



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 27, 2023 – 07:06 AM EDT

PDB ID : 3HV0  
Title : Tryptophanyl-tRNA synthetase from *Cryptosporidium parvum*  
Authors : Arakaki, T.; Merritt, E.A.; Medical Structural Genomics of Pathogenic Protozoa (MSGPP)  
Deposited on : 2009-06-15  
Resolution : 2.42 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 : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.35  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.35

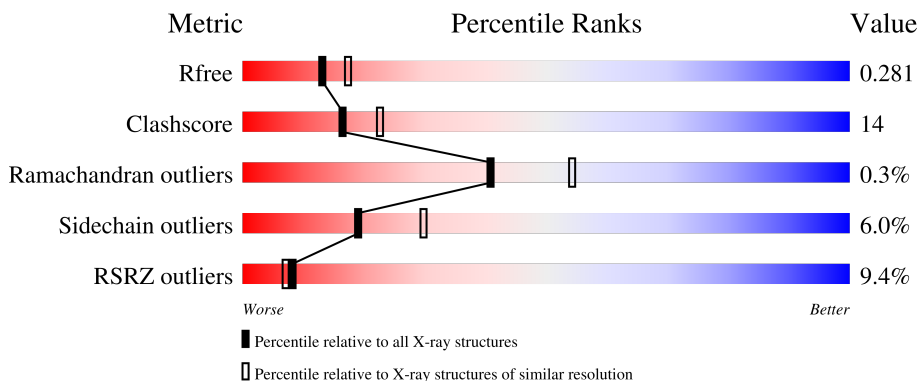
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.42 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))
$R_{free}$	130704	4647 (2.44-2.40)
Clashscore	141614	5161 (2.44-2.40)
Ramachandran outliers	138981	5073 (2.44-2.40)
Sidechain outliers	138945	5074 (2.44-2.40)
RSRZ outliers	127900	4543 (2.44-2.40)

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  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	393	
1	B	393	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5660 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 Tryptophanyl-tRNA synthetase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	352	2803	1804	463	524	12	0	0	0
1	B	352	2783	1794	464	513	12	0	0	0

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	201	GLY	-	expression tag	UNP Q5CYP8
A	202	PRO	-	expression tag	UNP Q5CYP8
A	203	GLY	-	expression tag	UNP Q5CYP8
A	204	SER	-	expression tag	UNP Q5CYP8
A	205	MET	-	expression tag	UNP Q5CYP8
B	201	GLY	-	expression tag	UNP Q5CYP8
B	202	PRO	-	expression tag	UNP Q5CYP8
B	203	GLY	-	expression tag	UNP Q5CYP8
B	204	SER	-	expression tag	UNP Q5CYP8
B	205	MET	-	expression tag	UNP Q5CYP8

- Molecule 2 is TRYPTOPHAN (three-letter code: TRP) (formula: C<sub>11</sub>H<sub>12</sub>N<sub>2</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
			Total	C	N			O
2	A	1	15	11	2	2	0	0
2	B	1	15	11	2	2	0	0

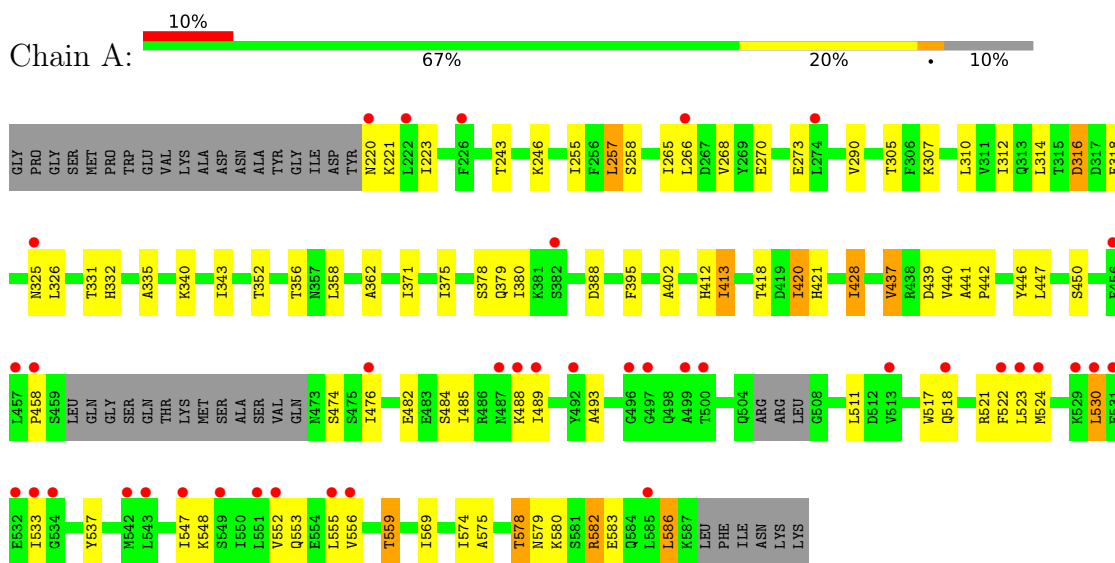
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	26	26	26	0	0
3	B	18	18	18	0	0

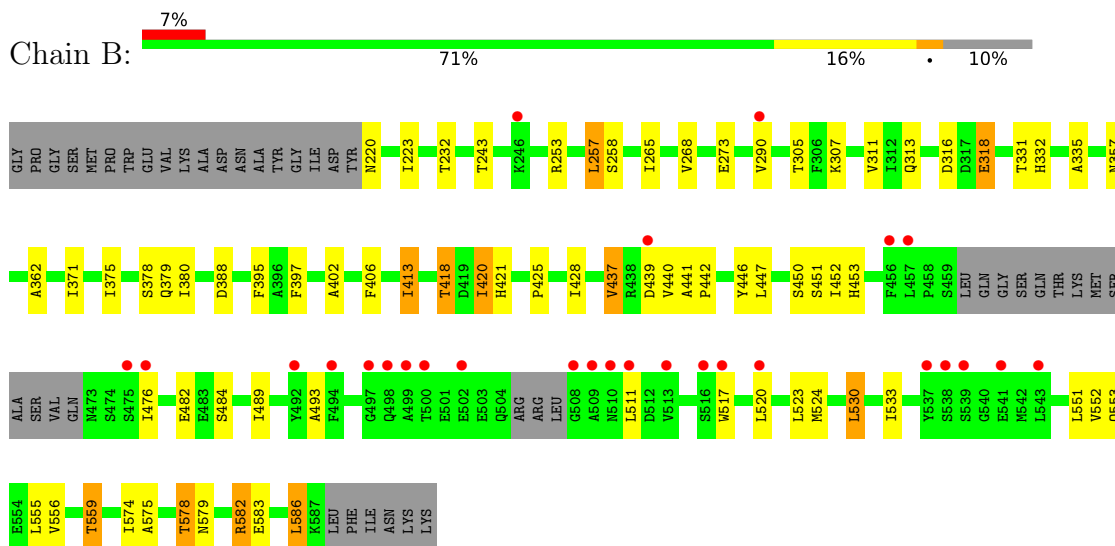
### 3 Residue-property plots

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 and electron density. 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. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). 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: Tryptophanyl-tRNA synthetase



- Molecule 1: Tryptophanyl-tRNA synthetase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	58.32Å 85.22Å 73.11Å 90.00° 101.91° 90.00°	Depositor
Resolution (Å)	40.00 – 2.42 43.07 – 2.42	Depositor EDS
% Data completeness (in resolution range)	95.0 (40.00-2.42) 94.9 (43.07-2.42)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.82 (at 2.42Å)	Xtrriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.227 , 0.273 0.234 , 0.281	Depositor DCC
$R_{free}$ test set	1276 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	48.5	Xtrriage
Anisotropy	0.583	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 70.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	5660	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	25.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.18% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.51	0/2866	0.62	0/3871
1	B	0.49	1/2846 (0.0%)	0.61	0/3846
All	All	0.50	1/5712 (0.0%)	0.62	0/7717

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	318	GLU	CG-CD	5.01	1.59	1.51

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 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	2803	0	2702	87	0
1	B	2783	0	2680	73	0
2	A	15	0	12	1	0
2	B	15	0	9	0	0
3	A	26	0	0	5	0
3	B	18	0	0	2	0
All	All	5660	0	5403	158	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 14.

All (158) 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:375:ILE:HD11	1:A:440:VAL:HG11	1.48	0.95
1:B:375:ILE:HD11	1:B:440:VAL:HG11	1.50	0.89
1:A:362:ALA:HB1	3:B:17:HOH:O	1.74	0.88
1:A:257:LEU:HD13	1:A:258:SER:HB2	1.53	0.88
3:A:20:HOH:O	1:B:362:ALA:HB1	1.74	0.88
1:B:420:ILE:CD1	1:B:586:LEU:HD22	2.04	0.86
1:A:420:ILE:HD11	1:A:586:LEU:HD22	1.57	0.86
1:A:420:ILE:CD1	1:A:586:LEU:HD22	2.05	0.86
1:B:257:LEU:HD13	1:B:258:SER:HB2	1.57	0.85
1:A:290:VAL:HG23	1:A:476:ILE:HG23	1.59	0.85
1:B:420:ILE:HD11	1:B:586:LEU:HD22	1.59	0.85
1:A:290:VAL:CG2	1:A:476:ILE:CG2	2.56	0.83
1:A:290:VAL:CG2	1:A:476:ILE:HG23	2.12	0.80
1:B:290:VAL:HG23	1:B:476:ILE:HG23	1.63	0.80
1:A:290:VAL:HG23	1:A:476:ILE:CG2	2.13	0.78
1:A:574:ILE:O	1:A:578:THR:HG22	1.86	0.74
1:B:220:ASN:O	1:B:223:ILE:HG22	1.88	0.74
1:A:316:ASP:OD2	1:A:356:THR:HB	1.90	0.71
1:A:375:ILE:HG21	1:A:380:ILE:CD1	2.24	0.68
1:B:375:ILE:HG21	1:B:380:ILE:CD1	2.23	0.68
1:B:482:GLU:HG3	1:B:556:VAL:HG11	1.75	0.68
1:A:257:LEU:HD12	1:A:257:LEU:H	1.58	0.67
1:A:375:ILE:CD1	1:A:440:VAL:HG11	2.23	0.67
1:A:579:ASN:O	1:A:582:ARG:NH2	2.26	0.67
1:B:579:ASN:O	1:B:582:ARG:NH2	2.25	0.67
1:B:575:ALA:HA	1:B:578:THR:HG23	1.77	0.66
1:B:265:ILE:HD11	1:B:450:SER:HB2	1.78	0.65
1:A:265:ILE:HD11	1:A:450:SER:HB2	1.76	0.65
1:B:517:TRP:CH2	1:B:530:LEU:HD23	2.31	0.65
1:A:265:ILE:HD11	1:A:450:SER:CB	2.26	0.65
1:B:375:ILE:CD1	1:B:440:VAL:HG11	2.24	0.64
1:A:524:MET:HE1	1:A:533:ILE:HD12	1.79	0.64
1:B:257:LEU:H	1:B:257:LEU:HD12	1.62	0.63
1:B:265:ILE:HD11	1:B:450:SER:CB	2.29	0.63
1:B:290:VAL:CG2	1:B:476:ILE:HG23	2.29	0.63
1:A:517:TRP:CH2	1:A:530:LEU:HD23	2.34	0.62
1:A:575:ALA:HA	1:A:578:THR:HG23	1.80	0.62
1:B:420:ILE:CD1	1:B:586:LEU:CD2	2.77	0.62
1:A:418:THR:HG21	1:A:446:TYR:CD1	2.35	0.61
1:A:413:ILE:HG23	1:A:582:ARG:HG3	1.82	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:552:VAL:O	1:A:556:VAL:HG13	2.02	0.59
1:A:290:VAL:HG21	1:A:476:ILE:CG2	2.32	0.59
1:A:489:ILE:O	1:A:493:ALA:HB3	2.02	0.59
1:B:418:THR:CG2	1:B:446:TYR:CD1	2.86	0.59
1:A:418:THR:CG2	1:A:446:TYR:CD1	2.86	0.59
1:A:524:MET:HB2	1:A:530:LEU:HD12	1.85	0.58
1:B:290:VAL:HG23	1:B:476:ILE:CG2	2.33	0.58
1:A:243:THR:HG21	1:A:305:THR:HG22	1.85	0.57
1:B:524:MET:HE1	1:B:533:ILE:HD12	1.87	0.57
1:B:476:ILE:CG2	1:B:476:ILE:O	2.53	0.57
1:A:413:ILE:CG2	1:A:582:ARG:HG3	2.34	0.57
1:B:418:THR:HG21	1:B:446:TYR:CD1	2.40	0.57
1:B:420:ILE:HD11	1:B:586:LEU:CD2	2.31	0.57
1:B:552:VAL:O	1:B:556:VAL:HG13	2.04	0.57
1:A:474:SER:HB3	1:A:488:LYS:HE2	1.85	0.56
1:B:574:ILE:O	1:B:578:THR:HG22	2.04	0.56
1:A:402:ALA:HB1	1:A:437:VAL:CG2	2.35	0.56
1:B:290:VAL:CG2	1:B:476:ILE:CG2	2.84	0.55
1:B:489:ILE:O	1:B:493:ALA:HB3	2.07	0.55
1:B:316:ASP:HA	1:B:331:THR:HG22	1.89	0.54
1:A:421:HIS:CD2	1:A:447:LEU:HD13	2.43	0.54
1:A:268:VAL:HG13	1:A:273:GLU:HB2	1.90	0.53
1:A:420:ILE:CD1	1:A:586:LEU:CD2	2.85	0.53
1:B:413:ILE:HG23	1:B:582:ARG:HG3	1.90	0.52
1:B:511:LEU:HD23	1:B:517:TRP:CE2	2.45	0.52
1:A:476:ILE:CG2	1:A:476:ILE:O	2.58	0.52
1:B:268:VAL:HG13	1:B:273:GLU:HB2	1.90	0.52
1:A:316:ASP:HA	1:A:331:THR:HG22	1.91	0.52
1:A:428:ILE:HD12	1:A:428:ILE:O	2.10	0.52
1:B:316:ASP:HA	1:B:331:THR:CG2	2.39	0.51
1:B:524:MET:HB2	1:B:530:LEU:HD12	1.91	0.51
1:A:523:LEU:HD21	1:A:555:LEU:HD23	1.91	0.51
1:B:524:MET:HE1	1:B:530:LEU:HA	1.91	0.51
1:B:421:HIS:CD2	1:B:447:LEU:HD13	2.45	0.51
1:A:316:ASP:O	1:A:331:THR:HG21	2.11	0.51
1:A:485:ILE:HD12	1:A:556:VAL:HG12	1.93	0.51
1:B:517:TRP:HH2	1:B:530:LEU:HD23	1.75	0.50
1:A:362:ALA:HB2	3:B:15:HOH:O	2.11	0.50
1:B:523:LEU:HD21	1:B:555:LEU:HD23	1.92	0.50
1:A:476:ILE:HG12	1:A:555:LEU:HD13	1.93	0.50
1:A:378:SER:HB3	1:B:388:ASP:HB3	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:548:LYS:O	1:A:552:VAL:HG23	2.11	0.49
1:B:555:LEU:O	1:B:559:THR:HB	2.11	0.49
1:A:310:LEU:HD21	1:A:312:ILE:HD11	1.93	0.49
1:B:375:ILE:HD11	1:B:440:VAL:CG1	2.34	0.49
1:B:316:ASP:O	1:B:331:THR:HG21	2.13	0.49
1:B:258:SER:HB3	1:B:453:HIS:HB2	1.95	0.49
1:B:332:HIS:O	1:B:335:ALA:HB3	2.13	0.49
1:A:316:ASP:HA	1:A:331:THR:CG2	2.42	0.49
1:A:418:THR:HG23	3:A:18:HOH:O	2.13	0.49
1:A:574:ILE:O	1:A:578:THR:CG2	2.59	0.48
1:A:458:PRO:HG3	1:A:518:GLN:CB	2.43	0.48
1:A:476:ILE:O	1:A:476:ILE:HG22	2.14	0.48
1:B:265:ILE:CD1	1:B:450:SER:CB	2.91	0.48
1:A:265:ILE:CD1	1:A:450:SER:CB	2.91	0.48
1:B:402:ALA:HB1	1:B:437:VAL:CG2	2.44	0.48
1:B:371:ILE:O	1:B:375:ILE:HD12	2.14	0.48
1:A:343:ILE:HB	1:A:569:ILE:HD13	1.96	0.48
1:B:476:ILE:O	1:B:476:ILE:HG22	2.13	0.48
1:A:375:ILE:HD11	1:A:440:VAL:CG1	2.32	0.47
1:B:441:ALA:HB3	1:B:442:PRO:HD3	1.96	0.47
1:A:371:ILE:O	1:A:375:ILE:HD12	2.15	0.47
1:B:413:ILE:CG2	1:B:582:ARG:HG3	2.45	0.47
1:A:375:ILE:CG2	1:A:380:ILE:CD1	2.93	0.47
1:A:265:ILE:N	1:A:265:ILE:HD12	2.30	0.47
1:A:325:ASN:C	3:A:25:HOH:O	2.53	0.46
1:A:511:LEU:HD23	1:A:517:TRP:CE2	2.50	0.46
1:A:290:VAL:HG21	1:A:476:ILE:HG23	1.92	0.46
1:B:517:TRP:CH2	1:B:530:LEU:CD2	2.99	0.46
1:A:555:LEU:O	1:A:559:THR:HB	2.16	0.46
1:B:425:PRO:HA	1:B:452:ILE:HG23	1.98	0.45
1:A:437:VAL:HA	1:A:440:VAL:HG22	1.98	0.45
1:B:253:ARG:CZ	1:B:530:LEU:HD13	2.46	0.45
1:B:313:GLN:NE2	1:B:357:ASN:OD1	2.49	0.45
1:B:318:GLU:HB2	1:B:397:PHE:CZ	2.51	0.45
1:B:420:ILE:HD12	1:B:586:LEU:HD22	1.93	0.45
1:A:441:ALA:HB3	1:A:442:PRO:HD3	1.99	0.45
1:A:517:TRP:HH2	1:A:530:LEU:HD23	1.79	0.45
1:B:316:ASP:OD2	1:B:316:ASP:N	2.47	0.45
1:B:380:ILE:HG21	1:B:395:PHE:CD1	2.51	0.45
1:B:265:ILE:HD11	1:B:450:SER:OG	2.17	0.44
1:B:428:ILE:HD12	1:B:428:ILE:O	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:451:SER:HB3	1:B:453:HIS:CE1	2.52	0.44
1:A:380:ILE:HG21	1:A:395:PHE:CD1	2.52	0.44
1:A:318:GLU:OE1	2:A:1:TRP:N	2.50	0.44
1:B:258:SER:HB3	1:B:453:HIS:CD2	2.53	0.44
1:B:441:ALA:HB3	1:B:442:PRO:CD	2.48	0.44
1:A:243:THR:HG21	1:A:305:THR:CG2	2.46	0.44
1:A:316:ASP:OD1	1:A:358:LEU:HG	2.18	0.44
1:B:265:ILE:HD12	1:B:265:ILE:N	2.32	0.44
1:B:375:ILE:CG2	1:B:380:ILE:CD1	2.93	0.44
1:A:265:ILE:HD11	1:A:450:SER:OG	2.18	0.43
1:A:413:ILE:HG23	1:A:582:ARG:CG	2.48	0.43
1:A:388:ASP:HB3	1:B:378:SER:HB3	1.99	0.43
1:A:326:LEU:N	3:A:25:HOH:O	2.51	0.43
1:A:375:ILE:HG21	1:A:380:ILE:HD12	1.98	0.43
1:A:332:HIS:O	1:A:335:ALA:HB3	2.19	0.43
1:A:421:HIS:HA	3:A:5:HOH:O	2.19	0.43
1:A:255:ILE:HD12	1:A:522:PHE:CZ	2.54	0.43
1:A:524:MET:HE1	1:A:530:LEU:HA	2.01	0.43
1:B:243:THR:CG2	1:B:305:THR:CG2	2.96	0.43
1:B:520:LEU:HD21	1:B:551:LEU:HA	2.01	0.43
1:B:406:PHE:CZ	1:B:437:VAL:HG22	2.53	0.42
1:A:412:HIS:CD2	1:A:580:LYS:HD3	2.55	0.42
1:B:574:ILE:O	1:B:578:THR:CG2	2.67	0.42
1:A:441:ALA:HB3	1:A:442:PRO:CD	2.50	0.42
1:A:537:TYR:CD2	1:A:547:ILE:HD12	2.55	0.41
1:A:352:THR:O	1:A:582:ARG:NH1	2.52	0.41
1:B:243:THR:HG21	1:B:305:THR:HG21	2.01	0.41
1:A:220:ASN:O	1:A:223:ILE:HG22	2.21	0.41
1:A:521:ARG:HA	1:A:530:LEU:HD11	2.02	0.41
1:A:266:LEU:O	1:A:270:GLU:HG3	2.21	0.41
1:A:340:LYS:O	1:A:569:ILE:HD12	2.20	0.41
1:B:476:ILE:HG12	1:B:555:LEU:HD13	2.02	0.41
1:A:402:ALA:HB1	1:A:437:VAL:HG23	2.02	0.40
1:A:482:GLU:HG3	1:A:556:VAL:HG11	2.04	0.40
1:A:517:TRP:CH2	1:A:530:LEU:CD2	3.03	0.40
1:B:265:ILE:CD1	1:B:450:SER:OG	2.69	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	346/393 (88%)	338 (98%)	7 (2%)	1 (0%)	41	54
1	B	346/393 (88%)	339 (98%)	6 (2%)	1 (0%)	41	54
All	All	692/786 (88%)	677 (98%)	13 (2%)	2 (0%)	41	54

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	583	GLU
1	B	583	GLU

### 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 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	301/352 (86%)	282 (94%)	19 (6%)	18	27
1	B	295/352 (84%)	278 (94%)	17 (6%)	20	31
All	All	596/704 (85%)	560 (94%)	36 (6%)	19	30

All (36) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	221	LYS
1	A	246	LYS
1	A	257	LEU
1	A	307	LYS

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Mol	Chain	Res	Type
1	A	314	LEU
1	A	316	ASP
1	A	379	GLN
1	A	413	ILE
1	A	420	ILE
1	A	428	ILE
1	A	437	VAL
1	A	439	ASP
1	A	484	SER
1	A	530	LEU
1	A	553	GLN
1	A	559	THR
1	A	578	THR
1	A	582	ARG
1	A	586	LEU
1	B	232	THR
1	B	257	LEU
1	B	307	LYS
1	B	311	VAL
1	B	379	GLN
1	B	413	ILE
1	B	418	THR
1	B	420	ILE
1	B	437	VAL
1	B	439	ASP
1	B	484	SER
1	B	530	LEU
1	B	553	GLN
1	B	559	THR
1	B	578	THR
1	B	582	ARG
1	B	586	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	292	HIS
1	A	401	GLN
1	A	412	HIS
1	B	292	HIS
1	B	401	GLN
1	B	412	HIS

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Mol	Chain	Res	Type
1	B	563	GLN

### 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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	TRP	A	1	-	14,16,16	0.83	0	16,22,22	0.93	0
2	TRP	B	2	-	14,16,16	0.97	1 (7%)	16,22,22	1.08	2 (12%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	TRP	A	1	-	-	2/7/8/8	0/2/2/2
2	TRP	B	2	-	-	2/7/8/8	0/2/2/2

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	2	TRP	OXT-C	-2.27	1.23	1.30

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	2	TRP	OXT-C-O	-2.54	118.33	124.09
2	B	2	TRP	OXT-C-CA	2.20	120.88	113.38

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1	TRP	N-CA-CB-CG
2	B	2	TRP	O-C-CA-CB
2	A	1	TRP	C-CA-CB-CG
2	B	2	TRP	OXT-C-CA-CB

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1	TRP	1	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	352/393 (89%)	0.55	39 (11%) <b>5</b> <b>4</b>	10, 26, 30, 39	0
1	B	352/393 (89%)	0.53	27 (7%) <b>13</b> <b>11</b>	15, 26, 30, 38	0
All	All	704/786 (89%)	0.54	66 (9%) <b>8</b> <b>7</b>	10, 26, 30, 39	0

All (66) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	499	ALA	6.2
1	B	500	THR	4.7
1	A	531	GLU	4.7
1	B	508	GLY	4.4
1	B	494	PHE	4.1
1	B	517	TRP	3.9
1	A	552	VAL	3.8
1	B	502	GLU	3.7
1	A	522	PHE	3.7
1	B	456	PHE	3.7
1	A	492	TYR	3.7
1	A	500	THR	3.7
1	B	511	LEU	3.5
1	A	487	ASN	3.5
1	A	547	ILE	3.5
1	A	551	LEU	3.5
1	A	457	LEU	3.4
1	A	542	MET	3.3
1	A	220	ASN	3.2
1	A	530	LEU	3.2
1	A	226	PHE	3.2
1	A	325	ASN	3.1
1	A	476	ILE	3.1
1	A	274	LEU	3.1

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	488	LYS	3.0
1	A	556	VAL	3.0
1	B	510	ASN	2.9
1	A	456	PHE	2.9
1	A	523	LEU	2.9
1	B	492	TYR	2.9
1	B	538	SER	2.8
1	A	524	MET	2.7
1	A	533	ILE	2.7
1	A	222	LEU	2.7
1	A	532	GLU	2.7
1	B	475	SER	2.7
1	B	541	GLU	2.6
1	B	498	GLN	2.6
1	A	529	LYS	2.6
1	A	549	SER	2.5
1	B	516	SER	2.5
1	A	543	LEU	2.4
1	B	509	ALA	2.4
1	B	290	VAL	2.4
1	A	489	ILE	2.4
1	A	518	GLN	2.4
1	A	534	GLY	2.4
1	A	513	VAL	2.4
1	A	585	LEU	2.3
1	B	497	GLY	2.3
1	A	496	GLY	2.3
1	A	497	GLY	2.2
1	B	543	LEU	2.2
1	A	499	ALA	2.2
1	A	266	LEU	2.1
1	A	555	LEU	2.1
1	B	457	LEU	2.1
1	B	520	LEU	2.1
1	B	513	VAL	2.1
1	B	476	ILE	2.1
1	A	458	PRO	2.1
1	B	439	ASP	2.1
1	B	537	TYR	2.1
1	A	382	SER	2.0
1	B	246	LYS	2.0
1	B	539	SER	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	TRP	B	2	15/15	0.95	0.19	43,45,47,48	0
2	TRP	A	1	15/15	0.96	0.17	39,40,42,42	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.