



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 11:35 AM GMT

PDB ID : 3PGF  
Title : Crystal structure of maltose bound MBP with a conformationally specific synthetic antigen binder (sAB)  
Authors : Kossiakoff, A.A.; Duguid, E.M.; Sandstrom, A.  
Deposited on : 2010-11-01  
Resolution : 2.10 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  
<http://wwpdb.org/validation/2016/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 : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
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) : trunk26865

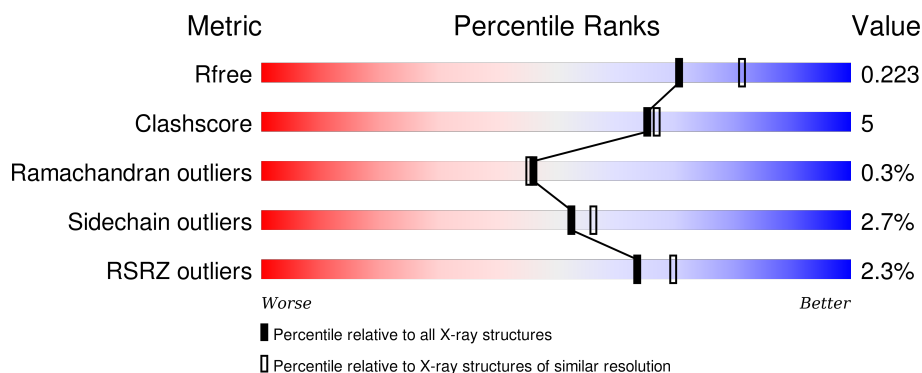
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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))
$R_{free}$	91344	3939 (2.10-2.10)
Clashscore	102246	4460 (2.10-2.10)
Ramachandran outliers	100387	4413 (2.10-2.10)
Sidechain outliers	100360	4414 (2.10-2.10)
RSRZ outliers	91569	3948 (2.10-2.10)

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	398	 2% 81% 8% 10%
2	H	231	 3% 84% 11% • •
3	L	215	 2% 83% 16%

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
5	IMD	A	368	-	-	-	X
5	IMD	A	369	-	-	-	X
6	GOL	H	222	-	-	-	X
6	GOL	L	215	-	-	-	X

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 6592 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 Maltose-binding periplasmic protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	358	Total	C	N	O	S	0	4	0
			2800	1806	455	533	6			

There are 32 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-30	MET	-	EXPRESSION TAG	UNP P0AEX9
A	-29	LYS	-	EXPRESSION TAG	UNP P0AEX9
A	-28	HIS	-	EXPRESSION TAG	UNP P0AEX9
A	-27	HIS	-	EXPRESSION TAG	UNP P0AEX9
A	-26	HIS	-	EXPRESSION TAG	UNP P0AEX9
A	-25	HIS	-	EXPRESSION TAG	UNP P0AEX9
A	-24	HIS	-	EXPRESSION TAG	UNP P0AEX9
A	-23	HIS	-	EXPRESSION TAG	UNP P0AEX9
A	-22	HIS	-	EXPRESSION TAG	UNP P0AEX9
A	-21	HIS	-	EXPRESSION TAG	UNP P0AEX9
A	-20	HIS	-	EXPRESSION TAG	UNP P0AEX9
A	-19	HIS	-	EXPRESSION TAG	UNP P0AEX9
A	-18	SER	-	EXPRESSION TAG	UNP P0AEX9
A	-17	SER	-	EXPRESSION TAG	UNP P0AEX9
A	-16	ASP	-	EXPRESSION TAG	UNP P0AEX9
A	-15	TYR	-	EXPRESSION TAG	UNP P0AEX9
A	-14	LYS	-	EXPRESSION TAG	UNP P0AEX9
A	-13	ASP	-	EXPRESSION TAG	UNP P0AEX9
A	-12	ASP	-	EXPRESSION TAG	UNP P0AEX9
A	-11	ASP	-	EXPRESSION TAG	UNP P0AEX9
A	-10	ASP	-	EXPRESSION TAG	UNP P0AEX9
A	-9	LYS	-	EXPRESSION TAG	UNP P0AEX9
A	-8	GLY	-	EXPRESSION TAG	UNP P0AEX9
A	-7	GLU	-	EXPRESSION TAG	UNP P0AEX9
A	-6	ASN	-	EXPRESSION TAG	UNP P0AEX9
A	-5	LEU	-	EXPRESSION TAG	UNP P0AEX9
A	-4	TYR	-	EXPRESSION TAG	UNP P0AEX9

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	PHE	-	EXPRESSION TAG	UNP P0AEX9
A	-2	GLN	-	EXPRESSION TAG	UNP P0AEX9
A	-1	GLY	-	EXPRESSION TAG	UNP P0AEX9
A	0	SER	-	EXPRESSION TAG	UNP P0AEX9
A	367	ASN	ARG	ENGINEERED MUTATION	UNP P0AEX9

- Molecule 2 is a protein called SAB Heavy Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	222	Total	C	N	O	S	0	7	0
			1688	1073	276	331	8			

- Molecule 3 is a protein called SAB Light Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	L	214	Total	C	N	O	S	0	8	0
			1659	1036	274	342	7			

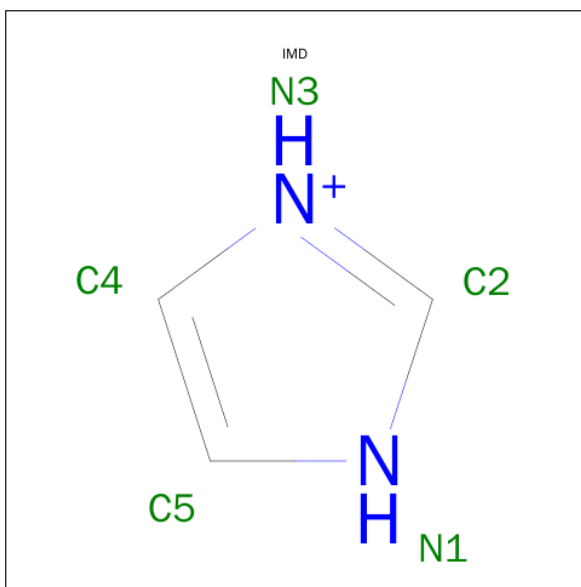
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
L	123	SER	GLU	ENGINEERED MUTATION	UNP QRTCD0

- Molecule 4 is a polymer of unknown type called SUGAR (2-MER).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	2	Total	C	O	0	0
			23	12	11		

- Molecule 5 is IMIDAZOLE (three-letter code: IMD) (formula: C<sub>3</sub>H<sub>5</sub>N<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	N	0	0
			5	3	2		
5	A	1	Total	C	N	0	0
			5	3	2		

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	H	1	Total	C	O	0	0
			6	3	3		
6	L	1	Total	C	O	0	0
			6	3	3		

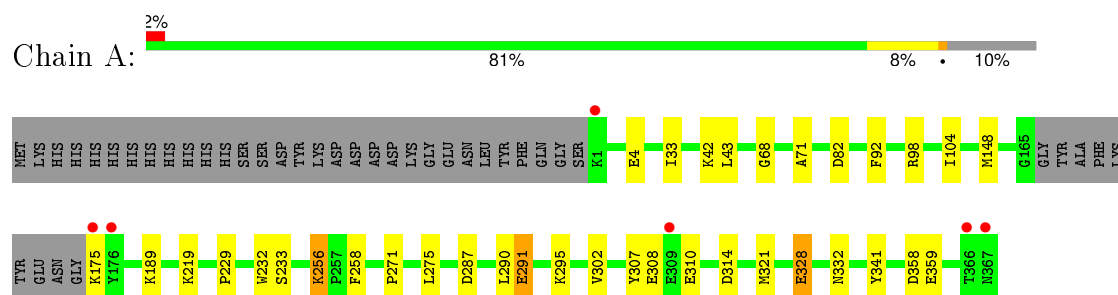
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	188	Total 188	O 188	0	0
7	H	81	Total 81	O 81	0	0
7	L	131	Total 131	O 131	0	0

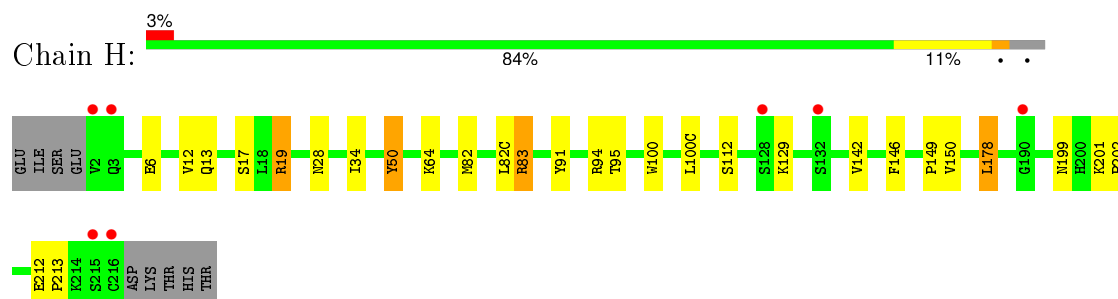
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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 ( $\text{RSRZ} > 2$ ). 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.

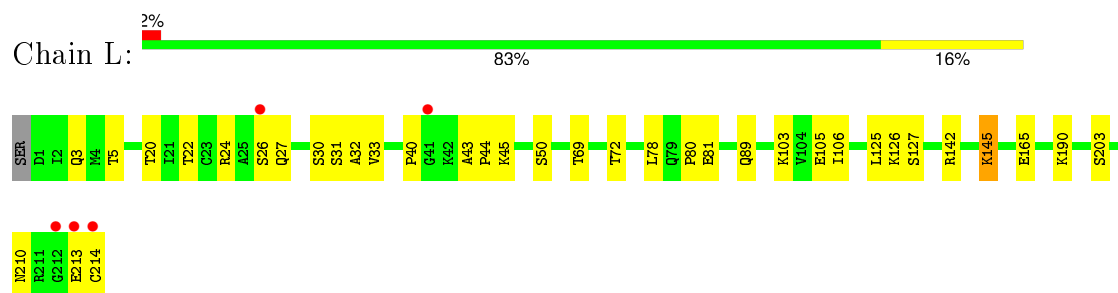
#### • Molecule 1: Maltose-binding periplasmic protein



#### • Molecule 2: SAB Heavy Chain



#### • Molecule 3: SAB Light Chain





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	63.87Å 228.46Å 135.57Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.07 – 2.10 36.66 – 2.10	Depositor EDS
% Data completeness (in resolution range)	97.0 (38.07-2.10) 97.0 (36.66-2.10)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	5.19 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, $R_{free}$	0.177 , 0.227 0.174 , 0.223	Depositor DCC
$R_{free}$ test set	2815 reflections (5.23%)	DCC
Wilson B-factor (Å <sup>2</sup> )	19.6	Xtriage
Anisotropy	0.349	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 35.6	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 56608 reflections	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	6592	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.36% 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, 0.375 respectively for untwinned datasets, and 0.333, 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: GOL, GLC, IMD

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	1.22	5/2877 (0.2%)	0.96	6/3901 (0.2%)
2	H	1.13	0/1757	0.88	1/2400 (0.0%)
3	L	1.22	1/1718 (0.1%)	0.96	0/2331
All	All	1.19	6/6352 (0.1%)	0.94	7/8632 (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
2	H	0	1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	359	GLU	CG-CD	5.88	1.60	1.51
1	A	328	GLU	CG-CD	5.79	1.60	1.51
1	A	256	LYS	CD-CE	5.43	1.64	1.51
1	A	92	PHE	CE2-CZ	5.25	1.47	1.37
1	A	310	GLU	CG-CD	5.17	1.59	1.51
3	L	81	GLU	CD-OE1	5.03	1.31	1.25

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	314	ASP	CB-CG-OD1	6.87	124.48	118.30
1	A	98	ARG	NE-CZ-NH1	6.30	123.45	120.30
2	H	178	LEU	CA-CB-CG	6.00	129.11	115.30
1	A	82	ASP	CB-CG-OD1	5.93	123.64	118.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	98	ARG	NE-CZ-NH2	-5.59	117.51	120.30
1	A	290	LEU	CB-CG-CD1	-5.13	102.28	111.00
1	A	219	LYS	CD-CE-NZ	-5.04	100.10	111.70

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	H	146	PHE	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	2800	0	2807	20	0
2	H	1688	0	1640	16	0
3	L	1659	0	1630	27	0
4	A	23	0	21	0	0
5	A	10	0	10	0	0
6	H	6	0	8	0	0
6	L	6	0	8	0	0
7	A	188	0	0	5	0
7	H	81	0	0	3	0
7	L	131	0	0	8	0
All	All	6592	0	6124	61	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

All (61) 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)
3:L:213:GLU:O	3:L:214:CYS:HB2	1.70	0.90
1:A:233:SER:HB3	7:A:380:HOH:O	1.74	0.87
2:H:83:ARG:HD3	7:H:274:HOH:O	1.82	0.78

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:341:TYR:HE1	7:A:489:HOH:O	1.69	0.76
3:L:190:LYS:HE3	3:L:210:ASN:HB3	1.68	0.75
3:L:45:LYS:HD2	7:L:382:HOH:O	1.89	0.70
3:L:40:PRO:HG3	3:L:165[A]:GLU:HG3	1.76	0.68
1:A:308:GLU:O	1:A:308:GLU:HG3	1.95	0.65
2:H:13:GLN:HG3	7:H:355:HOH:O	1.98	0.63
3:L:30:SER:O	3:L:32:ALA:N	2.30	0.63
3:L:213:GLU:O	3:L:214:CYS:CB	2.47	0.62
2:H:199[B]:ASN:HD21	2:H:201:LYS:HG3	1.65	0.62
3:L:103:LYS:HE2	7:L:376:HOH:O	1.98	0.61
1:A:341:TYR:CE1	7:A:489:HOH:O	2.47	0.61
3:L:22:THR:HG23	7:L:275:HOH:O	2.00	0.60
3:L:30:SER:C	3:L:32:ALA:H	2.06	0.58
3:L:142:ARG:NH1	7:L:297:HOH:O	2.37	0.57
1:A:308:GLU:O	1:A:308:GLU:CG	2.52	0.57
3:L:40:PRO:CG	3:L:165[A]:GLU:HG3	2.35	0.56
1:A:189[B]:LYS:HD2	1:A:358:ASP:OD1	2.07	0.55
2:H:12:VAL:HG11	2:H:82(C):LEU:HD13	1.88	0.54
2:H:64:LYS:HD3	7:H:381:HOH:O	2.07	0.53
3:L:40:PRO:HG3	3:L:165[A]:GLU:CG	2.39	0.52
3:L:20:THR:HG23	3:L:72:THR:HG23	1.92	0.52
3:L:145:LYS:HG3	7:L:301:HOH:O	2.09	0.51
1:A:33:ILE:HD13	1:A:275:LEU:CD2	2.40	0.51
3:L:40:PRO:HG2	3:L:165[B]:GLU:OE1	2.11	0.51
3:L:69:THR:HB	7:L:393:HOH:O	2.11	0.49
3:L:40:PRO:HA	7:L:389:HOH:O	2.12	0.49
1:A:42[A]:LYS:HD2	7:A:551:HOH:O	2.13	0.48
1:A:68:GLY:HA3	1:A:332:ASN:O	2.15	0.47
1:A:148:MET:HG2	7:A:559:HOH:O	2.14	0.47
2:H:142:VAL:HG11	2:H:150:VAL:HG11	1.97	0.47
3:L:203[B]:SER:HB3	7:L:276:HOH:O	2.15	0.47
1:A:4:GLU:HG3	1:A:271:PRO:HB2	1.97	0.47
3:L:125:LEU:O	3:L:127:SER:N	2.49	0.45
1:A:33:ILE:HD13	1:A:275:LEU:HD22	1.97	0.45
2:H:212:GLU:HB2	2:H:213:PRO:HD2	1.99	0.45
2:H:95:THR:HG23	2:H:100(C):LEU:HD23	2.00	0.44
3:L:33:VAL:HA	3:L:89:GLN:O	2.18	0.44
1:A:321:MET:HE3	2:H:100:TRP:CD2	2.53	0.44
1:A:229:PRO:HA	1:A:232:TRP:CE2	2.53	0.44
3:L:20:THR:HG23	3:L:72:THR:CG2	2.47	0.44
1:A:291:GLU:O	1:A:295:LYS:HG2	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:71:ALA:HB2	1:A:104[B]:ILE:HD12	1.99	0.43
2:H:34:ILE:O	2:H:50:TYR:HA	2.18	0.43
3:L:3:GLN:HB2	3:L:26:SER:HB3	2.01	0.43
1:A:287:ASP:O	1:A:291:GLU:HB2	2.19	0.42
2:H:19:ARG:HH11	2:H:19:ARG:HG2	1.85	0.42
1:A:256:LYS:HB3	1:A:256:LYS:HE3	1.58	0.42
2:H:201:LYS:N	2:H:202:PRO:CD	2.83	0.42
3:L:20:THR:CG2	3:L:72:THR:HG23	2.49	0.42
3:L:43:ALA:HA	3:L:44:PRO:HD3	1.95	0.42
3:L:78:LEU:HD21	3:L:106:ILE:HD12	2.02	0.41
1:A:328:GLU:CD	2:H:28:ASN:HD22	2.23	0.41
2:H:17[A]:SER:HA	2:H:82:MET:O	2.20	0.41
3:L:80:PRO:HA	3:L:106:ILE:HG13	2.03	0.41
1:A:302:VAL:HG21	1:A:307:TYR:HD2	1.85	0.41
2:H:6:GLU:OE2	2:H:91:TYR:HA	2.20	0.41
2:H:17[B]:SER:HA	2:H:82:MET:O	2.20	0.40
3:L:40:PRO:HG3	3:L:165[A]:GLU:CD	2.42	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

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	358/398 (90%)	353 (99%)	5 (1%)	0	100	100
2	H	227/231 (98%)	222 (98%)	5 (2%)	0	100	100
3	L	220/215 (102%)	212 (96%)	6 (3%)	2 (1%)	21	15
All	All	805/844 (95%)	787 (98%)	16 (2%)	2 (0%)	46	53

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	L	31	SER
3	L	126	LYS

### 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	292/323 (90%)	288 (99%)	4 (1%)	74	80
2	H	192/194 (99%)	184 (96%)	8 (4%)	36	35
3	L	197/190 (104%)	191 (97%)	6 (3%)	48	51
All	All	681/707 (96%)	663 (97%)	18 (3%)	52	58

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	43	LEU
1	A	175	LYS
1	A	258	PHE
1	A	291	GLU
2	H	19	ARG
2	H	50	TYR
2	H	83	ARG
2	H	94	ARG
2	H	112	SER
2	H	129	LYS
2	H	149	PRO
2	H	178	LEU
3	L	5	THR
3	L	24	ARG
3	L	27	GLN
3	L	50	SER
3	L	105	GLU
3	L	145	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	18	ASN
1	A	100	ASN
1	A	124	ASN
1	A	201	ASN
1	A	218	ASN
3	L	210	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 ⓘ

2 carbohydrates 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	$\# Z  > 2$
4	GLC	A	371	4	12,12,12	0.49	0	17,17,17	2.38	7 (41%)
4	GLC	A	372	4	11,11,12	1.34	2 (18%)	14,15,17	1.59	2 (14%)

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
4	GLC	A	371	4	-	0/2/22/22	0/1/1/1
4	GLC	A	372	4	-	0/2/19/22	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	372	GLC	O5-C1	-3.17	1.38	1.43
4	A	372	GLC	C1-C2	2.46	1.58	1.52

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	371	GLC	O1-C1-O5	-4.55	97.81	110.25
4	A	372	GLC	C2-C3-C4	-3.93	104.36	111.04
4	A	371	GLC	O5-C5-C6	-3.66	97.12	106.36
4	A	371	GLC	O2-C2-C3	-3.26	103.00	110.34
4	A	371	GLC	O3-C3-C2	-2.70	104.26	110.34
4	A	371	GLC	C3-C4-C5	-2.65	105.58	110.20
4	A	371	GLC	C1-C2-C3	2.01	113.42	110.43
4	A	372	GLC	C1-O5-C5	2.91	115.94	112.25
4	A	371	GLC	C1-O5-C5	4.27	121.36	113.47

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.6 Ligand geometry ⓘ

4 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	$\# Z  > 2$
5	IMD	A	368	-	3,5,5	0.75	0	4,5,5	1.31	0
5	IMD	A	369	-	3,5,5	1.42	0	4,5,5	1.40	1 (25%)
6	GOL	H	222	-	5,5,5	1.01	0	5,5,5	1.51	1 (20%)
6	GOL	L	215	-	5,5,5	0.31	0	5,5,5	0.74	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
5	IMD	A	368	-	-	0/0/0/0	0/1/1/1
5	IMD	A	369	-	-	0/0/0/0	0/1/1/1
6	GOL	H	222	-	-	0/4/4/4	0/0/0/0
6	GOL	L	215	-	-	0/4/4/4	0/0/0/0

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	H	222	GOL	O1-C1-C2	-3.10	95.17	110.18
5	A	369	IMD	C4-C5-N1	-2.12	103.93	107.74

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 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	358/398 (89%)	-0.22	6 (1%) 73 78	10, 19, 40, 56	0
2	H	222/231 (96%)	-0.23	7 (3%) 51 60	14, 27, 42, 111	0
3	L	214/215 (99%)	-0.36	5 (2%) 64 70	11, 20, 45, 58	1 (0%)
All	All	794/844 (94%)	-0.26	18 (2%) 64 70	10, 22, 42, 111	1 (0%)

All (18) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	L	214	CYS	9.0
2	H	216	CYS	7.9
2	H	215	SER	5.1
2	H	132	SER	4.7
1	A	176	TYR	4.7
1	A	367	ASN	4.3
3	L	212	GLY	4.0
2	H	190	GLY	3.4
1	A	1	LYS	3.0
3	L	213	GLU	2.7
1	A	175	LYS	2.7
3	L	26	SER	2.5
2	H	128	SER	2.4
2	H	3	GLN	2.2
2	H	2	VAL	2.2
1	A	309	GLU	2.1
1	A	366	THR	2.0
3	L	41	GLY	2.0

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

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

### 6.3 Carbohydrates [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(Å <sup>2</sup> )	Q<0.9
4	GLC	A	372	11/12	0.98	0.16	1.81	8,9,10,11	0
4	GLC	A	371	12/12	0.97	0.11	-0.45	9,12,15,17	0

### 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(Å <sup>2</sup> )	Q<0.9
5	IMD	A	368	5/5	0.91	0.31	24.73	21,22,23,24	0
6	GOL	H	222	6/6	0.91	0.14	5.46	14,18,19,19	0
5	IMD	A	369	5/5	0.83	0.17	3.62	19,20,21,26	0
6	GOL	L	215	6/6	0.96	0.14	2.80	15,16,17,22	0

### 6.5 Other polymers [i](#)

There are no such residues in this entry.