



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 30, 2017 – 03:02 PM EDT

PDB ID : 6ANK
Title : Synaptotagmin-7, C2A- and C2B-domains
Authors : Tomchick, D.R.; Rizo, J.; Voleti, R.
Deposited on : unknown
Resolution : 2.25 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

<http://wwpdb.org/validation/2016/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 : 1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20030345
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac : 5.8.0135
CCP4 : 6.5.0
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : rb-20030345

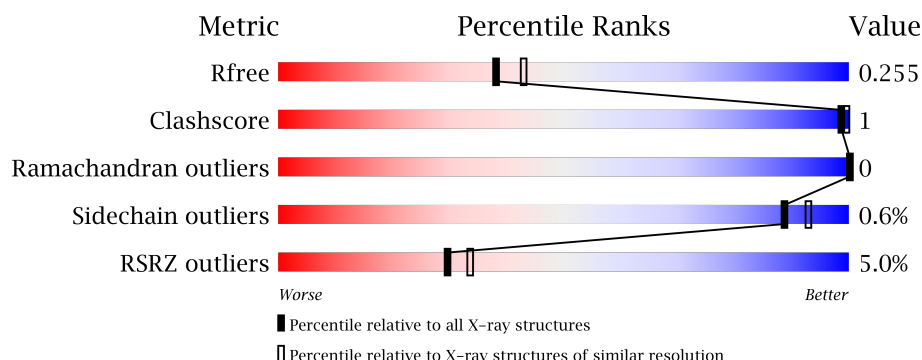
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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}	100719	1062 (2.26-2.26)
Clashscore	112137	1178 (2.26-2.26)
Ramachandran outliers	110173	1145 (2.26-2.26)
Sidechain outliers	110143	1146 (2.26-2.26)
RSRZ outliers	101464	1066 (2.26-2.26)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	289	<div> <div>3%</div> <div>88%</div> <div>9%</div> </div>
1	B	289	<div> <div>6%</div> <div>89%</div> <div>9%</div> </div>

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 8942 atoms, of which 4490 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 Synaptotagmin-7.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	262	Total	C	H	N	O	S	0	1	0
			4397	1400	2235	372	383	7			
1	B	263	Total	C	H	N	O	S	0	0	0
			4394	1399	2231	373	384	7			

There are 38 discrepancies between the modelled and reference sequences:

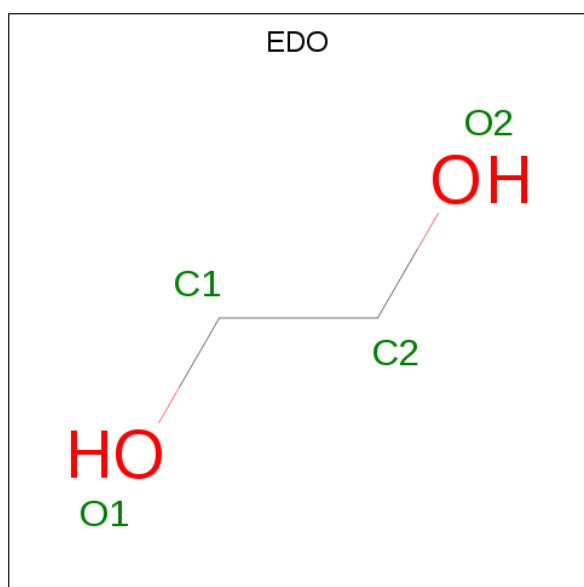
Chain	Residue	Modelled	Actual	Comment	Reference
A	115	GLY	-	expression tag	UNP Q62747
A	116	SER	-	expression tag	UNP Q62747
A	117	PRO	-	expression tag	UNP Q62747
A	118	GLY	-	expression tag	UNP Q62747
A	119	ILE	-	expression tag	UNP Q62747
A	120	SER	-	expression tag	UNP Q62747
A	121	GLY	-	expression tag	UNP Q62747
A	122	GLY	-	expression tag	UNP Q62747
A	123	GLY	-	expression tag	UNP Q62747
A	124	GLY	-	expression tag	UNP Q62747
A	125	GLY	-	expression tag	UNP Q62747
A	126	ILE	-	expression tag	UNP Q62747
A	127	LEU	-	expression tag	UNP Q62747
A	128	ASP	-	expression tag	UNP Q62747
A	129	SER	-	expression tag	UNP Q62747
A	130	MET	-	expression tag	UNP Q62747
A	131	GLY	-	expression tag	UNP Q62747
A	132	ARG	-	expression tag	UNP Q62747
A	133	LEU	-	expression tag	UNP Q62747
B	115	GLY	-	expression tag	UNP Q62747
B	116	SER	-	expression tag	UNP Q62747
B	117	PRO	-	expression tag	UNP Q62747
B	118	GLY	-	expression tag	UNP Q62747
B	119	ILE	-	expression tag	UNP Q62747
B	120	SER	-	expression tag	UNP Q62747

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Chain	Residue	Modelled	Actual	Comment	Reference
B	121	GLY	-	expression tag	UNP Q62747
B	122	GLY	-	expression tag	UNP Q62747
B	123	GLY	-	expression tag	UNP Q62747
B	124	GLY	-	expression tag	UNP Q62747
B	125	GLY	-	expression tag	UNP Q62747
B	126	ILE	-	expression tag	UNP Q62747
B	127	LEU	-	expression tag	UNP Q62747
B	128	ASP	-	expression tag	UNP Q62747
B	129	SER	-	expression tag	UNP Q62747
B	130	MET	-	expression tag	UNP Q62747
B	131	GLY	-	expression tag	UNP Q62747
B	132	ARG	-	expression tag	UNP Q62747
B	133	LEU	-	expression tag	UNP Q62747

- Molecule 2 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	H	O	0	0
			10	2	6	2		
2	A	1	Total	C	H	O	0	0
			10	2	6	2		
2	B	1	Total	C	H	O	0	0
			10	2	6	2		
2	B	1	Total	C	H	O	0	0
			10	2	6	2		

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	4	Total Ca 4 4	0	0
3	A	4	Total Ca 4 4	0	0

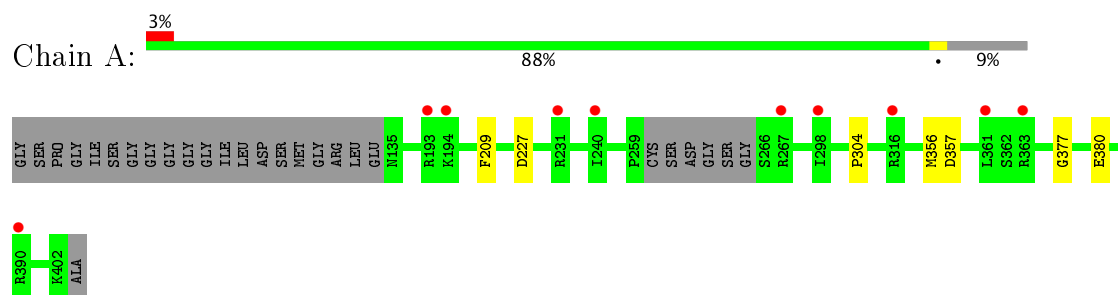
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	57	Total O 57 57	0	0
4	B	46	Total O 46 46	0	0

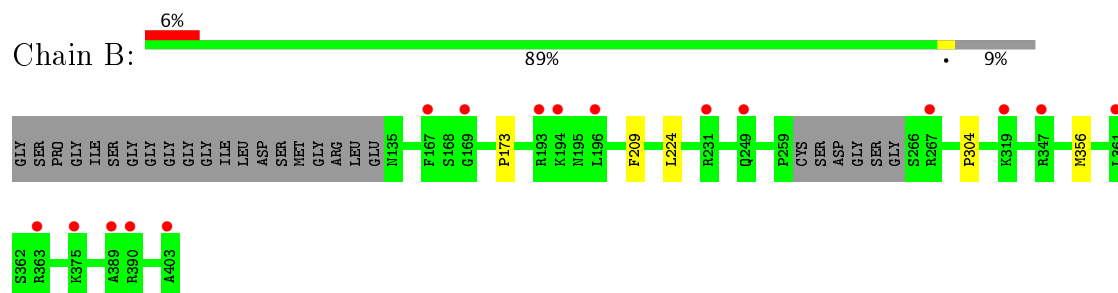
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: Synaptotagmin-7



• Molecule 1: Synaptotagmin-7



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	60.64Å 75.06Å 70.98Å 90.00° 114.51° 90.00°	Depositor
Resolution (Å)	44.46 – 2.25 44.46 – 2.25	Depositor EDS
% Data completeness (in resolution range)	80.2 (44.46-2.25) 80.3 (44.46-2.25)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.84 (at 2.24Å)	Xtriage
Refinement program	PHENIX 1.11.1_2575	Depositor
R, R_{free}	0.214 , 0.257 0.212 , 0.255	Depositor DCC
R_{free} test set	2008 reflections (9.12%)	DCC
Wilson B-factor (Å ²)	33.3	Xtriage
Anisotropy	0.284	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.41 , 36.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.54$, $\langle L^2 \rangle = 0.37$	Xtriage
Estimated twinning fraction	0.000 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	8942	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 49.95 % of the origin peak, indicating pseudo translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo translational symmetry is equal to 6.9373e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹ Intensities estimated from amplitudes.

² Theoretical 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CA, EDO

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	0.25	0/2215	0.44	0/2989
1	B	0.25	0/2213	0.43	0/2986
All	All	0.25	0/4428	0.43	0/5975

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

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	2162	2235	2235	3	0
1	B	2163	2231	2231	2	0
2	A	8	12	12	0	0
2	B	8	12	12	0	0
3	A	4	0	0	0	0
3	B	4	0	0	0	0
4	A	57	0	0	1	1
4	B	46	0	0	0	1
All	All	4452	4490	4490	5	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 1.

All (5) 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:304:PRO:HA	1:A:356:MET:O	2.13	0.48
1:A:227:ASP:OD2	4:A:601:HOH:O	2.21	0.47
1:B:304:PRO:HA	1:B:356:MET:O	2.15	0.46
1:A:377:GLY:N	1:A:380:GLU:OE1	2.44	0.41
1:B:173:PRO:HA	1:B:224:LEU:O	2.21	0.41

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)
4:A:635:HOH:O	4:B:644:HOH:O[2_646]	2.06	0.14

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	259/289 (90%)	245 (95%)	14 (5%)	0	100	100
1	B	259/289 (90%)	242 (93%)	17 (7%)	0	100	100
All	All	518/578 (90%)	487 (94%)	31 (6%)	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	244/259 (94%)	242 (99%)	2 (1%)	85	91
1	B	243/259 (94%)	242 (100%)	1 (0%)	93	95
All	All	487/518 (94%)	484 (99%)	3 (1%)	89	93

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	209	PHE
1	A	357	ASP
1	B	209	PHE

Some 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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 8 are monoatomic - leaving 4 for Mogul analysis.

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	EDO	A	501	-	3,3,3	0.45	0	2,2,2	0.34	0
2	EDO	A	502	-	3,3,3	0.41	0	2,2,2	0.44	0
2	EDO	B	501	-	3,3,3	0.46	0	2,2,2	0.33	0
2	EDO	B	502	-	3,3,3	0.45	0	2,2,2	0.30	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	EDO	A	501	-	-	0/1/1/1	0/0/0/0
2	EDO	A	502	-	-	0/1/1/1	0/0/0/0
2	EDO	B	501	-	-	0/1/1/1	0/0/0/0
2	EDO	B	502	-	-	0/1/1/1	0/0/0/0

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 [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	262/289 (90%)	0.33	10 (3%) 41 44	22, 43, 71, 91	0
1	B	263/289 (91%)	0.39	16 (6%) 22 24	23, 42, 76, 101	0
All	All	525/578 (90%)	0.36	26 (4%) 30 33	22, 42, 74, 101	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	403	ALA	6.2
1	A	363	ARG	4.8
1	A	194	LYS	4.1
1	A	193	ARG	3.8
1	B	231	ARG	3.3
1	B	390	ARG	3.3
1	A	361	LEU	3.2
1	A	298	ILE	3.2
1	B	169	GLY	3.0
1	B	167	PHE	2.9
1	B	267	ARG	2.9
1	A	231	ARG	2.7
1	B	193	ARG	2.7
1	B	375	LYS	2.5
1	B	194	LYS	2.5
1	B	347	ARG	2.4
1	B	363	ARG	2.4
1	B	361	LEU	2.3
1	A	390	ARG	2.3
1	B	249	GLN	2.2
1	A	316	ARG	2.2
1	B	196	LEU	2.2
1	A	240	ILE	2.1
1	B	389	ALA	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	319	LYS	2.1
1	A	267	ARG	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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å ²)	Q<0.9
2	EDO	A	501	4/4	0.54	0.28	1.68	78,94,95,95	0
2	EDO	A	502	4/4	0.74	0.21	0.48	75,90,90,91	0
3	CA	A	505	1/1	0.95	0.14	-0.68	36,36,36,36	0
3	CA	B	505	1/1	0.88	0.11	-1.44	36,36,36,36	0
3	CA	B	503	1/1	0.93	0.10	-1.70	49,49,49,49	0
3	CA	B	506	1/1	0.81	0.11	-2.17	44,44,44,44	0
3	CA	B	504	1/1	0.86	0.05	-3.54	69,69,69,69	0
3	CA	A	503	1/1	0.80	0.05	-4.50	60,60,60,60	0
3	CA	A	506	1/1	0.97	0.08	-4.99	36,36,36,36	0
2	EDO	B	501	4/4	0.77	0.17	-	72,86,87,87	0
3	CA	A	504	1/1	0.91	0.06	-	71,71,71,71	0
2	EDO	B	502	4/4	0.73	0.20	-	74,90,90,90	0

6.5 Other polymers [i](#)

There are no such residues in this entry.