



Full wwPDB X-ray Structure Validation Report ⓘ

Jul 10, 2024 – 02:52 pm BST

PDB ID : 8RZ2
Title : PfrH5 bound to monoclonal antibody R5.034
Authors : Farrell, B.; Higgins, M.K.
Deposited on : 2024-02-11
Resolution : 2.40 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
Xtriage (Phenix) : 1.13
EDS : 2.37.1
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) : 2.37.1

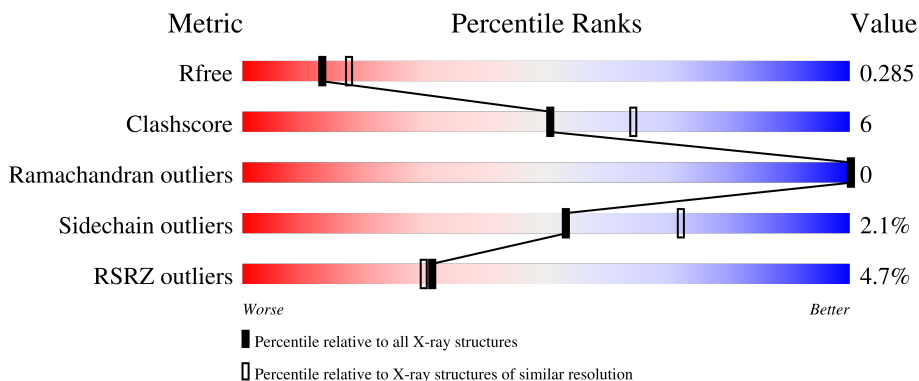
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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}	130704	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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	526	 3% 49% . 46%
2	B	256	 9% 66% 16% . 16%
3	C	235	 3% 77% 13% 10%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 5650 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 Reticulocyte binding protein 5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	282	2396	1548	401	434	13	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	216	ALA	THR	conflict	UNP B2L3N7

- Molecule 2 is a protein called R5.034 heavy chain.

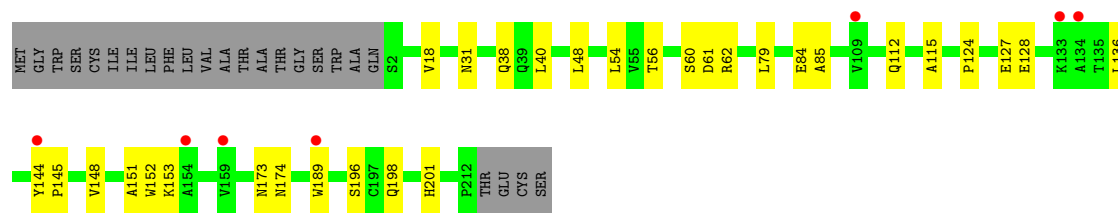
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	215	1612	1015	277	313	7	0	0	0

- Molecule 3 is a protein called R5.034 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	211	1577	987	265	321	4	0	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	29	Total	O	0	0
			29	29		
4	B	21	Total	O	0	0
			21	21		
4	C	15	Total	O	0	0
			15	15		



4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	82.75Å 82.99Å 118.75Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	68.03 – 2.40 68.03 – 2.40	Depositor EDS
% Data completeness (in resolution range)	100.0 (68.03-2.40) 100.0 (68.03-2.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.06 (at 2.40Å)	Xtrriage
Refinement program	BUSTER 2.10.4 (26-JUL-2023)	Depositor
R, R_{free}	0.255 , 0.305 0.242 , 0.285	Depositor DCC
R_{free} test set	1556 reflections (4.76%)	wwPDB-VP
Wilson B-factor (Å ²)	57.1	Xtrriage
Anisotropy	0.665	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 52.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.006 for k,h,-l	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5650	wwPDB-VP
Average B, all atoms (Å ²)	72.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.14% 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](#)

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	0.30	0/2446	0.45	0/3283
2	B	0.35	0/1649	0.58	0/2245
3	C	0.34	0/1614	0.55	0/2202
All	All	0.33	0/5709	0.52	0/7730

There are no bond length outliers.

There are no bond angle outliers.

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	2396	0	2412	12	0
2	B	1612	0	1577	32	0
3	C	1577	0	1532	22	0
4	A	29	0	0	0	0
4	B	21	0	0	0	0
4	C	15	0	0	0	0
All	All	5650	0	5521	63	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 6.

All (63) 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:454:GLU:O	1:A:458:ARG:HG2	1.90	0.72
3:C:40:LEU:HD23	3:C:85:ALA:HB2	1.73	0.70
2:B:128:VAL:HG11	2:B:205:VAL:HG11	1.75	0.68
2:B:126:PRO:HB3	2:B:152:TYR:HB3	1.76	0.67
3:C:127:GLU:O	3:C:128:GLU:HB3	1.95	0.66
2:B:166:LEU:HD22	2:B:192:PRO:HD3	1.79	0.65
3:C:112:GLN:HB2	3:C:144:TYR:CZ	2.31	0.65
3:C:153:LYS:HB2	3:C:196:SER:HB3	1.79	0.62
2:B:164:GLY:HA3	2:B:202:ILE:H	1.64	0.62
2:B:198:THR:HG22	2:B:221:LYS:HB3	1.89	0.54
1:A:238:LEU:HD13	1:A:303:MET:HG2	1.88	0.54
3:C:112:GLN:HB2	3:C:144:TYR:CE1	2.42	0.53
2:B:22:CYS:HB3	2:B:79:LEU:HB3	1.90	0.53
3:C:144:TYR:CD2	3:C:145:PRO:HD3	2.44	0.52
2:B:40:ALA:HB3	2:B:43:LYS:HD2	1.91	0.52
2:B:130:PRO:HB2	2:B:218:VAL:HG23	1.94	0.49
3:C:115:ALA:HB3	3:C:144:TYR:H	1.78	0.49
2:B:146:GLY:HA3	2:B:187:SER:O	2.13	0.48
2:B:198:THR:CG2	2:B:221:LYS:HB3	2.43	0.48
2:B:195:SER:O	2:B:196:LEU:C	2.51	0.48
2:B:129:PHE:CD2	3:C:128:GLU:HB2	2.48	0.48
2:B:191:VAL:HB	2:B:194:SER:OG	2.14	0.48
3:C:124:PRO:HD2	3:C:189:TRP:CE2	2.48	0.48
3:C:84:GLU:OE1	3:C:174:ASN:OD1	2.32	0.47
1:A:160:SER:HB3	1:A:177:PRO:HD3	1.96	0.47
1:A:164:LEU:HG	1:A:478:MET:HB3	1.95	0.47
2:B:151:ASP:HB3	2:B:182:LEU:HD13	1.98	0.46
1:A:413:ILE:O	1:A:417:MET:HG3	2.16	0.46
3:C:145:PRO:HD2	3:C:201:HIS:CE1	2.51	0.46
2:B:149:VAL:HG11	2:B:157:VAL:HG11	1.97	0.46
1:A:383:MET:HB2	1:A:383:MET:HE2	1.81	0.45
1:A:237:LYS:HB3	1:A:303:MET:CE	2.47	0.45
2:B:161:TRP:CH2	2:B:203:CYS:HB3	2.52	0.45
2:B:170:VAL:HG12	2:B:189:VAL:CG1	2.46	0.45
3:C:145:PRO:HB2	3:C:201:HIS:NE2	2.31	0.45
2:B:214:VAL:HG12	2:B:216:LYS:HG2	1.99	0.44
2:B:166:LEU:CD2	2:B:192:PRO:HD3	2.47	0.44
2:B:11:LEU:HD11	2:B:119:SER:HB3	1.99	0.44
3:C:38:GLN:HB2	3:C:48:LEU:HD11	2.00	0.44
2:B:166:LEU:HD23	2:B:189:VAL:HG23	1.99	0.44
3:C:124:PRO:HD3	3:C:136:LEU:CD2	2.48	0.44
3:C:151:ALA:HB3	3:C:198:GLN:HB2	1.99	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:18:VAL:CG2	3:C:79:LEU:HD22	2.48	0.43
2:B:129:PHE:CE2	3:C:128:GLU:HB2	2.54	0.43
2:B:89:GLU:H	2:B:89:GLU:CD	2.22	0.43
1:A:183:ASP:OD2	1:A:187:HIS:NE2	2.50	0.43
3:C:148:VAL:HG12	3:C:201:HIS:HB2	2.01	0.43
2:B:177:LEU:HD13	2:B:183:TYR:CE1	2.54	0.42
1:A:357:ARG:HH11	1:A:357:ARG:HG2	1.83	0.42
3:C:173:ASN:O	3:C:174:ASN:HB2	2.20	0.42
3:C:152:TRP:C	3:C:153:LYS:HD2	2.41	0.41
1:A:232:ILE:O	1:A:236:LYS:HG2	2.21	0.41
2:B:158:THR:O	2:B:205:VAL:HA	2.20	0.41
2:B:52:GLN:HG2	2:B:53:GLN:OE1	2.21	0.41
2:B:131:LEU:O	2:B:145:LEU:HB2	2.19	0.41
2:B:142:THR:HA	2:B:194:SER:HB2	2.04	0.40
2:B:163:SER:HB3	2:B:204:ASN:OD1	2.20	0.40
1:A:212:LYS:HG3	3:C:54:LEU:HD11	2.02	0.40
2:B:216:LYS:HD2	2:B:216:LYS:HA	1.91	0.40
1:A:452:LYS:O	1:A:456:LEU:HG	2.21	0.40
2:B:52:GLN:HG2	2:B:53:GLN:H	1.87	0.40
2:B:128:VAL:CG1	2:B:205:VAL:HG11	2.47	0.40
3:C:60:SER:OG	3:C:62:ARG:HG3	2.21	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	276/526 (52%)	273 (99%)	3 (1%)	0	100	100
2	B	211/256 (82%)	200 (95%)	11 (5%)	0	100	100
3	C	209/235 (89%)	198 (95%)	11 (5%)	0	100	100
All	All	696/1017 (68%)	671 (96%)	25 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

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	273/511 (53%)	268 (98%)	5 (2%)	59	76
2	B	177/213 (83%)	172 (97%)	5 (3%)	43	63
3	C	177/196 (90%)	174 (98%)	3 (2%)	60	78
All	All	627/920 (68%)	614 (98%)	13 (2%)	53	72

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	162	ASP
1	A	303	MET
1	A	404	TYR
1	A	448	ARG
1	A	497	LEU
2	B	52	GLN
2	B	157	VAL
2	B	189	VAL
2	B	196	LEU
2	B	202	ILE
3	C	31	ASN
3	C	56	THR
3	C	61	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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	282/526 (53%)	0.20	3 (1%) 80 79	49, 67, 94, 110	0
2	B	215/256 (83%)	0.69	23 (10%) 6 5	47, 68, 125, 135	0
3	C	211/235 (89%)	0.43	7 (3%) 46 45	50, 74, 92, 99	0
All	All	708/1017 (69%)	0.42	33 (4%) 31 30	47, 70, 108, 135	0

All (33) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	196	LEU	9.3
2	B	201	TYR	8.0
3	C	144	TYR	7.8
2	B	198	THR	7.6
2	B	219	GLU	7.3
2	B	192	PRO	6.1
3	C	133	LYS	5.3
2	B	193	SER	5.2
2	B	161	TRP	4.6
1	A	500	VAL	4.1
2	B	194	SER	3.9
2	B	217	ARG	3.9
2	B	200	THR	3.8
2	B	202	ILE	3.7
3	C	189	TRP	3.7
1	A	302	LYS	3.5
2	B	199	GLN	3.5
3	C	109	VAL	3.5
2	B	218	VAL	3.3
2	B	191	VAL	3.2
1	A	405	ILE	3.0
3	C	154	ALA	3.0
2	B	144	ALA	2.9

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Mol	Chain	Res	Type	RSRZ
3	C	134	ALA	2.9
2	B	165	ALA	2.7
2	B	145	LEU	2.6
2	B	160	SER	2.5
3	C	159	VAL	2.4
2	B	147	CYS	2.4
2	B	129	PHE	2.3
2	B	213	LYS	2.1
2	B	189	VAL	2.1
2	B	130	PRO	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](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.