



wwPDB X-ray Structure Validation Summary Report ⓘ

May 23, 2022 – 01:17 pm BST

PDB ID : 7OFP
Title : Apo Structure of Mu2 Adaptin Subunit (Ap50) Of AP2 Clathrin Adaptor
Authors : Zaccai, N.R.; Kelly, B.T.; Evans, P.R.; Owen, D.J.
Deposited on : 2021-05-05
Resolution : 1.92 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.28.1
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0267
CCP4 : 7.1.010 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.28.1

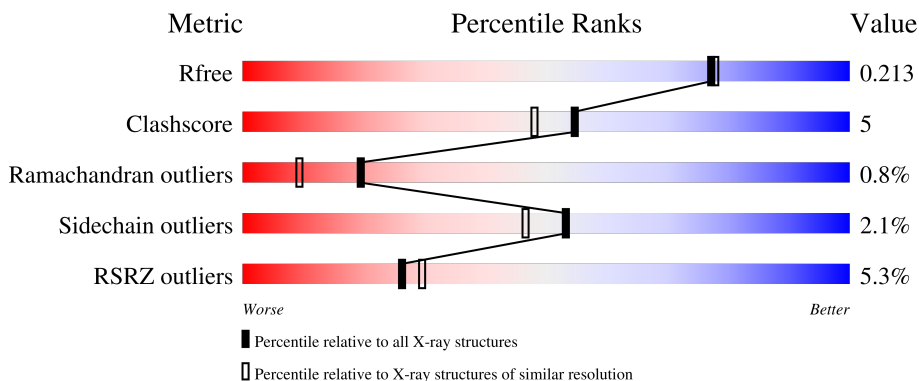
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.92 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	7937 (1.94-1.90)
Clashscore	141614	8644 (1.94-1.90)
Ramachandran outliers	138981	8530 (1.94-1.90)
Sidechain outliers	138945	8530 (1.94-1.90)
RSRZ outliers	127900	7793 (1.94-1.90)

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	285	
1	B	285	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	GOL	B	503	-	X	-	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 9111 atoms, of which 4512 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 AP-2 complex subunit mu.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	261	4314	1359	2200	372	369	14	0	1	0
1	B	266	4385	1378	2239	377	377	14	0	0	0

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	151	MET	-	initiating methionine	UNP P84092
A	152	HIS	-	expression tag	UNP P84092
A	153	HIS	-	expression tag	UNP P84092
A	154	HIS	-	expression tag	UNP P84092
A	155	HIS	-	expression tag	UNP P84092
A	156	HIS	-	expression tag	UNP P84092
A	157	HIS	-	expression tag	UNP P84092
B	151	MET	-	initiating methionine	UNP P84092
B	152	HIS	-	expression tag	UNP P84092
B	153	HIS	-	expression tag	UNP P84092
B	154	HIS	-	expression tag	UNP P84092
B	155	HIS	-	expression tag	UNP P84092
B	156	HIS	-	expression tag	UNP P84092
B	157	HIS	-	expression tag	UNP P84092

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
2	A	1	14	3	8	3	0	0
2	A	1	14	3	8	3	0	0
2	A	1	14	3	8	3	0	0
2	A	1	13	3	7	3	0	0
2	A	1	13	3	7	3	0	0
2	A	1	14	3	8	3	0	0
2	B	1	13	3	7	3	0	0
2	B	1	13	3	7	3	0	0
2	B	1	14	3	8	3	0	0

- Molecule 3 is CITRIC ACID (three-letter code: CIT) (formula: C₆H₈O₇).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	H	O		
3	A	1	18	6	5	7	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	140	140	140	0	0
4	B	132	132	132	0	0

4 Data and refinement statistics

Property	Value	Source
Space group	P 65	Depositor
Cell constants a, b, c, α , β , γ	123.83Å 123.83Å 112.67Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	77.68 – 1.92 77.68 – 1.92	Depositor EDS
% Data completeness (in resolution range)	99.8 (77.68-1.92) 99.9 (77.68-1.92)	Depositor EDS
R_{merge}	0.22	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.46 (at 1.92Å)	Xtrriage
Refinement program	REFMAC 1.19rc1_4016, PHENIX 1.19rc1_4016	Depositor
R, R_{free}	0.188 , 0.210 0.195 , 0.213	Depositor DCC
R_{free} test set	3820 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å ²)	30.8	Xtrriage
Anisotropy	0.303	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	(Not available) , (Not available)	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.034 for h,-h-k,-l	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	9111	wwPDB-VP
Average B, all atoms (Å ²)	46.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.95% 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: CIT, GOL

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	0.84	5/2160 (0.2%)	0.79	0/2904
1	B	0.89	2/2189 (0.1%)	0.82	0/2941
All	All	0.87	7/4349 (0.2%)	0.81	0/5845

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	246	CYS	CB-SG	-11.44	1.62	1.82
1	B	224	LYS	CE-NZ	6.23	1.64	1.49
1	A	246	CYS	CB-SG	-6.22	1.71	1.82
1	A	367	SER	CA-CB	5.78	1.61	1.52
1	A	337	CYS	CB-SG	-5.37	1.73	1.81

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	2114	2200	2211	23	0
1	B	2146	2239	2241	23	0
2	A	36	46	47	4	0
2	B	18	22	24	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	13	5	5	2	0
4	A	140	0	0	2	0
4	B	132	0	0	1	0
All	All	4599	4512	4528	46	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 5.

The worst 5 of 46 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:LYS:HG2	1:B:363:GLU:HG2	1.59	0.81
1:B:376:ASN:O	1:B:377:ASP:HB2	1.94	0.66
1:A:220:ILE:HG22	1:A:243:ILE:HG13	1.82	0.62
1:B:225:GLN:H	1:B:225:GLN:CD	2.05	0.60
1:A:319:LYS:HD3	1:A:391:GLU:OE1	2.02	0.59

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	258/285 (90%)	251 (97%)	6 (2%)	1 (0%)	34	24
1	B	262/285 (92%)	251 (96%)	8 (3%)	3 (1%)	14	5
All	All	520/570 (91%)	502 (96%)	14 (3%)	4 (1%)	19	9

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	377	ASP

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	377	ASP
1	B	244	ASP
1	B	380	LYS

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	238/257 (93%)	235 (99%)	3 (1%)	69	66
1	B	241/257 (94%)	234 (97%)	7 (3%)	42	33
All	All	479/514 (93%)	469 (98%)	10 (2%)	53	46

5 of 10 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	276	ARG
1	B	408	GLU
1	B	415	ASP
1	B	163	ARG
1	B	224	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	190	GLN
1	A	365	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

10 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
2	GOL	A	506	-	5,5,5	1.19	1 (20%)	5,5,5	1.07	1 (20%)
2	GOL	B	501	-	5,5,5	1.35	0	5,5,5	1.13	1 (20%)
3	CIT	A	507	-	3,12,12	1.49	1 (33%)	3,17,17	2.51	2 (66%)
2	GOL	A	501	-	5,5,5	0.83	0	5,5,5	0.70	0
2	GOL	A	504	-	5,5,5	1.11	1 (20%)	5,5,5	1.07	0
2	GOL	B	503	-	5,5,5	1.37	1 (20%)	5,5,5	1.29	1 (20%)
2	GOL	A	505	-	5,5,5	1.35	1 (20%)	5,5,5	1.01	0
2	GOL	B	502	-	5,5,5	0.99	0	5,5,5	0.76	0
2	GOL	A	503	-	5,5,5	0.71	0	5,5,5	0.82	0
2	GOL	A	502	-	5,5,5	1.05	0	5,5,5	1.09	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
2	GOL	A	506	-	-	2/4/4/4	-
2	GOL	B	501	-	-	2/4/4/4	-
3	CIT	A	507	-	-	3/6/16/16	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GOL	A	501	-	-	2/4/4/4	-
2	GOL	A	504	-	-	2/4/4/4	-
2	GOL	B	503	-	-	4/4/4/4	-
2	GOL	A	505	-	-	3/4/4/4	-
2	GOL	B	502	-	-	2/4/4/4	-
2	GOL	A	503	-	-	1/4/4/4	-
2	GOL	A	502	-	-	1/4/4/4	-

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	505	GOL	C3-C2	2.26	1.61	1.51
2	A	504	GOL	O1-C1	-2.24	1.32	1.42
2	B	503	GOL	O1-C1	2.21	1.51	1.42
3	A	507	CIT	O7-C3	2.15	1.46	1.43
2	A	506	GOL	O2-C2	-2.10	1.37	1.43

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	507	CIT	C3-C2-C1	-3.03	110.13	114.98
3	A	507	CIT	C3-C4-C5	-2.91	110.33	114.98
2	A	506	GOL	C3-C2-C1	-2.14	103.38	111.70
2	B	503	GOL	C3-C2-C1	-2.13	103.43	111.70
2	B	501	GOL	C3-C2-C1	-2.02	103.85	111.70

There are no chirality outliers.

5 of 22 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	505	GOL	C1-C2-C3-O3
2	B	501	GOL	C1-C2-C3-O3
3	A	507	CIT	O7-C3-C4-C5
3	A	507	CIT	C6-C3-C4-C5
2	A	501	GOL	C1-C2-C3-O3

There are no ring outliers.

3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	507	CIT	2	0
2	A	505	GOL	3	0
2	A	503	GOL	1	0

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	261/285 (91%)	0.16	15 (5%) 23 26	24, 34, 70, 136	0
1	B	266/285 (93%)	0.09	13 (4%) 29 33	24, 34, 68, 163	0
All	All	527/570 (92%)	0.13	28 (5%) 26 29	24, 34, 71, 163	0

The worst 5 of 28 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	375	THR	6.8
1	A	377	ASP	6.0
1	A	376	ASN	5.5
1	A	241	ILE	5.5
1	A	374	PRO	5.5

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](#)

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(\AA^2)	Q<0.9
2	GOL	B	502	6/6	0.77	0.17	53,79,107,107	0
3	CIT	A	507	13/13	0.78	0.13	60,83,98,107	0
2	GOL	A	502	6/6	0.82	0.20	48,65,85,85	0
2	GOL	A	505	6/6	0.83	0.14	45,60,83,95	0
2	GOL	A	503	6/6	0.86	0.25	47,72,87,88	0
2	GOL	B	503	6/6	0.91	0.12	39,50,67,80	0
2	GOL	A	504	6/6	0.91	0.16	41,62,79,88	0
2	GOL	A	506	6/6	0.93	0.14	44,62,74,76	0
2	GOL	B	501	6/6	0.94	0.12	32,51,63,64	0
2	GOL	A	501	6/6	0.94	0.24	42,66,81,88	0

6.5 Other polymers [\(i\)](#)

There are no such residues in this entry.