



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 14, 2017 – 11:53 pm GMT

PDB ID : 3ITJ  
Title : Crystal structure of *Saccharomyces cerevisiae* thioredoxin reductase 1 (Trr1)  
Authors : Oliveira, M.A.; Discola, K.F.; Alves, S.V.; Medrano, F.J.; Guimaraes, B.G.; Netto, L.E.S.  
Deposited on : 2009-08-28  
Resolution : 2.40 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

---

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.7.2 (RC1), CSD as538be (2017)  
Xtriage (Phenix) : 1.9-1692  
EDS : trunk28620  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : recalc28949

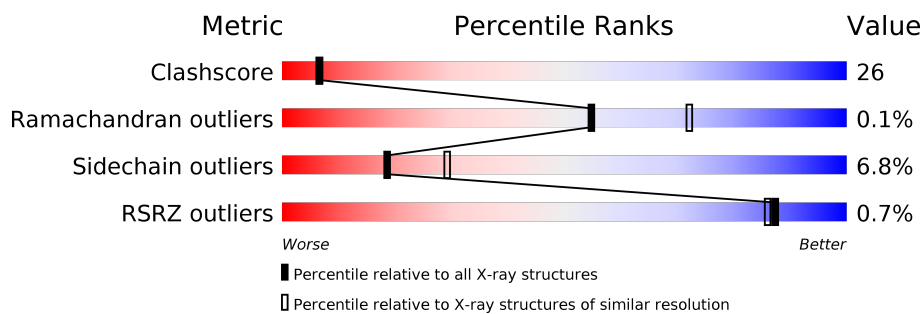
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 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	112137	3674 (2.40-2.40)
Ramachandran outliers	110173	3616 (2.40-2.40)
Sidechain outliers	110143	3617 (2.40-2.40)
RSRZ outliers	101464	3195 (2.40-2.40)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	338	<div> <div>%</div> <div> <div></div> <div>60%</div> <div>30%</div> <div>• 6%</div> </div> </div>
1	B	338	<div> <div></div> <div> <div>59%</div> <div>31%</div> <div>• 6%</div> </div> </div>
1	C	338	<div> <div>%</div> <div> <div></div> <div>58%</div> <div>30%</div> <div>• 7%</div> </div> </div>
1	D	338	<div> <div>%</div> <div> <div></div> <div>58%</div> <div>28%</div> <div>5%</div> <div>9%</div> </div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	CIT	A	501	-	-	X	X
3	CIT	C	505	-	-	-	X

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 9837 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 Thioredoxin reductase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	317	Total	C	N	O	S	0	1	0
			2376	1499	402	463	12			
1	B	319	Total	C	N	O	S	0	0	0
			2373	1496	402	463	12			
1	C	314	Total	C	N	O	S	0	0	0
			2299	1444	388	456	11			
1	D	307	Total	C	N	O	S	0	0	0
			2222	1401	369	442	10			

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	EXPRESSION TAG	UNP P29509
A	-18	GLY	-	EXPRESSION TAG	UNP P29509
A	-17	SER	-	EXPRESSION TAG	UNP P29509
A	-16	SER	-	EXPRESSION TAG	UNP P29509
A	-15	HIS	-	EXPRESSION TAG	UNP P29509
A	-14	HIS	-	EXPRESSION TAG	UNP P29509
A	-13	HIS	-	EXPRESSION TAG	UNP P29509
A	-12	HIS	-	EXPRESSION TAG	UNP P29509
A	-11	HIS	-	EXPRESSION TAG	UNP P29509
A	-10	HIS	-	EXPRESSION TAG	UNP P29509
A	-9	SER	-	EXPRESSION TAG	UNP P29509
A	-8	SER	-	EXPRESSION TAG	UNP P29509
A	-7	GLY	-	EXPRESSION TAG	UNP P29509
A	-6	LEU	-	EXPRESSION TAG	UNP P29509
A	-5	VAL	-	EXPRESSION TAG	UNP P29509
A	-4	PRO	-	EXPRESSION TAG	UNP P29509
A	-3	ARG	-	EXPRESSION TAG	UNP P29509
A	-2	GLY	-	EXPRESSION TAG	UNP P29509
A	-1	SER	-	EXPRESSION TAG	UNP P29509
A	0	HIS	-	EXPRESSION TAG	UNP P29509
B	-19	MET	-	EXPRESSION TAG	UNP P29509

*Continued on next page...*

*Continued from previous page...*

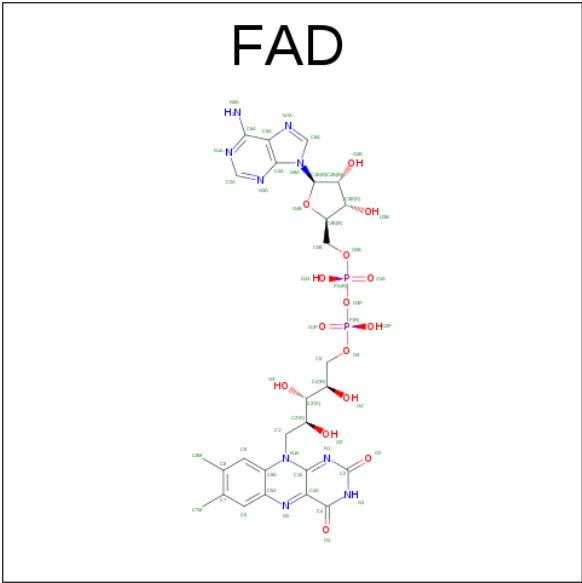
Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	GLY	-	EXPRESSION TAG	UNP P29509
B	-17	SER	-	EXPRESSION TAG	UNP P29509
B	-16	SER	-	EXPRESSION TAG	UNP P29509
B	-15	HIS	-	EXPRESSION TAG	UNP P29509
B	-14	HIS	-	EXPRESSION TAG	UNP P29509
B	-13	HIS	-	EXPRESSION TAG	UNP P29509
B	-12	HIS	-	EXPRESSION TAG	UNP P29509
B	-11	HIS	-	EXPRESSION TAG	UNP P29509
B	-10	HIS	-	EXPRESSION TAG	UNP P29509
B	-9	SER	-	EXPRESSION TAG	UNP P29509
B	-8	SER	-	EXPRESSION TAG	UNP P29509
B	-7	GLY	-	EXPRESSION TAG	UNP P29509
B	-6	LEU	-	EXPRESSION TAG	UNP P29509
B	-5	VAL	-	EXPRESSION TAG	UNP P29509
B	-4	PRO	-	EXPRESSION TAG	UNP P29509
B	-3	ARG	-	EXPRESSION TAG	UNP P29509
B	-2	GLY	-	EXPRESSION TAG	UNP P29509
B	-1	SER	-	EXPRESSION TAG	UNP P29509
B	0	HIS	-	EXPRESSION TAG	UNP P29509
C	-19	MET	-	EXPRESSION TAG	UNP P29509
C	-18	GLY	-	EXPRESSION TAG	UNP P29509
C	-17	SER	-	EXPRESSION TAG	UNP P29509
C	-16	SER	-	EXPRESSION TAG	UNP P29509
C	-15	HIS	-	EXPRESSION TAG	UNP P29509
C	-14	HIS	-	EXPRESSION TAG	UNP P29509
C	-13	HIS	-	EXPRESSION TAG	UNP P29509
C	-12	HIS	-	EXPRESSION TAG	UNP P29509
C	-11	HIS	-	EXPRESSION TAG	UNP P29509
C	-10	HIS	-	EXPRESSION TAG	UNP P29509
C	-9	SER	-	EXPRESSION TAG	UNP P29509
C	-8	SER	-	EXPRESSION TAG	UNP P29509
C	-7	GLY	-	EXPRESSION TAG	UNP P29509
C	-6	LEU	-	EXPRESSION TAG	UNP P29509
C	-5	VAL	-	EXPRESSION TAG	UNP P29509
C	-4	PRO	-	EXPRESSION TAG	UNP P29509
C	-3	ARG	-	EXPRESSION TAG	UNP P29509
C	-2	GLY	-	EXPRESSION TAG	UNP P29509
C	-1	SER	-	EXPRESSION TAG	UNP P29509
C	0	HIS	-	EXPRESSION TAG	UNP P29509
D	-19	MET	-	EXPRESSION TAG	UNP P29509
D	-18	GLY	-	EXPRESSION TAG	UNP P29509
D	-17	SER	-	EXPRESSION TAG	UNP P29509

*Continued on next page...*

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
D	-16	SER	-	EXPRESSION TAG	UNP P29509
D	-15	HIS	-	EXPRESSION TAG	UNP P29509
D	-14	HIS	-	EXPRESSION TAG	UNP P29509
D	-13	HIS	-	EXPRESSION TAG	UNP P29509
D	-12	HIS	-	EXPRESSION TAG	UNP P29509
D	-11	HIS	-	EXPRESSION TAG	UNP P29509
D	-10	HIS	-	EXPRESSION TAG	UNP P29509
D	-9	SER	-	EXPRESSION TAG	UNP P29509
D	-8	SER	-	EXPRESSION TAG	UNP P29509
D	-7	GLY	-	EXPRESSION TAG	UNP P29509
D	-6	LEU	-	EXPRESSION TAG	UNP P29509
D	-5	VAL	-	EXPRESSION TAG	UNP P29509
D	-4	PRO	-	EXPRESSION TAG	UNP P29509
D	-3	ARG	-	EXPRESSION TAG	UNP P29509
D	-2	GLY	-	EXPRESSION TAG	UNP P29509
D	-1	SER	-	EXPRESSION TAG	UNP P29509
D	0	HIS	-	EXPRESSION TAG	UNP P29509

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: C<sub>27</sub>H<sub>33</sub>N<sub>9</sub>O<sub>15</sub>P<sub>2</sub>).



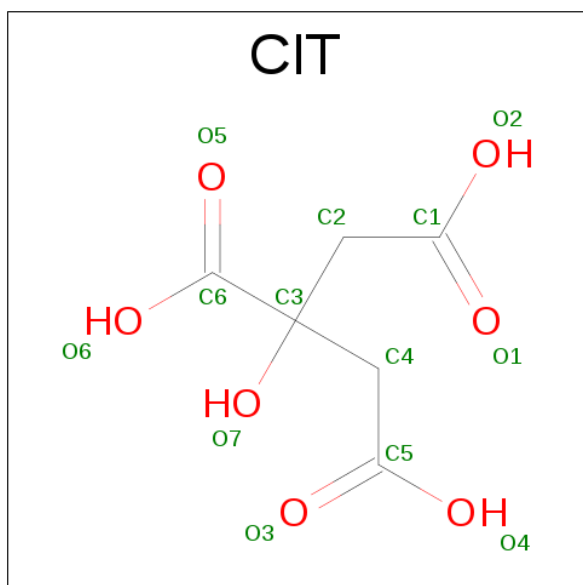
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 53	C 27	N 9	O 15	P 2	0	0
2	B	1	Total 53	C 27	N 9	O 15	P 2	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	D	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is CITRIC ACID (three-letter code: CIT) (formula:  $C_6H_8O_7$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			13	6	7		
3	B	1	Total	C	O	0	0
			13	6	7		
3	B	1	Total	C	O	0	0
			13	6	7		
3	C	1	Total	C	O	0	0
			13	6	7		
3	C	1	Total	C	O	0	0
			13	6	7		
3	D	1	Total	C	O	0	0
			13	6	7		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	82	Total	O	0	0
			82	82		

Continued on next page...

*Continued from previous page...*

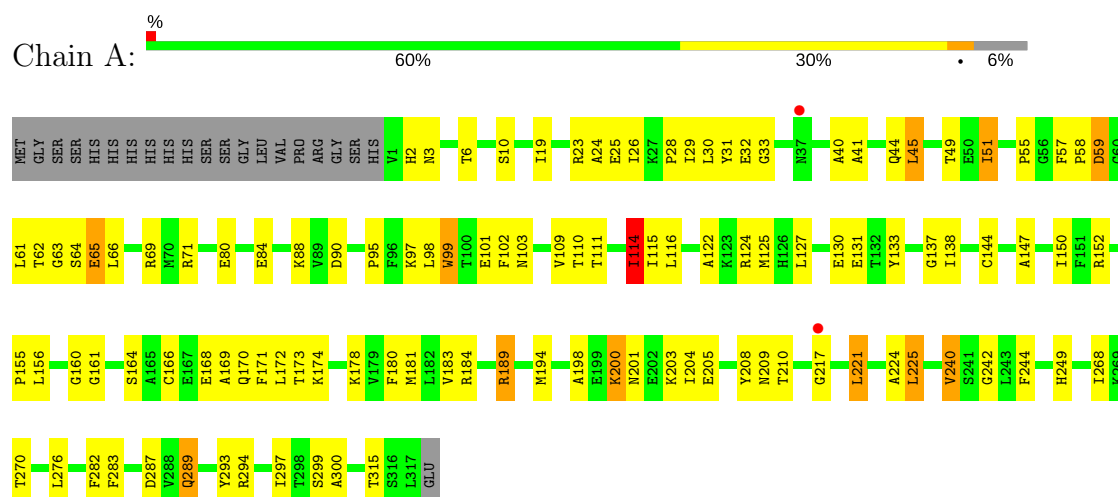
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	76	Total 76	O 76	0	0
4	C	65	Total 65	O 65	0	0
4	D	54	Total 54	O 54	0	0



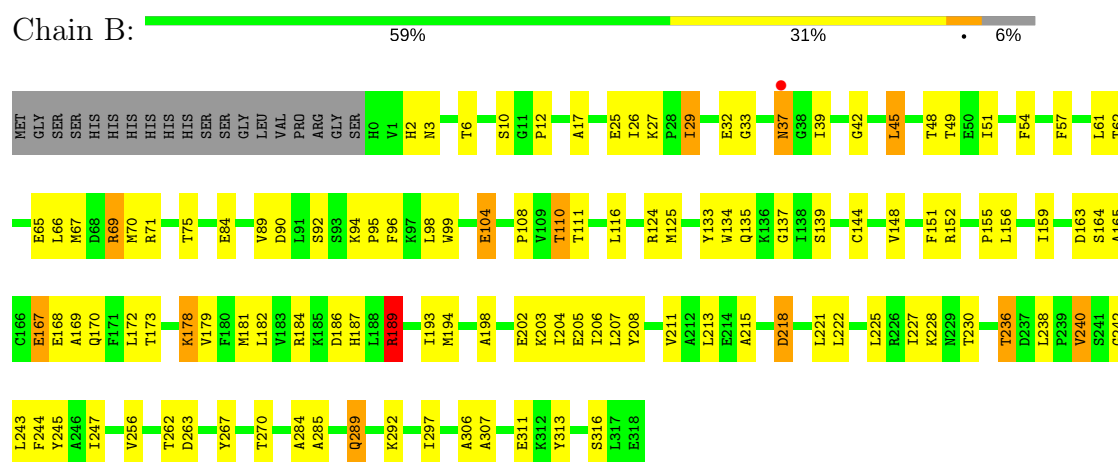
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA 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.

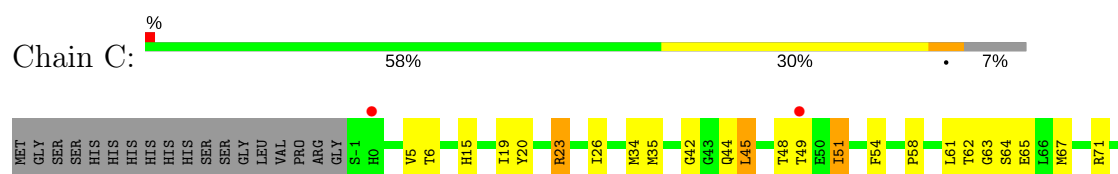
#### • Molecule 1: Thioredoxin reductase 1

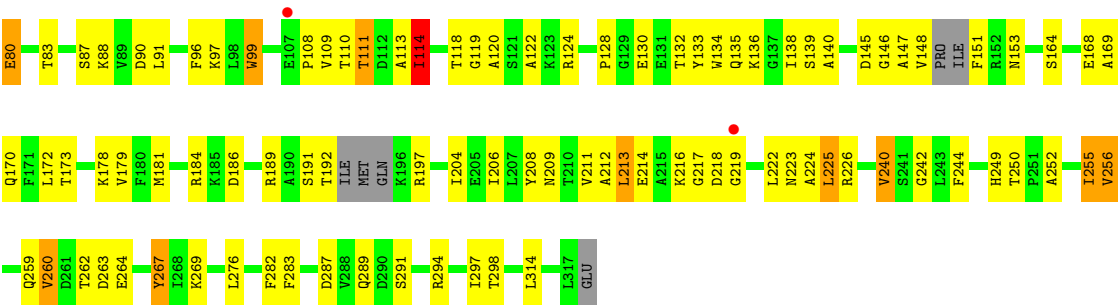


#### • Molecule 1: Thioredoxin reductase 1

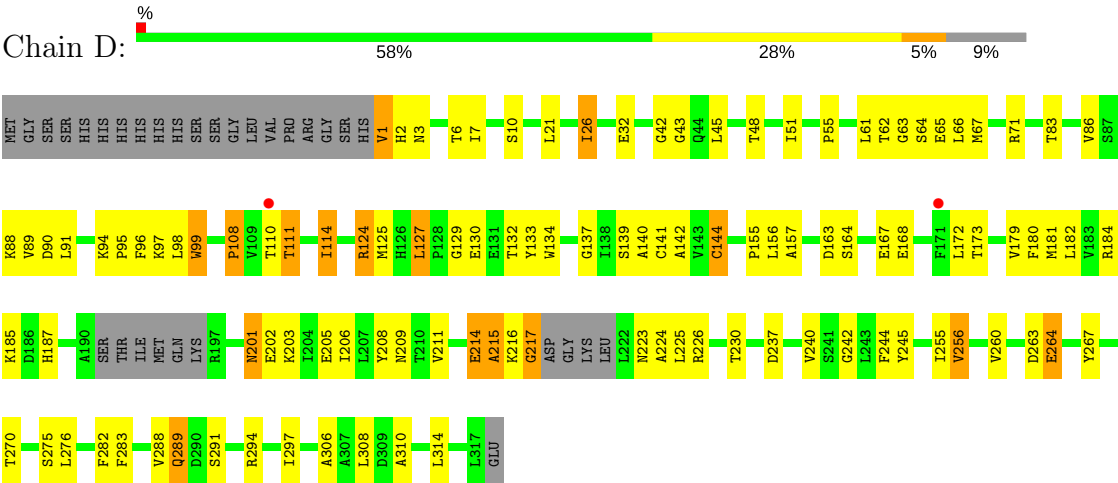


#### • Molecule 1: Thioredoxin reductase 1





• Molecule 1: Thioredoxin reductase 1



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	127.97Å 135.41Å 75.82Å 90.00° 89.95° 90.00°	Depositor
Resolution (Å)	50.00 – 2.40 46.50 – 2.39	Depositor EDS
% Data completeness (in resolution range)	97.0 (50.00-2.40) 79.0 (46.50-2.39)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.10	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.06 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.5.0066	Depositor
R, $R_{free}$	0.169 , 0.194 0.190 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	DCC
Wilson B-factor (Å <sup>2</sup> )	28.9	Xtriage
Anisotropy	0.147	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 42.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.52$ , $\langle L^2 \rangle = 0.36$	Xtriage
Estimated twinning fraction	0.000 for -h,-k,l	Xtriage
Reported twinning fraction	0.783 for H, K, L 0.217 for -H, -K, L	Depositor
Outliers	0 of 40523 reflections	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	9837	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	20.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.33% 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: FAD, CIT

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	1.10	3/2420 (0.1%)	1.03	2/3276 (0.1%)
1	B	1.17	3/2413 (0.1%)	1.07	4/3267 (0.1%)
1	C	1.12	3/2336 (0.1%)	1.08	7/3168 (0.2%)
1	D	1.11	3/2261 (0.1%)	1.06	6/3076 (0.2%)
All	All	1.13	12/9430 (0.1%)	1.06	19/12787 (0.1%)

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	D	0	1

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	80	GLU	CG-CD	6.54	1.61	1.51
1	C	20	TYR	CD1-CE1	-6.22	1.30	1.39
1	B	167	GLU	CG-CD	5.88	1.60	1.51
1	A	300	ALA	CA-CB	5.72	1.64	1.52
1	B	165	ALA	CA-CB	5.67	1.64	1.52

The worst 5 of 19 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	217	GLY	N-CA-C	10.59	139.56	113.10
1	C	114	ILE	CG1-CB-CG2	-9.13	91.32	111.40
1	C	225	LEU	CB-CG-CD2	-7.23	98.71	111.00
1	D	294	ARG	CG-CD-NE	-6.65	97.84	111.80

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	114	ILE	CG1-CB-CG2	-6.57	96.95	111.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	185	LYS	Peptide

## 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	2376	0	2382	113	0
1	B	2373	0	2375	129	0
1	C	2299	0	2234	113	0
1	D	2222	0	2130	129	0
2	A	53	0	31	4	0
2	B	53	0	31	9	0
2	C	53	0	31	2	0
2	D	53	0	31	2	0
3	A	13	0	5	7	0
3	B	26	0	10	8	0
3	C	26	0	10	6	0
3	D	13	0	5	2	0
4	A	82	0	0	7	0
4	B	76	0	0	4	0
4	C	65	0	0	4	0
4	D	54	0	0	4	0
All	All	9837	0	9275	493	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 26.

The worst 5 of 493 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:D:216:LYS:CB	1:D:224:ALA:H	1.26	1.45
1:D:201:ASN:ND2	1:D:203:LYS:H	1.37	1.20
1:C:191:SER:O	1:C:192:THR:HB	1.44	1.16
1:C:147:ALA:HB1	1:C:151:PHE:CB	1.75	1.15
1:C:249:HIS:ND1	3:C:505:CIT:O4	1.77	1.15

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	316/338 (94%)	300 (95%)	15 (5%)	1 (0%)	44	60
1	B	317/338 (94%)	301 (95%)	16 (5%)	0	100	100
1	C	308/338 (91%)	296 (96%)	12 (4%)	0	100	100
1	D	301/338 (89%)	280 (93%)	21 (7%)	0	100	100
All	All	1242/1352 (92%)	1177 (95%)	64 (5%)	1 (0%)	55	72

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	40	ALA

### 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	249/270 (92%)	233 (94%)	16 (6%)	20	32
1	B	247/270 (92%)	229 (93%)	18 (7%)	16	26
1	C	232/270 (86%)	215 (93%)	17 (7%)	16	26
1	D	222/270 (82%)	207 (93%)	15 (7%)	18	29
All	All	950/1080 (88%)	884 (93%)	66 (7%)	18	28

5 of 66 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	236	THR
1	C	51	ILE
1	D	211	VAL
1	B	240	VAL
1	B	297	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	170	GLN
1	B	289	GLN
1	C	289	GLN
1	B	37	ASN
1	C	259	GLN

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry

10 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	FAD	A	400	-	51,58,58	1.48	8 (15%)	54,89,89	2.18	12 (22%)
3	CIT	A	501	-	3,12,12	2.19	2 (66%)	3,17,17	6.61	3 (100%)
2	FAD	B	401	-	51,58,58	1.25	6 (11%)	54,89,89	1.93	6 (11%)
3	CIT	B	502	-	3,12,12	1.53	1 (33%)	3,17,17	3.28	1 (33%)
3	CIT	B	506	-	3,12,12	1.85	1 (33%)	3,17,17	2.79	1 (33%)
2	FAD	C	402	-	51,58,58	1.19	5 (9%)	54,89,89	2.43	15 (27%)
3	CIT	C	503	-	3,12,12	1.77	1 (33%)	3,17,17	2.56	1 (33%)
3	CIT	C	505	-	3,12,12	1.12	0	3,17,17	2.95	3 (100%)
2	FAD	D	403	-	51,58,58	1.33	7 (13%)	54,89,89	2.43	12 (22%)
3	CIT	D	504	-	3,12,12	0.60	0	3,17,17	3.22	2 (66%)

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	FAD	A	400	-	-	0/28/50/50	0/6/6/6
3	CIT	A	501	-	-	0/6/16/16	0/0/0/0
2	FAD	B	401	-	-	0/28/50/50	0/6/6/6
3	CIT	B	502	-	-	0/6/16/16	0/0/0/0
3	CIT	B	506	-	-	0/6/16/16	0/0/0/0
2	FAD	C	402	-	-	0/28/50/50	0/6/6/6
3	CIT	C	503	-	-	0/6/16/16	0/0/0/0
3	CIT	C	505	-	-	0/6/16/16	0/0/0/0
2	FAD	D	403	-	-	0/28/50/50	0/6/6/6
3	CIT	D	504	-	-	0/6/16/16	0/0/0/0

The worst 5 of 31 bond length outliers are listed below:



Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	506	CIT	C2-C3	-3.10	1.50	1.54
2	A	400	FAD	O4B-C4B	-2.58	1.39	1.45
3	A	501	CIT	C4-C3	-2.57	1.50	1.54
2	D	403	FAD	C4-C4X	-2.52	1.36	1.41
2	B	401	FAD	C4-C4X	-2.48	1.36	1.41

The worst 5 of 56 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	402	FAD	N3A-C2A-N1A	-10.94	119.33	128.86
2	D	403	FAD	N3A-C2A-N1A	-10.89	119.37	128.86
2	B	401	FAD	N3A-C2A-N1A	-10.41	119.79	128.86
2	A	400	FAD	N3A-C2A-N1A	-7.59	122.25	128.86
3	A	501	CIT	C3-C4-C5	-7.25	103.62	114.95

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

10 monomers are involved in 40 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	400	FAD	4	0
3	A	501	CIT	7	0
2	B	401	FAD	9	0
3	B	502	CIT	4	0
3	B	506	CIT	4	0
2	C	402	FAD	2	0
3	C	503	CIT	3	0
3	C	505	CIT	3	0
2	D	403	FAD	2	0
3	D	504	CIT	2	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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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	317/338 (93%)	-0.29	2 (0%) 89 87	9, 19, 31, 41	0
1	B	319/338 (94%)	-0.30	1 (0%) 93 93	10, 19, 31, 38	0
1	C	314/338 (92%)	-0.18	4 (1%) 77 75	10, 20, 33, 46	0
1	D	307/338 (90%)	-0.11	2 (0%) 87 86	9, 19, 32, 40	0
All	All	1257/1352 (92%)	-0.22	9 (0%) 87 86	9, 19, 33, 46	0

The worst 5 of 9 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	110	THR	3.2
1	B	37	ASN	2.5
1	C	107	GLU	2.5
1	D	171	PHE	2.3
1	A	37	ASN	2.2

### 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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
3	CIT	A	501	13/13	0.88	0.18	2.75	26,39,49,51	0
3	CIT	C	505	13/13	0.84	0.20	2.50	31,39,46,50	0
3	CIT	C	503	13/13	0.79	0.17	1.67	44,49,52,56	0
3	CIT	D	504	13/13	0.86	0.17	0.41	55,58,64,65	0
3	CIT	B	506	13/13	0.95	0.13	0.04	28,35,40,44	0
2	FAD	D	403	53/53	0.97	0.13	-0.19	11,22,28,31	1
2	FAD	A	400	53/53	0.97	0.12	-0.28	5,19,27,30	1
2	FAD	C	402	53/53	0.97	0.13	-0.34	12,23,29,35	1
2	FAD	B	401	53/53	0.96	0.13	-0.40	7,22,31,35	1
3	CIT	B	502	13/13	0.91	0.11	-1.03	33,37,40,40	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.