



Full wwPDB EM Model Validation Report

Jul 21, 2020 – 12:15 PM EDT


PDB ID : 6XQN
EMDB ID : EMD-22290
Title : Structure of a mitochondrial calcium uniporter holocomplex (MICU1, MICU2, MCU, EMRE) in low Ca²⁺
Authors : Long, S.B.; Wang, C.; Baradaran, R.; Jacewicz, A.; Delgado, B.
Deposited on : 2020-07-09
Resolution : 3.30 Å(reported)

This is a Full wwPDB EM Model Validation Report for a publicly released PDB/EMDB 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:

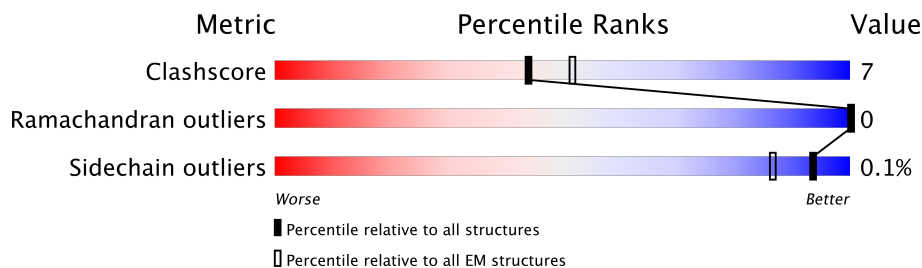
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.13

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 3.30 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 on 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	E	70	
1	G	70	
1	H	70	
2	A	203	
2	B	203	
2	C	203	
2	D	203	
3	I	394	
4	J	383	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 9433 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 Protein EMRE homolog, mitochondrial-like Protein.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
1	E	31	223	147	38	38	0	0
1	G	25	174	118	27	29	0	0
1	H	26	186	127	29	30	0	0

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	39	GLY	-	expression tag	UNP D6X268
E	40	PRO	-	expression tag	UNP D6X268
E	41	THR	-	expression tag	UNP D6X268
E	42	ALA	-	expression tag	UNP D6X268
E	43	ALA	-	expression tag	UNP D6X268
E	44	ALA	-	expression tag	UNP D6X268
E	45	LEU	-	expression tag	UNP D6X268
E	46	GLU	-	expression tag	UNP D6X268
G	39	GLY	-	expression tag	UNP D6X268
G	40	PRO	-	expression tag	UNP D6X268
G	41	THR	-	expression tag	UNP D6X268
G	42	ALA	-	expression tag	UNP D6X268
G	43	ALA	-	expression tag	UNP D6X268
G	44	ALA	-	expression tag	UNP D6X268
G	45	LEU	-	expression tag	UNP D6X268
G	46	GLU	-	expression tag	UNP D6X268
H	39	GLY	-	expression tag	UNP D6X268
H	40	PRO	-	expression tag	UNP D6X268
H	41	THR	-	expression tag	UNP D6X268
H	42	ALA	-	expression tag	UNP D6X268
H	43	ALA	-	expression tag	UNP D6X268
H	44	ALA	-	expression tag	UNP D6X268
H	45	LEU	-	expression tag	UNP D6X268
H	46	GLU	-	expression tag	UNP D6X268

- Molecule 2 is a protein called Calcium uniporter protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	A	154	1166	762	194	206	4	0	0
2	B	151	1128	738	185	201	4	0	0
2	C	154	1156	757	191	204	4	0	0
2	D	151	1137	745	186	202	4	0	0

There are 68 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	159	GLY	-	expression tag	UNP D6WIX5
A	160	PRO	-	expression tag	UNP D6WIX5
A	161	THR	-	expression tag	UNP D6WIX5
A	162	ALA	-	expression tag	UNP D6WIX5
A	163	ALA	-	expression tag	UNP D6WIX5
A	164	ALA	-	expression tag	UNP D6WIX5
A	165	LEU	-	expression tag	UNP D6WIX5
A	352	GLY	-	expression tag	UNP D6WIX5
A	353	GLY	-	expression tag	UNP D6WIX5
A	354	TRP	-	expression tag	UNP D6WIX5
A	355	SER	-	expression tag	UNP D6WIX5
A	356	HIS	-	expression tag	UNP D6WIX5
A	357	PRO	-	expression tag	UNP D6WIX5
A	358	GLN	-	expression tag	UNP D6WIX5
A	359	PHE	-	expression tag	UNP D6WIX5
A	360	GLU	-	expression tag	UNP D6WIX5
A	361	LYS	-	expression tag	UNP D6WIX5
B	159	GLY	-	expression tag	UNP D6WIX5
B	160	PRO	-	expression tag	UNP D6WIX5
B	161	THR	-	expression tag	UNP D6WIX5
B	162	ALA	-	expression tag	UNP D6WIX5
B	163	ALA	-	expression tag	UNP D6WIX5
B	164	ALA	-	expression tag	UNP D6WIX5
B	165	LEU	-	expression tag	UNP D6WIX5
B	352	GLY	-	expression tag	UNP D6WIX5
B	353	GLY	-	expression tag	UNP D6WIX5
B	354	TRP	-	expression tag	UNP D6WIX5
B	355	SER	-	expression tag	UNP D6WIX5
B	356	HIS	-	expression tag	UNP D6WIX5
B	357	PRO	-	expression tag	UNP D6WIX5

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Chain	Residue	Modelled	Actual	Comment	Reference
B	358	GLN	-	expression tag	UNP D6WIX5
B	359	PHE	-	expression tag	UNP D6WIX5
B	360	GLU	-	expression tag	UNP D6WIX5
B	361	LYS	-	expression tag	UNP D6WIX5
C	159	GLY	-	expression tag	UNP D6WIX5
C	160	PRO	-	expression tag	UNP D6WIX5
C	161	THR	-	expression tag	UNP D6WIX5
C	162	ALA	-	expression tag	UNP D6WIX5
C	163	ALA	-	expression tag	UNP D6WIX5
C	164	ALA	-	expression tag	UNP D6WIX5
C	165	LEU	-	expression tag	UNP D6WIX5
C	352	GLY	-	expression tag	UNP D6WIX5
C	353	GLY	-	expression tag	UNP D6WIX5
C	354	TRP	-	expression tag	UNP D6WIX5
C	355	SER	-	expression tag	UNP D6WIX5
C	356	HIS	-	expression tag	UNP D6WIX5
C	357	PRO	-	expression tag	UNP D6WIX5
C	358	GLN	-	expression tag	UNP D6WIX5
C	359	PHE	-	expression tag	UNP D6WIX5
C	360	GLU	-	expression tag	UNP D6WIX5
C	361	LYS	-	expression tag	UNP D6WIX5
D	159	GLY	-	expression tag	UNP D6WIX5
D	160	PRO	-	expression tag	UNP D6WIX5
D	161	THR	-	expression tag	UNP D6WIX5
D	162	ALA	-	expression tag	UNP D6WIX5
D	163	ALA	-	expression tag	UNP D6WIX5
D	164	ALA	-	expression tag	UNP D6WIX5
D	165	LEU	-	expression tag	UNP D6WIX5
D	352	GLY	-	expression tag	UNP D6WIX5
D	353	GLY	-	expression tag	UNP D6WIX5
D	354	TRP	-	expression tag	UNP D6WIX5
D	355	SER	-	expression tag	UNP D6WIX5
D	356	HIS	-	expression tag	UNP D6WIX5
D	357	PRO	-	expression tag	UNP D6WIX5
D	358	GLN	-	expression tag	UNP D6WIX5
D	359	PHE	-	expression tag	UNP D6WIX5
D	360	GLU	-	expression tag	UNP D6WIX5
D	361	LYS	-	expression tag	UNP D6WIX5

- Molecule 3 is a protein called Calcium uptake protein 1, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	I	307	2243	1451	380	401	11	0	0

There are 11 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
I	86	GLY	-	expression tag	UNP Q9BPX6
I	87	PRO	-	expression tag	UNP Q9BPX6
I	88	THR	-	expression tag	UNP Q9BPX6
I	89	ALA	-	expression tag	UNP Q9BPX6
I	90	ALA	-	expression tag	UNP Q9BPX6
I	91	ALA	-	expression tag	UNP Q9BPX6
I	92	LEU	-	expression tag	UNP Q9BPX6
I	93	GLU	-	expression tag	UNP Q9BPX6
I	477	SER	-	expression tag	UNP Q9BPX6
I	478	ASN	-	expression tag	UNP Q9BPX6
I	479	TRP	-	expression tag	UNP Q9BPX6

- Molecule 4 is a protein called Calcium uptake protein 2, mitochondrial.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	J	291	2019	1325	331	353	10	0	0

- Molecule 5 is CALCIUM ION (three-letter code: CA) (formula: Ca).

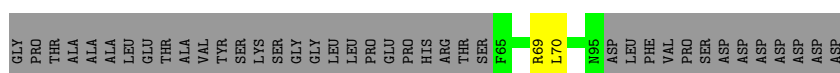
Mol	Chain	Residues	Atoms		AltConf
5	B	1	Total	Ca	0
			1	1	

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.

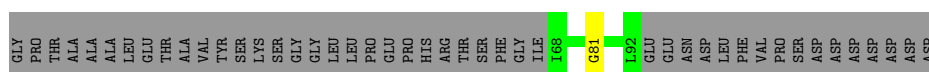
- Molecule 1: Protein EMRE homolog, mitochondrial-like Protein

Chain E:  41% 56%



- Molecule 1: Protein EMRE homolog, mitochondrial-like Protein

Chain G:  34% 64%



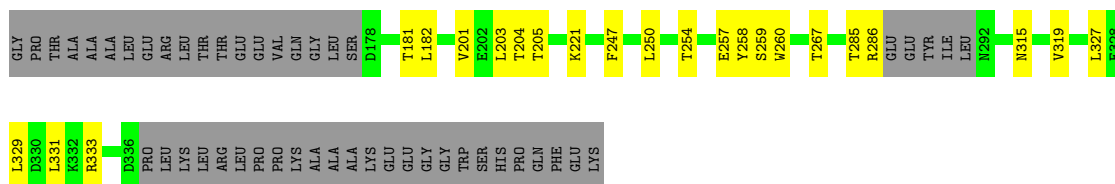
- Molecule 1: Protein EMRE homolog, mitochondrial-like Protein

Chain H:  37% 63%



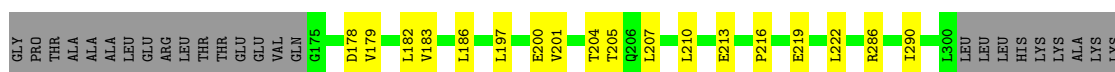
- Molecule 2: Calcium uniporter protein

Chain A:  65% 11% 24%



- Molecule 2: Calcium uniporter protein

Chain B:  62% 12% 26%



GLN
ALA
GLY
LYS
GLY
LEU
PHE

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	350160	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 ($e^-/\text{\AA}^2$)	71	Depositor
Minimum defocus (nm)	-1000	Depositor
Maximum defocus (nm)	-3000	Depositor
Magnification	22500	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

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	E	0.26	0/224	0.47	0/304
1	G	0.24	0/175	0.51	0/240
1	H	0.26	0/187	0.49	0/255
2	A	0.31	0/1189	0.43	0/1625
2	B	0.29	0/1150	0.42	0/1574
2	C	0.32	0/1179	0.43	0/1613
2	D	0.32	0/1159	0.44	0/1586
3	I	0.35	0/2283	0.48	0/3092
4	J	0.31	0/2065	0.48	0/2814
All	All	0.32	0/9611	0.46	0/13103

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	E	223	0	244	2	0
1	G	174	0	192	1	0
1	H	186	0	214	0	0
2	A	1166	0	1096	15	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	1128	0	1038	18	0
2	C	1156	0	1081	18	0
2	D	1137	0	1060	25	0
3	I	2243	0	2057	23	0
4	J	2019	0	1670	32	0
5	B	1	0	0	0	0
All	All	9433	0	8652	124	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 7.

All (124) 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)
2:B:210:LEU:HB2	2:B:324:ILE:HD13	1.67	0.76
2:B:320:LEU:HD13	2:C:329:LEU:HD21	1.74	0.69
2:D:210:LEU:HB3	2:D:324:ILE:HG12	1.76	0.68
3:I:370:PHE:HB2	3:I:406:VAL:HG21	1.81	0.63
3:I:249:ILE:HD11	4:J:341:ALA:HB2	1.83	0.60
4:J:319:LYS:O	4:J:323:HIS:ND1	2.26	0.60
3:I:212:LEU:HD22	3:I:303:LEU:HD11	1.83	0.59
2:A:257:GLU:HB3	2:A:258:TYR:HD1	1.70	0.57
2:C:246:GLN:NE2	2:C:274:THR:OG1	2.35	0.57
4:J:163:TYR:CE2	4:J:167:LEU:HD11	2.41	0.55
2:C:210:LEU:HD22	2:C:320:LEU:HD11	1.89	0.55
3:I:399:VAL:O	3:I:403:VAL:HG22	2.06	0.55
2:A:285:THR:HG23	2:A:286:ARG:HG3	1.89	0.54
2:B:201:VAL:O	2:B:205:THR:HG23	2.06	0.54
3:I:166:LEU:O	3:I:170:GLN:HB2	2.08	0.54
2:D:201:VAL:O	2:D:205:THR:HG23	2.08	0.54
4:J:108:ASP:O	4:J:112:SER:OG	2.24	0.54
2:D:200:GLU:O	2:D:204:THR:HG23	2.08	0.53
3:I:413:CYS:HA	3:I:416:VAL:HG22	1.89	0.53
3:I:411:HIS:O	3:I:415:VAL:HG23	2.09	0.53
4:J:200:LEU:O	4:J:204:ILE:HG13	2.09	0.53
4:J:371:PHE:CD1	4:J:382:LEU:HD13	2.44	0.53
2:B:179:VAL:O	2:B:183:VAL:HG23	2.09	0.52
3:I:194:ILE:HD11	3:I:299:PHE:CE2	2.44	0.52
4:J:345:VAL:O	4:J:381:CYS:HA	2.09	0.52
3:I:236:GLY:O	3:I:292:THR:HA	2.09	0.52
4:J:203:ILE:HG13	4:J:204:ILE:N	2.24	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:197:LEU:O	2:B:201:VAL:HG23	2.09	0.52
4:J:366:ILE:O	4:J:370:VAL:HG23	2.10	0.52
2:B:178:ASP:O	2:B:182:LEU:HG	2.10	0.52
3:I:365:GLU:O	3:I:369:THR:HG23	2.10	0.51
4:J:96:LEU:HB2	4:J:103:TYR:HB2	1.91	0.51
4:J:303:VAL:HG22	4:J:307:LEU:HD23	1.92	0.51
3:I:331:LEU:HD11	3:I:437:MET:SD	2.51	0.50
2:C:201:VAL:HA	2:C:204:THR:HG22	1.92	0.50
2:B:207:LEU:HD23	2:B:324:ILE:HD11	1.95	0.49
4:J:287:LEU:HD21	4:J:374:PHE:HE1	1.77	0.49
2:D:253:LEU:HB3	2:D:263:MET:SD	2.53	0.48
2:C:179:VAL:O	2:C:183:VAL:HG22	2.13	0.48
3:I:224:GLU:O	3:I:228:LYS:HG2	2.14	0.48
2:A:201:VAL:HA	2:A:204:THR:HG22	1.96	0.48
2:C:279:TYR:HE2	2:D:240:LEU:HB2	1.77	0.48
2:A:247:PHE:HD2	2:D:272:TYR:CD1	2.32	0.48
2:A:315:ASN:O	2:A:319:VAL:HG12	2.14	0.47
4:J:162:GLU:OE2	4:J:232:THR:HG21	2.14	0.47
2:A:201:VAL:O	2:A:205:THR:HG22	2.15	0.47
2:D:263:MET:O	2:D:267:THR:HG23	2.14	0.47
4:J:232:THR:HG23	4:J:235:GLN:H	1.80	0.47
2:C:327:LEU:HA	2:C:327:LEU:HD23	1.74	0.47
3:I:322:ILE:HG22	3:I:359:LEU:O	2.15	0.47
2:A:221:LYS:HB3	2:A:221:LYS:HE2	1.76	0.47
2:B:316:GLN:HA	2:B:319:VAL:HG12	1.97	0.47
1:E:70:LEU:HD11	2:D:280:ALA:HB1	1.97	0.47
3:I:218:THR:HG21	3:I:250:ILE:HG23	1.97	0.47
3:I:324:GLU:HG3	3:I:355:GLU:HA	1.97	0.47
2:B:213:GLU:O	2:B:216:PRO:HD2	2.14	0.47
4:J:105:THR:HB	4:J:154:ASP:HA	1.97	0.47
2:D:246:GLN:HE22	2:D:274:THR:HG1	1.55	0.47
3:I:339:SER:HA	3:I:342:LEU:HD13	1.97	0.46
2:B:186:LEU:HB2	2:D:182:LEU:HD22	1.98	0.46
2:B:320:LEU:CD1	2:C:329:LEU:HD21	2.45	0.46
2:D:213:GLU:HG2	2:D:320:LEU:HD21	1.97	0.46
4:J:271:PHE:CE1	4:J:286:TRP:HD1	2.33	0.46
2:D:210:LEU:HD22	2:D:320:LEU:HD11	1.97	0.46
4:J:101:GLU:OE2	4:J:102:TYR:N	2.48	0.46
4:J:387:PHE:CZ	4:J:391:LEU:HD11	2.52	0.45
1:E:69:ARG:HD2	1:E:69:ARG:HA	1.82	0.45
2:A:181:THR:HG23	2:A:182:LEU:HD12	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:210:LEU:HD12	2:C:327:LEU:HD12	1.97	0.45
2:C:215:LEU:HD12	2:C:215:LEU:HA	1.83	0.45
2:B:286:ARG:O	2:B:290:ILE:HG12	2.17	0.45
2:C:221:LYS:HB3	2:C:221:LYS:HE2	1.88	0.45
2:D:264:GLU:N	2:D:265:PRO:HD2	2.31	0.45
3:I:381:LEU:HA	3:I:381:LEU:HD23	1.83	0.45
2:B:201:VAL:O	2:B:204:THR:OG1	2.25	0.44
2:B:326:LYS:HB2	2:B:326:LYS:HE3	1.78	0.44
2:C:201:VAL:O	2:C:205:THR:HG23	2.18	0.44
2:D:326:LYS:HB2	2:D:326:LYS:HE3	1.71	0.44
4:J:278:MET:HG2	4:J:279:ARG:H	1.81	0.44
2:C:250:LEU:HA	2:C:250:LEU:HD23	1.85	0.44
2:B:313:ASP:HB3	2:B:316:GLN:HG2	1.98	0.44
2:A:329:LEU:HG	2:A:333:ARG:NH2	2.32	0.43
3:I:321:ARG:NH1	3:I:358:GLY:O	2.52	0.43
3:I:380:ALA:HB1	4:J:183:MET:SD	2.58	0.43
3:I:198:LEU:O	3:I:277:ALA:HB3	2.18	0.43
4:J:280:LYS:HZ1	4:J:365:ASN:HB2	1.84	0.43
4:J:285:GLU:O	4:J:289:PHE:HB2	2.18	0.43
4:J:325:THR:O	4:J:328:LEU:HG	2.19	0.43
2:D:177:SER:O	2:D:181:THR:HG23	2.18	0.43
4:J:365:ASN:OD1	4:J:366:ILE:N	2.50	0.43
4:J:374:PHE:HZ	4:J:390:VAL:HG11	1.83	0.43
4:J:178:HIS:HB2	4:J:249:TYR:OH	2.19	0.43
2:B:200:GLU:O	2:B:204:THR:HG23	2.19	0.43
4:J:333:ILE:O	4:J:337:MET:HG3	2.18	0.43
4:J:163:TYR:CZ	4:J:167:LEU:HD11	2.54	0.42
2:C:279:TYR:HD2	2:D:240:LEU:HD13	1.84	0.42
2:D:320:LEU:O	2:D:324:ILE:HG13	2.20	0.42
2:A:257:GLU:HB3	2:A:258:TYR:CD1	2.50	0.42
2:D:286:ARG:O	2:D:290:ILE:HG12	2.20	0.42
2:C:221:LYS:HB2	2:C:312:PHE:CE1	2.55	0.42
1:G:81:GLY:O	2:C:249:ILE:HG12	2.20	0.42
4:J:230:ILE:HD12	4:J:230:ILE:H	1.85	0.42
2:A:250:LEU:O	2:A:254:THR:HG23	2.19	0.41
2:B:331:LEU:HD12	2:B:331:LEU:HA	1.82	0.41
3:I:108:ASP:N	3:I:108:ASP:OD1	2.51	0.41
4:J:298:ILE:HG13	4:J:299:TYR:N	2.34	0.41
2:A:203:LEU:HD21	2:A:331:LEU:HA	2.02	0.41
2:A:250:LEU:HD13	2:A:267:THR:HG22	2.03	0.41
2:D:210:LEU:HD23	2:D:210:LEU:HA	1.72	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:188:GLU:O	2:D:192:VAL:HG13	2.20	0.41
3:I:241:GLU:O	3:I:245:GLN:HG3	2.21	0.41
2:C:222:LEU:HD12	2:C:222:LEU:HA	1.91	0.41
2:D:259:SER:OG	2:D:260:TRP:N	2.53	0.41
4:J:351:LYS:HB2	4:J:351:LYS:HE3	1.60	0.41
2:A:327:LEU:HD12	2:A:327:LEU:HA	1.80	0.41
2:D:332:LYS:HE3	2:D:332:LYS:HB2	1.79	0.41
3:I:416:VAL:O	3:I:420:PHE:HB2	2.21	0.41
2:D:247:PHE:C	2:D:247:PHE:CD1	2.94	0.41
2:B:219:GLU:O	2:B:222:LEU:HG	2.21	0.41
2:C:186:LEU:O	2:C:190:LEU:HG	2.20	0.40
2:A:259:SER:OG	2:A:260:TRP:N	2.53	0.40
2:D:179:VAL:O	2:D:183:VAL:HG23	2.21	0.40
2:D:253:LEU:HA	2:D:253:LEU:HD23	1.79	0.40
4:J:96:LEU:HD11	4:J:105:THR:HG22	2.02	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	E	29/70 (41%)	29 (100%)	0	0	100	100
1	G	23/70 (33%)	23 (100%)	0	0	100	100
1	H	24/70 (34%)	24 (100%)	0	0	100	100
2	A	150/203 (74%)	146 (97%)	4 (3%)	0	100	100
2	B	147/203 (72%)	145 (99%)	2 (1%)	0	100	100
2	C	150/203 (74%)	146 (97%)	4 (3%)	0	100	100
2	D	147/203 (72%)	145 (99%)	2 (1%)	0	100	100
3	I	299/394 (76%)	288 (96%)	11 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	J	287/383 (75%)	278 (97%)	9 (3%)	0	100	100
All	All	1256/1799 (70%)	1224 (98%)	32 (2%)	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	E	23/57 (40%)	23 (100%)	0	100	100
1	G	18/57 (32%)	18 (100%)	0	100	100
1	H	20/57 (35%)	20 (100%)	0	100	100
2	A	107/177 (60%)	107 (100%)	0	100	100
2	B	100/177 (56%)	100 (100%)	0	100	100
2	C	105/177 (59%)	105 (100%)	0	100	100
2	D	103/177 (58%)	103 (100%)	0	100	100
3	I	205/346 (59%)	204 (100%)	1 (0%)	88	93
4	J	156/345 (45%)	156 (100%)	0	100	100
All	All	837/1570 (53%)	836 (100%)	1 (0%)	93	97

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	I	129	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
3	I	397	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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

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 [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.