



# Full wwPDB X-ray Structure Validation Report ⓘ

May 15, 2020 – 05:41 am BST

PDB ID : 6AYY  
Title : Crystal structure of Apo fructose-1,6-bisphosphatase from Mycobacterium tuberculosis  
Authors : Abad-Zapatero, C.; Wolf, N.; Gutka, H.J.; Movahedzadeh, F.  
Deposited on : 2017-09-08  
Resolution : 2.60 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.

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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 : 2.11  
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) : 2.11

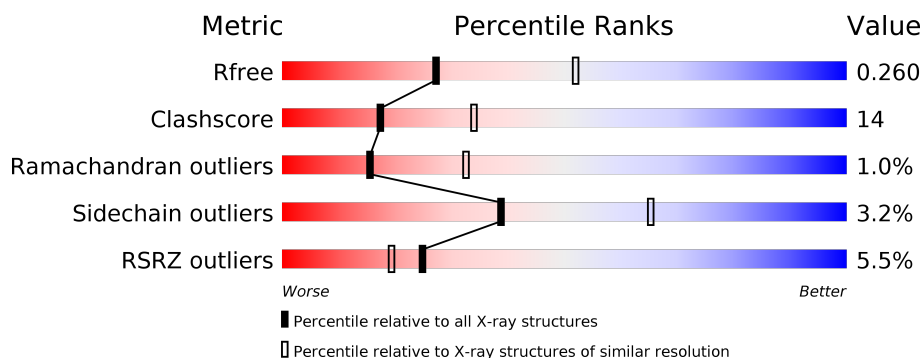
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.60 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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 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	347	<div> <div>5%</div> <div> <div></div> <div>67%</div> <div>22%</div> <div>10%</div> </div> </div>
1	B	347	<div> <div>5%</div> <div> <div></div> <div>65%</div> <div>22%</div> <div>11%</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
2	GOL	A	401	-	-	-	X
2	GOL	A	406	-	-	X	-
2	GOL	B	401	-	-	-	X
2	GOL	B	402	-	-	-	X
2	GOL	B	405	-	-	-	X
2	GOL	B	408	-	-	-	X
2	GOL	B	410	-	-	-	X
2	GOL	B	412	-	-	-	X

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 4848 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 Fructose-1,6-bisphosphatase class 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	312	Total	C	N	O	S	0	0	0
			2298	1414	418	447	19			
1	B	308	Total	C	N	O	S	0	0	0
			2260	1389	412	440	19			

There are 38 discrepancies between the modelled and reference sequences:

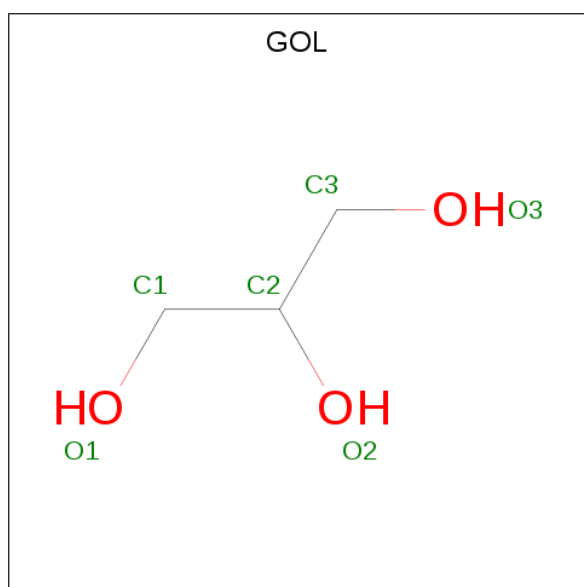
Chain	Residue	Modelled	Actual	Comment	Reference
A	-18	GLY	-	expression tag	UNP P9WN20
A	-17	SER	-	expression tag	UNP P9WN20
A	-16	SER	-	expression tag	UNP P9WN20
A	-15	HIS	-	expression tag	UNP P9WN20
A	-14	HIS	-	expression tag	UNP P9WN20
A	-13	HIS	-	expression tag	UNP P9WN20
A	-12	HIS	-	expression tag	UNP P9WN20
A	-11	HIS	-	expression tag	UNP P9WN20
A	-10	HIS	-	expression tag	UNP P9WN20
A	-9	SER	-	expression tag	UNP P9WN20
A	-8	SER	-	expression tag	UNP P9WN20
A	-7	GLY	-	expression tag	UNP P9WN20
A	-6	LEU	-	expression tag	UNP P9WN20
A	-5	VAL	-	expression tag	UNP P9WN20
A	-4	PRO	-	expression tag	UNP P9WN20
A	-3	ARG	-	expression tag	UNP P9WN20
A	-2	GLY	-	expression tag	UNP P9WN20
A	-1	SER	-	expression tag	UNP P9WN20
A	0	HIS	-	expression tag	UNP P9WN20
B	-18	GLY	-	expression tag	UNP P9WN20
B	-17	SER	-	expression tag	UNP P9WN20
B	-16	SER	-	expression tag	UNP P9WN20
B	-15	HIS	-	expression tag	UNP P9WN20
B	-14	HIS	-	expression tag	UNP P9WN20
B	-13	HIS	-	expression tag	UNP P9WN20

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-12	HIS	-	expression tag	UNP P9WN20
B	-11	HIS	-	expression tag	UNP P9WN20
B	-10	HIS	-	expression tag	UNP P9WN20
B	-9	SER	-	expression tag	UNP P9WN20
B	-8	SER	-	expression tag	UNP P9WN20
B	-7	GLY	-	expression tag	UNP P9WN20
B	-6	LEU	-	expression tag	UNP P9WN20
B	-5	VAL	-	expression tag	UNP P9WN20
B	-4	PRO	-	expression tag	UNP P9WN20
B	-3	ARG	-	expression tag	UNP P9WN20
B	-2	GLY	-	expression tag	UNP P9WN20
B	-1	SER	-	expression tag	UNP P9WN20
B	0	HIS	-	expression tag	UNP P9WN20

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		

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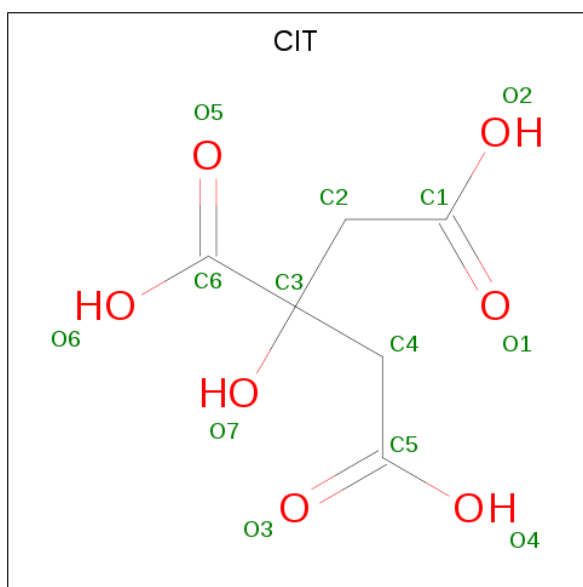
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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	A	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 3 is UNKNOWN ATOM OR ION (three-letter code: UNX) (formula: X).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	X	0	0
			1	1		

- Molecule 4 is CITRIC ACID (three-letter code: CIT) (formula: C<sub>6</sub>H<sub>8</sub>O<sub>7</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	B	1	Total	C	O	0	0
			13	6	7		

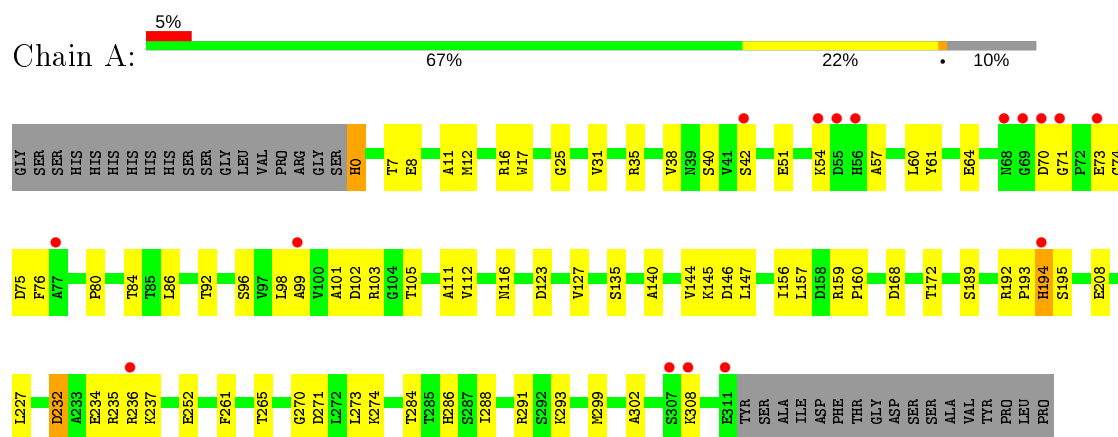
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	86	Total	O	0	0
			86	86		
5	B	70	Total	O	0	0
			70	70		

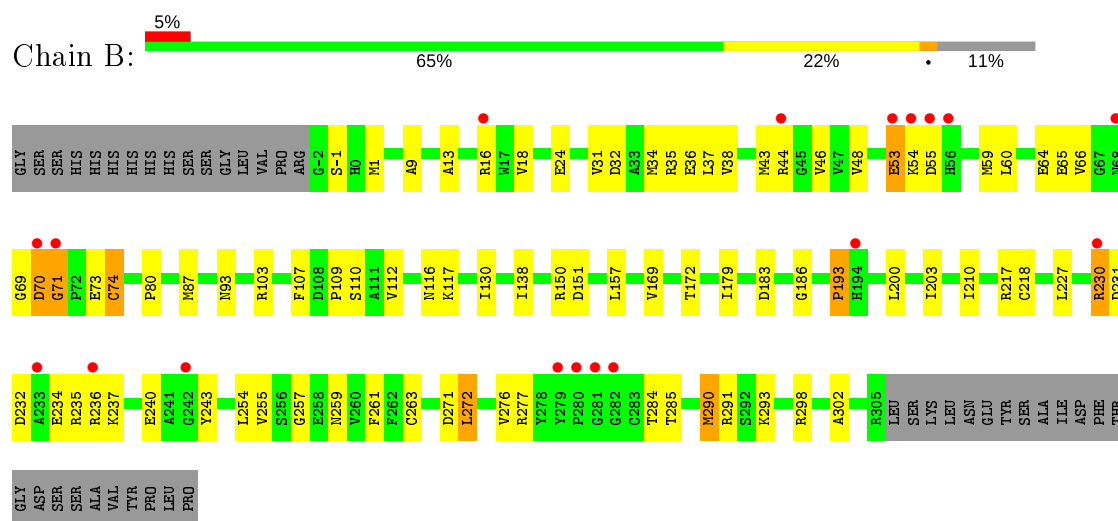
### 3 Residue-property plots [i](#)

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: Fructose-1,6-bisphosphatase class 2



- Molecule 1: Fructose-1,6-bisphosphatase class 2





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 61 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	131.54Å 131.54Å 144.35Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	19.95 – 2.60 19.95 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.9 (19.95-2.60) 99.9 (19.95-2.60)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	4.11 (at 2.59Å)	Xtriage
Refinement program	PHENIX (1.12_2829: ???)	Depositor
R, $R_{free}$	0.191 , 0.259 0.191 , 0.260	Depositor DCC
$R_{free}$ test set	1118 reflections (4.83%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	62.2	Xtriage
Anisotropy	0.106	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 60.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	4848	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	69.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.51% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: UNX, GOL, 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	0.45	0/2329	0.63	0/3150
1	B	0.45	1/2291 (0.0%)	0.66	1/3099 (0.0%)
All	All	0.45	1/4620 (0.0%)	0.65	1/6249 (0.0%)

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	263	CYS	CB-SG	-5.33	1.73	1.81

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	230	ARG	NE-CZ-NH2	7.66	124.13	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	53	GLU	Peptide

## 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	2298	0	2290	62	0
1	B	2260	0	2246	69	0
2	A	54	0	72	9	0
2	B	66	0	87	8	0
3	A	1	0	0	0	0
4	B	13	0	5	1	0
5	A	86	0	0	12	0
5	B	70	0	0	14	0
All	All	4848	0	4700	130	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 (130) 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:B:217:ARG:NH1	5:B:502:HOH:O	1.96	0.99
1:A:235:ARG:NH1	5:A:502:HOH:O	2.00	0.93
1:A:112:VAL:HG11	1:A:227:LEU:HB3	1.56	0.86
1:B:254:LEU:O	5:B:501:HOH:O	1.94	0.84
1:A:92:THR:HG23	2:B:402:GOL:H32	1.63	0.81
1:A:7:THR:O	5:A:501:HOH:O	1.98	0.80
1:A:232:ASP:OD1	1:A:236:ARG:NH1	2.14	0.80
1:B:9:ALA:HB2	1:B:37:LEU:HD22	1.63	0.80
1:A:127:VAL:HG11	1:A:144:VAL:HG21	1.64	0.78
1:A:159:ARG:HE	2:A:410:GOL:H32	1.50	0.77
1:B:18:VAL:HG12	1:B:87:MET:HG2	1.66	0.77
1:B:169:VAL:O	1:B:172:THR:HG22	1.86	0.76
1:A:96:SER:HB3	5:A:501:HOH:O	1.85	0.75
1:A:265:THR:HB	5:A:501:HOH:O	1.84	0.75
1:B:186:GLY:O	5:B:503:HOH:O	2.09	0.69
1:B:9:ALA:CB	1:B:37:LEU:HD22	2.22	0.68
1:B:44:ARG:NH2	1:B:65:GLU:HB3	2.09	0.68
1:A:31:VAL:HG22	1:A:80:PRO:HG2	1.76	0.68
1:A:236:ARG:NH1	5:A:502:HOH:O	2.27	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:109:PRO:HB2	2:B:407:GOL:H32	1.76	0.67
1:B:230:ARG:HG2	1:B:234:GLU:OE1	1.94	0.67
1:B:232:ASP:HA	1:B:235:ARG:HH12	1.60	0.66
1:B:36:GLU:OE2	1:B:37:LEU:HD12	1.95	0.66
1:A:192:ARG:HG2	1:A:195:SER:HB3	1.77	0.65
1:B:193:PRO:HG3	4:B:411:CIT:H21	1.78	0.65
1:A:237:LYS:HD2	1:A:237:LYS:O	1.97	0.65
1:B:272:LEU:HD22	5:B:520:HOH:O	1.97	0.64
1:B:232:ASP:HA	1:B:235:ARG:NH1	2.13	0.64
2:B:407:GOL:O1	2:B:407:GOL:O3	2.16	0.62
1:B:1:MET:HG2	2:B:412:GOL:H12	1.81	0.62
1:B:232:ASP:OD2	1:B:235:ARG:NH1	2.32	0.62
1:B:64:GLU:HG2	1:B:66:VAL:HG13	1.83	0.61
1:B:44:ARG:HH21	1:B:65:GLU:HB3	1.66	0.60
1:A:194:HIS:N	5:A:503:HOH:O	2.33	0.60
1:B:243:TYR:OH	5:B:504:HOH:O	2.16	0.60
1:A:70:ASP:OD2	1:A:71:GLY:N	2.34	0.60
1:B:230:ARG:NH1	5:B:506:HOH:O	2.35	0.59
1:A:98:LEU:HD12	1:A:99:ALA:N	2.18	0.59
1:A:140:ALA:O	1:A:144:VAL:HG23	2.03	0.58
1:A:84:THR:HB	2:A:407:GOL:H32	1.85	0.58
1:A:270:GLY:HA3	2:A:406:GOL:H2	1.84	0.58
1:B:150:ARG:HH22	2:B:401:GOL:H11	1.69	0.58
1:A:102:ASP:O	1:A:105:THR:HG22	2.05	0.57
1:A:73:GLU:HG2	1:A:103:ARG:HD3	1.86	0.57
1:B:53:GLU:HG2	1:B:54:LYS:H	1.70	0.57
1:A:208:GLU:N	1:A:208:GLU:OE1	2.29	0.57
1:A:16:ARG:NH2	1:B:151:ASP:OD1	2.38	0.56
1:B:112:VAL:HG21	1:B:227:LEU:HB3	1.88	0.56
1:A:273:LEU:O	2:A:406:GOL:H32	2.06	0.55
1:A:38:VAL:HG21	1:A:76:PHE:CZ	2.42	0.54
1:B:93:ASN:HD21	1:B:271:ASP:H	1.55	0.54
1:B:31:VAL:HG22	1:B:80:PRO:HG2	1.89	0.54
1:A:288:ILE:HD12	1:A:299:MET:SD	2.47	0.54
1:A:252:GLU:HG2	5:A:562:HOH:O	2.08	0.54
1:A:271:ASP:N	2:A:406:GOL:H2	2.23	0.53
1:B:237:LYS:HE2	5:B:559:HOH:O	2.08	0.52
1:A:112:VAL:HG23	1:A:234:GLU:CD	2.30	0.52
1:B:276:VAL:HG12	1:B:285:THR:HG22	1.90	0.52
1:A:51:GLU:HG2	5:A:541:HOH:O	2.09	0.52
1:B:200:LEU:HB2	5:B:503:HOH:O	2.10	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:110:SER:O	1:B:237:LYS:NZ	2.31	0.51
1:B:138:ILE:HD13	1:B:172:THR:HG21	1.91	0.51
1:B:44:ARG:HB3	1:B:70:ASP:HA	1.92	0.51
1:B:60:LEU:HA	5:B:521:HOH:O	2.11	0.51
1:A:111:ALA:O	1:A:237:LYS:NZ	2.43	0.51
1:A:86:LEU:HD13	1:A:92:THR:O	2.10	0.51
1:B:31:VAL:HG13	1:B:60:LEU:HD12	1.94	0.50
1:B:36:GLU:OE2	1:B:37:LEU:CD1	2.59	0.49
1:A:84:THR:H	2:A:407:GOL:H12	1.78	0.49
1:A:11:ALA:HB2	5:A:501:HOH:O	2.12	0.49
1:B:34:MET:O	1:B:38:VAL:HG12	2.13	0.48
1:B:157:LEU:HD23	1:B:179:ILE:HG13	1.95	0.48
1:A:237:LYS:C	1:A:237:LYS:HD2	2.34	0.48
1:B:117:LYS:NZ	1:B:183:ASP:OD1	2.46	0.48
1:B:257:GLY:N	5:B:502:HOH:O	2.46	0.48
1:B:298:ARG:NE	2:B:412:GOL:O2	2.25	0.47
1:A:146:ASP:O	1:A:147:LEU:HD23	2.14	0.47
1:A:31:VAL:HG13	1:A:60:LEU:HD12	1.96	0.47
1:B:210:ILE:HG23	5:B:501:HOH:O	2.13	0.47
1:B:179:ILE:HG22	2:B:402:GOL:H2	1.96	0.47
1:A:75:ASP:N	1:A:101:ALA:O	2.44	0.47
1:B:35:ARG:HH12	1:B:64:GLU:CD	2.18	0.47
1:A:135:SER:HB3	5:A:570:HOH:O	2.13	0.47
1:A:35:ARG:HA	1:A:38:VAL:HG12	1.96	0.47
1:B:231:ASP:HB2	5:B:553:HOH:O	2.15	0.47
1:A:8:GLU:O	1:A:12:MET:HG3	2.15	0.47
1:A:61:TYR:CE1	1:A:64:GLU:HB2	2.49	0.47
1:B:112:VAL:HG22	1:B:227:LEU:HD22	1.97	0.46
1:B:44:ARG:O	1:B:73:GLU:HA	2.14	0.46
1:A:0:HIS:H1	1:A:261:PHE:HE2	1.63	0.46
1:A:116:ASN:HD21	2:A:403:GOL:H12	1.81	0.45
1:B:46:VAL:HG13	1:B:48:VAL:HG23	1.98	0.45
1:B:35:ARG:HD2	1:B:59:MET:HB3	1.99	0.45
1:A:74:CYS:HB2	1:A:101:ALA:O	2.17	0.45
1:B:116:ASN:HD22	1:B:203:ILE:HG13	1.82	0.45
1:B:44:ARG:HE	1:B:44:ARG:HB2	1.60	0.45
1:A:160:PRO:HD2	5:A:556:HOH:O	2.15	0.44
1:A:123:ASP:N	1:A:123:ASP:OD1	2.50	0.44
1:B:218:CYS:HB2	1:B:290:MET:SD	2.58	0.44
1:A:261:PHE:CE2	1:A:291:ARG:HD3	2.53	0.44
1:B:24:GLU:N	1:B:24:GLU:OE1	2.40	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:74:CYS:HA	1:B:103:ARG:N	2.33	0.44
1:B:284:THR:HA	1:B:302:ALA:O	2.18	0.43
1:B:35:ARG:NH1	1:B:64:GLU:OE1	2.35	0.43
1:B:130:ILE:O	2:B:403:GOL:H12	2.18	0.43
1:B:13:ALA:O	1:B:16:ARG:HG2	2.19	0.43
1:B:232:ASP:HB3	1:B:236:ARG:NH1	2.33	0.43
1:A:57:ALA:O	1:A:61:TYR:HB3	2.18	0.43
1:A:168:ASP:O	1:A:172:THR:HG23	2.19	0.43
1:A:192:ARG:CG	1:A:195:SER:HB3	2.48	0.43
1:B:9:ALA:HB2	1:B:37:LEU:CD2	2.42	0.43
1:B:255:VAL:HG22	5:B:501:HOH:O	2.20	0.42
1:A:270:GLY:CA	2:A:406:GOL:H2	2.50	0.42
1:A:17:TRP:CZ3	1:A:25:GLY:HA3	2.55	0.42
1:A:273:LEU:HB2	2:A:406:GOL:H32	2.01	0.42
1:B:69:GLY:O	1:B:71:GLY:N	2.53	0.42
1:A:261:PHE:HD2	1:A:291:ARG:HH11	1.66	0.41
1:A:123:ASP:OD2	1:A:145:LYS:HG2	2.20	0.41
1:A:145:LYS:NZ	5:A:508:HOH:O	2.41	0.41
1:B:261:PHE:CE2	1:B:291:ARG:HD2	2.56	0.41
1:A:156:ILE:HG22	1:A:157:LEU:O	2.19	0.41
1:B:55:ASP:N	1:B:55:ASP:OD1	2.44	0.41
1:B:60:LEU:HD23	5:B:521:HOH:O	2.20	0.41
1:A:54:LYS:HG2	1:A:61:TYR:CD1	2.56	0.41
1:B:259:ASN:OD1	1:B:293:LYS:HE3	2.22	0.40
1:B:44:ARG:CB	1:B:70:ASP:HA	2.50	0.40
1:A:274:LYS:HG3	1:A:286:HIS:ND1	2.37	0.40
1:A:16:ARG:HH21	1:B:151:ASP:HA	1.86	0.40
1:B:261:PHE:HE2	1:B:291:ARG:HD2	1.87	0.40
1:A:284:THR:HA	1:A:302:ALA:O	2.22	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	310/347 (89%)	295 (95%)	13 (4%)	2 (1%)	25	47
1	B	306/347 (88%)	288 (94%)	14 (5%)	4 (1%)	12	24
All	All	616/694 (89%)	583 (95%)	27 (4%)	6 (1%)	15	32

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	193	PRO
1	A	42	SER
1	B	70	ASP
1	A	193	PRO
1	B	107	PHE
1	B	71	GLY

### 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	238/267 (89%)	231 (97%)	7 (3%)	42	68
1	B	233/267 (87%)	225 (97%)	8 (3%)	37	63
All	All	471/534 (88%)	456 (97%)	15 (3%)	39	65

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	0	HIS
1	A	40	SER
1	A	189	SER
1	A	194	HIS
1	A	232	ASP
1	A	293	LYS
1	A	308	LYS
1	B	-1	SER
1	B	32	ASP
1	B	43	MET

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Mol	Chain	Res	Type
1	B	74	CYS
1	B	240	GLU
1	B	272	LEU
1	B	277	ARG
1	B	290	MET

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	247	GLN
1	B	93	ASN

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 22 ligands modelled in this entry, 1 is unknown - leaving 21 for Mogul analysis.

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	GOL	A	405	-	5,5,5	0.74	0	5,5,5	1.02	0
2	GOL	B	405	-	5,5,5	0.97	0	5,5,5	0.97	0



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	GOL	B	401	-	5,5,5	0.89	0	5,5,5	1.04	0
2	GOL	A	401	-	5,5,5	0.91	0	5,5,5	0.97	0
2	GOL	B	412	-	5,5,5	1.28	1 (20%)	5,5,5	0.90	0
4	CIT	B	411	-	3,12,12	1.18	0	3,17,17	0.66	0
2	GOL	B	406	-	5,5,5	1.11	0	5,5,5	0.85	0
2	GOL	B	402	-	5,5,5	1.17	1 (20%)	5,5,5	0.82	0
2	GOL	A	404	-	5,5,5	0.97	0	5,5,5	0.82	0
2	GOL	A	409	-	5,5,5	1.05	0	5,5,5	0.88	0
2	GOL	A	410	-	5,5,5	0.79	0	5,5,5	1.14	0
2	GOL	A	407	-	5,5,5	0.99	1 (20%)	5,5,5	1.03	0
2	GOL	A	402	-	5,5,5	0.76	0	5,5,5	1.09	0
2	GOL	A	403	-	5,5,5	1.00	0	5,5,5	0.88	0
2	GOL	B	408	-	5,5,5	1.23	1 (20%)	5,5,5	0.89	0
2	GOL	B	404	-	5,5,5	1.32	1 (20%)	5,5,5	0.79	0
2	GOL	B	403	-	5,5,5	0.86	0	5,5,5	0.90	0
2	GOL	A	406	-	5,5,5	0.76	0	5,5,5	1.01	0
2	GOL	B	409	-	5,5,5	0.87	0	5,5,5	1.13	1 (20%)
2	GOL	B	407	-	5,5,5	0.87	0	5,5,5	0.91	0
2	GOL	B	410	-	5,5,5	0.95	0	5,5,5	0.96	0

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	GOL	A	405	-	-	1/4/4/4	-
2	GOL	B	405	-	-	1/4/4/4	-
2	GOL	B	401	-	-	2/4/4/4	-
2	GOL	A	401	-	-	2/4/4/4	-
2	GOL	B	412	-	-	2/4/4/4	-
4	CIT	B	411	-	-	3/6/16/16	-
2	GOL	B	406	-	-	2/4/4/4	-
2	GOL	B	402	-	-	2/4/4/4	-
2	GOL	A	404	-	-	0/4/4/4	-
2	GOL	A	409	-	-	0/4/4/4	-
2	GOL	A	410	-	-	0/4/4/4	-
2	GOL	A	407	-	-	2/4/4/4	-
2	GOL	A	402	-	-	0/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GOL	A	403	-	-	3/4/4/4	-
2	GOL	B	408	-	-	2/4/4/4	-
2	GOL	B	404	-	-	2/4/4/4	-
2	GOL	B	403	-	-	3/4/4/4	-
2	GOL	A	406	-	-	0/4/4/4	-
2	GOL	B	409	-	-	3/4/4/4	-
2	GOL	B	407	-	-	0/4/4/4	-
2	GOL	B	410	-	-	4/4/4/4	-

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	404	GOL	O2-C2	-2.39	1.36	1.43
2	B	408	GOL	C3-C2	2.06	1.60	1.51
2	B	412	GOL	C1-C2	2.03	1.60	1.51
2	A	407	GOL	C1-C2	2.01	1.60	1.51
2	B	402	GOL	C1-C2	2.00	1.59	1.51

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	409	GOL	C3-C2-C1	-2.01	103.90	111.70

There are no chirality outliers.

All (34) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	406	GOL	C1-C2-C3-O3
2	B	406	GOL	O2-C2-C3-O3
2	B	410	GOL	O1-C1-C2-C3
2	B	410	GOL	C1-C2-C3-O3
2	B	412	GOL	O1-C1-C2-C3
2	B	408	GOL	C1-C2-C3-O3
2	A	403	GOL	O1-C1-C2-O2
2	A	403	GOL	O1-C1-C2-C3
2	A	401	GOL	C1-C2-C3-O3
2	A	401	GOL	O2-C2-C3-O3
2	B	401	GOL	O1-C1-C2-C3
2	B	404	GOL	C1-C2-C3-O3
2	B	409	GOL	C1-C2-C3-O3

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Mol	Chain	Res	Type	Atoms
2	B	402	GOL	O1-C1-C2-O2
2	B	408	GOL	O2-C2-C3-O3
2	B	404	GOL	O2-C2-C3-O3
2	B	409	GOL	O2-C2-C3-O3
2	B	402	GOL	O1-C1-C2-C3
2	A	407	GOL	C1-C2-C3-O3
2	B	405	GOL	C1-C2-C3-O3
2	B	403	GOL	O1-C1-C2-C3
2	A	407	GOL	O2-C2-C3-O3
2	B	410	GOL	O1-C1-C2-O2
2	B	412	GOL	O1-C1-C2-O2
2	B	401	GOL	O1-C1-C2-O2
2	B	410	GOL	O2-C2-C3-O3
4	B	411	CIT	C1-C2-C3-C6
4	B	411	CIT	C6-C3-C4-C5
2	B	403	GOL	O2-C2-C3-O3
2	A	403	GOL	C1-C2-C3-O3
2	B	409	GOL	O1-C1-C2-C3
4	B	411	CIT	C1-C2-C3-O7
2	A	405	GOL	O2-C2-C3-O3
2	B	403	GOL	O1-C1-C2-O2

There are no ring outliers.

10 monomers are involved in 18 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	401	GOL	1	0
2	B	412	GOL	2	0
4	B	411	CIT	1	0
2	B	402	GOL	2	0
2	A	410	GOL	1	0
2	A	407	GOL	2	0
2	A	403	GOL	1	0
2	B	403	GOL	1	0
2	A	406	GOL	5	0
2	B	407	GOL	2	0

## 5.7 Other polymers [i](#)

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 ⓘ

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	312/347 (89%)	0.00	16 (5%) 28 22	43, 62, 99, 128	0
1	B	308/347 (88%)	0.08	18 (5%) 23 17	44, 63, 110, 138	0
All	All	620/694 (89%)	0.04	34 (5%) 25 19	43, 63, 106, 138	0

All (34) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	56	HIS	4.8
1	B	68	ASN	4.6
1	A	55	ASP	4.2
1	B	71	GLY	4.1
1	A	56	HIS	4.0
1	B	70	ASP	4.0
1	B	55	ASP	4.0
1	A	307	SER	3.9
1	A	70	ASP	3.8
1	A	71	GLY	3.6
1	B	53	GLU	3.3
1	B	282	GLY	3.3
1	B	230	ARG	3.3
1	A	308	LYS	3.2
1	A	311	GLU	3.1
1	A	69	GLY	2.8
1	B	54	LYS	2.8
1	B	233	ALA	2.7
1	B	44	ARG	2.7
1	B	236	ARG	2.6
1	B	279	TYR	2.6
1	B	280	PRO	2.6
1	A	42	SER	2.5
1	A	73	GLU	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	54	LYS	2.4
1	A	194	HIS	2.4
1	B	281	GLY	2.3
1	B	16	ARG	2.2
1	A	68	ASN	2.2
1	A	236	ARG	2.2
1	B	194	HIS	2.2
1	A	77	ALA	2.2
1	B	242	GLY	2.1
1	A	99	ALA	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 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. 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	GOL	A	401	6/6	-0.11	0.60	123,129,131,132	0
2	GOL	B	401	6/6	0.19	0.48	99,106,108,109	0
2	GOL	B	405	6/6	0.49	0.54	106,120,121,127	0
2	GOL	B	410	6/6	0.57	0.68	130,136,138,139	0
2	GOL	B	402	6/6	0.61	0.54	83,87,94,98	0
2	GOL	A	402	6/6	0.66	0.38	92,104,105,113	0
2	GOL	B	409	6/6	0.66	0.36	109,116,118,118	0
2	GOL	A	405	6/6	0.67	0.34	86,91,97,100	0
2	GOL	B	408	6/6	0.70	0.44	77,88,93,95	0
4	CIT	B	411	13/13	0.70	0.23	94,112,117,119	0
2	GOL	A	410	6/6	0.75	0.20	74,83,84,90	0
2	GOL	B	412	6/6	0.75	0.53	68,71,76,77	0
2	GOL	B	406	6/6	0.80	0.36	93,102,107,107	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	GOL	A	409	6/6	0.83	0.37	67,73,74,75	0
2	GOL	A	407	6/6	0.84	0.18	62,74,79,80	0
2	GOL	B	404	6/6	0.86	0.18	68,72,77,79	0
2	GOL	A	403	6/6	0.87	0.18	61,70,74,86	0
2	GOL	A	406	6/6	0.89	0.45	62,63,66,67	0
2	GOL	B	407	6/6	0.90	0.36	91,96,102,106	0
2	GOL	A	404	6/6	0.91	0.13	73,83,86,98	0
2	GOL	B	403	6/6	0.93	0.14	57,63,68,74	0
3	UNX	A	408	1/1	0.95	0.88	54,54,54,54	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.