Full wwPDB EM Validation Report ⓘ

Mar 9, 2026 – 02:13 AM JST

PDB ID	:	9U9R / pdb_00009u9r
EMDB ID	:	EMD-63968
Title	:	ARF1(Q71L) bound M4-CTD-undocked AP-4 core
Authors	:	Wang, Y.H.; Li, W.
Deposited on	:	2025-03-29
Resolution	:	6.60 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:

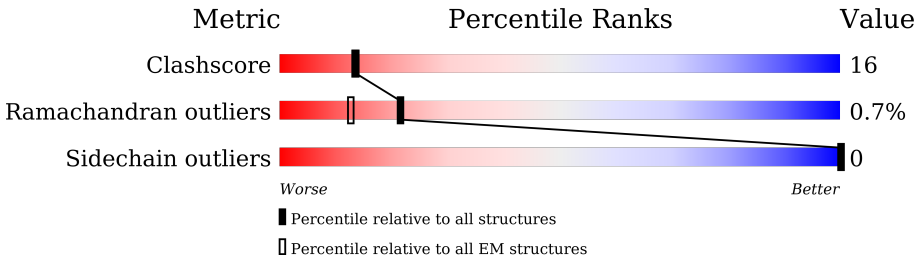
EMDB validation analysis	:	FAILED
MolProbity	:	4-5-2 with Phenix2.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics	:	NOT EXECUTED
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.48.1

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 6.60 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	B	576	59% 32% • 9%
2	E	612	50% 33% 16%
3	R	164	73% 26% •
4	M	453	20% 8% 71%
5	S	144	51% 33% • 16%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 11661 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 AP-4 complex subunit beta-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	B	526	4162	2659	707	761	35	0	0

- Molecule 2 is a protein called AP-4 complex subunit epsilon-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	E	515	4149	2689	680	754	26	0	0

- Molecule 3 is a protein called ADP-ribosylation factor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	R	162	1303	826	228	243	6	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
R	71	LEU	GLN	conflict	UNP P84077

- Molecule 4 is a protein called AP-4 complex subunit mu-1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	M	130	1035	663	175	193	4	0	0

- Molecule 5 is a protein called AP-4 complex subunit sigma-1.

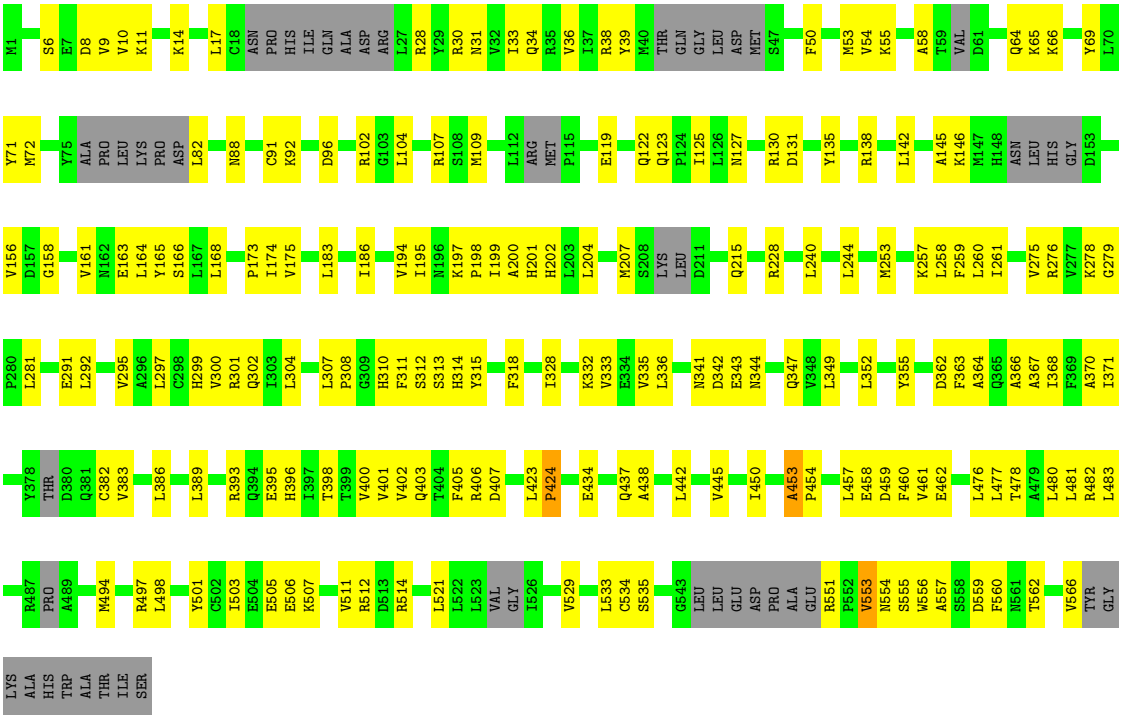
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	S	121	1012	659	163	183	7	0	0

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.

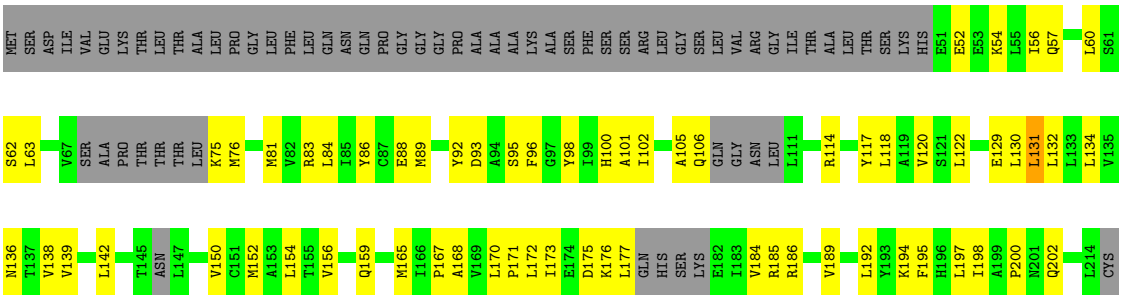
- Molecule 1: AP-4 complex subunit beta-1

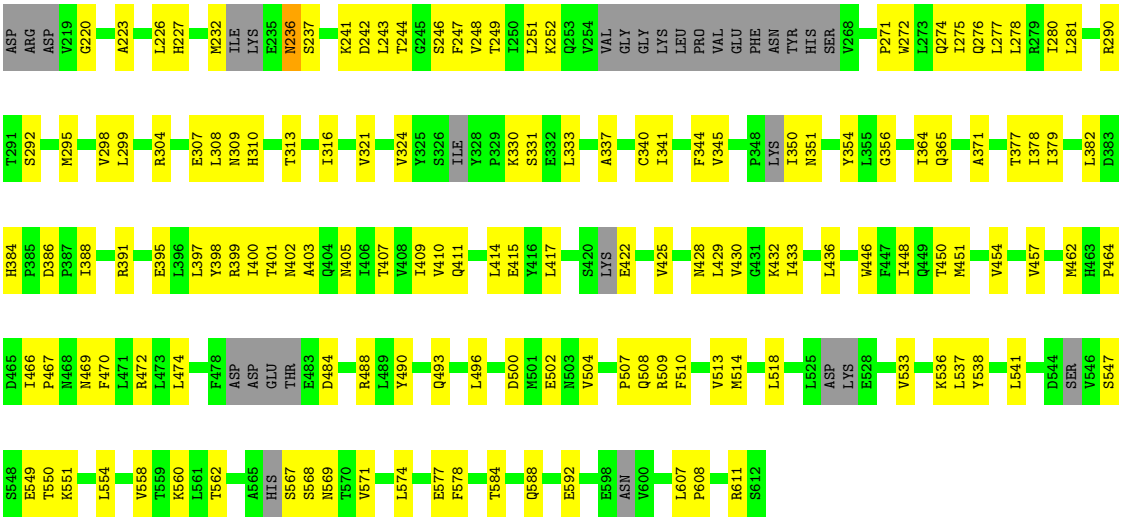
Chain B:



- Molecule 2: AP-4 complex subunit epsilon-1

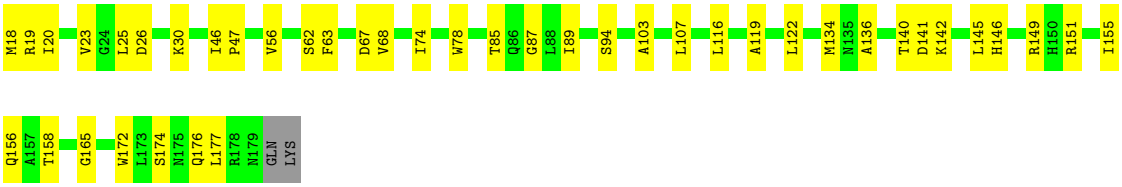
Chain E:





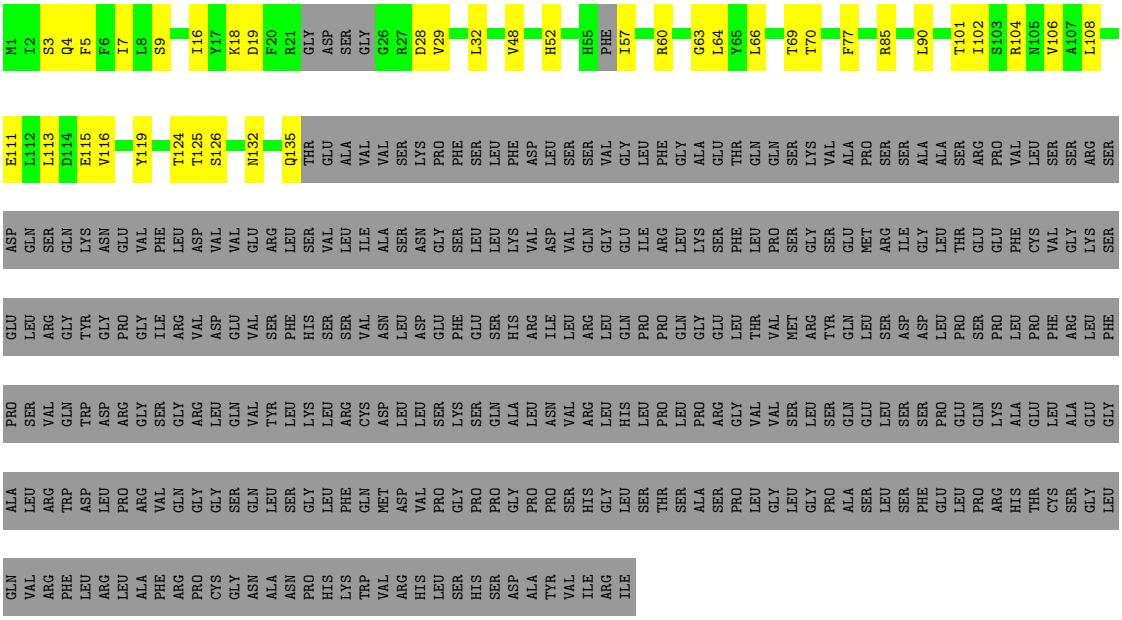
• Molecule 3: ADP-ribosylation factor 1

Chain R:



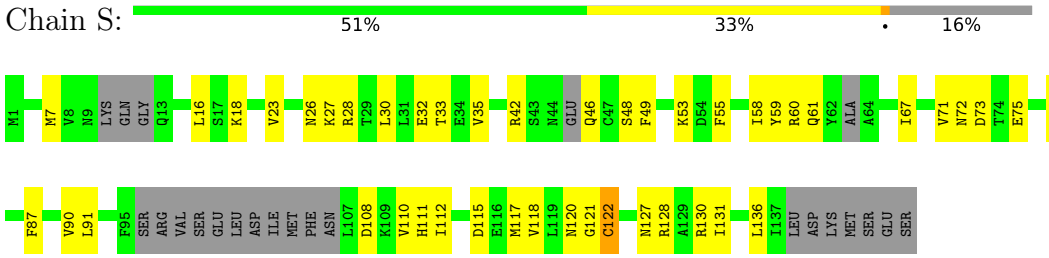
• Molecule 4: AP-4 complex subunit mu-1

Chain M:



• Molecule 5: AP-4 complex subunit sigma-1

Chain S:


51%
33%
16%
M1 M7 V8 N9 LYS GLN GLY Q13 L16 S17 K18 V23 N26 K27 R28 T29 L30 L31 E32 T33 E34 V35 R42 S43 N44 GLU Q46 C47 S48 F49 K53 D54 F55 I58 Y59 R60 Q61 Y62 ALA A64 I67 V71 N72 D73 T74 E75 I80 Y81 E82 F83
F87 V90 L91 F95 SER ARG VAL SER GLU LEU ASP ILE MET PHE ASN L107 D108 K109 V110 H111 I112 D115 E116 M117 V118 L119 N120 G121 C122 N127 R128 A129 R130 I131 L136 I137 LEU ASP LYS MET SER GLU SER

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	18467	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	TFS TITAN THEMIS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

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	B	0.17	0/4227	0.42	1/5708 (0.0%)
2	E	0.14	0/4214	0.54	3/5687 (0.1%)
3	R	0.12	0/1326	0.36	0/1796
4	M	0.09	0/1055	0.28	0/1425
5	S	0.12	0/1026	0.71	3/1378 (0.2%)
All	All	0.15	0/11848	0.48	7/15994 (0.0%)

There are no bond length outliers.

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	S	122	CYS	N-CA-CB	16.59	138.31	110.77
2	E	131	LEU	CB-CA-C	-14.52	82.61	110.35
2	E	132	LEU	N-CA-CB	-13.17	88.23	110.49
2	E	131	LEU	N-CA-C	11.66	136.62	113.29
5	S	121	GLY	N-CA-C	11.58	140.62	113.18
5	S	122	CYS	N-CA-C	-10.97	91.89	108.46
1	B	424	PRO	N-CA-C	-5.42	109.04	114.68

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	B	4162	0	4233	141	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	E	4149	0	4263	163	0
3	R	1303	0	1301	24	0
4	M	1035	0	1031	27	0
5	S	1012	0	1025	38	0
All	All	11661	0	11853	372	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 16.

All (372) 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:E:244:THR:HB	2:E:247:PHE:HB2	1.59	0.84
2:E:130:LEU:HD23	2:E:131:LEU:H	1.42	0.84
2:E:500:ASP:OD1	2:E:536:LYS:NZ	2.11	0.83
1:B:11:LYS:HD2	1:B:14:LYS:HZ1	1.48	0.78
1:B:58:ALA:HA	1:B:64:GLN:HE22	1.52	0.75
2:E:414:LEU:HD11	2:E:450:THR:HG22	1.70	0.73
3:R:174:SER:HA	3:R:177:LEU:HD23	1.70	0.73
1:B:553:VAL:HG23	1:B:554:ASN:H	1.55	0.72
1:B:311:PHE:HB3	1:B:314:HIS:HB2	1.72	0.71
2:E:398:TYR:HA	2:E:436:LEU:HD11	1.73	0.71
2:E:118:LEU:HG	5:S:112:ILE:HG12	1.72	0.71
2:E:402:ASN:OD1	2:E:403:ALA:N	2.24	0.70
2:E:100:HIS:O	2:E:102:ILE:N	2.25	0.69
2:E:186:ARG:HG3	2:E:220:GLY:HA3	1.75	0.68
1:B:281:LEU:HD13	1:B:300:VAL:HG22	1.74	0.68
2:E:308:LEU:HD12	2:E:313:THR:HB	1.76	0.67
2:E:272:TRP:O	2:E:276:GLN:NE2	2.27	0.67
1:B:163:GLU:OE2	1:B:166:SER:OG	2.13	0.67
1:B:342:ASP:OD1	1:B:343:GLU:N	2.28	0.67
3:R:158:THR:HG22	3:R:165:GLY:HA3	1.77	0.67
3:R:140:THR:HG23	3:R:145:LEU:HB2	1.77	0.66
2:E:60:LEU:HB3	2:E:63:LEU:HD23	1.78	0.66
2:E:167:PRO:HA	2:E:170:LEU:HD13	1.77	0.66
1:B:406:ARG:NH2	2:E:584:THR:OG1	2.28	0.65
2:E:397:LEU:HA	2:E:400:ILE:HG22	1.78	0.65
5:S:60:ARG:HD3	5:S:81:TYR:HE1	1.61	0.65
1:B:454:PRO:HA	1:B:457:LEU:HB2	1.77	0.65
1:B:138:ARG:HG2	1:B:175:VAL:HG12	1.79	0.64
1:B:135:TYR:HA	1:B:138:ARG:HG3	1.78	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:52:GLU:HG3	2:E:54:LYS:H	1.63	0.63
1:B:14:LYS:HA	1:B:17:LEU:HD13	1.81	0.63
1:B:199:ILE:O	1:B:202:HIS:ND1	2.30	0.63
1:B:494:MET:O	1:B:497:ARG:HG2	1.97	0.63
2:E:405:ASN:O	2:E:409:ILE:HG12	1.96	0.63
4:M:3:SER:H	4:M:70:THR:HG22	1.64	0.63
2:E:131:LEU:HA	2:E:134:LEU:HD13	1.80	0.62
4:M:29:VAL:O	4:M:32:LEU:HB3	1.99	0.62
1:B:344:ASN:ND2	1:B:347:GLN:OE1	2.31	0.62
1:B:295:VAL:HG12	1:B:566:VAL:HG11	1.80	0.62
3:R:156:GLN:NE2	3:R:165:GLY:O	2.33	0.62
1:B:457:LEU:HA	1:B:460:PHE:HD2	1.64	0.61
1:B:494:MET:SD	1:B:497:ARG:NE	2.71	0.61
3:R:94:SER:HB3	3:R:134:MET:H	1.64	0.61
2:E:277:LEU:O	2:E:280:ILE:HG22	2.00	0.61
2:E:138:VAL:HG21	2:E:154:LEU:HD22	1.83	0.61
5:S:55:PHE:HA	5:S:72:ASN:HA	1.83	0.61
2:E:243:LEU:HD11	2:E:292:SER:HA	1.83	0.61
5:S:117:MET:HG3	5:S:118:VAL:HG23	1.83	0.61
2:E:93:ASP:HA	2:E:96:PHE:HD2	1.67	0.60
2:E:54:LYS:HE2	2:E:57:GLN:HB2	1.82	0.60
5:S:23:VAL:HG13	5:S:28:ARG:HH22	1.67	0.60
1:B:535:SER:HB2	2:E:588:GLN:HE22	1.65	0.60
2:E:508:GLN:HB3	2:E:550:THR:HG21	1.83	0.60
5:S:58:ILE:HD13	5:S:80:ILE:HD11	1.82	0.60
1:B:458:GLU:HA	1:B:497:ARG:HH22	1.67	0.60
5:S:71:VAL:HG11	5:S:75:GLU:HB2	1.83	0.60
1:B:450:ILE:HG21	1:B:453:ALA:HB2	1.85	0.59
3:R:23:VAL:HG12	3:R:68:VAL:HB	1.84	0.59
2:E:388:ILE:HG23	2:E:391:ARG:HH21	1.68	0.59
2:E:236:ASN:CG	2:E:237:SER:H	2.11	0.59
1:B:461:VAL:HG13	1:B:498:LEU:HD13	1.83	0.59
2:E:490:TYR:HA	2:E:493:GLN:HE22	1.68	0.58
2:E:237:SER:HA	2:E:241:LYS:HE2	1.85	0.58
1:B:96:ASP:O	1:B:102:ARG:NH2	2.36	0.58
1:B:478:THR:O	1:B:482:ARG:HG2	2.02	0.58
2:E:139:VAL:HA	2:E:142:LEU:HD13	1.85	0.58
3:R:46:ILE:HD12	3:R:47:PRO:HD2	1.86	0.58
3:R:89:ILE:HG12	3:R:122:LEU:HB3	1.86	0.58
2:E:538:TYR:HD1	2:E:574:LEU:HD13	1.69	0.58
1:B:88:ASN:O	1:B:92:LYS:NZ	2.34	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:194:LYS:HZ1	5:S:120:ASN:HB3	1.70	0.57
4:M:124:THR:HG22	4:M:126:SER:H	1.69	0.57
1:B:481:LEU:HD22	1:B:533:LEU:HG	1.86	0.57
2:E:307:GLU:O	2:E:308:LEU:HG	2.05	0.57
4:M:132:ASN:O	4:M:135:GLN:NE2	2.35	0.57
2:E:136:ASN:O	2:E:139:VAL:HB	2.05	0.57
4:M:7:ILE:HB	4:M:16:ILE:HB	1.87	0.57
1:B:6:SER:O	1:B:10:VAL:HG23	2.04	0.57
1:B:183:LEU:HA	1:B:186:ILE:HG22	1.87	0.57
3:R:18:MET:N	3:R:62:SER:O	2.38	0.57
2:E:462:MET:HE1	2:E:467:PRO:HD3	1.86	0.57
2:E:558:VAL:O	2:E:562:THR:HG23	2.05	0.57
2:E:84:LEU:HD11	5:S:18:LYS:HZ1	1.70	0.57
1:B:244:LEU:HD13	1:B:276:ARG:HG2	1.87	0.56
1:B:333:VAL:HG13	1:B:370:ALA:HB2	1.85	0.56
2:E:142:LEU:HD23	2:E:172:LEU:HD22	1.86	0.56
1:B:276:ARG:O	1:B:276:ARG:NE	2.31	0.56
1:B:119:GLU:HG3	1:B:146:LYS:HD2	1.87	0.56
2:E:102:ILE:HA	2:E:105:ALA:HB3	1.87	0.56
2:E:173:ILE:HD11	2:E:189:VAL:HA	1.86	0.56
2:E:507:PRO:HG2	2:E:510:PHE:HB2	1.87	0.56
1:B:66:LYS:HZ2	4:M:111:GLU:HB3	1.69	0.56
2:E:139:VAL:O	2:E:142:LEU:HB2	2.06	0.55
2:E:130:LEU:O	2:E:131:LEU:HB2	2.07	0.55
2:E:236:ASN:OD1	2:E:237:SER:N	2.38	0.55
4:M:101:THR:HA	4:M:104:ARG:HE	1.71	0.55
3:R:119:ALA:O	3:R:151:ARG:NH1	2.40	0.55
3:R:146:HIS:O	3:R:149:ARG:NH2	2.40	0.55
1:B:461:VAL:HG22	1:B:476:LEU:HD21	1.88	0.55
2:E:551:LYS:HA	2:E:554:LEU:HB2	1.89	0.55
2:E:608:PRO:HB2	2:E:611:ARG:HE	1.72	0.55
1:B:145:ALA:HA	1:B:186:ILE:HD13	1.89	0.55
1:B:295:VAL:HG23	4:M:77:PHE:HE1	1.72	0.54
2:E:313:THR:HA	2:E:316:ILE:HG12	1.89	0.54
2:E:130:LEU:HD23	2:E:131:LEU:N	2.16	0.54
2:E:377:THR:HG23	2:E:378:ILE:HD12	1.89	0.54
2:E:310:HIS:ND1	5:S:82:GLU:OE2	2.29	0.54
1:B:123:GLN:OE1	1:B:127:ASN:ND2	2.40	0.54
1:B:165:TYR:HA	1:B:168:LEU:HD23	1.90	0.54
1:B:382:CYS:SG	1:B:383:VAL:N	2.73	0.54
2:E:175:ASP:OD1	2:E:176:LYS:N	2.41	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:R:19:ARG:HB2	3:R:85:THR:HA	1.90	0.54
1:B:315:TYR:HA	1:B:318:PHE:HD2	1.73	0.54
2:E:470:PHE:CZ	2:E:474:LEU:HD11	2.43	0.54
2:E:537:LEU:HD12	2:E:554:LEU:HD12	1.90	0.54
1:B:301:ARG:HA	1:B:304:LEU:HD23	1.90	0.53
2:E:81:MET:HE1	2:E:84:LEU:HD22	1.90	0.53
1:B:362:ASP:OD1	1:B:363:PHE:N	2.42	0.53
1:B:201:HIS:CE1	1:B:204:LEU:HD22	2.44	0.53
2:E:86:TYR:HB2	2:E:89:MET:HE2	1.90	0.53
1:B:335:VAL:HG23	1:B:336:LEU:HD12	1.91	0.53
2:E:401:THR:HB	2:E:409:ILE:HD11	1.91	0.53
2:E:474:LEU:HB3	2:E:488:ARG:NH2	2.23	0.53
4:M:4:GLN:NE2	4:M:19:ASP:OD1	2.33	0.53
2:E:251:LEU:HD11	2:E:298:VAL:HG11	1.90	0.53
5:S:117:MET:HE2	5:S:131:ILE:HD11	1.90	0.53
2:E:114:ARG:HH22	5:S:136:LEU:HD21	1.74	0.53
1:B:104:LEU:HA	1:B:107:ARG:HD3	1.90	0.52
2:E:60:LEU:O	2:E:62:SER:N	2.42	0.52
2:E:102:ILE:O	2:E:106:GLN:N	2.41	0.52
1:B:253:MET:HG2	4:M:77:PHE:HD2	1.75	0.52
1:B:333:VAL:HG21	1:B:366:ALA:HB1	1.91	0.52
2:E:417:LEU:HD13	2:E:457:VAL:HG21	1.90	0.52
4:M:4:GLN:HG3	4:M:19:ASP:HA	1.91	0.52
5:S:42:ARG:HG3	5:S:61:GLN:HE22	1.75	0.52
2:E:547:SER:O	2:E:550:THR:OG1	2.22	0.52
1:B:406:ARG:HH11	1:B:438:ALA:HA	1.74	0.52
2:E:83:ARG:HH12	2:E:95:SER:HA	1.75	0.52
2:E:422:GLU:HG3	2:E:425:VAL:H	1.75	0.52
1:B:403:GLN:NE2	1:B:407:ASP:OD2	2.43	0.52
2:E:275:ILE:HG12	2:E:316:ILE:HG22	1.92	0.51
3:R:20:ILE:HD13	3:R:87:GLY:HA3	1.91	0.51
5:S:18:LYS:HG2	5:S:111:HIS:HE1	1.75	0.51
2:E:330:LYS:HG3	2:E:331:SER:H	1.76	0.51
3:R:136:ALA:HB1	3:R:155:ILE:HG23	1.92	0.51
4:M:60:ARG:HE	4:M:63:GLY:HA2	1.75	0.51
5:S:60:ARG:HD3	5:S:81:TYR:CE1	2.43	0.51
1:B:553:VAL:HG23	1:B:554:ASN:N	2.26	0.51
1:B:50:PHE:HB3	1:B:53:MET:HB3	1.92	0.51
1:B:257:LYS:HD3	1:B:560:PHE:HB3	1.93	0.51
1:B:349:LEU:HD13	1:B:352:LEU:HD23	1.93	0.51
1:B:386:LEU:HA	1:B:389:LEU:HD23	1.91	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:177:LEU:HD22	2:E:185:ARG:HD3	1.92	0.51
2:E:364:ILE:HG22	2:E:399:ARG:HD3	1.93	0.51
1:B:194:VAL:HG13	1:B:200:ALA:HB2	1.93	0.50
1:B:364:ALA:O	1:B:368:ILE:HD12	2.11	0.50
1:B:480:LEU:HA	1:B:483:LEU:HG	1.93	0.50
5:S:59:TYR:HA	5:S:67:ILE:O	2.12	0.50
1:B:453:ALA:H	1:B:454:PRO:HD2	1.75	0.50
1:B:501:TYR:HA	1:B:505:GLU:HB2	1.93	0.50
2:E:98:TYR:HE1	2:E:120:VAL:HG23	1.76	0.50
2:E:131:LEU:HD13	2:E:134:LEU:HD22	1.94	0.50
3:R:25:LEU:O	3:R:30:LYS:NZ	2.40	0.50
5:S:72:ASN:OD1	5:S:73:ASP:N	2.38	0.50
1:B:161:VAL:O	1:B:164:LEU:HB2	2.12	0.50
1:B:207:MET:HE2	1:B:215:GLN:HG3	1.94	0.50
2:E:309:ASN:OD1	2:E:310:HIS:N	2.40	0.50
1:B:195:ILE:O	1:B:228:ARG:NH1	2.44	0.50
2:E:451:MET:HA	2:E:454:VAL:HG22	1.94	0.50
5:S:26:ASN:OD1	5:S:27:LYS:HD3	2.11	0.50
2:E:333:LEU:HD12	2:E:337:ALA:HB2	1.94	0.50
2:E:242:ASP:O	2:E:243:LEU:HB2	2.11	0.50
2:E:379:ILE:HD12	2:E:382:LEU:HD13	1.94	0.49
2:E:430:VAL:HA	2:E:433:ILE:HG22	1.93	0.49
2:E:541:LEU:HD21	2:E:578:PHE:CZ	2.47	0.49
4:M:9:SER:HA	4:M:64:LEU:HD13	1.94	0.49
1:B:38:ARG:HH21	4:M:106:VAL:HB	1.77	0.49
1:B:69:TYR:HA	1:B:72:MET:HG2	1.94	0.49
1:B:161:VAL:HA	1:B:164:LEU:HD23	1.93	0.49
2:E:407:THR:HA	2:E:410:VAL:HG22	1.94	0.49
2:E:560:LYS:HD3	2:E:607:LEU:HD12	1.95	0.49
2:E:248:VAL:O	2:E:252:LYS:N	2.45	0.49
5:S:30:LEU:O	5:S:33:THR:OG1	2.29	0.49
1:B:367:ALA:O	1:B:371:ILE:HG12	2.12	0.49
1:B:458:GLU:HG3	1:B:497:ARG:CZ	2.43	0.49
1:B:533:LEU:N	2:E:592:GLU:OE2	2.46	0.49
2:E:56:ILE:O	2:E:56:ILE:HG13	2.12	0.49
1:B:36:VAL:HA	1:B:39:TYR:CE2	2.48	0.49
1:B:501:TYR:O	1:B:506:GLU:N	2.35	0.49
3:R:141:ASP:OD1	3:R:142:LYS:N	2.46	0.48
2:E:251:LEU:HB2	2:E:277:LEU:HD21	1.96	0.48
1:B:459:ASP:HA	1:B:462:GLU:HG2	1.95	0.48
2:E:232:MET:SD	2:E:232:MET:N	2.86	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:462:MET:HE1	2:E:466:ILE:HB	1.95	0.48
1:B:328:ILE:O	1:B:332:LYS:HG2	2.13	0.48
1:B:521:LEU:HG	1:B:529:VAL:HG22	1.94	0.48
4:M:48:VAL:HB	4:M:57:ILE:HG22	1.96	0.48
1:B:122:GLN:OE1	1:B:122:GLN:N	2.38	0.48
1:B:521:LEU:HD11	1:B:529:VAL:HA	1.95	0.48
2:E:227:HIS:NE2	5:S:122:CYS:SG	2.74	0.48
1:B:395:GLU:CD	1:B:396:HIS:H	2.21	0.48
1:B:107:ARG:NH2	4:M:115:GLU:HA	2.29	0.47
1:B:197:LYS:HB3	1:B:198:PRO:HD3	1.96	0.47
2:E:340:CYS:O	2:E:344:PHE:HB3	2.14	0.47
1:B:54:VAL:HG11	1:B:82:LEU:HD11	1.95	0.47
1:B:461:VAL:HB	1:B:497:ARG:HH12	1.79	0.47
2:E:536:LYS:HG3	2:E:537:LEU:HD22	1.97	0.47
1:B:204:LEU:HD11	1:B:240:LEU:HD21	1.97	0.47
1:B:275:VAL:HA	1:B:278:LYS:HE2	1.97	0.47
1:B:434:GLU:O	1:B:437:GLN:HG2	2.14	0.47
2:E:152:MET:O	2:E:156:VAL:HG22	2.15	0.47
2:E:165:MET:HB2	2:E:202:GLN:HE21	1.79	0.47
2:E:337:ALA:O	2:E:341:ILE:N	2.45	0.47
2:E:608:PRO:HG2	2:E:611:ARG:HG3	1.95	0.47
5:S:48:SER:HA	5:S:59:TYR:CE1	2.50	0.47
1:B:142:LEU:HD21	4:M:119:TYR:HB2	1.96	0.47
2:E:290:ARG:HD2	2:E:290:ARG:HA	1.74	0.47
1:B:253:MET:HG2	4:M:77:PHE:CD2	2.50	0.47
2:E:533:VAL:O	2:E:537:LEU:HD23	2.15	0.47
1:B:299:HIS:O	1:B:302:GLN:HG3	2.14	0.46
2:E:278:LEU:HA	2:E:281:LEU:HD12	1.96	0.46
2:E:384:HIS:HD2	2:E:386:ASP:HB2	1.81	0.46
1:B:14:LYS:HA	1:B:17:LEU:CD1	2.44	0.46
1:B:535:SER:HB2	2:E:588:GLN:NE2	2.30	0.46
2:E:333:LEU:O	2:E:337:ALA:N	2.46	0.46
1:B:503:ILE:HD12	1:B:512:ARG:HG3	1.97	0.46
2:E:102:ILE:H	2:E:102:ILE:HD12	1.80	0.46
1:B:276:ARG:HH21	1:B:279:GLY:HA3	1.80	0.46
2:E:272:TRP:HB2	2:E:276:GLN:HE22	1.80	0.46
1:B:511:VAL:HG12	1:B:514:ARG:HH12	1.80	0.46
3:R:26:ASP:OD1	3:R:26:ASP:N	2.47	0.46
5:S:111:HIS:NE2	5:S:115:ASP:OD2	2.48	0.46
2:E:567:SER:OG	2:E:569:ASN:OD1	2.30	0.46
5:S:108:ASP:O	5:S:112:ILE:HG13	2.16	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:184:VAL:O	2:E:184:VAL:HG13	2.16	0.46
2:E:371:ALA:HA	2:E:400:ILE:HG13	1.97	0.46
1:B:506:GLU:OE2	1:B:507:LYS:N	2.49	0.45
2:E:410:VAL:O	2:E:414:LEU:HG	2.16	0.45
2:E:509:ARG:NH1	2:E:549:GLU:OE2	2.42	0.45
1:B:30:ARG:O	1:B:33:ILE:HG12	2.16	0.45
1:B:312:SER:OG	1:B:313:SER:N	2.50	0.45
2:E:493:GLN:OE1	2:E:493:GLN:N	2.47	0.45
1:B:131:ASP:OD1	1:B:131:ASP:N	2.46	0.45
2:E:84:LEU:HD12	2:E:122:LEU:HD11	1.97	0.45
5:S:127:ASN:HB3	5:S:130:ARG:HD3	1.98	0.45
1:B:311:PHE:O	1:B:313:SER:N	2.48	0.45
1:B:328:ILE:HD12	1:B:328:ILE:H	1.81	0.45
1:B:405:PHE:CD2	1:B:423:LEU:HD11	2.51	0.45
5:S:87:PHE:O	5:S:91:LEU:HD23	2.17	0.45
2:E:246:SER:O	2:E:249:THR:OG1	2.22	0.45
1:B:244:LEU:HD21	1:B:259:PHE:HE2	1.81	0.45
1:B:551:ARG:O	1:B:555:SER:OG	2.26	0.45
1:B:477:LEU:O	1:B:480:LEU:HG	2.17	0.45
1:B:559:ASP:O	1:B:562:THR:OG1	2.28	0.45
1:B:557:ALA:O	1:B:559:ASP:N	2.45	0.45
5:S:90:VAL:HG12	5:S:128:ARG:NE	2.32	0.45
2:E:510:PHE:HA	2:E:513:VAL:HG22	1.99	0.44
1:B:119:GLU:O	1:B:119:GLU:HG2	2.17	0.44
1:B:401:VAL:HG22	1:B:405:PHE:CZ	2.52	0.44
2:E:134:LEU:O	2:E:138:VAL:HG23	2.18	0.44
2:E:446:TRP:O	2:E:450:THR:HG23	2.18	0.44
3:R:74:ILE:HG22	3:R:78:TRP:HE1	1.81	0.44
4:M:108:LEU:O	4:M:111:GLU:HG3	2.17	0.44
1:B:64:GLN:NE2	1:B:65:LYS:HG3	2.32	0.44
1:B:164:LEU:HB3	1:B:183:LEU:HD21	1.98	0.44
1:B:297:LEU:HD22	1:B:332:LYS:HZ2	1.83	0.44
1:B:355:TYR:HB3	1:B:363:PHE:CZ	2.52	0.44
5:S:48:SER:OG	5:S:49:PHE:N	2.50	0.44
1:B:11:LYS:HD2	1:B:14:LYS:NZ	2.26	0.44
1:B:453:ALA:O	1:B:457:LEU:HD13	2.18	0.44
2:E:365:GLN:NE2	2:E:395:GLU:OE2	2.50	0.44
4:M:28:ASP:OD1	4:M:28:ASP:N	2.49	0.44
4:M:52:HIS:O	4:M:52:HIS:ND1	2.50	0.44
4:M:85:ARG:NE	4:M:125:THR:OG1	2.50	0.44
1:B:533:LEU:O	1:B:535:SER:N	2.51	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:568:SER:HB2	2:E:571:VAL:HB	1.99	0.44
2:E:130:LEU:CD2	2:E:131:LEU:H	2.20	0.44
2:E:295:MET:HG3	2:E:299:LEU:HD11	2.00	0.44
2:E:550:THR:O	2:E:554:LEU:HD23	2.18	0.44
1:B:393:ARG:HA	1:B:398:THR:HG22	2.00	0.44
2:E:117:TYR:CD2	2:E:150:VAL:HB	2.52	0.44
2:E:344:PHE:HE1	2:E:356:GLY:HA2	1.83	0.44
2:E:384:HIS:CD2	2:E:386:ASP:HB2	2.53	0.44
3:R:56:VAL:HG23	3:R:63:PHE:HB2	2.00	0.44
2:E:351:ASN:HB3	5:S:46:GLN:HA	2.00	0.44
2:E:354:TYR:HB2	5:S:46:GLN:HE22	1.82	0.44
2:E:86:TYR:C	2:E:88:GLU:H	2.25	0.43
2:E:244:THR:OG1	2:E:248:VAL:HG23	2.19	0.43
2:E:351:ASN:O	2:E:354:TYR:HB3	2.19	0.43
1:B:130:ARG:HD2	1:B:130:ARG:O	2.19	0.43
1:B:258:LEU:HA	1:B:261:ILE:HG12	1.99	0.43
2:E:365:GLN:HA	2:E:399:ARG:CZ	2.48	0.43
2:E:484:ASP:O	2:E:488:ARG:HG2	2.18	0.43
5:S:32:GLU:HA	5:S:35:VAL:HB	2.01	0.43
2:E:272:TRP:HA	2:E:275:ILE:HD12	1.99	0.43
1:B:423:LEU:N	1:B:424:PRO:HD2	2.33	0.43
1:B:400:VAL:O	1:B:403:GLN:N	2.52	0.43
4:M:3:SER:HB2	4:M:69:THR:O	2.19	0.43
1:B:55:LYS:HD2	1:B:55:LYS:HA	1.71	0.43
1:B:173:PRO:HG2	1:B:174:ILE:HD12	2.01	0.43
1:B:301:ARG:HE	1:B:301:ARG:HB3	1.73	0.43
5:S:53:LYS:HD3	5:S:53:LYS:HA	1.68	0.43
2:E:428:ASN:OD1	2:E:429:LEU:N	2.52	0.42
2:E:469:ASN:HD21	2:E:472:ARG:NH1	2.17	0.42
2:E:493:GLN:HA	2:E:496:LEU:HG	2.01	0.42
2:E:500:ASP:HA	2:E:536:LYS:NZ	2.34	0.42
2:E:192:LEU:HA	2:E:195:PHE:HD2	1.84	0.42
5:S:7:MET:HB2	5:S:16:LEU:HB3	2.00	0.42
2:E:611:ARG:HD3	2:E:611:ARG:HA	1.80	0.42
4:M:90:LEU:HD13	4:M:102:ILE:HD13	2.01	0.42
1:B:122:GLN:O	1:B:125:ILE:HG22	2.19	0.42
1:B:158:GLY:O	1:B:161:VAL:HG22	2.19	0.42
1:B:260:LEU:HD21	1:B:556:TRP:HD1	1.85	0.42
2:E:75:LYS:HG2	2:E:76:MET:H	1.85	0.42
2:E:165:MET:CB	2:E:202:GLN:HE21	2.32	0.42
5:S:91:LEU:HD11	5:S:110:VAL:HG13	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:8:ASP:OD1	1:B:9:VAL:N	2.53	0.42
2:E:92:TYR:CG	2:E:93:ASP:N	2.88	0.42
1:B:307:LEU:HD12	1:B:308:PRO:HD2	2.01	0.42
1:B:402:VAL:HA	1:B:405:PHE:CD2	2.55	0.42
1:B:442:LEU:O	1:B:445:VAL:HG22	2.20	0.42
2:E:304:ARG:HD2	2:E:307:GLU:HA	2.02	0.42
2:E:321:VAL:O	2:E:324:VAL:HG13	2.19	0.42
3:R:18:MET:SD	3:R:20:ILE:HG12	2.59	0.42
1:B:199:ILE:C	1:B:202:HIS:HD1	2.27	0.42
2:E:464:PRO:C	2:E:467:PRO:HD2	2.45	0.42
1:B:276:ARG:NH2	1:B:279:GLY:HA3	2.35	0.42
2:E:502:GLU:O	2:E:504:VAL:HG13	2.19	0.42
4:M:113:LEU:HA	4:M:116:VAL:HG12	2.02	0.42
1:B:28:ARG:NH2	1:B:31:ASN:OD1	2.54	0.41
1:B:199:ILE:HA	1:B:202:HIS:HD1	1.85	0.41
2:E:81:MET:HE3	2:E:81:MET:O	2.20	0.41
2:E:574:LEU:O	2:E:577:GLU:HG3	2.20	0.41
1:B:91:CYS:HA	1:B:109:MET:SD	2.60	0.41
2:E:168:ALA:O	2:E:171:PRO:HD2	2.21	0.41
2:E:186:ARG:NH1	5:S:130:ARG:HH21	2.18	0.41
2:E:223:ALA:O	2:E:226:LEU:HG	2.20	0.41
2:E:411:GLN:HA	2:E:414:LEU:HD12	2.02	0.41
2:E:608:PRO:HB2	2:E:611:ARG:NE	2.35	0.41
5:S:83:PHE:HZ	5:S:117:MET:HB2	1.85	0.41
1:B:304:LEU:HD22	1:B:310:HIS:NE2	2.35	0.41
2:E:341:ILE:HA	2:E:345:VAL:HG12	2.01	0.41
2:E:466:ILE:HB	2:E:467:PRO:HD3	2.02	0.41
1:B:341:ASN:OD1	1:B:344:ASN:HB2	2.19	0.41
2:E:52:GLU:C	2:E:54:LYS:H	2.29	0.41
3:R:116:LEU:HD23	3:R:116:LEU:O	2.21	0.41
4:M:5:PHE:CE1	4:M:66:LEU:HB3	2.56	0.41
2:E:170:LEU:O	2:E:173:ILE:HG22	2.20	0.41
2:E:365:GLN:OE1	2:E:399:ARG:NH2	2.54	0.41
2:E:411:GLN:O	2:E:415:GLU:OE1	2.38	0.41
2:E:448:ILE:HA	2:E:451:MET:HE3	2.02	0.41
3:R:172:TRP:CH2	3:R:176:GLN:HG3	2.55	0.41
1:B:260:LEU:HD21	1:B:556:TRP:CD1	2.55	0.41
1:B:291:GLU:HG2	1:B:292:LEU:N	2.35	0.41
1:B:311:PHE:HB2	1:B:318:PHE:CZ	2.56	0.41
2:E:117:TYR:HA	2:E:120:VAL:HG12	2.03	0.41
2:E:197:LEU:HG	2:E:198:ILE:HG12	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:432:LYS:O	2:E:436:LEU:HD23	2.21	0.41
2:E:514:MET:O	2:E:518:LEU:HD23	2.20	0.41
5:S:108:ASP:N	5:S:108:ASP:OD1	2.53	0.41
1:B:31:ASN:HA	1:B:34:GLN:OE1	2.21	0.41
3:R:30:LYS:HB3	3:R:67:ASP:OD1	2.21	0.41
1:B:163:GLU:O	1:B:166:SER:OG	2.30	0.40
2:E:401:THR:HG21	2:E:436:LEU:HD12	2.03	0.40
1:B:50:PHE:HB2	1:B:71:TYR:CE2	2.56	0.40
1:B:138:ARG:CG	1:B:175:VAL:HG12	2.49	0.40
3:R:103:ALA:O	3:R:107:LEU:HD23	2.21	0.40
5:S:118:VAL:O	5:S:118:VAL:HG12	2.22	0.40
2:E:271:PRO:HD2	2:E:274:GLN:HG3	2.03	0.40
2:E:350:ILE:HG13	5:S:46:GLN:HB2	2.03	0.40
2:E:550:THR:C	2:E:554:LEU:HD23	2.47	0.40
4:M:18:LYS:HD2	4:M:18:LYS:HA	1.83	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	B	502/576 (87%)	462 (92%)	36 (7%)	4 (1%)	16 55
2	E	483/612 (79%)	406 (84%)	72 (15%)	5 (1%)	13 49
3	R	160/164 (98%)	152 (95%)	8 (5%)	0	100 100
4	M	124/453 (27%)	120 (97%)	4 (3%)	0	100 100
5	S	111/144 (77%)	95 (86%)	16 (14%)	0	100 100
All	All	1380/1949 (71%)	1235 (90%)	136 (10%)	9 (1%)	21 57

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	553	VAL
2	E	101	ALA
2	E	200	PRO
2	E	236	ASN
1	B	156	VAL
1	B	453	ALA
2	E	129	GLU
1	B	534	CYS
2	E	159	GLN

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	B	467/510 (92%)	467 (100%)	0	100	100
2	E	466/547 (85%)	466 (100%)	0	100	100
3	R	140/142 (99%)	140 (100%)	0	100	100
4	M	116/397 (29%)	116 (100%)	0	100	100
5	S	115/136 (85%)	115 (100%)	0	100	100
All	All	1304/1732 (75%)	1304 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	162	ASN
1	B	178	ASN
1	B	238	ASN
1	B	268	HIS
1	B	270	GLN
1	B	394	GLN
1	B	431	GLN
2	E	202	GLN
2	E	205	HIS

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Mol	Chain	Res	Type
2	E	276	GLN
2	E	449	GLN
2	E	469	ASN
2	E	588	GLN
3	R	176	GLN
3	R	179	ASN
4	M	132	ASN
5	S	46	GLN
5	S	61	GLN
5	S	120	ASN

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

There are no ligands in this entry.

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.