WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Nov 22, 2023 – 11:23 AM JST

PDB ID	:	7VG7
Title	:	Plexin B1 extracellular fragment in complex with lasso-grafted PB1m6A9 peptide
Authors	:	Sugano, N.N.; Hirata, K.; Yamashita, K.; Yamamoto, M.; Arimori, T.; Takagi, J.
Deposited on	:	2021-09-14
Resolution	:	2.50 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	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36
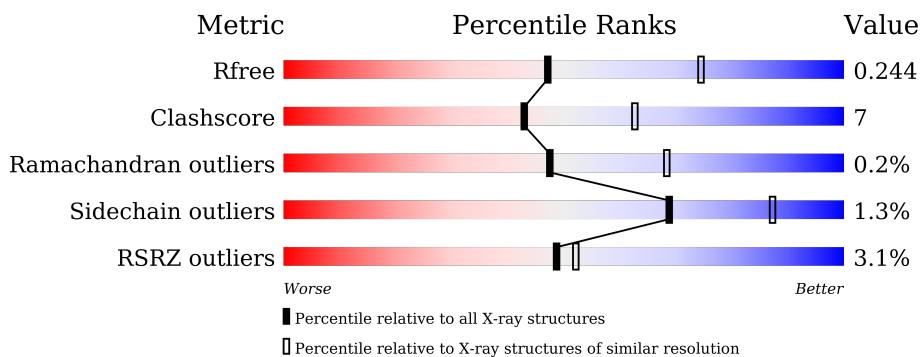
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION
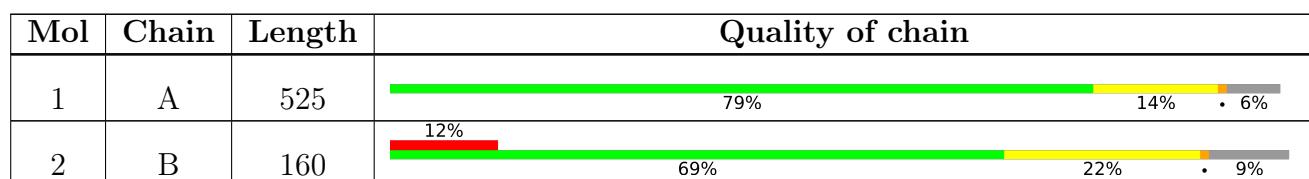
The reported resolution of this entry is 2.50 Å.

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	Percentile Ranks	Value
Rfree		0.244
Clashscore		7
Ramachandran outliers		0.2%
Sidechain outliers		1.3%
RSRZ outliers		3.1%

Worse   *Better*

▌Percentile relative to all X-ray structures

⫿ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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 <=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	525	79% 14% • 6%
2	B	160	12% 69% 22% • 9%

2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 5047 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 Plexin-B1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	496	3763	2365	656	720	22	0	0	0

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	19	SER	THR	engineered mutation	UNP O43157
A	536	THR	-	expression tag	UNP O43157
A	537	ARG	-	expression tag	UNP O43157
A	538	GLU	-	expression tag	UNP O43157
A	539	ASN	-	expression tag	UNP O43157
A	540	LEU	-	expression tag	UNP O43157
A	541	TYR	-	expression tag	UNP O43157
A	542	PHE	-	expression tag	UNP O43157
A	543	GLN	-	expression tag	UNP O43157
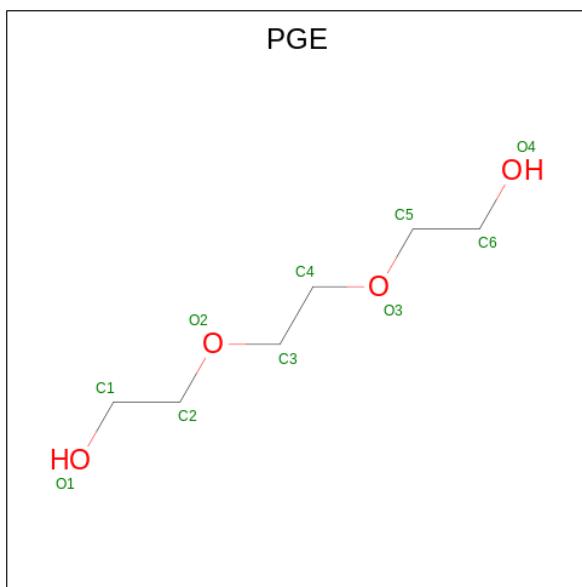
- Molecule 2 is a protein called Uteroglobin,PB1m6A9 peptide,Uteroglobin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	146	1160	734	195	221	10	0	0	0

There are 7 discrepancies between the modelled and reference sequences:
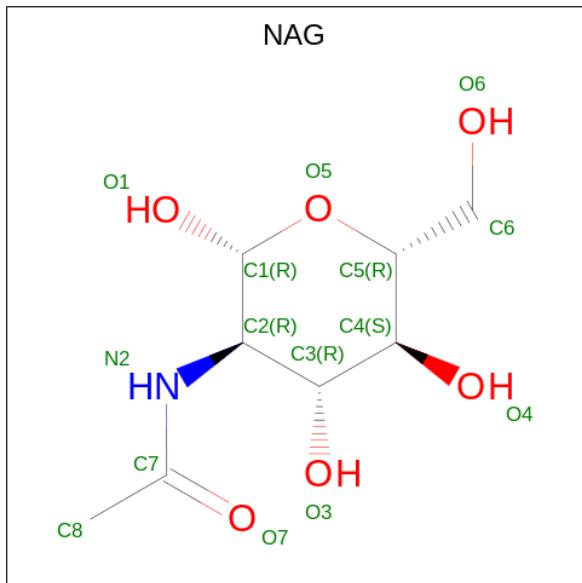
Chain	Residue	Modelled	Actual	Comment	Reference
B	21	SER	ALA	engineered mutation	UNP P11684
B	175	HIS	-	expression tag	UNP P11684
B	176	HIS	-	expression tag	UNP P11684
B	177	HIS	-	expression tag	UNP P11684
B	178	HIS	-	expression tag	UNP P11684
B	179	HIS	-	expression tag	UNP P11684
B	180	HIS	-	expression tag	UNP P11684

- Molecule 3 is TRIETHYLENE GLYCOL (three-letter code: PGE) (formula: $C_6H_{14}O_4$).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 10	C 6	O 4	0	0

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total 14	C 8	N 1	O 5	0	0
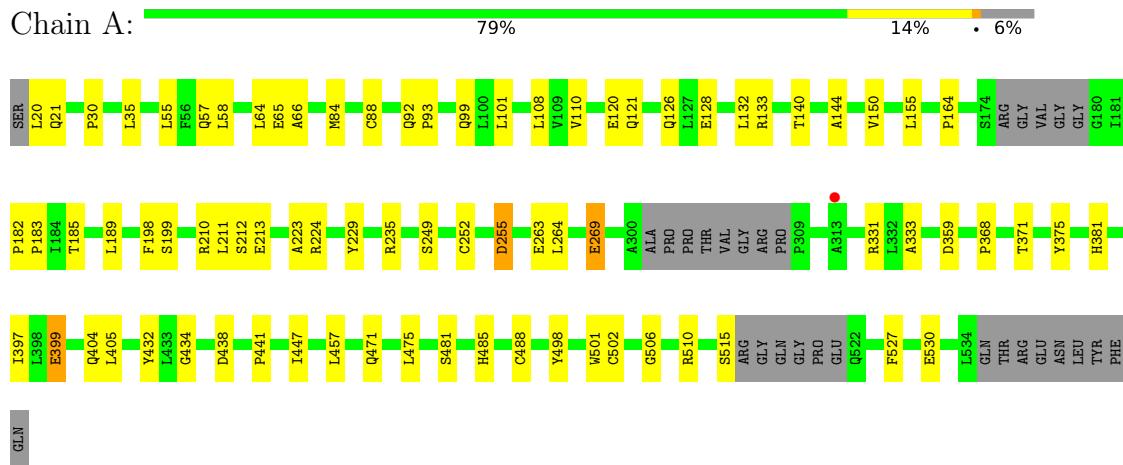
• Molecule 5 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	92	Total 92	O 92	0	0
5	B	8	Total 8	O 8	0	0
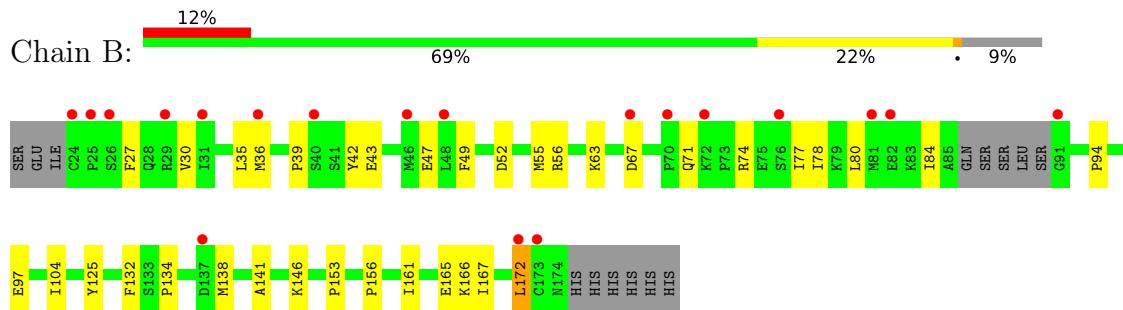
3 Residue-property plots ⓘ

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 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: Plexin-B1

Chain A:

• Molecule 2: Uteroglobin,PB1m6A9 peptide,Uteroglobin

Chain B:

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	69.19Å 62.49Å 82.60Å 90.00° 111.92° 90.00°	Depositor
Resolution (Å)	44.78 – 2.50 48.43 – 2.50	Depositor EDS
% Data completeness (in resolution range)	100.0 (44.78-2.50) 94.4 (48.43-2.50)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.42 (at 2.51Å)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.180 , 0.243 0.181 , 0.244	Depositor DCC
R_{free} test set	1123 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å^2)	19.6	Xtriage
Anisotropy	0.663	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 49.5	EDS
L-test for twinning[2]	$< \lvert L \rvert > = 0.47, < L^2 > = 0.30$	Xtriage
Estimated twinning fraction	0.030 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	5047	wwPDB-VP
Average B, all atoms (Å^2)	31.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.74% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< \lvert L \rvert >$, $< L^2 >$ 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: PGE, NAG

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	0.55	4/3857 (0.1%)	0.68	3/5268 (0.1%)
2	B	0.44	0/1180	0.68	2/1590 (0.1%)
All	All	0.53	4/5037 (0.1%)	0.68	5/6858 (0.1%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	399	GLU	CG-CD	8.07	1.64	1.51
1	A	269	GLU	CB-CG	7.05	1.65	1.52
1	A	399	GLU	CB-CG	6.92	1.65	1.52
1	A	269	GLU	CG-CD	5.93	1.60	1.51

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	172	LEU	CB-CG-CD2	-13.30	88.39	111.00
1	A	399	GLU	OE1-CD-OE2	-6.76	115.19	123.30
1	A	132	LEU	CA-CB-CG	5.70	128.40	115.30
1	A	457	LEU	CA-CB-CG	5.14	127.13	115.30
2	B	172	LEU	CA-CB-CG	5.05	126.91	115.30

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	3763	0	3613	44	0
2	B	1160	0	1183	23	0
3	A	10	0	14	1	0
4	A	14	0	13	1	0
5	A	92	0	0	1	0
5	B	8	0	0	0	0
All	All	5047	0	4823	66	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 7.

All (66) 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:99:GLN:HG2	1:A:144:ALA:HB1	1.63	0.78
1:A:404:GLN:NE2	1:A:405:LEU:O	2.21	0.73
1:A:30:PRO:HG3	1:A:35:LEU:HD21	1.70	0.73
1:A:331:ARG:HG3	4:A:602:NAG:H81	1.74	0.69
1:A:210:ARG:HB3	1:A:213:GLU:HG3	1.74	0.69
2:B:52:ASP:HB3	2:B:55:MET:HG3	1.77	0.66
1:A:252:CYS:HB2	1:A:255:ASP:HB3	1.78	0.65
1:A:21:GLN:NE2	1:A:481:SER:OG	2.30	0.65
2:B:161:ILE:O	2:B:165:GLU:HG2	1.97	0.65
1:A:126:GLN:HG2	1:A:128:GLU:OE2	1.97	0.64
1:A:269:GLU:OE2	1:A:399:GLU:OE1	2.17	0.62
2:B:35:LEU:HD13	2:B:78:ILE:HG12	1.80	0.62
1:A:447:ILE:HG23	1:A:475:LEU:HD12	1.80	0.62
1:A:55:LEU:HD11	1:A:110:VAL:HG11	1.83	0.61
2:B:39:PRO:O	2:B:43:GLU:HG3	2.00	0.61
1:A:183:PRO:HD3	1:A:211:LEU:HD21	1.86	0.57
1:A:101:LEU:HD11	1:A:108:LEU:HD21	1.87	0.56
2:B:63:LYS:NZ	2:B:67:ASP:OD1	2.39	0.54
1:A:58:LEU:HD23	1:A:64:LEU:HA	1.90	0.54
2:B:27:PHE:CD1	2:B:167:ILE:HG21	2.43	0.54
2:B:77:ILE:HG13	2:B:141:ALA:HB1	1.89	0.53
1:A:210:ARG:NH2	1:A:359:ASP:OD2	2.42	0.53
1:A:155:LEU:HD21	1:A:223:ALA:HB2	1.92	0.52
2:B:30:VAL:HG21	2:B:49:PHE:HE1	1.74	0.51
1:A:99:GLN:NE2	1:A:150:VAL:O	2.43	0.50
1:A:397:ILE:HG12	2:B:94:PRO:HB2	1.94	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:27:PHE:O	2:B:30:VAL:HB	2.11	0.49
2:B:84:ILE:HG13	2:B:132:PHE:CE1	2.47	0.49
1:A:249:SER:HB3	1:A:263:GLU:HG2	1.93	0.49
1:A:120:GLU:HB3	1:A:133:ARG:HG3	1.95	0.49
2:B:36:MET:HG2	2:B:78:ILE:HD11	1.95	0.48
1:A:530:GLU:H	1:A:530:GLU:CD	2.18	0.47
1:A:57:GLN:HG2	1:A:65:GLU:HB2	1.97	0.46
1:A:441:PRO:HG3	3:A:601:PGE:H32	1.97	0.46
2:B:47:GLU:OE2	2:B:56:ARG:NH2	2.37	0.46
1:A:182:PRO:HB2	1:A:185:THR:HG23	1.98	0.46
1:A:213:GLU:O	1:A:235:ARG:HD2	2.16	0.46
2:B:30:VAL:HG21	2:B:49:PHE:CE1	2.51	0.45
2:B:49:PHE:CE2	2:B:172:LEU:HD22	2.51	0.45
2:B:49:PHE:CE2	2:B:172:LEU:CD2	2.99	0.45
2:B:74:ARG:O	2:B:78:ILE:HG13	2.16	0.45
1:A:498:TYR:HD1	1:A:510:ARG:HD2	1.82	0.45
1:A:121:GLN:HG3	1:A:198:PHE:HZ	1.83	0.44
1:A:92:GLN:HB2	1:A:93:PRO:HD2	1.99	0.43
1:A:57:GLN:HB3	1:A:66:ALA:HB3	1.99	0.43
2:B:125:TYR:CD2	2:B:146:LYS:HB2	2.53	0.43
1:A:264:LEU:HD11	1:A:333:ALA:HB2	2.00	0.43
1:A:432:TYR:CZ	1:A:434:GLY:HA3	2.54	0.43
1:A:485:HIS:HA	5:A:786:HOH:O	2.19	0.42
1:A:20:LEU:HA	1:A:20:LEU:HD23	1.76	0.42
1:A:108:LEU:O	1:A:121:GLN:HA	2.19	0.42
2:B:153:PRO:HD2	2:B:156:PRO:HG2	2.02	0.42
1:A:375:TYR:CE2	1:A:381:HIS:HE1	2.38	0.42
2:B:80:LEU:HB2	2:B:138:MET:HG2	2.02	0.42
1:A:368:PRO:O	1:A:371:THR:HG23	2.19	0.41
1:A:502:CYS:O	1:A:506:GLY:N	2.53	0.41
1:A:120:GLU:CB	1:A:133:ARG:HG3	2.49	0.41
2:B:42:TYR:CE2	2:B:63:LYS:HB2	2.55	0.41
1:A:229:TYR:HA	1:A:249:SER:O	2.21	0.41
2:B:134:PRO:HB2	2:B:138:MET:HB2	2.03	0.41
1:A:84:MET:O	1:A:88:CYS:N	2.47	0.41
1:A:164:PRO:HB2	1:A:189:LEU:HD12	2.02	0.41
1:A:488:CYS:HA	1:A:501:TRP:CE3	2.56	0.41
2:B:97:GLU:HB2	2:B:104:ILE:HD12	2.03	0.41
1:A:438:ASP:N	1:A:438:ASP:OD1	2.53	0.40
1:A:140:THR:O	1:A:199:SER:HA	2.22	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	488/525 (93%)	470 (96%)	17 (4%)	1 (0%)	47	68
2	B	142/160 (89%)	136 (96%)	6 (4%)	0	100	100
All	All	630/685 (92%)	606 (96%)	23 (4%)	1 (0%)	47	68

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	255	ASP

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	402/424 (95%)	397 (99%)	5 (1%)	71	88
2	B	131/145 (90%)	129 (98%)	2 (2%)	65	85
All	All	533/569 (94%)	526 (99%)	7 (1%)	69	87

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

Mol	Chain	Res	Type
1	A	212	SER
1	A	224	ARG
1	A	471	GLN
1	A	515	SER
1	A	527	PHE

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Mol	Chain	Res	Type
2	B	71	GLN
2	B	166	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	21	GLN
1	A	158	GLN
1	A	256	GLN
1	A	449	GLN
2	B	136	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 ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

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	$\#\|Z\|>2$
3	PGE	A	601	-	9,9,9	0.42	0	8,8,8	0.39	0
4	NAG	A	602	1	14,14,15	0.37	0	17,19,21	0.51	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	PGE	A	601	-	-	4/7/7/7	-
4	NAG	A	602	1	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	602	NAG	O5-C5-C6-O6
4	A	602	NAG	C4-C5-C6-O6
3	A	601	PGE	O1-C1-C2-O2
3	A	601	PGE	C4-C3-O2-C2
3	A	601	PGE	C1-C2-O2-C3
3	A	601	PGE	O3-C5-C6-O4

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	601	PGE	1	0
4	A	602	NAG	1	0

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 ⓘ

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(Å²)	Q<0.9
1	A	496/525 (94%)	-0.21	1 (0%)	95	95	11, 22, 46, 58	0
2	B	146/160 (91%)	0.72	19 (13%)	3	3	13, 53, 74, 92	0
All	All	642/685 (93%)	0.00	20 (3%)	49	52	11, 26, 63, 92	0

All (20) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	173	CYS	4.5
2	B	70	PRO	3.7
2	B	46	MET	3.5
2	B	31	ILE	3.3
2	B	25	PRO	3.2
2	B	82	GLU	3.1
2	B	29	ARG	3.0
2	B	24	CYS	2.9
2	B	81	MET	2.8
1	A	313	ALA	2.7
2	B	76	SER	2.6
2	B	48	LEU	2.6
2	B	26	SER	2.6
2	B	172	LEU	2.4
2	B	36	MET	2.2
2	B	72	LYS	2.2
2	B	67	ASP	2.2
2	B	137	ASP	2.2
2	B	40	SER	2.0
2	B	91	GLY	2.0

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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	NAG	A	602	14/15	0.90	0.18	32,39,47,48	0
3	PGE	A	601	10/10	0.91	0.24	25,33,40,40	0

6.5 Other polymers ⓘ

There are no such residues in this entry.