



Full wwPDB EM Validation Report ⓘ

Aug 17, 2025 – 12:09 AM JST

PDB ID : 9L0D / pdb_00009l0d
EMDB ID : EMD-62697
Title : Cryo-EM structure of the human MON1A/CCZ1/C18orf8 complex
Authors : Tang, Y.; Han, Y.; Zhang, Y.; Pan, L.
Deposited on : 2024-12-12
Resolution : 3.41 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) : 2.45.1

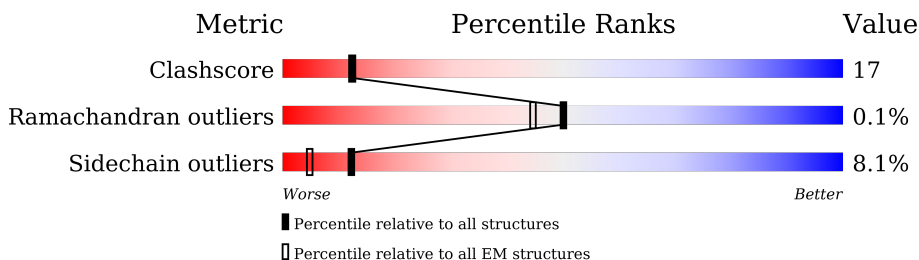
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.41 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	418	49% 45% 6%
2	B	482	67% 27% • •
3	C	657	62% 35% •
4	D	207	49% 32% • 14%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 13894 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 Vacuolar fusion protein MON1 homolog A.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	417	Total	C	N	O	S	0	0
			3349	2136	593	609	11		

- Molecule 2 is a protein called Vacuolar fusion protein CCZ1 homolog B.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	466	Total	C	N	O	S	0	0
			3837	2465	642	707	23		

- Molecule 3 is a protein called Regulator of MON1-CCZ1 complex.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	657	Total	C	N	O	S	0	0
			5280	3391	900	960	29		

- Molecule 4 is a protein called Ras-related protein Rab-7a.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	178	Total	C	N	O	S	0	0
			1428	908	241	273	6		

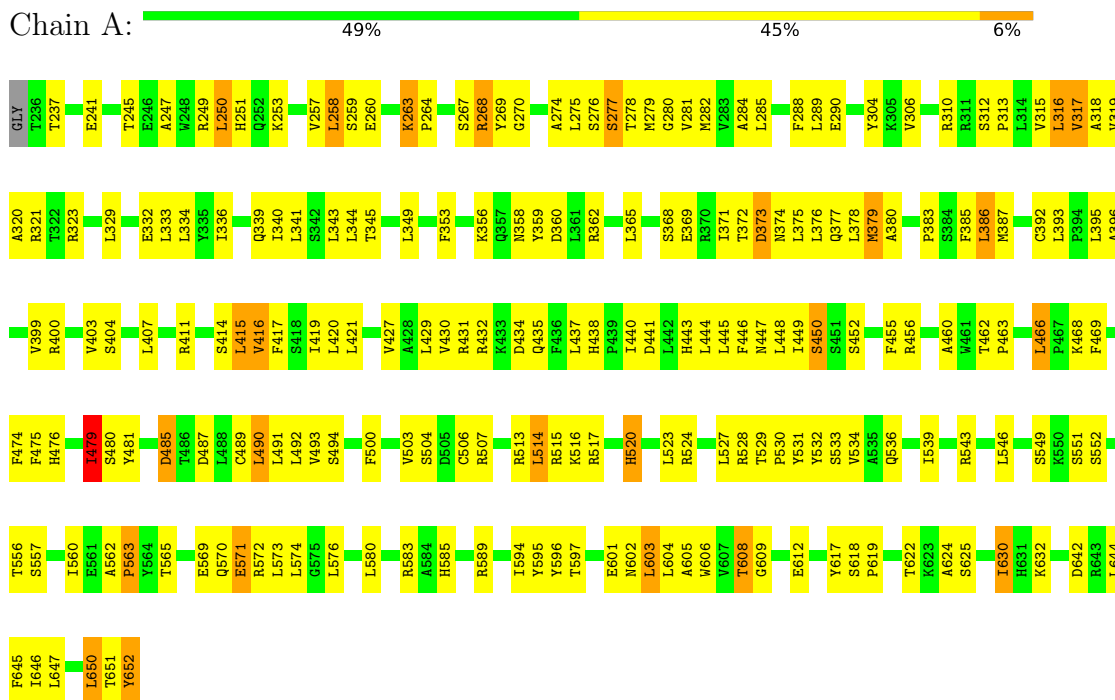
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	22	ASN	THR	conflict	UNP P51149

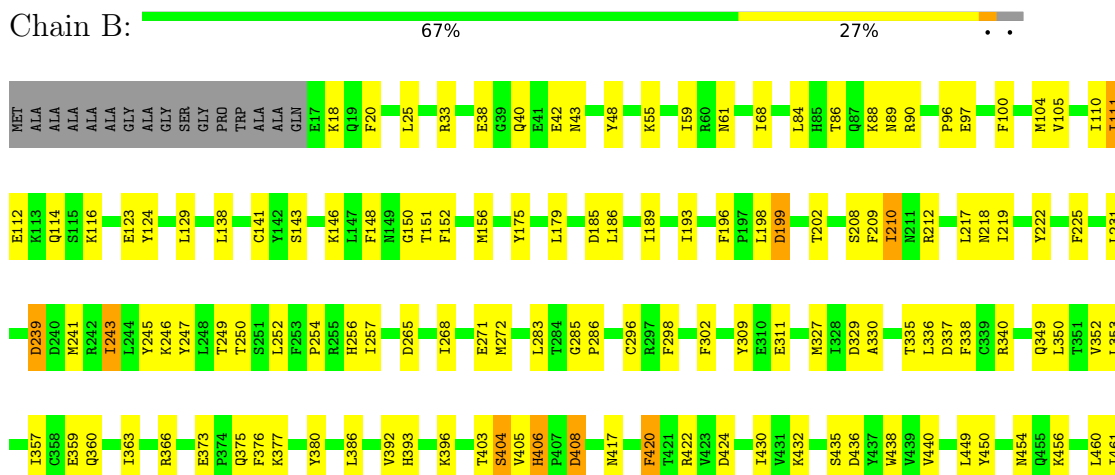
3 Residue-property plots

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: Vacuolar fusion protein MON1 homolog A



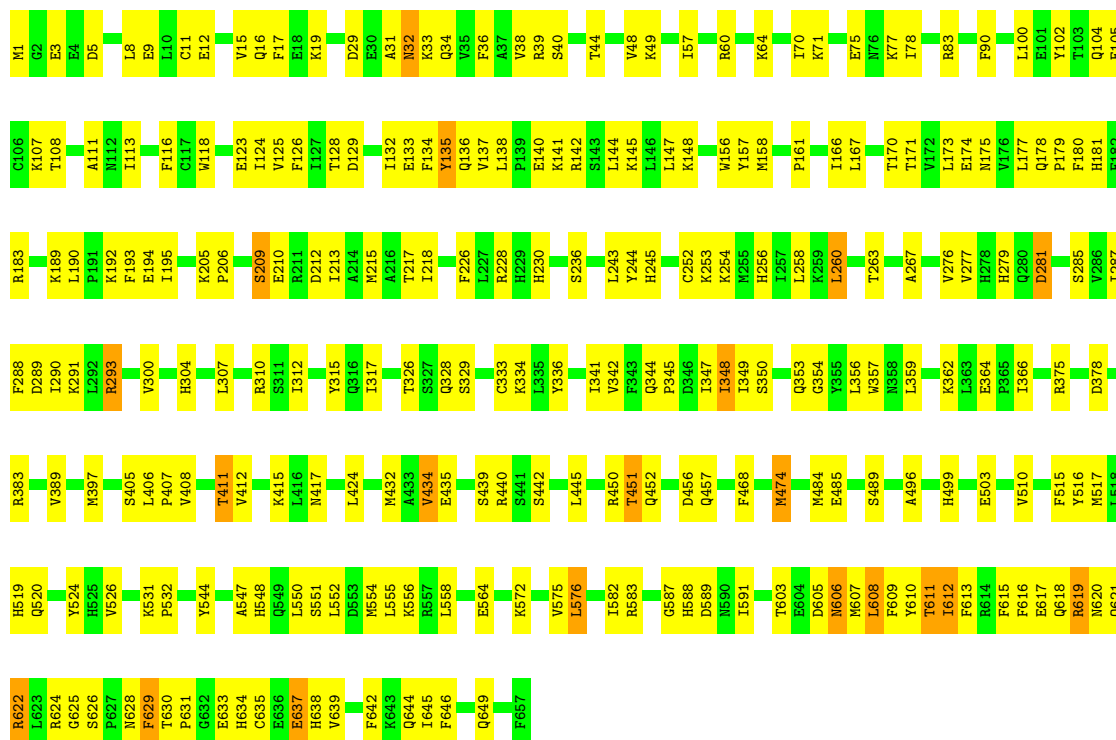
• Molecule 2: Vacuolar fusion protein CCZ1 homolog B





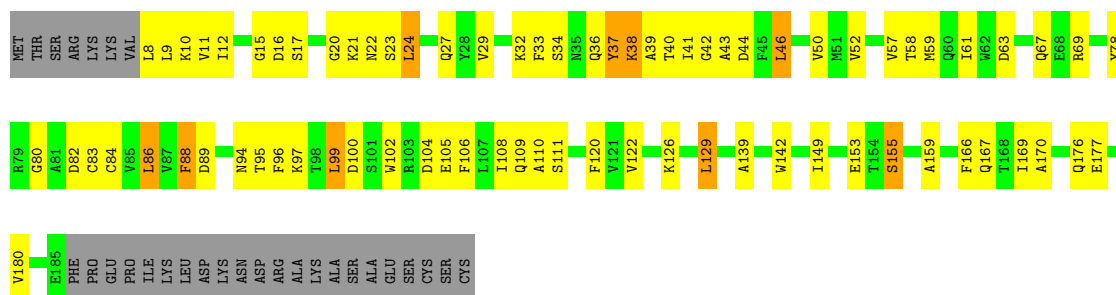
• Molecule 3: Regulator of MON1-CCZ1 complex

Chain C: 62% 35%



• Molecule 4: Ras-related protein Rab-7a

Chain D: 49% 32% 14%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	77193	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TECNAI SPIRIT	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	49.4	Depositor
Minimum defocus (nm)	1400	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k 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	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.25	0/3423	0.53	1/4636 (0.0%)
2	B	0.28	0/3927	0.46	0/5298
3	C	0.21	0/5404	0.45	0/7319
4	D	0.27	0/1455	0.55	0/1970
All	All	0.25	0/14209	0.48	1/19223 (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	2
3	C	0	2
All	All	0	4

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	479	ILE	N-CA-C	5.06	114.06	106.42

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	275	LEU	Peptide
1	A	277	SER	Peptide
3	C	611	THR	Peptide
3	C	649	GLN	Peptide

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	3349	0	3361	147	0
2	B	3837	0	3809	90	0
3	C	5280	0	5310	184	0
4	D	1428	0	1405	56	0
All	All	13894	0	13885	465	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 17.

All (465) 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:339:GLN:HE22	1:A:371:ILE:HG22	1.43	0.83
4:D:34:SER:HB3	4:D:46:LEU:HB3	1.62	0.81
1:A:455:PHE:HD1	1:A:479:ILE:HG12	1.45	0.81
3:C:519:HIS:HD1	3:C:544:TYR:HH	1.25	0.80
3:C:612:ILE:O	3:C:616:PHE:N	2.13	0.80
3:C:607:MET:O	3:C:611:THR:OG1	2.00	0.79
3:C:167:LEU:HD11	3:C:177:LEU:HB3	1.65	0.79
1:A:374:ASN:OD1	1:A:447:ASN:ND2	2.18	0.76
3:C:334:LYS:H	3:C:353:GLN:HE22	1.33	0.76
4:D:166:PHE:HA	4:D:169:ILE:HD12	1.68	0.75
2:B:186:LEU:HD12	2:B:189:ILE:HD12	1.68	0.74
2:B:212:ARG:NH1	2:B:349:GLN:OE1	2.20	0.74
2:B:468:LYS:HE2	2:B:482:ASP:HB3	1.71	0.73
1:A:597:THR:HA	1:A:602:ASN:HB2	1.69	0.72
2:B:286:PRO:HD3	2:B:296:CYS:HA	1.71	0.72
3:C:289:ASP:OD2	3:C:383:ARG:NH2	2.23	0.71
3:C:276:VAL:HG22	3:C:287:ILE:HG22	1.72	0.71
1:A:318:ALA:HB2	1:A:333:LEU:HD21	1.71	0.71
2:B:435:SER:O	2:B:456:LYS:NZ	2.24	0.71
2:B:202:THR:OG1	2:B:360:GLN:OE1	2.09	0.70
2:B:475:PHE:HB3	2:B:478:ILE:HB	1.73	0.70
1:A:562:ALA:HB3	1:A:563:PRO:HD3	1.72	0.70
3:C:605:ASP:O	3:C:608:LEU:N	2.21	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:20:PHE:HB2	2:B:110:ILE:HB	1.74	0.70
3:C:617:GLU:O	3:C:622:ARG:NH2	2.24	0.70
2:B:38:GLU:OE1	4:D:67:GLN:NE2	2.24	0.70
2:B:18:LYS:HB3	2:B:112:GLU:HB3	1.72	0.69
1:A:580:LEU:HD11	1:A:603:LEU:HD13	1.74	0.69
1:A:416:VAL:HG13	1:A:493:VAL:HG23	1.73	0.69
1:A:608:THR:OG1	1:A:609:GLY:N	2.23	0.69
3:C:17:PHE:HB3	3:C:49:LYS:HD2	1.75	0.69
4:D:17:SER:HA	4:D:21:LYS:HG3	1.74	0.69
4:D:33:PHE:O	4:D:37:TYR:OH	2.11	0.69
1:A:432:ARG:HH21	1:A:652:TYR:HB3	1.57	0.69
2:B:473:THR:HG22	2:B:474:GLN:HG2	1.74	0.69
1:A:393:LEU:O	1:A:400:ARG:NH2	2.21	0.68
1:A:431:ARG:NH1	1:A:435:GLN:O	2.27	0.68
4:D:8:LEU:HB2	4:D:58:THR:HB	1.76	0.67
3:C:125:VAL:HB	3:C:132:ILE:HD11	1.76	0.67
3:C:138:LEU:HD12	3:C:141:LYS:HD3	1.77	0.67
3:C:582:ILE:HD12	3:C:591:ILE:HG21	1.76	0.67
4:D:29:VAL:HG11	4:D:46:LEU:HD12	1.77	0.67
2:B:436:ASP:HB2	2:B:456:LYS:HD2	1.78	0.66
2:B:86:THR:OG1	2:B:89:ASN:O	2.14	0.66
3:C:642:PHE:HA	3:C:645:ILE:HD13	1.77	0.66
2:B:377:LYS:NZ	2:B:404:SER:OG	2.28	0.66
4:D:46:LEU:O	4:D:61:ILE:HB	1.96	0.66
1:A:403:VAL:HG23	1:A:514:LEU:HD11	1.77	0.65
3:C:326:THR:HG23	3:C:328:GLN:HG3	1.79	0.65
4:D:88:PHE:HD2	4:D:95:THR:HG23	1.62	0.65
4:D:11:VAL:HG22	4:D:83:CYS:HB3	1.78	0.64
1:A:407:LEU:HD23	1:A:430:VAL:HG23	1.78	0.64
3:C:147:LEU:HD23	3:C:148:LYS:HB2	1.80	0.64
1:A:264:PRO:HB3	1:A:279:MET:HE3	1.80	0.64
1:A:419:ILE:O	1:A:491:LEU:N	2.26	0.64
4:D:94:ASN:HA	4:D:97:LYS:HD2	1.80	0.64
1:A:419:ILE:HD13	1:A:429:LEU:HB2	1.81	0.63
3:C:307:LEU:HD11	3:C:366:ILE:HG23	1.81	0.62
4:D:120:PHE:HB2	4:D:149:ILE:HD13	1.81	0.62
3:C:624:ARG:HH22	3:C:626:SER:HB2	1.65	0.62
3:C:616:PHE:O	3:C:619:ARG:NE	2.33	0.62
3:C:8:LEU:HB3	3:C:359:LEU:HD11	1.80	0.62
1:A:572:ARG:NH1	1:A:601:GLU:OE1	2.33	0.61
3:C:285:SER:N	3:C:310:ARG:O	2.30	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:239:ASP:N	2:B:239:ASP:OD2	2.33	0.61
2:B:377:LYS:HB3	2:B:392:VAL:HG12	1.81	0.61
3:C:610:TYR:C	3:C:612:ILE:H	2.08	0.61
4:D:17:SER:OG	4:D:67:GLN:NE2	2.34	0.60
3:C:135:TYR:HB2	3:C:144:LEU:HD22	1.82	0.60
1:A:404:SER:OG	1:A:650:LEU:HG	2.02	0.60
3:C:624:ARG:NH2	3:C:626:SER:HB2	2.17	0.60
3:C:589:ASP:O	3:C:619:ARG:NH1	2.34	0.60
4:D:78:TYR:HB3	4:D:110:ALA:HB2	1.84	0.60
3:C:547:ALA:HA	3:C:550:LEU:HB2	1.83	0.60
3:C:607:MET:HB2	3:C:646:PHE:HZ	1.66	0.59
3:C:621:GLN:HE22	3:C:625:GLY:HA2	1.67	0.59
3:C:29:ASP:O	3:C:33:LYS:N	2.36	0.59
3:C:181:HIS:HE1	3:C:183:ARG:HB3	1.66	0.59
3:C:1:MET:SD	3:C:310:ARG:NH1	2.75	0.59
2:B:329:ASP:OD1	2:B:330:ALA:N	2.30	0.58
1:A:276:SER:O	1:A:280:GLY:N	2.36	0.58
1:A:460:ALA:HB3	1:A:479:ILE:HD11	1.84	0.58
1:A:267:SER:OG	1:A:270:GLY:O	2.19	0.58
1:A:279:MET:HA	1:A:282:MET:HB2	1.85	0.58
3:C:583:ARG:HA	3:C:588:HIS:HB3	1.86	0.58
1:A:339:GLN:NE2	1:A:371:ILE:O	2.37	0.58
1:A:455:PHE:CD1	1:A:479:ILE:HG12	2.34	0.58
3:C:179:PRO:HB2	3:C:190:LEU:HD12	1.85	0.58
3:C:621:GLN:HB3	3:C:622:ARG:HH21	1.69	0.57
4:D:100:ASP:OD1	4:D:142:TRP:NE1	2.37	0.57
3:C:451:THR:OG1	3:C:452:GLN:N	2.37	0.57
1:A:569:GLU:OE2	1:A:572:ARG:NE	2.33	0.57
1:A:481:TYR:CD2	1:A:489:CYS:HB2	2.40	0.57
3:C:16:GLN:O	3:C:49:LYS:NZ	2.30	0.57
3:C:350:SER:O	3:C:354:GLY:N	2.38	0.57
3:C:348:ILE:HG13	3:C:357:TRP:HB2	1.86	0.56
1:A:249:ARG:O	1:A:321:ARG:NH2	2.38	0.56
1:A:290:GLU:OE1	1:A:310:ARG:NH1	2.38	0.56
2:B:111:ILE:HG13	2:B:123:GLU:HB3	1.86	0.56
2:B:479:PHE:CE1	3:C:556:LYS:HB2	2.40	0.56
3:C:616:PHE:HA	3:C:619:ARG:HE	1.70	0.56
1:A:515:ARG:HA	1:A:520:HIS:HB3	1.87	0.56
3:C:606:ASN:O	3:C:610:TYR:N	2.38	0.56
3:C:612:ILE:HA	3:C:615:PHE:HB3	1.87	0.56
2:B:219:ILE:HD11	2:B:338:PHE:CE2	2.40	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:551:SER:O	3:C:554:MET:HB3	2.05	0.56
1:A:549:SER:OG	1:A:552:SER:OG	2.20	0.56
3:C:245:HIS:HB3	3:C:253:LYS:HG3	1.88	0.56
1:A:481:TYR:CE2	1:A:489:CYS:HB2	2.41	0.56
1:A:485:ASP:OD1	1:A:485:ASP:N	2.33	0.56
1:A:396:ALA:HB3	1:A:399:VAL:HB	1.87	0.55
1:A:400:ARG:HD3	1:A:646:ILE:HG12	1.89	0.55
1:A:606:TRP:HB2	1:A:630:ILE:HD11	1.88	0.55
3:C:218:ILE:HG21	3:C:290:ILE:HD13	1.88	0.55
4:D:17:SER:HA	4:D:21:LYS:CG	2.37	0.55
1:A:380:ALA:HB1	1:A:571:GLU:HG2	1.89	0.55
1:A:589:ARG:NE	2:B:408:ASP:HB3	2.21	0.55
3:C:138:LEU:O	3:C:142:ARG:N	2.40	0.55
1:A:263:LYS:HE3	4:D:8:LEU:HD21	1.88	0.54
1:A:395:LEU:H	1:A:400:ARG:NH2	2.05	0.54
3:C:564:GLU:OE2	3:C:564:GLU:N	2.38	0.54
1:A:312:SER:OG	1:A:313:PRO:HD3	2.07	0.54
3:C:107:LYS:NZ	3:C:108:THR:OG1	2.41	0.54
3:C:405:SER:OG	3:C:407:PRO:HD2	2.08	0.54
1:A:374:ASN:OD1	1:A:375:LEU:N	2.40	0.54
1:A:260:GLU:OE2	1:A:310:ARG:NH2	2.41	0.54
1:A:323:ARG:HE	2:B:422:ARG:HD3	1.73	0.54
3:C:397:MET:HE1	3:C:412:VAL:HG11	1.90	0.54
3:C:450:ARG:NH1	3:C:456:ASP:OD2	2.38	0.54
3:C:474:MET:SD	3:C:474:MET:N	2.80	0.54
3:C:615:PHE:HA	3:C:618:GLN:HB2	1.89	0.54
2:B:476:ASN:O	3:C:556:LYS:NZ	2.34	0.53
3:C:344:GLN:N	3:C:344:GLN:OE1	2.42	0.53
3:C:111:ALA:HB1	3:C:128:THR:HB	1.90	0.53
4:D:176:GLN:O	4:D:180:VAL:HG23	2.08	0.53
3:C:3:GLU:OE2	3:C:362:LYS:NZ	2.29	0.53
3:C:267:ALA:HB1	3:C:342:VAL:HG11	1.88	0.53
3:C:457:GLN:NE2	3:C:496:ALA:O	2.34	0.53
2:B:246:LYS:O	2:B:250:THR:OG1	2.19	0.53
1:A:284:ALA:O	1:A:288:PHE:N	2.38	0.53
3:C:39:ARG:O	3:C:44:THR:HA	2.09	0.53
3:C:32:ASN:O	3:C:34:GLN:NE2	2.39	0.53
3:C:180:PHE:HE1	3:C:189:LYS:HG2	1.74	0.53
3:C:484:MET:HE1	3:C:526:VAL:HG11	1.91	0.53
3:C:440:ARG:NH1	3:C:445:LEU:O	2.38	0.53
4:D:52:VAL:HG21	4:D:170:ALA:HB3	1.91	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:516:LYS:HE3	1:A:517:ARG:HH21	1.74	0.53
3:C:630:THR:HB	3:C:631:PRO:HD2	1.90	0.53
3:C:64:LYS:HE2	3:C:83:ARG:HD2	1.91	0.52
3:C:279:HIS:CE1	3:C:281:ASP:HB2	2.44	0.52
1:A:437:LEU:HD12	1:A:438:HIS:H	1.74	0.52
3:C:40:SER:HA	3:C:44:THR:HG22	1.90	0.52
3:C:260:LEU:HD11	3:C:277:VAL:HG11	1.91	0.52
4:D:39:ALA:C	4:D:41:ILE:H	2.17	0.52
3:C:100:LEU:HD22	3:C:142:ARG:HD3	1.91	0.52
4:D:96:PHE:HE2	4:D:139:ALA:HA	1.75	0.52
2:B:404:SER:OG	2:B:404:SER:O	2.26	0.52
3:C:157:TYR:HB2	3:C:166:ILE:HD11	1.92	0.52
1:A:358:ASN:O	1:A:358:ASN:ND2	2.43	0.52
2:B:208:SER:OG	3:C:485:GLU:OE2	2.28	0.52
4:D:36:GLN:HA	4:D:39:ALA:HB3	1.90	0.52
3:C:205:LYS:HD2	3:C:206:PRO:HD2	1.92	0.52
1:A:530:PRO:HG2	1:A:531:TYR:HD2	1.75	0.52
1:A:456:ARG:HG2	1:A:481:TYR:CE1	2.45	0.51
3:C:48:VAL:HB	3:C:57:ILE:HB	1.92	0.51
3:C:613:PHE:HA	3:C:616:PHE:HD2	1.74	0.51
3:C:177:LEU:HD11	3:C:195:ILE:HG12	1.92	0.51
3:C:605:ASP:O	3:C:607:MET:N	2.44	0.51
1:A:585:HIS:NE2	1:A:612:GLU:OE2	2.32	0.51
3:C:136:GLN:OE1	3:C:147:LEU:HB2	2.10	0.51
1:A:276:SER:O	1:A:278:THR:O	2.28	0.51
1:A:400:ARG:NH1	1:A:427:VAL:O	2.44	0.51
2:B:417:ASN:ND2	2:B:450:TYR:OH	2.44	0.51
3:C:411:THR:O	3:C:415:LYS:HG3	2.11	0.51
2:B:185:ASP:N	2:B:185:ASP:OD1	2.44	0.51
3:C:104:GLN:NE2	3:C:105:GLU:O	2.44	0.51
3:C:434:VAL:HG23	3:C:445:LEU:HD11	1.93	0.51
2:B:373:GLU:O	2:B:375:GLN:NE2	2.44	0.51
1:A:247:ALA:HA	1:A:250:LEU:HD11	1.92	0.51
3:C:342:VAL:HG12	3:C:348:ILE:HG22	1.93	0.51
1:A:368:SER:O	1:A:368:SER:OG	2.27	0.50
2:B:199:ASP:OD1	2:B:199:ASP:N	2.33	0.50
4:D:104:ASP:O	4:D:108:ILE:HG12	2.11	0.50
1:A:417:PHE:CE2	1:A:437:LEU:HD13	2.47	0.50
2:B:265:ASP:OD1	2:B:265:ASP:N	2.43	0.50
1:A:543:ARG:NE	1:A:618:SER:OG	2.42	0.50
2:B:336:LEU:O	2:B:340:ARG:HG3	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:304:TYR:HB2	1:A:320:ALA:O	2.11	0.50
2:B:193:ILE:HG21	2:B:231:LEU:HD22	1.93	0.50
3:C:548:HIS:CE1	3:C:572:LYS:HD3	2.46	0.50
1:A:360:ASP:OD2	1:A:362:ARG:HG2	2.12	0.50
1:A:419:ILE:HB	1:A:491:LEU:HB2	1.94	0.50
1:A:513:ARG:HB2	1:A:517:ARG:NH2	2.27	0.50
1:A:446:PHE:O	1:A:450:SER:OG	2.27	0.50
2:B:88:LYS:HG2	2:B:124:TYR:CE2	2.47	0.49
3:C:123:GLU:HB3	3:C:134:PHE:CE2	2.47	0.49
3:C:613:PHE:O	3:C:616:PHE:HB2	2.11	0.49
1:A:411:ARG:NH1	1:A:652:TYR:OXT	2.45	0.49
3:C:499:HIS:O	3:C:503:GLU:HG2	2.13	0.49
3:C:133:GLU:OE2	3:C:135:TYR:OH	2.27	0.49
1:A:276:SER:O	1:A:278:THR:C	2.56	0.49
1:A:416:VAL:HA	1:A:432:ARG:HG3	1.93	0.49
1:A:619:PRO:HB2	3:C:576:LEU:HD11	1.93	0.49
2:B:245:TYR:O	2:B:249:THR:HG22	2.13	0.49
4:D:52:VAL:HG22	4:D:167:GLN:HE22	1.77	0.49
4:D:88:PHE:HB2	4:D:95:THR:OG1	2.12	0.49
1:A:332:GLU:HG3	1:A:379:MET:HE3	1.95	0.49
1:A:466:LEU:HD13	1:A:469:PHE:HB3	1.94	0.49
1:A:487:ASP:OD1	1:A:487:ASP:N	2.42	0.49
3:C:624:ARG:HH21	3:C:630:THR:H	1.60	0.49
1:A:500:PHE:O	1:A:504:SER:HB2	2.13	0.49
1:A:573:LEU:HA	1:A:576:LEU:HD12	1.94	0.49
4:D:99:LEU:HD12	4:D:102:TRP:HD1	1.77	0.48
2:B:148:PHE:HZ	2:B:247:TYR:CZ	2.30	0.48
2:B:231:LEU:HD11	2:B:241:MET:HE2	1.93	0.48
1:A:449:ILE:HD11	1:A:491:LEU:HD21	1.95	0.48
2:B:86:THR:OG1	2:B:89:ASN:OD1	2.27	0.48
3:C:258:LEU:HB3	3:C:288:PHE:CE1	2.49	0.48
1:A:455:PHE:HA	1:A:479:ILE:HD13	1.95	0.48
2:B:104:MET:HB2	2:B:138:LEU:HD13	1.95	0.48
3:C:243:LEU:HB2	3:C:256:HIS:HB2	1.95	0.48
3:C:510:VAL:HG23	3:C:515:PHE:CE1	2.49	0.48
4:D:21:LYS:HD2	4:D:21:LYS:HA	1.66	0.48
2:B:454:ASN:O	2:B:454:ASN:ND2	2.47	0.48
3:C:622:ARG:H	3:C:622:ARG:NE	2.12	0.48
3:C:624:ARG:HG3	3:C:625:GLY:H	1.79	0.48
3:C:71:LYS:HB2	3:C:116:PHE:CE2	2.49	0.47
4:D:126:LYS:HD3	4:D:129:LEU:HD13	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:356:LYS:HE3	1:A:358:ASN:HB3	1.96	0.47
3:C:312:ILE:HG13	3:C:336:TYR:OH	2.14	0.47
4:D:15:GLY:HA3	4:D:21:LYS:NZ	2.28	0.47
1:A:356:LYS:HG2	4:D:180:VAL:HG13	1.96	0.47
1:A:386:LEU:HG	1:A:387:MET:HG2	1.96	0.47
3:C:175:ASN:ND2	3:C:194:GLU:OE1	2.47	0.47
4:D:9:LEU:HD23	4:D:82:ASP:OD2	2.15	0.47
1:A:344:LEU:HD13	1:A:365:LEU:HD21	1.97	0.47
1:A:594:ILE:HG22	1:A:595:TYR:H	1.79	0.47
3:C:32:ASN:HB2	3:C:34:GLN:HG2	1.96	0.47
3:C:610:TYR:C	3:C:612:ILE:N	2.69	0.47
3:C:618:GLN:C	3:C:622:ARG:HH22	2.21	0.47
3:C:129:ASP:OD2	3:C:129:ASP:N	2.46	0.47
3:C:516:TYR:O	3:C:520:GLN:HG3	2.15	0.47
1:A:430:VAL:HG13	1:A:650:LEU:HB3	1.96	0.47
1:A:466:LEU:HD11	1:A:475:PHE:CD1	2.49	0.47
1:A:533:SER:OG	1:A:534:VAL:N	2.47	0.47
3:C:644:GLN:H	3:C:644:GLN:CD	2.23	0.47
4:D:100:ASP:CG	4:D:142:TRP:HE1	2.22	0.47
1:A:604:LEU:HD23	1:A:605:ALA:N	2.29	0.47
2:B:210:ILE:HD11	2:B:225:PHE:HB2	1.97	0.47
3:C:12:GLU:OE1	3:C:12:GLU:N	2.47	0.47
3:C:317:ILE:HD11	3:C:333:CYS:HB3	1.96	0.47
3:C:171:THR:HG22	3:C:173:LEU:H	1.79	0.47
4:D:39:ALA:HB1	4:D:44:ASP:OD1	2.15	0.47
3:C:11:CYS:O	3:C:315:TYR:OH	2.32	0.47
3:C:75:GLU:HB3	3:C:77:LYS:HZ3	1.79	0.47
3:C:245:HIS:N	3:C:253:LYS:O	2.48	0.47
3:C:417:ASN:HD22	3:C:489:SER:HB2	1.80	0.47
4:D:46:LEU:HD21	4:D:63:ASP:OD1	2.14	0.46
2:B:302:PHE:HD1	2:B:309:TYR:HE1	1.62	0.46
3:C:29:ASP:O	3:C:33:LYS:CA	2.64	0.46
3:C:181:HIS:CE1	3:C:183:ARG:HE	2.33	0.46
3:C:315:TYR:HB3	3:C:333:CYS:SG	2.55	0.46
2:B:185:ASP:OD2	2:B:393:HIS:NE2	2.37	0.46
2:B:217:LEU:O	2:B:219:ILE:N	2.48	0.46
3:C:344:GLN:HA	3:C:345:PRO:HA	1.66	0.46
1:A:432:ARG:NH2	1:A:652:TYR:HB3	2.29	0.46
2:B:243:ILE:H	2:B:243:ILE:HG12	1.46	0.46
2:B:440:VAL:HG11	2:B:467:VAL:HG21	1.98	0.46
3:C:209:SER:OG	3:C:210:GLU:N	2.49	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:344:LEU:HD22	1:A:365:LEU:HD21	1.98	0.46
2:B:48:TYR:OH	2:B:61:ASN:ND2	2.48	0.46
4:D:38:LYS:O	4:D:43:ALA:N	2.43	0.46
1:A:524:ARG:O	1:A:528:ARG:NH1	2.48	0.46
2:B:146:LYS:HA	2:B:150:GLY:O	2.16	0.46
3:C:629:PHE:HB3	3:C:635:CYS:HB2	1.97	0.46
1:A:274:ALA:O	1:A:276:SER:N	2.47	0.46
1:A:374:ASN:O	1:A:377:GLN:N	2.48	0.46
1:A:392:CYS:SG	1:A:645:PHE:HA	2.56	0.46
1:A:546:LEU:HD23	1:A:557:SER:HB2	1.97	0.46
3:C:158:MET:O	3:C:166:ILE:HD12	2.16	0.46
1:A:500:PHE:O	1:A:504:SER:CB	2.64	0.46
2:B:42:GLU:OE1	2:B:55:LYS:NZ	2.39	0.46
3:C:5:ASP:HB3	3:C:310:ARG:NH1	2.30	0.46
3:C:181:HIS:CE1	3:C:183:ARG:HB3	2.48	0.46
3:C:613:PHE:HA	3:C:616:PHE:CD2	2.51	0.46
3:C:624:ARG:NH2	3:C:629:PHE:HA	2.31	0.46
1:A:624:ALA:HA	2:B:461:ILE:HD11	1.97	0.45
1:A:452:SER:HB3	1:A:455:PHE:CE2	2.51	0.45
2:B:59:ILE:HD12	4:D:69:ARG:HH11	1.82	0.45
2:B:90:ARG:HD2	2:B:129:LEU:HD12	1.98	0.45
3:C:633:GLU:HG3	3:C:633:GLU:O	2.17	0.45
1:A:241:GLU:O	1:A:245:THR:HG22	2.17	0.45
1:A:336:ILE:HD11	1:A:376:LEU:HD21	1.98	0.45
2:B:96:PRO:HD2	2:B:100:PHE:O	2.16	0.45
4:D:86:LEU:HD13	4:D:122:VAL:HG22	1.99	0.45
2:B:141:CYS:HA	2:B:175:TYR:HE1	1.82	0.45
3:C:519:HIS:ND1	3:C:544:TYR:OH	2.23	0.45
4:D:10:LYS:HD3	4:D:80:GLY:O	2.16	0.45
1:A:440:ILE:O	1:A:444:LEU:HG	2.17	0.45
1:A:480:SER:OG	1:A:507:ARG:NE	2.50	0.45
2:B:143:SER:HB3	2:B:243:ILE:HD12	1.98	0.45
2:B:222:TYR:HB2	2:B:327:MET:HB2	1.99	0.45
2:B:271:GLU:O	2:B:272:MET:HE2	2.17	0.45
3:C:180:PHE:CE1	3:C:189:LYS:HG2	2.51	0.45
1:A:281:VAL:HG12	1:A:285:LEU:HD13	1.99	0.45
2:B:141:CYS:SG	2:B:179:LEU:HD11	2.57	0.45
1:A:282:MET:SD	1:A:317:VAL:HG11	2.56	0.44
1:A:602:ASN:O	1:A:617:TYR:HB2	2.17	0.44
2:B:430:ILE:HD12	2:B:460:LEU:HD11	2.00	0.44
3:C:141:LYS:HD2	3:C:141:LYS:N	2.32	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:622:ARG:H	3:C:622:ARG:HE	1.65	0.44
4:D:84:CYS:HB2	4:D:106:PHE:CZ	2.52	0.44
1:A:378:LEU:HB3	1:A:385:PHE:HE2	1.82	0.44
2:B:353:LEU:O	2:B:357:ILE:HG13	2.17	0.44
2:B:408:ASP:OD2	2:B:408:ASP:N	2.50	0.44
3:C:138:LEU:HD23	3:C:145:LYS:HG2	2.00	0.44
1:A:320:ALA:HB3	1:A:329:LEU:HD11	2.00	0.44
1:A:369:GLU:O	1:A:373:ASP:N	2.51	0.44
2:B:363:ILE:HA	2:B:366:ARG:HH11	1.83	0.44
3:C:635:CYS:O	3:C:638:HIS:N	2.51	0.44
1:A:463:PRO:HB2	1:A:474:PHE:CD1	2.52	0.44
3:C:439:SER:O	3:C:442:SER:OG	2.28	0.44
1:A:383:PRO:HB3	1:A:574:LEU:HD11	1.99	0.44
1:A:449:ILE:CD1	1:A:491:LEU:HD21	2.48	0.44
2:B:359:GLU:O	2:B:363:ILE:HG12	2.18	0.44
3:C:531:LYS:HB3	3:C:532:PRO:HD3	2.00	0.44
1:A:258:LEU:HD12	1:A:279:MET:SD	2.58	0.43
1:A:594:ILE:HG22	1:A:595:TYR:N	2.33	0.43
2:B:463:VAL:O	2:B:467:VAL:HG23	2.18	0.43
3:C:31:ALA:HA	3:C:161:PRO:HG2	1.99	0.43
3:C:378:ASP:CG	3:C:415:LYS:HZ3	2.26	0.43
1:A:395:LEU:HD21	1:A:523:LEU:HD13	1.99	0.43
1:A:642:ASP:HA	1:A:647:LEU:HD21	2.00	0.43
3:C:16:GLN:NE2	3:C:17:PHE:O	2.51	0.43
3:C:178:GLN:NE2	3:C:179:PRO:O	2.51	0.43
1:A:274:ALA:C	1:A:276:SER:H	2.25	0.43
1:A:306:VAL:HG22	1:A:319:VAL:HG13	2.01	0.43
1:A:583:ARG:HA	1:A:583:ARG:HD3	1.85	0.43
2:B:55:LYS:O	2:B:59:ILE:HG13	2.17	0.43
3:C:107:LYS:HE3	3:C:107:LYS:HB3	1.89	0.43
4:D:155:SER:O	4:D:159:ALA:N	2.52	0.43
3:C:90:PHE:HB2	3:C:102:TYR:CZ	2.53	0.43
3:C:244:TYR:HA	3:C:254:LYS:HA	1.99	0.43
1:A:385:PHE:CE1	1:A:443:HIS:HB3	2.53	0.43
1:A:441:ASP:O	1:A:445:LEU:HG	2.18	0.43
1:A:524:ARG:O	1:A:528:ARG:HG2	2.18	0.43
3:C:613:PHE:CZ	3:C:629:PHE:HB2	2.54	0.43
3:C:619:ARG:HD2	3:C:620:ASN:HD22	1.84	0.43
1:A:416:VAL:HA	1:A:432:ARG:CG	2.48	0.43
1:A:524:ARG:HB3	1:A:528:ARG:NH2	2.34	0.43
2:B:247:TYR:CZ	2:B:252:LEU:HD12	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:137:VAL:HA	3:C:144:LEU:HD23	2.01	0.43
3:C:432:MET:HE3	3:C:432:MET:HB3	1.83	0.43
3:C:555:LEU:O	3:C:558:LEU:HB2	2.19	0.43
3:C:209:SER:N	3:C:212:ASP:OD2	2.51	0.43
3:C:289:ASP:OD1	3:C:291:LYS:N	2.47	0.43
3:C:617:GLU:HB3	3:C:621:GLN:HB2	2.01	0.43
4:D:86:LEU:HD11	4:D:120:PHE:HB3	2.00	0.43
1:A:356:LYS:HG3	1:A:358:ASN:H	1.83	0.43
1:A:415:LEU:HD12	1:A:415:LEU:HA	1.77	0.43
3:C:244:TYR:CE1	3:C:254:LYS:HB3	2.54	0.43
3:C:468:PHE:HE2	3:C:474:MET:HG3	1.84	0.43
4:D:20:GLY:C	4:D:22:ASN:N	2.75	0.43
1:A:415:LEU:HD21	1:A:492:LEU:HD22	2.00	0.43
1:A:596:TYR:HB3	1:A:603:LEU:HD12	2.01	0.43
2:B:196:PHE:O	3:C:524:TYR:OH	2.13	0.43
3:C:587:GLY:O	3:C:591:ILE:HG23	2.19	0.43
3:C:212:ASP:O	3:C:213:ILE:HD13	2.19	0.42
3:C:575:VAL:HG21	3:C:609:PHE:HE2	1.84	0.42
1:A:476:HIS:O	1:A:494:SER:N	2.47	0.42
2:B:393:HIS:HA	2:B:403:THR:HA	2.01	0.42
3:C:138:LEU:HB3	3:C:141:LYS:HB2	2.00	0.42
3:C:613:PHE:HZ	3:C:629:PHE:H	1.66	0.42
1:A:257:VAL:HG22	1:A:316:LEU:HB3	2.01	0.42
1:A:353:PHE:CE1	1:A:359:TYR:HB3	2.53	0.42
4:D:39:ALA:C	4:D:41:ILE:N	2.77	0.42
2:B:97:GLU:OE2	2:B:152:PHE:HB2	2.20	0.42
2:B:268:ILE:O	2:B:272:MET:HG2	2.20	0.42
3:C:293:ARG:HH12	3:C:375:ARG:HG3	1.83	0.42
4:D:16:ASP:O	4:D:21:LYS:HD3	2.19	0.42
4:D:39:ALA:HB1	4:D:44:ASP:HA	2.02	0.42
4:D:153:GLU:O	4:D:153:GLU:HG2	2.19	0.42
2:B:424:ASP:N	2:B:424:ASP:OD1	2.52	0.42
3:C:77:LYS:HB2	3:C:78:ILE:HD12	2.01	0.42
3:C:588:HIS:HA	3:C:591:ILE:HD13	2.00	0.42
4:D:52:VAL:HG21	4:D:170:ALA:CB	2.50	0.42
2:B:40:GLN:HB3	2:B:43:ASN:HD22	1.85	0.42
2:B:146:LYS:HE2	2:B:146:LYS:HB3	1.93	0.42
3:C:468:PHE:CE2	3:C:474:MET:HG3	2.54	0.42
3:C:517:MET:HE3	3:C:517:MET:HB2	1.79	0.42
3:C:558:LEU:HD23	3:C:558:LEU:HA	1.84	0.42
1:A:268:ARG:HG3	1:A:269:TYR:CD1	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:421:LEU:HD22	1:A:446:PHE:CE1	2.55	0.42
2:B:254:PRO:HA	2:B:257:ILE:HG22	2.02	0.42
1:A:532:TYR:OH	1:A:556:THR:OG1	2.30	0.42
2:B:198:LEU:HD23	2:B:198:LEU:HA	1.83	0.42
2:B:209:PHE:CZ	2:B:350:LEU:HD13	2.55	0.42
2:B:285:GLY:HA3	2:B:298:PHE:CE1	2.55	0.42
3:C:205:LYS:HD2	3:C:205:LYS:HA	1.87	0.42
3:C:293:ARG:NH1	3:C:375:ARG:HG3	2.35	0.42
1:A:304:TYR:HB3	1:A:321:ARG:HG3	2.02	0.42
1:A:420:LEU:O	1:A:427:VAL:HB	2.20	0.42
1:A:503:VAL:O	1:A:506:CYS:HB2	2.20	0.42
3:C:102:TYR:CD1	3:C:142:ARG:HG2	2.55	0.42
3:C:624:ARG:HH21	3:C:630:THR:N	2.18	0.42
4:D:38:LYS:HG3	4:D:42:GLY:HA3	2.02	0.42
1:A:251:HIS:HD2	1:A:269:TYR:CG	2.37	0.41
3:C:126:PHE:O	3:C:132:ILE:HD12	2.20	0.41
3:C:156:TRP:NE1	3:C:174:GLU:OE2	2.48	0.41
3:C:432:MET:O	3:C:435:GLU:HG3	2.19	0.41
1:A:276:SER:O	1:A:277:SER:C	2.63	0.41
2:B:302:PHE:CD1	2:B:309:TYR:HE1	2.38	0.41
3:C:29:ASP:O	3:C:33:LYS:HA	2.19	0.41
3:C:178:GLN:OE1	3:C:192:LYS:HG3	2.20	0.41
1:A:339:GLN:HG2	1:A:372:THR:HG23	2.02	0.41
1:A:452:SER:HB3	1:A:455:PHE:HE2	1.84	0.41
1:A:468:LYS:HD3	1:A:468:LYS:HA	1.71	0.41
1:A:574:LEU:HD12	1:A:574:LEU:HA	1.72	0.41
3:C:36:PHE:CD1	3:C:48:VAL:HG22	2.55	0.41
3:C:634:HIS:HE1	3:C:637:GLU:OE1	2.03	0.41
4:D:111:SER:O	4:D:111:SER:OG	2.35	0.41
1:A:253:LYS:NZ	1:A:332:GLU:OE2	2.53	0.41
1:A:420:LEU:HA	1:A:490:LEU:HA	2.01	0.41
2:B:256:HIS:HB3	2:B:283:LEU:HD22	2.03	0.41
3:C:140:GLU:H	3:C:140:GLU:CD	2.29	0.41
3:C:621:GLN:NE2	3:C:625:GLY:HA2	2.33	0.41
4:D:24:LEU:O	4:D:27:GLN:NE2	2.47	0.41
1:A:334:LEU:HD23	1:A:334:LEU:HA	1.88	0.41
1:A:529:THR:HG23	1:A:529:THR:O	2.20	0.41
2:B:380:TYR:CD1	2:B:475:PHE:HE1	2.38	0.41
2:B:420:PHE:HD1	2:B:420:PHE:HA	1.73	0.41
3:C:179:PRO:HG3	3:C:193:PHE:HE1	1.86	0.41
3:C:281:ASP:OD1	3:C:281:ASP:N	2.51	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:105:GLU:O	4:D:109:GLN:HG2	2.20	0.41
1:A:414:SER:OG	1:A:414:SER:O	2.37	0.41
3:C:226:PHE:CE1	3:C:228:ARG:HB2	2.55	0.41
4:D:24:LEU:C	4:D:27:GLN:HE22	2.29	0.41
1:A:349:LEU:HD23	1:A:349:LEU:HA	1.92	0.41
1:A:539:ILE:HD11	1:A:632:LYS:HB3	2.02	0.41
1:A:589:ARG:HA	1:A:589:ARG:NH1	2.36	0.41
2:B:151:THR:HG23	2:B:309:TYR:OH	2.21	0.41
2:B:218:ASN:OD1	2:B:218:ASN:N	2.52	0.41
2:B:393:HIS:CD2	2:B:403:THR:HG22	2.56	0.41
3:C:123:GLU:HB3	3:C:134:PHE:HE2	1.84	0.41
4:D:89:ASP:H	4:D:95:THR:HG21	1.86	0.41
4:D:59:MET:HE2	4:D:59:MET:HB3	1.90	0.41
1:A:263:LYS:H	1:A:263:LYS:HG2	1.57	0.40
1:A:527:LEU:O	1:A:527:LEU:HD23	2.22	0.40
3:C:15:VAL:HB	3:C:356:LEU:HB3	2.02	0.40
3:C:118:TRP:CE2	3:C:124:ILE:HD12	2.56	0.40
1:A:320:ALA:HB2	1:A:329:LEU:HD21	2.02	0.40
2:B:116:LYS:HB2	2:B:116:LYS:HE3	1.73	0.40
3:C:230:HIS:CE1	3:C:236:SER:HA	2.56	0.40
2:B:405:VAL:HG22	2:B:406:HIS:H	1.86	0.40
3:C:9:GLU:O	3:C:359:LEU:HD12	2.20	0.40
3:C:307:LEU:HD23	3:C:307:LEU:HA	1.83	0.40
3:C:341:ILE:HB	3:C:349:ILE:HG22	2.03	0.40
4:D:52:VAL:HG22	4:D:167:GLN:NE2	2.35	0.40
3:C:158:MET:SD	3:C:215:MET:HG3	2.61	0.40
2:B:25:LEU:HB3	2:B:105:VAL:HG12	2.04	0.40
2:B:90:ARG:HD2	2:B:129:LEU:HB2	2.02	0.40
2:B:396:LYS:HA	2:B:396:LYS:HD3	1.79	0.40
2:B:432:LYS:HD2	2:B:438:TRP:CZ2	2.56	0.40
3:C:258:LEU:HD13	3:C:288:PHE:CG	2.56	0.40
4:D:59:MET:HE2	4:D:61:ILE:HD11	2.02	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	415/418 (99%)	388 (94%)	26 (6%)	1 (0%)	44	73
2	B	464/482 (96%)	431 (93%)	33 (7%)	0	100	100
3	C	655/657 (100%)	615 (94%)	39 (6%)	1 (0%)	44	73
4	D	176/207 (85%)	162 (92%)	14 (8%)	0	100	100
All	All	1710/1764 (97%)	1596 (93%)	112 (6%)	2 (0%)	50	78

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	C	606	ASN
1	A	563	PRO

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	A	359/359 (100%)	315 (88%)	44 (12%)	4	14
2	B	431/436 (99%)	407 (94%)	24 (6%)	17	43
3	C	593/593 (100%)	553 (93%)	40 (7%)	13	38
4	D	155/181 (86%)	139 (90%)	16 (10%)	6	22
All	All	1538/1569 (98%)	1414 (92%)	124 (8%)	12	31

All (124) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	237	THR
1	A	250	LEU
1	A	258	LEU
1	A	259	SER

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Mol	Chain	Res	Type
1	A	263	LYS
1	A	268	ARG
1	A	289	LEU
1	A	315	VAL
1	A	316	LEU
1	A	317	VAL
1	A	340	ILE
1	A	341	LEU
1	A	343	LEU
1	A	345	THR
1	A	373	ASP
1	A	379	MET
1	A	386	LEU
1	A	415	LEU
1	A	416	VAL
1	A	434	ASP
1	A	448	LEU
1	A	450	SER
1	A	462	THR
1	A	466	LEU
1	A	479	ILE
1	A	485	ASP
1	A	490	LEU
1	A	514	LEU
1	A	520	HIS
1	A	536	GLN
1	A	551	SER
1	A	560	ILE
1	A	565	THR
1	A	570	GLN
1	A	571	GLU
1	A	603	LEU
1	A	608	THR
1	A	622	THR
1	A	625	SER
1	A	630	ILE
1	A	644	LEU
1	A	650	LEU
1	A	651	THR
1	A	652	TYR
2	B	33	ARG
2	B	68	ILE

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Mol	Chain	Res	Type
2	B	84	LEU
2	B	111	ILE
2	B	114	GLN
2	B	156	MET
2	B	199	ASP
2	B	210	ILE
2	B	239	ASP
2	B	243	ILE
2	B	311	GLU
2	B	335	THR
2	B	337	ASP
2	B	352	VAL
2	B	376	PHE
2	B	386	LEU
2	B	404	SER
2	B	406	HIS
2	B	408	ASP
2	B	420	PHE
2	B	449	LEU
2	B	473	THR
2	B	477	ASN
2	B	479	PHE
3	C	19	LYS
3	C	32	ASN
3	C	38	VAL
3	C	60	ARG
3	C	70	ILE
3	C	113	ILE
3	C	135	TYR
3	C	170	THR
3	C	209	SER
3	C	217	THR
3	C	252	CYS
3	C	260	LEU
3	C	263	THR
3	C	281	ASP
3	C	293	ARG
3	C	300	VAL
3	C	304	HIS
3	C	329	SER
3	C	347	ILE
3	C	348	ILE

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Mol	Chain	Res	Type
3	C	364	GLU
3	C	389	VAL
3	C	406	LEU
3	C	408	VAL
3	C	411	THR
3	C	424	LEU
3	C	434	VAL
3	C	451	THR
3	C	474	MET
3	C	552	LEU
3	C	576	LEU
3	C	603	THR
3	C	608	LEU
3	C	612	ILE
3	C	619	ARG
3	C	622	ARG
3	C	628	ASN
3	C	629	PHE
3	C	637	GLU
3	C	639	VAL
4	D	12	ILE
4	D	23	SER
4	D	24	LEU
4	D	32	LYS
4	D	37	TYR
4	D	38	LYS
4	D	40	THR
4	D	46	LEU
4	D	50	VAL
4	D	57	VAL
4	D	86	LEU
4	D	88	PHE
4	D	99	LEU
4	D	129	LEU
4	D	155	SER
4	D	177	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (37) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	251	HIS
1	A	327	GLN

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Mol	Chain	Res	Type
1	A	339	GLN
1	A	358	ASN
1	A	374	ASN
1	A	377	GLN
1	A	424	ASN
1	A	425	GLN
1	A	447	ASN
1	A	478	HIS
1	A	520	HIS
1	A	544	HIS
1	A	570	GLN
1	A	602	ASN
2	B	43	ASN
2	B	85	HIS
2	B	149	ASN
2	B	211	ASN
2	B	275	ASN
2	B	375	GLN
2	B	417	ASN
2	B	454	ASN
3	C	16	GLN
3	C	24	ASN
3	C	34	GLN
3	C	150	HIS
3	C	313	GLN
3	C	353	GLN
3	C	382	GLN
3	C	417	ASN
3	C	511	GLN
3	C	562	ASN
3	C	620	ASN
3	C	634	HIS
4	D	67	GLN
4	D	148	ASN
4	D	176	GLN

5.3.3 RNA ⓘ

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.