



Full wwPDB/EMDataBank EM Map/Model Validation Report ⓘ

Oct 29, 2019 – 03:53 PM EDT

PDB ID : 6KUP
EMDB ID: : EMD-9579
Title : Structure of influenza D virus polymerase bound to vRNA promoter in Mode A conformation(Class A2)
Authors : Peng, Q.; Peng, R.; Qi, J.; Gao, G.F.; Shi, Y.
Deposited on : 2019-09-02
Resolution : 4.30 Å(reported)

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

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

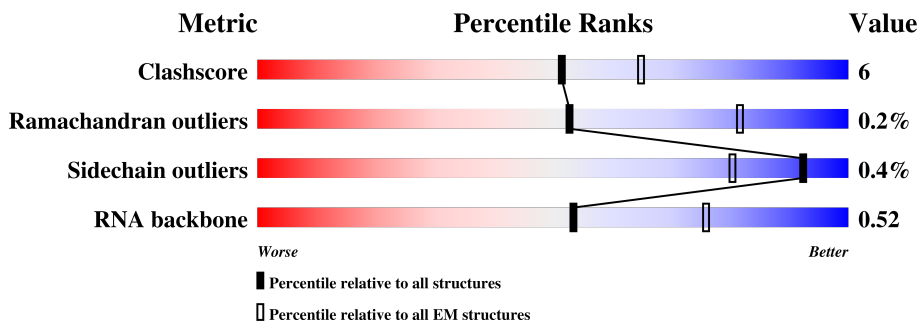
MolProbity : 4.02b-467
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : 2.4

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 4.30 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	136327	1886
Ramachandran outliers	132723	1663
Sidechain outliers	132532	1531
RNA backbone	3747	458

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 ≥ 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	A	710	
2	B	753	
3	C	772	
4	R	14	
5	V	15	

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 12254 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 Polymerase 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	511	4176	2657	712	771	36	0	0

- Molecule 2 is a protein called RNA-directed RNA polymerase catalytic subunit.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	701	5578	3523	949	1045	61	0	0

- Molecule 3 is a protein called Polymerase PB2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	249	2006	1303	340	351	12	0	0

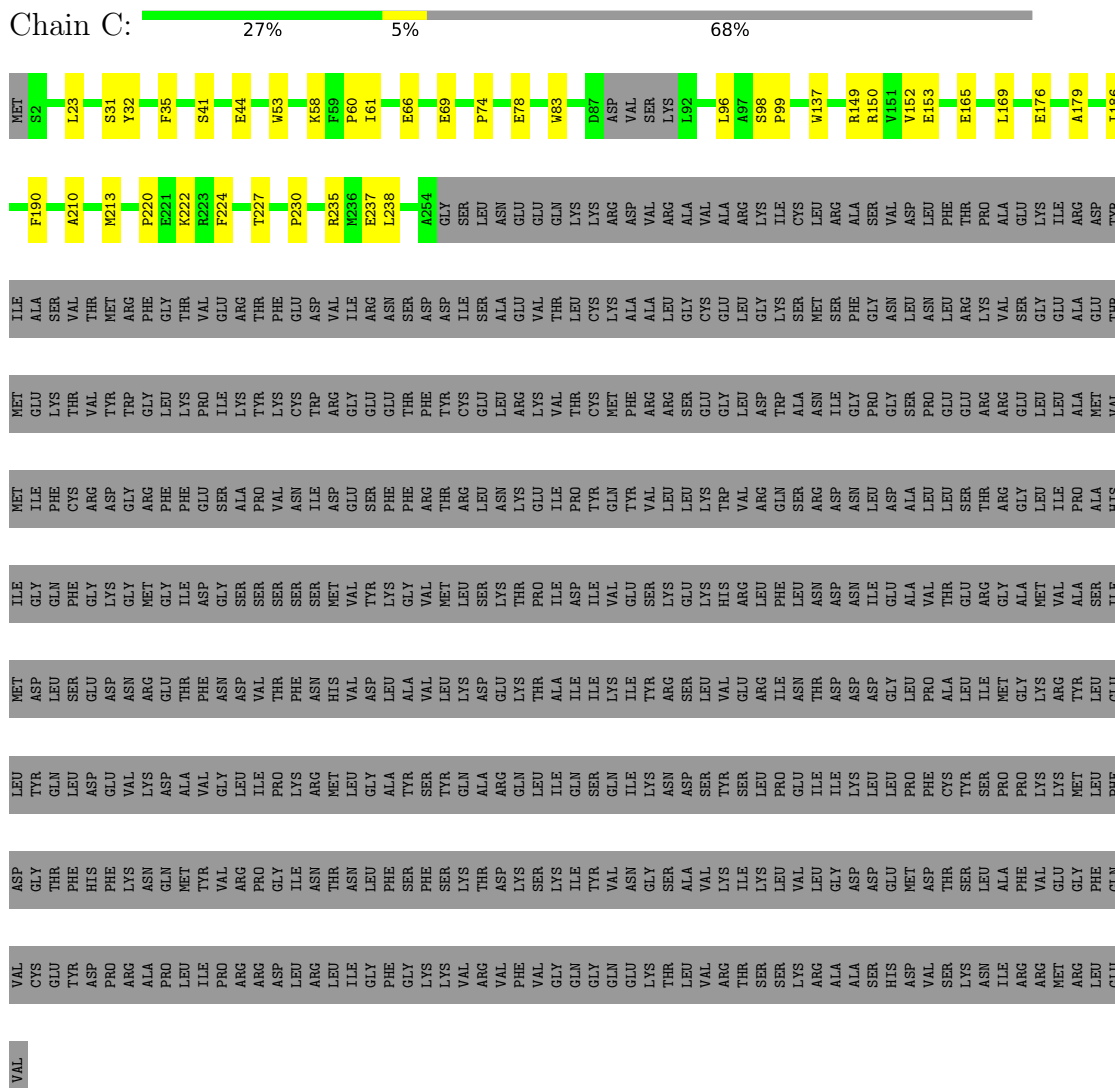
- Molecule 4 is a RNA chain called 3'-vRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
4	R	8	163	73	23	59	8	0	0

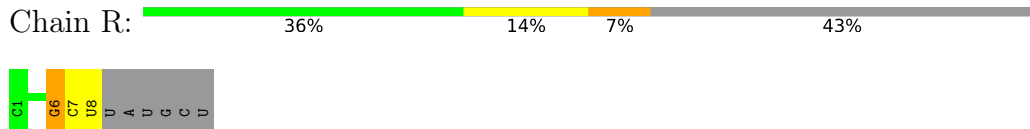
- Molecule 5 is a RNA chain called 5'-vRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
5	V	15	331	147	68	101	15	0	0

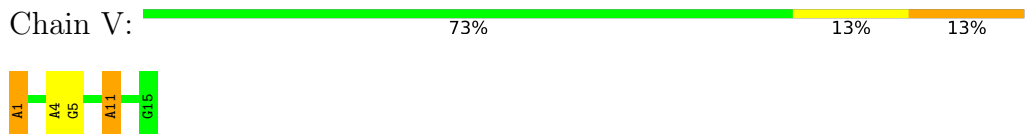
• Molecule 3: Polymerase PB2



• Molecule 4: 3'-vRNA



• Molecule 5: 5'-vRNA



4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	62457	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)	Not provided	Depositor
Maximum defocus (nm)	Not provided	Depositor
Magnification	Not provided	Depositor
Image detector	GATAN K2 QUANTUM (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 >2	RMSZ	# Z >2
1	A	0.30	0/4267	0.52	0/5725
2	B	0.29	0/5674	0.51	0/7616
3	C	0.27	0/2053	0.49	0/2765
4	R	0.37	0/179	1.21	0/275
5	V	0.64	1/372 (0.3%)	0.89	0/578
All	All	0.31	1/12545 (0.0%)	0.55	0/16959

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	V	1	A	OP3-P	-10.60	1.48	1.61

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	A	4176	0	4138	62	0
2	B	5578	0	5610	86	0
3	C	2006	0	2046	29	0
4	R	163	0	86	5	0
5	V	331	0	165	3	0
All	All	12254	0	12045	152	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 6.

All (152) 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:722:ALA:O	2:B:726:PHE:HB2	1.71	0.91
1:A:409:MET:SD	2:B:550:ARG:NH1	2.47	0.87
2:B:258:GLU:O	2:B:262:GLN:HB2	1.81	0.80
1:A:693:ARG:HH12	2:B:2:GLU:HB3	1.51	0.76
3:C:152:VAL:O	3:C:222:LYS:HA	1.86	0.74
5:V:5:G:OP2	5:V:5:G:N2	2.23	0.71
1:A:216:GLU:HA	2:B:329:LYS:HD2	1.75	0.69
2:B:725:GLN:O	2:B:730:ILE:HG13	1.93	0.68
2:B:721:ARG:O	2:B:725:GLN:HB2	1.95	0.67
1:A:504:GLU:HB2	1:A:549:TYR:HB2	1.74	0.67
3:C:165:GLU:O	3:C:169:LEU:HB2	1.96	0.65
2:B:721:ARG:HH21	2:B:725:GLN:HE22	1.46	0.64
1:A:601:ARG:HB3	1:A:617:SER:HB2	1.79	0.63
1:A:693:ARG:NH1	2:B:2:GLU:HB3	2.14	0.63
1:A:209:GLU:OE1	1:A:212:ARG:NH1	2.32	0.62
1:A:400:ILE:HG13	1:A:472:LEU:HD13	1.82	0.61
1:A:346:GLY:N	5:V:11:A:OP2	2.34	0.61
2:B:592:ILE:HG13	2:B:613:LYS:HZ2	1.64	0.61
1:A:263:HIS:O	1:A:551:ARG:NH2	2.34	0.61
3:C:98:SER:OG	3:C:99:PRO:HD2	2.00	0.60
2:B:281:LYS:NZ	3:C:149:ARG:HH21	2.00	0.60
2:B:680:LEU:HB3	2:B:684:ARG:NH1	2.16	0.60
2:B:304:ILE:HG23	2:B:450:LEU:HB3	1.84	0.59
2:B:159:THR:OG1	2:B:161:LYS:NZ	2.34	0.59
3:C:60:PRO:HG2	3:C:61:ILE:HG13	1.84	0.59
2:B:620:SER:O	2:B:624:ARG:HB2	2.03	0.58
1:A:693:ARG:NH2	2:B:2:GLU:OE1	2.36	0.58
2:B:680:LEU:HB3	2:B:684:ARG:HH12	1.70	0.56
2:B:592:ILE:HG13	2:B:613:LYS:NZ	2.21	0.56
3:C:186:ILE:O	3:C:190:PHE:N	2.39	0.56
1:A:335:PRO:HA	1:A:339:ARG:HH11	1.71	0.56
1:A:517:LYS:NZ	1:A:551:ARG:NH1	2.55	0.55
1:A:264:LYS:HE2	1:A:554:GLY:O	2.07	0.55
1:A:605:ALA:HA	2:B:3:ILE:HA	1.88	0.54
1:A:335:PRO:HA	1:A:339:ARG:HD3	1.89	0.54
2:B:472:LYS:NZ	2:B:477:ASN:HD22	2.05	0.54
1:A:606:HIS:HD2	2:B:7:LEU:HD11	1.73	0.53

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:216:GLU:HG2	2:B:329:LYS:HB2	1.91	0.53
1:A:517:LYS:HZ1	1:A:551:ARG:NH1	2.06	0.53
2:B:546:LEU:HB2	2:B:602:ILE:HD11	1.90	0.53
2:B:305:THR:HG21	2:B:492:GLU:HB3	1.90	0.53
2:B:722:ALA:O	2:B:726:PHE:CB	2.52	0.53
3:C:61:ILE:O	3:C:96:LEU:HA	2.09	0.52
2:B:490:LEU:HD12	2:B:499:SER:HA	1.92	0.52
1:A:522:GLU:C	1:A:548:LEU:H	2.13	0.52
1:A:583:LYS:NZ	2:B:15:THR:OG1	2.43	0.52
3:C:58:LYS:O	3:C:98:SER:HB2	2.09	0.51
2:B:567:SER:O	2:B:578:ARG:NH2	2.42	0.51
3:C:41:SER:HB2	4:R:7:C:H41	1.76	0.51
3:C:153:GLU:HB3	3:C:220:PRO:HB2	1.93	0.51
1:A:606:HIS:HB3	1:A:615:LEU:HD23	1.94	0.50
2:B:40:MET:O	2:B:44:SER:HB3	2.12	0.50
2:B:373:LYS:HE2	2:B:400:GLU:OE2	2.12	0.50
2:B:734:GLU:O	2:B:738:GLU:HB2	2.10	0.50
2:B:718:ILE:O	2:B:722:ALA:HB2	2.11	0.50
1:A:415:GLU:OE2	3:C:137:TRP:NE1	2.44	0.50
2:B:258:GLU:O	2:B:262:GLN:CB	2.57	0.50
1:A:661:ASP:HB3	1:A:663:LYS:HE2	1.93	0.50
2:B:301:MET:HA	2:B:452:CYS:O	2.11	0.50
1:A:266:LEU:HD23	1:A:269:ASP:HB2	1.93	0.49
2:B:49:TYR:OH	2:B:310:LYS:NZ	2.44	0.49
1:A:485:ILE:HB	1:A:501:VAL:HB	1.94	0.49
1:A:557:LYS:HD2	3:C:53:TRP:HH2	1.78	0.49
1:A:388:TRP:HH2	1:A:438:ARG:HH21	1.61	0.49
1:A:522:GLU:O	1:A:548:LEU:CB	2.60	0.49
2:B:154:GLN:HG2	2:B:159:THR:HA	1.94	0.49
1:A:597:LEU:HD23	1:A:620:LEU:HD23	1.95	0.48
2:B:281:LYS:HZ2	3:C:149:ARG:HH21	1.62	0.48
1:A:522:GLU:O	1:A:548:LEU:HB3	2.12	0.48
1:A:521:PHE:C	1:A:548:LEU:O	2.52	0.48
2:B:383:ASN:HB2	2:B:386:TRP:HD1	1.77	0.48
3:C:230:PRO:HG2	3:C:235:ARG:HD3	1.96	0.48
1:A:390:MET:HB3	1:A:629:VAL:HG21	1.95	0.47
2:B:519:ASN:ND2	2:B:661:SER:OG	2.47	0.47
2:B:428:ARG:HH12	2:B:438:TYR:HB2	1.80	0.47
2:B:8:LEU:O	2:B:12:ASN:ND2	2.47	0.47
2:B:421:GLY:HA3	2:B:443:GLN:HG2	1.97	0.47
3:C:31:SER:O	3:C:35:PHE:N	2.47	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:200:SER:HA	2:B:67:LYS:NZ	2.30	0.47
1:A:623:LEU:HD11	2:B:8:LEU:HD11	1.96	0.47
2:B:497:PHE:N	2:B:504:SER:OG	2.45	0.47
1:A:603:TRP:HB3	1:A:615:LEU:HD13	1.97	0.47
2:B:311:TRP:HZ3	2:B:476:ILE:HG23	1.80	0.47
2:B:429:GLU:HG3	2:B:430:GLU:HG3	1.97	0.47
2:B:332:SER:OG	2:B:333:ASN:N	2.48	0.47
2:B:291:THR:HG21	2:B:440:THR:HG21	1.96	0.47
2:B:688:VAL:HG21	3:C:23:LEU:HD22	1.97	0.46
2:B:136:SER:HA	2:B:185:LYS:NZ	2.30	0.46
1:A:646:CYS:HA	1:A:649:GLN:HG2	1.97	0.46
1:A:260:PRO:HD3	1:A:376:ARG:NH1	2.31	0.46
1:A:692:ASP:OD1	1:A:696:LYS:NZ	2.49	0.46
2:B:575:LYS:HE2	3:C:78:GLU:HB3	1.98	0.46
3:C:44:GLU:H	4:R:7:C:H42	1.62	0.46
3:C:230:PRO:O	3:C:235:ARG:NH2	2.49	0.45
1:A:517:LYS:HZ1	1:A:551:ARG:HH12	1.64	0.45
2:B:734:GLU:O	2:B:738:GLU:CB	2.64	0.45
3:C:150:ARG:O	3:C:224:PHE:HA	2.16	0.45
1:A:347:ARG:NH1	5:V:1:A:C8	2.84	0.45
1:A:606:HIS:HE1	1:A:696:LYS:HD3	1.82	0.45
1:A:663:LYS:NZ	2:B:488:PRO:HG3	2.32	0.44
1:A:192:LEU:HD11	2:B:216:ARG:HD2	1.98	0.44
3:C:98:SER:OG	3:C:99:PRO:CD	2.65	0.44
2:B:284:LEU:HA	2:B:287:THR:HG22	2.00	0.44
2:B:695:VAL:HG21	2:B:714:ILE:HG23	1.99	0.44
3:C:210:ALA:HA	3:C:213:MET:HG2	1.99	0.44
1:A:237:LYS:HE2	2:B:480:LEU:HD11	2.00	0.44
4:R:6:G:N3	4:R:6:G:H2'	2.32	0.44
2:B:320:TYR:O	2:B:324:LEU:HB2	2.18	0.44
2:B:138:ARG:NH1	4:R:8:U:O2	2.50	0.44
1:A:192:LEU:HD13	2:B:220:ILE:HD11	1.99	0.43
1:A:647:ASN:HA	1:A:650:LYS:NZ	2.33	0.43
3:C:237:GLU:HG2	3:C:238:LEU:HD12	2.00	0.43
3:C:74:PRO:HA	3:C:83:TRP:CD1	2.52	0.43
2:B:24:TYR:HA	2:B:235:ARG:NH1	2.33	0.43
2:B:311:TRP:HZ2	2:B:417:SER:HB3	1.82	0.43
1:A:263:HIS:CD2	1:A:265:PHE:H	2.36	0.43
3:C:176:GLU:HA	3:C:179:ALA:HB2	1.99	0.43
2:B:328:THR:HB	2:B:336:LYS:HA	2.00	0.42
2:B:427:TYR:O	2:B:428:ARG:NE	2.50	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:647:ASN:HD21	2:B:236:GLY:HA2	1.84	0.42
2:B:679:ALA:HA	2:B:682:GLU:HG2	2.01	0.42
3:C:66:GLU:HA	3:C:69:GLU:HG2	2.01	0.42
1:A:199:GLU:O	2:B:67:LYS:NZ	2.43	0.42
1:A:231:ASP:OD2	2:B:473:LEU:HG	2.19	0.42
2:B:359:ALA:O	2:B:367:GLU:HA	2.19	0.42
2:B:387:ARG:NH2	2:B:391:GLU:OE2	2.42	0.42
1:A:291:PHE:HA	1:A:294:ALA:HB3	2.02	0.41
1:A:494:ASP:HA	1:A:557:LYS:HE2	2.01	0.41
2:B:49:TYR:HE2	2:B:310:LYS:HG2	1.85	0.41
2:B:669:THR:N	4:R:6:G:OP1	2.53	0.41
1:A:671:LYS:NZ	1:A:675:GLU:OE2	2.53	0.41
1:A:417:GLU:OE2	2:B:602:ILE:HB	2.19	0.41
1:A:235:ARG:HH12	2:B:78:LEU:HG	1.85	0.41
2:B:489:GLU:HG3	2:B:500:GLY:HA2	2.03	0.41
2:B:553:LEU:HD22	2:B:598:LEU:HD22	2.02	0.41
1:A:424:CYS:O	1:A:428:GLU:HB3	2.20	0.41
1:A:455:ARG:HD3	3:C:53:TRP:CD2	2.55	0.41
1:A:521:PHE:HB3	1:A:522:GLU:H	1.65	0.41
2:B:47:TYR:OH	2:B:403:PHE:O	2.36	0.41
2:B:304:ILE:HA	2:B:484:TYR:O	2.21	0.41
2:B:299:GLN:HA	2:B:454:SER:O	2.20	0.41
3:C:152:VAL:HG21	3:C:227:THR:HG21	2.03	0.41
2:B:28:PRO:HB3	2:B:235:ARG:HE	1.85	0.41
3:C:32:TYR:HA	3:C:35:PHE:HB2	2.02	0.41
1:A:443:LEU:O	1:A:447:ILE:HB	2.21	0.41
2:B:24:TYR:HA	2:B:235:ARG:HH12	1.84	0.41
2:B:150:VAL:HA	2:B:153:ILE:HD12	2.03	0.41
1:A:522:GLU:CA	1:A:548:LEU:H	2.35	0.40
2:B:468:ILE:O	2:B:472:LYS:HB2	2.20	0.40
2:B:325:ALA:O	2:B:329:LYS:HB3	2.21	0.40
2:B:404:LEU:HD21	2:B:407:GLY:HA3	2.04	0.40
1:A:430:LYS:HG3	1:A:621:LYS:HB2	2.03	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	505/710 (71%)	464 (92%)	41 (8%)	0	100	100
2	B	691/753 (92%)	649 (94%)	39 (6%)	3 (0%)	36	76
3	C	245/772 (32%)	222 (91%)	23 (9%)	0	100	100
All	All	1441/2235 (64%)	1335 (93%)	103 (7%)	3 (0%)	53	84

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	730	ILE
2	B	332	SER
2	B	731	ILE

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	455/639 (71%)	452 (99%)	3 (1%)	85	92
2	B	617/666 (93%)	615 (100%)	2 (0%)	93	96
3	C	213/681 (31%)	213 (100%)	0	100	100
All	All	1285/1986 (65%)	1280 (100%)	5 (0%)	92	95

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	330	ARG
1	A	416	MET
1	A	638	ASN
2	B	17	MET
2	B	84	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	263	HIS
1	A	277	HIS
2	B	70	ASN
2	B	84	ASN
2	B	147	GLN
2	B	154	GLN
2	B	383	ASN
2	B	477	ASN
2	B	725	GLN
3	C	106	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
4	R	7/14 (50%)	1 (14%)	0
5	V	14/15 (93%)	2 (14%)	0
All	All	21/29 (72%)	3 (14%)	0

All (3) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
4	R	6	G
5	V	4	A
5	V	11	A

There are no RNA pucker outliers to report.

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.