



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2026 – 11:15 AM UTC

PDB ID : 1SHW / pdb_00001shw
Title : EphB2 / EphrinA5 Complex Structure
Authors : Himanen, J.P.; Chumley, M.J.; Lackmann, M.; Li, C.; Barton, W.A.; Jeffrey, P.D.; Vearing, C.; Geleick, D.; Feldheim, D.A.; Boyd, A.W.
Deposited on : 2004-02-26
Resolution : 2.20 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)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

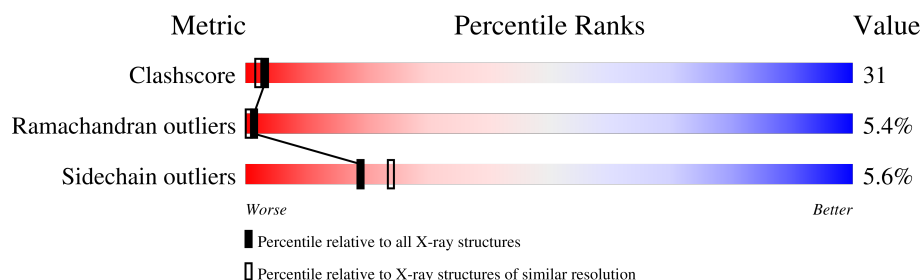
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	138	 55% 39% . .
2	B	181	 52% 39% 7% .
3	C	3	 33% 67%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 2880 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.

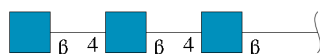
- Molecule 1 is a protein called Ephrin-A5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	138	Total	C	N	O	S	0	0	0
			1151	736	198	209	8			

- Molecule 2 is a protein called Ephrin type-B receptor 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	181	Total	C	N	O	S	57	0	0
			1464	925	252	275	12			

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	3	Total	C	N	O	0	0	0
			42	24	3	15			

- 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	107	Total	O	0	0
			107	107		

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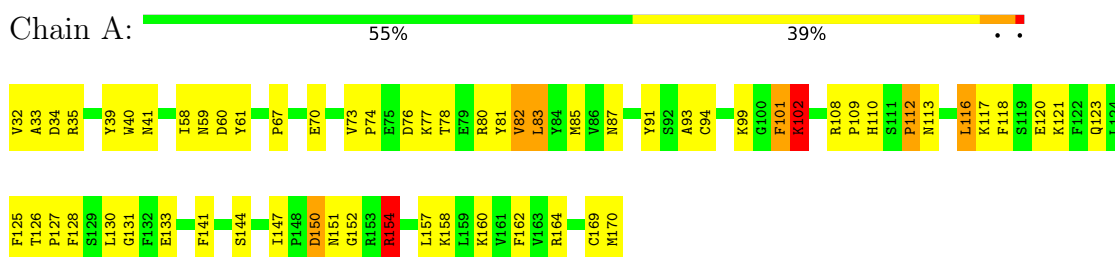
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	115	Total 115	O 115	0	0

3 Residue-property plots

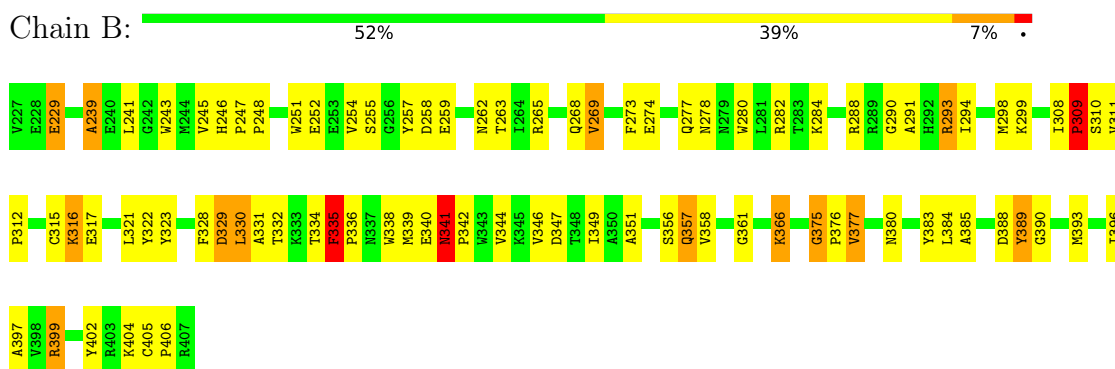
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded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

Note EDS was not executed.

• Molecule 1: Ephrin-A5



• Molecule 2: Ephrin type-B receptor 2



• Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	37.89Å 88.97Å 122.81Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 2.20	Depositor
% Data completeness (in resolution range)	(Not available) (8.00-2.20)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.258 , 0.305	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2880	wwPDB-VP
Average B, all atoms (Å ²)	48.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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

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	0.42	0/1190	0.97	11/1610 (0.7%)
2	B	0.39	0/1503	0.91	6/2035 (0.3%)
All	All	0.40	0/2693	0.94	17/3645 (0.5%)

There are no bond length outliers.

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	82	VAL	N-CA-C	-6.75	98.66	108.11
1	A	77	LYS	N-CA-C	-6.02	105.70	113.16
1	A	157	LEU	N-CA-C	-5.97	100.76	110.20
2	B	375	GLY	N-CA-C	5.94	124.45	112.34
2	B	396	ILE	N-CA-C	5.88	116.06	110.53
1	A	34	ASP	N-CA-C	-5.86	107.94	114.62
1	A	76	ASP	N-CA-C	-5.85	106.69	113.88
1	A	60	ASP	N-CA-C	-5.77	103.08	110.53
1	A	116	LEU	N-CA-C	-5.50	102.25	110.23
1	A	40	TRP	N-CA-C	5.29	117.80	109.39
1	A	85	MET	N-CA-C	-5.24	100.19	108.73
2	B	308	ILE	CA-C-N	5.20	126.34	119.84
2	B	308	ILE	C-N-CA	5.20	126.34	119.84
1	A	102	LYS	N-CA-C	-5.17	102.21	109.96
2	B	335	PHE	CA-C-N	-5.12	114.13	120.79
2	B	335	PHE	C-N-CA	-5.12	114.13	120.79
1	A	169	CYS	N-CA-C	5.03	117.26	108.52

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	1151	0	1067	57	0
2	B	1464	0	1386	101	0
3	C	42	0	37	3	0
4	A	1	0	0	0	0
5	A	107	0	0	21	0
5	B	115	0	0	35	0
All	All	2880	0	2490	156	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 31.

All (156) 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:154:ARG:HB2	1:A:154:ARG:HH11	1.12	1.07
2:B:346:VAL:HG23	5:B:499:HOH:O	1.57	1.00
1:A:126:THR:HG21	1:A:131:GLY:HA3	1.46	0.94
2:B:246:HIS:HB3	2:B:247:PRO:HD3	1.48	0.92
2:B:321:LEU:HB3	5:B:502:HOH:O	1.73	0.88
1:A:154:ARG:HH11	1:A:154:ARG:CB	1.89	0.83
2:B:335:PHE:HB3	2:B:336:PRO:HD3	1.66	0.78
1:A:41:ASN:HB3	5:A:1105:HOH:O	1.84	0.78
2:B:298:MET:HE2	5:B:456:HOH:O	1.83	0.77
2:B:335:PHE:HB3	2:B:336:PRO:CD	2.15	0.77
2:B:321:LEU:HG	5:B:500:HOH:O	1.86	0.76
2:B:399:ARG:HH11	2:B:399:ARG:HB3	1.52	0.75
2:B:316:LYS:CE	2:B:317:GLU:H	2.00	0.75
2:B:316:LYS:HA	2:B:316:LYS:HE3	1.71	0.73
2:B:298:MET:HE1	2:B:349:ILE:HG13	1.73	0.71
2:B:288:ARG:CD	2:B:377:VAL:HG12	2.21	0.71
1:A:108:ARG:HD2	5:A:1107:HOH:O	1.91	0.71
1:A:126:THR:HG22	1:A:128:PHE:H	1.54	0.71
1:A:126:THR:HB	5:A:1064:HOH:O	1.91	0.69
1:A:83:LEU:HD22	1:A:144:SER:HB3	1.73	0.69
2:B:288:ARG:HD3	2:B:377:VAL:HG12	1.74	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:246:HIS:CB	2:B:247:PRO:HD3	2.22	0.69
2:B:310:SER:O	2:B:312:PRO:HD3	1.92	0.68
2:B:336:PRO:HD2	5:B:493:HOH:O	1.95	0.66
1:A:81:TYR:HE2	5:A:1085:HOH:O	1.79	0.65
2:B:351:ALA:HB3	5:B:495:HOH:O	1.96	0.65
1:A:131:GLY:HA2	5:A:1040:HOH:O	1.96	0.64
1:A:70:GLU:HB2	5:A:1096:HOH:O	1.98	0.64
1:A:154:ARG:HB2	1:A:154:ARG:NH1	1.98	0.64
2:B:341:ASN:HA	5:B:507:HOH:O	1.97	0.63
2:B:323:TYR:OH	2:B:376:PRO:HG3	1.99	0.63
2:B:321:LEU:HD12	5:B:501:HOH:O	1.98	0.63
2:B:291:ALA:HB3	5:B:487:HOH:O	1.99	0.62
2:B:239:ALA:HB3	5:B:472:HOH:O	2.00	0.61
2:B:229:GLU:HG3	5:B:489:HOH:O	1.99	0.61
2:B:330:LEU:HB3	5:B:486:HOH:O	2.00	0.61
2:B:282:ARG:HG2	5:B:494:HOH:O	2.00	0.61
2:B:251:TRP:CE3	2:B:269:VAL:HG22	2.36	0.61
2:B:344:VAL:O	5:B:499:HOH:O	2.16	0.61
2:B:316:LYS:HE2	2:B:317:GLU:H	1.64	0.60
1:A:170:MET:H	1:A:170:MET:HE2	1.65	0.60
1:A:151:ASN:HA	5:A:1086:HOH:O	2.01	0.60
2:B:258:ASP:HB3	2:B:262:ASN:HB2	1.83	0.60
1:A:80:ARG:HB3	1:A:147:ILE:HD12	1.84	0.58
1:A:87:ASN:HB3	5:A:1069:HOH:O	2.04	0.58
2:B:332:THR:OG1	2:B:335:PHE:HB2	2.03	0.57
2:B:315:CYS:HA	2:B:390:GLY:O	2.05	0.57
2:B:274:GLU:HB3	2:B:277:GLN:NE2	2.20	0.57
2:B:288:ARG:HG3	5:B:487:HOH:O	2.04	0.56
1:A:35:ARG:HG2	1:A:61:TYR:HB2	1.88	0.56
1:A:151:ASN:HB3	1:A:154:ARG:HH22	1.69	0.56
1:A:116:LEU:HD23	1:A:117:LYS:N	2.21	0.56
1:A:127:PRO:HG3	2:B:268:GLN:HB2	1.87	0.56
2:B:376:PRO:HA	5:B:480:HOH:O	2.05	0.56
2:B:316:LYS:HE3	2:B:317:GLU:H	1.71	0.56
1:A:73:VAL:HG23	5:A:1096:HOH:O	2.04	0.55
2:B:294:ILE:HD12	2:B:294:ILE:N	2.20	0.55
2:B:339:MET:HE2	2:B:341:ASN:CG	2.31	0.55
1:A:125:PHE:HA	1:A:133:GLU:OE2	2.07	0.55
2:B:246:HIS:HB2	2:B:338:TRP:CD2	2.41	0.55
2:B:322:TYR:HA	5:B:499:HOH:O	2.07	0.55
2:B:376:PRO:HB3	5:B:519:HOH:O	2.07	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:366:LYS:N	5:B:452:HOH:O	2.39	0.54
1:A:67:PRO:HG2	5:A:1038:HOH:O	2.08	0.54
2:B:245:VAL:HG13	5:B:438:HOH:O	2.08	0.54
2:B:291:ALA:HB2	2:B:402:TYR:CG	2.44	0.53
2:B:316:LYS:HE3	2:B:316:LYS:CA	2.38	0.53
2:B:273:PHE:CE2	2:B:310:SER:HB2	2.44	0.52
3:C:2:NAG:H62	3:C:3:NAG:O5	2.09	0.52
2:B:316:LYS:HE3	2:B:317:GLU:N	2.25	0.51
2:B:309:PRO:O	2:B:311:VAL:HG23	2.10	0.51
1:A:112:PRO:HB2	5:A:1077:HOH:O	2.11	0.51
2:B:341:ASN:CB	2:B:342:PRO:CD	2.89	0.51
1:A:78:THR:HG22	1:A:80:ARG:HH11	1.76	0.50
1:A:164:ARG:CG	5:A:1108:HOH:O	2.59	0.50
1:A:170:MET:HE2	1:A:170:MET:N	2.26	0.50
2:B:293:ARG:C	2:B:294:ILE:HD12	2.37	0.49
2:B:243:TRP:HB3	2:B:282:ARG:O	2.12	0.49
2:B:316:LYS:HD3	5:B:459:HOH:O	2.11	0.49
1:A:32:VAL:HG12	1:A:33:ALA:N	2.28	0.49
2:B:299:LYS:HE2	2:B:397:ALA:HB3	1.95	0.49
1:A:80:ARG:HH11	1:A:80:ARG:HG3	1.77	0.49
2:B:329:ASP:O	2:B:330:LEU:HB3	2.11	0.49
2:B:346:VAL:O	2:B:347:ASP:HB2	2.12	0.49
1:A:127:PRO:HB2	2:B:393:MET:C	2.38	0.49
1:A:73:VAL:HB	5:A:1093:HOH:O	2.13	0.49
2:B:246:HIS:O	2:B:248:PRO:HD3	2.13	0.49
1:A:123:GLN:NE2	5:A:1058:HOH:O	2.46	0.48
1:A:101:PHE:N	1:A:101:PHE:CD1	2.81	0.48
2:B:257:TYR:HA	2:B:262:ASN:O	2.13	0.48
1:A:123:GLN:HG2	5:A:1058:HOH:O	2.14	0.48
2:B:340:GLU:HG2	5:B:483:HOH:O	2.13	0.48
2:B:330:LEU:HD22	5:B:486:HOH:O	2.13	0.47
1:A:162:PHE:O	5:A:1108:HOH:O	2.20	0.47
2:B:339:MET:HG3	2:B:342:PRO:HD2	1.95	0.47
1:A:116:LEU:HD22	1:A:118:PHE:CE1	2.50	0.47
1:A:164:ARG:HG3	5:A:1108:HOH:O	2.15	0.47
2:B:385:ALA:C	5:B:501:HOH:O	2.57	0.47
2:B:246:HIS:HB3	2:B:247:PRO:CD	2.33	0.46
2:B:288:ARG:HD2	2:B:377:VAL:HG12	1.95	0.46
2:B:294:ILE:N	2:B:294:ILE:CD1	2.79	0.46
1:A:147:ILE:C	1:A:150:ASP:H	2.22	0.46
2:B:258:ASP:CG	2:B:259:GLU:N	2.74	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:241:LEU:O	2:B:284:LYS:HE2	2.15	0.46
1:A:110:HIS:HD2	5:A:1082:HOH:O	1.98	0.46
2:B:247:PRO:HD2	5:B:438:HOH:O	2.15	0.46
2:B:246:HIS:CB	2:B:247:PRO:CD	2.93	0.46
1:A:67:PRO:HA	3:C:1:NAG:O7	2.16	0.46
2:B:251:TRP:CD2	2:B:269:VAL:HG22	2.52	0.46
2:B:328:PHE:O	2:B:329:ASP:O	2.34	0.46
1:A:121:LYS:NZ	5:A:1089:HOH:O	2.48	0.45
1:A:141:PHE:CE2	1:A:160:LYS:HG3	2.50	0.45
2:B:254:VAL:HG12	2:B:255:SER:N	2.31	0.45
2:B:316:LYS:HB2	5:B:479:HOH:O	2.15	0.45
2:B:239:ALA:N	5:B:421:HOH:O	2.50	0.45
2:B:331:ALA:HB2	2:B:383:TYR:CZ	2.52	0.45
2:B:323:TYR:HD2	5:B:499:HOH:O	2.00	0.45
2:B:402:TYR:HE1	2:B:404:LYS:HB2	1.82	0.44
2:B:356:SER:O	2:B:357:GLN:HB2	2.17	0.44
2:B:229:GLU:HB3	2:B:402:TYR:CE2	2.52	0.44
2:B:265:ARG:NH2	5:B:473:HOH:O	2.46	0.44
2:B:399:ARG:HH11	2:B:399:ARG:CB	2.24	0.44
1:A:87:ASN:OD1	1:A:99:LYS:HB3	2.18	0.43
1:A:147:ILE:C	1:A:150:ASP:N	2.75	0.43
2:B:288:ARG:HA	5:B:487:HOH:O	2.18	0.43
2:B:246:HIS:HB2	2:B:338:TRP:CE3	2.53	0.43
1:A:93:ALA:O	1:A:94:CYS:HB2	2.19	0.43
1:A:82:VAL:C	1:A:83:LEU:HD23	2.44	0.43
2:B:316:LYS:HG2	2:B:389:TYR:HE1	1.83	0.43
2:B:402:TYR:CE1	2:B:404:LYS:HB2	2.53	0.43
2:B:322:TYR:C	5:B:500:HOH:O	2.61	0.42
1:A:91:TYR:CD1	1:A:141:PHE:HB3	2.54	0.42
1:A:117:LYS:NZ	5:A:1075:HOH:O	2.49	0.42
1:A:164:ARG:HG2	5:A:1108:HOH:O	2.18	0.42
2:B:298:MET:HE1	2:B:349:ILE:CG1	2.46	0.42
1:A:61:TYR:OH	2:B:252:GLU:OE1	2.33	0.42
1:A:58:ILE:O	1:A:59:ASN:HB2	2.20	0.42
2:B:290:GLY:N	5:B:463:HOH:O	2.50	0.42
2:B:380:ASN:HD22	2:B:380:ASN:HA	1.69	0.41
1:A:91:TYR:CE1	1:A:158:LYS:HD3	2.55	0.41
2:B:375:GLY:C	5:B:408:HOH:O	2.62	0.41
2:B:329:ASP:HB3	2:B:330:LEU:H	1.75	0.41
1:A:78:THR:HG21	1:A:109:PRO:HG3	2.02	0.41
2:B:376:PRO:O	2:B:377:VAL:C	2.63	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:80:ARG:HG3	1:A:80:ARG:NH1	2.36	0.41
1:A:102:LYS:HB3	1:A:102:LYS:NZ	2.36	0.41
2:B:357:GLN:HB3	5:B:444:HOH:O	2.20	0.41
2:B:334:THR:HG23	2:B:335:PHE:N	2.36	0.41
1:A:116:LEU:HD23	1:A:117:LYS:H	1.85	0.40
2:B:316:LYS:HG2	2:B:389:TYR:CE1	2.55	0.40
2:B:278:ASN:HD21	2:B:280:TRP:HE1	1.70	0.40
1:A:39:TYR:HB2	3:C:1:NAG:O6	2.22	0.40
2:B:254:VAL:CG1	2:B:255:SER:N	2.85	0.40
2:B:340:GLU:CG	5:B:483:HOH:O	2.69	0.40
2:B:257:TYR:CE1	2:B:263:THR:HG22	2.57	0.40
2:B:405:CYS:HA	2:B:406:PRO:HD3	1.89	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	136/138 (99%)	118 (87%)	11 (8%)	7 (5%)	1	0
2	B	179/181 (99%)	146 (82%)	23 (13%)	10 (6%)	1	0
All	All	315/319 (99%)	264 (84%)	34 (11%)	17 (5%)	1	0

All (17) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	112	PRO
1	A	154	ARG
2	B	309	PRO
2	B	329	ASP
2	B	357	GLN
2	B	358	VAL

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Mol	Chain	Res	Type
2	B	377	VAL
1	A	113	ASN
1	A	150	ASP
1	A	130	LEU
2	B	239	ALA
2	B	335	PHE
2	B	341	ASN
2	B	361	GLY
1	A	74	PRO
2	B	366	LYS
1	A	152	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	127/127 (100%)	122 (96%)	5 (4%)	28	39
2	B	160/161 (99%)	149 (93%)	11 (7%)	14	16
All	All	287/288 (100%)	271 (94%)	16 (6%)	19	24

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	83	LEU
1	A	101	PHE
1	A	102	LYS
1	A	120	GLU
1	A	154	ARG
2	B	229	GLU
2	B	269	VAL
2	B	293	ARG
2	B	309	PRO
2	B	316	LYS
2	B	330	LEU
2	B	341	ASN

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Mol	Chain	Res	Type
2	B	384	LEU
2	B	388	ASP
2	B	389	TYR
2	B	399	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	68	HIS
2	B	268	GLN
2	B	278	ASN
2	B	341	ASN
2	B	380	ASN
2	B	387	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

3 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	NAG	C	1	1,3	14,14,15	0.87	1 (7%)	17,19,21	0.65	0
3	NAG	C	2	3	14,14,15	0.60	0	17,19,21	0.81	1 (5%)
3	NAG	C	3	3	14,14,15	0.54	0	17,19,21	0.61	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	NAG	C	1	1,3	-	2/6/23/26	0/1/1/1
3	NAG	C	2	3	-	4/6/23/26	0/1/1/1
3	NAG	C	3	3	-	6/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	1	NAG	C1-C2	2.75	1.56	1.52

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	2	NAG	C2-N2-C7	-2.30	119.82	122.90

There are no chirality outliers.

All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	1	NAG	C8-C7-N2-C2
3	C	1	NAG	O7-C7-N2-C2
3	C	2	NAG	C8-C7-N2-C2
3	C	2	NAG	O7-C7-N2-C2
3	C	3	NAG	C8-C7-N2-C2
3	C	3	NAG	O7-C7-N2-C2
3	C	2	NAG	C4-C5-C6-O6
3	C	3	NAG	O5-C5-C6-O6
3	C	2	NAG	O5-C5-C6-O6
3	C	3	NAG	C4-C5-C6-O6
3	C	3	NAG	C3-C2-N2-C7
3	C	3	NAG	C1-C2-N2-C7

There are no ring outliers.

3 monomers are involved in 3 short contacts:

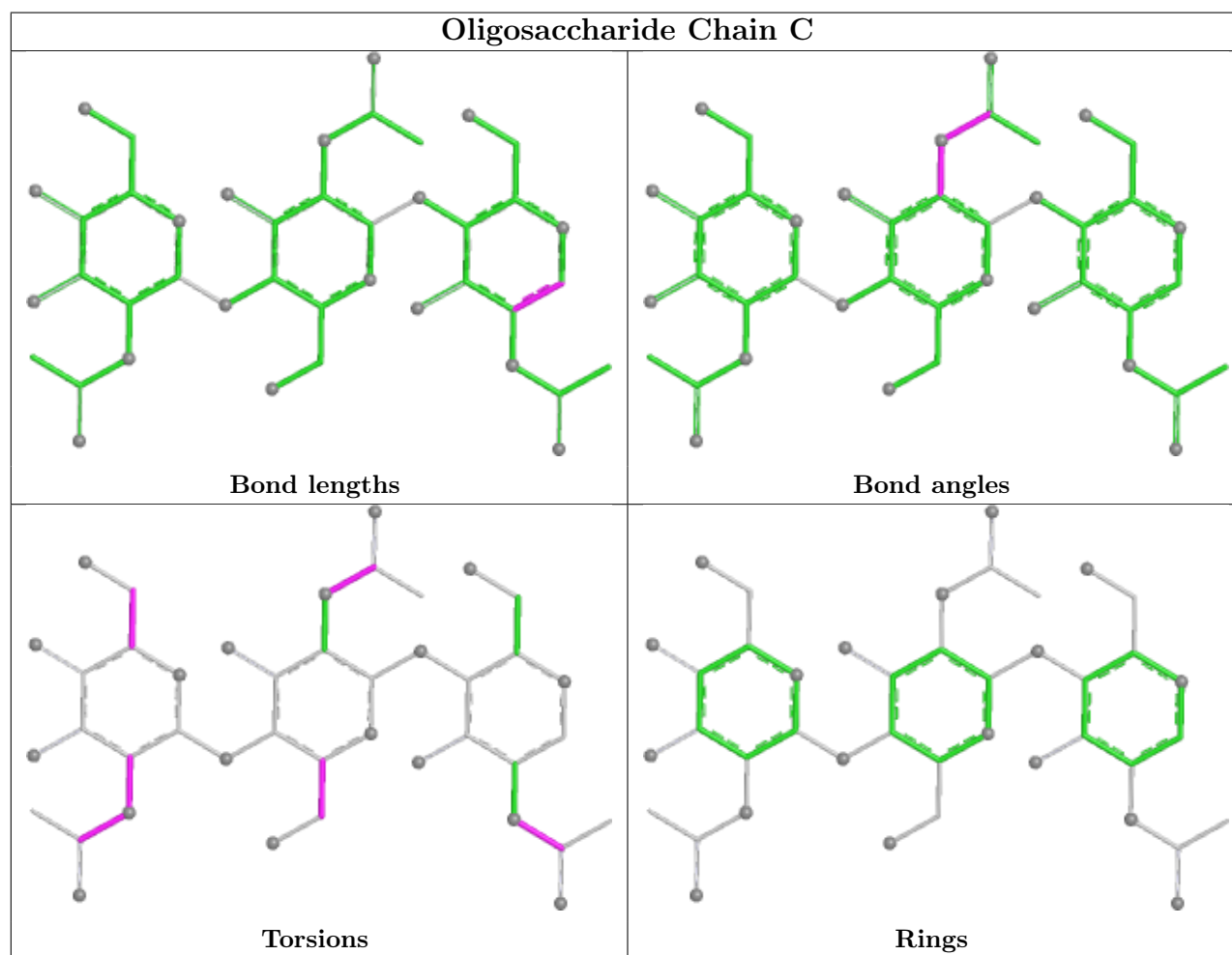
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	2	NAG	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	1	NAG	2	0
3	C	3	NAG	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 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 [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

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.