



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 04:39 PM UTC

PDB ID : 8G6B / pdb_00008g6b
Title : Crystal structure of PfAMA1-RON2L chimera
Authors : Boulanger, M.J.; Ramaswamy, R.
Deposited on : 2023-02-14
Resolution : 1.55 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

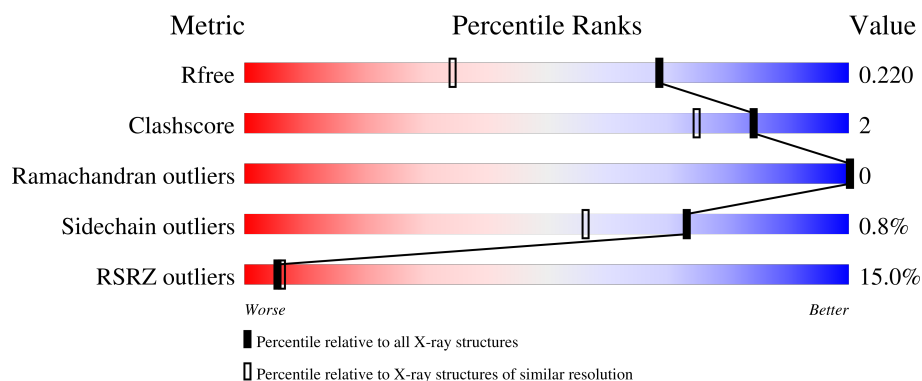
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.55 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	2145 (1.56-1.56)
Clashscore	190562	2189 (1.56-1.56)
Ramachandran outliers	187476	2153 (1.56-1.56)
Sidechain outliers	187428	2150 (1.56-1.56)
RSRZ outliers	180081	2146 (1.56-1.56)

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	372	12% 88% 9%
1	B	372	16% 90% 5%

2 Entry composition [i](#)

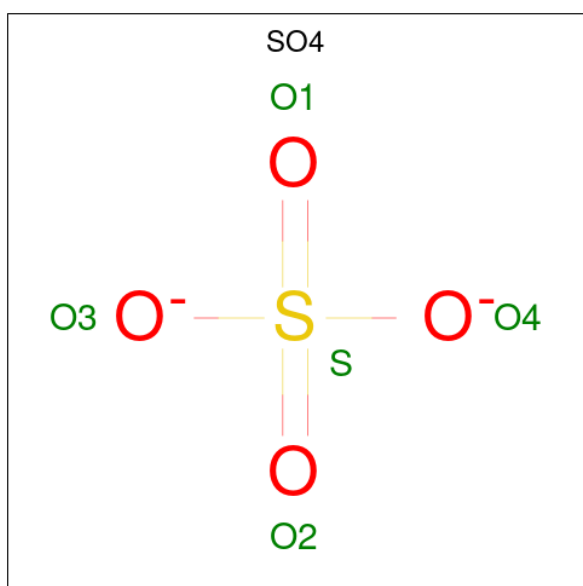
There are 3 unique types of molecules in this entry. The entry contains 6199 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Apical membrane antigen 1, rhoptry neck protein 2 chimera.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	339	Total	C	N	O	S	0	2	0
			2703	1700	460	522	21			
1	B	354	Total	C	N	O	S	0	3	0
			2791	1758	475	536	22			

- Molecule 2 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	380	Total	O	0	0
			380	380		

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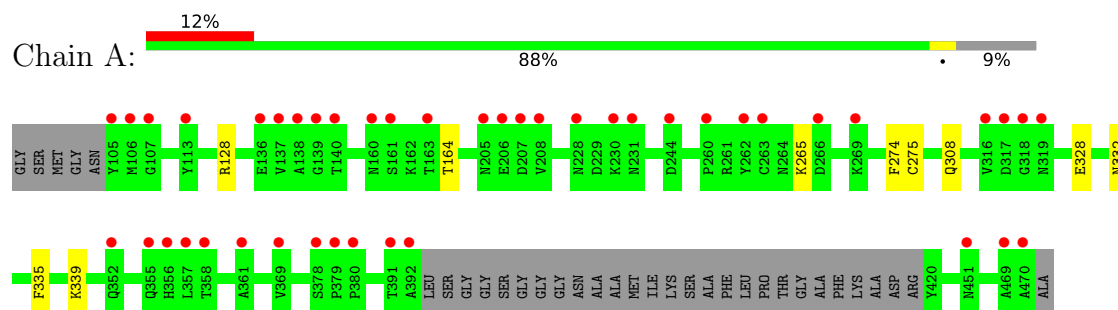
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	320	Total 320	O 320	0	0

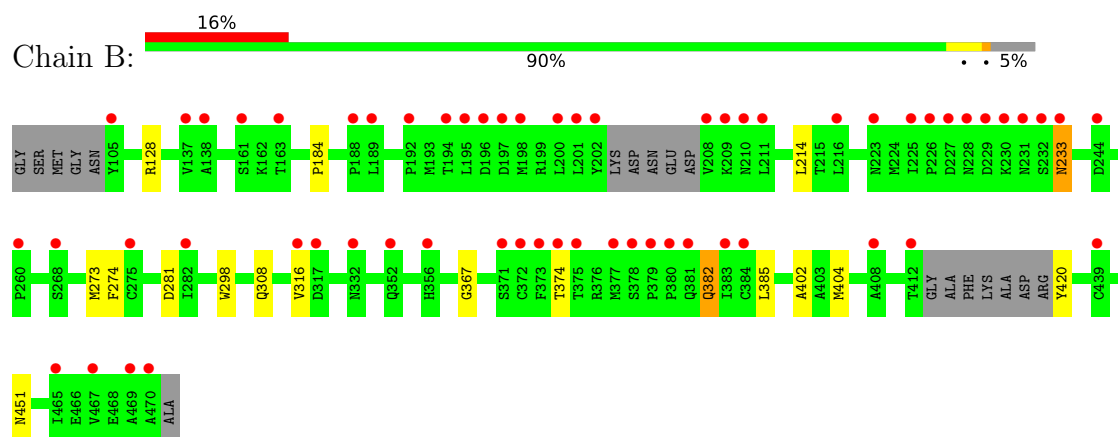
3 Residue-property plots [i](#)

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: Apical membrane antigen 1, rhoptry neck protein 2 chimera



- Molecule 1: Apical membrane antigen 1, rhoptry neck protein 2 chimera



4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	92.50Å 92.50Å 173.68Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	57.89 – 1.55 57.89 – 1.55	Depositor EDS
% Data completeness (in resolution range)	99.6 (57.89-1.55) 99.6 (57.89-1.55)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.01 (at 1.55Å)	Xtriage
Refinement program	PHENIX 1.8.3	Depositor
R, R_{free}	0.181 , 0.211 0.193 , 0.220	Depositor DCC
R_{free} test set	6136 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å ²)	20.7	Xtriage
Anisotropy	0.176	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 42.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.022 for -h,-k,l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	6199	wwPDB-VP
Average B, all atoms (Å ²)	28.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.50% 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

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	0.54	0/2770	0.72	1/3753 (0.0%)
1	B	0.46	0/2862	0.70	0/3875
All	All	0.50	0/5632	0.71	1/7628 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	332	ASN	N-CA-C	5.92	118.68	111.82

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	2703	0	2592	10	0
1	B	2791	0	2692	15	0
2	B	5	0	0	0	0
3	A	380	0	0	8	0
3	B	320	0	0	8	0
All	All	6199	0	5284	25	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 2.

All (25) 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:B:308:GLN:OE1	3:B:601:HOH:O	2.11	0.67
1:B:420:TYR:N	3:B:604:HOH:O	2.30	0.64
1:A:128[A]:ARG:NH1	3:A:508:HOH:O	2.34	0.60
1:B:128[A]:ARG:NE	3:B:606:HOH:O	2.35	0.60
1:B:367:GLY:H	1:B:404[A]:MET:HE2	1.69	0.58
1:B:281:ASP:OD1	3:B:602:HOH:O	2.18	0.54
1:A:335:PHE:CE1	1:A:339:LYS:HE3	2.42	0.54
1:B:233:ASN:OD1	1:B:233:ASN:N	2.36	0.50
1:A:308:GLN:NE2	3:A:510:HOH:O	2.37	0.50
1:B:367:GLY:H	1:B:404[A]:MET:CE	2.23	0.50
1:A:128[B]:ARG:NH1	3:A:507:HOH:O	2.33	0.49
1:A:328:GLU:OE1	3:A:501:HOH:O	2.20	0.48
1:A:128[B]:ARG:NE	3:A:507:HOH:O	2.40	0.48
1:A:128[A]:ARG:NE	3:A:508:HOH:O	2.46	0.47
1:B:128[A]:ARG:NH1	3:B:606:HOH:O	2.46	0.47
1:B:273:MET:HE3	1:B:402:ALA:HA	1.98	0.46
1:B:128[B]:ARG:NE	3:B:610:HOH:O	2.38	0.45
1:B:128[B]:ARG:NH1	3:B:610:HOH:O	2.40	0.44
1:B:374:THR:HG22	1:B:382:GLN:HG3	1.99	0.44
1:A:128[A]:ARG:CZ	3:A:508:HOH:O	2.65	0.43
1:A:164:THR:HB	3:A:543:HOH:O	2.19	0.42
1:B:451:ASN:ND2	3:B:614:HOH:O	2.44	0.42
1:B:184:PRO:HG2	1:B:385:LEU:HD22	2.02	0.42
1:A:265:LYS:HG3	1:A:275:CYS:SG	2.61	0.41
1:B:214:LEU:HD12	1:B:298:TRP:CZ2	2.56	0.41

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	337/372 (91%)	328 (97%)	9 (3%)	0	100	100
1	B	351/372 (94%)	346 (99%)	5 (1%)	0	100	100
All	All	688/744 (92%)	674 (98%)	14 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	300/317 (95%)	299 (100%)	1 (0%)	86	77
1	B	308/317 (97%)	304 (99%)	4 (1%)	61	36
All	All	608/634 (96%)	603 (99%)	5 (1%)	73	56

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	274	PHE
1	B	233	ASN
1	B	274	PHE
1	B	316	VAL
1	B	382	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	173	ASN
1	A	174	GLN
1	A	386	ASN
1	A	423	HIS
1	B	141	GLN
1	B	325	HIS
1	B	359	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](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

1 ligand is 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	SO4	B	501	-	4,4,4	0.31	0	6,6,6	0.27	0

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 ⓘ

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	339/372 (91%)	0.73	44 (12%) 7 9	9, 22, 50, 67	2 (0%)
1	B	354/372 (95%)	0.90	60 (16%) 4 5	9, 25, 52, 81	3 (0%)
All	All	693/744 (93%)	0.81	104 (15%) 5 6	9, 23, 50, 81	5 (0%)

All (104) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	369	VAL	5.4
1	B	227	ASP	4.8
1	B	105	TYR	4.8
1	A	392	ALA	4.2
1	A	105	TYR	4.1
1	A	470	ALA	4.1
1	B	138	ALA	4.1
1	A	356	HIS	3.9
1	A	206	GLU	3.9
1	A	106[A]	MET	3.9
1	B	201	LEU	3.9
1	A	260	PRO	3.9
1	A	316	VAL	3.7
1	B	379	PRO	3.7
1	B	230	LYS	3.6
1	A	138	ALA	3.6
1	B	380	PRO	3.5
1	A	230	LYS	3.5
1	B	317	ASP	3.5
1	B	377	MET	3.4
1	A	451	ASN	3.4
1	B	384	CYS	3.4
1	B	383	ILE	3.3
1	B	372	CYS	3.3

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Mol	Chain	Res	Type	RSRZ
1	B	233	ASN	3.3
1	B	374	THR	3.2
1	B	200	LEU	3.2
1	A	107	GLY	3.2
1	B	225	ILE	3.2
1	B	282	ILE	3.2
1	B	208	VAL	3.2
1	B	202	TYR	3.2
1	B	188	PRO	3.1
1	A	205	ASN	3.1
1	B	412	THR	3.1
1	B	137	VAL	3.1
1	A	139	GLY	3.1
1	B	469	ALA	3.1
1	B	163	THR	3.0
1	A	357	LEU	3.0
1	A	161	SER	3.0
1	B	375	THR	3.0
1	A	160	ASN	2.9
1	A	379	PRO	2.9
1	B	211	LEU	2.8
1	B	332	ASN	2.8
1	A	163	THR	2.8
1	A	391	THR	2.8
1	B	373	PHE	2.8
1	B	189	LEU	2.8
1	B	216	LEU	2.7
1	A	318	GLY	2.7
1	B	228	ASN	2.7
1	B	408	ALA	2.6
1	B	316	VAL	2.6
1	B	381	GLN	2.6
1	A	317	ASP	2.6
1	B	223	ASN	2.6
1	B	275	CYS	2.6
1	B	161	SER	2.6
1	B	232	SER	2.6
1	A	262	TYR	2.6
1	A	208	VAL	2.5
1	A	263	CYS	2.5
1	B	470	ALA	2.5
1	A	228	ASN	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	196	ASP	2.5
1	B	260	PRO	2.4
1	A	207	ASP	2.4
1	B	467	VAL	2.4
1	B	197	ASP	2.4
1	A	140	THR	2.4
1	A	355	GLN	2.4
1	A	358	THR	2.4
1	A	361	ALA	2.3
1	A	380	PRO	2.3
1	A	136	GLU	2.3
1	B	231	ASN	2.3
1	B	378	SER	2.3
1	A	266	ASP	2.3
1	B	439	CYS	2.2
1	B	226	PRO	2.2
1	B	194	THR	2.2
1	A	137	VAL	2.2
1	B	371	SER	2.2
1	B	198	MET	2.2
1	B	210	ASN	2.2
1	A	269	LYS	2.2
1	A	469	ALA	2.1
1	B	352	GLN	2.1
1	A	319	ASN	2.1
1	B	244	ASP	2.1
1	B	268	SER	2.1
1	A	352	GLN	2.1
1	A	378	SER	2.1
1	B	465	ILE	2.0
1	A	231	ASN	2.0
1	A	244	ASP	2.0
1	B	229	ASP	2.0
1	B	209	LYS	2.0
1	B	192	PRO	2.0
1	B	356	HIS	2.0
1	B	195	LEU	2.0
1	A	113	TYR	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 [i](#)

There are no oligosaccharides in this entry.

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
2	SO4	B	501	5/5	0.98	0.08	21,22,24,31	0

6.5 Other polymers [i](#)

There are no such residues in this entry.