Full wwPDB EM Validation Report

Sep 14, 2025 – 12:19 AM JST

PDB ID	:	9KNQ / pdb_00009knq
EMDB ID	:	EMD-62459
Title	:	Measles virus L-P complex in apo state
Authors	:	Wang, Y.R.; Zhang, H.Q.
Deposited on	:	2024-11-19
Resolution	:	3.00 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 (i) 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 (i)) were used in the production of this report:

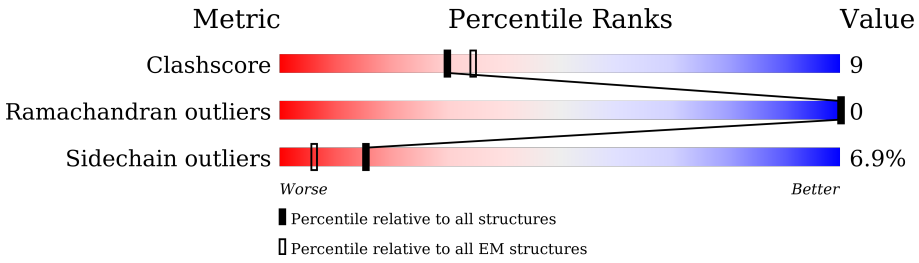
EMDB validation analysis	:	FAILED
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.45.1

1 Overall quality at a glance (i)

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	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 <=5%

Mol	Chain	Length	Quality of chain
1	A	2183	46% 11% · 41%
2	B	507	6% · 90%
2	C	507	19% 9% · 72%
2	D	507	7% · · 88%
2	E	507	· · · 92%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 12606 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 RNA-directed RNA polymerase L.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	1284	Total	C	N	O	S	0	0
			10307	6574	1784	1890	59		

- Molecule 2 is a protein called Phosphoprotein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	52	Total	C	N	O	S	0	0
			398	252	69	76	1		
2	D	61	Total	C	N	O	S	0	0
			461	289	77	94	1		
2	E	42	Total	C	N	O	S	0	0
			328	209	56	62	1		
2	C	142	Total	C	N	O	S	0	0
			1110	708	196	201	5		

- Molecule 3 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

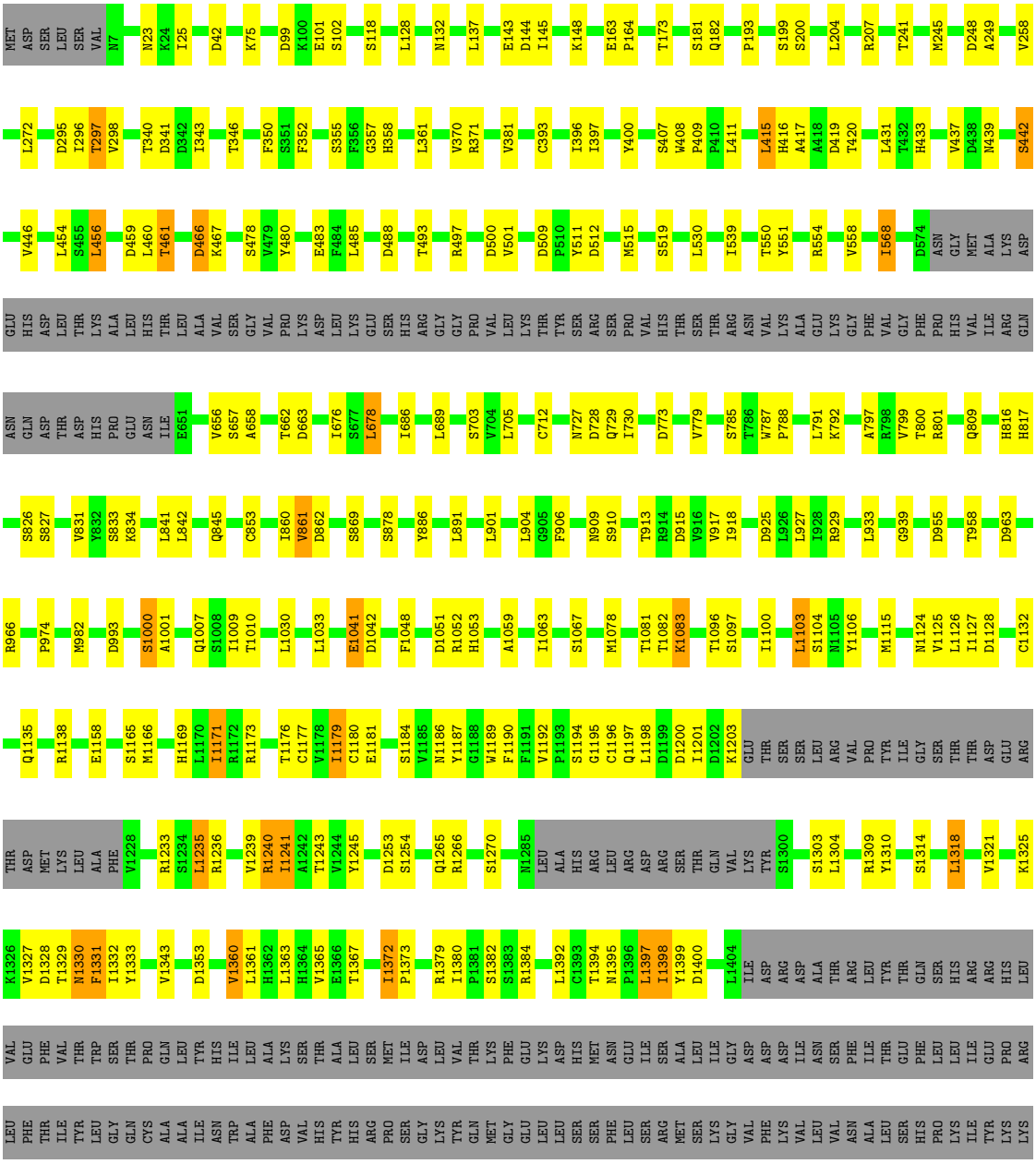
Mol	Chain	Residues	Atoms		AltConf
3	A	2	Total	Zn	0
			2	2	

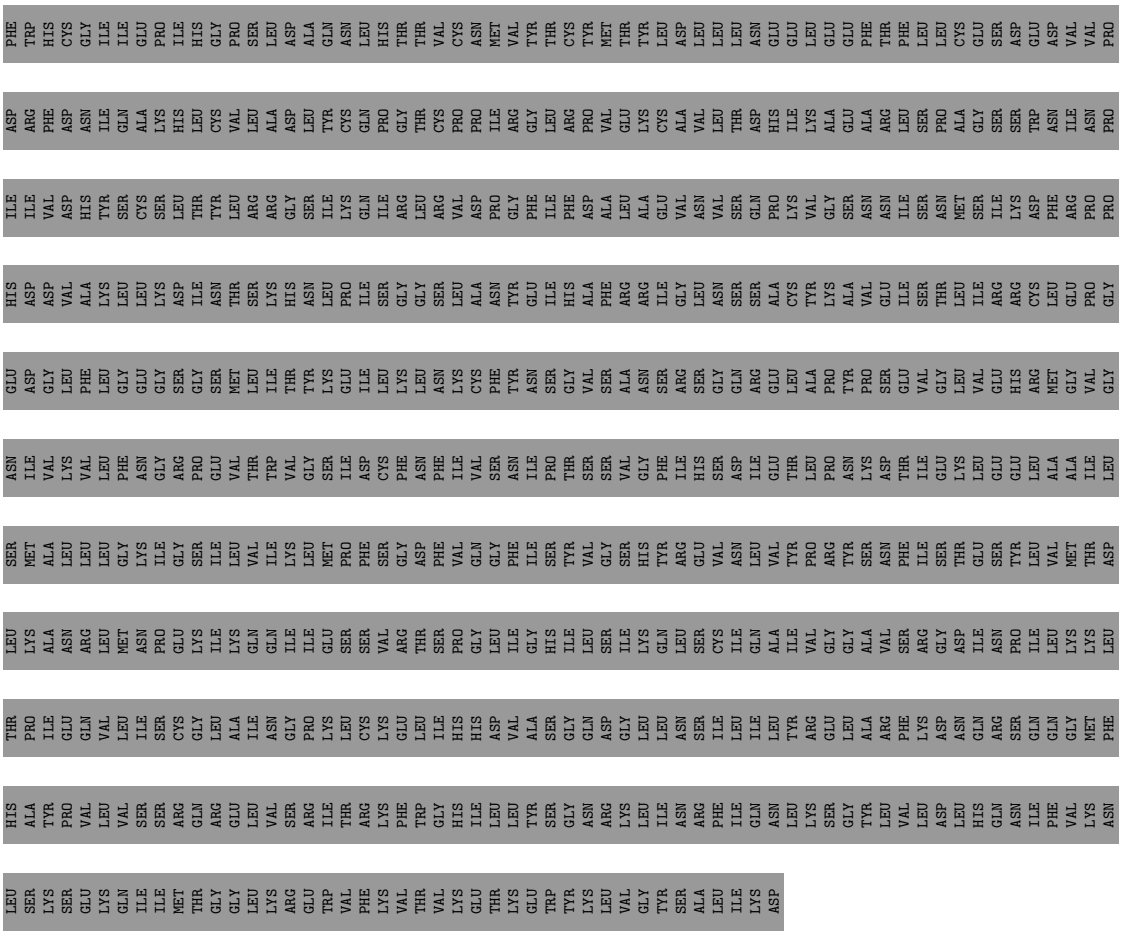
3 Residue-property plots (i)

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: RNA-directed RNA polymerase L

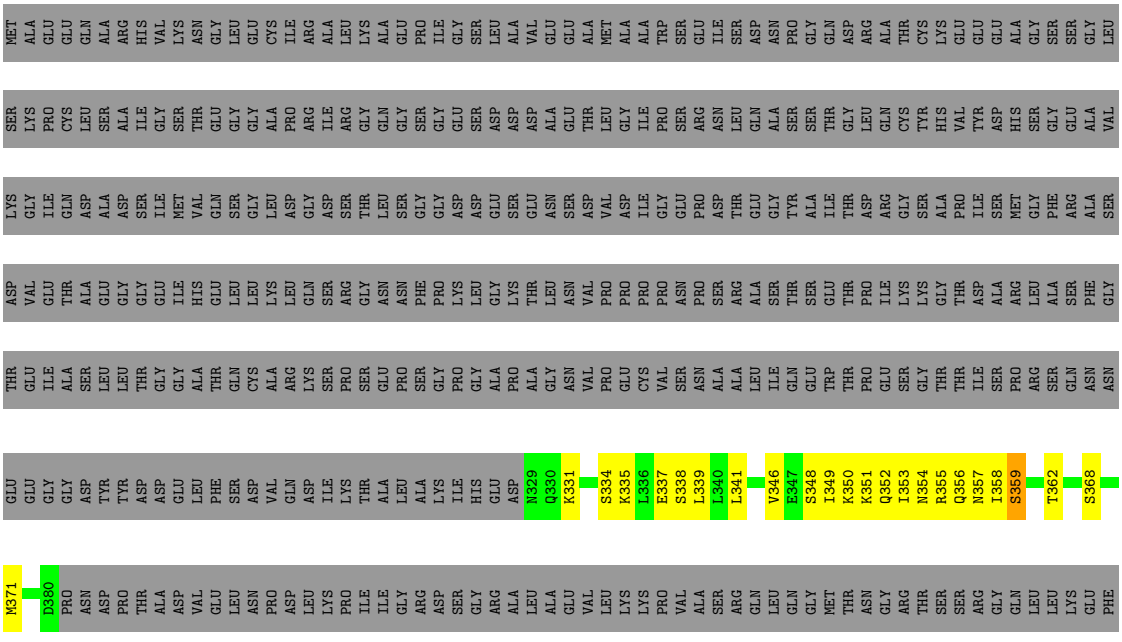
Chain A:





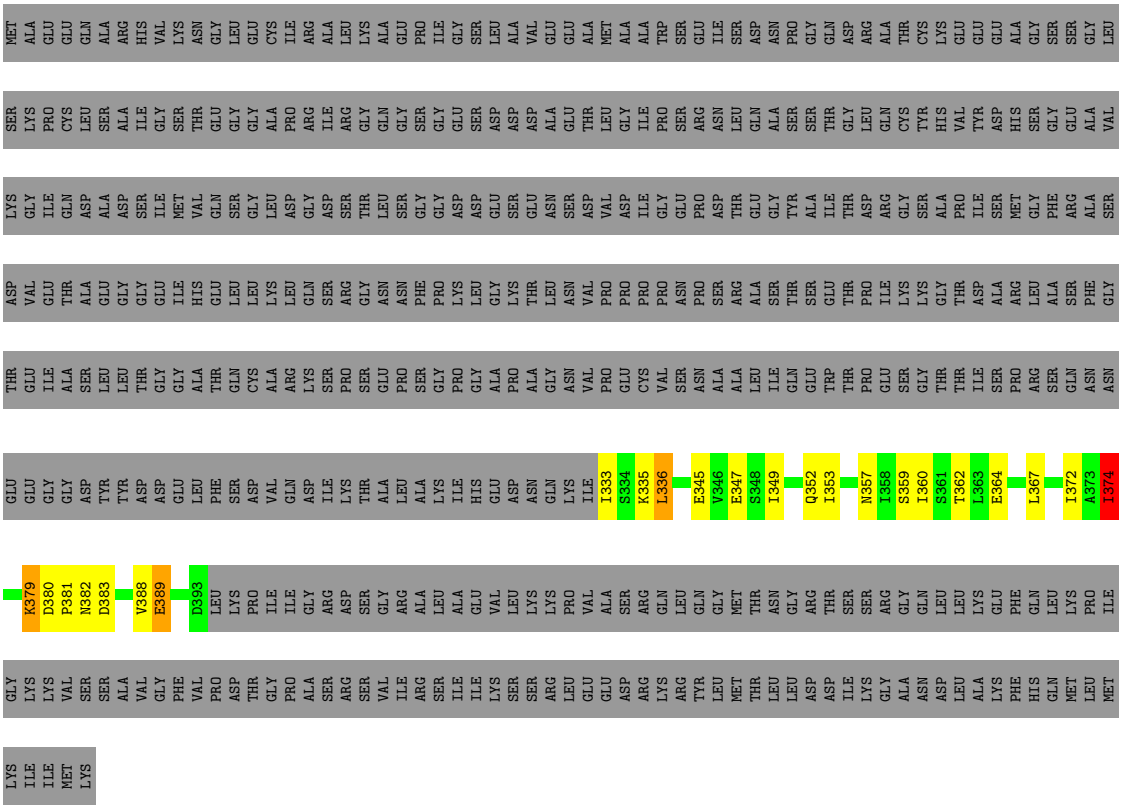
• Molecule 2: Phosphoprotein

Chain B: 6% 90%



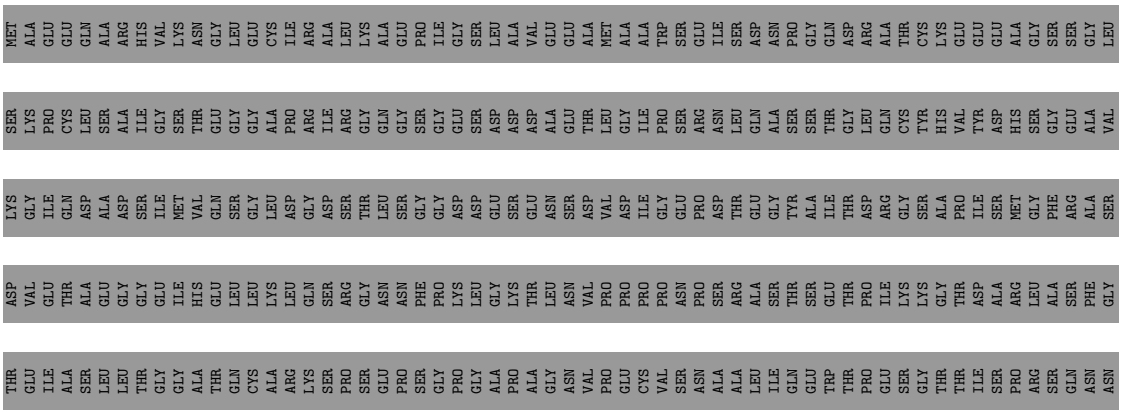
• Molecule 2: Phosphoprotein

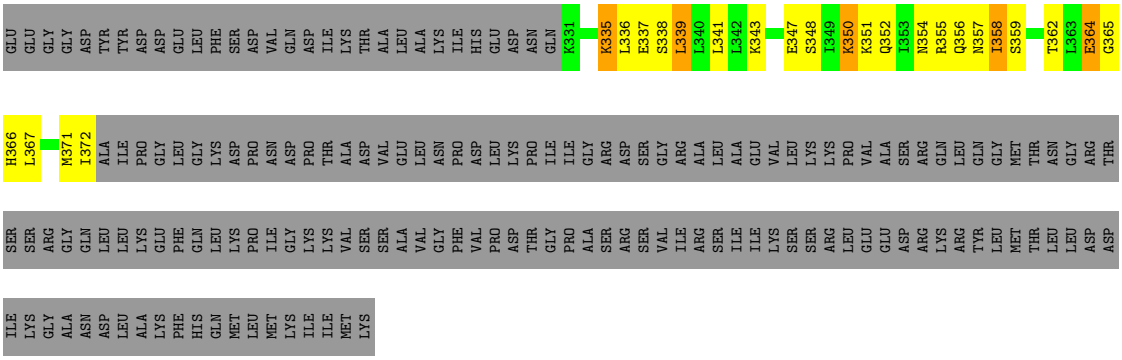
Chain D: 7% 88%



• Molecule 2: Phosphoprotein

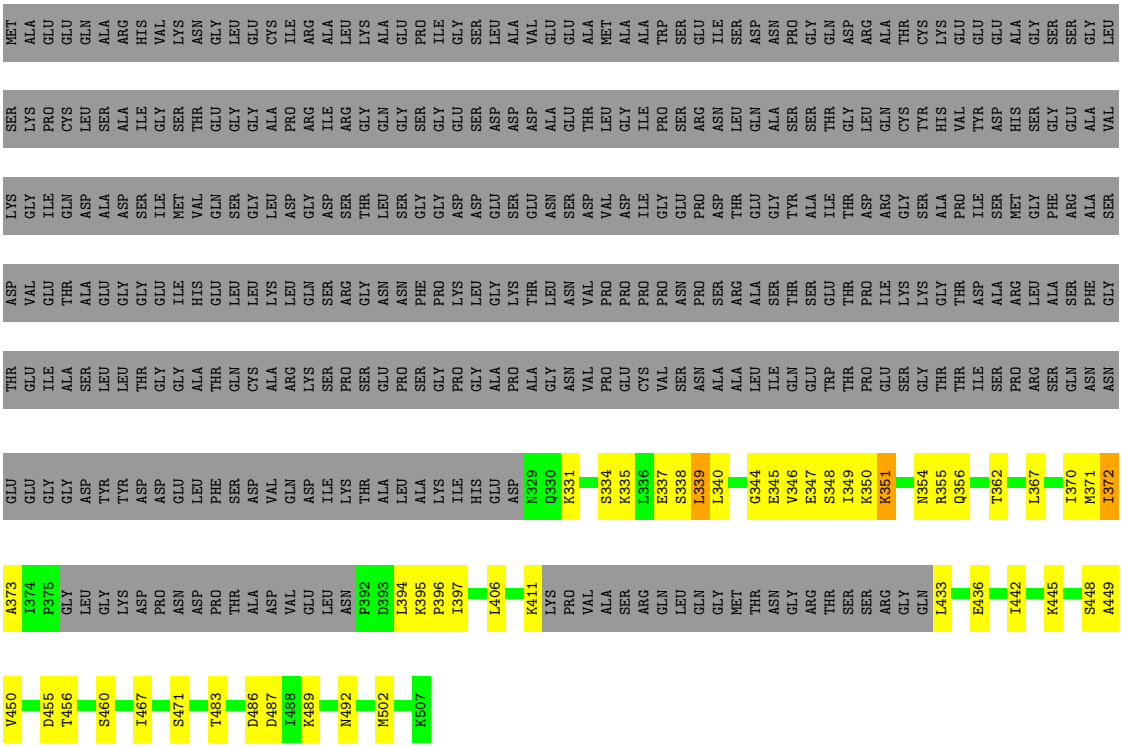
Chain E: 92%





• Molecule 2: Phosphoprotein

Chain C:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	185565	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

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

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	0.17	0/10537	0.36	0/14283
2	B	0.17	0/399	0.41	0/532
2	C	0.15	0/1119	0.41	0/1490
2	D	0.18	0/465	0.60	3/628 (0.5%)
2	E	0.18	0/328	0.48	0/436
All	All	0.17	0/12848	0.38	3/17369 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	374	ILE	CA-C-N	5.68	140.62	127.00
2	D	374	ILE	C-N-CA	5.68	140.62	127.00
2	D	374	ILE	C-N-CD	-5.12	109.34	120.60

There are no chirality outliers.

There are no planarity outliers.

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	10307	0	10315	149	0
2	B	398	0	438	16	0
2	C	1110	0	1216	36	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	461	0	483	21	0
2	E	328	0	367	22	0
3	A	2	0	0	0	0
All	All	12606	0	12819	226	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 9.

All (226) 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:1177:CYS:O	1:A:1181:GLU:HB2	1.78	0.83
2:D:379:LYS:HD2	2:D:380:ASP:H	1.41	0.83
1:A:1186:ASN:HB2	1:A:1318:LEU:HD23	1.64	0.80
1:A:1266:ARG:HD3	1:A:1399:TYR:HB2	1.65	0.78
1:A:729:GLN:HG2	1:A:730:ILE:HG23	1.66	0.78
2:B:338:SER:HB2	2:C:340:LEU:HD13	1.72	0.70
1:A:132:ASN:OD1	1:A:886:TYR:OH	2.05	0.68
2:B:356:GLN:OE1	2:C:356:GLN:NE2	2.28	0.66
1:A:1173:ARG:H	1:A:1173:ARG:HD3	1.61	0.66
1:A:23:ASN:ND2	1:A:712:CYS:SG	2.70	0.65
1:A:1166:MET:HG2	1:A:1365:VAL:HG22	1.78	0.63
1:A:371:ARG:NH2	1:A:728:ASP:O	2.32	0.62
1:A:1233:ARG:H	1:A:1235:LEU:HD23	1.65	0.62
2:C:331:LYS:HZ2	2:C:335:LYS:HG2	1.65	0.62
2:D:357:ASN:OD1	2:E:356:GLN:NE2	2.32	0.60
1:A:1171:ILE:HG23	1:A:1360:VAL:HG13	1.84	0.60
1:A:1201:ILE:HD11	1:A:1203:LYS:HG3	1.83	0.60
1:A:1325:LYS:HE3	1:A:1327:VAL:HG12	1.82	0.59
1:A:466:ASP:OD1	1:A:497:ARG:NH1	2.36	0.59
1:A:144:ASP:O	1:A:148:LYS:HG2	2.03	0.59
1:A:144:ASP:N	1:A:144:ASP:OD1	2.33	0.58
1:A:467:LYS:O	1:A:497:ARG:NH1	2.37	0.58
1:A:400:TYR:HE2	1:A:409:PRO:HD2	1.68	0.58
2:E:350:LYS:NZ	2:C:345:GLU:O	2.37	0.58
1:A:408:TRP:HB3	1:A:411:LEU:HB2	1.85	0.58
1:A:1330:ASN:N	1:A:1330:ASN:OD1	2.35	0.57
1:A:1318:LEU:O	1:A:1333:TYR:OH	2.21	0.57
2:E:371:MET:HB3	2:E:372:ILE:HD12	1.87	0.57
1:A:773:ASP:OD1	1:A:773:ASP:N	2.38	0.56
1:A:1007:GLN:OE1	1:A:1106:TYR:OH	2.23	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1372:ILE:HD12	1:A:1373:PRO:HD2	1.87	0.56
1:A:509:ASP:HB3	1:A:512:ASP:HB2	1.87	0.56
1:A:1138:ARG:HH22	1:A:1372:ILE:HB	1.69	0.56
1:A:101:GLU:HG2	1:A:199:SER:HB3	1.87	0.56
2:B:337:GLU:O	2:B:341:LEU:HG	2.07	0.55
1:A:245:MET:HE1	1:A:258:VAL:HG11	1.87	0.55
1:A:809:GLN:O	1:A:809:GLN:NE2	2.39	0.55
2:D:383:ASP:OD1	2:D:383:ASP:N	2.37	0.55
1:A:915:ASP:N	1:A:915:ASP:OD1	2.35	0.55
2:B:358:ILE:O	2:B:362:THR:HG23	2.07	0.55
2:D:379:LYS:HD2	2:D:380:ASP:N	2.18	0.54
1:A:417:ALA:HA	1:A:442:SER:HB2	1.89	0.54
1:A:343:ILE:O	1:A:346:THR:HG22	2.08	0.54
1:A:550:THR:HG22	1:A:551:TYR:H	1.71	0.54
2:B:335:LYS:O	2:B:339:LEU:HB2	2.08	0.54
1:A:568:ILE:HD11	1:A:686:ILE:HG21	1.89	0.54
1:A:860:ILE:HG12	1:A:1010:THR:HG22	1.90	0.54
2:E:337:GLU:O	2:E:341:LEU:HG	2.07	0.54
1:A:1239:VAL:O	1:A:1243:THR:HG22	2.08	0.53
1:A:1124:ASN:HB3	1:A:1127:ILE:HD12	1.89	0.53
1:A:1165:SER:HB2	1:A:1367:THR:HG22	1.88	0.53
2:E:350:LYS:NZ	2:C:349:ILE:HG23	2.22	0.53
2:D:345:GLU:O	2:D:349:ILE:HG12	2.09	0.53
1:A:1253:ASP:OD1	1:A:1253:ASP:N	2.38	0.53
1:A:963:ASP:OD1	1:A:966:ARG:NH2	2.42	0.52
1:A:1236:ARG:HD3	1:A:1240:ARG:HG2	1.91	0.52
2:E:348:SER:C	2:E:352:GLN:HE21	2.17	0.52
1:A:182:GLN:HG2	1:A:207:ARG:HH11	1.73	0.52
1:A:955:ASP:HB3	1:A:958:THR:HG22	1.90	0.52
1:A:1240:ARG:HD2	1:A:1241:ILE:H	1.75	0.52
2:E:355:ARG:HA	2:E:358:ILE:HG12	1.91	0.52
1:A:909:ASN:OD1	1:A:910:SER:N	2.43	0.52
1:A:407:SER:HB2	1:A:409:PRO:HD3	1.93	0.51
1:A:1189:TRP:HE3	1:A:1314:SER:HB3	1.76	0.51
1:A:1309:ARG:HG3	1:A:1310:TYR:HD1	1.75	0.51
2:D:333:ILE:N	2:D:336:LEU:HD23	2.26	0.51
2:C:351:LYS:HZ3	2:C:355:ARG:HG3	1.76	0.51
2:B:334:SER:OG	2:C:340:LEU:HD12	2.10	0.51
2:C:373:ALA:O	2:C:433:LEU:N	2.43	0.51
1:A:1395:ASN:HB3	1:A:1398:ILE:HG22	1.93	0.51
2:C:351:LYS:NZ	2:C:355:ARG:HG3	2.25	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:788:PRO:HG2	1:A:791:LEU:HD13	1.93	0.51
1:A:1303:SER:OG	1:A:1304:LEU:N	2.43	0.51
1:A:352:PHE:O	1:A:355:SER:OG	2.29	0.50
1:A:1082:THR:OG1	1:A:1083:LYS:N	2.43	0.50
1:A:1304:LEU:HD22	1:A:1304:LEU:H	1.77	0.50
2:B:357:ASN:OD1	2:B:358:ILE:N	2.45	0.50
2:C:351:LYS:HA	2:C:354:ASN:ND2	2.25	0.50
1:A:861:VAL:HG12	1:A:862:ASP:H	1.74	0.50
1:A:1327:VAL:HG23	1:A:1328:ASP:O	2.12	0.50
1:A:407:SER:C	1:A:408:TRP:HD1	2.20	0.49
1:A:797:ALA:O	1:A:801:ARG:HG3	2.12	0.49
2:B:349:ILE:HD12	2:B:350:LYS:N	2.27	0.49
2:E:337:GLU:HG2	2:E:338:SER:H	1.77	0.49
1:A:1009:ILE:HG23	1:A:1103:LEU:HG	1.94	0.49
1:A:500:ASP:OD1	1:A:501:VAL:N	2.45	0.49
2:C:345:GLU:OE1	2:C:346:VAL:HG13	2.12	0.49
2:C:467:ILE:O	2:C:471:SER:OG	2.29	0.49
1:A:1190:PHE:HB2	1:A:1361:LEU:HB3	1.94	0.49
2:E:343:LYS:HE3	2:C:339:LEU:HD12	1.94	0.49
2:C:346:VAL:O	2:C:350:LYS:HG3	2.13	0.48
1:A:1194:SER:OG	1:A:1195:GLY:N	2.45	0.48
1:A:1051:ASP:OD2	1:A:1384:ARG:NH2	2.41	0.48
1:A:456:LEU:HG	1:A:511:TYR:CD2	2.48	0.48
2:C:346:VAL:O	2:C:349:ILE:HG13	2.14	0.48
2:B:331:LYS:O	2:B:335:LYS:HB3	2.14	0.48
2:C:372:ILE:HG13	2:C:373:ALA:H	1.79	0.48
1:A:497:ARG:HD3	1:A:497:ARG:HA	1.70	0.48
1:A:173:THR:HG21	1:A:906:PHE:CE2	2.49	0.47
1:A:295:ASP:OD1	1:A:296:ILE:N	2.42	0.47
1:A:842:LEU:HD23	1:A:1304:LEU:HD12	1.96	0.47
2:C:371:MET:HB2	2:C:396:PRO:HA	1.97	0.47
2:D:380:ASP:N	2:D:381:PRO:HD3	2.30	0.47
2:C:367:LEU:O	2:C:370:ILE:HG22	2.15	0.47
1:A:419:ASP:OD1	1:A:419:ASP:N	2.48	0.47
1:A:371:ARG:HD3	1:A:727:ASN:HD21	1.79	0.47
1:A:248:ASP:OD1	1:A:249:ALA:N	2.48	0.47
1:A:480:TYR:HB2	1:A:485:LEU:HD11	1.97	0.47
1:A:929:ARG:HH11	1:A:974:PRO:HG2	1.78	0.47
2:C:455:ASP:OD1	2:C:460:SER:OG	2.32	0.47
2:C:411:LYS:HE2	2:C:436:GLU:HA	1.96	0.47
2:B:349:ILE:O	2:B:353:ILE:HG12	2.15	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1063:ILE:HD12	1:A:1245:TYR:HD1	1.80	0.46
2:C:351:LYS:HA	2:C:354:ASN:HD21	1.81	0.46
1:A:99:ASP:OD2	1:A:102:SER:OG	2.26	0.46
2:D:360:ILE:O	2:D:364:GLU:HG3	2.14	0.46
2:E:343:LYS:O	2:E:347:GLU:HG2	2.16	0.46
1:A:1000:SER:OG	1:A:1001:ALA:O	2.33	0.46
1:A:128:LEU:HD13	1:A:886:TYR:HB3	1.98	0.46
1:A:460:LEU:HG	1:A:1397:LEU:HD11	1.97	0.46
1:A:42:ASP:OD1	1:A:42:ASP:N	2.45	0.46
2:B:354:ASN:HB2	2:D:352:GLN:HE22	1.80	0.46
1:A:1177:CYS:O	1:A:1181:GLU:CB	2.58	0.45
2:E:357:ASN:HD21	2:C:355:ARG:HB2	1.82	0.45
1:A:1400:ASP:OD1	1:A:1400:ASP:N	2.49	0.45
1:A:904:LEU:HD23	1:A:904:LEU:HA	1.85	0.45
2:E:358:ILE:HG13	2:E:359:SER:N	2.31	0.45
1:A:530:LEU:HD22	1:A:705:LEU:HD22	1.97	0.45
1:A:918:ILE:HD13	1:A:918:ILE:HA	1.87	0.45
1:A:1063:ILE:HD12	1:A:1245:TYR:CD1	2.52	0.45
1:A:1115:MET:HE2	1:A:1115:MET:HB3	1.82	0.45
1:A:416:HIS:CE1	2:D:362:THR:HA	2.52	0.45
2:C:344:GLY:O	2:C:347:GLU:HG3	2.17	0.45
1:A:1169:HIS:CG	1:A:1179:ILE:HD11	2.52	0.45
2:B:352:GLN:O	2:B:355:ARG:HG3	2.17	0.44
1:A:833:SER:OG	1:A:834:LYS:N	2.48	0.44
1:A:1236:ARG:HA	1:A:1240:ARG:HG2	1.98	0.44
2:C:483:THR:HA	2:C:486:ASP:OD2	2.18	0.44
2:B:358:ILE:HD12	2:B:359:SER:N	2.32	0.44
2:D:367:LEU:HD23	2:D:367:LEU:HA	1.78	0.44
2:C:371:MET:HG2	2:C:395:LYS:O	2.18	0.44
1:A:459:ASP:OD1	1:A:460:LEU:N	2.42	0.44
2:D:359:SER:O	2:D:362:THR:OG1	2.34	0.44
2:E:350:LYS:HZ1	2:C:348:SER:HB3	1.83	0.44
1:A:371:ARG:HD3	1:A:727:ASN:ND2	2.33	0.44
1:A:1379:ARG:HD2	1:A:1379:ARG:HA	1.81	0.44
1:A:433:HIS:O	1:A:437:VAL:HG12	2.17	0.44
1:A:1233:ARG:C	1:A:1235:LEU:H	2.25	0.44
2:E:354:ASN:O	2:E:358:ILE:HG23	2.18	0.44
1:A:454:LEU:HD13	2:D:389:GLU:OE1	2.18	0.44
1:A:1392:LEU:H	1:A:1392:LEU:HD12	1.83	0.43
1:A:662:THR:OG1	1:A:663:ASP:N	2.51	0.43
1:A:1053:HIS:CE1	1:A:1380:ILE:HG23	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1363:LEU:HD12	1:A:1363:LEU:HA	1.89	0.43
2:B:346:VAL:HB	2:D:345:GLU:HG2	2.00	0.43
2:E:350:LYS:HG2	2:E:351:LYS:NZ	2.34	0.43
1:A:1169:HIS:CD2	1:A:1179:ILE:HD11	2.53	0.43
1:A:1200:ASP:OD1	1:A:1201:ILE:N	2.52	0.43
2:D:388:VAL:O	2:D:389:GLU:HB2	2.19	0.43
1:A:1059:ALA:O	1:A:1063:ILE:HG12	2.19	0.43
1:A:1097:SER:HA	1:A:1100:ILE:HG12	2.00	0.43
1:A:1265:GLN:HB3	1:A:1266:ARG:CZ	2.49	0.43
1:A:656:VAL:HG11	1:A:792:LYS:HB3	2.01	0.43
1:A:678:LEU:HD13	1:A:678:LEU:HA	1.78	0.43
1:A:241:THR:HG21	1:A:352:PHE:CE2	2.54	0.42
1:A:381:VAL:HG12	2:B:371:MET:HE2	2.01	0.42
2:B:348:SER:O	2:B:351:LYS:HG3	2.19	0.42
2:D:335:LYS:H	2:D:335:LYS:HD3	1.84	0.42
1:A:1007:GLN:OE1	1:A:1007:GLN:N	2.44	0.42
1:A:1125:VAL:HG23	1:A:1126:LEU:HD23	2.01	0.42
1:A:1329:THR:HB	1:A:1333:TYR:HB2	2.00	0.42
2:C:334:SER:O	2:C:337:GLU:HG3	2.19	0.42
2:D:349:ILE:O	2:D:353:ILE:HG12	2.19	0.42
1:A:1196:CYS:HA	1:A:1353:ASP:HB3	2.00	0.42
1:A:801:ARG:HB3	2:C:450:VAL:HG13	2.01	0.42
1:A:729:GLN:HE21	1:A:729:GLN:HB3	1.63	0.42
1:A:925:ASP:N	1:A:925:ASP:OD1	2.50	0.42
1:A:193:PRO:HB2	1:A:204:LEU:HD11	2.02	0.42
1:A:350:PHE:HB3	1:A:845:GLN:HE21	1.84	0.42
1:A:393:CYS:O	1:A:397:ILE:HG12	2.19	0.42
1:A:657:SER:HA	1:A:779:VAL:O	2.19	0.42
1:A:1197:GLN:CD	1:A:1198:LEU:H	2.28	0.42
2:E:336:LEU:HA	2:E:339:LEU:HB3	2.02	0.42
2:C:492:ASN:N	2:C:492:ASN:OD1	2.53	0.42
2:C:487:ASP:OD1	2:C:487:ASP:N	2.52	0.42
1:A:340:THR:OG1	1:A:341:ASP:N	2.52	0.42
1:A:1132:CYS:HB3	1:A:1135:GLN:HG2	2.02	0.42
1:A:1236:ARG:O	1:A:1240:ARG:NE	2.53	0.42
2:E:350:LYS:HZ2	2:C:349:ILE:HG23	1.84	0.42
2:C:442:ILE:O	2:C:442:ILE:HG13	2.19	0.42
1:A:901:LEU:HD23	1:A:901:LEU:HA	1.90	0.41
1:A:913:THR:O	1:A:917:VAL:HG12	2.20	0.41
1:A:1236:ARG:HH11	1:A:1240:ARG:HG2	1.85	0.41
1:A:143:GLU:H	1:A:143:GLU:CD	2.22	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:347:GLU:O	2:E:351:LYS:HE2	2.20	0.41
1:A:676:ILE:HD12	1:A:676:ILE:HA	1.89	0.41
2:D:379:LYS:H	2:D:379:LYS:HG3	1.64	0.41
2:C:448:SER:OG	2:C:449:ALA:N	2.52	0.41
1:A:298:VAL:HG22	2:C:502:MET:HG2	2.02	0.41
1:A:658:ALA:HB3	1:A:800:THR:OG1	2.20	0.41
2:E:364:GLU:HG3	2:E:365:GLY:N	2.35	0.41
1:A:297:THR:O	1:A:297:THR:OG1	2.37	0.41
1:A:415:LEU:HD13	1:A:416:HIS:CE1	2.56	0.41
1:A:461:THR:HG22	1:A:1078:MET:SD	2.61	0.41
1:A:163:GLU:HB2	1:A:164:PRO:HD3	2.03	0.41
1:A:554:ARG:HA	1:A:554:ARG:HD2	1.78	0.41
1:A:816:HIS:O	1:A:817:HIS:ND1	2.54	0.41
1:A:826:SER:OG	1:A:827:SER:N	2.54	0.41
1:A:1158:GLU:OE1	1:A:1158:GLU:N	2.53	0.41
1:A:1179:ILE:HD12	1:A:1180:CYS:N	2.36	0.41
1:A:515:MET:O	1:A:519:SER:OG	2.33	0.41
1:A:933:LEU:HB3	1:A:939:GLY:HA3	2.03	0.41
1:A:1187:TYR:N	1:A:1318:LEU:HB2	2.36	0.41
2:E:359:SER:O	2:E:362:THR:HG22	2.21	0.41
1:A:1041:GLU:HG3	1:A:1042:ASP:N	2.36	0.41
1:A:1048:PHE:HA	1:A:1384:ARG:HD2	2.03	0.41
1:A:357:GLY:O	1:A:358:HIS:ND1	2.55	0.40
2:E:335:LYS:C	2:E:336:LEU:HD23	2.46	0.40
1:A:1331:PHE:CE1	1:A:1333:TYR:HA	2.57	0.40
2:D:374:ILE:HA	2:D:374:ILE:HD12	1.77	0.40
2:C:445:LYS:HB2	2:C:445:LYS:HE2	1.74	0.40
1:A:1052:ARG:CZ	1:A:1382:SER:HB2	2.52	0.40
2:D:335:LYS:HE2	2:D:335:LYS:HB2	1.84	0.40
2:D:367:LEU:HD21	2:E:367:LEU:HD12	2.03	0.40
1:A:137:LEU:HD21	1:A:1343:VAL:HG13	2.02	0.40
2:C:489:LYS:HA	2:C:489:LYS:HD2	1.90	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	1276/2183 (58%)	1189 (93%)	87 (7%)	0	100	100
2	B	50/507 (10%)	48 (96%)	2 (4%)	0	100	100
2	C	136/507 (27%)	123 (90%)	13 (10%)	0	100	100
2	D	59/507 (12%)	47 (80%)	12 (20%)	0	100	100
2	E	40/507 (8%)	35 (88%)	5 (12%)	0	100	100
All	All	1561/4211 (37%)	1442 (92%)	119 (8%)	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	1144/1945 (59%)	1070 (94%)	74 (6%)	14	43
2	B	47/416 (11%)	45 (96%)	2 (4%)	25	58
2	C	127/416 (30%)	118 (93%)	9 (7%)	12	40
2	D	55/416 (13%)	48 (87%)	7 (13%)	3	17
2	E	40/416 (10%)	34 (85%)	6 (15%)	2	12
All	All	1413/3609 (39%)	1315 (93%)	98 (7%)	15	42

All (98) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	ILE
1	A	75	LYS
1	A	118	SER
1	A	145	ILE
1	A	181	SER
1	A	200	SER

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Mol	Chain	Res	Type
1	A	272	LEU
1	A	297	THR
1	A	361	LEU
1	A	370	VAL
1	A	396	ILE
1	A	415	LEU
1	A	420	THR
1	A	431	LEU
1	A	439	ASN
1	A	442	SER
1	A	446	VAL
1	A	456	LEU
1	A	461	THR
1	A	466	ASP
1	A	478	SER
1	A	483	GLU
1	A	488	ASP
1	A	493	THR
1	A	539	ILE
1	A	558	VAL
1	A	568	ILE
1	A	678	LEU
1	A	689	LEU
1	A	703	SER
1	A	785	SER
1	A	787	TRP
1	A	799	VAL
1	A	831	VAL
1	A	841	LEU
1	A	853	CYS
1	A	861	VAL
1	A	869	SER
1	A	878	SER
1	A	891	LEU
1	A	927	LEU
1	A	982	MET
1	A	993	ASP
1	A	1000	SER
1	A	1030	LEU
1	A	1033	LEU
1	A	1041	GLU
1	A	1067	SER

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Mol	Chain	Res	Type
1	A	1081	THR
1	A	1083	LYS
1	A	1096	THR
1	A	1103	LEU
1	A	1104	SER
1	A	1128	ASP
1	A	1171	ILE
1	A	1176	THR
1	A	1179	ILE
1	A	1184	SER
1	A	1192	VAL
1	A	1235	LEU
1	A	1240	ARG
1	A	1241	ILE
1	A	1254	SER
1	A	1270	SER
1	A	1318	LEU
1	A	1321	VAL
1	A	1330	ASN
1	A	1331	PHE
1	A	1332	ILE
1	A	1360	VAL
1	A	1372	ILE
1	A	1394	THR
1	A	1397	LEU
1	A	1398	ILE
2	B	359	SER
2	B	368	SER
2	D	336	LEU
2	D	347	GLU
2	D	372	ILE
2	D	374	ILE
2	D	379	LYS
2	D	382	ASN
2	D	389	GLU
2	E	335	LYS
2	E	339	LEU
2	E	350	LYS
2	E	358	ILE
2	E	364	GLU
2	E	366	HIS
2	C	338	SER

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Mol	Chain	Res	Type
2	C	339	LEU
2	C	351	LYS
2	C	362	THR
2	C	372	ILE
2	C	394	LEU
2	C	397	ILE
2	C	406	LEU
2	C	456	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	23	ASN
1	A	51	HIS
1	A	91	ASN
1	A	114	ASN
1	A	126	GLN
1	A	157	HIS
1	A	292	GLN
1	A	307	HIS
1	A	344	HIS
1	A	369	ASN
1	A	425	GLN
1	A	557	GLN
1	A	729	GLN
1	A	771	GLN
1	A	809	GLN
1	A	845	GLN
1	A	1061	HIS
1	A	1186	ASN
1	A	1317	ASN
1	A	1335	GLN
1	A	1401	ASN
2	B	356	GLN
2	B	366	HIS
2	D	352	GLN
2	D	356	GLN
2	E	352	GLN
2	E	354	ASN
2	C	356	GLN
2	C	498	HIS

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 2 ligands modelled in this entry, 2 are 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

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.