



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 03:40 PM UTC

PDB ID : 1QE0 / pdb\_00001qe0  
Title : CRYSTAL STRUCTURE OF APO S. AUREUS HISTIDYL-TRNA SYN-  
THETASE  
Authors : Qiu, X.; Janson, C.A.; Blackburn, M.N.; Chohan, I.K.; Hibbs, M.; Abdel-  
Meguid, S.S.  
Deposited on : 1999-07-12  
Resolution : 2.70 Å(reported)

This is a Full wwPDB X-ray Structure 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/XrayValidationReportHelp>

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:

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

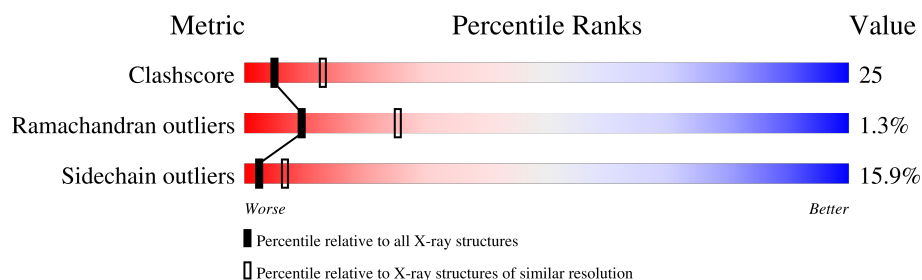
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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)	Similar resolution (#Entries, resolution range(Å))
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower 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  $\leq 5\%$

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	420	
1	B	420	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 5996 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 Histidine-tRNA ligase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	390	Total	C	N	O	S	0	0	0
			3150	2001	528	604	17			
1	B	342	Total	C	N	O	S	0	0	0
			2746	1747	455	530	14			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	201	ASP	ASN	conflict	UNP P60911
A	250	THR	ILE	conflict	UNP P60911
B	201	ASP	ASN	conflict	UNP P60911
B	250	THR	ILE	conflict	UNP P60911

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	50	Total	O	0	0
			50	50		
2	B	50	Total	O	0	0
			50	50		

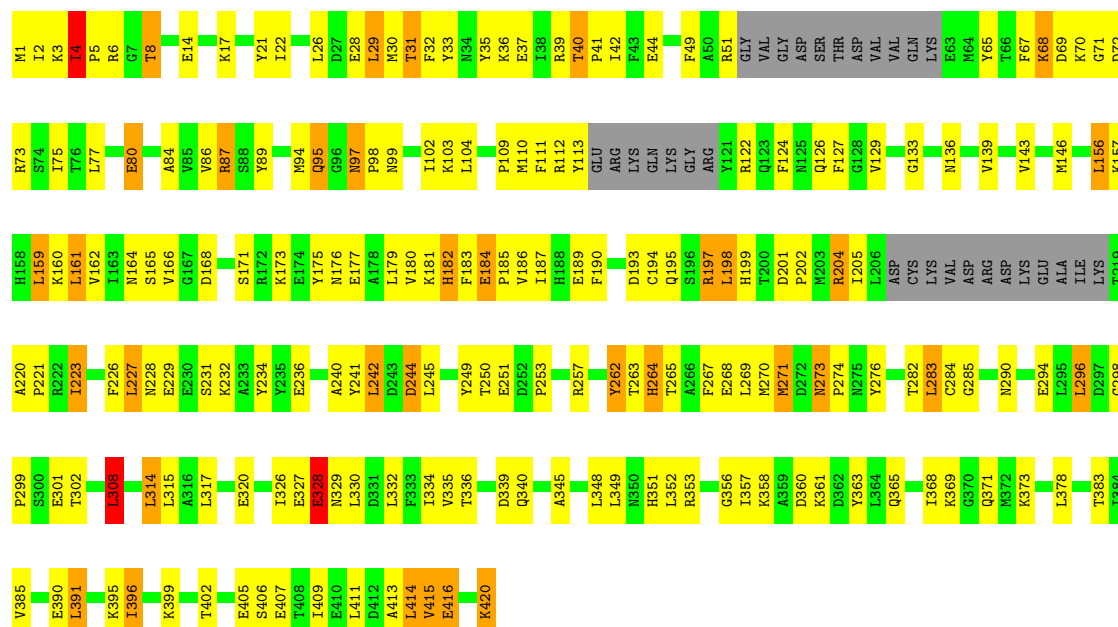
### 3 Residue-property plots

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.

Note EDS was not executed.

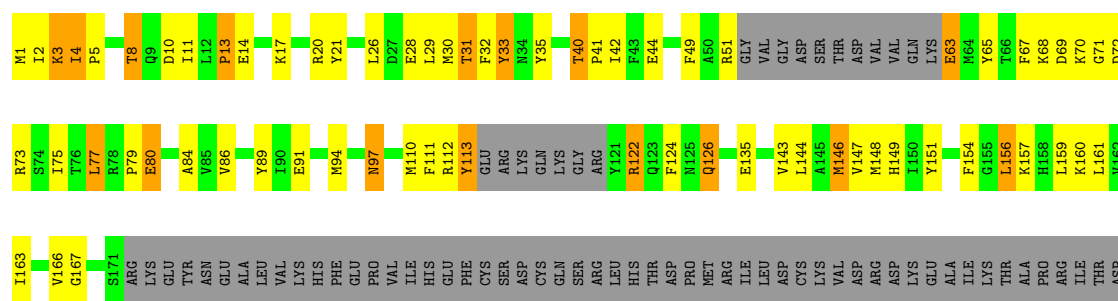
#### • Molecule 1: Histidine-tRNA ligase

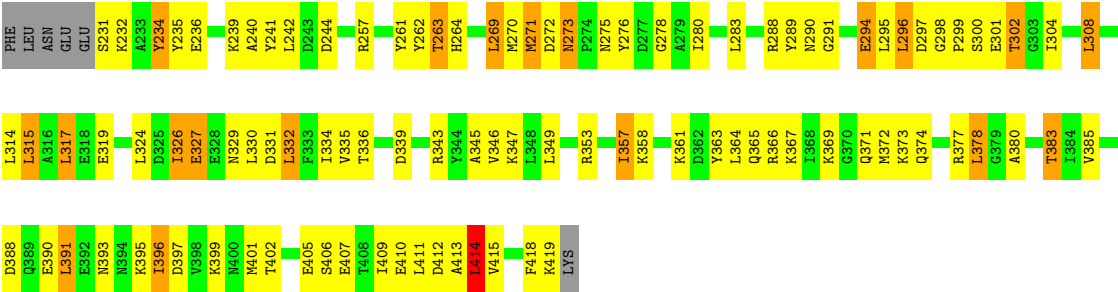
Chain A: 



#### • Molecule 1: Histidine-tRNA ligase

Chain B: 





## 4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 65	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	125.65Å 125.65Å 115.99Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	7.00 – 2.70	Depositor
% Data completeness (in resolution range)	70.0 (7.00-2.70)	Depositor
$R_{merge}$	0.19	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	X-PLOR 3.1	Depositor
R, $R_{free}$	0.197 , 0.270	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	5996	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	24.0	wwPDB-VP

## 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	0.81	0/3210	1.16	19/4327 (0.4%)
1	B	0.83	1/2796 (0.0%)	1.16	14/3770 (0.4%)
All	All	0.82	1/6006 (0.0%)	1.16	33/8097 (0.4%)

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	B	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	146	MET	SD-CE	-5.23	1.66	1.79

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	264	HIS	N-CA-C	8.35	121.39	108.12
1	B	363	TYR	N-CA-C	-8.34	97.47	109.31
1	A	273	ASN	CA-C-N	8.11	128.88	119.47
1	A	273	ASN	C-N-CA	8.11	128.88	119.47
1	A	298	GLY	CA-C-N	7.96	129.79	119.84
1	A	298	GLY	C-N-CA	7.96	129.79	119.84
1	B	298	GLY	CA-C-N	7.95	129.78	119.84
1	B	298	GLY	C-N-CA	7.95	129.78	119.84
1	A	363	TYR	N-CA-C	-7.90	98.09	109.31
1	A	339	ASP	N-CA-C	7.01	119.52	111.11
1	A	234	TYR	N-CA-C	-6.79	103.81	111.14
1	B	273	ASN	CA-C-N	6.77	128.31	119.84
1	B	273	ASN	C-N-CA	6.77	128.31	119.84

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	278	GLY	N-CA-C	-6.66	105.98	114.37
1	B	234	TYR	N-CA-C	-6.66	103.72	110.97
1	B	339	ASP	N-CA-C	6.56	119.02	111.02
1	A	199	HIS	N-CA-C	6.42	120.86	112.89
1	A	368	ILE	CB-CA-C	-6.18	103.97	111.88
1	A	181	LYS	N-CA-C	-6.01	104.64	111.07
1	B	401	MET	N-CA-C	5.87	119.54	112.38
1	B	240	ALA	N-CA-C	-5.81	104.85	111.07
1	A	265	THR	N-CA-C	5.79	118.72	110.10
1	A	197	ARG	N-CA-C	5.76	119.78	112.87
1	A	183	PHE	N-CA-C	5.68	117.48	111.28
1	B	388	ASP	N-CA-C	5.54	117.32	111.28
1	A	240	ALA	N-CA-C	-5.46	105.23	111.07
1	A	201	ASP	CA-C-N	5.46	125.80	119.47
1	A	201	ASP	C-N-CA	5.46	125.80	119.47
1	A	327	GLU	N-CA-C	5.24	118.77	112.38
1	A	4	ILE	CB-CA-C	-5.07	102.13	111.36
1	B	366	ARG	N-CA-C	5.02	117.49	109.81
1	B	77	LEU	N-CA-C	-5.01	102.49	109.96
1	A	308	LEU	CA-CB-CG	5.00	133.81	116.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	33	TYR	Sidechain

## 5.2 Too-close contacts [i](#)

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	3150	0	3097	167	0
1	B	2746	0	2698	166	0
2	A	50	0	0	0	0
2	B	50	0	0	4	0
All	All	5996	0	5795	292	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 25.

All (292) 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:232:LYS:O	1:A:236:GLU:HG2	1.64	0.97
1:B:4:ILE:HG23	1:B:8:THR:HG22	1.47	0.97
1:B:44:GLU:HB2	1:B:49:PHE:HE2	1.42	0.83
1:B:257:ARG:HD3	1:B:262:TYR:CE2	2.13	0.82
1:B:40:THR:HG21	1:B:84:ALA:HB1	1.64	0.79
1:A:182:HIS:O	1:A:185:PRO:HD2	1.84	0.78
1:A:273:ASN:HB3	1:A:276:TYR:CD2	2.19	0.78
1:A:180:VAL:O	1:A:184:GLU:HB3	1.85	0.76
1:B:44:GLU:HB2	1:B:49:PHE:CE2	2.20	0.75
1:A:113:TYR:HE1	1:B:70:LYS:HA	1.52	0.74
1:A:44:GLU:HB2	1:A:49:PHE:CE2	2.22	0.74
1:B:334:ILE:HD12	1:B:349:LEU:HD13	1.71	0.72
1:A:40:THR:HG21	1:A:84:ALA:HB1	1.71	0.71
1:B:4:ILE:CG2	1:B:8:THR:HG22	2.21	0.71
1:B:5:PRO:HD2	1:B:8:THR:HG21	1.73	0.70
1:B:393:ASN:HB3	1:B:395:LYS:HG2	1.73	0.69
1:A:175:TYR:CE1	1:A:179:LEU:HD11	2.27	0.69
1:A:44:GLU:HB2	1:A:49:PHE:HE2	1.57	0.68
1:A:351:HIS:ND1	1:A:415:VAL:HG21	2.09	0.68
1:B:1:MET:HE3	1:B:3:LYS:HE2	1.73	0.68
1:A:352:LEU:HD23	1:A:415:VAL:HG13	1.75	0.67
1:B:89:TYR:OH	1:B:301:GLU:HG3	1.95	0.67
1:B:273:ASN:HB3	1:B:276:TYR:CE2	2.30	0.67
1:A:80:GLU:HB3	1:A:112:ARG:HH21	1.60	0.66
1:A:166:VAL:HG12	1:A:223:ILE:HG21	1.77	0.66
1:A:263:THR:HG22	1:A:264:HIS:H	1.60	0.66
1:A:2:ILE:HD11	1:B:51:ARG:NH1	2.10	0.65
1:A:67:PHE:HD1	1:A:69:ASP:CG	2.04	0.65
1:B:294:GLU:OE2	1:B:300:SER:HA	1.97	0.65
1:B:35:TYR:CE2	1:B:146:MET:HE1	2.32	0.65
1:B:31:THR:HG22	1:B:32:PHE:CD2	2.31	0.65
1:B:65:TYR:HB2	1:B:77:LEU:HB2	1.79	0.65
1:B:4:ILE:HD11	1:B:10:ASP:OD1	1.96	0.64
1:B:73:ARG:NH2	2:B:2069:HOH:O	2.31	0.64
1:A:179:LEU:HD13	1:A:202:PRO:HB2	1.80	0.64
1:B:257:ARG:HD3	1:B:262:TYR:CD2	2.33	0.64
1:A:334:ILE:HD12	1:A:349:LEU:HD13	1.79	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:40:THR:HG21	1:A:84:ALA:CB	2.28	0.63
1:A:220:ALA:HB1	1:A:221:PRO:HD2	1.81	0.63
1:A:358:LYS:HG2	1:B:31:THR:HG23	1.80	0.63
1:B:26:LEU:O	1:B:30:MET:HG2	1.99	0.62
1:B:148:MET:SD	1:B:269:LEU:HD21	2.39	0.62
1:A:87:ARG:CZ	1:B:4:ILE:HG13	2.30	0.62
1:A:67:PHE:CE1	1:A:75:ILE:HD11	2.34	0.62
1:B:28:GLU:O	1:B:31:THR:HB	1.99	0.62
1:A:28:GLU:O	1:A:31:THR:HB	2.00	0.61
1:A:41:PRO:HG2	1:B:8:THR:CG2	2.31	0.61
1:B:273:ASN:HB3	1:B:276:TYR:HE2	1.65	0.60
1:B:280:ILE:O	1:B:280:ILE:HD12	2.00	0.60
1:A:97:ASN:ND2	1:A:98:PRO:HD2	2.17	0.60
1:B:390:GLU:HG2	1:B:396:ILE:HG22	1.84	0.60
1:A:168:ASP:HA	1:A:263:THR:CG2	2.32	0.59
1:B:33:TYR:OH	1:B:149:HIS:HD2	1.85	0.59
1:A:51:ARG:CZ	1:B:2:ILE:HD11	2.32	0.59
1:A:70:LYS:HG2	2:B:2093:HOH:O	2.02	0.59
1:A:127:PHE:HB3	1:A:308:LEU:HD22	1.84	0.59
1:B:257:ARG:HH11	1:B:262:TYR:HE2	1.46	0.59
1:A:86:VAL:HG11	1:A:296:LEU:HD23	1.85	0.59
1:A:369:LYS:HG2	1:A:373:LYS:HE3	1.84	0.59
1:A:1:MET:HA	1:B:297:ASP:HB2	1.83	0.58
1:B:94:MET:O	1:B:97:ASN:HB2	2.03	0.58
1:B:68:LYS:O	1:B:72:ASP:HA	2.03	0.58
1:B:156:LEU:CD1	1:B:317:LEU:HD13	2.34	0.58
1:A:110:MET:HG3	1:A:126:GLN:HG2	1.85	0.58
1:A:396:ILE:HD11	1:A:414:LEU:CD2	2.34	0.57
1:A:41:PRO:CG	1:B:8:THR:HG23	2.35	0.57
1:A:97:ASN:HD22	1:A:98:PRO:HD2	1.68	0.57
1:A:330:LEU:HD21	1:A:360:ASP:HB2	1.86	0.57
1:B:396:ILE:HD11	1:B:414:LEU:CD2	2.35	0.57
1:B:232:LYS:O	1:B:236:GLU:HG2	2.04	0.57
1:A:98:PRO:HG2	1:B:377:ARG:HD2	1.86	0.56
1:A:41:PRO:HG2	1:B:8:THR:HG23	1.86	0.56
1:A:51:ARG:NH1	1:B:2:ILE:HD11	2.20	0.56
1:A:111:PHE:HZ	1:B:42:ILE:HG13	1.70	0.56
1:B:40:THR:HG21	1:B:84:ALA:CB	2.33	0.56
1:B:396:ILE:CG1	1:B:411:LEU:HD12	2.35	0.56
1:A:3:LYS:HG2	1:B:91:GLU:OE1	2.05	0.56
1:A:95:GLN:H	1:A:95:GLN:NE2	2.03	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:335:VAL:O	1:A:385:VAL:HA	2.06	0.56
1:A:110:MET:CG	1:A:126:GLN:HG2	2.36	0.56
1:B:357:ILE:HG12	1:B:418:PHE:HB3	1.87	0.55
1:A:175:TYR:CD1	1:A:223:ILE:HG12	2.41	0.55
1:B:167:GLY:O	1:B:263:THR:O	2.24	0.55
1:A:358:LYS:HA	1:B:32:PHE:HA	1.88	0.55
1:B:231:SER:O	1:B:234:TYR:N	2.39	0.55
1:B:86:VAL:HG11	1:B:296:LEU:HD23	1.88	0.55
1:B:409:ILE:HD12	1:B:413:ALA:HB3	1.88	0.55
1:A:8:THR:CG2	1:B:41:PRO:HG2	2.35	0.55
1:A:94:MET:O	1:A:97:ASN:HB2	2.07	0.55
1:B:276:TYR:CZ	1:B:319:GLU:HG3	2.42	0.55
1:A:251:GLU:O	1:A:253:PRO:HD3	2.07	0.54
1:A:136:ASN:HB3	1:A:139:VAL:HG23	1.89	0.54
1:B:49:PHE:CE1	1:B:79:PRO:HD2	2.42	0.54
1:B:324:LEU:HB2	1:B:326:ILE:HG12	1.90	0.54
1:A:197:ARG:CD	1:A:204:ARG:HB3	2.38	0.54
1:A:271:MET:HE3	1:A:283:LEU:HD21	1.90	0.54
1:B:151:TYR:OH	1:B:308:LEU:HG	2.08	0.54
1:A:89:TYR:OH	1:A:301:GLU:HG3	2.08	0.54
1:B:335:VAL:HA	1:B:371:GLN:OE1	2.08	0.54
1:A:164:ASN:ND2	1:A:165:SER:H	2.05	0.53
1:B:330:LEU:HB3	1:B:380:ALA:HA	1.90	0.53
1:A:173:LYS:O	1:A:177:GLU:HG3	2.09	0.53
1:A:31:THR:HG23	1:B:358:LYS:HG2	1.90	0.53
1:A:65:TYR:HB2	1:A:77:LEU:HB2	1.91	0.53
1:B:4:ILE:HG23	1:B:8:THR:CG2	2.30	0.53
1:B:409:ILE:HD11	1:B:414:LEU:HD22	1.90	0.53
1:A:198:LEU:O	1:A:202:PRO:HG3	2.08	0.53
1:B:257:ARG:NH1	1:B:262:TYR:HE2	2.07	0.53
1:A:369:LYS:O	1:A:373:LYS:HG3	2.08	0.53
1:B:14:GLU:O	1:B:14:GLU:HG2	2.09	0.53
1:B:14:GLU:O	1:B:17:LYS:HE2	2.08	0.52
1:B:151:TYR:CD2	1:B:269:LEU:HD12	2.43	0.52
1:B:241:TYR:O	1:B:244:ASP:HB2	2.09	0.52
1:A:8:THR:HG23	1:B:41:PRO:CG	2.40	0.52
1:A:358:LYS:CG	1:B:31:THR:HG23	2.38	0.52
1:B:280:ILE:HD12	1:B:280:ILE:C	2.35	0.52
1:A:263:THR:HG22	1:A:264:HIS:N	2.24	0.52
1:A:175:TYR:HD2	1:A:226:PHE:CD2	2.27	0.52
1:A:273:ASN:O	1:A:276:TYR:HB2	2.10	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:331:ASP:HB2	1:B:358:LYS:O	2.09	0.52
1:A:180:VAL:HA	1:A:198:LEU:HD21	1.92	0.52
1:B:63:GLU:C	1:B:113:TYR:HB2	2.35	0.52
1:B:374:GLN:HG3	1:B:378:LEU:HD22	1.91	0.52
1:B:396:ILE:HG13	1:B:411:LEU:HD12	1.92	0.51
1:A:190:PHE:HB3	1:A:194:CYS:HB2	1.92	0.51
1:A:329:ASN:O	1:A:358:LYS:HE2	2.09	0.51
1:B:156:LEU:HD11	1:B:317:LEU:HD13	1.92	0.51
1:A:336:THR:HG21	1:A:345:ALA:HB2	1.92	0.51
1:A:113:TYR:CE1	1:B:70:LYS:HA	2.40	0.51
1:A:273:ASN:HB3	1:A:276:TYR:CE2	2.46	0.51
1:A:202:PRO:O	1:A:205:ILE:HB	2.11	0.51
1:B:110:MET:HG3	1:B:126:GLN:HG2	1.92	0.51
1:A:6:ARG:NH2	2:B:2069:HOH:O	2.43	0.51
1:A:190:PHE:O	1:A:195:GLN:HG3	2.10	0.51
1:B:336:THR:HG21	1:B:345:ALA:HB2	1.92	0.51
1:A:180:VAL:HG22	1:A:198:LEU:HD22	1.93	0.51
1:A:330:LEU:HD21	1:A:360:ASP:CB	2.41	0.51
1:B:273:ASN:ND2	1:B:276:TYR:CE2	2.79	0.51
1:A:36:LYS:HB3	1:B:13:PRO:HB3	1.94	0.50
1:B:166:VAL:HG23	1:B:263:THR:O	2.12	0.50
1:A:197:ARG:HD2	1:A:204:ARG:HB3	1.93	0.50
1:B:160:LYS:HB3	1:B:270:MET:HB2	1.93	0.50
1:B:410:GLU:OE1	1:B:412:ASP:HB2	2.11	0.50
1:B:276:TYR:OH	1:B:319:GLU:HG3	2.12	0.50
1:B:135:GLU:HG2	1:B:234:TYR:HE2	1.77	0.50
1:B:67:PHE:CE1	1:B:75:ILE:HD11	2.47	0.49
1:A:271:MET:HG2	1:A:276:TYR:HE2	1.76	0.49
1:B:63:GLU:O	1:B:113:TYR:HB2	2.12	0.49
1:A:29:LEU:O	1:A:33:TYR:HD2	1.96	0.49
1:A:184:GLU:HB2	1:A:198:LEU:HD11	1.94	0.49
1:B:161:LEU:CD1	1:B:163:ILE:HG23	2.43	0.49
1:A:5:PRO:HD2	1:A:8:THR:HG21	1.94	0.49
1:A:68:LYS:O	1:A:72:ASP:HA	2.13	0.49
1:B:235:TYR:CZ	1:B:239:LYS:HD3	2.47	0.49
1:B:21:TYR:CB	1:B:326:ILE:HD11	2.43	0.49
1:B:144:LEU:O	1:B:147:VAL:HG12	2.13	0.49
1:A:186:VAL:HB	1:A:189:GLU:CD	2.38	0.49
1:A:284:CYS:SG	1:A:285:GLY:N	2.85	0.49
1:B:80:GLU:HB3	1:B:112:ARG:HH21	1.77	0.48
1:A:8:THR:HG23	1:B:41:PRO:HG2	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:171:SER:HB3	1:A:226:PHE:O	2.12	0.48
1:A:32:PHE:HA	1:B:358:LYS:HA	1.95	0.48
1:A:352:LEU:HD23	1:A:415:VAL:CG1	2.42	0.48
1:A:168:ASP:HA	1:A:263:THR:HG23	1.96	0.48
1:B:21:TYR:CE1	1:B:324:LEU:HD22	2.48	0.48
1:A:26:LEU:O	1:A:30:MET:HG2	2.14	0.48
1:B:49:PHE:CD1	1:B:79:PRO:HD2	2.48	0.48
1:A:70:LYS:O	1:A:73:ARG:HG3	2.14	0.48
1:B:335:VAL:HG13	1:B:371:GLN:OE1	2.14	0.48
1:A:349:LEU:HD12	1:A:349:LEU:HA	1.61	0.47
1:B:110:MET:CG	1:B:126:GLN:HG2	2.44	0.47
1:A:87:ARG:NH2	1:B:4:ILE:HG13	2.29	0.47
1:A:175:TYR:CE1	1:A:223:ILE:HG12	2.49	0.47
1:A:14:GLU:O	1:A:17:LYS:HE2	2.15	0.47
1:A:37:GLU:HB3	1:B:20:ARG:NH2	2.29	0.47
1:A:89:TYR:HA	1:A:94:MET:SD	2.53	0.47
1:A:241:TYR:OH	1:B:343:ARG:HG2	2.15	0.47
1:B:349:LEU:O	1:B:353:ARG:HG3	2.14	0.47
1:B:395:LYS:O	1:B:395:LYS:HG3	2.14	0.47
1:A:182:HIS:CE1	1:A:220:ALA:HB2	2.49	0.47
1:A:340:GLN:HG2	1:A:391:LEU:HD23	1.97	0.47
1:A:351:HIS:CE1	1:A:415:VAL:HG21	2.49	0.47
1:A:69:ASP:HB3	1:B:113:TYR:OH	2.15	0.47
1:A:175:TYR:HB2	1:A:226:PHE:CG	2.49	0.47
1:A:390:GLU:HG2	1:A:396:ILE:HG22	1.96	0.47
1:B:71:GLY:C	1:B:73:ARG:H	2.21	0.47
1:B:272:ASP:HA	1:B:280:ILE:HA	1.97	0.47
1:B:67:PHE:HD1	1:B:69:ASP:CG	2.22	0.47
1:B:5:PRO:O	1:B:8:THR:HB	2.15	0.47
1:B:21:TYR:HB2	1:B:326:ILE:HD11	1.97	0.47
1:B:396:ILE:HG12	1:B:411:LEU:HD12	1.97	0.47
1:B:273:ASN:ND2	1:B:275:ASN:HB2	2.30	0.46
1:A:22:ILE:HD11	1:A:314:LEU:HD13	1.98	0.46
1:B:335:VAL:O	1:B:385:VAL:HA	2.15	0.46
1:A:273:ASN:HA	1:A:274:PRO:HD2	1.72	0.46
1:A:413:ALA:O	1:A:414:LEU:C	2.57	0.46
1:B:21:TYR:CD1	1:B:324:LEU:HD22	2.51	0.46
1:A:36:LYS:CB	1:B:13:PRO:HB3	2.46	0.46
1:B:111:PHE:N	1:B:111:PHE:CD2	2.83	0.45
1:B:271:MET:O	1:B:280:ILE:HA	2.16	0.45
1:B:413:ALA:O	1:B:414:LEU:C	2.59	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:245:LEU:HD23	1:B:347:LYS:HA	1.98	0.45
1:A:356:GLY:HA2	1:B:32:PHE:CZ	2.52	0.45
1:A:22:ILE:CD1	1:A:314:LEU:HD13	2.47	0.45
1:A:21:TYR:CG	1:A:326:ILE:HD11	2.51	0.45
1:B:410:GLU:HG3	1:B:413:ALA:H	1.82	0.45
1:A:39:ARG:HB2	1:B:11:ILE:HB	1.99	0.45
1:B:21:TYR:HB2	1:B:326:ILE:CD1	2.46	0.45
1:A:335:VAL:HA	1:A:371:GLN:OE1	2.17	0.45
1:B:399:LYS:HA	1:B:406:SER:HA	1.98	0.44
1:B:273:ASN:HB3	1:B:276:TYR:CD2	2.53	0.44
1:A:257:ARG:HD3	1:A:262:TYR:CE2	2.52	0.44
1:B:156:LEU:HD13	1:B:317:LEU:HD13	1.98	0.44
1:A:51:ARG:HG3	1:A:296:LEU:CD1	2.48	0.44
1:A:242:LEU:HD12	1:A:242:LEU:HA	1.79	0.44
1:A:241:TYR:O	1:A:244:ASP:HB2	2.18	0.44
1:B:32:PHE:CD2	1:B:32:PHE:N	2.85	0.44
1:A:4:ILE:HD13	1:A:4:ILE:HG21	1.63	0.44
1:A:228:ASN:ND2	1:A:231:SER:OG	2.51	0.43
1:A:334:ILE:HD12	1:A:349:LEU:CD1	2.48	0.43
1:A:399:LYS:HA	1:A:406:SER:HA	2.00	0.43
1:B:291:GLY:O	1:B:295:LEU:HG	2.18	0.43
1:B:70:LYS:HB3	1:B:73:ARG:HB2	2.00	0.43
1:A:5:PRO:O	1:A:8:THR:HB	2.18	0.43
1:A:349:LEU:O	1:A:353:ARG:HG3	2.18	0.43
1:B:369:LYS:HG2	1:B:373:LYS:HE3	2.01	0.43
1:A:2:ILE:HD11	1:B:51:ARG:CZ	2.48	0.43
1:A:35:TYR:CE2	1:A:103:LYS:HE2	2.53	0.43
1:B:73:ARG:CZ	2:B:2069:HOH:O	2.65	0.43
1:B:231:SER:O	1:B:232:LYS:C	2.60	0.43
1:A:334:ILE:HD13	1:A:348:LEU:HD23	1.99	0.43
1:A:156:LEU:HD12	1:A:320:GLU:HG3	2.01	0.43
1:B:326:ILE:HG22	1:B:327:GLU:N	2.33	0.43
1:B:391:LEU:HD12	1:B:391:LEU:HA	1.83	0.43
1:A:6:ARG:O	1:B:70:LYS:HE3	2.18	0.43
1:A:31:THR:CG2	1:B:358:LYS:HG2	2.48	0.43
1:B:31:THR:HG22	1:B:32:PHE:HD2	1.83	0.43
1:B:372:MET:HE3	1:B:372:MET:HA	2.01	0.43
1:A:1:MET:HA	1:B:297:ASP:CB	2.49	0.43
1:A:71:GLY:C	1:A:73:ARG:H	2.27	0.42
1:A:99:ASN:HB2	1:B:377:ARG:HG2	2.00	0.42
1:B:63:GLU:HB3	1:B:113:TYR:CD2	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:299:PRO:HB2	1:A:301:GLU:HG2	2.01	0.42
1:A:420:LYS:HE3	1:A:420:LYS:HB3	1.68	0.42
1:B:273:ASN:CB	1:B:276:TYR:HE2	2.32	0.42
1:B:288:ARG:HH21	1:B:302:THR:HB	1.84	0.42
1:A:268:GLU:HG2	1:A:282:THR:CG2	2.49	0.42
1:A:40:THR:CG2	1:A:84:ALA:HB1	2.46	0.42
1:A:87:ARG:NH2	1:B:10:ASP:OD2	2.51	0.42
1:A:227:LEU:N	1:A:227:LEU:HD23	2.34	0.42
1:A:409:ILE:HD11	1:A:414:LEU:HD22	2.01	0.42
1:B:124:PHE:CD1	1:B:124:PHE:N	2.88	0.42
1:B:299:PRO:HB2	1:B:301:GLU:HG2	2.01	0.42
1:B:331:ASP:OD1	1:B:358:LYS:HD3	2.19	0.42
1:A:35:TYR:CE2	1:A:146:MET:HE1	2.54	0.42
1:B:271:MET:HE3	1:B:271:MET:HB2	1.85	0.42
1:A:21:TYR:HB2	1:A:326:ILE:CD1	2.50	0.41
1:A:133:GLY:O	1:B:364:LEU:HD11	2.20	0.41
1:A:176:ASN:HA	1:A:179:LEU:HD12	2.02	0.41
1:A:245:LEU:HD21	1:B:346:VAL:HG12	2.02	0.41
1:A:335:VAL:HB	1:A:385:VAL:HA	2.00	0.41
1:A:349:LEU:HD22	1:A:361:LYS:HD2	2.02	0.41
1:A:391:LEU:HD12	1:A:391:LEU:HA	1.82	0.41
1:A:70:LYS:HB3	1:A:73:ARG:HB2	2.02	0.41
1:B:154:PHE:HB3	1:B:317:LEU:HD11	2.01	0.41
1:B:315:LEU:O	1:B:315:LEU:HD22	2.19	0.41
1:A:17:LYS:HD2	1:A:328:GLU:HG3	2.02	0.41
1:A:37:GLU:HB3	1:B:20:ARG:HH22	1.85	0.41
1:A:42:ILE:HG13	1:B:111:PHE:HZ	1.85	0.41
1:A:102:ILE:HG22	1:A:104:LEU:HG	2.02	0.41
1:A:416:GLU:HA	1:A:416:GLU:OE2	2.20	0.41
1:B:349:LEU:HD22	1:B:361:LYS:HD2	2.01	0.41
1:B:367:LYS:H	1:B:367:LYS:HG3	1.72	0.41
1:A:159:LEU:HD12	1:A:159:LEU:HA	1.92	0.41
1:B:4:ILE:HD13	1:B:4:ILE:HG21	1.70	0.41
1:B:332:LEU:HG	1:B:418:PHE:CZ	2.56	0.41
1:A:180:VAL:HA	1:A:198:LEU:CD2	2.50	0.41
1:B:40:THR:HG23	1:B:41:PRO:HD2	2.02	0.41
1:B:272:ASP:HB3	1:B:280:ILE:HG22	2.02	0.41
1:A:3:LYS:HA	1:B:91:GLU:OE1	2.21	0.41
1:A:67:PHE:HD1	1:A:69:ASP:OD2	2.04	0.41
1:A:249:TYR:CD1	1:A:249:TYR:C	2.99	0.41
1:B:288:ARG:HA	1:B:304:ILE:HA	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:109:PRO:HA	1:A:124:PHE:O	2.21	0.40
1:A:162:VAL:O	1:A:267:PHE:HA	2.22	0.40
1:A:414:LEU:HA	1:A:414:LEU:HD13	1.89	0.40
1:B:65:TYR:OH	1:B:122:ARG:HG2	2.21	0.40
1:A:161:LEU:C	1:A:161:LEU:HD12	2.46	0.40
1:B:261:TYR:O	1:B:289:TYR:HA	2.21	0.40
1:A:175:TYR:HB2	1:A:226:PHE:CB	2.51	0.40
1:A:369:LYS:HE2	1:A:373:LYS:HE3	2.03	0.40
1:B:372:MET:HE1	1:B:383:THR:HG21	2.04	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 X-ray entries followed by that with respect to entries of similar resolution.

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	382/420 (91%)	339 (89%)	38 (10%)	5 (1%)	9	25
1	B	334/420 (80%)	300 (90%)	30 (9%)	4 (1%)	10	27
All	All	716/840 (85%)	639 (89%)	68 (10%)	9 (1%)	9	25

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	328	GLU
1	A	193	ASP
1	A	365	GLN
1	B	365	GLN
1	B	326	ILE
1	B	327	GLU
1	A	182	HIS
1	A	264	HIS
1	B	414	LEU



### 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 X-ray entries followed by that with respect to entries of similar resolution.

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	340/368 (92%)	283 (83%)	57 (17%)	2	6
1	B	294/368 (80%)	250 (85%)	44 (15%)	3	7
All	All	634/736 (86%)	533 (84%)	101 (16%)	2	7

All (101) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	4	ILE
1	A	8	THR
1	A	29	LEU
1	A	31	THR
1	A	40	THR
1	A	68	LYS
1	A	80	GLU
1	A	87	ARG
1	A	95	GLN
1	A	97	ASN
1	A	122	ARG
1	A	129	VAL
1	A	143	VAL
1	A	156	LEU
1	A	157	LYS
1	A	159	LEU
1	A	160	LYS
1	A	161	LEU
1	A	184	GLU
1	A	187	ILE
1	A	198	LEU
1	A	204	ARG
1	A	223	ILE
1	A	227	LEU
1	A	229	GLU
1	A	242	LEU
1	A	244	ASP

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Mol	Chain	Res	Type
1	A	250	THR
1	A	262	TYR
1	A	269	LEU
1	A	270	MET
1	A	271	MET
1	A	283	LEU
1	A	290	ASN
1	A	294	GLU
1	A	296	LEU
1	A	302	THR
1	A	308	LEU
1	A	314	LEU
1	A	315	LEU
1	A	317	LEU
1	A	328	GLU
1	A	332	LEU
1	A	357	ILE
1	A	378	LEU
1	A	383	THR
1	A	391	LEU
1	A	395	LYS
1	A	396	ILE
1	A	402	THR
1	A	405	GLU
1	A	407	GLU
1	A	411	LEU
1	A	414	LEU
1	A	415	VAL
1	A	416	GLU
1	A	420	LYS
1	B	3	LYS
1	B	4	ILE
1	B	8	THR
1	B	13	PRO
1	B	29	LEU
1	B	31	THR
1	B	40	THR
1	B	63	GLU
1	B	80	GLU
1	B	97	ASN
1	B	113	TYR
1	B	122	ARG

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Mol	Chain	Res	Type
1	B	126	GLN
1	B	143	VAL
1	B	156	LEU
1	B	157	LYS
1	B	159	LEU
1	B	242	LEU
1	B	263	THR
1	B	269	LEU
1	B	271	MET
1	B	283	LEU
1	B	290	ASN
1	B	294	GLU
1	B	296	LEU
1	B	302	THR
1	B	308	LEU
1	B	314	LEU
1	B	315	LEU
1	B	317	LEU
1	B	329	ASN
1	B	332	LEU
1	B	357	ILE
1	B	378	LEU
1	B	383	THR
1	B	391	LEU
1	B	396	ILE
1	B	397	ASP
1	B	402	THR
1	B	405	GLU
1	B	407	GLU
1	B	414	LEU
1	B	415	VAL
1	B	419	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (21) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	9	GLN
1	A	24	ASN
1	A	95	GLN
1	A	97	ASN
1	A	164	ASN
1	A	188	HIS

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Mol	Chain	Res	Type
1	A	195	GLN
1	A	199	HIS
1	A	237	GLN
1	A	365	GLN
1	B	9	GLN
1	B	97	ASN
1	B	149	HIS
1	B	164	ASN
1	B	237	GLN
1	B	273	ASN
1	B	275	ASN
1	B	329	ASN
1	B	354	HIS
1	B	365	GLN
1	B	393	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.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.