WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report (i)

Dec 4, 2025 – 02:08 AM JST

PDB ID	:	8Z4H / pdb_00008z4h
Title	:	Pseudomurein Endoisopeptidase PeiR
Authors	:	Guo, L.Z.; Wang, S.X.; Bai, L.p.
Deposited on	:	2024-04-17
Resolution	:	2.00 Å(reported)

The following versions of software and data (see references (i)) were used in the production of this report:

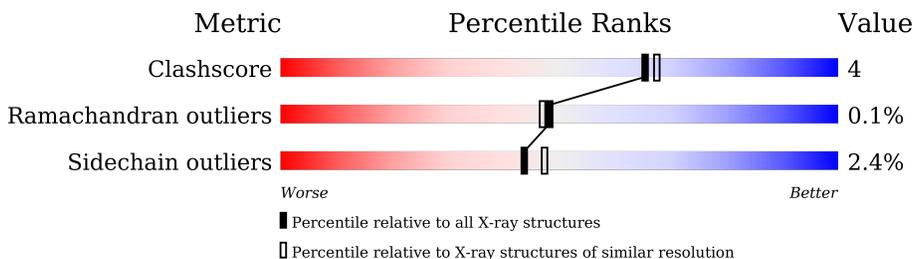|		
MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

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 2.00 Å.

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

Metric	Percentile Ranks	Value
Clashscore		4
Ramachandran outliers		0.1%
Sidechain outliers		2.4%

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))
Clashscore	180529	10737 (2.00-2.00)
Ramachandran outliers	177936	10628 (2.00-2.00)
Sidechain outliers	177891	10627 (2.00-2.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	228	94% 5% •
1	B	228	94% 5% •
1	C	228	86% 14% •
1	D	228	89% 10% •

2 Entry composition ⓘ

There are 2 unique types of molecules in this entry. The entry contains 8032 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 Endoisopeptidase PeiR.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	228	Total	C	N	O	S	0	0	0
			1843	1175	322	331	15			
1	B	228	Total	C	N	O	S	0	0	0
			1842	1175	322	330	15			
1	C	228	Total	C	N	O	S	0	0	0
			1843	1175	322	331	15			
1	D	228	Total	C	N	O	S	0	0	0
			1843	1175	322	331	15			

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	159	Total	O	0	0
			159	159		
2	B	176	Total	O	0	0
			176	176		
2	C	154	Total	O	0	0
			154	154		
2	D	172	Total	O	0	0
			172	172		

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.
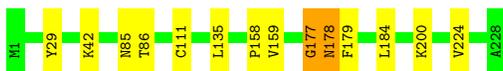
Note EDS was not executed.
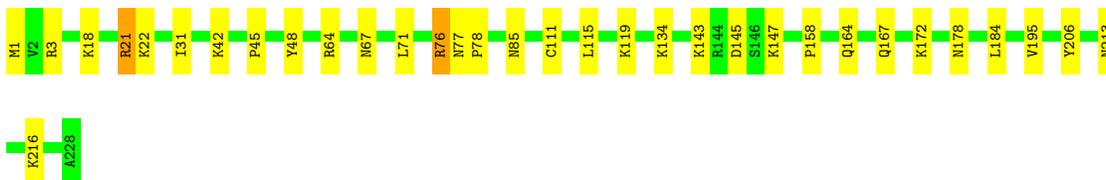
• Molecule 1: Endoisopeptidase PeiR

Chain A:

• Molecule 1: Endoisopeptidase PeiR

Chain B:

• Molecule 1: Endoisopeptidase PeiR

Chain C:

• Molecule 1: Endoisopeptidase PeiR

Chain D:

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	73.83Å 86.92Å 87.99Å 90.00° 91.85° 90.00°	Depositor
Resolution (Å)	73.79 – 2.00	Depositor
% Data completeness (in resolution range)	95.2 (73.79-2.00)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	PHENIX 1.21.2_5419	Depositor
R, R_{free}	0.206 , 0.237	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	8032	wwPDB-VP
Average B, all atoms (Å^2)	37.0	wwPDB-VP

5   Model quality ⓘ

5.1   Standard geometry ⓘ

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	0.32	0/1890	0.52	0/2547
1	B	0.32	0/1889	0.48	0/2547
1	C	0.31	0/1890	0.48	0/2547
1	D	0.32	0/1890	0.51	0/2547
All	All	0.32	0/7559	0.50	0/10188

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	1
All	All	0	2

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	177	GLY	Peptide
1	B	177	GLY	Peptide

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.

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1843	0	1833	10	0
1	B	1842	0	1833	9	0
1	C	1843	0	1833	23	0
1	D	1843	0	1833	21	0
2	A	159	0	0	1	1
2	B	176	0	0	0	0
2	C	154	0	0	2	1
2	D	172	0	0	5	0
All	All	8032	0	7332	55	1

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 4.

All (55) 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:D:86:THR:HG23	2:D:403:HOH:O	1.79	0.81
1:D:85:ASN:HB2	2:D:403:HOH:O	1.89	0.73
1:D:18:LYS:HD2	1:D:21:ARG:HH21	1.57	0.68
1:C:213:ASN:OD1	2:C:301:HOH:O	2.13	0.65
1:B:158:PRO:HB2	1:B:184:LEU:HD11	1.79	0.64
1:C:167:GLN:CD	1:C:216:LYS:HE3	2.25	0.61
1:A:142:ILE:HD11	1:A:148:GLU:HB3	1.83	0.60
1:D:205:LYS:HD3	2:D:449:HOH:O	2.02	0.59
1:D:172:LYS:NZ	2:D:302:HOH:O	2.38	0.55
1:A:123:THR:HG23	2:A:373:HOH:O	2.07	0.54
1:C:172:LYS:HG2	1:C:206:TYR:CZ	2.42	0.54
1:C:158:PRO:HB2	1:C:184:LEU:HD11	1.90	0.54
1:C:76:ARG:NE	1:C:76:ARG:H	2.06	0.53
1:D:76:ARG:H	1:D:76:ARG:NE	2.06	0.53
1:A:34:ASP:HB3	1:A:39:LYS:H	1.74	0.53
1:A:177:GLY:HA3	1:C:1:MET:HE3	1.90	0.52
1:B:178:ASN:H	1:D:1:MET:HE3	1.74	0.52
1:B:29:TYR:CD2	1:B:42:LYS:HE3	2.46	0.51
1:B:179:PHE:CE2	1:D:1:MET:HE1	2.46	0.51
1:C:167:GLN:NE2	1:C:216:LYS:HG2	2.27	0.49
1:B:177:GLY:HA3	1:D:1:MET:HE3	1.94	0.49
1:D:18:LYS:HD2	1:D:21:ARG:NH2	2.27	0.48
1:D:77:ASN:HB2	1:D:78:PRO:HD2	1.95	0.48
1:C:111:CYS:O	1:C:115:LEU:HG	2.14	0.47
1:A:179:PHE:CE2	1:C:1:MET:HE1	2.50	0.46
1:D:200:LYS:HB3	1:D:204:ARG:HD2	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:117:THR:HG23	1:A:123:THR:HG22	1.98	0.45
1:B:200:LYS:HE3	1:B:200:LYS:HB3	1.77	0.45
1:D:34:ASP:HB3	2:D:309:HOH:O	2.16	0.45
1:D:14:LYS:O	1:D:18:LYS:HG2	2.17	0.45
1:D:158:PRO:HB2	1:D:184:LEU:HD11	1.99	0.45
1:D:154:LYS:HE2	1:D:154:LYS:C	2.41	0.45
1:B:111:CYS:HA	1:B:135:LEU:HD11	1.99	0.44
1:C:134:LYS:NZ	2:C:305:HOH:O	2.50	0.44
1:C:145:ASP:OD1	1:C:147:LYS:HG2	2.17	0.44
1:D:172:LYS:HG2	1:D:206:TYR:CZ	2.52	0.44
1:D:76:ARG:HE	1:D:76:ARG:HB2	1.58	0.44
1:C:18:LYS:HB2	1:C:18:LYS:HE3	1.66	0.44
1:C:31:ILE:HD13	1:C:42:LYS:HG2	2.00	0.44
1:A:179:PHE:HE2	1:C:1:MET:HE1	1.83	0.44
1:C:21:ARG:HH11	1:C:22:LYS:HG2	1.83	0.43
1:A:61:LYS:HB3	1:C:85:ASN:OD1	2.18	0.43
1:C:45:PRO:HA	1:C:48:TYR:CE2	2.52	0.43
1:C:21:ARG:O	1:C:21:ARG:HG2	2.17	0.43
1:A:142:ILE:CD1	1:A:148:GLU:HB3	2.45	0.43
1:D:174:ASP:OD2	1:D:204:ARG:HD3	2.19	0.42
1:D:91:CYS:HB2	1:D:182:TYR:CD2	2.55	0.42
1:C:164:GLN:HB2	1:C:167:GLN:HG3	2.02	0.41
1:A:1:MET:HE2	1:C:178:ASN:H	1.85	0.41
1:C:77:ASN:HB2	1:C:78:PRO:HD2	2.02	0.41
1:D:88:TYR:CZ	1:D:119:LYS:HG2	2.56	0.41
1:C:143:LYS:HB2	1:C:143:LYS:HE2	1.82	0.41
1:B:159:VAL:HG22	1:B:224:VAL:HG22	2.03	0.41
1:B:85:ASN:OD1	1:B:86:THR:HG23	2.21	0.40
1:C:21:ARG:NH1	1:C:22:LYS:HG2	2.36	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:456:HOH:O	2:C:437:HOH:O[2_656]	2.14	0.06

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	226/228 (99%)	218 (96%)	7 (3%)	1 (0%)	30	27
1	B	226/228 (99%)	219 (97%)	7 (3%)	0	100	100
1	C	226/228 (99%)	221 (98%)	5 (2%)	0	100	100
1	D	226/228 (99%)	221 (98%)	5 (2%)	0	100	100
All	All	904/912 (99%)	879 (97%)	24 (3%)	1 (0%)	48	47

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	120	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	199/199 (100%)	195 (98%)	4 (2%)	50	55
1	B	199/199 (100%)	198 (100%)	1 (0%)	86	90
1	C	199/199 (100%)	191 (96%)	8 (4%)	27	26
1	D	199/199 (100%)	193 (97%)	6 (3%)	36	37
All	All	796/796 (100%)	777 (98%)	19 (2%)	44	47

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	14	LYS
1	A	37	ARG
1	A	76	ARG
1	A	123	THR
1	B	178	ASN
1	C	3	ARG
1	C	21	ARG
1	C	64	ARG
1	C	67	ASN
1	C	71	LEU
1	C	76	ARG
1	C	119	LYS
1	C	195	VAL
1	D	7	ASP
1	D	34	ASP
1	D	76	ARG
1	D	151	LYS
1	D	154	LYS
1	D	207	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	164	GLN
1	A	178	ASN
1	B	164	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 oligosaccharides in this entry.

5.6　Ligand geometry ⓘ

There are no ligands in this entry.

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 ⓘ

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.