



Full wwPDB X-ray Structure Validation Report

Feb 26, 2014 – 03:16 PM GMT

PDB ID : 2EFD
Title : Ara7/AtVps9a
Authors : Uejima, T.; Ihara, K.; Wakatsuki, S.
Deposited on : 2007-02-22
Resolution : 3.00 Å(reported)

This is a full wwPDB 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/ValidationPDFNotes.html>

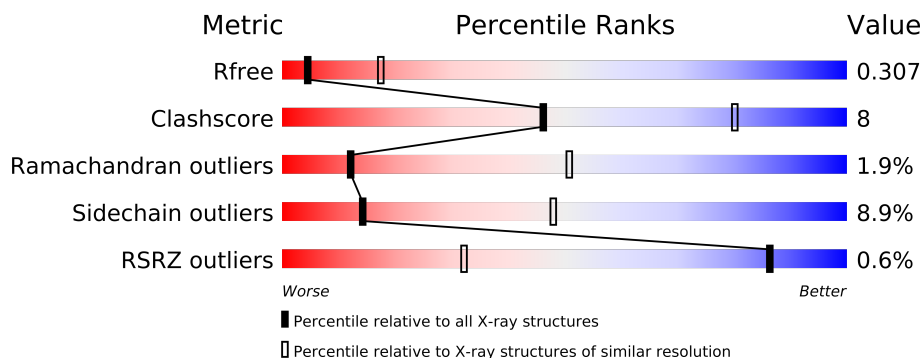
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 3.00 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	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	66092	1216 (3.00-3.00)
Clashscore	79885	1594 (3.00-3.00)
Ramachandran outliers	78287	1537 (3.00-3.00)
Sidechain outliers	78261	1540 (3.00-3.00)
RSRZ outliers	66119	1217 (3.00-3.00)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	267	
1	C	267	
2	B	181	
2	D	181	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 6266 atoms, of which 0 are hydrogen and 0 are deuterium.

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 Similarity to vacuolar protein sorting-associated protein VPS9.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	246	Total	C	N	O	S	0	0	0
			1953	1242	324	375	12			
1	C	246	Total	C	N	O	S	0	0	0
			1953	1242	324	375	12			

There are 4 discrepancies between the modelled and reference sequences:

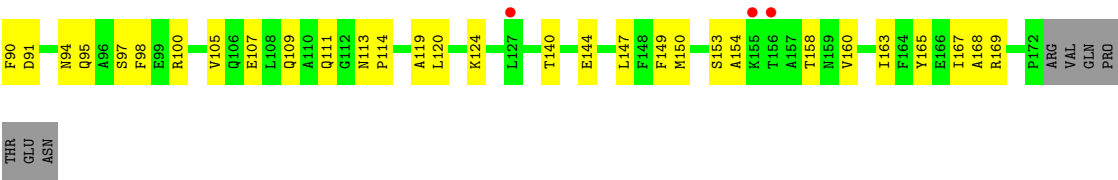
Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	EXPRESSION TAG	UNP Q9LT31
A	0	SER	-	EXPRESSION TAG	UNP Q9LT31
C	-1	GLY	-	EXPRESSION TAG	UNP Q9LT31
C	0	SER	-	EXPRESSION TAG	UNP Q9LT31

- Molecule 2 is a protein called Small GTP-binding protein-like.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	152	Total	C	N	O	S	0	0	0
			1180	752	202	222	4			
2	D	152	Total	C	N	O	S	0	0	0
			1180	752	202	222	4			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-1	GLY	-	EXPRESSION TAG	UNP Q9LT31
B	0	SER	-	EXPRESSION TAG	UNP Q9LT31
D	-1	GLY	-	EXPRESSION TAG	UNP Q9LT31
D	0	SER	-	EXPRESSION TAG	UNP Q9LT31



4 Data and refinement statistics

Property	Value	Source
Space group	P 61	Depositor
Cell constants a, b, c, α , β , γ	189.54Å 189.54Å 75.17Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	38.95 – 3.00 38.94 – 3.00	Depositor EDS
% Data completeness (in resolution range)	95.9 (38.95-3.00) 95.9 (38.94-3.00)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.23 (at 3.01Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.306 , 0.351 0.286 , 0.307	Depositor DCC
R_{free} test set	1494 reflections (5.29%)	DCC
Wilson B-factor (Å ²)	74.0	Xtriage
Anisotropy	0.085	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 22.8	EDS
Estimated twinning fraction	0.076 for h,-h-k,-l	Xtriage
L-test for twinning	$\langle L \rangle = 0.43$, $\langle L^2 \rangle = 0.25$	Xtriage
Outliers	0 of 29742 reflections	Xtriage
F_o, F_c correlation	0.85	EDS
Total number of atoms	6266	wwPDB-VP
Average B, all atoms (Å ²)	74.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.17% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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	0.48	0/1991	0.61	0/2687
1	C	0.46	0/1991	0.57	0/2687
2	B	0.48	0/1200	0.62	0/1622
2	D	0.43	0/1200	0.59	0/1622
All	All	0.46	0/6382	0.60	0/8618

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1953	0	1937	39	0
1	C	1953	0	1937	28	0
2	B	1180	0	1174	20	0
2	D	1180	0	1174	21	0
All	All	6266	0	6222	102	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 8.

All (102) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
2:D:105:VAL:HG12	2:D:109:GLN:HE21	1.42	0.83
1:C:128:PRO:HA	1:C:131:GLN:HG3	1.63	0.79
1:A:48:ALA:O	1:A:52:GLU:HB2	1.87	0.73
1:C:111:LYS:O	1:C:115:VAL:HG23	1.89	0.71
1:A:41:PRO:HA	1:A:93:ARG:HH21	1.55	0.71
2:D:105:VAL:HG12	2:D:109:GLN:NE2	2.08	0.68
1:A:84:LYS:HG3	1:A:151:ALA:HB2	1.75	0.68
1:A:176:ALA:HB2	1:C:138:LEU:HD21	1.79	0.65
1:A:161:ASN:O	1:A:165:VAL:HG23	1.99	0.63
1:A:64:HIS:CE1	1:A:66:LEU:HB2	2.34	0.63
2:B:51:THR:HA	2:B:60:LYS:HA	1.80	0.62
1:C:115:VAL:HA	1:C:118:PHE:CE2	2.35	0.61
2:B:29:ARG:HH11	2:B:157:ALA:HB2	1.67	0.59
1:C:128:PRO:CA	1:C:131:GLN:HG3	2.33	0.59
1:C:170:LEU:HD21	1:C:190:VAL:HG21	1.83	0.59
2:D:120:LEU:HD23	2:D:149:PHE:HD2	1.66	0.59
1:A:156:LEU:HD23	1:A:160:LEU:HG	1.84	0.58
2:D:163:ILE:O	2:D:167:ILE:HG13	2.03	0.58
2:D:107:GLU:O	2:D:111:GLN:HG2	2.04	0.57
2:B:61:PHE:HB3	2:B:63:ILE:HD11	1.86	0.57
1:A:38:ASN:CG	1:A:38:ASN:O	2.41	0.57
1:C:229:ASN:O	1:C:232:SER:OG	2.17	0.57
1:C:146:ILE:HG23	1:C:147:ASN:OD1	2.04	0.56
2:B:166:GLU:O	2:B:170:ARG:HG3	2.07	0.54
1:A:105:ASP:OD2	1:A:204:HIS:HB3	2.08	0.54
1:A:39:ASN:HB2	1:A:93:ARG:HH12	1.73	0.54
1:A:41:PRO:HA	1:A:93:ARG:NH2	2.22	0.53
1:A:167:ASN:O	1:A:171:LEU:HB2	2.09	0.53
1:C:226:PHE:O	1:C:229:ASN:HB2	2.09	0.52
2:D:17:GLY:O	2:D:23:LYS:HE3	2.10	0.52
2:B:126:ASP:N	2:B:126:ASP:OD2	2.39	0.52
1:A:108:LEU:HD21	1:A:234:GLU:HG3	1.92	0.52
1:C:84:LYS:HG3	1:C:151:ALA:HB2	1.91	0.51
1:A:115:VAL:HA	1:A:118:PHE:CE2	2.45	0.51
1:C:83:GLU:CD	1:C:152:PRO:HG2	2.31	0.51
1:A:241:ASP:O	1:A:242:ALA:C	2.49	0.51
1:A:225:TYR:OH	2:B:65:ASP:O	2.29	0.50
1:A:36:PHE:O	1:A:93:ARG:NH1	2.45	0.50
1:C:153:ARG:O	1:C:157:VAL:HG23	2.11	0.50
1:C:242:ALA:HB1	1:C:247:LEU:O	2.10	0.50
2:B:13:LEU:HD21	2:B:87:ILE:HG13	1.93	0.50
2:D:91:ASP:HB3	2:D:94:ASN:HB2	1.93	0.50
2:B:94:ASN:O	2:B:96:ALA:N	2.46	0.49

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:C:128:PRO:HA	1:C:131:GLN:CG	2.41	0.48
2:D:120:LEU:HD23	2:D:149:PHE:CD2	2.47	0.48
1:A:157:VAL:O	1:A:158:CYS:C	2.52	0.48
1:C:132:ASN:HB3	1:C:136:TRP:NE1	2.28	0.48
1:A:163:CYS:SG	1:A:187:PHE:HZ	2.37	0.47
1:A:37:SER:HA	1:A:93:ARG:HD2	1.96	0.47
1:A:199:ASN:O	1:A:201:PRO:HD3	2.13	0.47
1:A:138:LEU:HB3	1:A:165:VAL:HG11	1.97	0.46
2:D:87:ILE:HA	2:D:119:ALA:O	2.16	0.46
2:B:61:PHE:HB3	2:B:63:ILE:CD1	2.45	0.46
2:D:90:PHE:HB2	2:D:97:SER:HB2	1.97	0.46
1:C:120:SER:OG	1:C:122:GLU:HG2	2.16	0.46
2:D:76:ALA:N	2:D:77:PRO:HD2	2.31	0.46
2:D:77:PRO:HA	2:D:80:TYR:CE1	2.51	0.46
1:C:185:ASP:O	1:C:189:PRO:HG2	2.16	0.45
1:C:126:ILE:HG22	1:C:131:GLN:HG2	1.98	0.45
1:C:124:LEU:HB3	2:D:72:TYR:OH	2.17	0.45
1:A:192:ILE:O	1:A:193:TYR:C	2.56	0.45
1:A:61:PHE:HE1	1:A:82:LEU:HD22	1.81	0.44
1:C:132:ASN:HB3	1:C:136:TRP:CE2	2.52	0.44
1:C:107:LYS:NZ	1:C:111:LYS:HE3	2.32	0.44
2:B:24:SER:O	2:B:28:LEU:HD23	2.18	0.44
1:A:140:GLN:OE1	1:A:197:LYS:HB3	2.17	0.44
1:A:163:CYS:HG	1:A:187:PHE:HZ	1.65	0.44
2:B:8:SER:HB3	2:B:58:THR:O	2.17	0.44
1:A:90:LEU:O	1:A:94:VAL:HG22	2.18	0.43
1:A:29:ILE:O	1:A:33:ILE:HG13	2.19	0.43
1:A:87:MET:HE3	1:A:94:VAL:HG21	1.99	0.43
2:B:9:ILE:HB	2:B:59:VAL:HG23	2.01	0.43
1:A:44:GLU:H	1:A:44:GLU:CD	2.21	0.43
2:D:23:LYS:HB3	2:D:89:VAL:HG21	2.01	0.43
1:C:192:ILE:O	1:C:196:ILE:HG13	2.19	0.43
2:D:140:THR:O	2:D:144:GLU:HG3	2.19	0.42
2:B:168:ALA:HA	2:B:171:LEU:HD12	2.01	0.42
2:B:54:VAL:HG12	2:B:165:TYR:CD2	2.54	0.42
1:A:64:HIS:HE1	1:A:66:LEU:HB2	1.82	0.42
1:A:39:ASN:O	1:A:93:ARG:CZ	2.67	0.42
2:B:152:THR:HA	2:B:159:ASN:HB2	2.02	0.42
2:D:90:PHE:CE1	2:D:98:PHE:HB2	2.54	0.42
1:C:214:ARG:O	1:C:215:ARG:C	2.58	0.42
1:A:122:GLU:O	1:A:123:ASN:C	2.56	0.42
1:C:259:ALA:C	1:C:261:ALA:H	2.21	0.42

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:73:GLU:HG3	1:A:73:GLU:H	1.60	0.42
2:D:160:VAL:O	2:D:163:ILE:HG22	2.20	0.42
2:B:12:LYS:NZ	2:B:81:ARG:O	2.51	0.42
1:C:71:SER:O	1:C:75:LEU:HG	2.18	0.42
1:A:222:GLU:O	1:A:226:PHE:HD1	2.03	0.42
1:A:160:LEU:O	1:A:164:LYS:HG3	2.19	0.41
1:C:189:PRO:HG3	2:D:72:TYR:CE1	2.55	0.41
2:B:30:PHE:CE1	2:B:50:GLN:HG2	2.56	0.41
2:D:113:ASN:HA	2:D:114:PRO:HD3	1.82	0.41
1:C:120:SER:O	1:C:123:ASN:HB2	2.21	0.41
1:A:19:LYS:HA	1:A:20:PRO:HD3	1.95	0.41
1:A:39:ASN:O	1:A:93:ARG:NH1	2.54	0.40
2:D:165:TYR:O	2:D:168:ALA:HB3	2.21	0.40
2:B:113:ASN:HA	2:B:114:PRO:HD3	1.84	0.40
1:C:125:ASP:CG	2:D:71:ARG:HE	2.24	0.40
2:B:171:LEU:HA	2:B:172:PRO:HD2	1.83	0.40
1:A:232:SER:HB2	2:B:75:LEU:HD13	2.04	0.40

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	244/267 (91%)	209 (86%)	31 (13%)	4 (2%)	14	56
1	C	244/267 (91%)	218 (89%)	23 (9%)	3 (1%)	19	64
2	B	148/181 (82%)	132 (89%)	13 (9%)	3 (2%)	11	48
2	D	148/181 (82%)	123 (83%)	20 (14%)	5 (3%)	6	31
All	All	784/896 (88%)	682 (87%)	87 (11%)	15 (2%)	12	51

All (15) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	67	TRP

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Mol	Chain	Res	Type
2	B	95	GLN
2	D	56	ASP
1	A	215	ARG
2	D	124	LYS
2	B	56	ASP
1	C	215	ARG
2	D	95	GLN
2	B	157	ALA
2	D	74	SER
2	D	154	ALA
1	A	20	PRO
1	A	71	SER
1	C	37	SER
1	C	43	PRO

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	217/235 (92%)	198 (91%)	19 (9%)	14	48
1	C	217/235 (92%)	206 (95%)	11 (5%)	33	76
2	B	120/143 (84%)	102 (85%)	18 (15%)	4	20
2	D	120/143 (84%)	108 (90%)	12 (10%)	11	39
All	All	674/756 (89%)	614 (91%)	60 (9%)	14	48

All (60) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	34	VAL
1	A	38	ASN
1	A	47	CYS
1	A	56	LYS
1	A	62	ARG
1	A	67	TRP
1	A	73	GLU
1	A	93	ARG

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Mol	Chain	Res	Type
1	A	99	THR
1	A	108	LEU
1	A	122	GLU
1	A	137	LEU
1	A	171	LEU
1	A	174	SER
1	A	179	GLU
1	A	228	THR
1	A	231	LEU
1	A	238	SER
1	A	254	LYS
2	B	8	SER
2	B	9	ILE
2	B	13	LEU
2	B	18	ASP
2	B	24	SER
2	B	27	VAL
2	B	28	LEU
2	B	49	SER
2	B	50	GLN
2	B	56	ASP
2	B	61	PHE
2	B	62	GLU
2	B	100	ARG
2	B	115	ASN
2	B	126	ASP
2	B	147	LEU
2	B	158	THR
2	B	169	ARG
1	C	37	SER
1	C	56	LYS
1	C	111	LYS
1	C	113	SER
1	C	132	ASN
1	C	156	LEU
1	C	197	LYS
1	C	214	ARG
1	C	231	LEU
1	C	246	SER
1	C	254	LYS
2	D	13	LEU
2	D	28	LEU

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Mol	Chain	Res	Type
2	D	54	VAL
2	D	58	THR
2	D	60	LYS
2	D	62	GLU
2	D	100	ARG
2	D	147	LEU
2	D	150	MET
2	D	153	SER
2	D	158	THR
2	D	169	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	116	GLN
2	B	94	ASN
2	B	159	ASN
2	D	10	ASN
2	D	94	ASN
2	D	109	GLN
2	D	139	GLN
2	D	143	GLN

5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates 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 ⓘ

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	246/267 (92%)	-0.12	0	100 100	43, 56, 94, 101	0
1	C	246/267 (92%)	-0.02	0	100 100	49, 65, 114, 127	0
2	B	152/181 (83%)	0.09	0	100 100	46, 86, 106, 109	0
2	D	152/181 (83%)	0.20	5 (3%)	44 8	65, 92, 116, 118	0
All	All	796/896 (88%)	0.01	5 (0%)	86 32	43, 69, 113, 127	0

All (5) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	D	29	ARG	5.3
2	D	53	ALA	2.9
2	D	155	LYS	2.5
2	D	156	THR	2.4
2	D	127	LEU	2.3

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 ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

There are no ligands in this entry.

6.5 Other polymers ⓘ

There are no such residues in this entry.