



Full wwPDB EM Validation Report ⓘ

Jul 9, 2025 – 12:16 PM JST

PDB ID : 8H8F / pdb_00008h8f
EMDB ID : EMD-34545
Title : Structure of *Xenopus tropicalis* acid-sensitive outwardly rectifying channel ASOR (resting state)
Authors : Chi, P.; Wang, X.; Li, J.; Li, K.; Zhang, Y.; Geng, J.; Wu, J.; Deng, D.
Deposited on : 2022-10-22
Resolution : 3.48 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

EMDB validation analysis : **FAILED**
MolProbity : 4-5-2 with Phenix2.0rc1
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

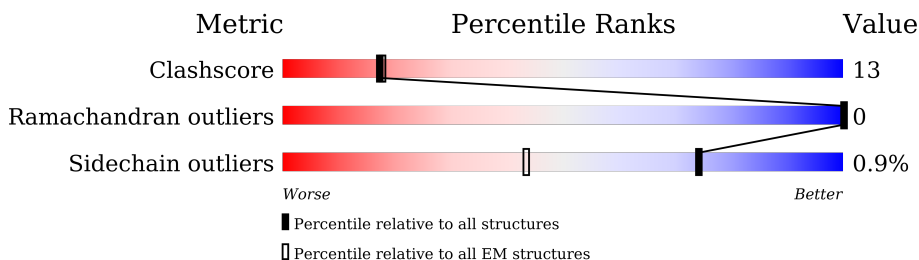
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.48 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	352	
1	B	352	
1	C	352	

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 6168 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.

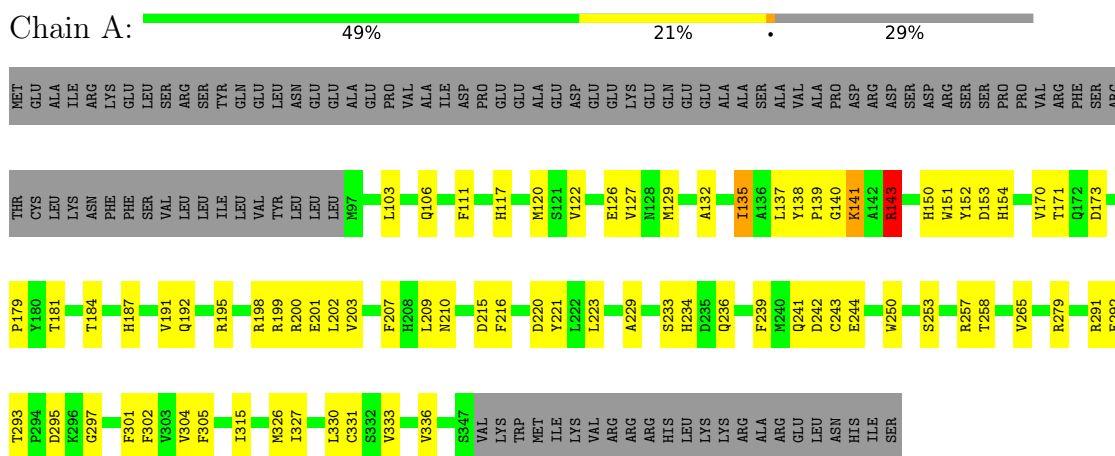
- Molecule 1 is a protein called Proton-activated chloride channel.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	251	Total	C	N	O	S	0	0
			2056	1330	337	378	11		
1	B	251	Total	C	N	O	S	0	0
			2056	1330	337	378	11		
1	C	251	Total	C	N	O	S	0	0
			2056	1330	337	378	11		

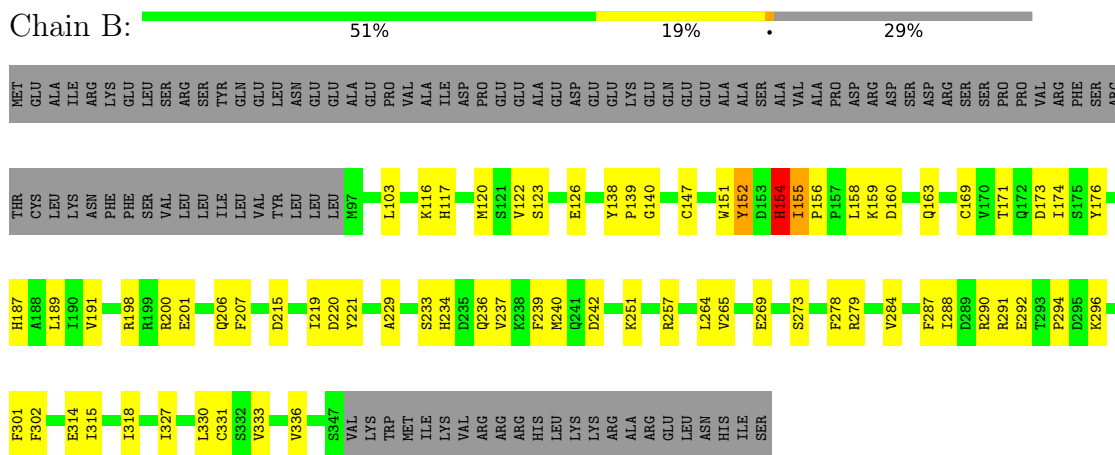
3 Residue-property plots

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.

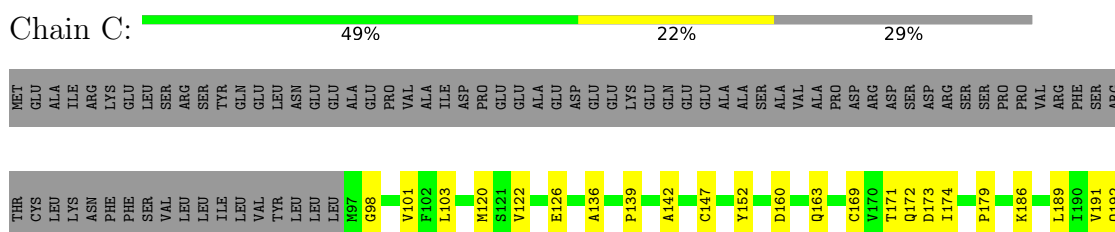
• Molecule 1: Proton-activated chloride channel



• Molecule 1: Proton-activated chloride channel



• Molecule 1: Proton-activated chloride channel



E281	R195	R198	R199	L202	F207	H208	L209	T212	K213	F216	I219	D220	Y221	L222	A229	F230	S233	H234	D235	Q236	V237	K238	F239	H240	Q241	D242	C243	E244	F247	S248	S249	W250	K251	F252	F256	R257	T258	W259	W262	V265	E269	S273	R279	Q280
V285	I288	E292	T293	P294	D295	K296	G297	D298	F301	F302	F305	I315	I327	L330	V333	F334	L335	V336	S347	VAL	LYS	TRP	MET	ILE	LYS	VAL	ARG	ARG	ARG	HIS	LEU	LYS	LYS	ARG	ALA	ARG	GLU	LEU	ASN	HIS	ILE	SER		

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	172281	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

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	0.22	0/2113	0.45	0/2861
1	B	0.24	0/2113	0.52	4/2861 (0.1%)
1	C	0.12	0/2113	0.32	0/2861
All	All	0.20	0/6339	0.44	4/8583 (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
1	A	0	1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	154	HIS	CA-C-N	-6.66	117.54	123.33
1	B	154	HIS	C-N-CA	-6.66	117.54	123.33
1	B	152	TYR	CA-C-N	-5.22	113.46	120.82
1	B	152	TYR	C-N-CA	-5.22	113.46	120.82

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	143	ARG	Sidechain

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	2056	0	2005	69	0
1	B	2056	0	2005	53	0
1	C	2056	0	2005	56	0
All	All	6168	0	6015	163	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 13.

All (163) 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:129:MET:HE2	1:A:195:ARG:HB3	1.61	0.81
1:C:281:GLU:N	1:C:281:GLU:OE1	2.14	0.81
1:A:140:GLY:HA2	1:A:187:HIS:NE2	1.99	0.78
1:C:171:THR:HG22	1:C:191:VAL:HG12	1.66	0.77
1:B:327:ILE:HD12	1:B:330:LEU:HD21	1.68	0.74
1:B:171:THR:HG22	1:B:191:VAL:HG12	1.69	0.73
1:B:159:LYS:HG2	1:B:206:GLN:OE1	1.92	0.69
1:A:111:PHE:CE1	1:A:326:MET:HE2	2.29	0.68
1:C:262:MET:HE1	1:C:305:PHE:HB3	1.76	0.67
1:A:257:ARG:HG3	1:C:216:PHE:CE2	2.30	0.66
1:B:126:GLU:OE1	1:B:198:ARG:NH2	2.27	0.66
1:B:234:HIS:O	1:B:236:GLN:NE2	2.29	0.65
1:C:220:ASP:OD1	1:C:221:TYR:N	2.31	0.64
1:C:265:VAL:HG21	1:C:279:ARG:HE	1.63	0.62
1:C:207:PHE:HB2	1:C:301:PHE:HB2	1.80	0.62
1:C:257:ARG:HG2	1:C:302:PHE:HB2	1.81	0.62
1:A:127:VAL:O	1:A:198:ARG:NH2	2.32	0.62
1:C:234:HIS:O	1:C:236:GLN:NE2	2.33	0.61
1:A:327:ILE:HD12	1:A:330:LEU:HD21	1.82	0.60
1:C:122:VAL:HG12	1:C:315:ILE:HG12	1.84	0.59
1:C:186:LYS:NZ	1:C:244:GLU:OE1	2.28	0.59
1:A:236:GLN:HA	1:A:239:PHE:HB3	1.85	0.58
1:B:336:VAL:HG23	1:C:335:LEU:HD22	1.85	0.58
1:A:295:ASP:N	1:A:295:ASP:OD1	2.35	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:152:TYR:HD1	1:C:199:ARG:HB3	1.69	0.57
1:A:291:ARG:NH2	1:C:212:THR:O	2.36	0.57
1:A:234:HIS:O	1:A:236:GLN:NE2	2.37	0.57
1:C:222:LEU:HD12	1:C:249:SER:HB3	1.86	0.57
1:B:207:PHE:HB2	1:B:301:PHE:HB2	1.85	0.57
1:A:221:TYR:HH	1:A:250:TRP:CD1	2.23	0.57
1:A:111:PHE:HE1	1:A:326:MET:HE2	1.70	0.56
1:B:237:VAL:O	1:B:240:MET:HE3	2.04	0.56
1:C:192:GLN:OE1	1:C:195:ARG:NH2	2.33	0.56
1:C:172:GLN:HG3	1:C:174:ILE:HD11	1.88	0.56
1:A:265:VAL:HG21	1:A:279:ARG:HE	1.72	0.55
1:A:135:ILE:HG23	1:A:223:LEU:CD2	2.37	0.55
1:C:327:ILE:HD12	1:C:330:LEU:HD21	1.88	0.55
1:B:152:TYR:O	1:B:200:ARG:NH2	2.40	0.55
1:B:120:MET:HG2	1:C:122:VAL:HG22	1.89	0.55
1:A:117:HIS:HE1	1:B:318:ILE:HG21	1.71	0.54
1:C:179:PRO:HD2	1:C:244:GLU:OE2	2.07	0.54
1:A:132:ALA:HB2	1:A:195:ARG:HG2	1.88	0.54
1:B:333:VAL:HA	1:B:336:VAL:HG12	1.90	0.54
1:B:103:LEU:HD23	1:B:333:VAL:HG21	1.89	0.53
1:B:173:ASP:HB3	1:B:189:LEU:HG	1.90	0.53
1:C:179:PRO:HD3	1:C:241:GLN:HG2	1.90	0.53
1:A:103:LEU:HD23	1:A:333:VAL:HG21	1.90	0.53
1:B:160:ASP:OD1	1:B:163:GLN:HB2	2.10	0.52
1:A:291:ARG:HH22	1:C:213:LYS:HA	1.75	0.52
1:B:257:ARG:HG2	1:B:302:PHE:HB2	1.92	0.52
1:B:155:ILE:HD12	1:B:156:PRO:HD2	1.92	0.52
1:A:137:LEU:O	1:A:139:PRO:HD3	2.10	0.52
1:A:326:MET:HG3	1:A:327:ILE:N	2.24	0.52
1:A:215:ASP:O	1:B:288:ILE:HG12	2.10	0.51
1:B:229:ALA:O	1:B:233:SER:OG	2.28	0.51
1:B:294:PRO:HB2	1:B:296:LYS:HG2	1.93	0.51
1:C:221:TYR:HH	1:C:250:TRP:CD1	2.29	0.50
1:A:179:PRO:HG3	1:A:241:GLN:HB3	1.92	0.50
1:A:257:ARG:HG2	1:A:302:PHE:HB2	1.94	0.50
1:C:229:ALA:O	1:C:233:SER:OG	2.30	0.50
1:A:150:HIS:HB2	1:A:202:LEU:HG	1.93	0.50
1:A:229:ALA:O	1:A:233:SER:OG	2.29	0.50
1:B:140:GLY:HA2	1:B:187:HIS:NE2	2.26	0.50
1:C:126:GLU:OE1	1:C:198:ARG:NH2	2.46	0.49
1:C:160:ASP:HB3	1:C:163:GLN:HE22	1.77	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:139:PRO:HA	1:C:219:ILE:HD12	1.93	0.49
1:A:239:PHE:HA	1:A:242:ASP:OD1	2.12	0.48
1:C:243:CYS:O	1:C:247:PHE:N	2.38	0.48
1:A:297:GLY:O	1:B:290:ARG:NH1	2.47	0.48
1:A:117:HIS:CE1	1:B:318:ILE:HG21	2.48	0.48
1:A:111:PHE:O	1:A:111:PHE:CD2	2.66	0.48
1:A:333:VAL:HA	1:A:336:VAL:HG12	1.95	0.48
1:B:220:ASP:OD1	1:B:221:TYR:N	2.47	0.48
1:A:173:ASP:OD1	1:A:173:ASP:N	2.47	0.47
1:A:103:LEU:O	1:A:106:GLN:HG3	2.15	0.47
1:A:126:GLU:HG2	1:A:198:ARG:HH22	1.79	0.47
1:B:176:TYR:CD1	1:B:240:MET:HE2	2.49	0.47
1:B:122:VAL:HG12	1:B:315:ILE:HG12	1.96	0.47
1:A:135:ILE:HG23	1:A:223:LEU:HD22	1.97	0.47
1:B:269:GLU:OE2	1:B:273:SER:OG	2.32	0.47
1:C:292:GLU:HG3	1:C:294:PRO:HD3	1.96	0.47
1:C:103:LEU:HD13	1:C:333:VAL:HG21	1.98	0.46
1:C:208:HIS:HE1	1:C:298:ASP:HB3	1.80	0.46
1:B:265:VAL:HG21	1:B:279:ARG:HE	1.80	0.46
1:B:220:ASP:HA	1:B:251:LYS:HA	1.97	0.46
1:B:292:GLU:HG3	1:B:294:PRO:HD3	1.96	0.46
1:A:152:TYR:HD1	1:A:199:ARG:HB3	1.80	0.46
1:A:170:VAL:HB	1:A:192:GLN:HB3	1.96	0.46
1:A:207:PHE:HB2	1:A:301:PHE:HB2	1.97	0.46
1:A:141:LYS:HA	1:A:141:LYS:HD2	1.49	0.45
1:B:138:TYR:HD2	1:B:220:ASP:HB3	1.81	0.45
1:C:219:ILE:HB	1:C:252:PHE:CZ	2.51	0.45
1:C:258:THR:O	1:C:258:THR:OG1	2.32	0.45
1:A:241:GLN:O	1:A:244:GLU:HG3	2.16	0.45
1:A:253:SER:HB3	1:B:284:VAL:O	2.16	0.45
1:B:147:CYS:HB3	1:B:169:CYS:HB2	1.58	0.45
1:C:173:ASP:HB3	1:C:189:LEU:HG	1.98	0.45
1:A:153:ASP:O	1:A:200:ARG:NH1	2.49	0.45
1:A:292:GLU:HG2	1:A:293:THR:N	2.32	0.45
1:C:333:VAL:HA	1:C:336:VAL:HG12	1.98	0.45
1:B:151:TRP:HA	1:B:201:GLU:HG3	1.99	0.45
1:B:291:ARG:N	1:B:291:ARG:HD2	2.31	0.45
1:A:111:PHE:CE1	1:A:326:MET:CE	2.99	0.44
1:A:243:CYS:SG	1:A:244:GLU:N	2.90	0.44
1:A:336:VAL:HG21	1:B:331:CYS:SG	2.57	0.44
1:A:126:GLU:OE1	1:A:198:ARG:NH1	2.50	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:135:ILE:HG21	1:A:305:PHE:CZ	2.52	0.44
1:A:151:TRP:HA	1:A:201:GLU:HG3	1.98	0.44
1:B:154:HIS:HA	1:B:200:ARG:HH12	1.82	0.44
1:C:202:LEU:HD22	1:C:259:TRP:CH2	2.52	0.44
1:C:294:PRO:HB2	1:C:296:LYS:HG2	2.00	0.44
1:C:220:ASP:HA	1:C:251:LYS:HA	1.99	0.44
1:A:202:LEU:HB2	1:A:304:VAL:HG13	2.00	0.44
1:A:209:LEU:HD12	1:A:210:ASN:N	2.33	0.44
1:B:155:ILE:HG13	1:B:156:PRO:O	2.17	0.44
1:C:202:LEU:C	1:C:202:LEU:HD12	2.42	0.44
1:A:122:VAL:HG12	1:A:315:ILE:HG12	1.99	0.44
1:B:154:HIS:CD2	1:B:154:HIS:H	2.33	0.44
1:C:136:ALA:HB3	1:C:222:LEU:HB3	2.00	0.44
1:A:138:TYR:HD2	1:A:220:ASP:HB2	1.81	0.44
1:B:330:LEU:O	1:B:333:VAL:HG12	2.18	0.44
1:A:138:TYR:CD2	1:A:220:ASP:HB2	2.52	0.43
1:A:181:THR:OG1	1:A:184:THR:OG1	2.28	0.43
1:A:154:HIS:HA	1:A:200:ARG:NH1	2.33	0.43
1:C:147:CYS:HB3	1:C:169:CYS:HB2	1.53	0.43
1:C:240:MET:HE3	1:C:240:MET:HB3	1.81	0.43
1:A:203:VAL:HG22	1:A:305:PHE:HB2	2.01	0.43
1:B:176:TYR:CD1	1:B:240:MET:HG3	2.52	0.43
1:C:152:TYR:CD1	1:C:199:ARG:HB3	2.52	0.43
1:A:137:LEU:HD23	1:A:221:TYR:HB3	2.00	0.43
1:A:258:THR:O	1:A:258:THR:OG1	2.35	0.43
1:B:123:SER:N	1:B:314:GLU:O	2.50	0.43
1:B:174:ILE:HB	1:B:176:TYR:CE2	2.54	0.43
1:C:139:PRO:HG3	1:C:189:LEU:HD22	2.00	0.43
1:B:139:PRO:HG3	1:B:189:LEU:HD22	2.01	0.43
1:A:143:ARG:H	1:A:143:ARG:HG3	1.64	0.42
1:C:173:ASP:OD1	1:C:173:ASP:N	2.43	0.42
1:B:139:PRO:HA	1:B:219:ILE:HD13	2.02	0.42
1:A:120:MET:HE1	1:C:120:MET:HE1	2.00	0.42
1:B:264:LEU:HB2	1:B:278:PHE:HE1	1.84	0.42
1:A:171:THR:HG22	1:A:191:VAL:HG12	2.01	0.42
1:A:331:CYS:SG	1:C:336:VAL:HG21	2.59	0.42
1:A:234:HIS:C	1:A:236:GLN:HE21	2.27	0.42
1:C:230:PHE:HD2	1:C:239:PHE:HD2	1.68	0.42
1:A:216:PHE:CE1	1:B:287:PHE:HB2	2.54	0.42
1:C:160:ASP:O	1:C:163:GLN:NE2	2.53	0.41
1:B:116:LYS:HG3	1:B:117:HIS:CD2	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:111:PHE:CD2	1:A:111:PHE:C	2.97	0.41
1:A:150:HIS:O	1:A:201:GLU:HA	2.21	0.41
1:B:176:TYR:CG	1:B:240:MET:HE2	2.56	0.41
1:B:239:PHE:HA	1:B:242:ASP:OD1	2.20	0.41
1:B:234:HIS:C	1:B:236:GLN:HE21	2.27	0.41
1:B:215:ASP:HA	1:C:288:ILE:HD11	2.03	0.41
1:A:120:MET:C	1:A:120:MET:SD	3.04	0.41
1:A:179:PRO:HG2	1:A:244:GLU:OE2	2.21	0.41
1:A:330:LEU:O	1:A:333:VAL:HG12	2.20	0.41
1:C:142:ALA:HB2	1:C:209:LEU:HB2	2.02	0.41
1:C:269:GLU:OE2	1:C:273:SER:OG	2.37	0.41
1:C:237:VAL:O	1:C:240:MET:HE3	2.21	0.41
1:C:330:LEU:O	1:C:333:VAL:HG12	2.21	0.41
1:B:236:GLN:O	1:B:239:PHE:HB3	2.21	0.40
1:C:98:GLY:HA2	1:C:101:VAL:HG12	2.03	0.40
1:C:256:PHE:HB2	1:C:285:VAL:O	2.22	0.40

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	249/352 (71%)	241 (97%)	8 (3%)	0	100	100
1	B	249/352 (71%)	238 (96%)	11 (4%)	0	100	100
1	C	249/352 (71%)	243 (98%)	6 (2%)	0	100	100
All	All	747/1056 (71%)	722 (97%)	25 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	229/321 (71%)	226 (99%)	3 (1%)	65	80
1	B	229/321 (71%)	226 (99%)	3 (1%)	65	80
1	C	229/321 (71%)	229 (100%)	0	100	100
All	All	687/963 (71%)	681 (99%)	6 (1%)	74	85

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	135	ILE
1	A	141	LYS
1	A	143	ARG
1	B	154	HIS
1	B	155	ILE
1	B	158	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	236	GLN
1	B	236	GLN
1	C	128	ASN
1	C	163	GLN
1	C	274	GLN

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 oligosaccharides 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.