



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 02:57 AM UTC

PDB ID : 1PYY / pdb_00001pyy
Title : Double mutant PBP2x T338A/M339F from Streptococcus pneumoniae strain R6 at 2.4 Å resolution
Authors : Chesnel, L.; Pernot, L.; Lemaire, D.; Champelovier, D.; Croize, J.; Dideberg, O.; Vernet, T.; Zapun, A.
Deposited on : 2003-07-09
Resolution : 2.42 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

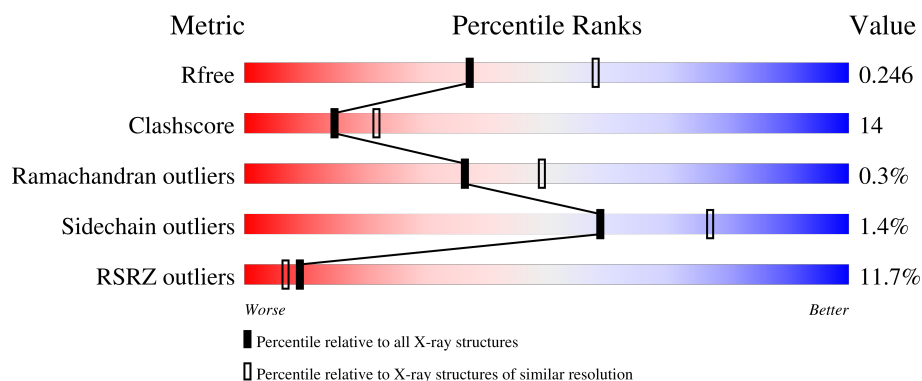
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.42 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	6062 (2.44-2.40)
Clashscore	190562	6562 (2.44-2.40)
Ramachandran outliers	187476	6481 (2.44-2.40)
Sidechain outliers	187428	6482 (2.44-2.40)
RSRZ outliers	180081	6066 (2.44-2.40)

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	702	
2	B	2	

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 4928 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 Penicillin-binding protein 2X.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	607	4642	2909	774	938	21	0	0	0

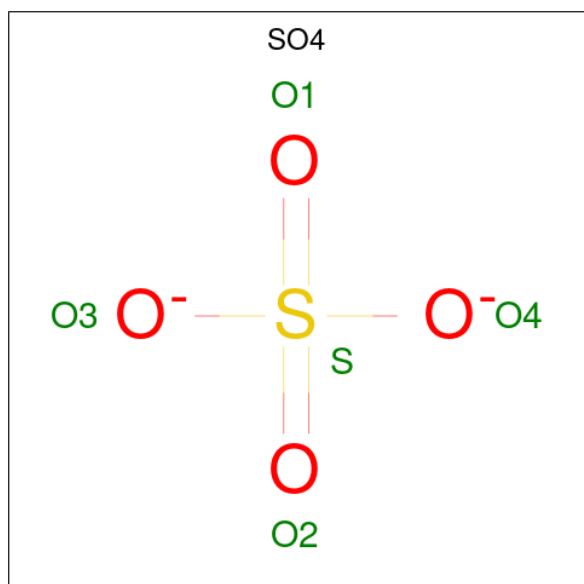
There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	338	ALA	THR	engineered mutation	UNP P59676
A	339	PHE	MET	engineered mutation	UNP P59676

- Molecule 2 is an oligosaccharide called 6-O-octanoyl-beta-D-fructofuranose-(2-1)-alpha-D-glucopyranose.

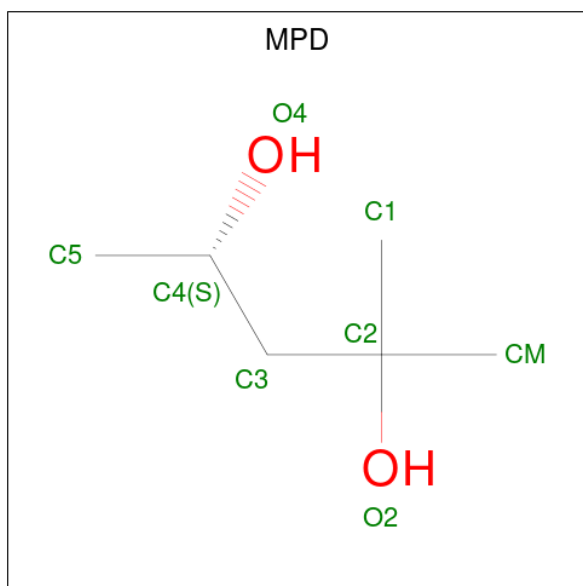
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
			Total	C	O			
2	B	2	32	20	12	0	0	0

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

- Molecule 4 is (4S)-2-METHYL-2,4-PENTANEDIOL (CCD ID: MPD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			8	6	2		

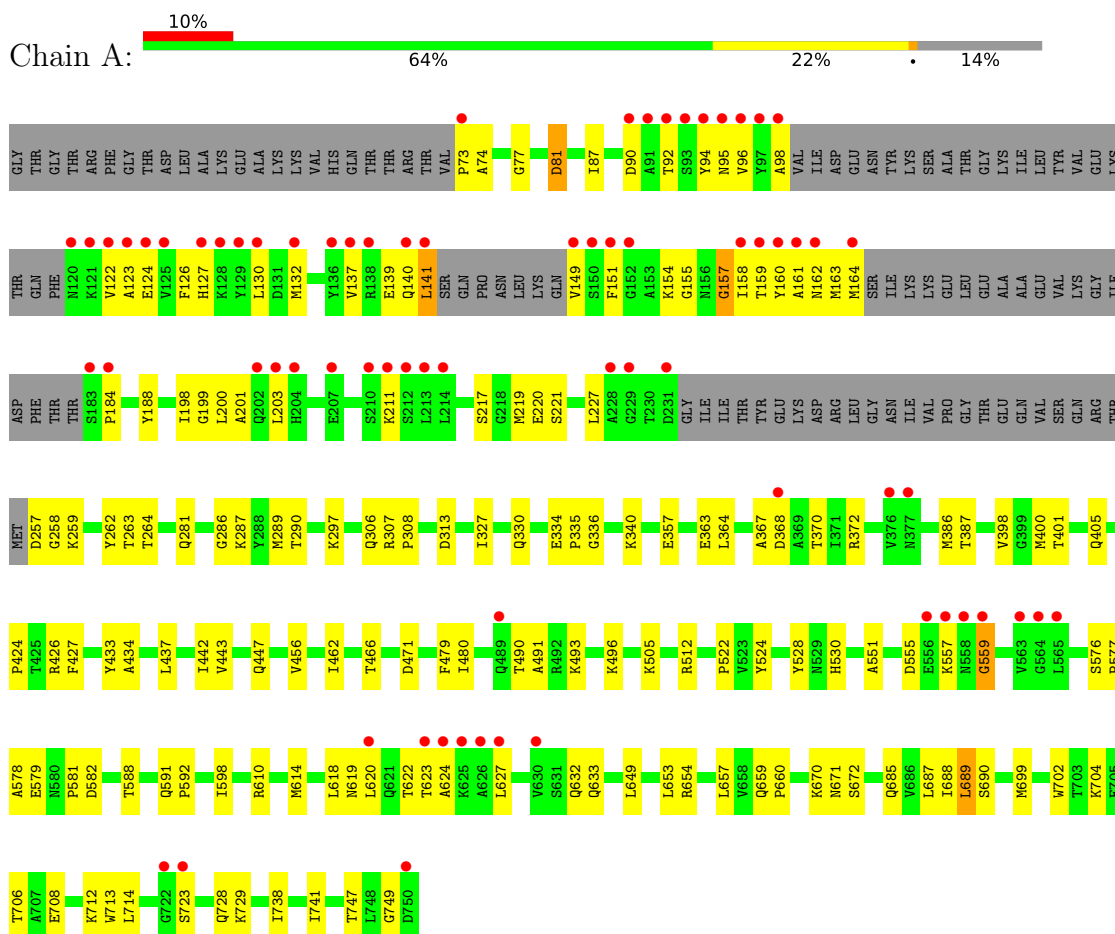
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	241	Total	O	0	0
			241	241		

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: Penicillin-binding protein 2X



- Molecule 2: 6-O-octanoyl-beta-D-fructofuranose-(2-1)-alpha-D-glucopyranose



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	128.22Å 64.75Å 146.97Å 90.00° 118.89° 90.00°	Depositor
Resolution (Å)	30.69 – 2.42 30.69 – 2.42	Depositor EDS
% Data completeness (in resolution range)	99.6 (30.69-2.42) 99.6 (30.69-2.42)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.94 (at 2.42Å)	Xtriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.218 , 0.244 0.221 , 0.246	Depositor DCC
R_{free} test set	2014 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	37.0	Xtriage
Anisotropy	0.321	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 47.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	4928	wwPDB-VP
Average B, all atoms (Å ²)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.47% 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: SO4, GLC, TRV, MPD

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	0.44	1/4723 (0.0%)	0.91	5/6395 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	73	PRO	C-N	-8.94	1.21	1.33

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	73	PRO	CA-N-CD	-13.94	92.49	112.00
1	A	334	GLU	CA-C-N	7.95	127.87	119.05
1	A	334	GLU	C-N-CA	7.95	127.87	119.05
1	A	582	ASP	N-CA-C	-7.57	104.57	113.88
1	A	87	ILE	N-CA-C	-6.25	106.68	111.62

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	4642	0	4542	128	0
2	B	32	0	10	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	5	0	0	0	0
4	A	8	0	14	0	0
5	A	241	0	0	2	0
All	All	4928	0	4566	128	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 14.

All (128) 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:92:THR:HG22	1:A:184:PRO:HA	1.40	1.04
1:A:493:LYS:HD3	1:A:623:THR:HG21	1.56	0.87
1:A:95:ASN:HD22	1:A:157:GLY:H	1.22	0.85
1:A:557:LYS:HA	1:A:557:LYS:HE2	1.59	0.83
1:A:137:VAL:HG13	1:A:151:PHE:HE1	1.45	0.82
1:A:98:ALA:HB3	1:A:149:VAL:HA	1.61	0.81
1:A:123:ALA:HA	1:A:137:VAL:HG11	1.62	0.81
1:A:198:ILE:HD13	1:A:219:MET:HE2	1.61	0.80
1:A:198:ILE:HD13	1:A:219:MET:CE	2.14	0.77
1:A:95:ASN:ND2	1:A:157:GLY:H	1.83	0.76
1:A:728:GLN:HG3	1:A:749:GLY:HA3	1.69	0.72
1:A:623:THR:HG22	1:A:624:ALA:N	2.04	0.72
1:A:92:THR:HG22	1:A:184:PRO:CA	2.19	0.72
1:A:74:ALA:HB1	1:A:257:ASP:HA	1.72	0.71
1:A:340:LYS:HG2	1:A:400:MET:HG3	1.72	0.71
1:A:130:LEU:O	1:A:154:LYS:HD3	1.93	0.68
1:A:281:GLN:HA	1:A:289:MET:HE2	1.74	0.68
1:A:363:GLU:HG3	1:A:372:ARG:HB3	1.77	0.67
1:A:623:THR:HG22	1:A:624:ALA:H	1.58	0.66
1:A:159:THR:HG22	1:A:161:ALA:H	1.60	0.66
1:A:336:GLY:HA3	1:A:551:ALA:HB2	1.78	0.65
1:A:493:LYS:CD	1:A:623:THR:HG21	2.28	0.63
1:A:201:ALA:N	1:A:220:GLU:HG2	2.14	0.62
1:A:158:ILE:HD11	1:A:163:MET:HB3	1.82	0.62
1:A:471:ASP:HB3	1:A:505:LYS:HG3	1.82	0.61
1:A:335:PRO:HG3	1:A:456:VAL:HG22	1.82	0.61
1:A:137:VAL:HG13	1:A:151:PHE:CE1	2.31	0.61
1:A:227:LEU:O	1:A:258:GLY:HA3	2.01	0.60
1:A:610:ARG:O	1:A:614:MET:HG2	2.01	0.60
1:A:219:MET:HE1	1:A:263:THR:HG21	1.83	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:141:LEU:HD22	1:A:151:PHE:HZ	1.67	0.60
1:A:579:GLU:H	1:A:579:GLU:CD	2.10	0.59
1:A:522:PRO:O	1:A:530:HIS:HE1	1.87	0.58
1:A:610:ARG:HG3	1:A:614:MET:HE3	1.86	0.57
1:A:512:ARG:NH2	5:A:818:HOH:O	2.36	0.57
1:A:141:LEU:HD22	1:A:151:PHE:CZ	2.39	0.57
1:A:689:LEU:HD22	1:A:690:SER:O	2.05	0.57
1:A:139:GLU:HG3	1:A:140:GLN:N	2.18	0.56
1:A:490:THR:HG22	1:A:632:GLN:HG3	1.88	0.56
1:A:368:ASP:OD1	1:A:368:ASP:C	2.50	0.54
1:A:160:TYR:O	1:A:163:MET:HG3	2.08	0.54
1:A:576:SER:HA	1:A:577:PRO:C	2.32	0.54
1:A:623:THR:CG2	1:A:624:ALA:H	2.22	0.53
1:A:424:PRO:HG3	1:A:434:ALA:HB2	1.89	0.53
1:A:203:LEU:HD21	1:A:211:LYS:HD3	1.90	0.53
1:A:203:LEU:HD11	1:A:211:LYS:HB3	1.91	0.53
1:A:623:THR:CG2	1:A:624:ALA:N	2.72	0.53
1:A:490:THR:HG22	1:A:632:GLN:CG	2.38	0.53
1:A:126:PHE:O	1:A:130:LEU:HB2	2.09	0.53
1:A:90:ASP:OD1	1:A:92:THR:HG23	2.10	0.52
1:A:287:LYS:HE2	1:A:591:GLN:OE1	2.09	0.52
1:A:649:LEU:HD12	1:A:688:ILE:HD13	1.92	0.52
1:A:367:ALA:HB2	1:A:442:ILE:HD11	1.91	0.52
1:A:618:LEU:HB2	1:A:620:LEU:HD13	1.91	0.51
1:A:512:ARG:HD2	1:A:578:ALA:O	2.10	0.51
1:A:96:VAL:HG12	1:A:155:GLY:O	2.10	0.51
1:A:286:GLY:HA2	1:A:592:PRO:HA	1.92	0.51
1:A:335:PRO:HG3	1:A:456:VAL:CG2	2.40	0.50
1:A:163:MET:SD	1:A:163:MET:O	2.69	0.50
1:A:462:ILE:O	1:A:466:THR:HG23	2.10	0.50
1:A:164:MET:HE3	1:A:164:MET:HA	1.93	0.50
1:A:598:ILE:HD12	1:A:598:ILE:N	2.28	0.49
1:A:729:LYS:HB3	1:A:747:THR:HB	1.94	0.49
1:A:364:LEU:HD11	1:A:398:VAL:HG13	1.95	0.49
1:A:386:MET:HG2	1:A:524:TYR:CE1	2.48	0.49
1:A:217:SER:N	1:A:221:SER:HB2	2.27	0.49
1:A:367:ALA:O	1:A:368:ASP:OD1	2.30	0.49
1:A:741:ILE:C	1:A:741:ILE:HD12	2.38	0.49
1:A:297:LYS:HE3	1:A:581:PRO:O	2.12	0.48
1:A:123:ALA:HA	1:A:137:VAL:CG1	2.38	0.48
1:A:200:LEU:C	1:A:220:GLU:HG2	2.39	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:137:VAL:O	1:A:141:LEU:HD23	2.14	0.48
1:A:714:LEU:HD13	1:A:738:ILE:CD1	2.44	0.48
1:A:653:LEU:HD12	1:A:660:PRO:HB3	1.96	0.48
1:A:158:ILE:CD1	1:A:163:MET:HB3	2.44	0.48
1:A:496:LYS:HE3	5:A:774:HOH:O	2.14	0.48
1:A:657:LEU:HD12	1:A:657:LEU:N	2.29	0.47
1:A:704:LYS:O	1:A:708:GLU:HG3	2.14	0.47
1:A:367:ALA:O	1:A:368:ASP:CG	2.58	0.47
1:A:619:ASN:HB3	1:A:622:THR:OG1	2.15	0.47
1:A:363:GLU:HG2	1:A:370:THR:HG23	1.95	0.47
1:A:132:MET:HE1	1:A:151:PHE:HB3	1.97	0.46
1:A:618:LEU:HB2	1:A:620:LEU:CD1	2.45	0.46
1:A:689:LEU:HB2	1:A:713:TRP:CZ3	2.51	0.46
1:A:124:GLU:CD	1:A:124:GLU:C	2.84	0.46
1:A:139:GLU:HG3	1:A:140:GLN:H	1.80	0.46
1:A:264:THR:OG1	1:A:479:PHE:HA	2.16	0.46
1:A:557:LYS:HE2	1:A:557:LYS:CA	2.40	0.46
1:A:687:LEU:HG	1:A:706:THR:HG23	1.98	0.45
1:A:372:ARG:NH1	2:B:2:TRV:O1N	2.45	0.45
1:A:188:TYR:O	1:A:313:ASP:HB2	2.16	0.45
1:A:364:LEU:CD1	1:A:398:VAL:HG13	2.46	0.45
1:A:699:MET:HG2	1:A:702:TRP:CZ3	2.51	0.45
1:A:201:ALA:HB2	1:A:220:GLU:CG	2.46	0.45
1:A:579:GLU:CD	1:A:579:GLU:N	2.75	0.45
1:A:306:GLN:HB2	1:A:327:ILE:HD12	1.98	0.45
1:A:426:ARG:O	1:A:654:ARG:HD2	2.18	0.44
1:A:522:PRO:HA	1:A:528:TYR:CD2	2.53	0.44
1:A:81:ASP:OD1	1:A:81:ASP:C	2.60	0.44
1:A:610:ARG:HD2	1:A:614:MET:HE3	1.99	0.44
1:A:290:THR:HB	1:A:588:THR:OG1	2.16	0.44
1:A:614:MET:O	1:A:618:LEU:HG	2.18	0.44
1:A:649:LEU:HD12	1:A:688:ILE:CD1	2.47	0.44
1:A:307:ARG:HA	1:A:308:PRO:C	2.43	0.44
1:A:357:GLU:O	1:A:387:THR:HA	2.18	0.43
1:A:330:GLN:HA	1:A:433:TYR:CD1	2.54	0.43
1:A:336:GLY:CA	1:A:551:ALA:HB2	2.48	0.43
1:A:443:VAL:O	1:A:447:GLN:HG3	2.17	0.43
1:A:122:VAL:C	1:A:124:GLU:H	2.26	0.43
1:A:672:SER:HA	1:A:687:LEU:O	2.19	0.43
1:A:659:GLN:O	1:A:685:GLN:HA	2.18	0.42
1:A:610:ARG:CG	1:A:614:MET:HE3	2.49	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:555:ASP:HB3	1:A:559:GLY:O	2.19	0.42
1:A:479:PHE:CD1	1:A:480:ILE:HG13	2.54	0.42
1:A:122:VAL:C	1:A:124:GLU:N	2.76	0.41
1:A:401:THR:O	1:A:405:GLN:HG2	2.20	0.41
1:A:670:LYS:O	1:A:671:ASN:HB2	2.20	0.41
1:A:126:PHE:CG	1:A:130:LEU:HD12	2.56	0.41
1:A:199:GLY:HA3	1:A:217:SER:O	2.21	0.41
1:A:162:ASN:C	1:A:164:MET:H	2.29	0.41
1:A:159:THR:C	1:A:161:ALA:N	2.74	0.41
1:A:262:TYR:CZ	1:A:627:LEU:HD11	2.56	0.41
1:A:491:ALA:O	1:A:633:GLN:HA	2.20	0.41
1:A:77:GLY:HA3	1:A:259:LYS:O	2.21	0.40
1:A:94:TYR:O	1:A:158:ILE:HG12	2.20	0.40
1:A:124:GLU:O	1:A:127:HIS:HB3	2.22	0.40
1:A:522:PRO:O	1:A:530:HIS:CE1	2.72	0.40
1:A:728:GLN:HG3	1:A:749:GLY:CA	2.45	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	597/702 (85%)	558 (94%)	37 (6%)	2 (0%)	36	49

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	559	GLY
1	A	157	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	506/589 (86%)	499 (99%)	7 (1%)	59 77

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	81	ASP
1	A	141	LEU
1	A	427	PHE
1	A	437	LEU
1	A	689	LEU
1	A	712	LYS
1	A	723	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	83	ASN
1	A	95	ASN
1	A	120	ASN
1	A	350	ASN
1	A	351	ASN
1	A	394	HIS
1	A	487	ASN
1	A	501	ASN
1	A	530	HIS
1	A	580	ASN
1	A	590	GLN
1	A	619	ASN
1	A	656	ASN
1	A	721	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 ⓘ

2 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	B	1	2	11,11,12	1.83	2 (18%)	15,15,17	0.76	0
2	TRV	B	2	2	20,21,21	1.21	1 (5%)	20,28,28	2.06	4 (20%)

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	B	1	2	-	2/2/19/22	0/1/1/1
2	TRV	B	2	2	-	4/15/34/34	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	2	TRV	O2-C2	4.54	1.48	1.40
2	B	1	GLC	O5-C1	3.78	1.50	1.43
2	B	1	GLC	O5-C5	3.25	1.49	1.43

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	2	TRV	O6-C6-C5	7.13	123.45	108.41
2	B	2	TRV	O5-C5-C6	2.66	115.75	109.50
2	B	2	TRV	C6-O6-C1N	-2.59	107.65	117.12
2	B	2	TRV	C3N-C2N-C1N	-2.45	104.71	113.69

There are no chirality outliers.

All (6) torsion outliers are listed below:

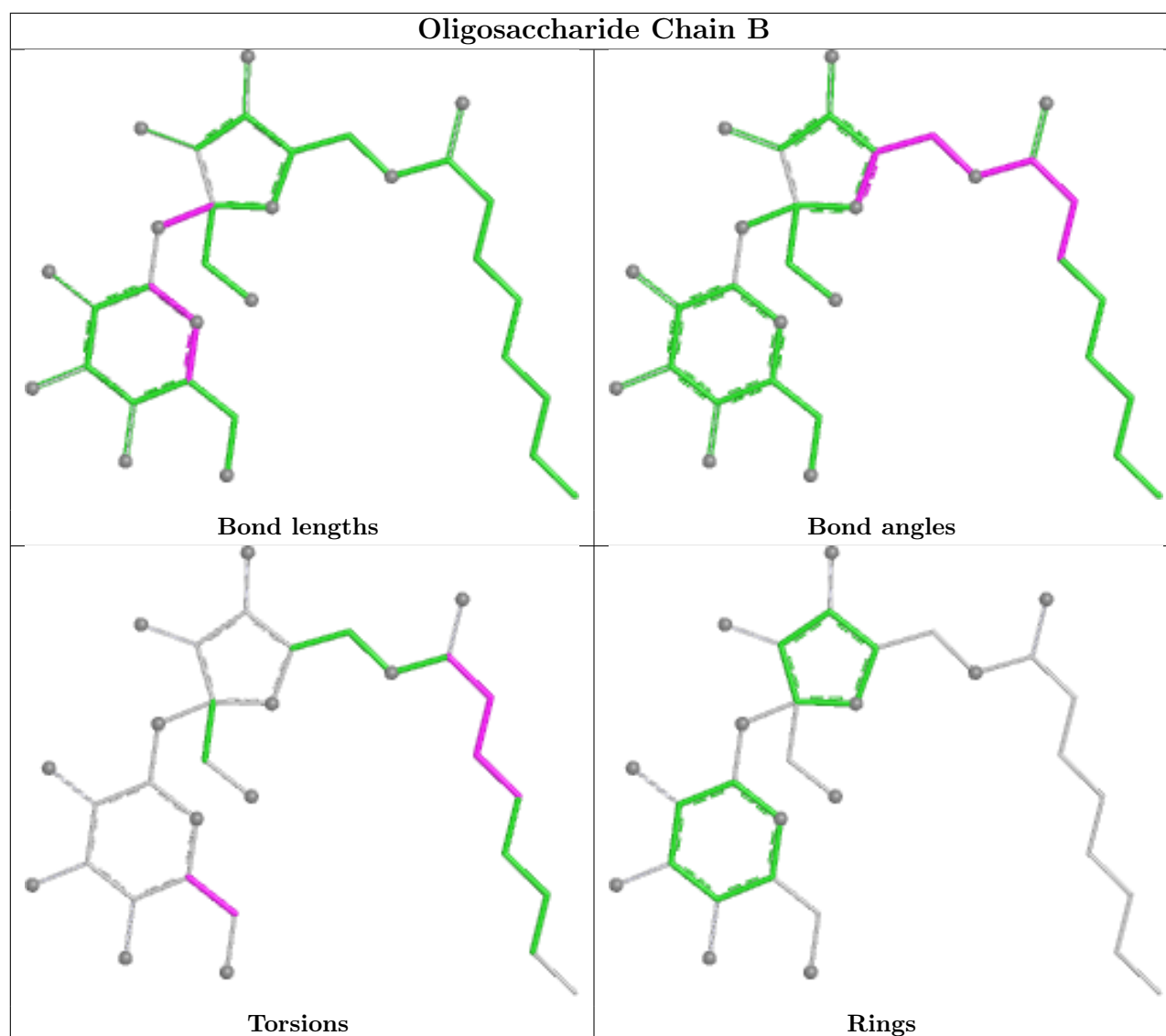
Mol	Chain	Res	Type	Atoms
2	B	2	TRV	C2N-C3N-C4N-C5N
2	B	1	GLC	C4-C5-C6-O6
2	B	1	GLC	O5-C5-C6-O6
2	B	2	TRV	C1N-C2N-C3N-C4N
2	B	2	TRV	O1N-C1N-C2N-C3N
2	B	2	TRV	O6-C1N-C2N-C3N

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	2	TRV	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](#)

2 ligands 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	$\# Z > 2$
4	MPD	A	753	-	7,7,7	0.49	0	9,10,10	0.51	0
3	SO4	A	751	-	4,4,4	0.38	0	6,6,6	0.14	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
4	MPD	A	753	-	-	0/5/5/5	-

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 [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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	607/702 (86%)	0.37	71 (11%) 9 7	24, 47, 103, 118	0

All (71) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	97	TYR	8.2
1	A	149	VAL	6.6
1	A	98	ALA	6.6
1	A	183	SER	6.3
1	A	160	TYR	6.3
1	A	96	VAL	6.1
1	A	94	TYR	5.6
1	A	141	LEU	5.5
1	A	184	PRO	5.3
1	A	377	ASN	4.7
1	A	128	LYS	4.7
1	A	159	THR	4.6
1	A	129	TYR	4.0
1	A	203	LEU	4.0
1	A	120	ASN	3.9
1	A	136	TYR	3.8
1	A	164	MET	3.7
1	A	124	GLU	3.7
1	A	137	VAL	3.6
1	A	376	VAL	3.5
1	A	123	ALA	3.5
1	A	228	ALA	3.5
1	A	162	ASN	3.4
1	A	161	ALA	3.3
1	A	624	ALA	3.3
1	A	212	SER	3.3
1	A	138	ARG	3.3

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Mol	Chain	Res	Type	RSRZ
1	A	626	ALA	3.3
1	A	140	GLN	3.2
1	A	565	LEU	3.2
1	A	151	PHE	3.2
1	A	214	LEU	3.1
1	A	95	ASN	3.1
1	A	73	PRO	3.0
1	A	213	LEU	3.0
1	A	127	HIS	2.8
1	A	623	THR	2.8
1	A	211	LYS	2.8
1	A	158	ILE	2.8
1	A	121	LYS	2.7
1	A	92	THR	2.6
1	A	564	GLY	2.5
1	A	557	LYS	2.5
1	A	489	GLN	2.5
1	A	558	ASN	2.4
1	A	750	ASP	2.4
1	A	723	SER	2.4
1	A	627	LEU	2.4
1	A	130	LEU	2.3
1	A	202	GLN	2.3
1	A	132	MET	2.3
1	A	630	VAL	2.3
1	A	204	HIS	2.3
1	A	620	LEU	2.2
1	A	231	ASP	2.2
1	A	93	SER	2.2
1	A	90	ASP	2.2
1	A	122	VAL	2.2
1	A	91	ALA	2.2
1	A	207	GLU	2.2
1	A	368	ASP	2.2
1	A	152	GLY	2.1
1	A	229	GLY	2.1
1	A	559	GLY	2.1
1	A	625	LYS	2.1
1	A	150	SER	2.1
1	A	210	SER	2.1
1	A	722	GLY	2.0
1	A	125	VAL	2.0

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Mol	Chain	Res	Type	RSRZ
1	A	563	VAL	2.0
1	A	556	GLU	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

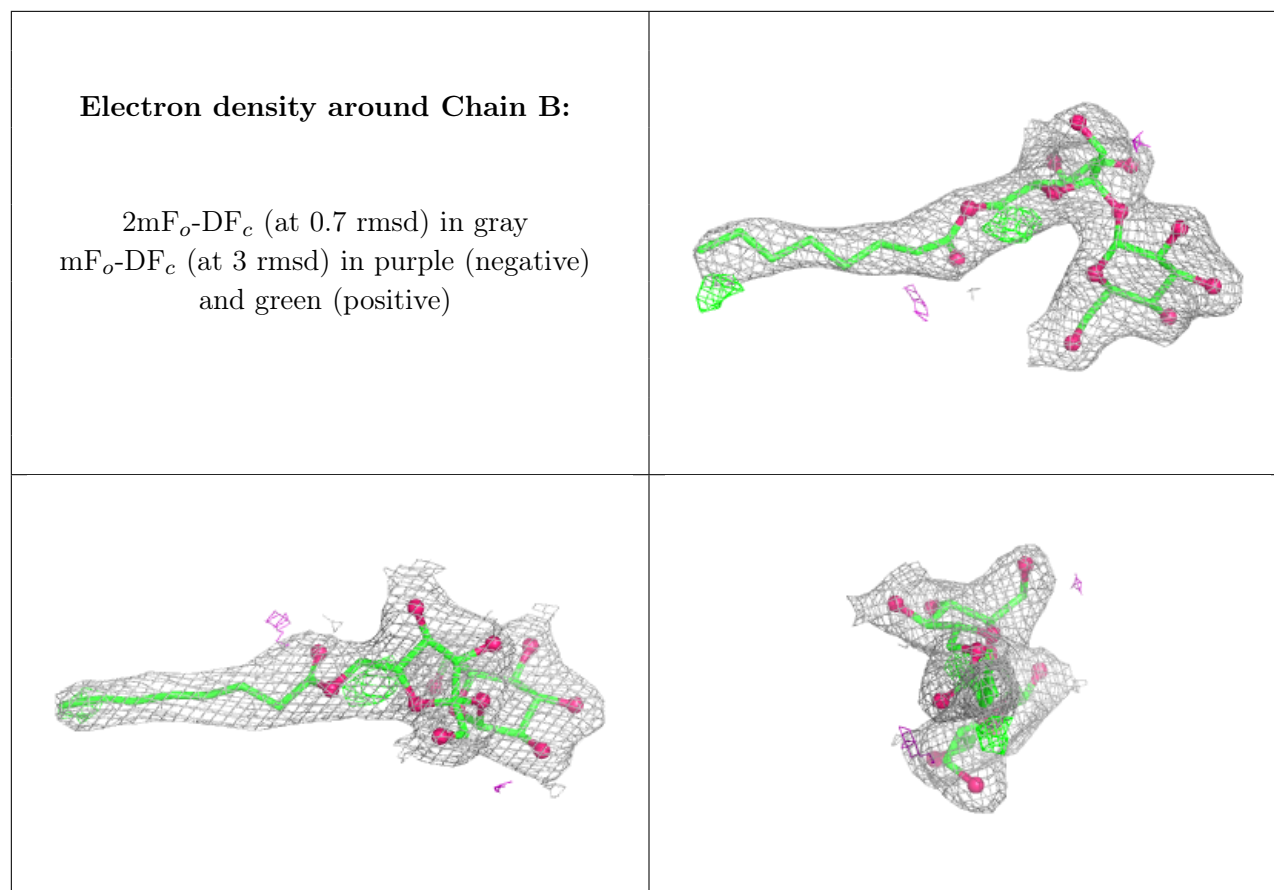
There are no non-standard protein/DNA/RNA residues in this entry.

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
2	TRV	B	2	21/21	0.94	0.14	37,44,70,71	0
2	GLC	B	1	11/12	0.95	0.08	37,42,45,46	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.



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	MPD	A	753	8/8	0.88	0.24	76,83,87,89	0
3	SO4	A	751	5/5	0.98	0.05	49,50,53,56	0

6.5 Other polymers [i](#)

There are no such residues in this entry.