



wwPDB EM Validation Summary Report ⓘ

Nov 21, 2022 – 12:20 pm GMT

PDB ID : 7Z1H
EMDB ID : EMD-14446
Title : VAR2CSA APO
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Deposited on : 2022-02-24
Resolution : 3.12 Å (reported)

This is a wwPDB EM 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/EMValidationReportHelp>

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:

EMDB validation analysis : 0.0.0.dev97
MolProbity : 4.02b-467
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) : 2.26

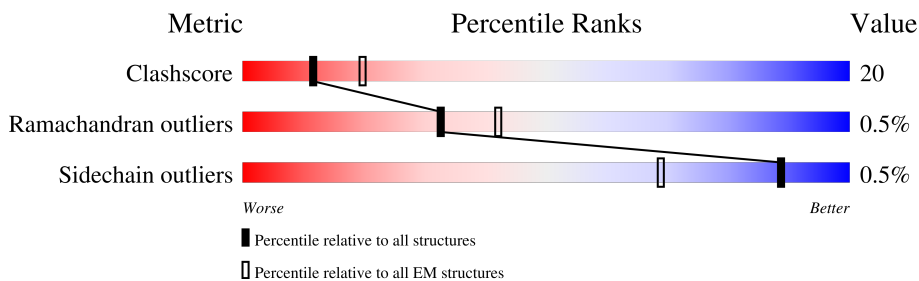
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.12 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)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	2040	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 15032 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 VAR2CSA APO.

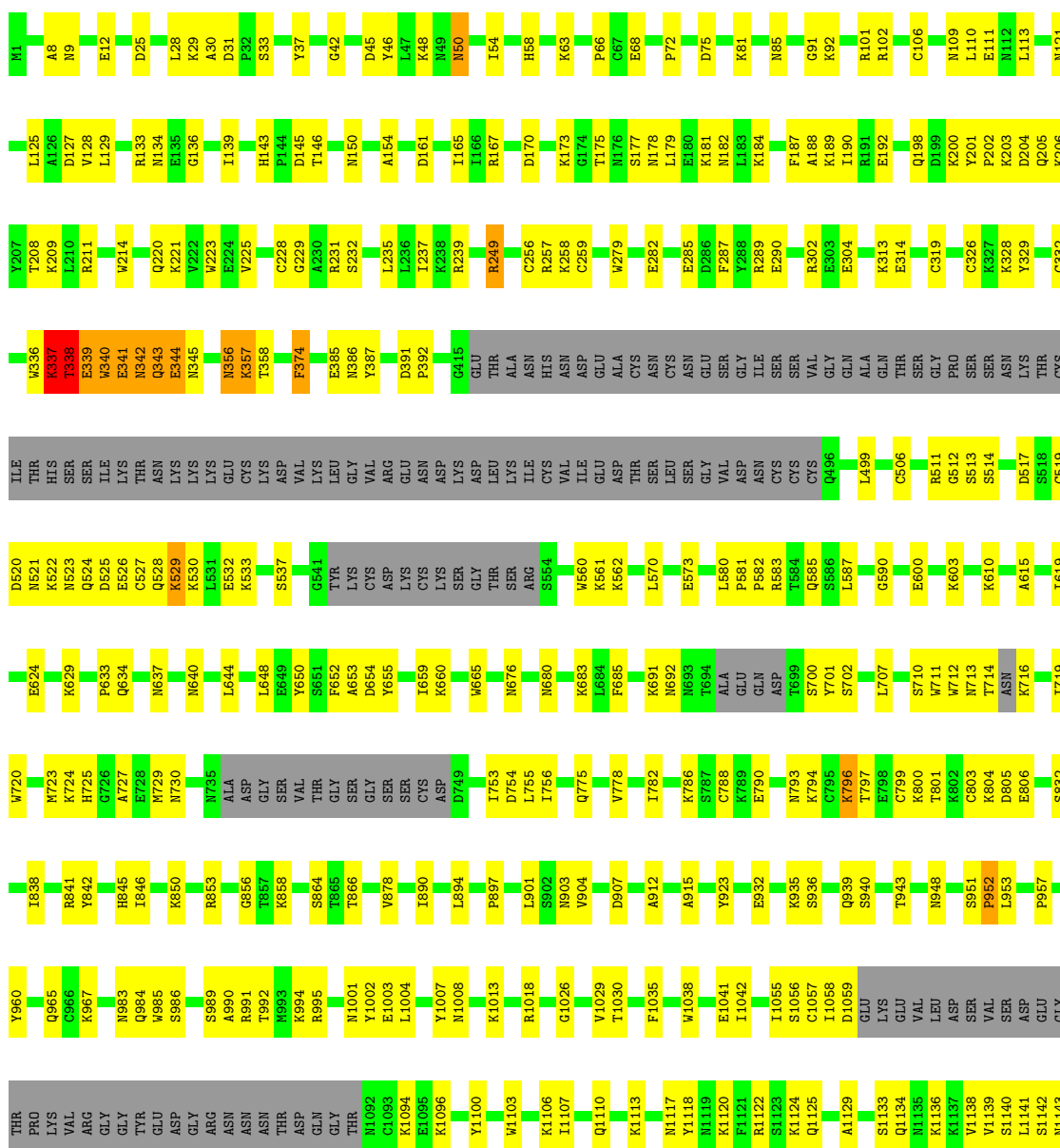
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1848	15032	9381	2590	2962	99	0	0

3 Residue-property plots [i](#)

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.

- Molecule 1: VAR2CSA APO

Chain A:  62% 27% 9%



ILE	E1970	Y1862	W1741	Q1630	I1497	I1376	K1293	F1147
PRD	E1971	Y1863	W1744	L1631	Q1498	K1377	K1294	
	Q1972	M1864	M1745	C1632	K1502	K1378	E1294	
	L1973	K1865	E1745	L1633	K1505	L1379	L1295	
	M1974	I1866	T1746	Y1634	Y1508	L1380	L1296	
	Y1983	S1874	T1748	E1635	Y1508	E1381	K1297	
	K1984	E1975	M1749	L1636	Y1508	K1382	Q1155	
	Y1986	P1638	R1753	F1637	I1512	G1383	D1161	
	E1990	G1877	K1754	P1638	I1512	Q1386	A1303	
CYS		H1879	T1755	I1640	K1515	W1404	I1304	
PHE		Y1880	L1756	E1644	K1516	R1440	H1305	
ASP		I1883	Q1758	E1645	W1519		E1307	
GLN		I1889	L1759	L1655	D1520	D1414	I1306	
THR		I1892	W1760	E1656	K1521	A1415	K1164	
LYS		L1894	M1761	T1657	Q1522	A1419	E1174	
MET		M1893	M1764	I1660	T1524	K1422	G1187	
LYS		K1894	M1783	V1661	K1525	K1422	E1309	
VAL		R1895	G1784	A1662	Y1526	I1423	E1310	
CYS		M1903	V1785	E1663	W1531	A1426	E1199	
ASP		Y1904	E1786	E1665	L1538	N1427	K1200	
LEU		I1905	H1787	A1666	L1539	S1430	K1201	
ILE		M1911	I1788	M1674	K1540	I1431	C1202	
ALA		I1912	K1792	D1682	M1540	F1432	K1203	
ASP		I1916	Q1794	A1683	Y1543	E1436	E1204	
ALA		K1929	R1797	M1684	C1546	D1446	M1205	
GLY		E1930	W1798	A1687	I1554	S1450	E1206	
CYS		L1933	L1799	I1691	F1555	S1450	S1207	
LYS		E1934	E1800	I1691	E1560	V1451	T1209	
LEU		E1935	E1801	F1695	E1564	S1452	T1210	
ASP		L1940	M1802	Y1696	Y1564	K1455	S1215	
GLU		E1945	T1803	D1697	D1569	E1456	E1216	
LEU		E1946	N1804	L1698	Y1581	W1457		
TRP		L1947	E1808	E1699	Y1581	R1465		
GLU		M1950	K1809	D1700	M1585	L1466		
ASN		Y1954	Y1810	I1701	M1586	R1467		
ASP		M1959	P1823	D1706	Y1468	D1353		
ASP		K1960	P1824	L1707	E1469	H1257		
NET		T1961	D1828	V1708	S1594	T1260		
ASP		T1962	M1833	H1709	M1603	I1265		
LEU		E1963	N1836	D1710	T1604	I1265		
ARG		Y1964	I1836	E1711	W1605	L1272		
GLY		I1965	K1839	Y1712	S1606	L1278		
THR		L1966	K1719	T1713	K1611	D1279		
TYR		E1967	L1720	K1719	P1626	K1280		
ASN		Y1968	I1724	L1724	R1627	G1284		
LYS		H1968	F1724	F1724	R1628	E1284		
HIS					Q1629	E1284		
LYS								
GLY								
VAL								
LEU								

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	207129	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	40	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor

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	0.86	26/15330 (0.2%)	0.58	26/20612 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	7

The worst 5 of 26 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	374	PHE	CE2-CZ	45.16	2.23	1.37
1	A	374	PHE	CE1-CZ	43.54	2.20	1.37
1	A	374	PHE	CD2-CE2	41.85	2.23	1.39
1	A	374	PHE	CD1-CE1	40.20	2.19	1.39
1	A	374	PHE	CG-CD1	28.39	1.81	1.38

The worst 5 of 26 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	356	ASN	C-N-CA	12.76	153.59	121.70
1	A	1381	GLU	C-N-CA	11.62	150.76	121.70
1	A	343	GLN	C-N-CA	10.43	147.78	121.70
1	A	341	GLU	C-N-CA	9.92	146.49	121.70
1	A	337	LYS	N-CA-CB	-8.59	95.14	110.60

There are no chirality outliers.

5 of 7 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	109	ASN	Peptide
1	A	1375	ASP	Peptide
1	A	337	LYS	Peptide
1	A	338	THR	Peptide
1	A	342	ASN	Peptide

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	15032	0	14596	587	0
All	All	15032	0	14596	587	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 20.

The worst 5 of 587 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:374:PHE:CD2	1:A:374:PHE:CG	1.79	1.70
1:A:374:PHE:CG	1:A:374:PHE:CD1	1.81	1.67
1:A:357:LYS:N	1:A:357:LYS:CA	1.67	1.54
1:A:357:LYS:N	1:A:374:PHE:CE2	1.94	1.36
1:A:357:LYS:N	1:A:374:PHE:CZ	1.90	1.35

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 PDB entries followed by that with respect to all EM entries.

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	1836/2040 (90%)	1628 (89%)	199 (11%)	9 (0%)	29 63

5 of 9 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	529	LYS
1	A	907	ASP
1	A	952	PRO
1	A	793	ASN
1	A	1366	TYR

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 PDB entries followed by that with respect to all EM entries.

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	1670/1839 (91%)	1661 (100%)	9 (0%)	88 94

5 of 9 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1410	ARG
1	A	1628	ARG
1	A	249	ARG
1	A	313	LYS
1	A	796	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1305	HIS
1	A	1847	ASN
1	A	1330	GLN
1	A	1972	GLN
1	A	1586	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 monosaccharides 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](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	A	2

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	343:GLN	C	344:GLU	N	1.60
1	A	1381:GLU	C	1382:LYS	N	1.60

6 Map visualisation

This section contains visualisations of the EMDB entry EMD-14446. These allow visual inspection of the internal detail of the map and identification of artifacts.

No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

This section was not generated.

6.2 Central slices

This section was not generated.

6.3 Largest variance slices

This section was not generated.

6.4 Orthogonal surface views

This section was not generated.

6.5 Mask visualisation

This section was not generated. No masks/segmentation were deposited.

7 Map analysis

This section contains the results of statistical analysis of the map.

7.1 Map-value distribution

This section was not generated.

7.2 Volume estimate versus contour level

This section was not generated.

7.3 Rotationally averaged power spectrum

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit

This section was not generated.