



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 01:25 AM UTC

PDB ID : 1VFM / pdb_00001vfm
Title : Crystal structure of Thermoactinomyces vulgaris R-47 alpha-amylase 2/alpha-cyclodextrin complex
Authors : Ohtaki, A.; Mizuno, M.; Tonozuka, T.; Sakano, Y.; Kamitori, S.
Deposited on : 2004-04-16
Resolution : 2.90 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

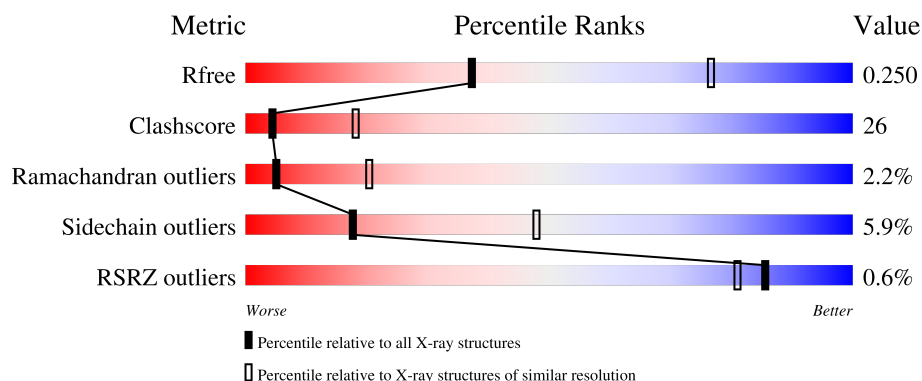
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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	2481 (2.90-2.90)
Clashscore	190562	2690 (2.90-2.90)
Ramachandran outliers	187476	2623 (2.90-2.90)
Sidechain outliers	187428	2625 (2.90-2.90)
RSRZ outliers	180081	2481 (2.90-2.90)

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	585	51% 42% 7%
1	B	585	51% 44% 5%
2	C	6	33% 33% 33%
3	D	6	17% 33% 50%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 9924 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.

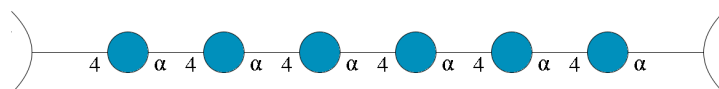
- Molecule 1 is a protein called Neopullulanase 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	585	Total	C	N	O	S	0	0	0
			4776	3056	833	872	15			
1	B	585	Total	C	N	O	S	0	0	0
			4776	3056	833	872	15			

There are 4 discrepancies between the modelled and reference sequences:

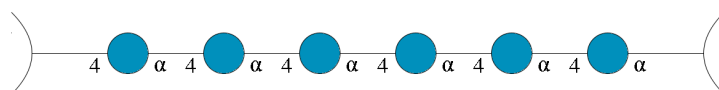
Chain	Residue	Modelled	Actual	Comment	Reference
A	325	ASN	ASP	engineered mutation	UNP Q08751
A	421	ASN	ASP	engineered mutation	UNP Q08751
B	325	ASN	ASP	engineered mutation	UNP Q08751
B	421	ASN	ASP	engineered mutation	UNP Q08751

- Molecule 2 is an oligosaccharide called Cyclohexakis-(1-4)-(alpha-D-glucopyranose).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
2	C	6	Total	C	O	0	0	0
			66	36	30			

- Molecule 3 is an oligosaccharide called Cyclic beta-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
3	D	6	Total	C	O	0	0	0
			66	36	30			

- Molecule 4 is CALCIUM ION (CCD ID: CA) (formula: Ca).

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

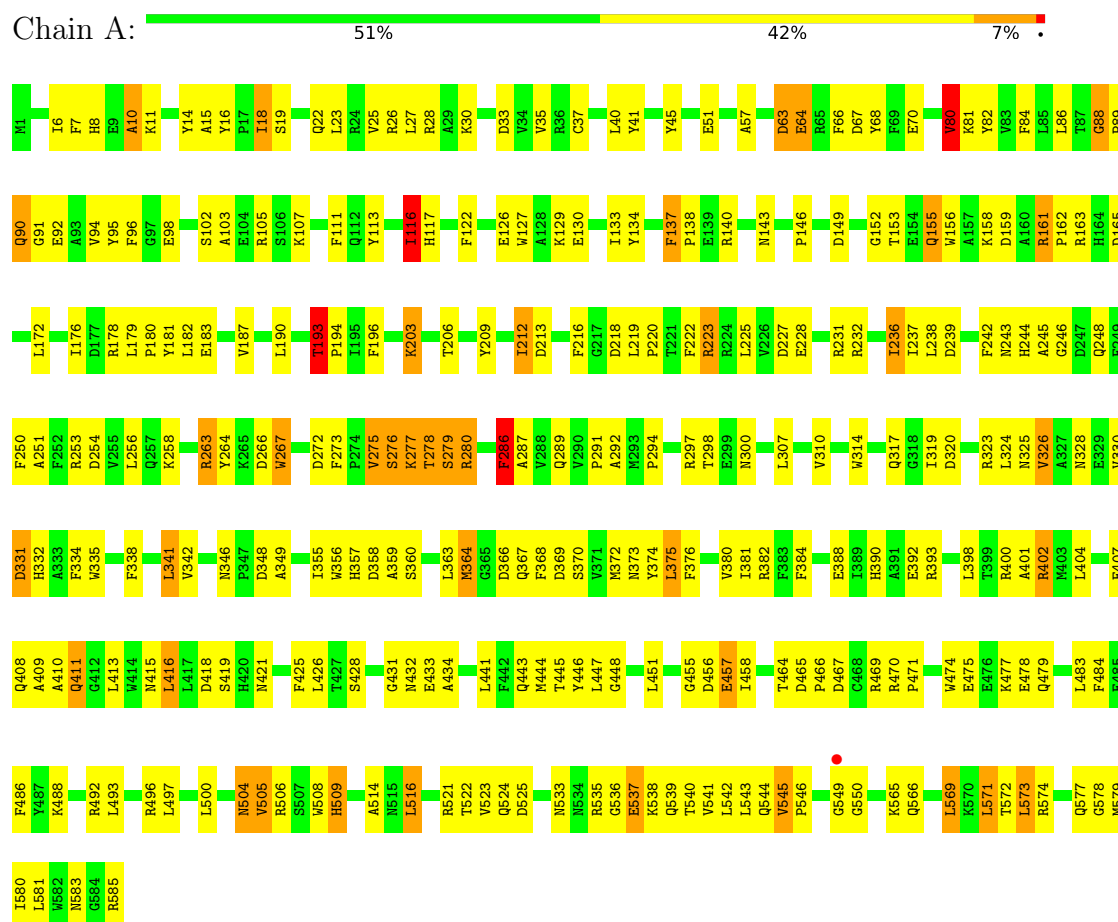
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	135	Total	O	0	0
			135	135		
5	B	103	Total	O	0	0
			103	103		

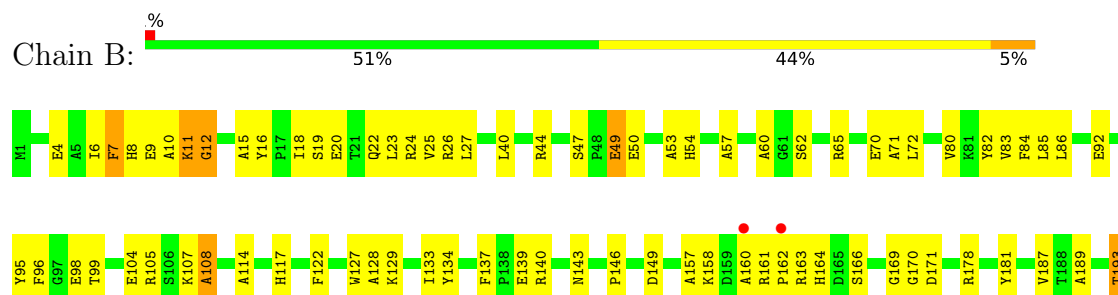
3 Residue-property plots

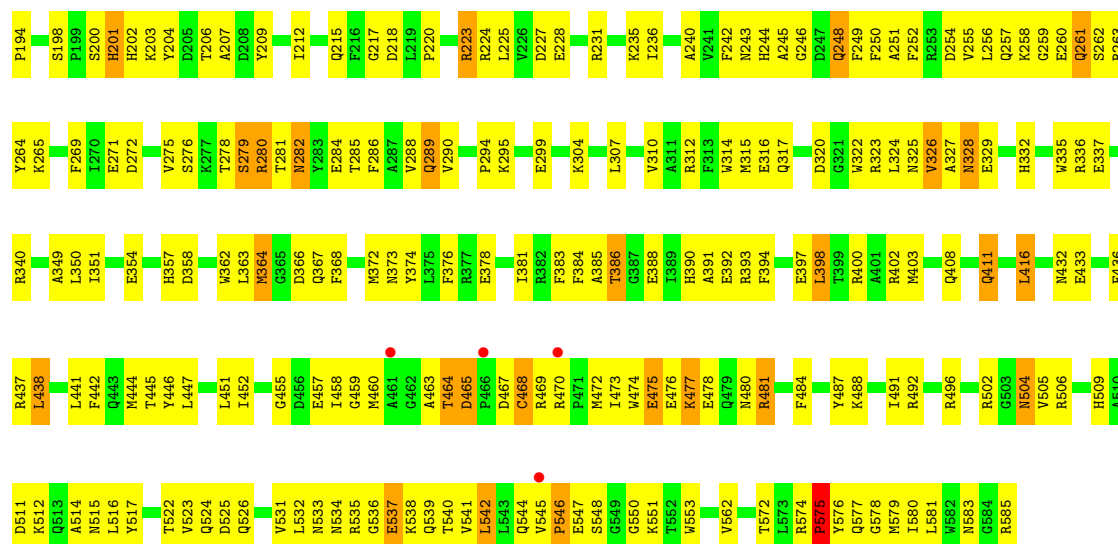
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Neopullulanase 2



• Molecule 1: Neopullulanase 2





• Molecule 2: Cyclohexakis-(1-4)-(α -D-glucopyranose)

Chain C: 33% 33% 33%



• Molecule 3: Cyclic β -D-glucopyranose-(1-4)- α -D-glucopyranose-(1-4)- α -D-glucopyranose-(1-4)- α -D-glucopyranose-(1-4)- α -D-glucopyranose

Chain D: 17% 33% 50%



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	115.39Å 118.43Å 113.69Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	40.49 – 2.90 40.49 – 2.90	Depositor EDS
% Data completeness (in resolution range)	92.2 (40.49-2.90) 92.3 (40.49-2.90)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.38 (at 2.90Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.191 , 0.248 0.197 , 0.250	Depositor DCC
R_{free} test set	3241 reflections (9.98%)	wwPDB-VP
Wilson B-factor (Å ²)	63.3	Xtriage
Anisotropy	0.306	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 57.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.019 for k,h,-l 0.021 for -h,-l,-k 0.017 for l,-k,h 0.007 for k,l,h 0.007 for l,h,k	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	9924	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.40% 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: CA, BGC, 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	0.47	0/4906	0.98	23/6641 (0.3%)
1	B	0.44	0/4906	0.96	16/6641 (0.2%)
All	All	0.46	0/9812	0.97	39/13282 (0.3%)

There are no bond length outliers.

All (39) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	18	ILE	N-CA-C	-9.56	103.83	113.10
1	A	276	SER	N-CA-C	8.66	122.43	109.95
1	B	257	GLN	N-CA-C	7.70	119.75	111.36
1	B	80	VAL	N-CA-C	7.24	117.33	108.06
1	B	468	CYS	N-CA-C	-7.24	104.70	113.97
1	A	80	VAL	N-CA-C	7.20	117.81	107.88
1	A	267	TRP	N-CA-C	-7.06	104.55	113.72
1	A	161	ARG	CA-C-N	7.02	128.62	119.84
1	A	161	ARG	C-N-CA	7.02	128.62	119.84
1	A	88	GLY	N-CA-C	6.50	120.10	112.10
1	B	108	ALA	N-CA-C	-6.24	105.67	113.28
1	B	18	ILE	N-CA-C	-6.22	107.19	113.47
1	B	477	LYS	N-CA-C	-6.16	106.31	113.88
1	B	279	SER	N-CA-C	-6.08	105.13	112.54
1	A	287	ALA	CB-CA-C	-5.97	109.67	116.54
1	B	310	VAL	N-CA-C	-5.82	104.84	110.72
1	A	67	ASP	N-CA-C	-5.76	100.02	109.40
1	A	369	ASP	N-CA-C	-5.70	106.49	113.50
1	A	280	ARG	N-CA-C	-5.64	98.79	110.80
1	B	391	ALA	N-CA-C	5.64	117.10	111.07
1	A	524	GLN	CB-CA-C	-5.57	110.14	116.54
1	A	393	ARG	N-CA-C	-5.50	105.36	111.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	203	LYS	N-CA-C	5.47	119.25	112.58
1	A	103	ALA	N-CA-C	-5.45	105.73	112.38
1	B	217	GLY	N-CA-C	5.44	117.25	110.29
1	B	316	GLU	N-CA-C	-5.41	105.41	112.23
1	A	286	PHE	N-CA-C	-5.37	102.92	110.50
1	A	137	PHE	CA-C-N	5.34	126.52	119.84
1	A	137	PHE	C-N-CA	5.34	126.52	119.84
1	B	201	HIS	N-CA-C	-5.32	106.92	113.41
1	A	88	GLY	CA-C-N	5.26	124.71	119.24
1	A	88	GLY	C-N-CA	5.26	124.71	119.24
1	A	193	THR	CA-C-N	-5.21	114.43	119.90
1	A	193	THR	C-N-CA	-5.21	114.43	119.90
1	B	207	ALA	N-CA-C	-5.14	107.66	114.04
1	B	9	GLU	N-CA-C	-5.14	100.22	108.55
1	B	7	PHE	N-CA-C	5.09	116.92	109.24
1	A	116	ILE	CB-CA-C	-5.08	106.15	112.45
1	B	394	PHE	N-CA-C	-5.05	104.77	112.04

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	4776	0	4611	259	0
1	B	4776	0	4611	247	0
2	C	66	0	54	4	0
3	D	66	0	54	7	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	A	135	0	0	8	0
5	B	103	0	0	9	0
All	All	9924	0	9330	503	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 26.

All (503) 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:277:LYS:CD	1:A:278:THR:H	1.73	1.00
1:A:277:LYS:HD2	1:A:278:THR:N	1.79	0.98
1:B:269:PHE:HB2	1:B:284:GLU:HB3	1.43	0.97
1:B:579:MET:HE2	1:B:581:LEU:HD21	1.50	0.94
1:B:323:ARG:HD2	1:B:372:MET:HE2	1.54	0.89
3:D:5:GLC:H3	3:D:6:BGC:O5	1.75	0.86
1:A:364:MET:HE2	1:A:364:MET:HA	1.58	0.85
1:A:84:PHE:HB2	1:A:96:PHE:HB3	1.62	0.80
1:B:445:THR:HG21	1:B:580:ILE:HD12	1.63	0.80
1:A:516:LEU:HD13	1:A:541:VAL:HG11	1.63	0.79
1:A:277:LYS:HE3	1:A:280:ARG:HB2	1.64	0.79
1:A:514:ALA:HB1	1:A:539:GLN:HE22	1.48	0.79
1:B:139:GLU:HG2	1:B:215:GLN:HE22	1.48	0.78
1:A:579:MET:HE2	1:A:581:LEU:HD11	1.64	0.78
1:A:236:ILE:HD11	1:A:319:ILE:HG22	1.64	0.78
1:B:85:LEU:HD13	1:B:95:TYR:CE2	2.20	0.77
1:B:393:ARG:O	1:B:397:GLU:HG3	1.85	0.77
1:A:323:ARG:HH21	1:A:372:MET:HE2	1.49	0.76
1:B:26:ARG:HD3	1:B:70:GLU:HG3	1.67	0.75
1:A:410:ALA:HA	1:A:413:LEU:CD2	2.17	0.74
1:A:545:VAL:HG21	1:A:569:LEU:HD12	1.68	0.74
1:B:535:ARG:HB3	1:B:539:GLN:NE2	2.03	0.74
1:B:105:ARG:HH11	1:B:105:ARG:HG2	1.54	0.73
1:B:158:LYS:HD2	1:B:478:GLU:HB3	1.69	0.73
1:A:326:VAL:O	1:A:326:VAL:CG1	2.36	0.73
1:A:390:HIS:HD2	1:A:392:GLU:H	1.35	0.73
1:A:497:LEU:HB2	1:A:500:LEU:HD12	1.70	0.72
1:B:484:PHE:CE1	1:B:488:LYS:HD2	2.24	0.72
1:A:326:VAL:O	1:A:326:VAL:HG12	1.89	0.72
1:A:298:THR:HB	1:A:334:PHE:CD2	2.26	0.71
1:B:163:ARG:HG3	1:B:166:SER:OG	1.91	0.71
1:A:277:LYS:HD3	1:A:278:THR:H	1.56	0.71
1:A:516:LEU:C	1:A:516:LEU:HD23	2.17	0.70
1:A:140:ARG:HG2	1:A:469:ARG:O	1.91	0.69
1:B:562:VAL:HG12	5:B:1041:HOH:O	1.92	0.69
1:B:278:THR:HG22	1:B:279:SER:H	1.57	0.69
1:B:336:ARG:HD3	1:B:366:ASP:OD2	1.92	0.69
1:A:323:ARG:NH2	1:A:372:MET:HE2	2.06	0.69
1:B:146:PRO:HA	1:B:149:ASP:OD1	1.92	0.69
1:A:243:ASN:HD22	1:A:244:HIS:HD2	1.39	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:275:VAL:HG12	1:A:276:SER:H	1.58	0.68
1:B:223:ARG:HB3	1:B:223:ARG:NH2	2.09	0.68
1:B:27:LEU:HD23	1:B:27:LEU:C	2.18	0.68
1:A:19:SER:HB3	1:A:22:GLN:HG3	1.75	0.68
1:A:277:LYS:CD	1:A:278:THR:N	2.41	0.68
1:B:133:ILE:HD12	1:B:189:ALA:HB3	1.76	0.68
1:A:155:GLN:HE21	1:A:156:TRP:H	1.42	0.67
1:B:304:LYS:HE2	5:B:1069:HOH:O	1.93	0.67
1:B:463:ALA:O	1:B:464:THR:O	2.13	0.67
1:A:90:GLN:NE2	1:A:90:GLN:H	1.93	0.67
1:A:410:ALA:HA	1:A:413:LEU:HD21	1.76	0.67
1:B:320:ASP:O	1:B:349:ALA:HA	1.94	0.67
1:B:481:ARG:HG2	1:B:481:ARG:HH11	1.60	0.67
1:B:323:ARG:HH21	1:B:372:MET:HE2	1.60	0.67
1:A:6:ILE:HD13	1:A:86:LEU:HD13	1.76	0.66
1:B:256:LEU:HD23	1:B:275:VAL:HB	1.77	0.66
1:B:326:VAL:O	1:B:326:VAL:HG12	1.96	0.66
1:B:350:LEU:C	1:B:351:ILE:HD12	2.20	0.66
1:A:203:LYS:HE3	1:A:216:PHE:CE2	2.30	0.66
1:A:346:ASN:ND2	1:A:348:ASP:H	1.93	0.66
1:B:381:ILE:O	1:B:385:ALA:HB3	1.94	0.66
1:A:26:ARG:HG2	1:A:70:GLU:HG3	1.78	0.65
1:A:475:GLU:HG2	5:A:1013:HOH:O	1.96	0.65
1:B:255:VAL:HG12	1:B:275:VAL:HG21	1.78	0.65
1:B:457:GLU:HA	1:B:487:TYR:CE1	2.31	0.65
1:B:460:MET:HE1	1:B:470:ARG:O	1.95	0.65
1:A:223:ARG:HD2	1:A:317:GLN:OE1	1.96	0.65
1:A:63:ASP:HB2	1:A:68:TYR:HE1	1.61	0.64
1:A:286:PHE:CE2	2:C:1:GLC:H62	2.33	0.64
1:B:47:SER:HB3	1:B:50:GLU:HG3	1.78	0.64
1:A:223:ARG:HB3	1:A:223:ARG:NH1	2.12	0.64
1:A:275:VAL:HG12	1:A:276:SER:N	2.13	0.64
1:B:384:PHE:HE2	1:B:438:LEU:HD12	1.61	0.64
1:A:88:GLY:HA3	1:A:92:GLU:HG3	1.77	0.64
1:A:402:ARG:HD3	5:A:1127:HOH:O	1.98	0.64
1:A:193:THR:HB	1:A:194:PRO:CD	2.28	0.64
1:A:544:GLN:O	1:A:545:VAL:HG13	1.98	0.63
1:A:88:GLY:HA3	1:A:92:GLU:CG	2.28	0.63
1:A:577:GLN:HG3	1:A:578:GLY:N	2.13	0.62
1:A:196:PHE:HB2	5:A:1049:HOH:O	1.98	0.62
1:B:384:PHE:CE2	1:B:438:LEU:HD12	2.33	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:514:ALA:HB1	1:A:539:GLN:NE2	2.14	0.62
1:A:458:ILE:HG23	1:A:479:GLN:HB3	1.81	0.62
3:D:5:GLC:C3	3:D:6:BGC:O5	2.47	0.62
1:A:445:THR:HG21	1:A:580:ILE:HD12	1.82	0.61
1:B:250:PHE:CG	1:B:251:ALA:N	2.67	0.61
1:A:509:HIS:HD2	1:A:516:LEU:HD22	1.66	0.61
1:B:242:PHE:HB3	1:B:307:LEU:HD13	1.81	0.61
1:B:364:MET:HE3	1:B:364:MET:HA	1.82	0.61
1:A:286:PHE:CZ	2:C:1:GLC:H62	2.36	0.60
1:B:278:THR:HG22	1:B:279:SER:N	2.16	0.60
1:B:26:ARG:HD2	1:B:403:MET:HE1	1.83	0.60
1:A:278:THR:O	1:A:280:ARG:N	2.35	0.60
1:A:410:ALA:O	1:A:413:LEU:HD23	2.02	0.60
1:B:467:ASP:CG	1:B:470:ARG:HH11	2.10	0.60
1:A:27:LEU:HD23	1:A:28:ARG:N	2.17	0.60
1:A:542:LEU:HA	1:A:569:LEU:O	2.02	0.59
1:B:84:PHE:HB2	1:B:96:PHE:HB3	1.84	0.59
1:B:243:ASN:HD21	1:B:295:LYS:HZ3	1.50	0.59
1:A:163:ARG:NH1	1:A:165:ASP:OD1	2.36	0.59
1:B:547:GLU:HG2	1:B:551:LYS:HE2	1.84	0.59
1:B:492:ARG:HD2	1:B:496:ARG:HH12	1.68	0.59
3:D:2:GLC:H61	3:D:3:GLC:O5	2.03	0.59
1:A:382:ARG:HG2	1:A:388:GLU:HB2	1.83	0.59
1:A:416:LEU:HD12	1:A:416:LEU:H	1.68	0.59
1:A:212:ILE:HD12	1:A:314:TRP:HH2	1.66	0.58
1:B:325:ASN:OD1	1:B:326:VAL:HG23	2.02	0.58
1:B:143:ASN:ND2	1:B:169:GLY:HA3	2.19	0.58
1:B:337:GLU:HG2	1:B:340:ARG:NH1	2.18	0.58
1:B:245:ALA:O	1:B:294:PRO:HD2	2.02	0.58
1:B:328:ASN:N	1:B:328:ASN:HD22	2.01	0.58
1:B:437:ARG:HB2	5:B:1080:HOH:O	2.03	0.58
1:A:360:SER:HB3	1:B:11:LYS:HZ2	1.69	0.58
1:A:569:LEU:HD22	1:A:571:LEU:HD11	1.85	0.58
1:B:536:GLY:N	1:B:576:TYR:CE2	2.72	0.58
2:C:1:GLC:H5	2:C:6:GLC:H61	1.86	0.57
1:A:172:LEU:O	1:A:176:ILE:HG13	2.04	0.57
1:A:256:LEU:HD23	1:A:275:VAL:HB	1.85	0.57
1:A:401:ALA:HA	1:A:404:LEU:HD13	1.87	0.57
1:A:504:ASN:H	1:A:504:ASN:HD22	1.51	0.57
1:A:550:GLY:N	1:A:585:ARG:HH22	2.01	0.57
1:B:198:SER:HB3	1:B:203:LYS:HG3	1.86	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:526:GLN:HG3	1:B:585:ARG:OXT	2.03	0.57
1:A:178:ARG:HD2	1:A:474:TRP:CH2	2.39	0.57
1:B:258:LYS:O	1:B:261:GLN:HB2	2.04	0.57
1:B:545:VAL:O	1:B:546:PRO:C	2.47	0.57
1:B:468:CYS:SG	1:B:469:ARG:HG3	2.45	0.57
1:B:458:ILE:O	1:B:480:ASN:HB3	2.05	0.57
1:A:236:ILE:O	1:A:236:ILE:HG13	2.04	0.56
1:A:346:ASN:HD22	1:A:346:ASN:C	2.13	0.56
1:A:573:LEU:N	1:A:573:LEU:HD22	2.21	0.56
1:B:243:ASN:HD21	1:B:295:LYS:NZ	2.03	0.56
1:B:504:ASN:C	1:B:504:ASN:HD22	2.14	0.56
1:B:357:HIS:O	1:B:358:ASP:C	2.48	0.56
1:B:133:ILE:CD1	1:B:189:ALA:HB3	2.36	0.56
1:B:25:VAL:HG23	1:B:71:ALA:HB3	1.88	0.56
1:A:63:ASP:HB2	1:A:68:TYR:CE1	2.40	0.55
1:A:183:GLU:CD	1:A:232:ARG:HG2	2.31	0.55
1:A:289:GLN:O	1:A:291:PRO:HD3	2.06	0.55
1:B:212:ILE:CD1	1:B:314:TRP:HH2	2.19	0.55
1:B:325:ASN:HD21	3:D:1:GLC:H2	1.70	0.55
1:B:240:ALA:HB2	1:B:322:TRP:CE3	2.42	0.55
1:B:525:ASP:HB3	1:B:585:ARG:HH11	1.72	0.55
1:B:20:GLU:HB2	5:B:1101:HOH:O	2.06	0.55
1:A:332:HIS:HD2	1:A:367:GLN:OE1	1.90	0.55
1:B:516:LEU:C	1:B:516:LEU:HD23	2.32	0.55
1:A:263:ARG:HG2	1:A:263:ARG:HH11	1.72	0.54
1:A:172:LEU:HD22	1:A:225:LEU:HD22	1.89	0.54
1:B:204:TYR:CD1	3:D:1:GLC:H61	2.41	0.54
1:A:223:ARG:HB3	1:A:223:ARG:CZ	2.38	0.54
1:B:157:ALA:HB3	1:B:160:ALA:HB2	1.88	0.54
1:B:447:LEU:HB2	1:B:505:VAL:CG2	2.38	0.54
1:A:159:ASP:HA	1:A:161:ARG:HH22	1.72	0.54
1:A:504:ASN:HD22	1:A:504:ASN:N	2.04	0.54
1:B:323:ARG:HH21	1:B:372:MET:CE	2.21	0.54
1:A:538:LYS:HE2	1:A:572:THR:HG21	1.90	0.54
1:A:538:LYS:HE2	1:A:572:THR:CG2	2.38	0.54
1:B:105:ARG:HG2	1:B:105:ARG:NH1	2.19	0.54
1:A:194:PRO:HB2	1:A:203:LYS:HB2	1.90	0.53
1:B:262:SER:C	1:B:264:TYR:H	2.15	0.53
1:B:577:GLN:HG2	1:B:578:GLY:H	1.73	0.53
1:A:129:LYS:HA	1:A:411:GLN:OE1	2.07	0.53
1:A:324:LEU:HD13	1:A:335:TRP:CZ3	2.43	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:346:ASN:ND2	1:A:346:ASN:C	2.65	0.53
1:B:4:GLU:N	1:B:4:GLU:OE2	2.41	0.53
1:A:458:ILE:HD12	1:A:479:GLN:HB3	1.89	0.53
1:A:504:ASN:O	1:A:521:ARG:HA	2.08	0.53
1:A:341:LEU:O	1:A:341:LEU:HD22	2.09	0.53
1:A:483:LEU:O	1:A:486:PHE:HB3	2.09	0.53
1:B:447:LEU:HB2	1:B:505:VAL:HG21	1.91	0.53
1:B:516:LEU:HD23	1:B:517:TYR:N	2.23	0.53
1:A:409:ALA:O	1:A:413:LEU:HD22	2.08	0.53
1:A:455:GLY:N	1:A:457:GLU:OE1	2.39	0.53
1:A:122:PHE:HB3	1:A:408:GLN:NE2	2.25	0.52
1:B:438:LEU:HD11	1:B:532:LEU:HB3	1.90	0.52
1:B:129:LYS:HD2	1:B:502:ARG:HH22	1.74	0.52
1:B:65:ARG:HH11	1:B:65:ARG:HG2	1.74	0.52
1:B:492:ARG:HD2	1:B:496:ARG:NH1	2.24	0.52
1:A:37:CYS:HB3	1:A:57:ALA:HB3	1.90	0.52
1:A:504:ASN:H	1:A:504:ASN:ND2	2.07	0.52
1:B:218:ASP:HB2	1:B:220:PRO:HD2	1.91	0.52
1:B:545:VAL:O	1:B:546:PRO:O	2.28	0.52
1:B:134:TYR:HB2	1:B:187:VAL:HG11	1.91	0.52
1:B:514:ALA:HB1	1:B:539:GLN:OE1	2.09	0.52
1:B:535:ARG:HD3	1:B:539:GLN:NE2	2.25	0.52
1:A:493:LEU:HD23	1:A:496:ARG:NH2	2.25	0.52
1:A:537:GLU:O	1:A:539:GLN:HG3	2.09	0.52
1:B:386:THR:OG1	1:B:388:GLU:HG3	2.09	0.52
1:A:298:THR:HB	1:A:334:PHE:HD2	1.74	0.51
1:B:193:THR:HB	1:B:194:PRO:CD	2.39	0.51
1:A:64:GLU:O	1:A:64:GLU:HG3	2.08	0.51
1:A:375:LEU:HD23	1:A:401:ALA:CB	2.41	0.51
1:B:92:GLU:OE2	1:B:92:GLU:N	2.33	0.51
1:A:40:LEU:N	1:A:40:LEU:HD12	2.25	0.51
1:A:565:LYS:O	1:A:565:LYS:HG3	2.10	0.51
1:A:245:ALA:O	1:A:294:PRO:HD2	2.10	0.51
1:B:362:TRP:HB3	1:B:368:PHE:CD2	2.45	0.51
1:A:140:ARG:NH2	5:A:1114:HOH:O	2.42	0.51
1:A:26:ARG:CD	1:A:70:GLU:HG3	2.40	0.51
1:A:441:LEU:O	1:A:441:LEU:HD23	2.11	0.51
1:A:445:THR:HG21	1:A:580:ILE:CD1	2.40	0.51
1:B:99:THR:HB	1:B:108:ALA:C	2.36	0.51
1:B:122:PHE:HE2	1:B:363:LEU:O	1.94	0.51
1:B:259:GLY:C	1:B:261:GLN:H	2.18	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:324:LEU:HD13	1:B:335:TRP:CZ3	2.46	0.51
1:A:328:ASN:HB3	1:A:355:ILE:HD13	1.93	0.51
1:B:544:GLN:O	1:B:546:PRO:HD3	2.11	0.51
1:B:548:SER:C	1:B:550:GLY:H	2.19	0.51
1:A:26:ARG:HD3	1:A:70:GLU:OE2	2.11	0.50
1:B:416:LEU:CD2	1:B:416:LEU:H	2.25	0.50
1:A:549:GLY:C	1:A:585:ARG:HH22	2.19	0.50
1:B:304:LYS:HD3	1:B:337:GLU:OE1	2.12	0.50
1:A:236:ILE:CD1	1:A:238:LEU:HD21	2.41	0.50
1:A:279:SER:HA	1:A:291:PRO:HG3	1.94	0.50
1:A:583:ASN:HD21	1:A:585:ARG:HB2	1.76	0.50
1:A:133:ILE:HB	1:A:451:LEU:CD1	2.41	0.50
1:A:390:HIS:CD2	1:A:392:GLU:HB2	2.46	0.50
1:B:252:PHE:O	1:B:255:VAL:HB	2.10	0.50
1:B:276:SER:OG	1:B:282:ASN:N	2.43	0.50
1:B:444:MET:HE1	1:B:452:ILE:HD11	1.94	0.50
1:B:541:VAL:HG22	1:B:542:LEU:N	2.27	0.50
1:A:146:PRO:HA	1:A:149:ASP:OD2	2.12	0.50
1:B:158:LYS:C	1:B:160:ALA:H	2.20	0.50
1:A:536:GLY:O	1:A:537:GLU:HG2	2.11	0.49
1:B:457:GLU:OE1	1:B:457:GLU:N	2.40	0.49
1:B:212:ILE:HD11	1:B:314:TRP:HH2	1.76	0.49
1:A:246:GLY:C	1:A:248:GLN:H	2.19	0.49
1:B:326:VAL:HG22	3:D:6:BGC:O3	2.11	0.49
1:A:90:GLN:HE21	1:A:90:GLN:N	2.11	0.49
1:A:130:GLU:HG3	1:A:130:GLU:O	2.11	0.49
1:A:242:PHE:HB3	1:A:307:LEU:HD13	1.95	0.49
1:A:273:PHE:HB2	5:A:1059:HOH:O	2.11	0.49
1:B:374:TYR:O	1:B:378:GLU:HG3	2.13	0.49
1:B:506:ARG:HG2	1:B:506:ARG:HH21	1.77	0.49
1:A:328:ASN:HD22	1:B:114:ALA:HB2	1.77	0.49
1:B:7:PHE:CG	1:B:8:HIS:N	2.80	0.49
1:B:60:ALA:HA	1:B:506:ARG:HE	1.76	0.49
1:B:411:GLN:HG2	1:B:411:GLN:O	2.13	0.49
1:A:16:TYR:C	1:A:23:LEU:HD12	2.37	0.49
1:A:360:SER:HB3	1:B:11:LYS:NZ	2.28	0.49
1:A:447:LEU:HD22	1:A:505:VAL:CG2	2.43	0.49
1:B:464:THR:O	1:B:465:ASP:C	2.55	0.49
1:B:169:GLY:O	1:B:170:GLY:C	2.56	0.49
1:A:117:HIS:HB3	1:B:299:GLU:OE2	2.12	0.49
1:A:236:ILE:HD12	1:A:238:LEU:HD21	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:127:TRP:CD2	1:B:235:LYS:HD2	2.48	0.49
1:A:7:PHE:HB3	1:A:28:ARG:HE	1.78	0.48
1:B:127:TRP:CG	1:B:235:LYS:HE3	2.48	0.48
1:A:356:TRP:CZ3	1:A:374:TYR:HB3	2.47	0.48
1:B:11:LYS:N	1:B:15:ALA:HB3	2.28	0.48
1:A:113:TYR:CD2	1:A:116:ILE:HD13	2.48	0.48
1:A:183:GLU:OE2	1:A:232:ARG:HG2	2.14	0.48
1:B:574:ARG:O	1:B:575:PRO:C	2.56	0.48
1:B:26:ARG:NE	1:B:70:GLU:OE2	2.44	0.48
1:A:155:GLN:HE21	1:A:156:TRP:N	2.10	0.48
1:A:418:ASP:OD1	1:A:418:ASP:N	2.45	0.48
1:B:392:GLU:CD	1:B:512:LYS:HB3	2.38	0.48
1:A:134:TYR:HB2	1:A:187:VAL:HG11	1.95	0.48
1:A:244:HIS:CD2	1:A:286:PHE:HB2	2.48	0.48
1:A:416:LEU:HD13	1:A:416:LEU:O	2.14	0.48
1:A:222:PHE:O	1:A:225:LEU:HB3	2.14	0.48
1:A:366:ASP:O	1:A:367:GLN:HG3	2.14	0.48
1:A:11:LYS:N	1:A:15:ALA:HB3	2.28	0.47
1:A:264:TYR:O	1:A:267:TRP:HB2	2.14	0.47
1:A:90:GLN:NE2	1:A:90:GLN:N	2.61	0.47
1:A:373:ASN:HB2	1:A:413:LEU:HB3	1.96	0.47
1:B:441:LEU:HD23	1:B:441:LEU:C	2.40	0.47
1:B:540:THR:HG23	1:B:572:THR:HG22	1.95	0.47
1:A:10:ALA:C	1:A:15:ALA:HB3	2.40	0.47
1:A:179:LEU:HB3	1:A:232:ARG:HD2	1.95	0.47
1:B:535:ARG:HB3	1:B:539:GLN:HE21	1.76	0.47
1:A:508:TRP:O	1:A:509:HIS:HB2	2.13	0.47
1:B:481:ARG:HG2	1:B:481:ARG:NH1	2.27	0.47
1:B:243:ASN:ND2	1:B:295:LYS:NZ	2.62	0.47
1:B:260:GLU:HA	1:B:265:LYS:HD3	1.96	0.47
1:B:373:ASN:O	1:B:376:PHE:HB3	2.15	0.47
1:B:515:ASN:HD21	1:B:534:ASN:ND2	2.13	0.47
1:A:26:ARG:CG	1:A:70:GLU:HG3	2.44	0.47
1:A:155:GLN:HE21	1:A:155:GLN:CA	2.27	0.47
1:A:263:ARG:HG2	1:A:263:ARG:NH1	2.29	0.47
1:A:577:GLN:CG	1:A:578:GLY:N	2.78	0.47
1:B:162:PRO:HG2	1:B:470:ARG:HA	1.97	0.47
1:B:218:ASP:N	1:B:218:ASP:OD2	2.46	0.47
1:B:281:THR:OG1	1:B:289:GLN:HG2	2.15	0.47
1:B:533:ASN:O	1:B:576:TYR:HA	2.15	0.47
1:A:356:TRP:CE3	1:A:374:TYR:HB3	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:280:ARG:O	1:B:280:ARG:HD3	2.15	0.47
1:A:7:PHE:CG	1:A:8:HIS:N	2.83	0.47
1:A:133:ILE:HB	1:A:451:LEU:HD13	1.95	0.47
1:A:525:ASP:HB3	1:A:585:ARG:HD2	1.96	0.47
1:A:432:ASN:OD1	1:A:434:ALA:HB3	2.15	0.47
1:A:41:TYR:HB3	1:A:82:TYR:HB3	1.96	0.46
1:B:92:GLU:H	1:B:92:GLU:CD	2.22	0.46
1:B:433:GLU:O	1:B:437:ARG:HG3	2.15	0.46
1:A:182:LEU:HD13	1:A:190:LEU:HD21	1.96	0.46
1:B:323:ARG:HD2	1:B:372:MET:CE	2.36	0.46
1:A:179:LEU:N	1:A:180:PRO:CD	2.78	0.46
1:A:368:PHE:N	1:A:368:PHE:CD2	2.83	0.46
1:A:426:LEU:HD13	1:A:431:GLY:HA2	1.96	0.46
1:A:6:ILE:HG22	1:A:96:PHE:CE1	2.50	0.46
1:A:98:GLU:O	1:B:400:ARG:NH1	2.46	0.46
1:A:358:ASP:OD1	1:A:360:SER:HB2	2.15	0.46
1:B:455:GLY:O	1:B:458:ILE:HG12	2.16	0.46
1:B:536:GLY:O	1:B:537:GLU:HB2	2.15	0.46
1:A:250:PHE:CG	1:A:251:ALA:N	2.83	0.46
1:B:202:HIS:O	1:B:203:LYS:HB2	2.16	0.46
1:B:458:ILE:HD12	1:B:473:ILE:HB	1.97	0.46
1:B:583:ASN:HD21	1:B:585:ARG:HG3	1.81	0.46
1:A:544:GLN:C	1:A:545:VAL:HG22	2.40	0.46
1:A:565:LYS:O	1:A:566:GLN:HB2	2.16	0.46
1:B:504:ASN:C	1:B:504:ASN:ND2	2.72	0.46
1:B:523:VAL:O	1:B:524:GLN:C	2.58	0.46
1:B:562:VAL:HG23	1:B:562:VAL:O	2.15	0.46
1:A:212:ILE:HD12	1:A:314:TRP:CH2	2.48	0.46
1:A:228:GLU:OE1	1:A:231:ARG:NH1	2.49	0.46
1:A:243:ASN:HD22	1:A:244:HIS:CD2	2.28	0.46
1:A:492:ARG:HD3	5:A:1090:HOH:O	2.15	0.46
1:B:487:TYR:O	1:B:491:ILE:HG12	2.15	0.46
1:A:30:LYS:HG3	1:B:4:GLU:HG2	1.98	0.46
1:B:27:LEU:C	1:B:27:LEU:CD2	2.89	0.46
1:B:137:PHE:CE1	1:B:469:ARG:HD3	2.50	0.46
1:A:143:ASN:HD21	1:A:149:ASP:CG	2.22	0.46
1:B:357:HIS:HA	1:B:374:TYR:OH	2.16	0.46
1:A:18:ILE:O	1:A:18:ILE:HD12	2.16	0.46
1:B:475:GLU:HB3	1:B:478:GLU:OE2	2.16	0.46
1:A:320:ASP:O	1:A:349:ALA:HA	2.17	0.45
1:A:441:LEU:HD21	1:A:580:ILE:HD11	1.96	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:227:ASP:O	1:B:231:ARG:HG2	2.16	0.45
1:B:504:ASN:HD22	1:B:504:ASN:N	2.14	0.45
1:B:178:ARG:HD2	1:B:474:TRP:CH2	2.51	0.45
1:B:336:ARG:HG2	1:B:366:ASP:O	2.17	0.45
1:A:419:SER:C	1:A:421:ASN:H	2.23	0.45
1:B:225:LEU:HG	1:B:236:ILE:HD11	1.99	0.45
1:A:415:ASN:HD21	1:A:448:GLY:HA3	1.80	0.45
1:B:535:ARG:HB3	1:B:539:GLN:HE22	1.80	0.45
1:A:95:TYR:CE2	1:A:105:ARG:HB2	2.52	0.45
1:A:416:LEU:H	1:A:416:LEU:CD1	2.29	0.45
1:B:49:GLU:HB2	5:B:1089:HOH:O	2.17	0.45
1:A:364:MET:HA	1:A:364:MET:CE	2.36	0.45
1:A:516:LEU:C	1:A:516:LEU:CD2	2.89	0.45
1:B:26:ARG:HD2	1:B:403:MET:CE	2.47	0.45
1:B:577:GLN:HG2	1:B:578:GLY:N	2.31	0.45
1:A:181:TYR:CE1	1:A:484:PHE:CE2	3.05	0.45
1:B:65:ARG:HG2	1:B:65:ARG:NH1	2.31	0.45
1:A:390:HIS:HD2	1:A:392:GLU:N	2.09	0.45
1:A:443:GLN:NE2	1:A:444:MET:HE2	2.32	0.45
1:B:57:ALA:HB2	1:B:71:ALA:HB2	1.98	0.45
1:B:104:GLU:HB3	5:B:1025:HOH:O	2.16	0.45
1:B:553:TRP:HB2	1:B:562:VAL:CG2	2.48	0.45
1:A:156:TRP:CE2	1:A:471:PRO:HB2	2.52	0.44
1:A:540:THR:HA	1:A:571:LEU:O	2.17	0.44
1:A:16:TYR:OH	1:A:407:GLU:OE1	2.28	0.44
1:A:366:ASP:C	1:A:367:GLN:HG3	2.42	0.44
1:A:400:ARG:NH1	1:B:98:GLU:O	2.50	0.44
1:A:402:ARG:HH11	1:A:506:ARG:NH2	2.15	0.44
1:B:24:ARG:HD2	1:B:70:GLU:HG2	1.98	0.44
1:B:463:ALA:C	1:B:464:THR:O	2.59	0.44
1:A:206:THR:HG21	1:A:209:TYR:CD2	2.52	0.44
1:B:515:ASN:HD21	1:B:534:ASN:HD22	1.65	0.44
1:A:95:TYR:CE2	1:A:105:ARG:HD3	2.52	0.44
1:A:432:ASN:O	1:A:433:GLU:C	2.61	0.44
1:B:263:ARG:NE	1:B:263:ARG:O	2.51	0.44
1:A:212:ILE:CG2	1:A:213:ASP:N	2.80	0.44
1:B:26:ARG:NH1	5:B:1091:HOH:O	2.51	0.44
1:B:531:VAL:O	1:B:578:GLY:HA2	2.16	0.44
1:A:82:TYR:CE1	1:A:111:PHE:HB2	2.53	0.44
1:A:446:TYR:CG	1:A:447:LEU:N	2.85	0.44
1:B:255:VAL:HA	1:B:262:SER:CB	2.48	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:382:ARG:HD2	5:A:1003:HOH:O	2.18	0.44
1:A:504:ASN:N	1:A:504:ASN:ND2	2.66	0.44
1:B:143:ASN:HA	1:B:171:ASP:OD1	2.18	0.44
1:A:307:LEU:O	1:A:310:VAL:HB	2.18	0.43
1:B:60:ALA:O	1:B:402:ARG:NH2	2.50	0.43
1:B:161:ARG:HA	1:B:162:PRO:HD3	1.83	0.43
1:A:172:LEU:HD22	1:A:225:LEU:CD2	2.48	0.43
1:B:484:PHE:O	1:B:488:LYS:HG3	2.18	0.43
1:A:6:ILE:HD13	1:A:86:LEU:CD1	2.46	0.43
1:A:27:LEU:HD23	1:A:27:LEU:C	2.43	0.43
1:A:359:ALA:O	1:A:360:SER:C	2.61	0.43
1:B:444:MET:CE	1:B:452:ILE:HD11	2.48	0.43
1:A:277:LYS:HD2	1:A:277:LYS:C	2.37	0.43
1:A:543:LEU:O	1:A:545:VAL:HG22	2.19	0.43
1:B:206:THR:HG21	1:B:209:TYR:CG	2.54	0.43
1:A:338:PHE:O	1:A:342:VAL:HG23	2.19	0.43
1:A:374:TYR:CZ	1:A:375:LEU:HD13	2.54	0.43
1:B:10:ALA:C	1:B:15:ALA:HB3	2.43	0.43
1:B:200:SER:OG	1:B:201:HIS:N	2.52	0.43
1:B:383:PHE:O	1:B:534:ASN:ND2	2.51	0.43
1:A:218:ASP:OD1	1:A:220:PRO:HD2	2.18	0.43
1:A:464:THR:O	1:A:465:ASP:C	2.61	0.43
1:B:326:VAL:HG12	1:B:329:GLU:HB2	2.01	0.43
1:B:327:ALA:HB1	1:B:368:PHE:CZ	2.54	0.43
1:A:158:LYS:HB2	1:A:478:GLU:OE2	2.19	0.43
1:A:376:PHE:CD1	1:A:376:PHE:C	2.96	0.43
1:A:441:LEU:HD23	1:A:441:LEU:C	2.44	0.43
1:A:45:TYR:CE2	3:D:5:GLC:H61	2.54	0.43
1:A:380:VAL:HG12	1:A:425:PHE:CZ	2.53	0.43
1:B:139:GLU:OE2	1:B:139:GLU:O	2.36	0.43
1:B:472:MET:HG2	1:B:474:TRP:CZ2	2.54	0.43
1:B:540:THR:HG23	1:B:572:THR:CG2	2.48	0.43
1:A:102:SER:OG	1:A:107:LYS:HB2	2.19	0.43
1:A:137:PHE:CZ	1:A:469:ARG:HD3	2.54	0.43
1:A:223:ARG:NH2	1:A:227:ASP:OD1	2.52	0.43
1:B:139:GLU:CG	1:B:215:GLN:HE22	2.25	0.43
2:C:1:GLC:H5	2:C:6:GLC:C6	2.47	0.43
1:A:18:ILE:HD12	1:A:18:ILE:C	2.44	0.42
1:A:239:ASP:OD1	1:A:325:ASN:HB2	2.19	0.42
1:A:137:PHE:HA	1:A:138:PRO:HD2	1.85	0.42
1:A:341:LEU:HD22	1:A:341:LEU:C	2.44	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:44:ARG:NH2	5:B:1005:HOH:O	2.51	0.42
1:B:223:ARG:HB3	1:B:223:ARG:CZ	2.49	0.42
1:A:14:TYR:O	1:A:25:VAL:HA	2.18	0.42
1:A:248:GLN:O	1:A:253:ARG:HD3	2.19	0.42
1:A:297:ARG:O	1:A:297:ARG:HG2	2.18	0.42
1:B:139:GLU:OE2	1:B:140:ARG:NH1	2.51	0.42
1:A:86:LEU:HB2	1:A:94:VAL:HG13	2.00	0.42
1:A:254:ASP:OD2	1:A:254:ASP:C	2.61	0.42
1:B:16:TYR:C	1:B:23:LEU:HD12	2.44	0.42
1:B:535:ARG:O	1:B:537:GLU:N	2.53	0.42
1:A:63:ASP:HB3	1:A:66:PHE:H	1.83	0.42
1:B:82:TYR:CD2	1:B:82:TYR:N	2.87	0.42
1:B:225:LEU:HG	1:B:236:ILE:CD1	2.49	0.42
1:B:390:HIS:CE1	1:B:512:LYS:HE2	2.53	0.42
1:B:398:LEU:HD21	1:B:442:PHE:HZ	1.85	0.42
1:A:425:PHE:O	1:A:428:SER:HB2	2.20	0.42
1:A:465:ASP:HA	1:A:466:PRO:HA	1.71	0.42
1:B:269:PHE:HE2	1:B:295:LYS:HG2	1.83	0.42
1:B:537:GLU:O	1:B:538:LYS:C	2.62	0.42
1:A:484:PHE:CE1	1:A:488:LYS:HD2	2.55	0.42
1:B:223:ARG:HB3	1:B:223:ARG:HH21	1.80	0.42
1:B:228:GLU:OE2	1:B:228:GLU:HA	2.19	0.42
1:B:376:PHE:CD1	1:B:376:PHE:C	2.97	0.42
1:B:446:TYR:CG	1:B:447:LEU:N	2.87	0.42
1:A:504:ASN:HD21	1:A:522:THR:HB	1.84	0.42
1:B:11:LYS:O	1:B:12:GLY:C	2.61	0.42
1:A:152:GLY:O	1:A:153:THR:C	2.63	0.42
1:A:331:ASP:N	1:B:117:HIS:CE1	2.88	0.42
1:A:363:LEU:HD23	1:A:363:LEU:HA	1.88	0.42
1:A:574:ARG:O	1:A:577:GLN:HB3	2.20	0.42
1:B:104:GLU:OE1	1:B:107:LYS:HE3	2.20	0.42
1:B:249:PHE:CE2	1:B:251:ALA:HB3	2.55	0.42
1:A:155:GLN:HA	1:A:155:GLN:NE2	2.34	0.42
1:B:312:ARG:NE	5:B:1044:HOH:O	2.48	0.42
1:A:6:ILE:HG23	1:A:27:LEU:HD21	2.01	0.41
1:A:380:VAL:HG13	1:A:384:PHE:CD1	2.55	0.41
1:A:35:VAL:HG21	1:A:89:PRO:HA	2.03	0.41
1:B:54:HIS:N	1:B:54:HIS:CD2	2.88	0.41
1:B:178:ARG:O	1:B:181:TYR:HB3	2.20	0.41
1:A:126:GLU:O	1:A:129:LYS:HB2	2.20	0.41
1:A:180:PRO:HB2	5:A:1029:HOH:O	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:246:GLY:C	1:B:248:GLN:H	2.27	0.41
1:B:250:PHE:CD1	1:B:251:ALA:N	2.88	0.41
1:B:254:ASP:OD2	1:B:258:LYS:HE2	2.20	0.41
1:B:272:ASP:O	1:B:282:ASN:ND2	2.53	0.41
1:A:219:LEU:HB3	1:A:220:PRO:HD3	2.02	0.41
1:B:416:LEU:H	1:B:416:LEU:HD23	1.86	0.41
1:B:83:VAL:HG23	1:B:96:PHE:O	2.21	0.41
1:B:351:ILE:HD12	1:B:351:ILE:N	2.35	0.41
1:B:467:ASP:OD2	1:B:470:ARG:NH1	2.53	0.41
1:A:80:VAL:CG2	1:A:81:LYS:N	2.81	0.41
1:A:488:LYS:O	1:A:492:ARG:HG3	2.21	0.41
1:B:285:THR:OG1	1:B:286:PHE:N	2.54	0.41
1:A:458:ILE:HA	1:A:458:ILE:HD13	1.73	0.41
1:A:533:ASN:HB2	1:A:573:LEU:HG	2.01	0.41
1:B:6:ILE:HD13	1:B:86:LEU:CD1	2.51	0.41
1:B:251:ALA:O	1:B:255:VAL:HG23	2.20	0.41
1:B:408:GLN:O	1:B:411:GLN:NE2	2.54	0.41
1:A:127:TRP:HH2	1:A:237:ILE:HD11	1.85	0.41
1:A:275:VAL:CG1	1:A:276:SER:N	2.83	0.41
1:A:497:LEU:HB2	1:A:500:LEU:CD1	2.46	0.41
1:A:535:ARG:HG2	1:A:535:ARG:NH1	2.36	0.41
1:A:455:GLY:O	1:A:456:ASP:C	2.64	0.41
1:B:194:PRO:HG2	1:B:204:TYR:CD1	2.56	0.41
1:B:244:HIS:CD2	1:B:286:PHE:HB2	2.56	0.41
1:B:332:HIS:HD2	1:B:367:GLN:OE1	2.04	0.41
1:B:504:ASN:HD21	1:B:522:THR:HB	1.85	0.41
1:B:224:ARG:NH1	1:B:224:ARG:HG3	2.34	0.41
1:B:459:GLY:O	1:B:460:MET:C	2.63	0.41
1:A:6:ILE:CD1	1:A:86:LEU:HD13	2.49	0.40
1:A:266:ASP:O	1:A:300:ASN:ND2	2.50	0.40
1:B:40:LEU:HA	1:B:53:ALA:O	2.22	0.40
1:B:285:THR:HG21	1:B:290:VAL:H	1.86	0.40
1:B:467:ASP:OD1	1:B:470:ARG:HD3	2.21	0.40
1:B:475:GLU:OE2	1:B:477:LYS:HB2	2.22	0.40
1:B:509:HIS:HE1	1:B:511:ASP:HB2	1.85	0.40
1:A:545:VAL:HA	1:A:546:PRO:HD2	1.93	0.40
1:B:6:ILE:HG23	1:B:27:LEU:HD21	2.04	0.40
1:B:22:GLN:HB3	1:B:72:LEU:HD11	2.03	0.40
1:B:193:THR:CB	1:B:194:PRO:CD	2.98	0.40
1:B:223:ARG:HD2	1:B:317:GLN:OE1	2.21	0.40
1:B:438:LEU:HD22	1:B:438:LEU:HA	1.91	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:535:ARG:CB	1:B:539:GLN:HE22	2.35	0.40
1:A:30:LYS:HB3	1:A:33:ASP:HB2	2.04	0.40
1:A:370:SER:OG	1:A:413:LEU:HA	2.21	0.40
1:A:467:ASP:O	1:A:470:ARG:HG3	2.21	0.40
1:B:128:ALA:HB2	1:B:350:LEU:HD13	2.03	0.40
1:B:262:SER:C	1:B:264:TYR:N	2.79	0.40
1:B:263:ARG:O	1:B:263:ARG:CD	2.69	0.40
1:A:246:GLY:HA2	1:A:292:ALA:O	2.21	0.40
1:A:407:GLU:O	1:A:408:GLN:C	2.64	0.40
1:A:505:VAL:HG13	1:A:521:ARG:CD	2.52	0.40
1:A:357:HIS:O	1:A:358:ASP:C	2.65	0.40
1:B:315:MET:HE2	1:B:315:MET:HB3	1.96	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	583/585 (100%)	506 (87%)	66 (11%)	11 (2%)	6	23
1	B	583/585 (100%)	492 (84%)	76 (13%)	15 (3%)	4	17
All	All	1166/1170 (100%)	998 (86%)	142 (12%)	26 (2%)	5	20

All (26) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	279	SER
1	B	464	THR
1	B	546	PRO
1	A	63	ASP
1	B	271	GLU
1	A	162	PRO

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Mol	Chain	Res	Type
1	A	331	ASP
1	B	289	GLN
1	B	476	GLU
1	B	537	GLU
1	A	193	THR
1	A	258	LYS
1	A	402	ARG
1	B	386	THR
1	B	432	ASN
1	B	164	HIS
1	B	326	VAL
1	B	436	PHE
1	B	575	PRO
1	A	10	ALA
1	A	275	VAL
1	A	509	HIS
1	B	11	LYS
1	B	193	THR
1	B	12	GLY
1	A	91	GLY

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	493/493 (100%)	458 (93%)	35 (7%)	13	40
1	B	493/493 (100%)	470 (95%)	23 (5%)	23	56
All	All	986/986 (100%)	928 (94%)	58 (6%)	18	48

All (58) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	51	GLU
1	A	64	GLU
1	A	80	VAL

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Mol	Chain	Res	Type
1	A	90	GLN
1	A	116	ILE
1	A	155	GLN
1	A	193	THR
1	A	212	ILE
1	A	223	ARG
1	A	236	ILE
1	A	263	ARG
1	A	272	ASP
1	A	277	LYS
1	A	278	THR
1	A	286	PHE
1	A	326	VAL
1	A	330	VAL
1	A	341	LEU
1	A	364	MET
1	A	375	LEU
1	A	381	ILE
1	A	398	LEU
1	A	411	GLN
1	A	416	LEU
1	A	457	GLU
1	A	477	LYS
1	A	504	ASN
1	A	505	VAL
1	A	516	LEU
1	A	523	VAL
1	A	537	GLU
1	A	545	VAL
1	A	569	LEU
1	A	571	LEU
1	A	573	LEU
1	B	19	SER
1	B	49	GLU
1	B	62	SER
1	B	223	ARG
1	B	248	GLN
1	B	261	GLN
1	B	280	ARG
1	B	282	ASN
1	B	288	VAL
1	B	328	ASN

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Mol	Chain	Res	Type
1	B	354	GLU
1	B	364	MET
1	B	398	LEU
1	B	411	GLN
1	B	416	LEU
1	B	438	LEU
1	B	451	LEU
1	B	465	ASP
1	B	475	GLU
1	B	481	ARG
1	B	504	ASN
1	B	542	LEU
1	B	575	PRO

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (41) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	22	GLN
1	A	54	HIS
1	A	90	GLN
1	A	155	GLN
1	A	244	HIS
1	A	248	GLN
1	A	261	GLN
1	A	325	ASN
1	A	328	ASN
1	A	332	HIS
1	A	346	ASN
1	A	367	GLN
1	A	390	HIS
1	A	421	ASN
1	A	443	GLN
1	A	504	ASN
1	A	509	HIS
1	A	526	GLN
1	A	539	GLN
1	A	544	GLN
1	A	568	GLN
1	B	135	GLN
1	B	215	GLN
1	B	243	ASN
1	B	244	HIS

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Mol	Chain	Res	Type
1	B	261	GLN
1	B	289	GLN
1	B	328	ASN
1	B	332	HIS
1	B	357	HIS
1	B	390	HIS
1	B	411	GLN
1	B	421	ASN
1	B	443	GLN
1	B	504	ASN
1	B	527	HIS
1	B	534	ASN
1	B	539	GLN
1	B	566	GLN
1	B	568	GLN
1	B	583	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 ⓘ

12 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	$\# Z > 2$
2	GLC	C	1	2	11,11,12	0.51	0	15,15,17	0.85	1 (6%)
2	GLC	C	2	2	11,11,12	0.58	0	15,15,17	0.85	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	GLC	C	3	2	11,11,12	0.48	0	15,15,17	0.71	0
2	GLC	C	4	2	11,11,12	0.66	0	15,15,17	0.65	1 (6%)
2	GLC	C	5	2	11,11,12	0.85	0	15,15,17	0.72	1 (6%)
2	GLC	C	6	2	11,11,12	0.70	0	15,15,17	0.79	1 (6%)
3	GLC	D	1	3	11,11,12	0.61	0	15,15,17	1.02	2 (13%)
3	GLC	D	2	3	11,11,12	0.60	0	15,15,17	0.57	0
3	GLC	D	3	3	11,11,12	0.52	0	15,15,17	0.52	0
3	GLC	D	4	3	11,11,12	0.61	0	15,15,17	0.55	0
3	GLC	D	5	3	11,11,12	0.67	0	15,15,17	0.74	1 (6%)
3	BGC	D	6	3	11,11,12	0.70	0	15,15,17	1.07	1 (6%)

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	C	1	2	-	2/2/19/22	0/1/1/1
2	GLC	C	2	2	-	0/2/19/22	0/1/1/1
2	GLC	C	3	2	-	2/2/19/22	0/1/1/1
2	GLC	C	4	2	-	2/2/19/22	0/1/1/1
2	GLC	C	5	2	-	2/2/19/22	0/1/1/1
2	GLC	C	6	2	-	0/2/19/22	0/1/1/1
3	GLC	D	1	3	-	1/2/19/22	0/1/1/1
3	GLC	D	2	3	-	0/2/19/22	0/1/1/1
3	GLC	D	3	3	-	0/2/19/22	0/1/1/1
3	GLC	D	4	3	-	0/2/19/22	0/1/1/1
3	GLC	D	5	3	-	2/2/19/22	0/1/1/1
3	BGC	D	6	3	-	2/2/19/22	0/1/1/1

There are no bond length outliers.

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1	GLC	C1-O5-C5	2.84	116.00	112.19
2	C	6	GLC	C1-O5-C5	2.45	115.47	112.19
3	D	1	GLC	C3-C4-C5	2.43	114.64	110.23
3	D	5	GLC	C1-O5-C5	2.34	115.32	112.19
3	D	6	BGC	C2-C3-C4	-2.32	106.78	110.86

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	5	GLC	C1-O5-C5	2.31	115.28	112.19
2	C	4	GLC	C1-O5-C5	2.27	115.23	112.19
3	D	1	GLC	C2-C3-C4	2.18	114.69	110.86

There are no chirality outliers.

All (13) torsion outliers are listed below:

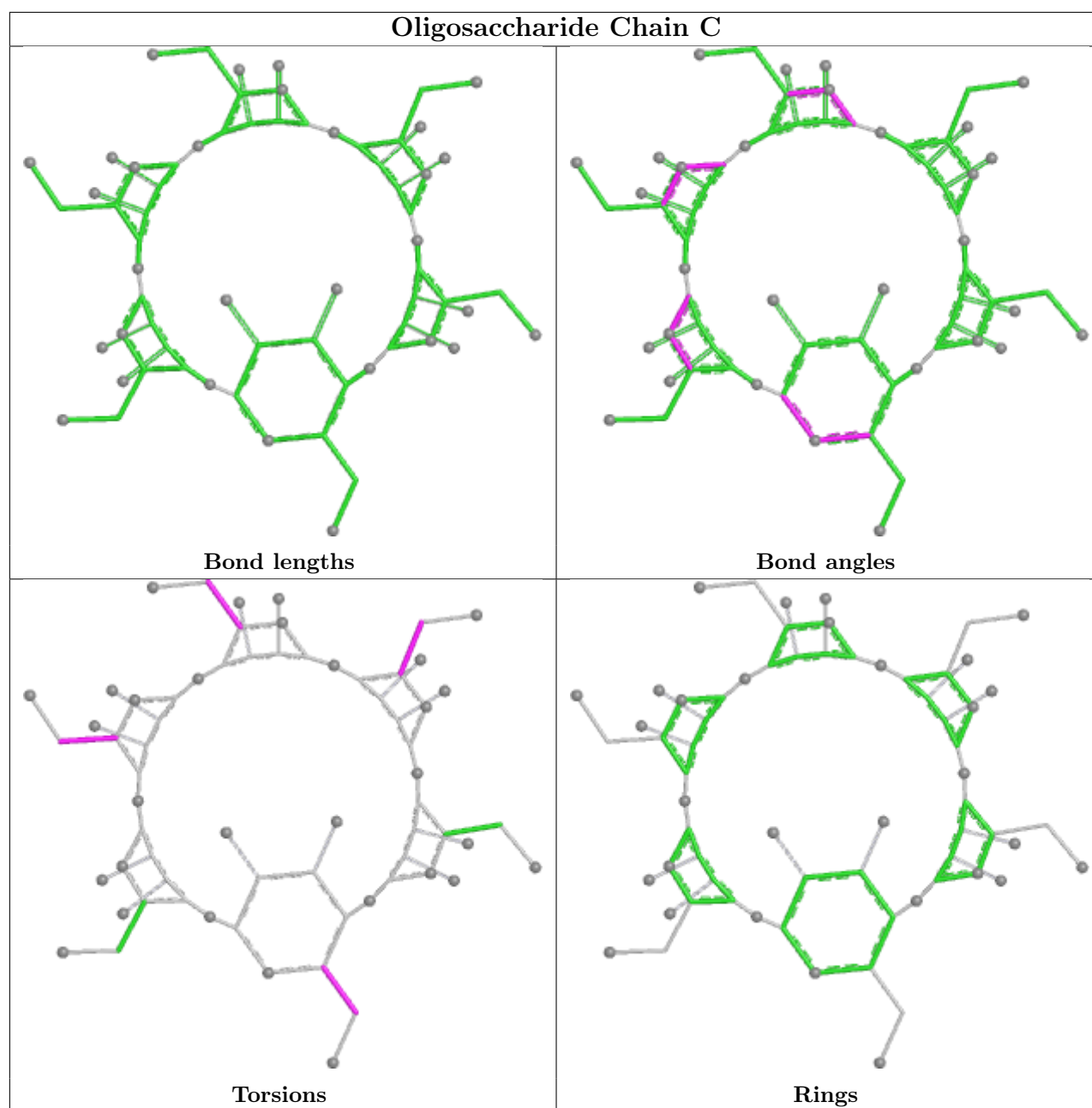
Mol	Chain	Res	Type	Atoms
3	D	5	GLC	C4-C5-C6-O6
2	C	5	GLC	O5-C5-C6-O6
2	C	5	GLC	C4-C5-C6-O6
3	D	5	GLC	O5-C5-C6-O6
2	C	4	GLC	O5-C5-C6-O6
2	C	4	GLC	C4-C5-C6-O6
2	C	1	GLC	C4-C5-C6-O6
2	C	3	GLC	C4-C5-C6-O6
2	C	1	GLC	O5-C5-C6-O6
3	D	1	GLC	O5-C5-C6-O6
2	C	3	GLC	O5-C5-C6-O6
3	D	6	BGC	O5-C5-C6-O6
3	D	6	BGC	C4-C5-C6-O6

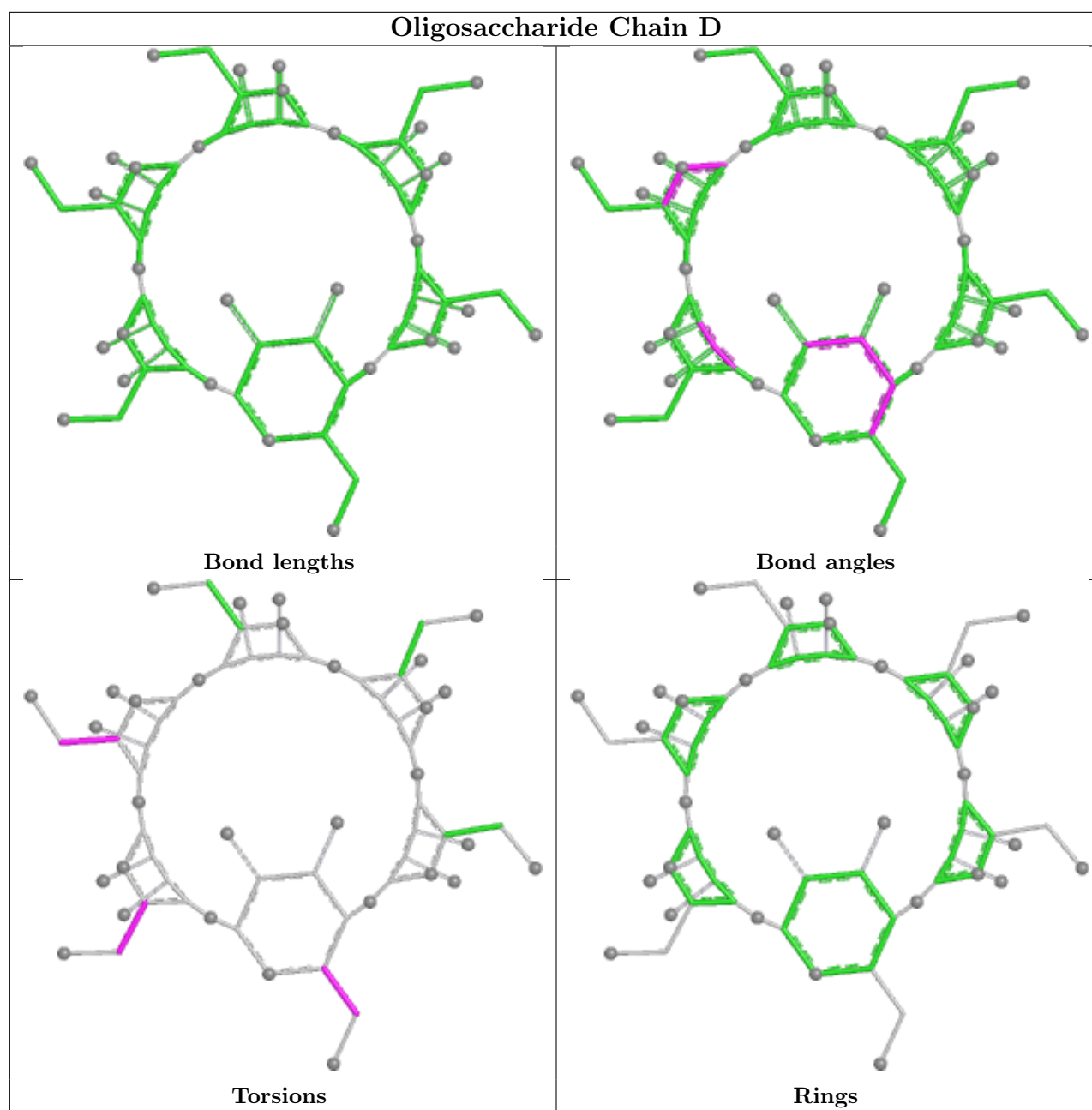
There are no ring outliers.

7 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	3	GLC	1	0
3	D	5	GLC	3	0
3	D	1	GLC	2	0
2	C	1	GLC	4	0
3	D	6	BGC	3	0
2	C	6	GLC	2	0
3	D	2	GLC	1	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.





5.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 2 are 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	585/585 (100%)	-0.43	1 (0%) 91 89	26, 48, 75, 97	0
1	B	585/585 (100%)	-0.20	6 (1%) 79 73	34, 56, 91, 101	0
All	All	1170/1170 (100%)	-0.32	7 (0%) 85 81	26, 51, 86, 101	0

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	545	VAL	3.2
1	B	162	PRO	3.2
1	A	549	GLY	2.9
1	B	461	ALA	2.8
1	B	470	ARG	2.3
1	B	466	PRO	2.0
1	B	160	ALA	2.0

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. 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	D	3	11/12	0.82	0.11	71,72,73,73	11
3	GLC	D	2	11/12	0.83	0.16	71,72,72,73	11

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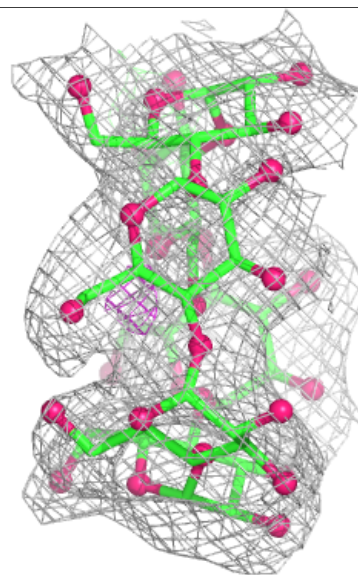
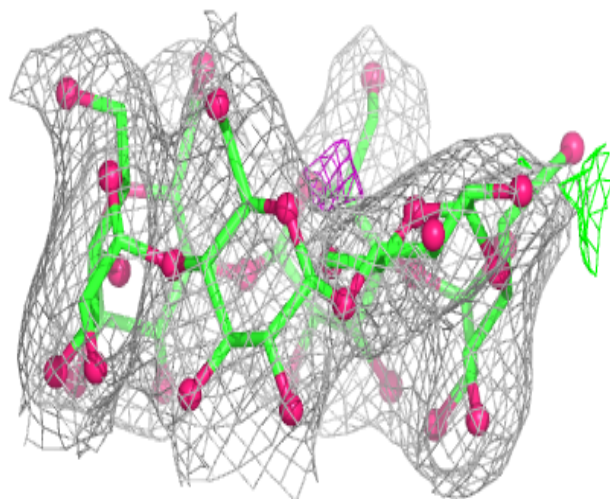
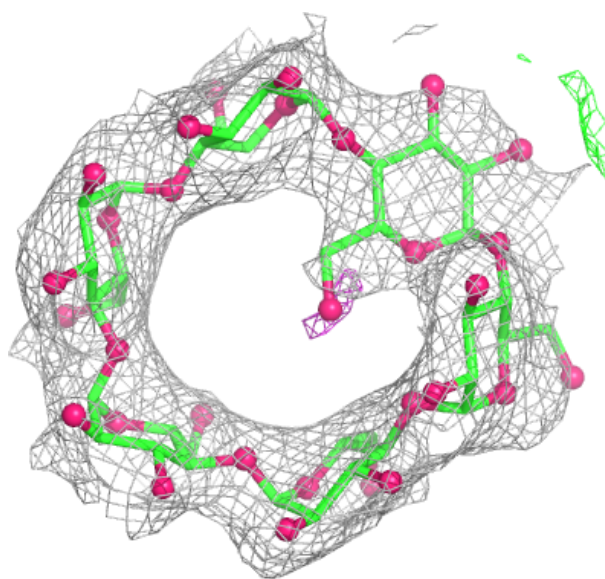
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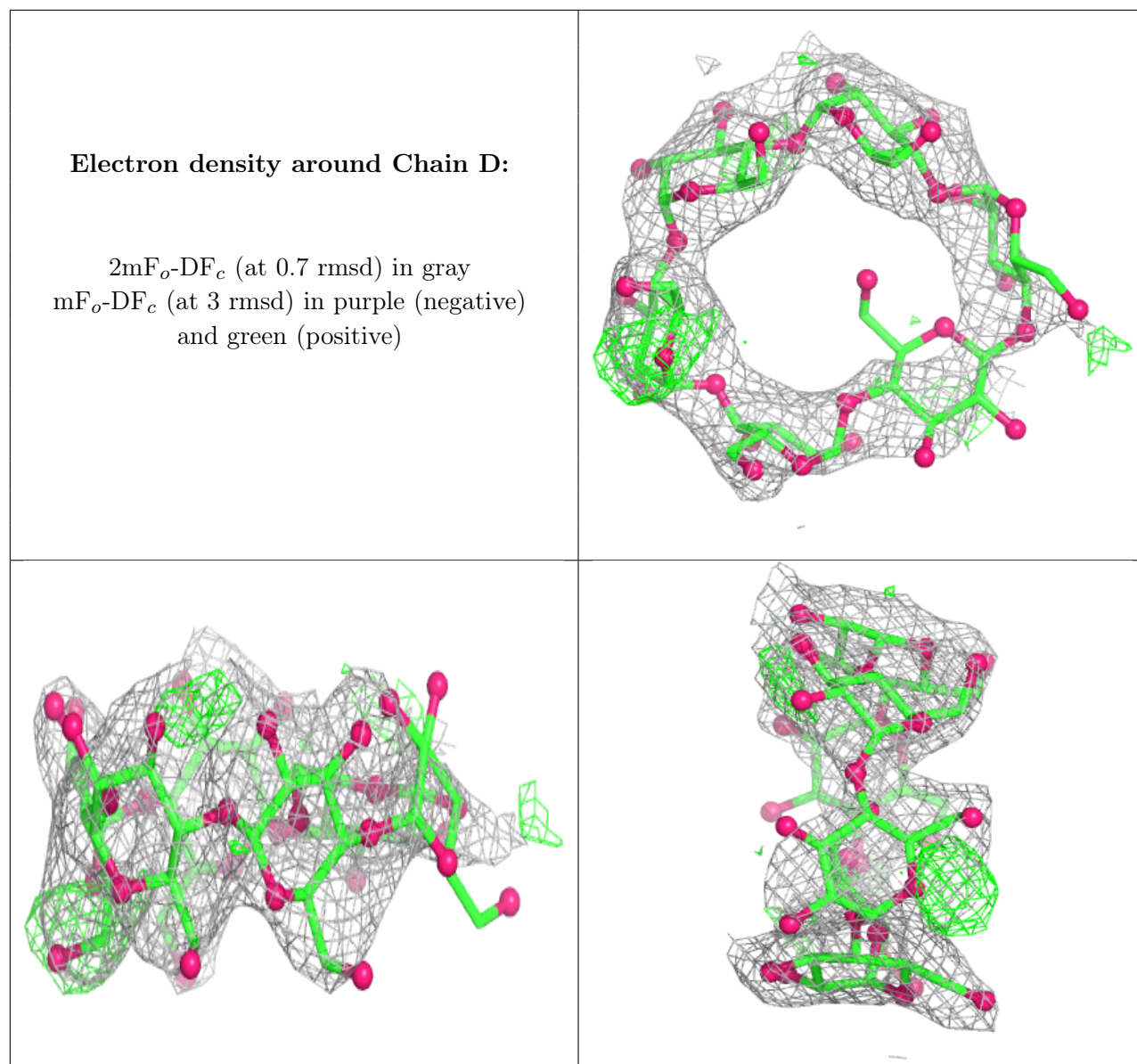
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	GLC	D	4	11/12	0.86	0.10	72,72,73,74	11
3	BGC	D	6	11/12	0.86	0.19	74,76,77,77	11
3	GLC	D	5	11/12	0.88	0.15	74,75,76,76	11
2	GLC	C	6	11/12	0.88	0.12	66,68,69,70	0
3	GLC	D	1	11/12	0.91	0.13	68,71,72,73	11
2	GLC	C	4	11/12	0.91	0.07	63,65,66,67	0
2	GLC	C	2	11/12	0.91	0.09	60,61,62,63	0
2	GLC	C	3	11/12	0.92	0.08	63,64,65,66	0
2	GLC	C	5	11/12	0.94	0.08	66,67,70,70	0
2	GLC	C	1	11/12	0.95	0.07	58,61,64,64	0

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)





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
4	CA	A	1001	1/1	0.97	0.03	45,45,45,45	0
4	CA	B	1002	1/1	0.98	0.04	73,73,73,73	0

6.5 Other polymers [i](#)

There are no such residues in this entry.