Full wwPDB EM Validation Report ⓘ

Sep 21, 2025 – 12:28 AM JST

PDB ID	:	9UT9 / pdb_00009ut9
EMDB ID	:	EMD-64485
Title	:	The VFT domains of human sweet taste receptor TAS1R2 and TAS1R3 in the apo state
Authors	:	Shi, Z.J.; Xu, W.X.; Yue, X.L.; Wu, L.J.; Hua, T.; Liu, Z.J.
Deposited on	:	2025-05-03
Resolution	:	3.18 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:

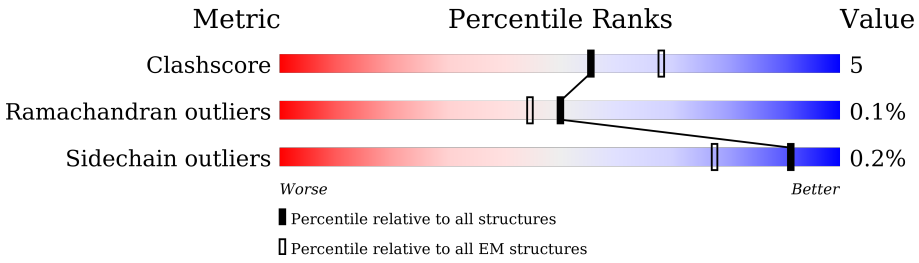
EMDB validation analysis	:	FAILED
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)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

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.18 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	1078	40% 5% 55%
2	B	1130	41% · 55%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 7958 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 Taste receptor type 1 member 2,Engineered red fluorescent protein mScarlet3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	490	3962	2541	665	733	23	0	0

There are 29 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	MET	-	initiating methionine	UNP Q8TE23
A	-2	LYS	-	expression tag	UNP Q8TE23
A	-1	THR	-	expression tag	UNP Q8TE23
A	0	ILE	-	expression tag	UNP Q8TE23
A	1	ILE	-	expression tag	UNP Q8TE23
A	2	ALA	-	expression tag	UNP Q8TE23
A	3	LEU	-	expression tag	UNP Q8TE23
A	4	SER	-	expression tag	UNP Q8TE23
A	5	TYR	-	expression tag	UNP Q8TE23
A	6	ILE	-	expression tag	UNP Q8TE23
A	7	PHE	-	expression tag	UNP Q8TE23
A	8	CYS	-	expression tag	UNP Q8TE23
A	9	LEU	-	expression tag	UNP Q8TE23
A	10	VAL	-	expression tag	UNP Q8TE23
A	11	PHE	-	expression tag	UNP Q8TE23
A	12	ALA	-	expression tag	UNP Q8TE23
A	13	GLY	-	expression tag	UNP Q8TE23
A	14	SER	-	expression tag	UNP Q8TE23
A	15	ASP	-	expression tag	UNP Q8TE23
A	16	TYR	-	expression tag	UNP Q8TE23
A	17	LYS	-	expression tag	UNP Q8TE23
A	18	ASP	-	expression tag	UNP Q8TE23
A	19	ASP	-	expression tag	UNP Q8TE23
A	20	ASP	-	expression tag	UNP Q8TE23
A	21	ASP	-	expression tag	UNP Q8TE23
A	22	LYS	-	expression tag	UNP Q8TE23
A	23	GLY	-	expression tag	UNP Q8TE23

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Chain	Residue	Modelled	Actual	Comment	Reference
A	24	SER	-	expression tag	UNP Q8TE23
A	25	ALA	-	expression tag	UNP Q8TE23

- Molecule 2 is a protein called Taste receptor type 1 member 3,mNeonGreen.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	514	Total	C	N	O	S	0	0
			3996	2526	704	733	33		

There are 63 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-7	MET	-	initiating methionine	UNP Q7RTX0
B	-6	LYS	-	expression tag	UNP Q7RTX0
B	-5	THR	-	expression tag	UNP Q7RTX0
B	-4	ILE	-	expression tag	UNP Q7RTX0
B	-3	ILE	-	expression tag	UNP Q7RTX0
B	-2	ALA	-	expression tag	UNP Q7RTX0
B	-1	LEU	-	expression tag	UNP Q7RTX0
B	0	SER	-	expression tag	UNP Q7RTX0
B	1	TYR	-	expression tag	UNP Q7RTX0
B	2	ILE	-	expression tag	UNP Q7RTX0
B	3	PHE	-	expression tag	UNP Q7RTX0
B	4	CYS	-	expression tag	UNP Q7RTX0
B	5	LEU	-	expression tag	UNP Q7RTX0
B	6	VAL	-	expression tag	UNP Q7RTX0
B	7	PHE	-	expression tag	UNP Q7RTX0
B	8	ALA	-	expression tag	UNP Q7RTX0
B	9	GLY	-	expression tag	UNP Q7RTX0
B	10	SER	-	expression tag	UNP Q7RTX0
B	11	ASP	-	expression tag	UNP Q7RTX0
B	12	TYR	-	expression tag	UNP Q7RTX0
B	13	LYS	-	expression tag	UNP Q7RTX0
B	14	ASP	-	expression tag	UNP Q7RTX0
B	15	ASP	-	expression tag	UNP Q7RTX0
B	16	ASP	-	expression tag	UNP Q7RTX0
B	17	ASP	-	expression tag	UNP Q7RTX0
B	18	LYS	-	expression tag	UNP Q7RTX0
B	19	GLY	-	expression tag	UNP Q7RTX0
B	20	SER	-	expression tag	UNP Q7RTX0
B	853	GLY	-	linker	UNP Q7RTX0
B	854	SER	-	linker	UNP Q7RTX0

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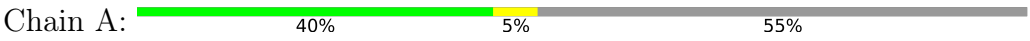
Chain	Residue	Modelled	Actual	Comment	Reference
B	855	SER	-	linker	UNP Q7RTX0
B	856	GLY	-	linker	UNP Q7RTX0
B	857	LEU	-	linker	UNP Q7RTX0
B	858	GLU	-	linker	UNP Q7RTX0
B	859	VAL	-	linker	UNP Q7RTX0
B	860	LEU	-	linker	UNP Q7RTX0
B	861	PHE	-	linker	UNP Q7RTX0
B	862	GLN	-	linker	UNP Q7RTX0
B	863	GLY	-	linker	UNP Q7RTX0
B	864	PRO	-	linker	UNP Q7RTX0
B	865	SER	-	linker	UNP Q7RTX0
B	866	GLY	-	linker	UNP Q7RTX0
B	867	GLY	-	linker	UNP Q7RTX0
B	1103	GLY	-	expression tag	UNP A0A1S4NYF2
B	1104	SER	-	expression tag	UNP A0A1S4NYF2
B	1105	GLU	-	expression tag	UNP A0A1S4NYF2
B	1106	ASN	-	expression tag	UNP A0A1S4NYF2
B	1107	LEU	-	expression tag	UNP A0A1S4NYF2
B	1108	TYR	-	expression tag	UNP A0A1S4NYF2
B	1109	PHE	-	expression tag	UNP A0A1S4NYF2
B	1110	GLN	-	expression tag	UNP A0A1S4NYF2
B	1111	SER	-	expression tag	UNP A0A1S4NYF2
B	1112	SER	-	expression tag	UNP A0A1S4NYF2
B	1113	GLY	-	expression tag	UNP A0A1S4NYF2
B	1114	HIS	-	expression tag	UNP A0A1S4NYF2
B	1115	HIS	-	expression tag	UNP A0A1S4NYF2
B	1116	HIS	-	expression tag	UNP A0A1S4NYF2
B	1117	HIS	-	expression tag	UNP A0A1S4NYF2
B	1118	HIS	-	expression tag	UNP A0A1S4NYF2
B	1119	HIS	-	expression tag	UNP A0A1S4NYF2
B	1120	HIS	-	expression tag	UNP A0A1S4NYF2
B	1121	HIS	-	expression tag	UNP A0A1S4NYF2
B	1122	HIS	-	expression tag	UNP A0A1S4NYF2

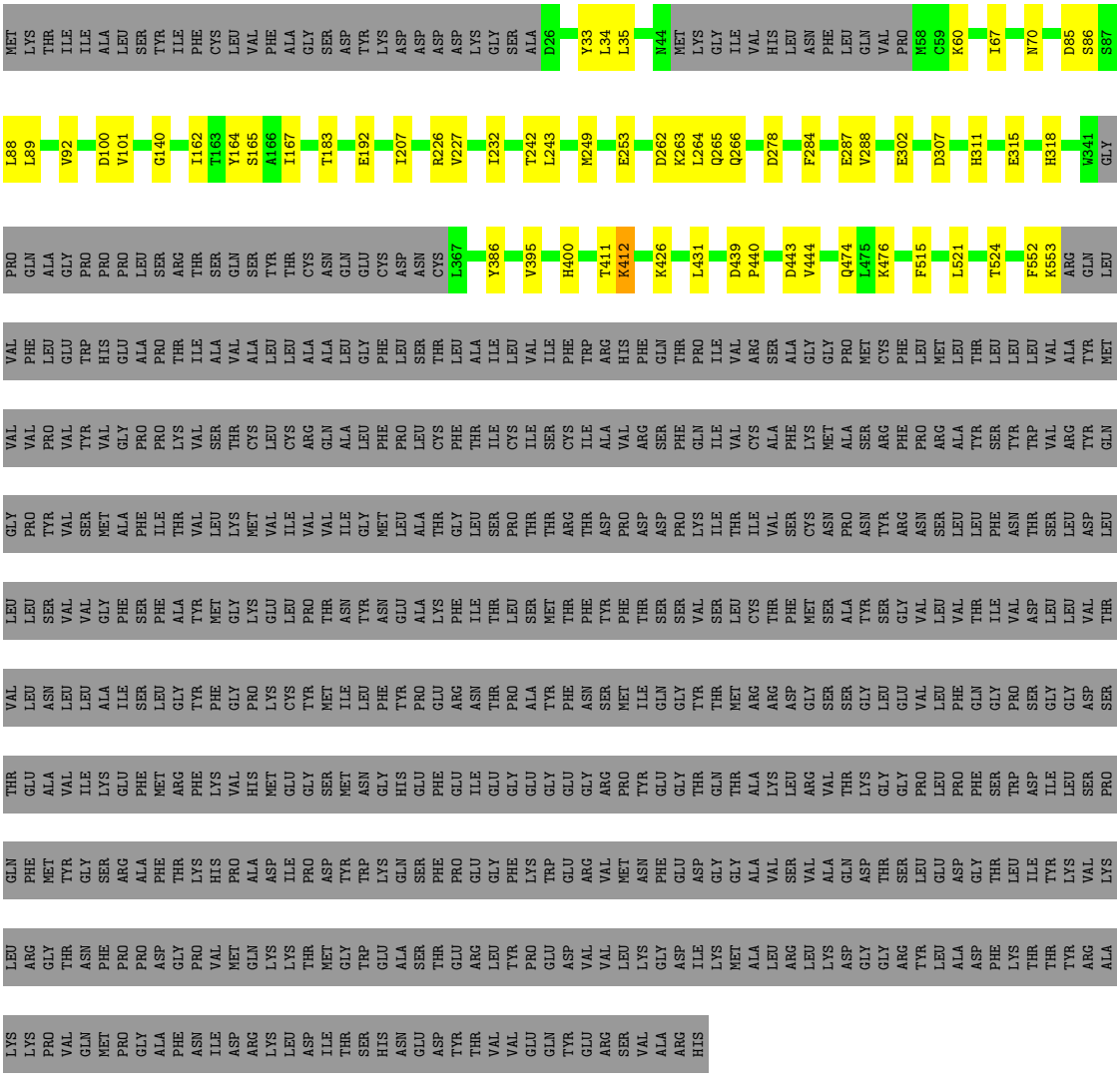
3 Residue-property plots (i)

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: Taste receptor type 1 member 2,Engineered red fluorescent protein mScarlet3

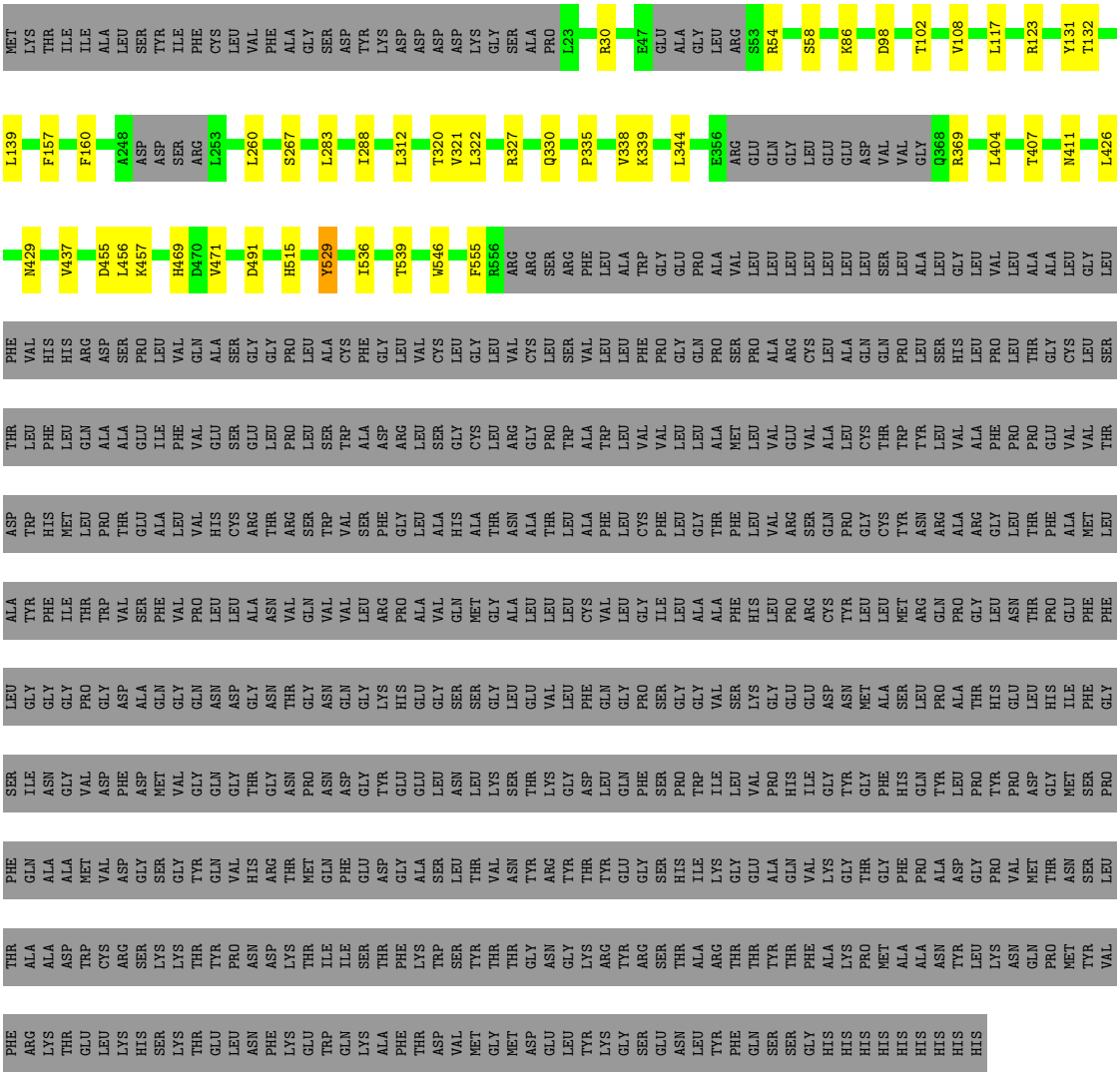
Chain A:





• Molecule 2: Taste receptor type 1 member 3,mNeonGreen

Chain B:


MET LYS THR ILE ILE ALA LEU SER TYR ILE PHE CYS LEU VAL PHE ALA GLY SER ASP TYR LYS ASP ASP ASP LYS GLY SER ALA PRO L23 R30 E47 GLU ALA GLY LEU ARG S53 R54 S58 K86 D98 T102 V108 L117 R123 Y131 T132
L139 F157 F160 A248 ASP ASP SER ARG L253 L260 S267 L283 I288 L312 T320 V321 L322 R327 Q330 P335 V338 K339 L344 E356 ARG GLU GLN GLY LEU GLU GLU ASP VAL GLY Q368 R369 L404 T407 N411 L426
M429 V437 D455 L456 K457 H469 D470 V471 D491 H515 Y529 I536 T539 W546 F555 R556 ARG ARG SER ARG PHE LEU ALA TRP GLY GLU PRO ALA VAL LEU LEU LEU LEU LEU LEU LEU SER LEU ALA LEU GLY LEU
PHE VAL HIS HIS ARG ASP SER PRO LEU VAL GLN ALA SER GLY GLY PRO LEU ALA CYS PHE GLY LEU VAL CYS LEU GLY LEU VAL CYS LEU SER VAL LEU LEU PHE PRO GLY GLN PRO SER PRO ALA ARG CYS LEU ALA GLN GLN PRO LEU SER HIS LEU PRO LEU THR GLY CYS LEU SER
THR LEU PHE LEU GLN ALA ALA GLU ILE PHE VAL GLU SER GLU LEU PRO LEU SER TRP ALA ASP ARG LEU SER GLY CYS LEU ARG GLY PRO TRP ALA TRP LEU VAL LEU LEU ALA MET LEU VAL GLU VAL ALA LEU CYS THR TRP TYR LEU SER VAL ALA PHE PRO PRO GLU VAL VAL THR
ASP TRP HIS MET LEU PRO THR GLU GLY ALA LEU VAL HIS CYS ARG THR ARG SER TRP VAL SER PHE GLY LEU ALA HIS ALA THR ASN ARG ALA THR LEU ALA PHE LEU CYS PHE LEU GLY THR PHE LEU VAL ARG SER GLN PRO GLY CYS TYR LEU LEU MET ARG GLN PRO GLY LEU ASN THR PRO GLU PHE PHE
ALA TYR PHE ILE THR TRP VAL SER PHE VAL PRO LEU LEU ALA ASN VAL GLN VAL VAL LEU ARG PRO ALA VAL GLN MET GLY ALA LEU LEU LEU CYS VAL LEU GLY ILE LEU GLY ALA ALA PHE HIS LEU PRO ARG CYS TYR LEU LEU MET ARG GLN PRO GLY LEU ASN THR PRO GLU PHE PHE
LEU GLY GLY PRO GLY ASP ALA GLN GLY GLN ASN ASP GLY ASN THR GLY ASN GLN GLY SER SER GLY LEU GLU VAL LEU PHE GLN GLY PRO SER GLY GLY VAL SER LYS GLY GLU GLU ASP ASN MET ALA SER LEU PRO ALA THR HIS GLU LEU HIS ILE PHE GLY
SER ILE ASN GLY VAL ASP PHE ASP MET VAL GLY GLN GLY THR GLY ASN PRO ASN ASP GLY TYR GLU GLU LEU ASN LEU LYS SER THR LYS GLY ASP LEU PRO ILE LEU VAL PRO HIS ILE GLY TYR GLY PHE HIS GLN TYR LEU PRO TYR PRO ASP GLY MET SER PRO
PHE GLN ALA ALA MET VAL ASP GLY SER GLY TYR GLN VAL HIS ARG THR MET GLN PHE GLU ASP GLY ALA SER LEU THR VAL ASN TYR ARG TYR THR TYR GLU GLY SER HIS ILE LYS GLY GLU ALA GLN VAL LYS GLY THR GLY PHE HIS GLN PRO ALA ASP GLY PRO VAL MET THR ASN SER LEU
THR ALA ALA ASP TRP CYS ARG SER LYS LYS THR TYR PRO ASN ASP LYS THR ILE ILE SER THR PHE LYS TRP SER TYR THR THR GLY ASN GLY LYS ARG TYR ARG SER THR ALA ARG THR THR TYR THR PHE ALA LYS PRO MET ALA ALA ASN TYR LEU LYS ASN GLN PRO MET TYR VAL
PHE ARG LYS THR GLU LEU LYS HIS SER LYS THR GLU LEU ASN PHE LYS GLU TRP GLN LYS ALA PHE THR ASP VAL MET GLY MET ASP GLU LEU TYR LYS GLY SER GLU ASN LEU TYR PHE GLN SER SER GLY HIS HIS HIS HIS HIS HIS HIS HIS

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	189062	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	60	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (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	A	0.16	0/4062	0.31	0/5534
2	B	0.18	0/4092	0.35	0/5551
All	All	0.17	0/8154	0.33	0/11085

There are no bond length outliers.

There are no bond angle outliers.

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	3962	0	3854	41	0
2	B	3996	0	3883	36	0
All	All	7958	0	7737	76	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 5.

All (76) 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:284:PHE:O	1:A:288:VAL:HG23	1.86	0.76
1:A:88:LEU:O	1:A:400:HIS:ND1	2.19	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:164:TYR:HD1	1:A:165:SER:HG	1.38	0.72
1:A:243:LEU:HD21	1:A:253:GLU:OE1	1.90	0.71
1:A:243:LEU:HD21	1:A:253:GLU:CD	2.20	0.67
2:B:546:TRP:N	2:B:555:PHE:O	2.29	0.66
1:A:100:ASP:OD1	1:A:101:VAL:N	2.29	0.65
1:A:89:LEU:HD22	1:A:92:VAL:HB	1.83	0.61
2:B:260:LEU:HD21	2:B:283:LEU:HD11	1.84	0.60
2:B:98:ASP:OD1	2:B:369:ARG:NH2	2.36	0.57
1:A:183:THR:HA	1:A:444:VAL:HG22	1.85	0.57
2:B:139:LEU:HD21	2:B:426:LEU:CD1	2.36	0.55
1:A:33:TYR:C	1:A:34:LEU:HD23	2.31	0.55
1:A:192:GLU:OE1	1:A:226:ARG:NH1	2.38	0.55
1:A:278:ASP:N	1:A:278:ASP:OD1	2.40	0.54
1:A:307:ASP:O	1:A:307:ASP:OD1	2.25	0.54
2:B:131:TYR:O	2:B:132:THR:HB	2.07	0.54
2:B:330:GLN:N	2:B:330:GLN:OE1	2.41	0.54
1:A:85:ASP:OD1	1:A:86:SER:N	2.40	0.54
2:B:536:ILE:HG13	2:B:536:ILE:O	2.08	0.53
1:A:263:LYS:NZ	2:B:515:HIS:O	2.38	0.53
2:B:267:SER:O	2:B:267:SER:OG	2.28	0.51
2:B:407:THR:OG1	2:B:429:ASN:OD1	2.20	0.51
2:B:54:ARG:NH2	2:B:58:SER:O	2.44	0.51
1:A:265:GLN:HG2	1:A:265:GLN:O	2.11	0.50
1:A:439:ASP:OD1	1:A:443:ASP:N	2.44	0.50
2:B:139:LEU:HD21	2:B:426:LEU:HD11	1.94	0.50
1:A:315:GLU:HA	1:A:315:GLU:OE2	2.12	0.49
2:B:344:LEU:HD12	2:B:344:LEU:O	2.12	0.49
2:B:132:THR:HG22	2:B:132:THR:O	2.13	0.49
1:A:67:ILE:O	1:A:70:ASN:OD1	2.30	0.49
2:B:411:ASN:OD1	2:B:411:ASN:C	2.55	0.49
2:B:123:ARG:CG	2:B:123:ARG:O	2.61	0.49
1:A:167:ILE:HD11	1:A:302:GLU:OE2	2.13	0.48
2:B:117:LEU:HD13	2:B:160:PHE:CD1	2.47	0.48
2:B:529:TYR:CD1	2:B:539:THR:HG23	2.48	0.48
1:A:552:PHE:O	1:A:553:LYS:C	2.55	0.48
2:B:335:PRO:O	2:B:339:LYS:HG2	2.13	0.48
1:A:227:VAL:HG13	1:A:232:ILE:HB	1.95	0.48
1:A:311:HIS:ND1	1:A:311:HIS:O	2.47	0.47
2:B:86:LYS:HB2	2:B:86:LYS:NZ	2.30	0.46
1:A:35:LEU:HD21	1:A:395:VAL:HG11	1.97	0.46
1:A:140:GLY:N	1:A:162:ILE:O	2.49	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:139:LEU:HD11	2:B:404:LEU:HD13	1.98	0.46
1:A:474:GLN:OE1	1:A:476:LYS:NZ	2.41	0.46
1:A:411:THR:O	1:A:412:LYS:HB2	2.15	0.46
1:A:242:THR:O	1:A:242:THR:HG23	2.16	0.46
1:A:521:LEU:O	1:A:524:THR:OG1	2.31	0.45
2:B:529:TYR:CD1	2:B:529:TYR:N	2.83	0.45
2:B:456:LEU:HD23	2:B:457:LYS:N	2.31	0.45
2:B:322:LEU:HD22	2:B:456:LEU:HD21	1.97	0.45
1:A:307:ASP:OD1	1:A:307:ASP:C	2.60	0.44
1:A:262:ASP:OD1	1:A:266:GLN:NE2	2.50	0.44
2:B:117:LEU:HD11	2:B:157:PHE:HD1	1.83	0.44
2:B:437:VAL:CG1	2:B:437:VAL:O	2.66	0.44
2:B:288:ILE:CD1	2:B:312:LEU:HD23	2.47	0.44
1:A:207:ILE:HD13	1:A:264:LEU:HD23	1.99	0.43
1:A:287:GLU:O	1:A:287:GLU:OE1	2.37	0.43
1:A:426:LYS:O	1:A:426:LYS:HG3	2.18	0.43
2:B:491:ASP:OD1	2:B:491:ASP:N	2.36	0.43
2:B:102:THR:O	2:B:108:VAL:HG13	2.19	0.43
2:B:456:LEU:HD22	2:B:471:VAL:CG2	2.49	0.42
1:A:439:ASP:HB2	1:A:440:PRO:CD	2.50	0.42
2:B:320:THR:HG22	2:B:321:VAL:N	2.35	0.42
1:A:60:LYS:H	1:A:60:LYS:HD2	1.84	0.42
1:A:318:HIS:O	1:A:318:HIS:ND1	2.53	0.42
1:A:243:LEU:HD11	1:A:249:MET:HE2	2.01	0.41
1:A:386:TYR:OH	1:A:431:LEU:O	2.39	0.41
2:B:123:ARG:O	2:B:123:ARG:HG3	2.21	0.41
1:A:515:PHE:CD1	1:A:515:PHE:C	2.98	0.41
2:B:30:ARG:NH1	2:B:30:ARG:HB3	2.36	0.41
2:B:456:LEU:HD23	2:B:456:LEU:C	2.46	0.41
1:A:243:LEU:CD1	1:A:249:MET:HE2	2.51	0.41
1:A:552:PHE:O	1:A:552:PHE:CD2	2.73	0.40
2:B:335:PRO:O	2:B:338:VAL:HG12	2.21	0.40
2:B:327:ARG:HD2	2:B:455:ASP:OD1	2.21	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	484/1078 (45%)	440 (91%)	43 (9%)	1 (0%)	44 73
2	B	506/1130 (45%)	476 (94%)	30 (6%)	0	100 100
All	All	990/2208 (45%)	916 (92%)	73 (7%)	1 (0%)	50 78

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	412	LYS

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	446/955 (47%)	446 (100%)	0	100 100
2	B	433/941 (46%)	431 (100%)	2 (0%)	86 93
All	All	879/1896 (46%)	877 (100%)	2 (0%)	91 97

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	469	HIS
2	B	529	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	107	ASN
1	A	143	ASN
1	A	266	GLN
1	A	286	ASN
1	A	291	GLN
1	A	397	HIS
1	A	419	GLN
2	B	193	GLN
2	B	202	GLN
2	B	317	GLN
2	B	326	GLN
2	B	341	HIS
2	B	532	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.