



# Full wwPDB/EMDatabank EM Map/Model Validation Report ⓘ

Mar 2, 2017 – 11:35 am GMT

PDB ID : 3J91  
EMDB ID: : EMD-6200  
Title : Cryo-electron microscopy of Enterovirus 71 (EV71) procapsid in complex with Fab fragments of neutralizing antibody 22A12  
Authors : Shingler, K.L.; Cifuentes, J.O.; Ashley, R.E.; Makhov, A.M.; Conway, J.F.; Hafenstein, S.  
Deposited on : 2014-11-24  
Resolution : 8.80 Å (reported)  
Based on PDB ID : 4GMP

This is a Full wwPDB/EMDatabank EM Map/Model Validation Report  
for a publicly released PDB/EMDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<http://wwpdb.org/validation/2016/EMValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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MolProbity : 4.02b-467  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : recalc29047

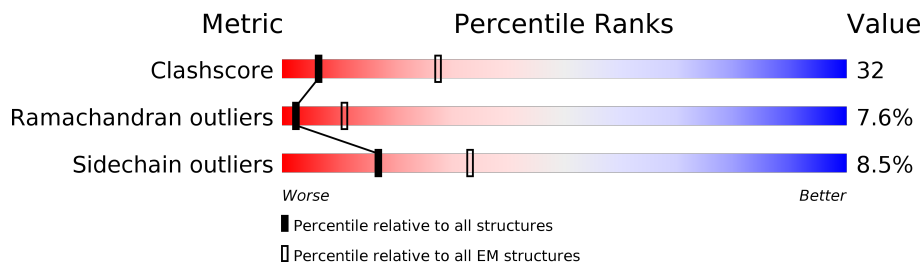
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 8.80 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	125131	1336
Ramachandran outliers	121729	1120
Sidechain outliers	121581	1026

The table below summarises the geometric issues observed across the polymeric chains. The red, orange, yellow and green segments on the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	0	323	
2	1	297	
3	3	242	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5395 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 VP0.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	0	237	Total	C	N	O	S	0	0
			1833	1179	301	345	8		

- Molecule 2 is a protein called VP1.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	1	218	Total	C	N	O	S	0	0
			1717	1101	289	316	11		

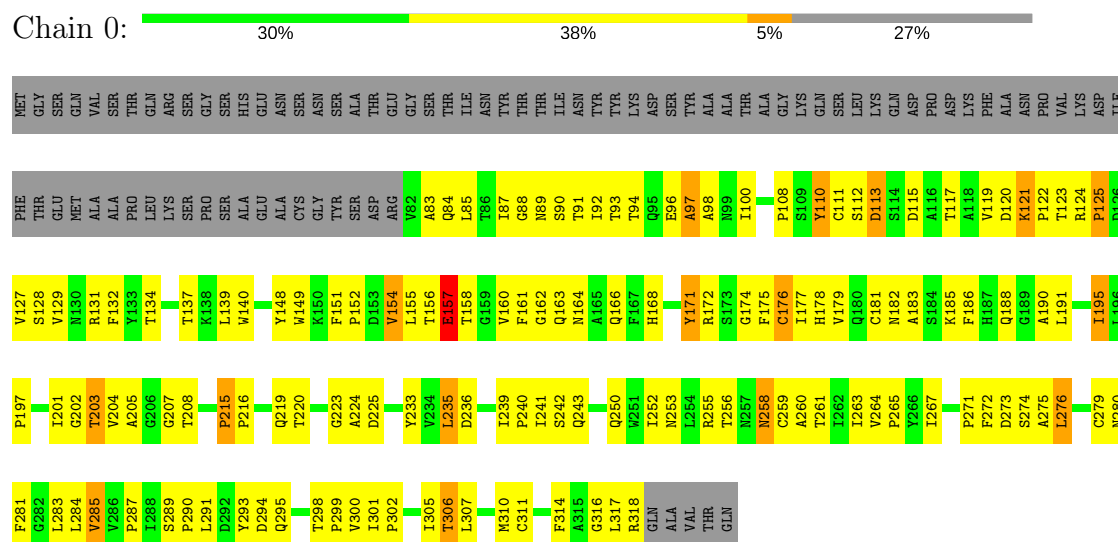
- Molecule 3 is a protein called VP3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	3	240	Total	C	N	O	S	0	0
			1845	1188	304	342	11		

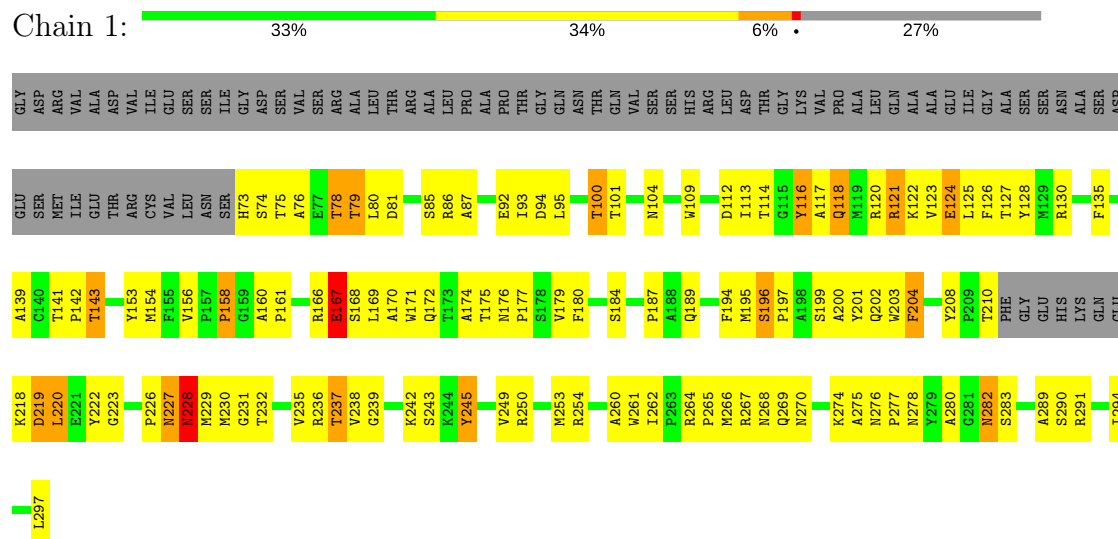
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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: VP0



#### • Molecule 2: VP1



#### • Molecule 3: VP3





## 4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, I	Depositor
Number of particles used	15226	Depositor
Resolution determination method	FSC 0.5	Depositor
CTF correction method	CTFFind3	Depositor
Microscope	FEI TECNAI F20	Depositor
Voltage (kV)	200	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	Not provided	Depositor
Minimum defocus (nm)	Not provided	Depositor
Maximum defocus (nm)	Not provided	Depositor
Magnification	50000	Depositor
Image detector	KODAK SO-163 FILM	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	$\# Z  > 2$	RMSZ	$\# Z  > 2$
1	0	0.44	0/1888	0.67	0/2591
2	1	0.46	0/1769	0.68	0/2411
3	3	0.49	0/1897	0.71	0/2596
All	All	0.47	0/5554	0.69	0/7598

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	0	1833	0	1774	121	0
2	1	1717	0	1674	126	0
3	3	1845	0	1822	132	0
All	All	5395	0	5270	336	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 32.

All (336) 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)
3:3:20:VAL:HG22	3:3:21:SER:H	1.17	1.04

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:3:206:ILE:HD12	3:3:206:ILE:H	1.24	1.00
2:1:229:MET:HE2	2:1:231:GLY:H	1.26	0.96
3:3:58:VAL:HG23	3:3:59:PRO:HD3	1.50	0.93
3:3:109:THR:HB	3:3:228:LEU:HB3	1.52	0.91
2:1:76:ALA:O	2:1:79:THR:HG23	1.73	0.89
3:3:188:TYR:O	3:3:189:TYR:HB3	1.75	0.86
3:3:172:ILE:O	3:3:172:ILE:HD12	1.75	0.86
3:3:167:LEU:HD12	3:3:168:VAL:N	1.91	0.85
2:1:112:ASP:OD2	2:1:114:THR:HG22	1.75	0.85
2:1:218:LYS:HD3	2:1:219:ASP:H	1.43	0.84
2:1:141:THR:OG1	2:1:143:THR:HG23	1.78	0.82
3:3:20:VAL:HG22	3:3:21:SER:N	1.95	0.82
2:1:121:ARG:HG2	2:1:121:ARG:HH11	1.43	0.81
1:0:117:THR:HB	1:0:120:ASP:HB3	1.63	0.81
2:1:218:LYS:HD3	2:1:219:ASP:N	1.95	0.81
3:3:58:VAL:HG23	3:3:59:PRO:CD	2.10	0.81
3:3:178:ARG:NH1	3:3:187:ASP:HB3	1.97	0.80
3:3:85:VAL:HG21	3:3:142:LEU:HD12	1.62	0.79
2:1:139:ALA:HB2	2:1:249:VAL:HG22	1.65	0.79
3:3:179:ALA:HA	3:3:184:GLY:HA2	1.66	0.78
2:1:197:PRO:HD2	2:1:227:ASN:HB2	1.65	0.77
2:1:276:ASN:HB2	2:1:277:PRO:HD2	1.65	0.76
3:3:20:VAL:CG2	3:3:21:SER:H	1.98	0.76
1:0:188:GLN:NE2	3:3:209:PRO:HB2	2.01	0.75
3:3:84:ALA:HB3	3:3:196:ILE:HD11	1.66	0.75
2:1:100:THR:HG23	2:1:101:THR:H	1.52	0.74
2:1:121:ARG:HD2	2:1:267:ARG:HB3	1.70	0.74
3:3:73:VAL:HA	3:3:198:TYR:OH	1.87	0.73
1:0:139:LEU:HD22	1:0:300:VAL:HB	1.69	0.73
3:3:42:ASN:OD1	3:3:44:LEU:HB2	1.89	0.73
1:0:125:PRO:HB3	1:0:129:VAL:HG21	1.71	0.73
3:3:131:MET:HG2	3:3:159:PHE:HE1	1.53	0.73
2:1:112:ASP:CG	2:1:114:THR:HG22	2.09	0.72
2:1:177:PRO:HB2	3:3:24:ILE:HD11	1.70	0.72
3:3:178:ARG:HB2	3:3:178:ARG:HH11	1.54	0.72
1:0:128:SER:OG	1:0:160:VAL:HG11	1.91	0.71
1:0:201:ILE:HG22	1:0:202:GLY:N	2.05	0.71
2:1:141:THR:HB	2:1:142:PRO:HD2	1.73	0.70
1:0:233:TYR:HA	3:3:66:MET:HE3	1.72	0.70
3:3:83:CYS:HB3	3:3:196:ILE:HG13	1.73	0.70
2:1:158:PRO:HD3	2:1:231:GLY:HA2	1.76	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:1:218:LYS:O	2:1:219:ASP:HB2	1.93	0.67
2:1:168:SER:C	2:1:170:ALA:H	1.99	0.67
2:1:194:PHE:CZ	2:1:200:ALA:HA	2.30	0.66
2:1:121:ARG:NH1	2:1:121:ARG:HG2	2.08	0.66
2:1:153:TYR:CD1	2:1:235:VAL:HG13	2.31	0.66
3:3:239:GLY:O	3:3:240:THR:C	2.33	0.66
3:3:6:LEU:HD12	3:3:10:THR:HG21	1.77	0.65
3:3:204:VAL:HG13	3:3:208:ALA:HB3	1.79	0.65
1:0:179:VAL:HG22	1:0:305:ILE:HG12	1.79	0.64
2:1:229:MET:HE2	2:1:231:GLY:N	2.06	0.64
2:1:78:THR:HG22	3:3:43:LEU:HB2	1.79	0.64
1:0:203:THR:H	1:0:215:PRO:HG3	1.62	0.64
2:1:85:SER:O	2:1:86:ARG:HB2	1.97	0.64
3:3:50:GLU:HA	3:3:219:ALA:HB2	1.80	0.64
2:1:153:TYR:HD1	2:1:235:VAL:HG13	1.64	0.63
2:1:168:SER:O	2:1:170:ALA:N	2.31	0.63
2:1:229:MET:HE2	2:1:230:MET:N	2.13	0.63
2:1:156:VAL:HB	2:1:232:THR:HB	1.81	0.63
2:1:104:ASN:HA	2:1:242:LYS:NZ	2.14	0.62
1:0:171:TYR:CG	1:0:275:ALA:HB2	2.34	0.62
2:1:112:ASP:OD1	2:1:114:THR:HG22	1.99	0.62
3:3:178:ARG:HH11	3:3:187:ASP:HB3	1.64	0.61
1:0:233:TYR:HA	3:3:66:MET:CE	2.30	0.61
2:1:189:GLN:HG3	3:3:21:SER:HB3	1.82	0.61
3:3:225:THR:HG22	3:3:226:MET:N	2.15	0.61
2:1:130:ARG:NE	3:3:33:CYS:HB3	2.16	0.61
2:1:128:TYR:HB2	2:1:261:TRP:HB2	1.82	0.61
1:0:129:VAL:HG13	1:0:161:PHE:HD1	1.65	0.60
3:3:225:THR:O	3:3:226:MET:HG2	2.00	0.60
3:3:115:LEU:HD11	3:3:172:ILE:HG12	1.82	0.60
2:1:189:GLN:HG3	3:3:21:SER:CB	2.32	0.60
3:3:2:PHE:CD1	3:3:3:PRO:HD2	2.36	0.60
1:0:120:ASP:O	1:0:122:PRO:HD3	2.03	0.59
1:0:168:HIS:CD2	1:0:314:PHE:HB3	2.38	0.59
3:3:10:THR:HG22	3:3:11:ASN:ND2	2.16	0.59
1:0:177:ILE:HG21	1:0:283:LEU:CD1	2.33	0.59
2:1:139:ALA:CB	2:1:249:VAL:HG22	2.33	0.58
1:0:171:TYR:CB	1:0:275:ALA:HB2	2.33	0.58
1:0:148:TYR:HB3	1:0:284:LEU:HD23	1.85	0.58
2:1:158:PRO:HD3	2:1:231:GLY:CA	2.33	0.58
3:3:178:ARG:HG2	3:3:179:ALA:H	1.68	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:0:178:HIS:HE1	1:0:259:CYS:HB2	1.69	0.58
1:0:195:ILE:HG13	1:0:281:PHE:CE2	2.39	0.57
1:0:88:GLY:C	1:0:90:SER:H	2.08	0.57
3:3:14:LEU:HB3	3:3:17:ASP:HB2	1.86	0.57
2:1:254:ARG:HB3	2:1:254:ARG:HH11	1.70	0.57
2:1:266:MET:HE2	3:3:103:GLN:HB3	1.87	0.57
3:3:131:MET:HG2	3:3:159:PHE:CE1	2.37	0.57
1:0:92:ILE:O	1:0:92:ILE:HG13	2.04	0.57
2:1:93:ILE:HD11	2:1:109:TRP:HB2	1.86	0.57
1:0:171:TYR:HB3	1:0:275:ALA:HB2	1.85	0.57
2:1:135:PHE:CD1	2:1:253:MET:HB2	2.40	0.57
1:0:201:ILE:CG2	1:0:202:GLY:N	2.68	0.57
2:1:280:ALA:CB	2:1:283:SER:HB3	2.36	0.56
2:1:254:ARG:HB3	2:1:254:ARG:NH1	2.20	0.56
3:3:52:ILE:HA	3:3:217:LEU:HD23	1.87	0.56
3:3:65:LEU:O	3:3:68:ARG:HG3	2.06	0.56
1:0:119:VAL:O	1:0:119:VAL:HG12	2.06	0.55
1:0:90:SER:OG	1:0:132:PHE:HB2	2.06	0.55
3:3:206:ILE:H	3:3:206:ILE:CD1	1.98	0.55
1:0:188:GLN:HB3	3:3:124:SER:HA	1.89	0.55
1:0:235:LEU:HD12	1:0:239:ILE:CD1	2.37	0.55
1:0:162:GLY:O	1:0:166:GLN:HG3	2.07	0.55
1:0:250:GLN:HG2	1:0:260:ALA:HB1	1.89	0.55
2:1:120:ARG:HH11	3:3:237:GLN:HE22	1.53	0.55
3:3:50:GLU:HA	3:3:218:ALA:O	2.06	0.55
3:3:6:LEU:CD1	3:3:10:THR:HG21	2.37	0.55
1:0:137:THR:HG21	1:0:302:PRO:HB2	1.88	0.54
2:1:276:ASN:HB2	2:1:277:PRO:CD	2.34	0.54
2:1:92:GLU:HG3	2:1:250:ARG:HG2	1.89	0.54
3:3:9:GLY:HA2	3:3:12:GLN:OE1	2.08	0.54
1:0:84:GLN:HB3	1:0:93:THR:HA	1.90	0.54
3:3:174:ASN:OD1	3:3:174:ASN:O	2.25	0.54
1:0:100:ILE:HG22	1:0:261:THR:HB	1.90	0.54
1:0:125:PRO:HG2	1:0:314:PHE:CD2	2.42	0.54
2:1:93:ILE:HG13	2:1:235:VAL:HG21	1.88	0.54
2:1:94:ASP:O	2:1:95:LEU:HD23	2.07	0.54
1:0:125:PRO:HB3	1:0:129:VAL:CG2	2.37	0.54
1:0:134:THR:HG23	1:0:306:THR:HG23	1.89	0.54
1:0:240:PRO:HG3	1:0:243:GLN:NE2	2.22	0.54
2:1:195:MET:O	2:1:196:SER:O	2.25	0.54
2:1:261:TRP:NE1	3:3:39:GLU:HB2	2.23	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:0:239:ILE:HG13	1:0:239:ILE:O	2.06	0.53
1:0:177:ILE:HG21	1:0:283:LEU:HD11	1.89	0.53
2:1:123:VAL:HG23	2:1:124:GLU:N	2.22	0.53
3:3:91:GLY:HA3	3:3:111:TRP:CZ2	2.43	0.53
1:0:155:LEU:C	1:0:157:GLU:N	2.62	0.53
3:3:61:ASN:ND2	3:3:64:SER:OG	2.42	0.53
1:0:271:PRO:HG2	1:0:272:PHE:H	1.73	0.53
3:3:18:ASP:O	3:3:19:GLY:O	2.27	0.53
1:0:111:CYS:SG	1:0:115:ASP:OD1	2.67	0.53
2:1:158:PRO:HB3	2:1:229:MET:HG3	1.91	0.53
2:1:168:SER:C	2:1:170:ALA:N	2.62	0.53
1:0:197:PRO:HG2	2:1:262:ILE:HG21	1.91	0.53
1:0:208:THR:HA	2:1:282:ASN:OD1	2.08	0.52
2:1:208:TYR:HE1	2:1:222:TYR:HB2	1.74	0.52
3:3:225:THR:HG22	3:3:226:MET:H	1.74	0.52
3:3:56:ASN:O	3:3:68:ARG:HA	2.09	0.52
1:0:140:TRP:CE2	1:0:291:LEU:HB2	2.44	0.52
3:3:91:GLY:HA3	3:3:111:TRP:HZ2	1.75	0.52
3:3:79:LYS:NZ	3:3:79:LYS:HB2	2.25	0.52
3:3:74:SER:HB2	3:3:211:THR:OG1	2.10	0.52
3:3:54:GLU:O	3:3:95:PRO:HB3	2.10	0.52
3:3:167:LEU:HD12	3:3:168:VAL:H	1.73	0.52
1:0:183:ALA:HB2	1:0:301:ILE:HG21	1.92	0.52
1:0:201:ILE:HG22	1:0:202:GLY:H	1.75	0.52
2:1:80:LEU:HD21	2:1:260:ALA:HB3	1.92	0.52
2:1:166:ARG:HH11	2:1:166:ARG:HG2	1.74	0.51
2:1:180:PHE:N	2:1:180:PHE:CD1	2.78	0.51
2:1:171:TRP:CZ3	2:1:236:ARG:HG2	2.44	0.51
2:1:194:PHE:HZ	2:1:200:ALA:HA	1.73	0.51
3:3:44:LEU:HD21	3:3:224:PHE:HB3	1.92	0.51
3:3:54:GLU:HG3	3:3:98:SER:CB	2.40	0.51
1:0:123:THR:O	1:0:125:PRO:HD3	2.11	0.51
1:0:188:GLN:HG2	3:3:209:PRO:HG2	1.92	0.51
1:0:154:VAL:HG23	1:0:224:ALA:HA	1.92	0.51
2:1:135:PHE:CE1	2:1:253:MET:HB2	2.46	0.51
1:0:115:ASP:C	1:0:117:THR:H	2.14	0.50
1:0:255:ARG:HG3	1:0:256:THR:HG23	1.93	0.50
2:1:204:PHE:CD1	2:1:204:PHE:N	2.77	0.50
2:1:87:ALA:HA	2:1:254:ARG:HB2	1.93	0.50
2:1:166:ARG:NH2	2:1:237:THR:OG1	2.45	0.50
1:0:182:ASN:O	1:0:301:ILE:HG23	2.11	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:1:156:VAL:HG22	2:1:176:ASN:ND2	2.26	0.50
1:0:307:LEU:N	1:0:307:LEU:HD23	2.27	0.50
2:1:203:TRP:HB2	2:1:204:PHE:CD1	2.47	0.50
3:3:218:ALA:O	3:3:219:ALA:HB2	2.11	0.50
3:3:128:THR:HG23	3:3:203:VAL:HB	1.93	0.50
3:3:30:PRO:O	3:3:31:THR:C	2.49	0.50
2:1:174:ALA:C	2:1:176:ASN:H	2.14	0.50
1:0:204:VAL:O	1:0:205:ALA:HB3	2.12	0.49
3:3:142:LEU:HD23	3:3:142:LEU:O	2.12	0.49
2:1:260:ALA:O	3:3:39:GLU:HG3	2.11	0.49
2:1:73:HIS:HA	3:3:225:THR:HG21	1.94	0.49
1:0:155:LEU:C	1:0:157:GLU:H	2.14	0.49
1:0:92:ILE:HG12	1:0:132:PHE:CE1	2.47	0.49
2:1:220:LEU:N	2:1:220:LEU:HD23	2.28	0.49
1:0:265:PRO:O	1:0:267:ILE:HG13	2.11	0.49
2:1:280:ALA:HB1	2:1:283:SER:HB3	1.95	0.49
1:0:243:GLN:HA	3:3:51:THR:HG22	1.95	0.49
1:0:293:TYR:CE1	1:0:299:PRO:HA	2.48	0.49
2:1:127:THR:OG1	2:1:264:ARG:NH2	2.46	0.49
1:0:129:VAL:HG22	1:0:164:ASN:ND2	2.29	0.48
1:0:252:ILE:O	1:0:252:ILE:HG22	2.12	0.48
3:3:130:LYS:HB2	3:3:200:THR:HG23	1.95	0.48
1:0:216:PRO:HD2	1:0:219:GLN:OE1	2.14	0.48
3:3:92:ARG:HD3	3:3:188:TYR:HD2	1.78	0.48
2:1:113:ILE:HG22	2:1:253:MET:SD	2.53	0.48
1:0:276:LEU:HD12	1:0:276:LEU:N	2.29	0.48
1:0:241:ILE:HG21	3:3:66:MET:HE3	1.96	0.48
1:0:92:ILE:HG21	1:0:306:THR:HG21	1.96	0.48
1:0:108:PRO:CB	1:0:174:GLY:HA3	2.44	0.47
1:0:125:PRO:CB	1:0:129:VAL:HG21	2.43	0.47
1:0:125:PRO:HG2	1:0:314:PHE:CE2	2.49	0.47
1:0:185:LYS:HD3	3:3:125:PHE:CD1	2.48	0.47
1:0:201:ILE:CG2	1:0:202:GLY:H	2.27	0.47
1:0:195:ILE:HG12	1:0:264:VAL:CG2	2.44	0.47
2:1:122:LYS:HG3	3:3:107:TYR:CE1	2.49	0.47
3:3:109:THR:OG1	3:3:228:LEU:HD12	2.15	0.47
3:3:182:ARG:HG3	3:3:182:ARG:NH2	2.29	0.47
3:3:148:THR:HA	3:3:151:LEU:HD12	1.97	0.47
3:3:170:PRO:HG2	3:3:171:TRP:H	1.79	0.47
1:0:110:TYR:O	1:0:111:CYS:HB2	2.15	0.47
2:1:126:PHE:CG	2:1:260:ALA:HB1	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:1:210:THR:O	2:1:210:THR:HG22	2.14	0.47
1:0:96:GLU:O	1:0:97:ALA:HB2	2.15	0.47
2:1:268:ASN:OD1	2:1:269:GLN:HG2	2.14	0.47
1:0:100:ILE:HD12	1:0:100:ILE:O	2.15	0.46
1:0:176:CYS:SG	1:0:263:ILE:HD13	2.55	0.46
2:1:290:SER:OG	3:3:68:ARG:NH2	2.48	0.46
2:1:238:VAL:HG12	2:1:239:GLY:N	2.29	0.46
3:3:121:PHE:CE2	3:3:123:GLY:HA3	2.50	0.46
1:0:172:ARG:HB3	1:0:272:PHE:CE1	2.50	0.46
2:1:229:MET:CE	2:1:230:MET:N	2.79	0.46
3:3:167:LEU:HD12	3:3:167:LEU:C	2.36	0.46
3:3:71:PHE:CE1	3:3:214:ILE:HB	2.50	0.46
1:0:235:LEU:HD12	1:0:239:ILE:HD12	1.97	0.46
1:0:83:ALA:HB3	1:0:96:GLU:HA	1.98	0.46
2:1:238:VAL:CG1	2:1:239:GLY:N	2.79	0.46
3:3:115:LEU:HB2	3:3:169:ILE:HB	1.97	0.46
3:3:146:ARG:NH1	3:3:146:ARG:HG2	2.31	0.46
3:3:22:ALA:HB1	3:3:23:PRO:HD2	1.97	0.46
3:3:24:ILE:HG23	3:3:25:LEU:HD13	1.98	0.46
1:0:128:SER:CB	1:0:160:VAL:HG11	2.46	0.45
1:0:129:VAL:CG1	1:0:161:PHE:HD1	2.27	0.45
1:0:89:ASN:ND2	1:0:131:ARG:HH21	2.14	0.45
2:1:154:MET:CE	2:1:171:TRP:HA	2.45	0.45
3:3:58:VAL:H	3:3:59:PRO:HD2	1.81	0.45
2:1:201:TYR:HA	2:1:228:ASN:HD21	1.81	0.45
3:3:66:MET:HE1	3:3:69:LEU:HD11	1.98	0.45
1:0:156:THR:HA	1:0:162:GLY:HA2	1.99	0.45
3:3:204:VAL:CG1	3:3:208:ALA:HB3	2.44	0.45
1:0:317:LEU:HD23	1:0:318:ARG:N	2.32	0.45
3:3:61:ASN:OD1	3:3:62:ALA:N	2.50	0.45
1:0:157:GLU:HB3	1:0:158:THR:H	1.50	0.45
2:1:123:VAL:C	2:1:125:LEU:H	2.20	0.45
1:0:250:GLN:CG	1:0:260:ALA:HB1	2.46	0.44
2:1:156:VAL:HG12	2:1:156:VAL:O	2.17	0.44
3:3:90:PRO:HD2	3:3:188:TYR:OH	2.17	0.44
1:0:183:ALA:HB2	1:0:301:ILE:CG2	2.47	0.44
1:0:191:LEU:HD23	1:0:287:PRO:HA	1.99	0.44
2:1:242:LYS:HG3	2:1:243:SER:N	2.32	0.44
3:3:14:LEU:HD22	3:3:16:THR:H	1.82	0.44
2:1:245:TYR:N	2:1:245:TYR:CD1	2.85	0.44
1:0:129:VAL:CG2	1:0:164:ASN:ND2	2.80	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:1:261:TRP:CD1	3:3:36:ILE:HB	2.52	0.44
3:3:6:LEU:HD23	3:3:6:LEU:N	2.32	0.44
2:1:125:LEU:HD23	2:1:126:PHE:CZ	2.52	0.44
3:3:118:THR:HG23	3:3:166:THR:OG1	2.17	0.44
2:1:294:ILE:CD1	3:3:71:PHE:HB3	2.47	0.44
2:1:116:TYR:HE2	2:1:118:GLN:HE21	1.66	0.44
2:1:203:TRP:C	2:1:204:PHE:CD1	2.91	0.44
1:0:310:MET:O	1:0:311:CYS:HB2	2.17	0.44
2:1:261:TRP:CD1	3:3:39:GLU:HB2	2.53	0.44
2:1:104:ASN:O	2:1:166:ARG:HD2	2.18	0.44
3:3:183:ASP:O	3:3:185:VAL:N	2.50	0.44
3:3:54:GLU:HG2	3:3:69:LEU:HD23	1.99	0.44
3:3:46:LEU:O	3:3:49:VAL:HG23	2.18	0.43
1:0:190:ALA:HB3	1:0:289:SER:HB3	1.99	0.43
2:1:123:VAL:CG2	2:1:124:GLU:N	2.81	0.43
2:1:197:PRO:CD	2:1:227:ASN:HB2	2.43	0.43
3:3:182:ARG:HG3	3:3:182:ARG:HH21	1.83	0.43
1:0:152:PRO:HD2	1:0:279:CYS:HA	2.00	0.43
2:1:294:ILE:HD12	3:3:56:ASN:HA	1.99	0.43
1:0:235:LEU:O	1:0:236:ASP:HB2	2.19	0.43
2:1:167:GLU:CD	2:1:167:GLU:N	2.71	0.43
1:0:239:ILE:HB	2:1:265:PRO:HB2	2.00	0.43
2:1:266:MET:O	2:1:267:ARG:C	2.57	0.43
2:1:297:LEU:HD23	3:3:85:VAL:CG2	2.48	0.43
3:3:150:MET:HE2	3:3:151:LEU:HA	2.00	0.43
1:0:195:ILE:HG12	1:0:264:VAL:HG21	2.00	0.43
1:0:253:ASN:HD21	3:3:122:THR:HA	1.84	0.43
1:0:273:ASP:OD1	1:0:274:SER:N	2.51	0.43
1:0:129:VAL:CG2	1:0:164:ASN:HD21	2.32	0.43
1:0:197:PRO:HG2	2:1:262:ILE:CG2	2.48	0.43
1:0:84:GLN:NE2	1:0:91:THR:HG21	2.34	0.43
2:1:120:ARG:HH11	3:3:237:GLN:NE2	2.16	0.43
1:0:160:VAL:O	1:0:163:GLN:HB3	2.19	0.42
2:1:235:VAL:HG11	2:1:249:VAL:HG21	2.01	0.42
2:1:78:THR:HB	3:3:42:ASN:HD21	1.83	0.42
2:1:116:TYR:HE2	2:1:118:GLN:NE2	2.17	0.42
1:0:233:TYR:CD2	3:3:65:LEU:HB3	2.53	0.42
1:0:175:PHE:HB3	1:0:176:CYS:H	1.67	0.42
2:1:154:MET:HE3	2:1:171:TRP:HA	2.01	0.42
1:0:121:LYS:H	1:0:121:LYS:HD2	1.84	0.42
2:1:94:ASP:C	2:1:95:LEU:HD23	2.39	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:3:135:TYR:CD1	3:3:169:ILE:HD12	2.54	0.42
1:0:84:GLN:CB	1:0:93:THR:HA	2.49	0.42
1:0:220:THR:HG23	2:1:222:TYR:CE1	2.55	0.42
3:3:29:TYR:HA	3:3:30:PRO:HD2	1.71	0.42
1:0:110:TYR:CE1	1:0:124:ARG:HB3	2.55	0.42
2:1:120:ARG:HH12	2:1:274:LYS:HA	1.85	0.42
2:1:81:ASP:O	2:1:85:SER:HB3	2.19	0.42
3:3:225:THR:CG2	3:3:226:MET:N	2.83	0.42
2:1:199:SER:OG	3:3:34:ILE:HG12	2.20	0.41
1:0:258:ASN:CG	1:0:259:CYS:N	2.74	0.41
1:0:90:SER:CB	1:0:132:PHE:HB2	2.50	0.41
3:3:178:ARG:HG2	3:3:179:ALA:N	2.34	0.41
3:3:89:ASP:HA	3:3:188:TYR:CZ	2.55	0.41
3:3:90:PRO:O	3:3:102:GLY:HA2	2.20	0.41
2:1:126:PHE:CD2	2:1:260:ALA:HB1	2.55	0.41
2:1:80:LEU:HA	2:1:80:LEU:HD12	1.79	0.41
1:0:121:LYS:HB3	1:0:121:LYS:HE3	1.79	0.41
1:0:186:PHE:CE1	3:3:126:MET:HG3	2.56	0.41
1:0:85:LEU:HD12	1:0:94:THR:HG21	2.01	0.41
2:1:104:ASN:HA	2:1:242:LYS:HZ2	1.81	0.41
2:1:177:PRO:CB	3:3:24:ILE:HD11	2.47	0.41
1:0:258:ASN:CG	1:0:259:CYS:H	2.24	0.41
2:1:180:PHE:H	2:1:180:PHE:HD1	1.69	0.41
2:1:291:ARG:O	3:3:58:VAL:HG12	2.21	0.41
3:3:133:ILE:HG12	3:3:196:ILE:HG22	2.02	0.41
2:1:117:ALA:HB1	3:3:236:LEU:HD22	2.03	0.41
3:3:74:SER:CB	3:3:211:THR:OG1	2.69	0.41
2:1:297:LEU:HD23	3:3:85:VAL:HG22	2.03	0.41
2:1:174:ALA:C	2:1:176:ASN:N	2.74	0.41
3:3:188:TYR:C	3:3:190:THR:H	2.24	0.41
3:3:25:LEU:HB3	3:3:28:PHE:HB2	2.02	0.41
1:0:151:PHE:CD1	1:0:151:PHE:N	2.88	0.41
1:0:185:LYS:HB3	3:3:125:PHE:HD1	1.85	0.41
2:1:160:ALA:HA	2:1:161:PRO:HD3	1.86	0.41
1:0:195:ILE:HD12	1:0:195:ILE:HA	1.85	0.41
1:0:289:SER:HA	1:0:290:PRO:HD2	1.82	0.41
3:3:162:GLN:HG3	3:3:162:GLN:O	2.21	0.41
1:0:87:ILE:O	1:0:131:ARG:HA	2.21	0.41
3:3:170:PRO:O	3:3:171:TRP:HB2	2.20	0.41
1:0:92:ILE:HG12	1:0:132:PHE:HE1	1.85	0.40
2:1:177:PRO:HB2	3:3:24:ILE:CD1	2.45	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:1:74:SER:C	2:1:76:ALA:H	2.24	0.40
3:3:90:PRO:HG2	3:3:115:LEU:HD11	2.02	0.40
1:0:205:ALA:HB2	2:1:278:ASN:HD22	1.86	0.40
1:0:215:PRO:HA	1:0:216:PRO:HD3	1.85	0.40
2:1:125:LEU:HD13	2:1:266:MET:SD	2.61	0.40
3:3:130:LYS:O	3:3:199:GLN:HB3	2.21	0.40
1:0:149:TRP:HZ3	1:0:285:VAL:CG1	2.33	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	0	235/323 (73%)	175 (74%)	41 (17%)	19 (8%)	1	16
2	1	214/297 (72%)	171 (80%)	27 (13%)	16 (8%)	1	18
3	3	238/242 (98%)	187 (79%)	34 (14%)	17 (7%)	1	19
All	All	687/862 (80%)	533 (78%)	102 (15%)	52 (8%)	2	18

All (52) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	0	97	ALA
1	0	112	SER
1	0	127	VAL
2	1	169	LEU
2	1	196	SER
2	1	226	PRO
2	1	227	ASN
2	1	275	ALA
3	3	92	ARG
3	3	180	HIS

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Mol	Chain	Res	Type
3	3	186	PHE
1	0	98	ALA
1	0	316	GLY
2	1	282	ASN
2	1	289	ALA
3	3	19	GLY
3	3	140	GLY
3	3	177	TYR
1	0	110	TYR
1	0	113	ASP
1	0	176	CYS
1	0	258	ASN
2	1	75	THR
3	3	147	ALA
3	3	182	ARG
3	3	188	TYR
3	3	219	ALA
3	3	228	LEU
1	0	154	VAL
1	0	157	GLU
1	0	223	GLY
1	0	280	ASN
2	1	124	GLU
2	1	167	GLU
2	1	219	ASP
2	1	228	ASN
3	3	43	LEU
1	0	203	THR
1	0	215	PRO
1	0	235	LEU
2	1	79	THR
3	3	189	TYR
1	0	207	GLY
3	3	58	VAL
1	0	125	PRO
2	1	158	PRO
3	3	72	PRO
3	3	184	GLY
3	3	90	PRO
2	1	187	PRO
2	1	223	GLY
1	0	285	VAL

### 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 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	0	201/272 (74%)	188 (94%)	13 (6%)	20	52
2	1	186/250 (74%)	168 (90%)	18 (10%)	9	35
3	3	200/202 (99%)	181 (90%)	19 (10%)	10	36
All	All	587/724 (81%)	537 (92%)	50 (8%)	17	42

All (50) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	0	113	ASP
1	0	121	LYS
1	0	157	GLU
1	0	171	TYR
1	0	181	CYS
1	0	195	ILE
1	0	225	ASP
1	0	242	SER
1	0	276	LEU
1	0	294	ASP
1	0	295	GLN
1	0	298	THR
1	0	306	THR
2	1	78	THR
2	1	100	THR
2	1	116	TYR
2	1	118	GLN
2	1	121	ARG
2	1	143	THR
2	1	167	GLU
2	1	172	GLN
2	1	175	THR
2	1	179	VAL
2	1	184	SER
2	1	202	GLN
2	1	204	PHE

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Mol	Chain	Res	Type
2	1	220	LEU
2	1	228	ASN
2	1	237	THR
2	1	245	TYR
2	1	270	ASN
3	3	6	LEU
3	3	14	LEU
3	3	44	LEU
3	3	51	THR
3	3	53	LEU
3	3	58	VAL
3	3	63	THR
3	3	70	ARG
3	3	72	PRO
3	3	79	LYS
3	3	87	ARG
3	3	90	PRO
3	3	150	MET
3	3	159	PHE
3	3	178	ARG
3	3	204	VAL
3	3	206	ILE
3	3	226	MET
3	3	228	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	0	164	ASN
1	0	168	HIS
1	0	188	GLN
1	0	214	HIS
2	1	118	GLN
2	1	152	GLN
2	1	176	ASN
2	1	202	GLN
2	1	278	ASN
3	3	48	GLN
3	3	110	GLN
3	3	176	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 carbohydrates 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.