Full wwPDB X-ray Structure Validation Report ⓘ

Oct 17, 2021 – 03:34 AM EDT

PDB ID : 1G7W

Title : ASPARTATE AMINOTRANSFERASE ACTIVE SITE MUTANT N194A/R386L

Authors : Mizuguchi, H.; Hayashi, H.; Okada, K.; Miyahara, I.; Hirotsu, K.; Kagamiyama, H.

Deposited on : 2000-11-15

Resolution : 2.20 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 following versions of software and data (see references ⓘ) were used in the production of this report:

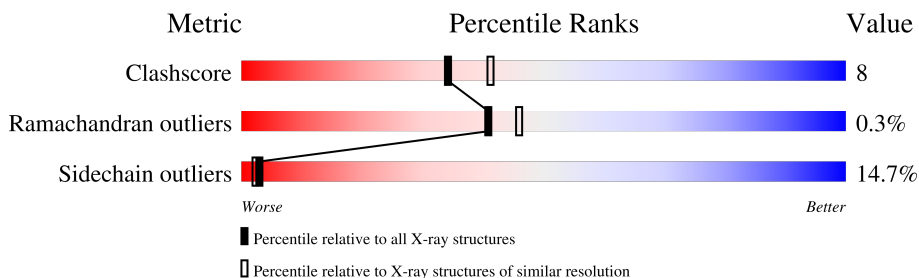|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.23.2

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 2.20 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	Percentile Ranks	Value
Clashscore		8
Ramachandran outliers		0.3%
Sidechain outliers		14.7%

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	5594 (2.20-2.20)
Ramachandran outliers	138981	5503 (2.20-2.20)
Sidechain outliers	138945	5504 (2.20-2.20)

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 <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	396	71% 23% 6% •

2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 3266 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 ASPARTATE AMINOTRANSFERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	396	Total 3063	C 1935	N 532	O 583	S 13	3	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	194	ALA	ASN	engineered mutation	UNP P00509
A	386	LEU	ARG	engineered mutation	UNP P00509

- Molecule 2 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula: $C_8H_{10}NO_6P$).
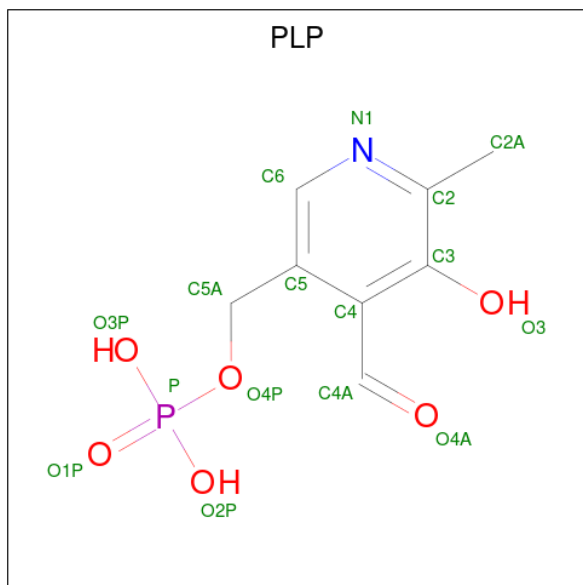
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 15	C 8	N 1	O 5	P 1	0	0

- Molecule 3 is water.

Full wwPDB X-ray Structure Validation Report

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	188	Total 188	O 188	0	0

3 Residue-property plots ⓘ

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. 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.

Note EDS was not executed.

• Molecule 1: ASPARTATE AMINOTRANSFERASE
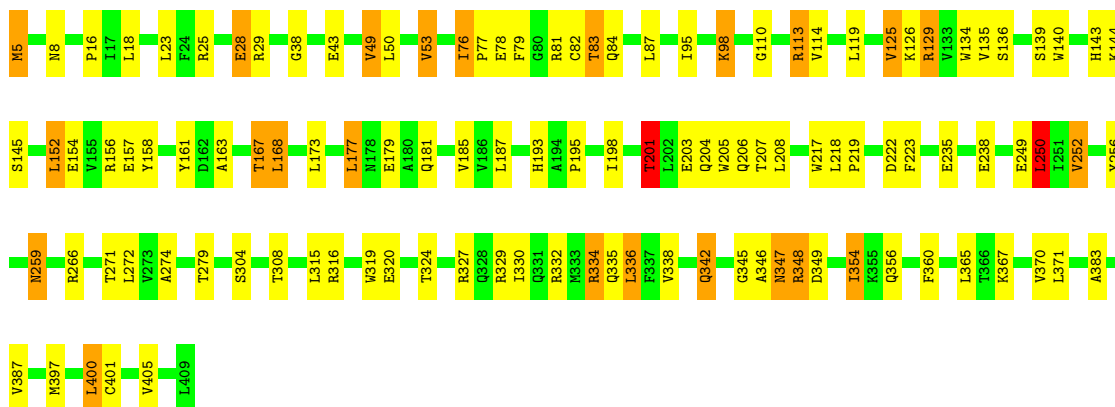
4 Data and refinement statistics ⓘ

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	154.94Å 89.33Å 79.96Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 2.20	Depositor
% Data completeness (in resolution range)	86.4 (10.00-2.20)	Depositor
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.217 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3266	wwPDB-VP
Average B, all atoms (Å^2)	27.0	wwPDB-VP

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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

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	0.74	0/3124	1.41	34/4233 (0.8%)

There are no bond length outliers.

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	334	ARG	NE-CZ-NH2	11.12	125.86	120.30
1	A	347	ASN	CA-C-N	-9.47	96.36	117.20
1	A	334	ARG	NE-CZ-NH1	-8.81	115.89	120.30
1	A	319	TRP	CD1-CG-CD2	8.68	113.24	106.30
1	A	134	TRP	CD1-CG-CD2	8.30	112.94	106.30
1	A	217	TRP	CD1-CG-CD2	8.26	112.91	106.30
1	A	140	TRP	CD1-CG-CD2	7.88	112.60	106.30
1	A	134	TRP	CE2-CD2-CG	-7.70	101.14	107.30
1	A	319	TRP	CE2-CD2-CG	-7.51	101.29	107.30
1	A	205	TRP	CD1-CG-CD2	7.40	112.22	106.30
1	A	217	TRP	CE2-CD2-CG	-7.15	101.58	107.30
1	A	327	ARG	NE-CZ-NH2	6.90	123.75	120.30
1	A	140	TRP	CE2-CD2-CG	-6.88	101.79	107.30
1	A	205	TRP	CE2-CD2-CG	-6.85	101.82	107.30
1	A	113	ARG	NE-CZ-NH2	6.50	123.55	120.30
1	A	250	LEU	CA-CB-CG	6.36	129.94	115.30
1	A	129	ARG	NE-CZ-NH2	6.31	123.46	120.30
1	A	217	TRP	CG-CD1-NE1	-6.15	103.95	110.10
1	A	266	ARG	NE-CZ-NH1	-6.09	117.25	120.30
1	A	217	TRP	CG-CD2-CE3	6.05	139.35	133.90
1	A	349	ASP	N-CA-C	-5.91	95.05	111.00
1	A	25	ARG	NE-CZ-NH1	-5.75	117.42	120.30
1	A	201	THR	N-CA-CB	-5.66	99.54	110.30
1	A	400	LEU	CA-CB-CG	5.66	128.32	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	319	TRP	CG-CD1-NE1	-5.66	104.44	110.10
1	A	113	ARG	NE-CZ-NH1	-5.65	117.47	120.30
1	A	332	ARG	NE-CZ-NH2	5.56	123.08	120.30
1	A	316	ARG	NE-CZ-NH1	-5.31	117.64	120.30
1	A	167	THR	CA-CB-CG2	5.22	119.71	112.40
1	A	329	ARG	NE-CZ-NH2	5.16	122.88	120.30
1	A	5	MET	CG-SD-CE	-5.09	92.05	100.20
1	A	25	ARG	NE-CZ-NH2	5.07	122.83	120.30
1	A	125	VAL	CB-CA-C	-5.03	101.83	111.40
1	A	140	TRP	CG-CD1-NE1	-5.01	105.09	110.10

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	3063	0	3013	51	0
2	A	15	0	7	0	0
3	A	188	0	0	4	0
All	All	3266	0	3020	51	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 8.

All (51) 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:81:ARG:NH1	1:A:82:CYS:SG	2.43	0.92
1:A:335:GLN:HA	1:A:354:ILE:HD11	1.66	0.76
1:A:76:ILE:HG21	3:A:446:HOH:O	1.85	0.76
1:A:125:VAL:HG11	1:A:185:VAL:HG23	1.65	0.76
1:A:203:GLU:HA	1:A:206:GLN:HE21	1.62	0.65
1:A:370:VAL:HG21	1:A:383:ALA:HA	1.81	0.62
1:A:81:ARG:CZ	1:A:82:CYS:SG	2.88	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:50:LEU:HB2	1:A:53:VAL:HG13	1.84	0.60
1:A:304:SER:O	1:A:308:THR:HG23	2.04	0.58
1:A:252:VAL:HG13	1:A:271:THR:HB	1.84	0.58
1:A:320:GLU:O	1:A:324:THR:HG23	2.03	0.57
1:A:168:LEU:HD21	1:A:173:LEU:HD12	1.86	0.57
1:A:49:VAL:HG23	1:A:53:VAL:HG22	1.87	0.55
1:A:346:ALA:H	1:A:348:ARG:HD2	1.72	0.55
1:A:348:ARG:HH22	1:A:405:VAL:HG22	1.71	0.54
1:A:274:ALA:HB1	1:A:279:THR:HG23	1.88	0.54
1:A:95:ILE:O	1:A:98:LYS:HD2	2.07	0.53
1:A:135:VAL:HG22	1:A:187:LEU:HD23	1.91	0.53
1:A:219:PRO:HG2	1:A:250:LEU:HB2	1.90	0.53
1:A:81:ARG:NE	1:A:82:CYS:SG	2.82	0.52
1:A:125:VAL:HG13	3:A:604:HOH:O	2.09	0.51
1:A:38:GLY:HA2	1:A:360:PHE:HZ	1.78	0.49
1:A:201:THR:HG22	1:A:204:GLN:H	1.78	0.49
1:A:346:ALA:HB3	1:A:348:ARG:CZ	2.43	0.48
1:A:129:ARG:HD3	1:A:154:GLU:HB2	1.94	0.48
1:A:136:SER:OG	1:A:193:HIS:HE1	1.97	0.48
1:A:198:ILE:HD13	1:A:356:GLN:HG2	1.97	0.47
1:A:158:TYR:HB3	1:A:177:LEU:HD13	1.96	0.47
1:A:84:GLN:HE22	1:A:98:LYS:NZ	2.13	0.47
1:A:28:GLU:HG2	1:A:29:ARG:HE	1.79	0.47
1:A:203:GLU:O	1:A:207:THR:HG23	2.14	0.47
1:A:336:LEU:HB3	1:A:397:MET:HE3	1.98	0.45
1:A:330:ILE:O	1:A:334:ARG:HG3	2.17	0.45
1:A:401:CYS:O	1:A:405:VAL:HG23	2.16	0.45
1:A:76:ILE:HA	1:A:77:PRO:HD3	1.80	0.44
1:A:129:ARG:HD2	1:A:156:ARG:HG2	1.99	0.44
1:A:152:LEU:HD12	1:A:152:LEU:HA	1.88	0.43
1:A:110:GLY:O	1:A:114:VAL:HG13	2.18	0.43
1:A:79:PHE:O	1:A:83:THR:HG23	2.19	0.43
1:A:187:LEU:HD11	1:A:222:ASP:HB2	2.00	0.43
1:A:143:HIS:HB2	3:A:595:HOH:O	2.19	0.42
1:A:29:ARG:HG3	3:A:530:HOH:O	2.19	0.42
1:A:338:VAL:HG21	1:A:354:ILE:HD13	2.02	0.42
1:A:161:TYR:CE2	1:A:163:ALA:HA	2.55	0.42
1:A:28:GLU:HG2	1:A:29:ARG:HH11	1.85	0.41
1:A:348:ARG:H	1:A:348:ARG:HG2	1.69	0.41
1:A:342:GLN:HE21	1:A:342:GLN:N	2.19	0.41
1:A:135:VAL:O	1:A:157:GLU:HA	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:235:GLU:O	1:A:238:GLU:HB2	2.20	0.41
1:A:256:TYR:HA	1:A:259:ASN:HD21	1.86	0.41
1:A:342:GLN:HA	1:A:348:ARG:HD3	2.03	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	394/396 (100%)	379 (96%)	14 (4%)	1 (0%)	41	46

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	345	GLY

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	319/319 (100%)	272 (85%)	47 (15%)	3	2

All (47) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	MET
1	A	8	ASN
1	A	16	PRO
1	A	18	LEU
1	A	23	LEU
1	A	28	GLU
1	A	43	GLU
1	A	49	VAL
1	A	53	VAL
1	A	76	ILE
1	A	78	GLU
1	A	83	THR
1	A	87	LEU
1	A	98	LYS
1	A	113	ARG
1	A	119	LEU
1	A	126	LYS
1	A	139	SER
1	A	144	LYS
1	A	145	SER
1	A	152	LEU
1	A	167	THR
1	A	168	LEU
1	A	177	LEU
1	A	179	GLU
1	A	181	GLN
1	A	195	PRO
1	A	201	THR
1	A	208	LEU
1	A	218	LEU
1	A	223	PHE
1	A	249	GLU
1	A	250	LEU
1	A	252	VAL
1	A	259	ASN
1	A	272	LEU
1	A	315	LEU
1	A	336	LEU
1	A	342	GLN
1	A	347	ASN
1	A	348	ARG
1	A	354	ILE
1	A	365	LEU

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Mol	Chain	Res	Type
1	A	367	LYS
1	A	371	LEU
1	A	387	VAL
1	A	400	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	69	ASN
1	A	84	GLN
1	A	166	HIS
1	A	193	HIS
1	A	206	GLN
1	A	226	GLN
1	A	247	HIS
1	A	259	ASN
1	A	342	GLN
1	A	347	ASN

5.3.3 RNA ⓘ

There are no RNA molecules 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 monosaccharides in this entry.

5.6 Ligand geometry ⓘ

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	PLP	A	413	1	15,15,16	1.47	3 (20%)	20,22,23	1.42	1 (5%)

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	PLP	A	413	1	-	0/6/6/8	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	413	PLP	C3-C2	-3.02	1.37	1.40
2	A	413	PLP	C5-C4	-2.63	1.37	1.40
2	A	413	PLP	P-O3P	-2.14	1.46	1.54

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	413	PLP	O4P-C5A-C5	4.65	118.22	109.35

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 ⓘ

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 ⓘ

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section is therefore empty.

6.4 Ligands ⓘ

EDS was not executed - this section is therefore empty.

6.5 Other polymers ⓘ

EDS was not executed - this section is therefore empty.