 116	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	255	ILE	3.1
1	A	34	ALA	2.3
1	A	97	HIS	2.2
2	B	253	GLY	2.2
1	A	98	ALA	2.1
1	A	138	GLU	2.1
1	A	133	GLY	2.1
2	B	254	SER	2.1

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](#)

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
3	GLC	C	1	11/12	0.66	0.24	82,87,88,88	11

Continued on next page...

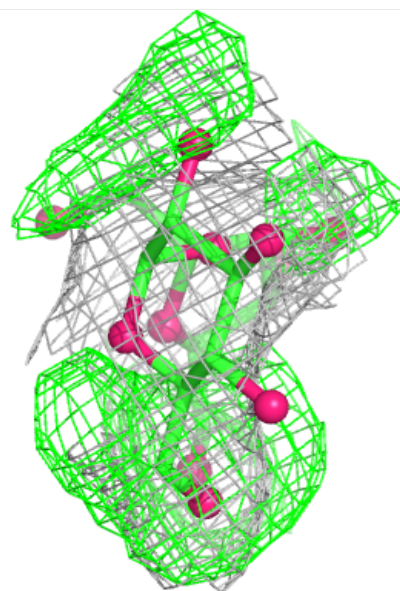
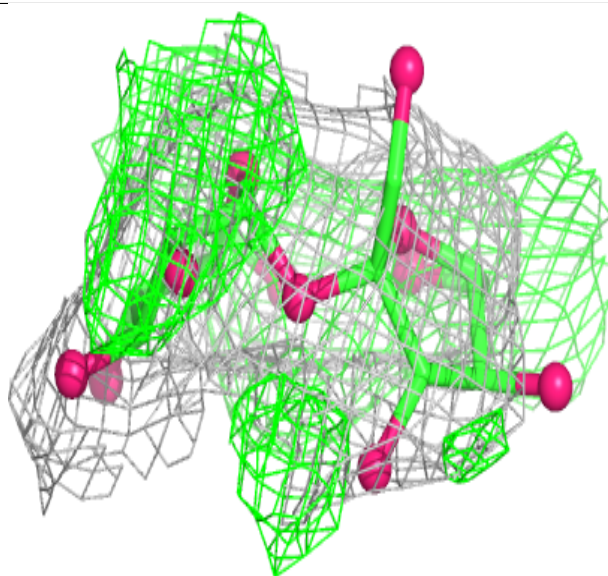
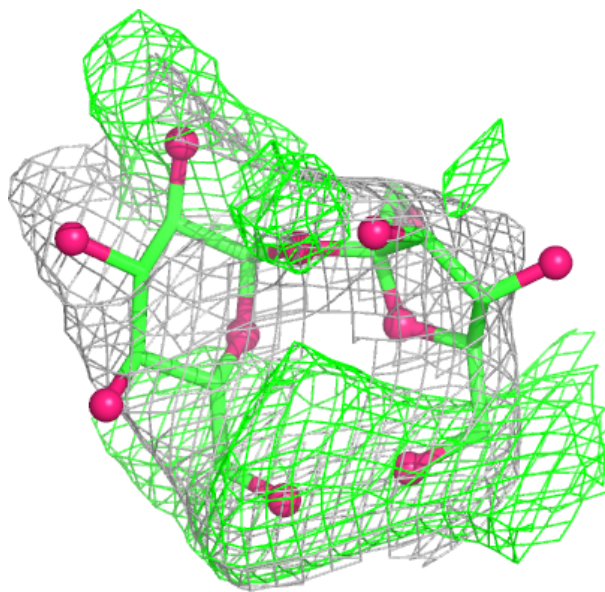
Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	FRU	E	2	12/12	0.84	0.25	104,112,113,117	12
3	FRU	C	2	12/12	0.86	0.26	81,89,91,93	12
3	GLC	D	1	11/12	0.88	0.22	113,115,115,116	11
3	FRU	D	2	12/12	0.91	0.20	113,115,115,115	12
3	GLC	E	1	11/12	0.94	0.23	110,111,111,112	11

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

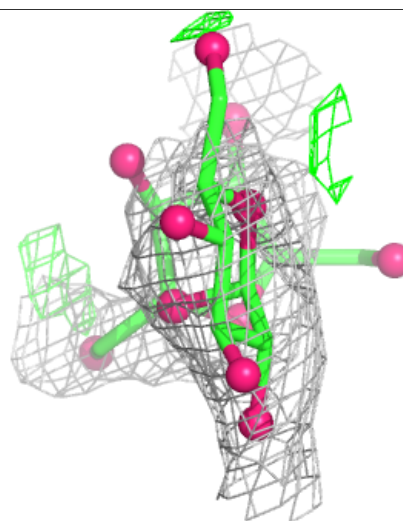
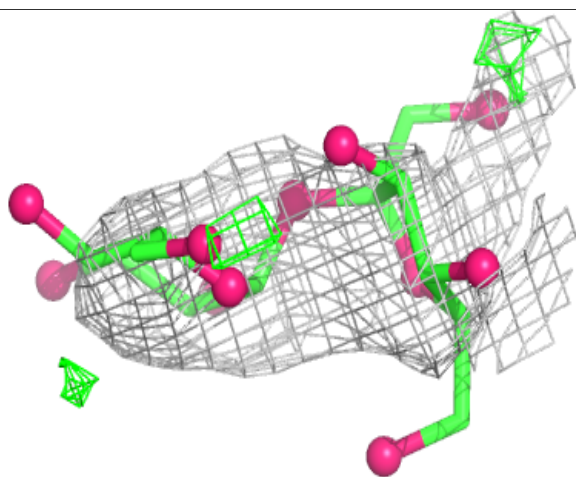
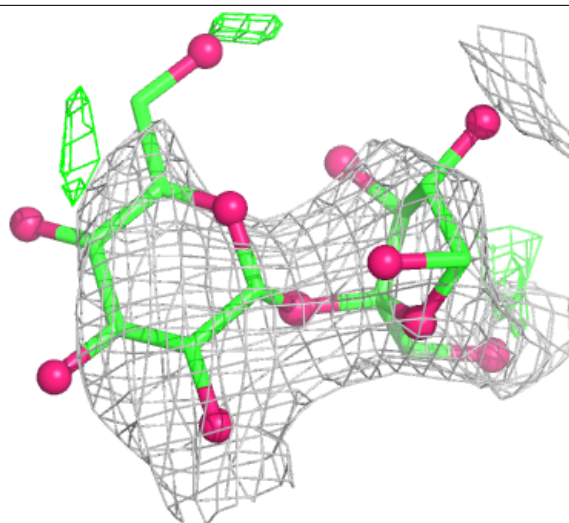
Electron density around Chain C:

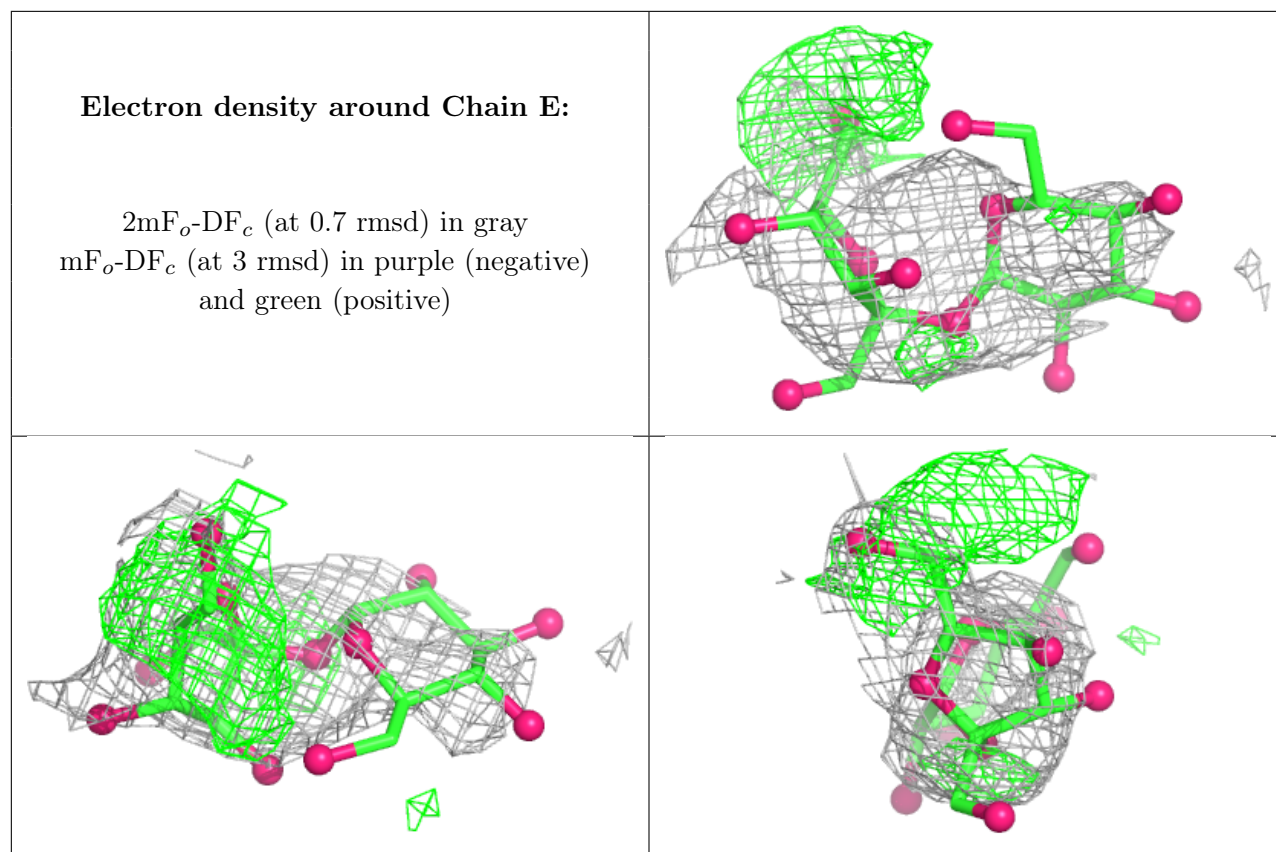
2mF_o-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around Chain D:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





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($\text{\AA}^2$)	Q<0.9
4	ZN	A	999	1/1	0.91	0.08	68,68,68,68	0

6.5 Other polymers [i](#)

There are no such residues in this entry.