



## Full wwPDB EM Validation Report ⓘ

Jul 15, 2025 – 07:28 PM JST

PDB ID : 8IHN / pdb\_00008ihn  
EMDB ID : EMD-35450  
Title : Cryo-EM structure of the Rpd3S core complex  
Authors : Zhang, Y.; Gang, C.  
Deposited on : 2023-02-23  
Resolution : 3.37 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](mailto: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>.

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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) : 2.44

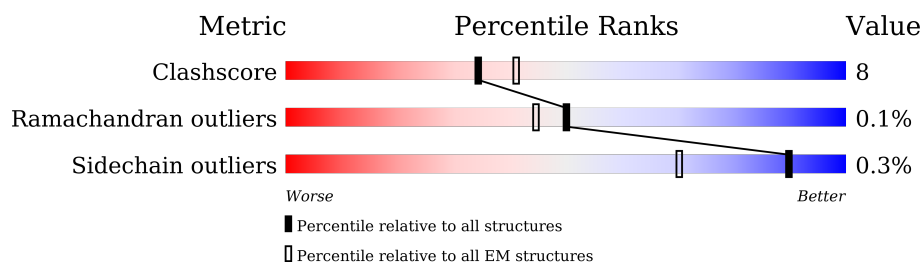
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.37 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  $\geq 3$ , 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	24	
2	K	1536	
3	L	433	
4	M	684	
4	O	684	
5	N	401	
5	P	401	

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 14611 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 Histone H3.

Mol	Chain	Residues	Atoms				AltConf	Trace
1	A	24	Total	C	N	O	0	0
			169	101	37	31		

- Molecule 2 is a protein called Transcriptional regulatory protein SIN3.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	K	598	Total	C	N	O	S	0	0
			4716	3013	815	873	15		

- Molecule 3 is a protein called Histone deacetylase RPD3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	L	410	Total	C	N	O	S	0	0
			3082	1949	527	584	22		

- Molecule 4 is a protein called RCO1 isoform 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	M	357	Total	C	N	O	S	0	0
			2707	1708	469	519	11		
4	O	153	Total	C	N	O	S	0	0
			1133	722	195	211	5		

- Molecule 5 is a protein called Chromatin modification-related protein EAF3.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	N	183	Total	C	N	O	S	0	0
			1410	900	229	274	7		
5	P	184	Total	C	N	O	S	0	0
			1392	888	231	267	6		

- Molecule 6 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
6	L	1	Total	Zn	0
			1	1	

- Molecule 7 is CALCIUM ION (CCD ID: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

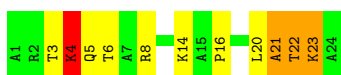
Mol	Chain	Residues	Atoms		AltConf
7	L	1	Total	Ca	0
			1	1	

### 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.

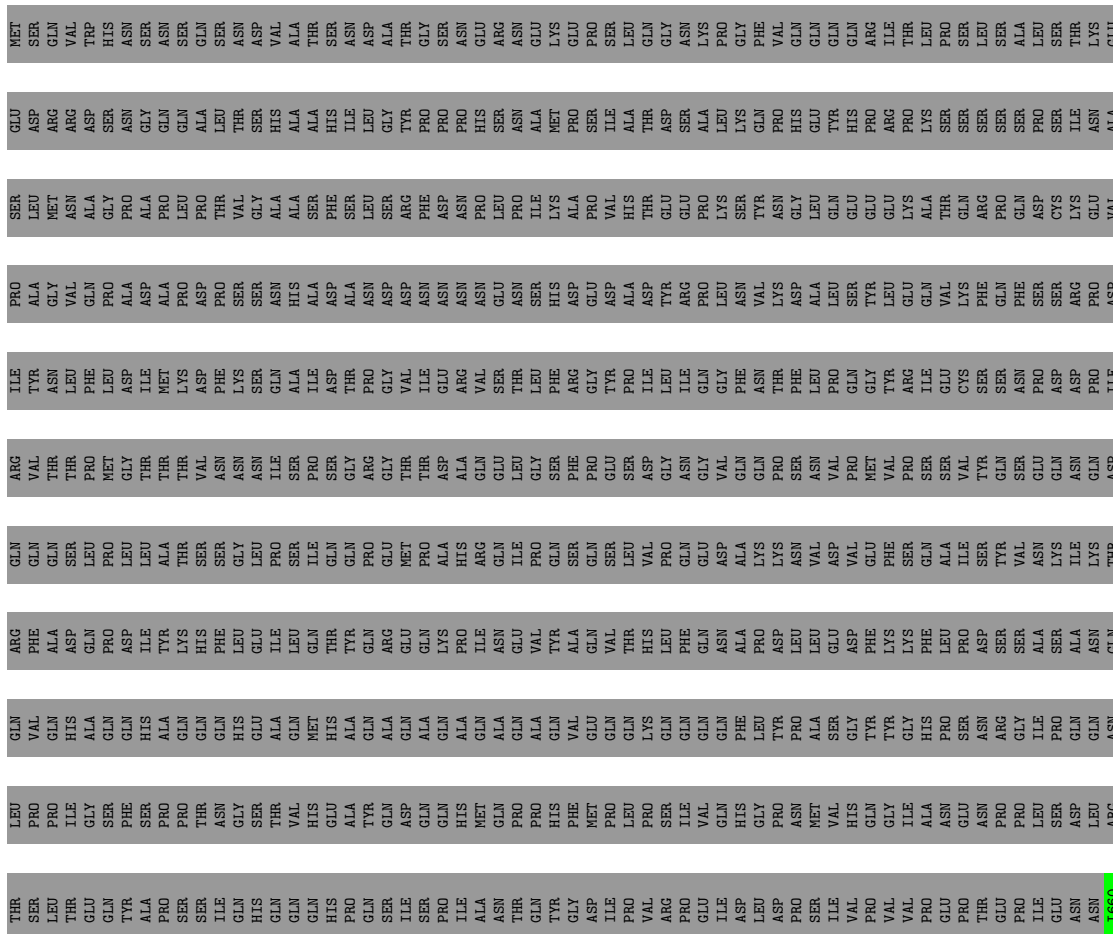
#### • Molecule 1: Histone H3

Chain A: 



#### • Molecule 2: Transcriptional regulatory protein SIN3

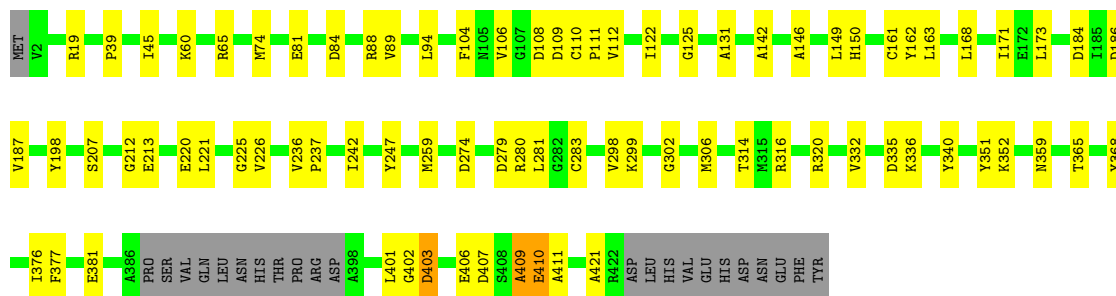
Chain K: 





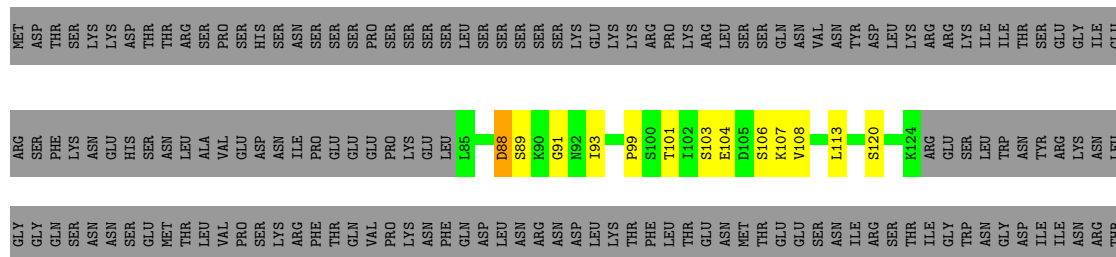
### • Molecule 3: Histone deacetylase RPD3

Chain L: 76% 18% 5%

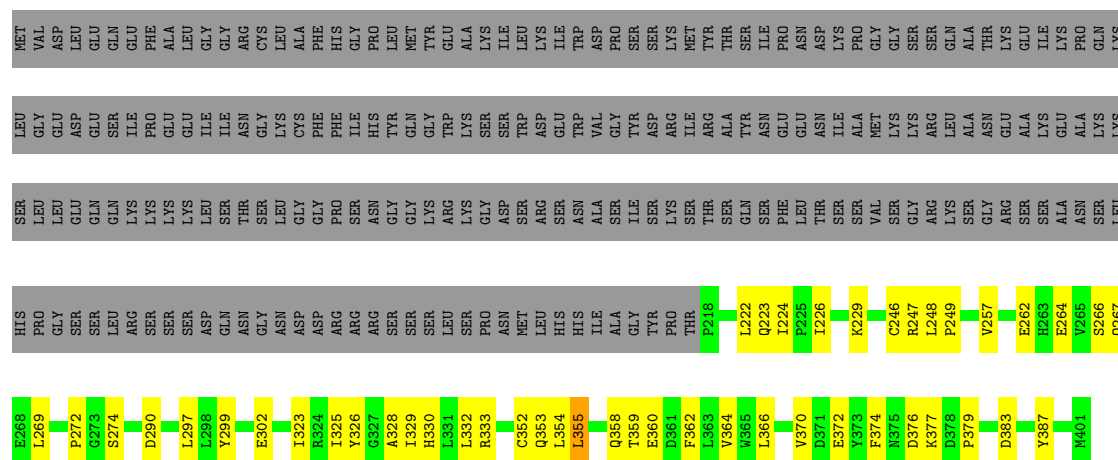


### • Molecule 4: RCO1 isoform 1

Chain M: 43% 9% 48%









## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	107252	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 ( $e^-/\text{\AA}^2$ )	53	Depositor
Minimum defocus (nm)	1800	Depositor
Maximum defocus (nm)	2800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k 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, CA

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# $ Z  > 5$	RMSZ	# $ Z  > 5$
1	A	0.55	0/169	1.04	1/223 (0.4%)
2	K	0.27	0/4813	0.53	8/6510 (0.1%)
3	L	0.35	0/3153	0.61	6/4275 (0.1%)
4	M	0.42	1/2766 (0.0%)	0.79	15/3746 (0.4%)
4	O	0.27	0/1155	0.64	4/1556 (0.3%)
5	N	0.35	0/1436	0.55	1/1949 (0.1%)
5	P	0.23	0/1417	0.46	1/1923 (0.1%)
All	All	0.33	1/14909 (0.0%)	0.62	36/20182 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	M	452	VAL	CA-C	-8.65	1.46	1.53

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	M	452	VAL	N-CA-C	-15.70	90.18	107.77
4	O	289	PRO	N-CA-C	-10.09	98.40	110.70
1	A	21	ALA	N-CA-C	-9.29	99.54	112.45
4	M	452	VAL	CA-C-N	-9.11	110.38	119.76
4	M	452	VAL	C-N-CA	-9.11	110.38	119.76
4	M	107	LYS	N-CA-C	-8.97	98.69	110.53
4	M	108	VAL	N-CA-C	8.82	119.62	110.62
4	M	466	CYS	CA-C-N	-8.15	112.39	120.21
4	M	466	CYS	C-N-CA	-8.15	112.39	120.21
4	M	88	ASP	N-CA-C	-7.88	97.81	109.15
3	L	409	ALA	N-CA-C	7.62	121.67	112.38
4	O	289	PRO	CA-C-N	-7.20	112.35	119.76
4	O	289	PRO	C-N-CA	-7.20	112.35	119.76

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	K	872	ASP	N-CA-C	7.17	121.42	111.74
5	N	380	ASN	N-CA-C	-7.10	103.62	111.36
2	K	875	ARG	N-CA-C	-7.04	103.61	111.28
3	L	125	GLY	N-CA-C	-7.04	105.64	114.16
4	M	317	ALA	N-CA-C	6.96	118.87	111.28
4	M	453	PRO	N-CA-C	-6.79	100.55	111.14
5	P	355	LEU	N-CA-C	-6.74	103.94	111.28
4	M	452	VAL	CB-CA-C	-6.54	103.25	110.78
3	L	410	GLU	N-CA-C	6.49	118.35	111.28
4	M	467	PRO	N-CA-C	-6.47	102.16	111.22
4	M	106	SER	N-CA-C	-5.91	104.84	111.28
2	K	1081	ASN	CB-CA-C	5.76	121.04	110.10
4	M	108	VAL	CB-CA-C	-5.71	104.43	112.14
3	L	403	ASP	N-CA-C	-5.59	101.77	110.10
4	O	288	ASP	N-CA-C	-5.58	105.24	113.16
2	K	852	PRO	CA-C-N	-5.50	114.03	119.92
2	K	852	PRO	C-N-CA	-5.50	114.03	119.92
2	K	962	LYS	N-CA-C	-5.47	105.31	111.28
2	K	871	TYR	N-CA-C	5.15	117.84	110.68
3	L	365	THR	CA-C-N	-5.15	113.62	119.28
3	L	365	THR	C-N-CA	-5.15	113.62	119.28
4	M	316	MET	N-CA-C	-5.09	104.37	111.39
2	K	873	LYS	CB-CA-C	-5.05	110.36	117.23

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	169	0	184	17	0
2	K	4716	0	4466	76	0
3	L	3082	0	2838	49	0
4	M	2707	0	2455	40	0
4	O	1133	0	1026	21	0
5	N	1410	0	1361	15	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	P	1392	0	1320	33	0
6	L	1	0	0	0	0
7	L	1	0	0	0	0
All	All	14611	0	13650	222	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 8.

All (222) 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:20:LEU:CB	1:A:23:LYS:H	2.05	0.69
4:M:315:SER:O	4:M:316:MET:C	2.38	0.67
1:A:4:LYS:O	1:A:5:GLN:HG2	1.97	0.63
5:P:372:GLU:HA	5:P:377:LYS:HD2	1.82	0.62
5:N:314:SER:OG	5:N:315:LYS:NZ	2.32	0.61
1:A:8:ARG:HD3	1:A:14:LYS:NZ	2.15	0.61
1:A:16:PRO:HG2	2:K:787:VAL:HG12	1.82	0.61
5:P:329:ILE:HG23	5:P:330:HIS:HD2	1.66	0.60
1:A:8:ARG:CZ	1:A:22:THR:HG21	2.32	0.60
3:L:402:GLY:O	3:L:403:ASP:C	2.46	0.59
2:K:1021:PHE:O	2:K:1273:ARG:NH2	2.36	0.59
4:M:374:ASP:OD1	4:M:375:GLU:N	2.33	0.58
3:L:142:ALA:HB3	3:L:306:MET:HG3	1.86	0.58
4:O:351:PHE:CE1	5:P:333:ARG:HB3	2.39	0.57
2:K:1196:LEU:HD11	2:K:1219:LEU:HD11	1.86	0.57
4:O:326:PHE:O	4:O:330:ASN:ND2	2.30	0.57
5:N:253:THR:H	5:N:256:MET:HE3	1.69	0.57
4:O:564:ARG:HH22	4:O:565:LYS:HG3	1.70	0.57
1:A:14:LYS:HE2	1:A:22:THR:HG23	1.87	0.56
2:K:962:LYS:O	2:K:966:TRP:N	2.37	0.56
5:N:269:LEU:HD11	5:N:275:GLN:HG3	1.87	0.56
2:K:1234:ASN:O	3:L:359:ASN:ND2	2.37	0.56
3:L:109:ASP:OD1	3:L:110:CYS:N	2.37	0.56
1:A:14:LYS:HG2	1:A:21:ALA:H	1.70	0.56
4:O:336:PHE:HE1	5:P:355:LEU:HD21	1.71	0.56
2:K:853:PRO:HA	2:K:884:HIS:CE1	2.41	0.55
2:K:1186:LEU:HD23	3:L:351:TYR:CZ	2.42	0.55
5:P:222:LEU:HD11	5:P:359:THR:HG21	1.88	0.55
4:O:357:ILE:HD11	5:P:229:LYS:HA	1.88	0.55
2:K:690:ASN:ND2	4:M:520:ILE:HG13	2.22	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:P:376:ASP:HB3	5:P:379:PRO:HB3	1.88	0.55
2:K:960:THR:O	2:K:963:LYS:HB3	2.06	0.54
2:K:906:ARG:HB3	2:K:910:ARG:HH21	1.73	0.54
3:L:401:LEU:O	3:L:402:GLY:C	2.46	0.53
1:A:8:ARG:HD3	1:A:14:LYS:HZ1	1.73	0.53
5:P:226:ILE:HA	5:P:229:LYS:HD3	1.90	0.53
4:M:99:PRO:HB2	4:M:101:THR:HG23	1.89	0.53
5:N:256:MET:HA	5:N:259:ASN:HB2	1.90	0.53
3:L:89:VAL:HG22	3:L:112:VAL:HG11	1.90	0.53
2:K:796:ILE:HD13	4:M:396:THR:CB	2.38	0.52
3:L:74:MET:HE3	3:L:163:LEU:HD22	1.91	0.52
3:L:335:ASP:OD2	3:L:336:LYS:N	2.42	0.52
4:O:262:PHE:HA	4:O:269:SER:HA	1.91	0.52
4:O:344:ASP:OD1	4:O:345:SER:N	2.42	0.52
2:K:810:ILE:HD11	2:K:919:LEU:HD23	1.92	0.51
2:K:748:CYS:SG	2:K:749:GLU:N	2.83	0.51
2:K:962:LYS:O	2:K:965:HIS:N	2.44	0.51
2:K:1013:LEU:HD22	2:K:1257:MET:SD	2.51	0.51
2:K:962:LYS:O	2:K:963:LYS:C	2.51	0.51
4:M:452:VAL:O	4:M:453:PRO:C	2.50	0.51
3:L:184:ASP:HB3	3:L:207:SER:HA	1.92	0.51
2:K:1219:LEU:HD23	2:K:1224:PHE:HB2	1.93	0.50
3:L:279:ASP:HA	3:L:314:THR:OG1	2.12	0.50
4:M:103:SER:O	4:M:104:GLU:C	2.50	0.50
5:P:299:TYR:H	5:P:302:GLU:HB2	1.75	0.50
3:L:406:GLU:O	3:L:407:ASP:HB2	2.11	0.50
4:M:553:ASP:HA	5:P:272:PRO:HD2	1.92	0.50
2:K:1075:GLN:O	2:K:1079:ARG:N	2.37	0.50
2:K:853:PRO:HA	2:K:884:HIS:HE1	1.76	0.50
4:M:441:ASP:HB3	4:M:463:LYS:HD3	1.94	0.50
2:K:683:THR:HG23	4:M:522:ILE:HG13	1.92	0.49
5:P:366:LEU:HD12	5:P:374:PHE:CE1	2.47	0.49
4:M:410:ASN:OD1	4:M:411:SER:N	2.45	0.49
5:N:238:TYR:HA	5:N:242:ASP:HB2	1.95	0.49
4:M:424:ARG:O	4:M:434:SER:HA	2.12	0.49
5:N:254:VAL:HG13	5:N:331:LEU:HD22	1.94	0.49
4:O:351:PHE:HD1	5:P:297:LEU:HA	1.75	0.49
3:L:410:GLU:O	3:L:411:ALA:C	2.55	0.49
5:P:246:CYS:HB2	5:P:387:TYR:CE1	2.48	0.49
2:K:1303:ILE:HG13	2:K:1314:ILE:HG12	1.93	0.49
5:N:246:CYS:HA	5:N:387:TYR:HA	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:3:THR:O	1:A:4:LYS:O	2.30	0.49
3:L:111:PRO:O	3:L:162:TYR:OH	2.23	0.49
2:K:778:LEU:HD21	3:L:171:ILE:HD11	1.95	0.49
3:L:163:LEU:HD11	3:L:168:LEU:HD11	1.95	0.49
5:P:223:GLN:NE2	5:P:224:ILE:O	2.46	0.49
5:P:264:GLU:HA	5:P:267:GLN:NE2	2.28	0.48
2:K:771:ASP:OD1	2:K:772:ASP:N	2.46	0.48
4:M:264:SER:HB2	4:M:282:PHE:CE1	2.48	0.48
5:P:269:LEU:HD22	5:P:274:SER:HB3	1.95	0.48
2:K:798:HIS:CG	3:L:283:CYS:HB3	2.49	0.48
1:A:20:LEU:CB	1:A:23:LYS:HB3	2.43	0.48
5:P:333:ARG:NH2	5:P:387:TYR:OH	2.46	0.48
5:P:358:GLN:O	5:P:362:PHE:N	2.41	0.48
2:K:666:VAL:HG11	4:O:552:PHE:HD1	1.78	0.48
2:K:961:ASN:O	2:K:964:ILE:HB	2.14	0.47
4:M:404:ASP:O	4:M:407:ILE:HG22	2.14	0.47
2:K:672:ALA:O	2:K:676:ILE:HG12	2.14	0.47
2:K:918:GLU:HB2	4:M:120:SER:O	2.15	0.47
4:M:416:ILE:O	4:M:446:PRO:HG2	2.14	0.47
5:P:360:GLU:O	5:P:364:VAL:HG23	2.15	0.47
2:K:1209:ARG:O	2:K:1213:ARG:HG3	2.15	0.47
2:K:1309:THR:O	2:K:1310:LEU:C	2.56	0.47
3:L:377:PHE:O	3:L:381:GLU:HG3	2.14	0.47
4:M:88:ASP:O	4:M:91:GLY:N	2.48	0.47
1:A:4:LYS:HB2	1:A:5:GLN:H	1.48	0.47
1:A:6:THR:OG1	4:M:271:SER:N	2.48	0.47
2:K:834:ILE:O	2:K:838:ILE:HD12	2.14	0.47
4:M:478:ILE:HG13	4:M:480:HIS:H	1.79	0.47
3:L:212:GLY:O	3:L:213:GLU:HG2	2.15	0.47
2:K:1138:LEU:HD12	2:K:1269:PHE:CZ	2.50	0.47
4:M:287:LEU:HA	4:M:348:PRO:HG2	1.96	0.47
4:O:323:GLU:O	4:O:327:ILE:HD12	2.15	0.47
2:K:1027:GLU:OE1	2:K:1027:GLU:N	2.32	0.46
2:K:963:LYS:HE3	2:K:970:LYS:HB3	1.97	0.46
2:K:1235:LYS:HA	2:K:1235:LYS:HD3	1.52	0.46
3:L:65:ARG:HB2	3:L:409:ALA:HB2	1.98	0.46
4:O:355:ASN:O	4:O:359:GLU:N	2.39	0.46
2:K:993:ASP:OD1	2:K:1011:LYS:HE3	2.15	0.46
4:M:438:MET:HE2	4:M:464:TRP:CE3	2.51	0.46
3:L:237:PRO:O	3:L:368:TYR:OH	2.30	0.46
4:O:327:ILE:HG13	4:O:337:ALA:HB1	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:M:567:PHE:HB3	4:O:569:PHE:CE2	2.51	0.46
5:N:276:SER:O	5:N:280:GLU:HG2	2.16	0.46
5:P:290:ASP:OD1	5:P:323:ILE:HG23	2.16	0.46
5:P:366:LEU:O	5:P:370:VAL:N	2.49	0.46
3:L:60:LYS:HE2	3:L:332:VAL:HG21	1.97	0.45
3:L:149:LEU:HB3	3:L:161:CYS:HB3	1.99	0.45
3:L:104:PHE:O	3:L:106:VAL:N	2.50	0.45
2:K:999:THR:HG22	2:K:1001:ALA:H	1.80	0.45
2:K:919:LEU:HD22	4:M:120:SER:OG	2.17	0.45
2:K:1013:LEU:HD23	2:K:1253:ALA:HB1	1.98	0.45
4:M:338:LYS:NZ	5:N:346:THR:O	2.47	0.45
2:K:1176:SER:O	3:L:352:LYS:NZ	2.46	0.45
3:L:19:ARG:NH2	3:L:299:LYS:O	2.50	0.45
2:K:714:LYS:HB2	2:K:714:LYS:NZ	2.32	0.45
2:K:1131:GLN:O	2:K:1277:THR:HG22	2.17	0.45
4:O:302:HIS:O	4:O:307:LYS:NZ	2.35	0.45
3:L:242:ILE:HG12	3:L:247:TYR:HD1	1.82	0.45
3:L:316:ARG:O	3:L:320:ARG:HG3	2.17	0.45
4:M:503:GLN:HE21	4:M:539:ILE:HG12	1.82	0.45
5:N:227:LYS:O	5:N:231:VAL:HG23	2.17	0.45
3:L:186:ASP:OD1	3:L:187:VAL:N	2.50	0.44
1:A:14:LYS:HE3	1:A:21:ALA:HB3	1.99	0.44
4:M:300:ASP:OD1	4:M:300:ASP:N	2.50	0.44
5:P:247:ARG:HH21	5:P:383:ASP:HB2	1.81	0.44
2:K:1300:MET:HE2	2:K:1319:LEU:HD21	1.98	0.44
3:L:81:GLU:HG3	3:L:104:PHE:HZ	1.82	0.44
4:M:319:LEU:O	4:M:320:LYS:C	2.59	0.44
5:N:231:VAL:O	5:N:232:LEU:C	2.57	0.44
5:P:354:LEU:O	5:P:355:LEU:C	2.58	0.44
3:L:198:TYR:CE2	3:L:225:GLY:HA2	2.52	0.44
4:M:382:THR:HG22	4:M:384:ARG:H	1.83	0.44
1:A:14:LYS:HD2	3:L:108:ASP:OD2	2.17	0.44
2:K:785:HIS:ND1	2:K:787:VAL:HG22	2.33	0.44
2:K:1027:GLU:O	2:K:1031:GLU:HG2	2.17	0.44
5:P:248:LEU:HA	5:P:249:PRO:C	2.43	0.44
2:K:809:LYS:O	2:K:813:GLU:HG3	2.18	0.44
2:K:911:GLU:HG3	4:M:113:LEU:HD22	2.00	0.44
3:L:236:VAL:HG22	3:L:376:ILE:HD13	2.00	0.44
4:M:477:LYS:NZ	4:M:489:TYR:HB3	2.33	0.44
2:K:890:THR:HA	4:M:93:ILE:HD13	1.99	0.43
3:L:259:MET:HE1	3:L:298:VAL:HG13	1.98	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:K:773:MET:HE1	3:L:171:ILE:HG23	2.00	0.43
2:K:1117:THR:HB	2:K:1120:LEU:HG	1.99	0.43
3:L:45:ILE:HG12	3:L:146:ALA:HA	2.00	0.43
5:P:248:LEU:HD13	5:P:326:TYR:CE2	2.52	0.43
5:P:262:GLU:O	5:P:266:SER:HB3	2.18	0.43
2:K:898:LEU:HD23	2:K:898:LEU:HA	1.89	0.43
2:K:987:ASP:OD2	2:K:1204:TYR:OH	2.29	0.43
2:K:1137:ASN:HA	2:K:1304:GLU:HA	2.00	0.43
3:L:198:TYR:CZ	3:L:225:GLY:HA2	2.53	0.43
4:M:568:GLN:O	4:M:572:SER:N	2.50	0.43
2:K:1134:SER:HB3	2:K:1307:LYS:HB3	2.00	0.43
3:L:84:ASP:OD2	3:L:88:ARG:NH2	2.52	0.43
4:O:265:ALA:O	4:O:350:GLN:HB2	2.18	0.43
5:P:257:VAL:HG21	5:P:328:ALA:HB2	2.01	0.43
4:M:290:PRO:HG2	5:N:307:ASP:HB2	2.01	0.43
4:M:499:ASN:OD1	4:M:500:LYS:N	2.52	0.43
4:O:293:PRO:O	4:O:296:LEU:HG	2.18	0.43
5:P:246:CYS:HB2	5:P:387:TYR:CD1	2.54	0.43
2:K:676:ILE:HD12	2:K:709:TYR:HD1	1.82	0.43
2:K:1111:ALA:O	2:K:1112:LYS:C	2.62	0.43
2:K:949:ILE:HD11	2:K:1142:THR:HG23	1.99	0.43
2:K:1036:HIS:CB	2:K:1212:ARG:HH22	2.32	0.43
3:L:220:GLU:OE1	3:L:221:LEU:N	2.51	0.43
4:M:396:THR:O	4:M:459:ASN:ND2	2.51	0.42
5:P:332:LEU:HD22	5:P:374:PHE:CE1	2.55	0.42
2:K:926:LYS:NZ	2:K:1226:GLU:OE2	2.52	0.42
2:K:1013:LEU:HD12	2:K:1065:LEU:HD11	2.00	0.42
4:O:289:PRO:O	4:O:290:PRO:C	2.60	0.42
3:L:280:ARG:HG3	3:L:281:LEU:HG	2.00	0.42
2:K:824:ASN:O	2:K:828:ILE:HG12	2.20	0.42
2:K:909:GLN:O	2:K:913:ASN:N	2.53	0.42
1:A:4:LYS:H	1:A:4:LYS:HG2	1.54	0.42
2:K:757:ARG:HG3	2:K:781:GLU:HG2	2.01	0.42
2:K:951:GLU:CD	2:K:1149:ARG:HH22	2.28	0.42
2:K:860:MET:O	2:K:864:LYS:HE2	2.20	0.41
2:K:879:ILE:O	2:K:883:LEU:N	2.46	0.41
4:M:565:LYS:HA	4:M:565:LYS:HD3	1.96	0.41
5:N:258:LEU:HD21	5:N:285:LEU:HD23	2.02	0.41
4:O:288:ASP:CB	4:O:289:PRO:HD3	2.51	0.41
4:M:378:LYS:HB2	4:M:378:LYS:HE2	1.90	0.41
4:O:336:PHE:CE1	5:P:355:LEU:HD21	2.53	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
5:P:248:LEU:HD22	5:P:326:TYR:CD2	2.55	0.41
2:K:1162:LYS:HD2	2:K:1204:TYR:CE2	2.56	0.41
4:M:340:LEU:O	4:M:343:ILE:HG22	2.20	0.41
2:K:782:TRP:CE2	3:L:226:VAL:HG21	2.55	0.41
5:P:352:CYS:O	5:P:353:GLN:C	2.61	0.41
2:K:1081:ASN:N	2:K:1081:ASN:OD1	2.53	0.41
3:L:39:PRO:HB3	3:L:280:ARG:HD3	2.03	0.41
3:L:186:ASP:OD1	3:L:274:ASP:HB2	2.20	0.41
1:A:8:ARG:HD3	1:A:14:LYS:HZ3	1.86	0.41
2:K:1266:MET:HA	2:K:1269:PHE:HB3	2.02	0.41
3:L:131:ALA:HB1	3:L:173:LEU:HG	2.02	0.41
4:M:466:CYS:C	4:M:467:PRO:O	2.61	0.41
4:O:305:GLU:HG2	4:O:309:LYS:NZ	2.35	0.41
5:P:325:ILE:HG13	5:P:326:TYR:N	2.36	0.41
2:K:1018:ILE:HD13	2:K:1018:ILE:HA	1.92	0.41
3:L:340:TYR:HE2	3:L:421:ALA:HB3	1.86	0.41
2:K:666:VAL:HG11	4:O:552:PHE:CD1	2.56	0.40
3:L:19:ARG:HH21	3:L:302:GLY:CA	2.35	0.40
5:N:354:LEU:HD12	5:N:354:LEU:HA	1.88	0.40
5:N:386:LEU:H	5:N:386:LEU:HG	1.66	0.40
2:K:835:VAL:HA	2:K:838:ILE:HD13	2.03	0.40
2:K:1148:PHE:CZ	2:K:1312:VAL:HG11	2.57	0.40
2:K:1180:PHE:CD2	3:L:340:TYR:HB2	2.56	0.40
1:A:23:LYS:HB3	1:A:23:LYS:HE2	1.61	0.40
2:K:1196:LEU:HB3	2:K:1227:SER:HB2	2.04	0.40
3:L:94:LEU:HD23	3:L:94:LEU:HA	1.80	0.40
3:L:150:HIS:NE2	3:L:186:ASP:OD2	2.50	0.40
4:M:88:ASP:O	4:M:89:SER:C	2.64	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	22/24 (92%)	18 (82%)	3 (14%)	1 (4%)	2	12
2	K	590/1536 (38%)	568 (96%)	22 (4%)	0	100	100
3	L	406/433 (94%)	392 (97%)	14 (3%)	0	100	100
4	M	347/684 (51%)	327 (94%)	20 (6%)	0	100	100
4	O	149/684 (22%)	143 (96%)	5 (3%)	1 (1%)	19	47
5	N	181/401 (45%)	175 (97%)	6 (3%)	0	100	100
5	P	182/401 (45%)	178 (98%)	4 (2%)	0	100	100
All	All	1877/4163 (45%)	1801 (96%)	74 (4%)	2 (0%)	50	77

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	4	LYS
4	O	289	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	15/17 (88%)	12 (80%)	3 (20%)	1	3
2	K	479/1391 (34%)	479 (100%)	0	100	100
3	L	300/367 (82%)	299 (100%)	1 (0%)	91	95
4	M	275/653 (42%)	275 (100%)	0	100	100
4	O	111/653 (17%)	111 (100%)	0	100	100
5	N	152/359 (42%)	151 (99%)	1 (1%)	81	89
5	P	143/359 (40%)	143 (100%)	0	100	100
All	All	1475/3799 (39%)	1470 (100%)	5 (0%)	90	95

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

Mol	Chain	Res	Type
1	A	4	LYS
1	A	22	THR
1	A	23	LYS
3	L	122	ILE
5	N	252	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
2	K	690	ASN
2	K	727	GLN
2	K	1206	GLN
2	K	1221	HIS
3	L	341	ASN
4	M	325	ASN
4	M	342	ASN
4	M	346	HIS
4	M	444	GLN
4	M	495	GLN
4	M	545	ASN
5	N	317	GLN
5	N	358	GLN
4	O	583	GLN
5	P	263	HIS
5	P	277	GLN
5	P	330	HIS
5	P	389	ASN

### 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 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.