



wwPDB EM Validation Summary Report ⓘ

Nov 21, 2022 – 12:20 pm GMT

PDB ID : 7Z12
EMDB ID : EMD-14438
Title : VAR2 complex with PAM1.4
Authors : Raghavan, S.S.R.; Wang, K.T.
Deposited on : 2022-02-24
Resolution : 3.00 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

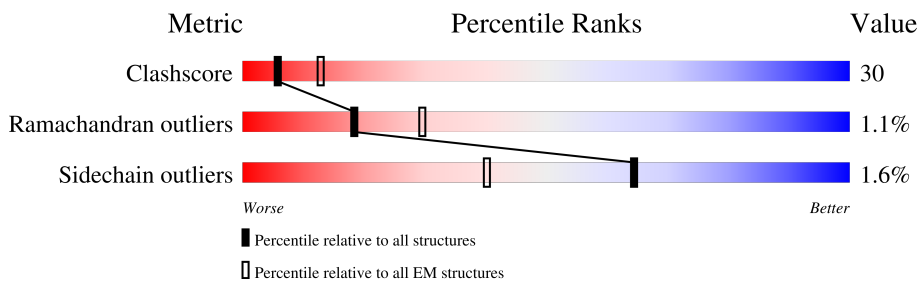
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.00 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)	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	B	472	
2	C	233	
3	A	2040	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 18352 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 PAM1.4, Heavy Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	B	221	1650	1042	283	319	6	0	0

- Molecule 2 is a protein called PAM1.4, light Chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	C	212	1631	1021	279	326	5	0	0

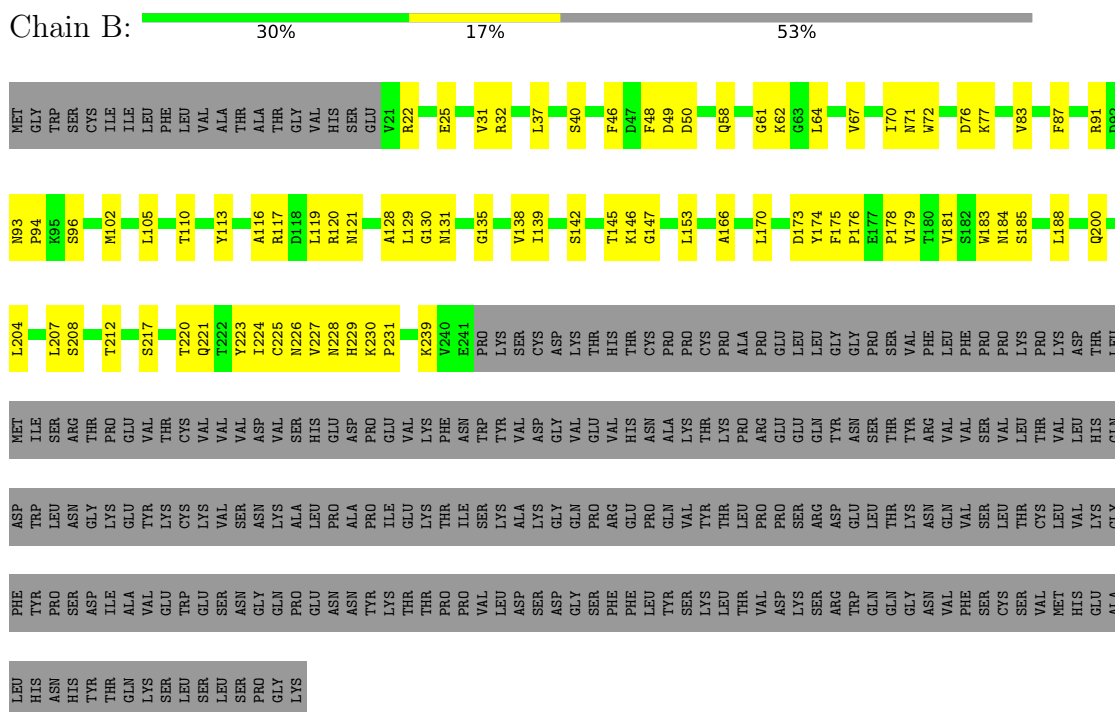
- Molecule 3 is a protein called VAR2CSA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	A	1853	15071	9402	2597	2973	99	0	0

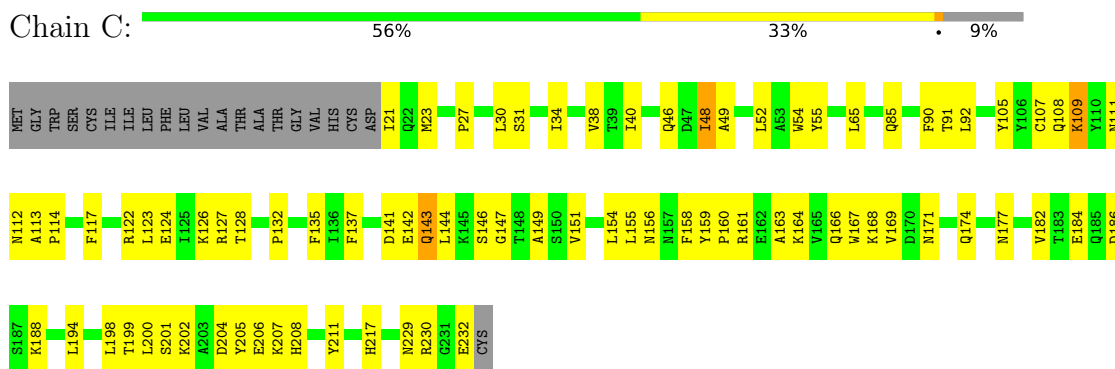
3 Residue-property plots [i](#)

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: PAM1.4, Heavy Chain



- Molecule 2: PAM1.4, light Chain



- Molecule 3: VAR2CSA



I1154	K1156	D1161	K1164	I1165	N1167	I1168	E1174	F1175	L1176	I1177	S1184	G1187	I1190	E1193	K1194	M1197	A1198	A1199	K1200	K1201	K1202	K1203	E1204	N1205	S1207	T1208	D1209	I1210	N1211	N1212	N1213	K1214	S1215	E1216	T1217	S1218	C1219	D1220	L1221	T1224	N1225	Y1226	I1227	Y1235	D1236																																		
GLN	GLY	THR	N1092	K1093	E1095	K1096	K1097	K1098	K1099	K1099	Y1100	K1101	L1102	W1103	K1106	N1107	D1108	Q1110	W1111	G1112	K1113	K1114	K1115	D1116	M1117	Y1118	N1119	K1120	F1121	R1122	S1123	K1124	Q1125	Y1126	Y1127	D1128	A1129	N1130	K1131	G1132	S1133	Q1134	N1135	K1136	M1137	V1138	V1139	S1140	L1141	S1142	N1143	F1146	F1147	S1148	C1149	W1150																							
V947	N948	V949	P950	S951	P952	L953	T956	P957	Y958	R959	Y960	C964	Q965	K966	K967	I968	P969	T970	N971	E972	C975	R978	K979	E980	N981	N982	N983	Q984	N985	S986	C987	G988	S989	A990	R991	T992	M993	K994	R995	G996	Y997	K998	N999	D1000	M1001	Y1002	E1003	L1004	C1005	K1006	S941	S942	T943	L944	V946																								
T862	S863	S864	T865	T866	N867	A868	A869	A870	S871	T872	D873	E874	I882	L889	T890	D891	L894	P897	S898	Y900	L901	S902	N903	Y904	L905	D906	T909	T926	T927	K914	T924	T925	E927	K928	N929	K931	E932	R933	D934	K935	S936	K937	S938	Q939	R953	S940	S941	S942	T943	L944	V946																												
R761	F762	L763	Q764	E765	W766	V767	F770	K779	I782	T783	K786	S787	E790	C795	E798	C799	K802	G803	K804	D805	E806	C807	C817	G825	P830	Q837	I838	R841	Y842	S843	R844	H845	T846	E847	K850	R851	N852	R853	K854	T857	K858	N859	C860	G861																																			
T694	A695	E696	Q697	D698	T699	S700	Y701	S702	S703	E706	L707	R708	E709	S710	W711	W712	N713	T714	N715	K716	K717	Y718	W720	T721	A722	W723	K724	H725	G726	A727	E728	N730	I731	T732	W735	ALA	ASP	GLY	SER	VAL	THR	GLY	THR	CYS	ASP	ASP	D749	I750	I753	P757																													
L614	A615	Q616	C617	L618	T619	V620	E624	K629	L630	R631	F632	P633	Q634	N635	K636	N637	S638	G639	N640	Y650	A653	D654	Y655	E658	O571	E572	E573	Y574	A575	N576	T577	I578	G579	L580	P581	P582	R583	T584	Q585	N586	L587	Y588	L589	G590	N591	F592	L592	P593	E600	K603	D604	K610																											
LYS	LEU	GLY	VAL	ARG	GLU	ASN	ASP	THR	ALA	ASN	ILE	ASP	GLU	ASP	THR	SER	LEU	SER	GLY	VAL	ASP	ASN	ILE	SER	CYS	GLY	VAL	Q496	D497	L498	L499	E504	N509	K510	R511	G512	L513	S514	N521	K522	N523	Q524	D525	ILE	SER	LYS	THR	ASN	K529	K530	L531	G532	F533	V534	K535	S537	L538	E538																					
D297	M298	E299	C319	C322	K323	D324	K325	K326	K327	K328	Y329	C332	V333	K334	K335	W336	K337	T338	E339	W340	F341	N342	Q343	E344	N345	H346	Q496	D497	L498	L499	E504	N509	K510	R511	G512	L513	S514	N521	K522	N523	Q524	D525	ILE	SER	LYS	THR	ASN	K529	K530	L531	G532	F533	V534	K535	S537	L538	E538																						
M1	D2	S3	T4	S5	T6	I7	A8	N9	K10	E11	E12	E13	Y14	W80	K81	C82	Q83	Q84	N85	D88	P93	N95	E94	I96	C97	F159	A160	D164	I165	L166	R167	G168	T169	D170	T175	M176	S177	M178	L179	P180	K181	R101	R102	E103	R104	L105	Y108	K29	A30	D31	P32	S33	E34	V35	E36	Y37	Y38	R39	D45	Y46	L47	K48	I51	T55	H58	S59	D60	Y64	D65	P66	C67	S148	E68	K69	M150	L155	E156	R157	S158
F159	A160	D164	I165	L166	R167	G168	T169	D170	T175	M176	S177	M178	L179	P180	K181	R101	R102	E103	R104	L105	Y108	K29	A30	D31	P32	S33	E34	V35	E36	Y37	Y38	R39	D45	Y46	L47	K48	I51	T55	H58	S59	D60	Y64	D65	P66	C67	S148	E68	K69	M150	L155	E156	R157	S158																										
V225	I226	R231	D234	L235	L236	L237	R238	T244	S247	D248	R249	K250	K251	N252	F253	E254	L255	C256	F187	A188	K189	C259	E260	N345	H346	Q496	D497	L498	L499	E504	N509	K510	R511	G512	L513	S514	N521	K522	N523	Q524	D525	ILE	SER	LYS	THR	ASN	K529	K530	L531	G532	F533	V534	K535	S537	L538	E538																							

TRP	K1960	I1756	I1638	K1525	P1442	Q1373	E1309	G1237
ASN	C1961	R1757	L1640	Y1526	T1443	E1374	L1310	F1240
ASP	T1962	Q1758	I1641	K1642	G1444	D1375	L1311	L1241
MET	E1963	K1642	K1642	Y1530	M1445	I1376	Y1312	P1241
LEU	V1964	D1761	L1655	L1538	D1446	K1377	E1313	G1242
LEU	Y1965	D1762	L1655	L1538	Q1449	K1378	Y1314	K1243
ARG	L1966	A1763	E1656	M1542	Q1449	I1379	H1315	E1246
GLY	E1967	M1764	T1657	Y1543	F1454	I1380	D1316	K1247
THR	H1968	Q1785	I1660	Y1543	F1454	E1381	T1317	K1248
TYR	V1969	Q1785	V1661	C1546	K1455	E1382	G1318	G1249
ASN	Q1972	R1769	A1662	C1546	E1456	G1383	T1319	W1249
LYS	L1973	Y1770	A1662	M1550	W1457	T1384	A1320	I1250
LYS	I1976	P1780	R1664	M1550	Q1460	P1385	I1321	C1251
GLY	D1977	L1781	E1665	M1556	Q1460	Q1386	L1322	K1252
VAL	D1977	L1781	E1666	Y1561	E1464	K1390	S1323	H1257
LEU	M1978	C1782	A1666	Y1561	R1465	I1391	K1324	K1260
ILE	A1979	M1783	Y1667	Y1564	R1466	K1328	M1325	M1261
ILE	V1988	I1788	Y1668	Y1564	L1467	G1329	G1329	G1262
PRO	I1989	I1788	L1669	Y1564	Y1467	G1395	K1332	
	K1981	G1789	W1670	D1569	E1468	S1396	K1333	I1265
	M1993	I1790	K1671	S1572	Q1470	S1397	M1334	P1266
	M1901	A1791	Q1672	I1573	M1471	T1398	R1267	R1268
	G1902	Q1794	C1688	I1573	E1472	E1399	T1269	Q1270
	M1903	Q1794	C1688	I1573	R1473	N1400	M1271	M1271
	I1912	R1797	R1692	Q1578	E1474	V1401	L1272	C1273
	G1913	W1799	Y1696	Y1581	A1475	A1403	G1274	V1274
	A1914	L1799	C1476	Y1581	A1476	A1403	E1275	G1275
	CYS	E1800	D1697	Y1582	T1477	M1404	G1276	E1276
	PHE	E1801	L1698	K1583	I1478	W1405	L1277	L1277
	ASP	S1919	I1701	Y1584	M1479	W1405	C1278	L1278
	ASP	F1814	I1701	Y1584	G1480	K1406	K1280	K1280
	GLN	K1818	D1706	E1588	E1483	I1408	S1281	S1281
	THR	K1818	K1589	K1590	K1484	E1409	Y1282	Y1282
	LYS	C1821	E1711	S1594	K1485	R1410	R1285	R1285
	MET	D1822	Y1712	L1595	K1485	E1411	I1352	I1352
	LYS	P1823	Y1715	L1595	K1489	M1412	D1353	D1353
	VAL	P1824	Y1715	C1596	K1490	W1413	Q1348	Q1348
	CYS	K1825	K1719	C1596	K1490	D1414	R1349	R1349
	ASP	R1826	L1720	K1599	K1496	A1415	S1360	S1360
	LEU	A1827	L1720	K1599	K1496	A1415	F1361	F1361
	ILE	D1828	M1721	K1612	Q1498	V1416	I1286	I1286
	ALA	T1829	E1722	K1612	G1499	R1417	S1286	S1286
	ASP	C1830	I1723	M1615	A1500	C1418	N1287	N1287
	ALA	G1831	S1726	G1616	C1501	A1419	I1288	I1288
	ILE	D1832	S1726	R1617	C1502	I1420	E1294	E1294
	GLY	M1833	S1726	R1617	K1503	K1422	L1295	L1295
	CYS	M1943	T1729	P1626	R1504	N1424	L1296	L1296
	LYS	C1838	T1729	R1627	K1504	K1425	G1360	G1360
	LYS	K1839	R1738	R1628	K1507	K1426	K1297	K1297
	LYS	A1843	W1741	Q1629	Y1508	N1427	E1298	E1298
	LYS	M1847	T1746	Q1630	Y1511	I1428	K1299	K1299
	ASP	Y1954	T1746	L1633	Y1511	N1428	I1300	I1300
	LEU	Y1954	T1746	Y1634	Y1511	M1364	M1301	M1301
	GLU	H1853	D1752	E1635	W1519	N1429	M1302	M1302
	LEU	I1854	R1753	L1636	W1519	A1430	A1303	A1303
	ASP	E1855	K1754	F1637	D1520	I1431	I1304	I1304
	GLU	M1959	I1755	P1638	K1522	E1436	H1368	H1368
						C1437	L1369	L1369
							G1370	G1370
							K1371	K1371
							L1372	L1372

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	50000	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	B	0.39	0/1688	0.53	0/2297
2	C	0.36	0/1665	0.51	0/2263
3	A	0.38	0/15370	0.57	2/20668 (0.0%)
All	All	0.38	0/18723	0.56	2/25228 (0.0%)

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
2	C	0	1
3	A	0	31
All	All	0	32

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	562	LYS	CB-CA-C	-7.20	95.99	110.40
3	A	1203	LYS	N-CA-C	6.14	127.59	111.00

There are no chirality outliers.

5 of 32 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
3	A	201	TYR	Peptide
3	A	236	LEU	Peptide
3	A	239	ARG	Peptide
3	A	37	TYR	Peptide
2	C	48	ILE	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	B	1650	0	1628	59	0
2	C	1631	0	1599	60	0
3	A	15071	0	14624	984	0
All	All	18352	0	17851	1093	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 30.

The worst 5 of 1093 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)
3:A:924:THR:HA	3:A:946:VAL:O	1.27	1.31
3:A:251:LYS:HB3	3:A:566:ASN:HB2	1.21	1.12
3:A:325:LYS:O	3:A:329:TYR:HB2	1.60	0.99
3:A:83:GLN:HB3	3:A:95:ASN:HD21	1.28	0.97
3:A:559:ILE:HG22	3:A:561:LYS:HG2	1.48	0.95

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	B	219/472 (46%)	205 (94%)	14 (6%)	0	100	100
2	C	210/233 (90%)	189 (90%)	21 (10%)	0	100	100
3	A	1843/2040 (90%)	1512 (82%)	305 (16%)	26 (1%)	11	43

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	2272/2745 (83%)	1906 (84%)	340 (15%)	26 (1%)	18	50

5 of 26 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	A	563	SER
3	A	566	ASN
3	A	683	LYS
3	A	690	LYS
3	A	699	THR

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	B	181/411 (44%)	180 (99%)	1 (1%)	86	95
2	C	184/201 (92%)	182 (99%)	2 (1%)	73	90
3	A	1674/1839 (91%)	1644 (98%)	30 (2%)	59	85
All	All	2039/2451 (83%)	2006 (98%)	33 (2%)	64	86

5 of 33 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	A	1156	LYS
3	A	1490	LYS
3	A	1980	ILE
3	A	561	LYS
3	A	559	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 11 such sidechains are listed below:

Mol	Chain	Res	Type
3	A	1400	ASN
3	A	1427	ASN

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Mol	Chain	Res	Type
3	A	1972	GLN
3	A	1957	HIS
3	A	1305	HIS

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](#)

There are no chain breaks in this entry.

6 Map visualisation

This section contains visualisations of the EMDB entry EMD-14438. 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.