



# Full wwPDB X-ray Structure Validation Report ⓘ

May 16, 2020 – 04:17 pm BST

PDB ID : 4N3G  
Title : Crystal structure of eukaryotic translation initiation factor eIF5B (870-1116) from *Chaetomium thermophilum*, domains III and IV  
Authors : Kuhle, B.; Ficner, R.  
Deposited on : 2013-10-07  
Resolution : 3.20 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 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

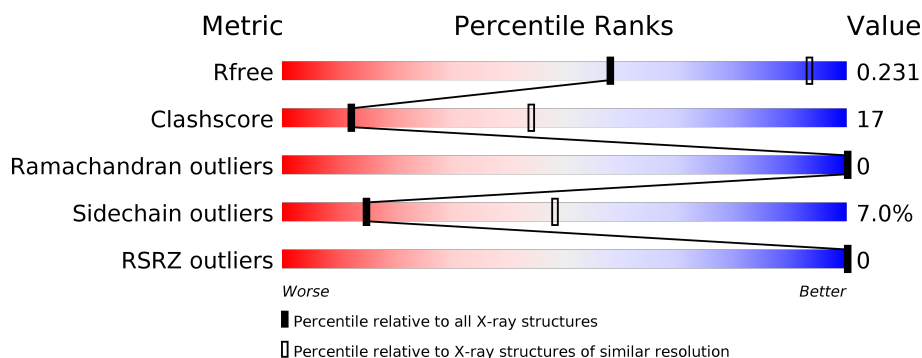
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.20 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	1133 (3.20-3.20)
Clashscore	141614	1253 (3.20-3.20)
Ramachandran outliers	138981	1234 (3.20-3.20)
Sidechain outliers	138945	1233 (3.20-3.20)
RSRZ outliers	127900	1095 (3.20-3.20)

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	603	<div> <div>31%</div> <div>9%</div> <div>.</div> <div>59%</div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 1944 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 Eukaryotic translation initiation factor 5B-like protein, eIF5B(870-C).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	247	Total	C	N	O	S	0	0	0
			1931	1237	325	357	12			

There are 27 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	514	SER	-	EXPRESSION TAG	UNP G0S8G9
A	515	HIS	-	EXPRESSION TAG	UNP G0S8G9
A	516	MET	-	EXPRESSION TAG	UNP G0S8G9
A	576	VAL	-	EXPRESSION TAG	UNP G0S8G9
A	577	VAL	-	EXPRESSION TAG	UNP G0S8G9
A	578	ASN	-	EXPRESSION TAG	UNP G0S8G9
A	579	LYS	-	EXPRESSION TAG	UNP G0S8G9
A	580	ASP	-	EXPRESSION TAG	UNP G0S8G9
A	581	GLY	-	EXPRESSION TAG	UNP G0S8G9
A	582	LYS	-	EXPRESSION TAG	UNP G0S8G9
A	583	PHE	-	EXPRESSION TAG	UNP G0S8G9
A	584	GLU	-	EXPRESSION TAG	UNP G0S8G9
A	585	PHE	-	EXPRESSION TAG	UNP G0S8G9
A	586	LYS	-	EXPRESSION TAG	UNP G0S8G9
A	587	VAL	-	EXPRESSION TAG	UNP G0S8G9
A	588	PRO	-	EXPRESSION TAG	UNP G0S8G9
A	589	GLY	-	EXPRESSION TAG	UNP G0S8G9
A	590	LEU	-	EXPRESSION TAG	UNP G0S8G9
A	591	LEU	-	EXPRESSION TAG	UNP G0S8G9
A	592	ILE	-	EXPRESSION TAG	UNP G0S8G9
A	593	ILE	-	EXPRESSION TAG	UNP G0S8G9
A	594	ASP	-	EXPRESSION TAG	UNP G0S8G9
A	595	THR	-	EXPRESSION TAG	UNP G0S8G9
A	596	PRO	-	EXPRESSION TAG	UNP G0S8G9
A	597	GLY	-	EXPRESSION TAG	UNP G0S8G9
A	598	HIS	-	EXPRESSION TAG	UNP G0S8G9

*Continued on next page...*

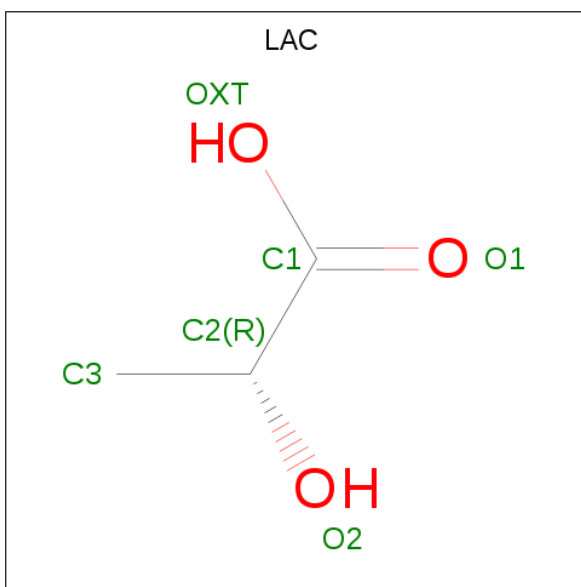
Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
A	599	GLU	-	EXPRESSION TAG	UNP G0S8G9

- Molecule 2 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Cl 1 1	0	0

- Molecule 3 is LACTIC ACID (three-letter code: LAC) (formula: C<sub>3</sub>H<sub>6</sub>O<sub>3</sub>).

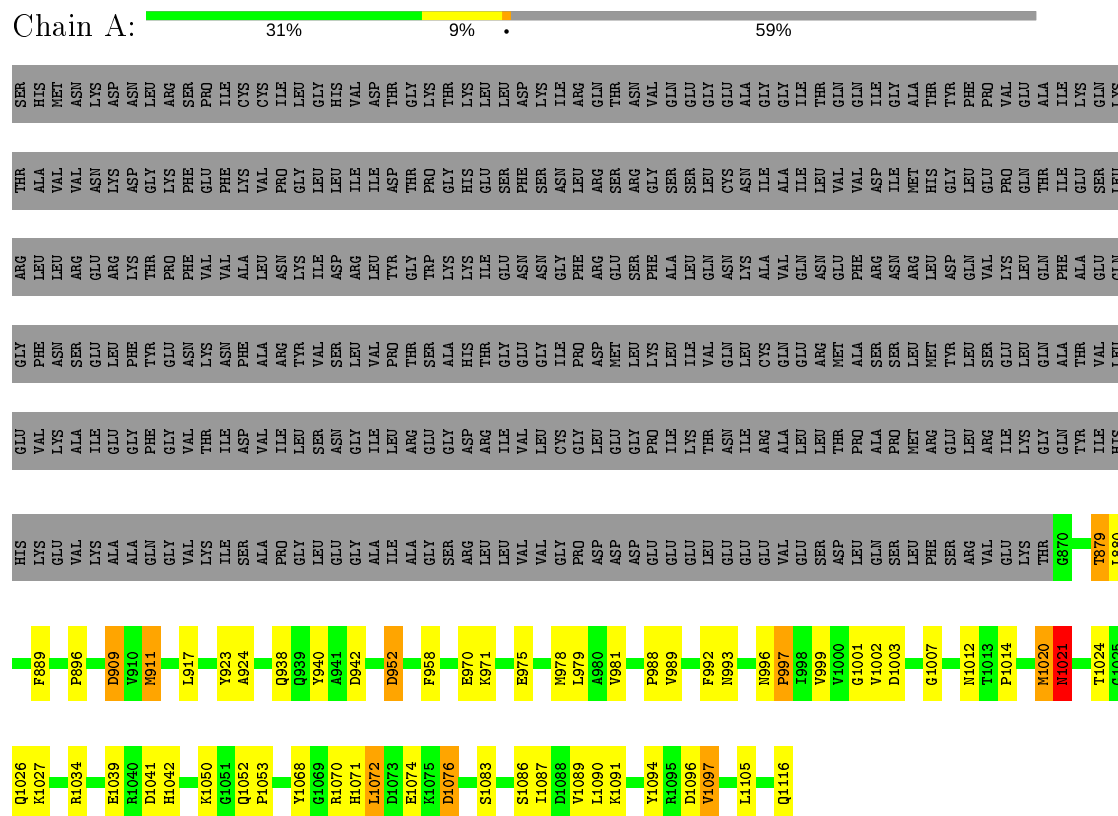


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 6 3 3	0	0
3	A	1	Total C O 6 3 3	0	0

### 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: Eukaryotic translation initiation factor 5B-like protein, eIF5B(870-C)



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	98.23 Å 98.23 Å 97.42 Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	43.86 – 3.20 49.12 – 3.20	Depositor EDS
% Data completeness (in resolution range)	99.8 (43.86-3.20) 99.8 (49.12-3.20)	Depositor EDS
$R_{merge}$	0.03	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.91 (at 3.19 Å)	Xtriage
Refinement program	PHENIX 1.8.2_1309	Depositor
R, $R_{free}$	0.190 , 0.220 0.201 , 0.231	Depositor DCC
$R_{free}$ test set	466 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	117.2	Xtriage
Anisotropy	0.256	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 73.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.042 for -h,-k,l	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	1944	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	97.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.60% 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: CL, LAC

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	0.29	0/1965	0.45	1/2654 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	A	1021	ASN	C-N-CD	5.92	140.82	128.40

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	1931	0	1988	67	1
2	A	1	0	0	0	0
3	A	12	0	10	0	0
All	All	1944	0	1998	67	1

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 17.

All (67) 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:1068:TYR:CE2	1:A:1072:LEU:HD11	2.08	0.89
1:A:1068:TYR:CE2	1:A:1072:LEU:CD1	2.57	0.87
1:A:1020:MET:HG3	1:A:1027:LYS:HA	1.58	0.85
1:A:1096:ASP:OD1	1:A:1097:VAL:N	2.18	0.76
1:A:1024:THR:HG22	1:A:1026:GLN:CB	2.15	0.75
1:A:1024:THR:CG2	1:A:1026:GLN:HB3	2.21	0.71
1:A:1083:SER:H	1:A:1086:SER:HB3	1.56	0.70
1:A:992:PHE:HB2	1:A:999:VAL:HG23	1.72	0.69
1:A:1068:TYR:CE2	1:A:1072:LEU:HD12	2.28	0.69
1:A:992:PHE:HB2	1:A:999:VAL:CG2	2.23	0.69
1:A:1020:MET:CG	1:A:1027:LYS:HA	2.23	0.67
1:A:1021:ASN:CG	1:A:1024:THR:HB	2.16	0.65
1:A:978:MET:CE	1:A:1012:ASN:OD1	2.45	0.65
1:A:979:LEU:HB3	1:A:1089:VAL:HG21	1.79	0.64
1:A:978:MET:HE1	1:A:1012:ASN:OD1	1.97	0.64
1:A:1021:ASN:ND2	1:A:1024:THR:OG1	2.31	0.63
1:A:981:VAL:HG13	1:A:1014:PRO:HD2	1.81	0.63
1:A:1020:MET:SD	1:A:1027:LYS:HA	2.39	0.62
1:A:1024:THR:HG22	1:A:1026:GLN:HB2	1.81	0.62
1:A:1007:GLY:H	1:A:1050:LYS:HE3	1.64	0.62
1:A:993:ASN:N	1:A:999:VAL:HG22	2.15	0.62
1:A:993:ASN:H	1:A:999:VAL:HG22	1.64	0.61
1:A:1041:ASP:O	1:A:1042:HIS:HB2	2.00	0.61
1:A:1070:ARG:HB3	1:A:1071:HIS:HD2	1.65	0.61
1:A:938:GLN:NE2	1:A:942:ASP:OD1	2.34	0.61
1:A:1094:TYR:O	1:A:1097:VAL:HG23	2.01	0.61
1:A:1020:MET:HG3	1:A:1027:LYS:CA	2.30	0.59
1:A:1021:ASN:OD1	1:A:1024:THR:HB	2.02	0.59
1:A:1024:THR:HG21	1:A:1026:GLN:HB3	1.85	0.59
1:A:917:LEU:HA	1:A:924:ALA:HB2	1.83	0.59
1:A:988:PRO:HA	1:A:1002:VAL:HG12	1.87	0.57
1:A:1012:ASN:O	1:A:1034:ARG:NH1	2.38	0.56
1:A:1024:THR:HG22	1:A:1026:GLN:HB3	1.81	0.56
1:A:1068:TYR:CD2	1:A:1072:LEU:HD11	2.41	0.55
1:A:952:ASP:N	1:A:952:ASP:OD2	2.30	0.55
1:A:993:ASN:H	1:A:999:VAL:CG2	2.19	0.54
1:A:981:VAL:O	1:A:1090:LEU:HD11	2.08	0.53
1:A:1068:TYR:HE1	1:A:1074:GLU:HA	1.73	0.53
1:A:1076:ASP:OD1	1:A:1076:ASP:N	2.42	0.52
1:A:1021:ASN:N	1:A:1021:ASN:OD1	2.36	0.52
1:A:993:ASN:CB	1:A:999:VAL:HG22	2.39	0.52
1:A:1021:ASN:ND2	1:A:1024:THR:CB	2.73	0.52

*Continued on next page...*



Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:909:ASP:OD2	1:A:909:ASP:N	2.43	0.51
1:A:1024:THR:CG2	1:A:1026:GLN:CB	2.82	0.50
1:A:1071:HIS:N	1:A:1071:HIS:CD2	2.81	0.49
1:A:993:ASN:N	1:A:999:VAL:CG2	2.75	0.49
1:A:1068:TYR:CZ	1:A:1072:LEU:HD12	2.47	0.49
1:A:879:THR:OG1	1:A:880:LEU:N	2.46	0.48
1:A:1021:ASN:ND2	1:A:1024:THR:HB	2.28	0.48
1:A:1020:MET:HG3	1:A:1026:GLN:C	2.34	0.48
1:A:1087:ILE:O	1:A:1091:LYS:HG2	2.15	0.47
1:A:1052:GLN:HG3	1:A:1053:PRO:HD2	1.95	0.47
1:A:996:ASN:N	1:A:997:PRO:HA	2.28	0.47
1:A:989:VAL:N	1:A:1001:GLY:O	2.44	0.46
1:A:979:LEU:HA	1:A:979:LEU:HD23	1.76	0.45
1:A:1071:HIS:H	1:A:1071:HIS:CD2	2.35	0.45
1:A:896:PRO:HG2	1:A:923:TYR:HE2	1.82	0.45
1:A:1068:TYR:CD2	1:A:1072:LEU:CD1	2.99	0.45
1:A:911:MET:HG3	1:A:940:TYR:CE2	2.52	0.44
1:A:1094:TYR:HD1	1:A:1097:VAL:HG21	1.83	0.44
1:A:1020:MET:SD	1:A:1027:LYS:HG3	2.58	0.44
1:A:979:LEU:O	1:A:981:VAL:HG23	2.18	0.44
1:A:979:LEU:CB	1:A:1089:VAL:HG21	2.49	0.42
1:A:992:PHE:HB2	1:A:999:VAL:HG21	2.01	0.42
1:A:896:PRO:HG2	1:A:923:TYR:CE2	2.55	0.41
1:A:1116:GLN:H	1:A:1116:GLN:CD	2.23	0.41
1:A:889:PHE:HE2	1:A:958:PHE:HB2	1.86	0.41

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1039:GLU:OE2	1:A:1042:HIS:ND1[6_555]	2.19	0.01

## 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	245/603 (41%)	242 (99%)	3 (1%)	0	100	100

There are no Ramachandran outliers to report.

### 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	215/522 (41%)	200 (93%)	15 (7%)	15	48

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

Mol	Chain	Res	Type
1	A	879	THR
1	A	909	ASP
1	A	911	MET
1	A	952	ASP
1	A	970	GLU
1	A	971	LYS
1	A	975	GLU
1	A	997	PRO
1	A	1003	ASP
1	A	1020	MET
1	A	1021	ASN
1	A	1072	LEU
1	A	1076	ASP
1	A	1097	VAL
1	A	1105	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1071	HIS

### 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 ⓘ

Of 3 ligands modelled in this entry, 1 is monoatomic - leaving 2 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	$\# Z  > 2$
3	LAC	A	1203	-	2,5,5	0.29	0	3,6,6	0.25	0
3	LAC	A	1202	-	2,5,5	0.30	0	3,6,6	0.32	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
3	LAC	A	1203	-	-	0/0/4/4	-
3	LAC	A	1202	-	-	0/0/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

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

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 [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	247/603 (40%)	0.10	0 <a href="#">100</a> <a href="#">100</a>	59, 95, 130, 160	0

There are no RSRZ outliers to report.

### 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	CL	A	1201	1/1	0.83	0.14	95,95,95,95	0
3	LAC	A	1202	6/6	0.84	0.13	74,93,101,103	0
3	LAC	A	1203	6/6	0.93	0.38	73,96,99,104	0

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

There are no such residues in this entry.