Full wwPDB X-ray Structure Validation Report (i)

May 22, 2020 – 07:25 am BST

PDB ID	:	1AA7
Title	:	INFLUENZA VIRUS MATRIX PROTEIN CRYSTAL STRUCTURE AT PH 4.0
Authors	:	Sha, B.; Luo, M.
Deposited on	:	1997-01-24
Resolution	:	2.08 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 (i) symbol.

The following versions of software and data (see references (1)) were used in the production of this report:

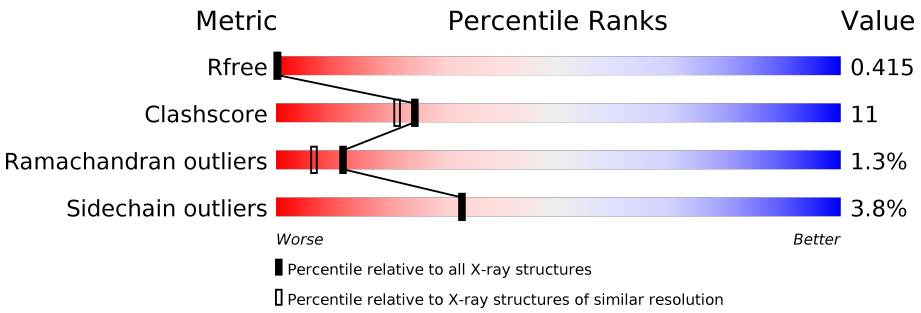
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.08 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	6189 (2.10-2.06)
Clashscore	141614	6738 (2.10-2.06)
Ramachandran outliers	138981	6663 (2.10-2.06)
Sidechain outliers	138945	6664 (2.10-2.06)

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 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 <=5%

Mol	Chain	Length	Quality of chain
1	A	158	78% 17% •
1	B	158	75% 22% • •

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 3238 atoms, of which 724 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 INFLUENZA VIRUS MATRIX PROTEIN.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	158	1496	773	278	209	228	8	0	0	0
1	B	157	1484	768	274	208	227	7	0	0	0

- Molecule 2 is water.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	H	O		
2	A	49	147	98	49	0	0
2	B	37	111	74	37	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. 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. 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: INFLUENZA VIRUS MATRIX PROTEIN

Chain A:

- Molecule 1: INFLUENZA VIRUS MATRIX PROTEIN

Chain B:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α, β, γ	66.17Å 66.17Å 135.30Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	8.00 – 2.08 24.47 – 2.06	Depositor EDS
% Data completeness (in resolution range)	94.7 (8.00-2.08) 91.8 (24.47-2.06)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	0.05	Depositor
$< I/\sigma(I) >$ [1]	4.21 (at 2.06Å)	Xtriage
Refinement program	X-PLOR	Depositor
R, R_{free}	0.208 , 0.280 0.384 , 0.415	Depositor DCC
R_{free} test set	1904 reflections (9.51%)	wwPDB-VP
Wilson B-factor (Å^2)	19.4	Xtriage
Anisotropy	0.325	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 47.7	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.035 for -h,-k,l	Xtriage
F_o,F_c correlation	0.75	EDS
Total number of atoms	3238	wwPDB-VP
Average B, all atoms (Å^2)	16.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.45% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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	0.49	0/1236	0.66	0/1668
1	B	0.52	0/1228	0.69	0/1658
All	All	0.50	0/2464	0.67	0/3326

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	1218	278	1259	29	2
1	B	1210	274	1247	26	2
2	A	49	98	0	5	2
2	B	37	74	0	1	2
All	All	2514	724	2506	54	4

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 11.

All (54) 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:303:LEU:HD23	1:B:315:ILE:HD11	1.56	0.86

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:103:LEU:HD23	1:A:115:ILE:HD11	1.59	0.83
1:B:261:GLY:O	1:B:265:THR:HG23	1.80	0.81
1:B:253:SER:HB3	1:B:256:THR:HG23	1.63	0.79
1:A:77:ARG:HH11	1:A:77:ARG:HG2	1.50	0.75
1:A:61:GLY:O	1:A:65:THR:HG23	1.89	0.72
1:A:74:LEU:HD13	2:A:506:HOH:O	1.91	0.69
1:B:250:PRO:O	1:B:251:ILE:HG12	1.94	0.68
1:B:214:ILE:HD11	1:B:354:ILE:HB	1.76	0.65
1:B:232:PHE:HE1	1:B:267:THR:HG21	1.60	0.65
1:A:36:ASN:HA	1:A:69:PRO:HG2	1.80	0.64
1:A:77:ARG:NH1	1:A:77:ARG:HG2	2.12	0.63
1:A:69:PRO:HG3	2:A:567:HOH:O	2.00	0.62
1:A:50:PRO:O	1:A:51:ILE:HG12	1.99	0.61
1:A:65:THR:HG21	2:A:508:HOH:O	2.02	0.59
1:A:2:SER:OG	1:A:5:THR:HG23	2.03	0.58
1:A:103:LEU:CD2	1:A:115:ILE:HD11	2.33	0.57
1:B:232:PHE:CE1	1:B:267:THR:HG21	2.39	0.56
1:B:339:THR:OG1	1:B:342:VAL:HG23	2.04	0.56
1:B:231:VAL:HG22	1:B:236:ASN:HB3	1.90	0.54
1:A:59:ILE:O	1:A:63:VAL:HG23	2.08	0.54
1:B:214:ILE:CD1	1:B:354:ILE:HB	2.38	0.54
1:B:346:LEU:O	1:B:350:THR:HG23	2.09	0.53
1:A:135:MET:SD	1:B:335:MET:SD	3.07	0.52
1:A:5:THR:HG22	2:A:505:HOH:O	2.10	0.52
1:B:227:ARG:O	1:B:231:VAL:HG23	2.11	0.51
1:A:77:ARG:NH1	2:A:506:HOH:O	2.43	0.51
1:B:224:ILE:HD11	1:B:252:LEU:HD11	1.92	0.50
1:B:205:THR:O	1:B:209:THR:HG23	2.12	0.49
1:B:312:ALA:HB2	1:B:342:VAL:HG13	1.94	0.49
1:B:266:LEU:HG	1:B:340:THR:HG23	1.95	0.48
1:A:71:GLU:O	1:A:74:LEU:HG	2.14	0.48
1:A:20:LEU:HA	1:A:23:GLU:OE1	2.13	0.48
1:B:302:LYS:NZ	2:B:548:HOH:O	2.43	0.47
1:B:264:PHE:O	1:B:268:VAL:HB	2.16	0.46
1:B:249:ARG:HA	1:B:249:ARG:NE	2.29	0.46
1:B:214:ILE:HD11	1:B:351:CYS:O	2.16	0.46
1:A:46:LEU:HD11	1:A:64:PHE:HD2	1.81	0.45
1:A:111:GLY:O	1:A:115:ILE:HG23	2.16	0.45
1:B:253:SER:HB3	1:B:256:THR:CG2	2.42	0.45
1:B:214:ILE:HA	1:B:214:ILE:HD13	1.75	0.45
1:B:269:PRO:HG2	1:B:270:SER:H	1.82	0.44

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:346:LEU:O	1:B:350:THR:CG2	2.65	0.44
1:A:77:ARG:HH11	1:A:77:ARG:CG	2.22	0.43
1:A:46:LEU:HD11	1:A:64:PHE:CD2	2.54	0.42
1:A:45:TRP:O	1:A:49:ARG:HG2	2.20	0.42
1:A:19:PRO:O	1:A:22:ALA:HB3	2.19	0.42
1:A:36:ASN:CA	1:A:69:PRO:HG2	2.46	0.42
1:B:286:GLY:O	1:B:287:ASN:OD1	2.38	0.42
1:A:89:ASP:O	1:A:93:MET:HG3	2.20	0.41
1:A:55:LEU:HD13	1:A:154:ILE:HD13	2.02	0.41
1:A:104:LYS:NZ	1:A:137:ALA:O	2.53	0.41
1:A:36:ASN:HA	1:A:69:PRO:CG	2.49	0.41
1:A:64:PHE:O	1:A:68:VAL:HB	2.20	0.41

All (4) 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)
1:A:70:SER:OG	2:A:529:HOH:O[5_665]	2.01	0.19
1:B:322:GLY:H	2:B:580:HOH:O[4_546]	1.46	0.14
1:B:322:GLY:N	2:B:580:HOH:O[4_546]	2.13	0.07
1:A:70:SER:CB	2:A:529:HOH:O[5_665]	2.16	0.04

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	156/158 (99%)	152 (97%)	2 (1%)	2 (1%)	12 7
1	B	155/158 (98%)	149 (96%)	4 (3%)	2 (1%)	12 7
All	All	311/316 (98%)	301 (97%)	6 (2%)	4 (1%)	12 7

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	251	ILE
1	A	2	SER
1	B	237	THR
1	A	51	ILE

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	133/133 (100%)	127 (96%)	6 (4%)	27	26
1	B	132/133 (99%)	128 (97%)	4 (3%)	41	43
All	All	265/266 (100%)	255 (96%)	10 (4%)	33	33

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	20	LEU
1	A	42	LEU
1	A	55	LEU
1	A	68	VAL
1	A	70	SER
1	A	77	ARG
1	B	255	LEU
1	B	265	THR
1	B	268	VAL
1	B	350	THR

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

Mol	Chain	Res	Type
1	A	110	HIS
1	B	292	ASN

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)

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 (i)

6.1 Protein, DNA and RNA chains (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers (i)

Unable to reproduce the depositors R factor - this section is therefore empty.