



# wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 9, 2018 – 01:42 am GMT

PDB ID : 4F7B  
Title : Structure of the lysosomal domain of limp-2  
Authors : Neculai, D.; Ravichandran, M.; Seitova, A.; Neculai, M.; Pizzaro, J.C.; Bountra, C.; Edwards, A.M.; Arrowsmith, C.H.; Dhe-Paganon, D.; Structural Genomics Consortium (SGC)  
Deposited on : 2012-05-15  
Resolution : 3.00 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

<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 : 1.7.3 (157068), CSD as539be (2018)  
Xtriage (Phenix) : 1.13  
EDS : trunk30967  
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)  
Refmac : 5.8.0158  
CCP4 : 7.0 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk30967

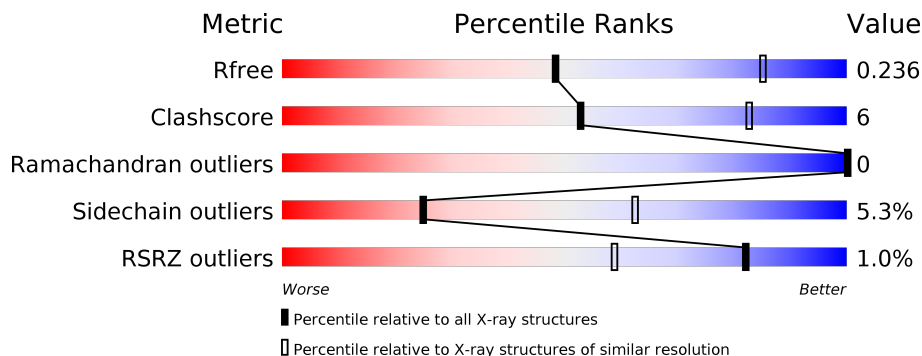
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 3.00 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))
$R_{free}$	111664	1851 (3.00-3.00)
Clashscore	122126	2167 (3.00-3.00)
Ramachandran outliers	120053	2101 (3.00-3.00)
Sidechain outliers	120020	2104 (3.00-3.00)
RSRZ outliers	108989	1751 (3.00-3.00)

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	423	<div> <div>77%</div> <div>15%</div> <div>7%</div> </div>
1	B	423	<div> <div>77%</div> <div>15%</div> <div>7%</div> </div>
1	C	423	<div> <div>78%</div> <div>10%</div> <div>11%</div> </div>
1	D	423	<div> <div>76%</div> <div>14%</div> <div>8%</div> </div>
1	E	423	<div> <div>75%</div> <div>16%</div> <div>8%</div> </div>
1	F	423	<div> <div>74%</div> <div>17%</div> <div>8%</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	NAG	C	710	-	-	-	X
2	NAG	D	707	-	-	-	X
2	NAG	E	709	-	-	-	X
3	BMA	C	705	-	-	-	X

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 19810 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 Lysosome membrane protein 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	393	Total	C	N	O	S	0	0	0
			3093	1995	503	584	11			
1	B	393	Total	C	N	O	S	0	0	0
			3073	1981	493	588	11			
1	C	378	Total	C	N	O	S	0	0	0
			2969	1919	475	564	11			
1	D	389	Total	C	N	O	S	0	0	0
			3090	1989	501	589	11			
1	E	390	Total	C	N	O	S	0	0	0
			3100	1999	503	587	11			
1	F	390	Total	C	N	O	S	0	0	0
			3100	1997	501	591	11			

There are 162 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	8	ALA	-	EXPRESSION TAG	UNP Q14108
A	9	ALA	-	EXPRESSION TAG	UNP Q14108
A	10	PRO	-	EXPRESSION TAG	UNP Q14108
A	11	GLU	-	EXPRESSION TAG	UNP Q14108
A	12	HIS	-	EXPRESSION TAG	UNP Q14108
A	13	HIS	-	EXPRESSION TAG	UNP Q14108
A	14	HIS	-	EXPRESSION TAG	UNP Q14108
A	15	HIS	-	EXPRESSION TAG	UNP Q14108
A	16	HIS	-	EXPRESSION TAG	UNP Q14108
A	17	HIS	-	EXPRESSION TAG	UNP Q14108
A	18	ASP	-	EXPRESSION TAG	UNP Q14108
A	19	TYR	-	EXPRESSION TAG	UNP Q14108
A	20	ASP	-	EXPRESSION TAG	UNP Q14108
A	21	ILE	-	EXPRESSION TAG	UNP Q14108
A	22	PRO	-	EXPRESSION TAG	UNP Q14108
A	23	THR	-	EXPRESSION TAG	UNP Q14108
A	24	THR	-	EXPRESSION TAG	UNP Q14108

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Chain	Residue	Modelled	Actual	Comment	Reference
A	25	GLU	-	EXPRESSION TAG	UNP Q14108
A	26	ASN	-	EXPRESSION TAG	UNP Q14108
A	27	LEU	-	EXPRESSION TAG	UNP Q14108
A	28	TYR	-	EXPRESSION TAG	UNP Q14108
A	29	PHE	-	EXPRESSION TAG	UNP Q14108
A	30	GLN	-	EXPRESSION TAG	UNP Q14108
A	31	GLY	-	EXPRESSION TAG	UNP Q14108
A	32	ALA	-	EXPRESSION TAG	UNP Q14108
A	33	MET	-	EXPRESSION TAG	UNP Q14108
A	34	ASP	-	EXPRESSION TAG	UNP Q14108
B	8	ALA	-	EXPRESSION TAG	UNP Q14108
B	9	ALA	-	EXPRESSION TAG	UNP Q14108
B	10	PRO	-	EXPRESSION TAG	UNP Q14108
B	11	GLU	-	EXPRESSION TAG	UNP Q14108
B	12	HIS	-	EXPRESSION TAG	UNP Q14108
B	13	HIS	-	EXPRESSION TAG	UNP Q14108
B	14	HIS	-	EXPRESSION TAG	UNP Q14108
B	15	HIS	-	EXPRESSION TAG	UNP Q14108
B	16	HIS	-	EXPRESSION TAG	UNP Q14108
B	17	HIS	-	EXPRESSION TAG	UNP Q14108
B	18	ASP	-	EXPRESSION TAG	UNP Q14108
B	19	TYR	-	EXPRESSION TAG	UNP Q14108
B	20	ASP	-	EXPRESSION TAG	UNP Q14108
B	21	ILE	-	EXPRESSION TAG	UNP Q14108
B	22	PRO	-	EXPRESSION TAG	UNP Q14108
B	23	THR	-	EXPRESSION TAG	UNP Q14108
B	24	THR	-	EXPRESSION TAG	UNP Q14108
B	25	GLU	-	EXPRESSION TAG	UNP Q14108
B	26	ASN	-	EXPRESSION TAG	UNP Q14108
B	27	LEU	-	EXPRESSION TAG	UNP Q14108
B	28	TYR	-	EXPRESSION TAG	UNP Q14108
B	29	PHE	-	EXPRESSION TAG	UNP Q14108
B	30	GLN	-	EXPRESSION TAG	UNP Q14108
B	31	GLY	-	EXPRESSION TAG	UNP Q14108
B	32	ALA	-	EXPRESSION TAG	UNP Q14108
B	33	MET	-	EXPRESSION TAG	UNP Q14108
B	34	ASP	-	EXPRESSION TAG	UNP Q14108
C	8	ALA	-	EXPRESSION TAG	UNP Q14108
C	9	ALA	-	EXPRESSION TAG	UNP Q14108
C	10	PRO	-	EXPRESSION TAG	UNP Q14108
C	11	GLU	-	EXPRESSION TAG	UNP Q14108
C	12	HIS	-	EXPRESSION TAG	UNP Q14108

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Chain	Residue	Modelled	Actual	Comment	Reference
C	13	HIS	-	EXPRESSION TAG	UNP Q14108
C	14	HIS	-	EXPRESSION TAG	UNP Q14108
C	15	HIS	-	EXPRESSION TAG	UNP Q14108
C	16	HIS	-	EXPRESSION TAG	UNP Q14108
C	17	HIS	-	EXPRESSION TAG	UNP Q14108
C	18	ASP	-	EXPRESSION TAG	UNP Q14108
C	19	TYR	-	EXPRESSION TAG	UNP Q14108
C	20	ASP	-	EXPRESSION TAG	UNP Q14108
C	21	ILE	-	EXPRESSION TAG	UNP Q14108
C	22	PRO	-	EXPRESSION TAG	UNP Q14108
C	23	THR	-	EXPRESSION TAG	UNP Q14108
C	24	THR	-	EXPRESSION TAG	UNP Q14108
C	25	GLU	-	EXPRESSION TAG	UNP Q14108
C	26	ASN	-	EXPRESSION TAG	UNP Q14108
C	27	LEU	-	EXPRESSION TAG	UNP Q14108
C	28	TYR	-	EXPRESSION TAG	UNP Q14108
C	29	PHE	-	EXPRESSION TAG	UNP Q14108
C	30	GLN	-	EXPRESSION TAG	UNP Q14108
C	31	GLY	-	EXPRESSION TAG	UNP Q14108
C	32	ALA	-	EXPRESSION TAG	UNP Q14108
C	33	MET	-	EXPRESSION TAG	UNP Q14108
C	34	ASP	-	EXPRESSION TAG	UNP Q14108
D	8	ALA	-	EXPRESSION TAG	UNP Q14108
D	9	ALA	-	EXPRESSION TAG	UNP Q14108
D	10	PRO	-	EXPRESSION TAG	UNP Q14108
D	11	GLU	-	EXPRESSION TAG	UNP Q14108
D	12	HIS	-	EXPRESSION TAG	UNP Q14108
D	13	HIS	-	EXPRESSION TAG	UNP Q14108
D	14	HIS	-	EXPRESSION TAG	UNP Q14108
D	15	HIS	-	EXPRESSION TAG	UNP Q14108
D	16	HIS	-	EXPRESSION TAG	UNP Q14108
D	17	HIS	-	EXPRESSION TAG	UNP Q14108
D	18	ASP	-	EXPRESSION TAG	UNP Q14108
D	19	TYR	-	EXPRESSION TAG	UNP Q14108
D	20	ASP	-	EXPRESSION TAG	UNP Q14108
D	21	ILE	-	EXPRESSION TAG	UNP Q14108
D	22	PRO	-	EXPRESSION TAG	UNP Q14108
D	23	THR	-	EXPRESSION TAG	UNP Q14108
D	24	THR	-	EXPRESSION TAG	UNP Q14108
D	25	GLU	-	EXPRESSION TAG	UNP Q14108
D	26	ASN	-	EXPRESSION TAG	UNP Q14108
D	27	LEU	-	EXPRESSION TAG	UNP Q14108

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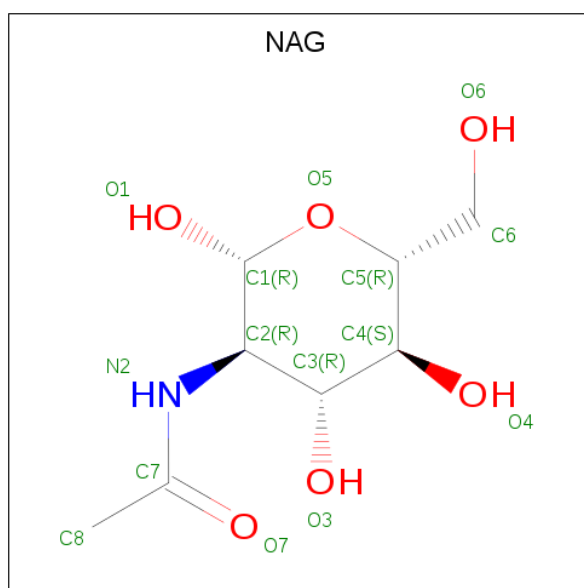
Chain	Residue	Modelled	Actual	Comment	Reference
D	28	TYR	-	EXPRESSION TAG	UNP Q14108
D	29	PHE	-	EXPRESSION TAG	UNP Q14108
D	30	GLN	-	EXPRESSION TAG	UNP Q14108
D	31	GLY	-	EXPRESSION TAG	UNP Q14108
D	32	ALA	-	EXPRESSION TAG	UNP Q14108
D	33	MET	-	EXPRESSION TAG	UNP Q14108
D	34	ASP	-	EXPRESSION TAG	UNP Q14108
E	8	ALA	-	EXPRESSION TAG	UNP Q14108
E	9	ALA	-	EXPRESSION TAG	UNP Q14108
E	10	PRO	-	EXPRESSION TAG	UNP Q14108
E	11	GLU	-	EXPRESSION TAG	UNP Q14108
E	12	HIS	-	EXPRESSION TAG	UNP Q14108
E	13	HIS	-	EXPRESSION TAG	UNP Q14108
E	14	HIS	-	EXPRESSION TAG	UNP Q14108
E	15	HIS	-	EXPRESSION TAG	UNP Q14108
E	16	HIS	-	EXPRESSION TAG	UNP Q14108
E	17	HIS	-	EXPRESSION TAG	UNP Q14108
E	18	ASP	-	EXPRESSION TAG	UNP Q14108
E	19	TYR	-	EXPRESSION TAG	UNP Q14108
E	20	ASP	-	EXPRESSION TAG	UNP Q14108
E	21	ILE	-	EXPRESSION TAG	UNP Q14108
E	22	PRO	-	EXPRESSION TAG	UNP Q14108
E	23	THR	-	EXPRESSION TAG	UNP Q14108
E	24	THR	-	EXPRESSION TAG	UNP Q14108
E	25	GLU	-	EXPRESSION TAG	UNP Q14108
E	26	ASN	-	EXPRESSION TAG	UNP Q14108
E	27	LEU	-	EXPRESSION TAG	UNP Q14108
E	28	TYR	-	EXPRESSION TAG	UNP Q14108
E	29	PHE	-	EXPRESSION TAG	UNP Q14108
E	30	GLN	-	EXPRESSION TAG	UNP Q14108
E	31	GLY	-	EXPRESSION TAG	UNP Q14108
E	32	ALA	-	EXPRESSION TAG	UNP Q14108
E	33	MET	-	EXPRESSION TAG	UNP Q14108
E	34	ASP	-	EXPRESSION TAG	UNP Q14108
F	8	ALA	-	EXPRESSION TAG	UNP Q14108
F	9	ALA	-	EXPRESSION TAG	UNP Q14108
F	10	PRO	-	EXPRESSION TAG	UNP Q14108
F	11	GLU	-	EXPRESSION TAG	UNP Q14108
F	12	HIS	-	EXPRESSION TAG	UNP Q14108
F	13	HIS	-	EXPRESSION TAG	UNP Q14108
F	14	HIS	-	EXPRESSION TAG	UNP Q14108
F	15	HIS	-	EXPRESSION TAG	UNP Q14108

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Chain	Residue	Modelled	Actual	Comment	Reference
F	16	HIS	-	EXPRESSION TAG	UNP Q14108
F	17	HIS	-	EXPRESSION TAG	UNP Q14108
F	18	ASP	-	EXPRESSION TAG	UNP Q14108
F	19	TYR	-	EXPRESSION TAG	UNP Q14108
F	20	ASP	-	EXPRESSION TAG	UNP Q14108
F	21	ILE	-	EXPRESSION TAG	UNP Q14108
F	22	PRO	-	EXPRESSION TAG	UNP Q14108
F	23	THR	-	EXPRESSION TAG	UNP Q14108
F	24	THR	-	EXPRESSION TAG	UNP Q14108
F	25	GLU	-	EXPRESSION TAG	UNP Q14108
F	26	ASN	-	EXPRESSION TAG	UNP Q14108
F	27	LEU	-	EXPRESSION TAG	UNP Q14108
F	28	TYR	-	EXPRESSION TAG	UNP Q14108
F	29	PHE	-	EXPRESSION TAG	UNP Q14108
F	30	GLN	-	EXPRESSION TAG	UNP Q14108
F	31	GLY	-	EXPRESSION TAG	UNP Q14108
F	32	ALA	-	EXPRESSION TAG	UNP Q14108
F	33	MET	-	EXPRESSION TAG	UNP Q14108
F	34	ASP	-	EXPRESSION TAG	UNP Q14108

- Molecule 2 is N-ACETYL-D-GLUCOSAMINE (three-letter code: NAG) (formula:  $C_8H_{15}NO_6$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	E	1	Total	C	N	O	0	0
			14	8	1	5		
2	E	1	Total	C	N	O	0	0
			14	8	1	5		
2	E	1	Total	C	N	O	0	0
			14	8	1	5		
2	E	1	Total	C	N	O	0	0
			14	8	1	5		
2	E	1	Total	C	N	O	0	0
			14	8	1	5		
2	E	1	Total	C	N	O	0	0
			14	8	1	5		
2	E	1	Total	C	N	O	0	0
			14	8	1	5		
2	E	1	Total	C	N	O	0	0
			14	8	1	5		
2	E	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	F	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 3 is BETA-D-MANNOSE (three-letter code: BMA) (formula:  $C_6H_{12}O_6$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			11	6	5		
3	A	1	Total	C	O	0	0
			11	6	5		
3	A	1	Total	C	O	0	0
			11	6	5		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			11	6	5		
3	B	1	Total	C	O	0	0
			11	6	5		
3	B	1	Total	C	O	0	0
			11	6	5		
3	C	1	Total	C	O	0	0
			11	6	5		
3	D	1	Total	C	O	0	0
			11	6	5		
3	D	1	Total	C	O	0	0
			11	6	5		
3	E	1	Total	C	O	0	0
			11	6	5		
3	E	1	Total	C	O	0	0
			11	6	5		
3	E	1	Total	C	O	0	0
			11	6	5		
3	E	1	Total	C	O	0	0
			11	6	5		
3	F	1	Total	C	O	0	0
			11	6	5		
3	F	1	Total	C	O	0	0
			11	6	5		
3	F	1	Total	C	O	0	0
			11	6	5		
3	F	1	Total	C	O	0	0
			11	6	5		

- Molecule 4 is ALPHA-D-MANNOSE (three-letter code: MAN) (formula: C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			11	6	5		
4	A	1	Total	C	O	0	0
			11	6	5		
4	B	1	Total	C	O	0	0
			11	6	5		
4	B	1	Total	C	O	0	0
			11	6	5		
4	D	1	Total	C	O	0	0
			11	6	5		
4	E	1	Total	C	O	0	0
			11	6	5		
4	E	1	Total	C	O	0	0
			11	6	5		
4	E	1	Total	C	O	0	0
			11	6	5		
4	E	1	Total	C	O	0	0
			11	6	5		
4	F	1	Total	C	O	0	0
			11	6	5		
4	F	1	Total	C	O	0	0
			11	6	5		
4	F	1	Total	C	O	0	0
			11	6	5		

- Molecule 5 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	P	0	0
			5	4	1		
5	B	1	Total	O	P	0	0
			5	4	1		
5	C	1	Total	O	P	0	0
			5	4	1		
5	D	1	Total	O	P	0	0
			5	4	1		
5	E	1	Total	O	P	0	0
			5	4	1		
5	F	1	Total	O	P	0	0
			5	4	1		

- Molecule 6 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



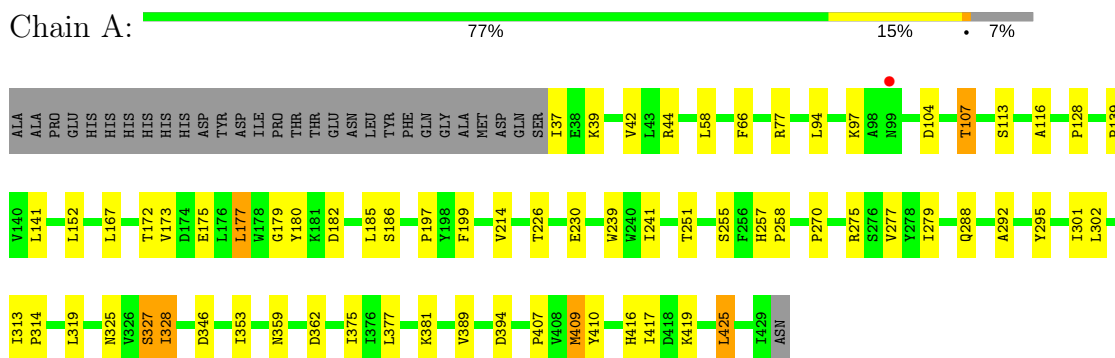
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			7	4	3		
6	F	1	Total	C	O	0	0
			7	4	3		



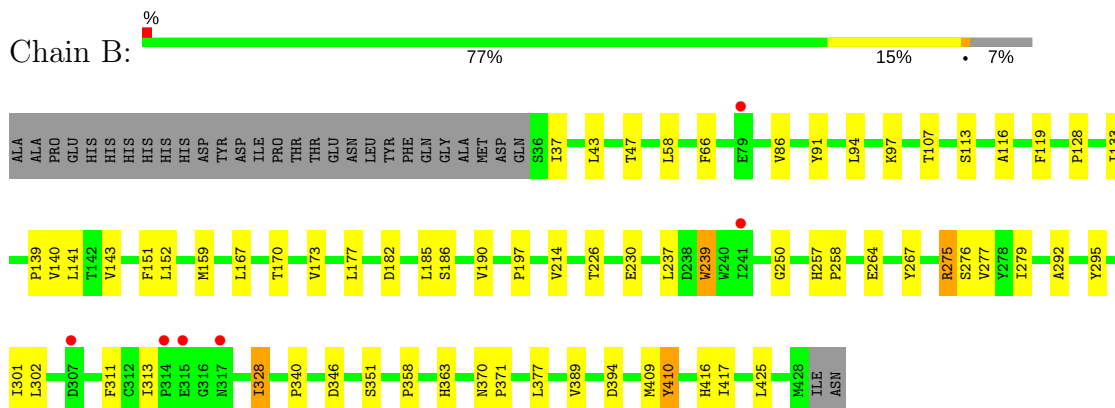
### 3 Residue-property plots

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.

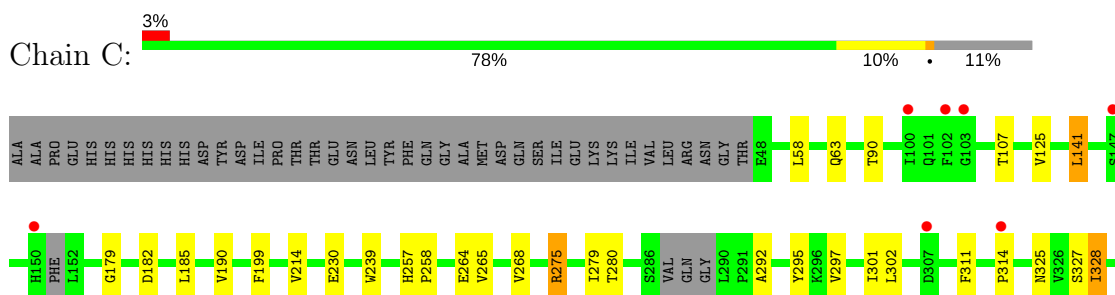
#### • Molecule 1: Lysosome membrane protein 2

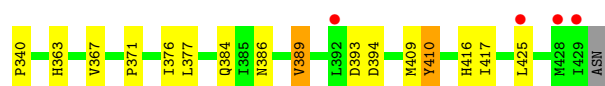


#### • Molecule 1: Lysosome membrane protein 2

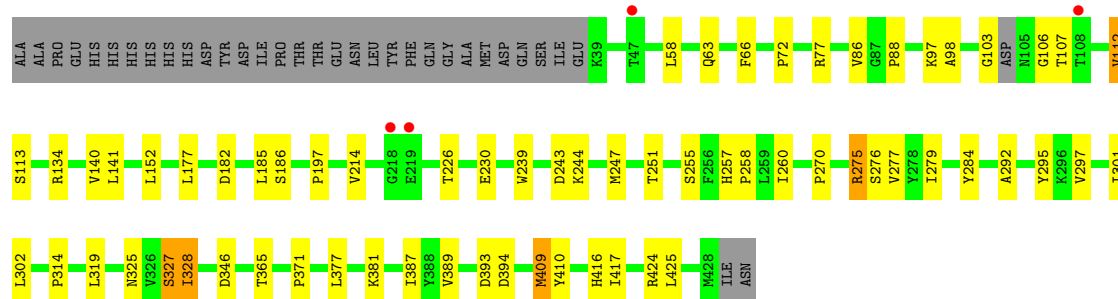
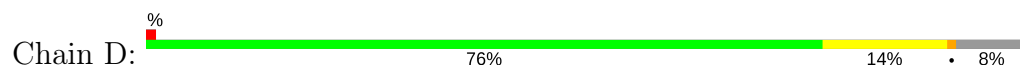


#### • Molecule 1: Lysosome membrane protein 2

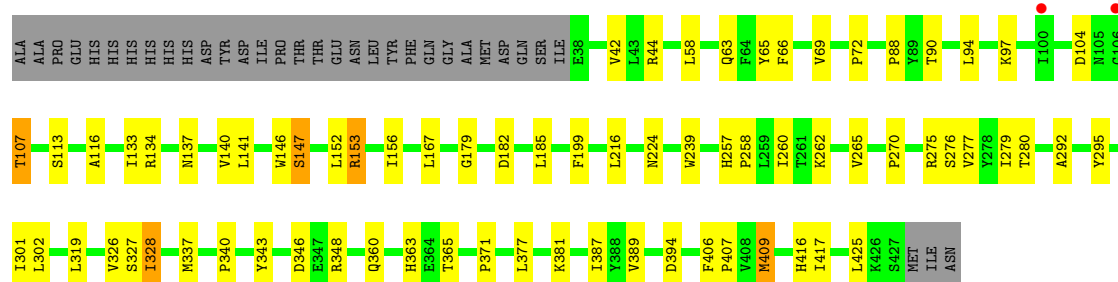




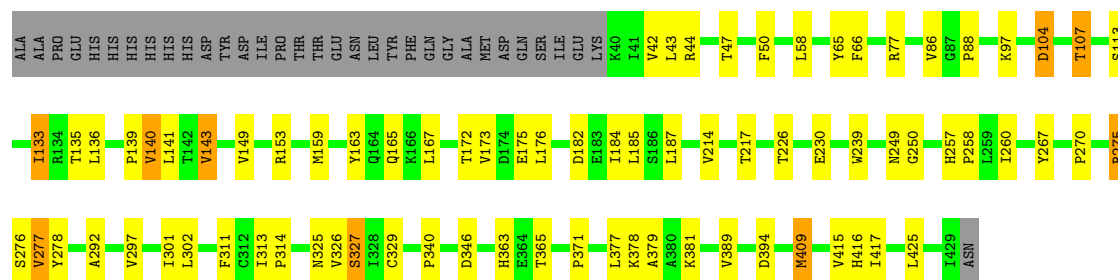
• Molecule 1: Lysosome membrane protein 2



• Molecule 1: Lysosome membrane protein 2



• Molecule 1: Lysosome membrane protein 2



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	101.77Å 115.98Å 145.08Å 90.00° 96.38° 90.00°	Depositor
Resolution (Å)	34.64 – 3.00 39.39 – 3.00	Depositor EDS
% Data completeness (in resolution range)	99.9 (34.64-3.00) 99.9 (39.39-3.00)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.60 (at 3.01Å)	Xtriage
Refinement program	REFMAC 5.6.0117, BUSTER 2.10.0	Depositor
R, $R_{free}$	0.198 , 0.232 0.234 , 0.236	Depositor DCC
$R_{free}$ test set	3359 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	58.8	Xtriage
Anisotropy	0.321	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.27 , 45.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.90	EDS
Total number of atoms	19810	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	84.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.12% 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: PO4, PEG, NAG, BMA, MAN

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	0.57	0/3174	0.77	0/4328
1	B	0.56	0/3155	0.77	2/4307 (0.0%)
1	C	0.53	0/3049	0.74	0/4158
1	D	0.52	0/3171	0.73	0/4322
1	E	0.59	0/3183	0.77	0/4338
1	F	0.54	0/3182	0.75	0/4338
All	All	0.55	0/18914	0.76	2/25791 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	152	LEU	CB-CA-C	-9.37	92.40	110.20
1	B	151	PHE	CB-CA-C	-6.11	98.18	110.40

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	3093	0	2912	39	0
1	B	3073	0	2854	41	0
1	C	2969	0	2760	25	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	3090	0	2918	36	0
1	E	3100	0	2938	36	0
1	F	3100	0	2926	49	0
2	A	196	0	173	3	0
2	B	154	0	138	5	0
2	C	140	0	125	3	0
2	D	168	0	149	0	0
2	E	168	0	147	2	0
2	F	196	0	173	4	0
3	A	44	0	38	1	0
3	B	22	0	18	0	0
3	C	11	0	10	0	0
3	D	22	0	19	0	0
3	E	44	0	36	0	0
3	F	44	0	37	0	0
4	A	22	0	19	0	0
4	B	22	0	19	0	0
4	D	11	0	9	0	0
4	E	44	0	39	0	0
4	F	33	0	30	0	0
5	A	5	0	0	0	0
5	B	5	0	0	0	0
5	C	5	0	0	0	0
5	D	5	0	0	0	0
5	E	5	0	0	0	0
5	F	5	0	0	0	0
6	A	7	0	10	1	0
6	F	7	0	10	2	0
All	All	19810	0	18507	226	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 6.

The worst 5 of 226 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)
2:C:710:NAG:H5	2:C:710:NAG:HN2	1.43	0.83
1:A:313:ILE:HG21	2:A:716:NAG:H61	1.61	0.82
1:B:313:ILE:HG21	2:B:712:NAG:H61	1.62	0.81
1:F:313:ILE:HG21	2:F:716:NAG:H61	1.63	0.81
1:F:326:VAL:HG22	1:F:329:CYS:SG	2.21	0.81

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	391/423 (92%)	372 (95%)	19 (5%)	0	100	100
1	B	391/423 (92%)	369 (94%)	22 (6%)	0	100	100
1	C	372/423 (88%)	358 (96%)	14 (4%)	0	100	100
1	D	385/423 (91%)	366 (95%)	19 (5%)	0	100	100
1	E	388/423 (92%)	369 (95%)	19 (5%)	0	100	100
1	F	388/423 (92%)	371 (96%)	17 (4%)	0	100	100
All	All	2315/2538 (91%)	2205 (95%)	110 (5%)	0	100	100

There are no Ramachandran outliers to report.

#### 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	328/380 (86%)	312 (95%)	16 (5%)	27	66
1	B	324/380 (85%)	309 (95%)	15 (5%)	29	68
1	C	313/380 (82%)	298 (95%)	15 (5%)	28	66
1	D	334/380 (88%)	313 (94%)	21 (6%)	20	55
1	E	335/380 (88%)	319 (95%)	16 (5%)	28	66
1	F	335/380 (88%)	313 (93%)	22 (7%)	18	53

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	1969/2280 (86%)	1864 (95%)	105 (5%)	25 62

5 of 105 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	86	VAL
1	D	328	ILE
1	F	327	SER
1	D	107	THR
1	D	275	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 17 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	257	HIS
1	C	384	GLN
1	E	165	GLN
1	C	165	GLN
1	E	257	HIS

### 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](#)

110 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	NAG	A	701	1,2	14,14,15	0.31	0	17,19,21	0.72	1 (5%)
2	NAG	A	702	3,2	14,14,15	0.35	0	17,19,21	0.89	1 (5%)
3	BMA	A	703	2,4	11,11,12	0.30	0	15,15,17	0.77	1 (6%)
4	MAN	A	704	3	11,11,12	0.41	0	15,15,17	1.25	1 (6%)
2	NAG	A	705	1,2	14,14,15	0.36	0	17,19,21	2.95	5 (29%)
2	NAG	A	706	3,2	14,14,15	0.47	0	17,19,21	1.26	2 (11%)
3	BMA	A	707	2,4	11,11,12	0.24	0	15,15,17	0.76	1 (6%)
4	MAN	A	708	3,2	11,11,12	0.41	0	15,15,17	0.89	1 (6%)
2	NAG	A	709	4	14,14,15	0.42	0	17,19,21	1.63	3 (17%)
2	NAG	A	710	1,2	14,14,15	0.31	0	17,19,21	1.08	1 (5%)
2	NAG	A	711	3,2	14,14,15	0.37	0	17,19,21	1.08	1 (5%)
3	BMA	A	712	2	11,11,12	0.36	0	15,15,17	0.62	0
2	NAG	A	713	1,2	14,14,15	0.34	0	17,19,21	0.67	0
2	NAG	A	714	2	14,14,15	0.37	0	17,19,21	2.26	2 (11%)
2	NAG	A	715	1	14,14,15	0.39	0	17,19,21	2.37	2 (11%)
2	NAG	A	716	1,2	14,14,15	0.28	0	17,19,21	0.74	0
2	NAG	A	717	3,2	14,14,15	0.36	0	17,19,21	0.79	0
3	BMA	A	718	2	11,11,12	0.42	0	15,15,17	0.79	1 (6%)
2	NAG	A	719	1	14,14,15	0.30	0	17,19,21	0.57	0
2	NAG	A	720	1	14,14,15	0.33	0	17,19,21	2.71	3 (17%)
5	PO4	A	721	-	4,4,4	1.10	0	6,6,6	0.39	0
6	PEG	A	722	-	6,6,6	0.35	0	5,5,5	0.19	0
2	NAG	B	701	1,2	14,14,15	0.28	0	17,19,21	0.76	1 (5%)
2	NAG	B	702	2	14,14,15	0.30	0	17,19,21	0.58	0
2	NAG	B	703	1,2	14,14,15	0.29	0	17,19,21	1.34	3 (17%)
2	NAG	B	704	3,2	14,14,15	0.40	0	17,19,21	0.94	1 (5%)
3	BMA	B	705	2,4	11,11,12	0.24	0	15,15,17	0.53	0
4	MAN	B	706	3,2	11,11,12	0.31	0	15,15,17	0.82	1 (6%)
2	NAG	B	707	4	14,14,15	0.40	0	17,19,21	1.77	2 (11%)
4	MAN	B	708	3	11,11,12	0.45	0	15,15,17	0.97	1 (6%)
2	NAG	B	709	1	14,14,15	0.34	0	17,19,21	1.16	1 (5%)
2	NAG	B	710	1	14,14,15	0.30	0	17,19,21	0.85	2 (11%)
2	NAG	B	711	1	14,14,15	0.36	0	17,19,21	1.45	2 (11%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	NAG	B	712	1,2	14,14,15	0.34	0	17,19,21	0.77	0
2	NAG	B	713	3,2	14,14,15	0.42	0	17,19,21	0.95	1 (5%)
3	BMA	B	714	2	11,11,12	0.46	0	15,15,17	1.00	1 (6%)
2	NAG	B	715	1	14,14,15	0.34	0	17,19,21	0.58	0
5	PO4	B	716	-	4,4,4	1.29	1 (25%)	6,6,6	0.89	0
2	NAG	C	701	1,2	14,14,15	0.27	0	17,19,21	0.72	1 (5%)
2	NAG	C	702	2	14,14,15	0.31	0	17,19,21	0.59	0
2	NAG	C	703	1,2	14,14,15	0.30	0	17,19,21	1.35	2 (11%)
2	NAG	C	704	3,2	14,14,15	0.48	0	17,19,21	0.98	1 (5%)
3	BMA	C	705	2	11,11,12	0.20	0	15,15,17	0.44	0
2	NAG	C	706	1,2	14,14,15	0.30	0	17,19,21	0.94	1 (5%)
2	NAG	C	707	2	14,14,15	0.31	0	17,19,21	0.60	0
2	NAG	C	708	1	14,14,15	0.29	0	17,19,21	1.39	1 (5%)
2	NAG	C	709	1,2	14,14,15	0.34	0	17,19,21	0.68	0
2	NAG	C	710	2	14,14,15	0.33	0	17,19,21	0.62	0
2	NAG	C	711	1	14,14,15	0.34	0	17,19,21	0.73	0
5	PO4	C	712	-	4,4,4	1.42	1 (25%)	6,6,6	0.52	0
2	NAG	D	701	1,2	14,14,15	0.31	0	17,19,21	0.68	1 (5%)
2	NAG	D	702	2	14,14,15	0.27	0	17,19,21	0.62	0
2	NAG	D	703	1,2	14,14,15	0.30	0	17,19,21	1.24	3 (17%)
2	NAG	D	704	3,2	14,14,15	0.36	0	17,19,21	0.97	1 (5%)
3	BMA	D	705	2,4	11,11,12	0.24	0	15,15,17	0.53	0
4	MAN	D	706	3,2	11,11,12	0.40	0	15,15,17	0.87	1 (6%)
2	NAG	D	707	4	14,14,15	0.38	0	17,19,21	1.58	2 (11%)
2	NAG	D	708	1,2	14,14,15	0.29	0	17,19,21	1.34	2 (11%)
2	NAG	D	709	3,2	14,14,15	0.31	0	17,19,21	1.82	1 (5%)
3	BMA	D	710	2	11,11,12	0.36	0	15,15,17	0.64	0
2	NAG	D	711	1,2	14,14,15	0.33	0	17,19,21	0.63	0
2	NAG	D	712	2	14,14,15	0.35	0	17,19,21	1.06	1 (5%)
2	NAG	D	713	1,2	14,14,15	0.32	0	17,19,21	0.61	0
2	NAG	D	714	2	14,14,15	0.35	0	17,19,21	1.39	1 (5%)
2	NAG	D	715	1	14,14,15	0.29	0	17,19,21	0.58	0
5	PO4	D	716	-	4,4,4	1.48	1 (25%)	6,6,6	0.67	0
2	NAG	E	701	1,2	14,14,15	0.25	0	17,19,21	0.43	0
2	NAG	E	702	3,2	14,14,15	0.32	0	17,19,21	1.20	2 (11%)
3	BMA	E	703	2,4	11,11,12	0.38	0	15,15,17	1.08	2 (13%)
4	MAN	E	704	3	11,11,12	0.51	0	15,15,17	1.58	2 (13%)
2	NAG	E	705	1,2	14,14,15	0.30	0	17,19,21	1.12	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	NAG	E	706	3,2	14,14,15	0.43	0	17,19,21	0.95	1 (5%)
3	BMA	E	707	2,4	11,11,12	0.26	0	15,15,17	0.73	1 (6%)
4	MAN	E	708	3,2	11,11,12	0.41	0	15,15,17	0.89	1 (6%)
2	NAG	E	709	4	14,14,15	0.36	0	17,19,21	1.54	2 (11%)
4	MAN	E	710	3	11,11,12	0.45	0	15,15,17	0.87	1 (6%)
2	NAG	E	711	1,2	14,14,15	0.30	0	17,19,21	1.28	2 (11%)
2	NAG	E	712	2	14,14,15	0.43	0	17,19,21	0.78	0
2	NAG	E	713	1,2	14,14,15	0.34	0	17,19,21	1.05	1 (5%)
2	NAG	E	714	3,2	14,14,15	0.33	0	17,19,21	1.13	1 (5%)
3	BMA	E	715	2	11,11,12	0.44	0	15,15,17	1.54	2 (13%)
2	NAG	E	716	1,2	14,14,15	0.28	0	17,19,21	0.82	1 (5%)
2	NAG	E	717	3,2	14,14,15	0.32	0	17,19,21	0.65	0
3	BMA	E	718	2,4	11,11,12	0.30	0	15,15,17	1.07	1 (6%)
4	MAN	E	719	3	11,11,12	0.46	0	15,15,17	1.19	1 (6%)
2	NAG	E	720	1	14,14,15	0.34	0	17,19,21	0.66	1 (5%)
5	PO4	E	721	-	4,4,4	1.78	1 (25%)	6,6,6	0.32	0
2	NAG	F	701	1,2	14,14,15	0.30	0	17,19,21	0.73	1 (5%)
2	NAG	F	702	3,2	14,14,15	0.32	0	17,19,21	0.67	1 (5%)
3	BMA	F	703	2,4	11,11,12	0.37	0	15,15,17	1.13	1 (6%)
4	MAN	F	704	3	11,11,12	0.56	0	15,15,17	1.62	1 (6%)
2	NAG	F	705	1,2	14,14,15	0.27	0	17,19,21	1.07	2 (11%)
2	NAG	F	706	3,2	14,14,15	0.47	0	17,19,21	1.04	1 (5%)
3	BMA	F	707	2,4	11,11,12	1.29	1 (9%)	15,15,17	1.07	2 (13%)
4	MAN	F	708	3	11,11,12	0.42	0	15,15,17	0.91	1 (6%)
4	MAN	F	709	3	11,11,12	0.74	0	15,15,17	1.90	4 (26%)
2	NAG	F	710	1,2	14,14,15	0.26	0	17,19,21	1.04	1 (5%)
2	NAG	F	711	3,2	14,14,15	0.38	0	17,19,21	1.30	2 (11%)
3	BMA	F	712	2	11,11,12	0.37	0	15,15,17	0.53	0
2	NAG	F	713	1,2	14,14,15	0.38	0	17,19,21	0.58	0
2	NAG	F	714	2	14,14,15	0.38	0	17,19,21	0.89	2 (11%)
2	NAG	F	715	1	14,14,15	0.37	0	17,19,21	1.66	4 (23%)
2	NAG	F	716	1,2	14,14,15	0.32	0	17,19,21	0.85	0
2	NAG	F	717	3,2	14,14,15	0.33	0	17,19,21	0.91	2 (11%)
3	BMA	F	718	2	11,11,12	0.36	0	15,15,17	0.59	0
2	NAG	F	719	1	14,14,15	0.27	0	17,19,21	0.67	0
2	NAG	F	720	1	14,14,15	0.27	0	17,19,21	0.78	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	NAG	F	721	1	14,14,15	0.33	0	17,19,21	1.60	2 (11%)
5	PO4	F	722	-	4,4,4	1.84	1 (25%)	6,6,6	0.39	0
6	PEG	F	723	-	6,6,6	0.23	0	5,5,5	0.22	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	NAG	A	701	1,2	-	0/6/23/26	0/1/1/1
2	NAG	A	702	3,2	-	0/6/23/26	0/1/1/1
3	BMA	A	703	2,4	-	0/2/19/22	0/1/1/1
4	MAN	A	704	3	-	0/2/19/22	1/1/1/1
2	NAG	A	705	1,2	-	0/6/23/26	0/1/1/1
2	NAG	A	706	3,2	-	0/6/23/26	0/1/1/1
3	BMA	A	707	2,4	-	0/2/19/22	0/1/1/1
4	MAN	A	708	3,2	-	0/2/19/22	0/1/1/1
2	NAG	A	709	4	-	0/6/23/26	0/1/1/1
2	NAG	A	710	1,2	-	0/6/23/26	0/1/1/1
2	NAG	A	711	3,2	-	0/6/23/26	0/1/1/1
3	BMA	A	712	2	-	0/2/19/22	0/1/1/1
2	NAG	A	713	1,2	-	0/6/23/26	0/1/1/1
2	NAG	A	714	2	-	0/6/23/26	0/1/1/1
2	NAG	A	715	1	-	0/6/23/26	0/1/1/1
2	NAG	A	716	1,2	-	0/6/23/26	0/1/1/1
2	NAG	A	717	3,2	-	0/6/23/26	0/1/1/1
3	BMA	A	718	2	-	0/2/19/22	0/1/1/1
2	NAG	A	719	1	-	0/6/23/26	0/1/1/1
2	NAG	A	720	1	-	0/6/23/26	0/1/1/1
5	PO4	A	721	-	-	0/0/0/0	0/0/0/0
6	PEG	A	722	-	-	0/4/4/4	0/0/0/0
2	NAG	B	701	1,2	-	0/6/23/26	0/1/1/1
2	NAG	B	702	2	-	0/6/23/26	0/1/1/1
2	NAG	B	703	1,2	-	0/6/23/26	0/1/1/1
2	NAG	B	704	3,2	-	0/6/23/26	0/1/1/1
3	BMA	B	705	2,4	-	0/2/19/22	0/1/1/1
4	MAN	B	706	3,2	-	0/2/19/22	0/1/1/1
2	NAG	B	707	4	-	0/6/23/26	0/1/1/1
4	MAN	B	708	3	-	0/2/19/22	0/1/1/1
2	NAG	B	709	1	-	0/6/23/26	0/1/1/1
2	NAG	B	710	1	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	B	711	1	-	0/6/23/26	0/1/1/1
2	NAG	B	712	1,2	-	0/6/23/26	0/1/1/1
2	NAG	B	713	3,2	-	0/6/23/26	0/1/1/1
3	BMA	B	714	2	-	0/2/19/22	0/1/1/1
2	NAG	B	715	1	-	0/6/23/26	0/1/1/1
5	PO4	B	716	-	-	0/0/0/0	0/0/0/0
2	NAG	C	701	1,2	-	0/6/23/26	0/1/1/1
2	NAG	C	702	2	-	0/6/23/26	0/1/1/1
2	NAG	C	703	1,2	-	0/6/23/26	0/1/1/1
2	NAG	C	704	3,2	-	0/6/23/26	0/1/1/1
3	BMA	C	705	2	-	0/2/19/22	0/1/1/1
2	NAG	C	706	1,2	-	0/6/23/26	0/1/1/1
2	NAG	C	707	2	-	0/6/23/26	0/1/1/1
2	NAG	C	708	1	-	0/6/23/26	0/1/1/1
2	NAG	C	709	1,2	-	0/6/23/26	0/1/1/1
2	NAG	C	710	2	-	0/6/23/26	0/1/1/1
2	NAG	C	711	1	-	0/6/23/26	0/1/1/1
5	PO4	C	712	-	-	0/0/0/0	0/0/0/0
2	NAG	D	701	1,2	-	0/6/23/26	0/1/1/1
2	NAG	D	702	2	-	0/6/23/26	0/1/1/1
2	NAG	D	703	1,2	-	0/6/23/26	0/1/1/1
2	NAG	D	704	3,2	-	0/6/23/26	0/1/1/1
3	BMA	D	705	2,4	-	0/2/19/22	0/1/1/1
4	MAN	D	706	3,2	-	0/2/19/22	0/1/1/1
2	NAG	D	707	4	-	0/6/23/26	0/1/1/1
2	NAG	D	708	1,2	-	0/6/23/26	0/1/1/1
2	NAG	D	709	3,2	-	0/6/23/26	0/1/1/1
3	BMA	D	710	2	-	0/2/19/22	0/1/1/1
2	NAG	D	711	1,2	-	0/6/23/26	0/1/1/1
2	NAG	D	712	2	-	0/6/23/26	0/1/1/1
2	NAG	D	713	1,2	-	0/6/23/26	0/1/1/1
2	NAG	D	714	2	-	0/6/23/26	0/1/1/1
2	NAG	D	715	1	-	0/6/23/26	0/1/1/1
5	PO4	D	716	-	-	0/0/0/0	0/0/0/0
2	NAG	E	701	1,2	-	0/6/23/26	0/1/1/1
2	NAG	E	702	3,2	-	0/6/23/26	0/1/1/1
3	BMA	E	703	2,4	-	0/2/19/22	0/1/1/1
4	MAN	E	704	3	-	0/2/19/22	1/1/1/1
2	NAG	E	705	1,2	-	0/6/23/26	0/1/1/1
2	NAG	E	706	3,2	-	0/6/23/26	0/1/1/1
3	BMA	E	707	2,4	-	0/2/19/22	0/1/1/1
4	MAN	E	708	3,2	-	0/2/19/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	E	709	4	-	0/6/23/26	0/1/1/1
4	MAN	E	710	3	-	0/2/19/22	0/1/1/1
2	NAG	E	711	1,2	-	0/6/23/26	0/1/1/1
2	NAG	E	712	2	-	0/6/23/26	0/1/1/1
2	NAG	E	713	1,2	-	0/6/23/26	0/1/1/1
2	NAG	E	714	3,2	-	0/6/23/26	0/1/1/1
3	BMA	E	715	2	-	0/2/19/22	0/1/1/1
2	NAG	E	716	1,2	-	0/6/23/26	0/1/1/1
2	NAG	E	717	3,2	-	0/6/23/26	0/1/1/1
3	BMA	E	718	2,4	-	0/2/19/22	0/1/1/1
4	MAN	E	719	3	-	0/2/19/22	0/1/1/1
2	NAG	E	720	1	-	0/6/23/26	0/1/1/1
5	PO4	E	721	-	-	0/0/0/0	0/0/0/0
2	NAG	F	701	1,2	-	0/6/23/26	0/1/1/1
2	NAG	F	702	3,2	-	0/6/23/26	0/1/1/1
3	BMA	F	703	2,4	-	0/2/19/22	0/1/1/1
4	MAN	F	704	3	-	0/2/19/22	1/1/1/1
2	NAG	F	705	1,2	-	0/6/23/26	0/1/1/1
2	NAG	F	706	3,2	-	0/6/23/26	0/1/1/1
3	BMA	F	707	2,4	-	0/2/19/22	0/1/1/1
4	MAN	F	708	3	-	0/2/19/22	0/1/1/1
4	MAN	F	709	3	-	0/2/19/22	0/1/1/1
2	NAG	F	710	1,2	-	0/6/23/26	0/1/1/1
2	NAG	F	711	3,2	-	0/6/23/26	0/1/1/1
3	BMA	F	712	2	-	0/2/19/22	0/1/1/1
2	NAG	F	713	1,2	-	0/6/23/26	0/1/1/1
2	NAG	F	714	2	-	0/6/23/26	0/1/1/1
2	NAG	F	715	1	-	0/6/23/26	0/1/1/1
2	NAG	F	716	1,2	-	0/6/23/26	0/1/1/1
2	NAG	F	717	3,2	-	0/6/23/26	0/1/1/1
3	BMA	F	718	2	-	0/2/19/22	0/1/1/1
2	NAG	F	719	1	-	0/6/23/26	0/1/1/1
2	NAG	F	720	1	-	0/6/23/26	0/1/1/1
2	NAG	F	721	1	-	0/6/23/26	0/1/1/1
5	PO4	F	722	-	-	0/0/0/0	0/0/0/0
6	PEG	F	723	-	-	0/4/4/4	0/0/0/0

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	F	707	BMA	O6-C6	-4.20	1.24	1.42
5	B	716	PO4	P-O1	2.17	1.55	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	712	PO4	P-O1	2.40	1.56	1.50
5	D	716	PO4	P-O1	2.50	1.56	1.50
5	F	722	PO4	P-O1	3.25	1.58	1.50

The worst 5 of 112 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	705	NAG	O5-C1-C2	-8.30	100.06	111.52
2	D	709	NAG	O5-C1-C2	-6.91	101.98	111.52
2	A	720	NAG	O5-C1-C2	-5.35	104.13	111.52
2	F	721	NAG	C1-C2-N2	-4.48	102.83	110.49
2	C	703	NAG	O5-C1-C2	-3.98	106.02	111.52

There are no chirality outliers.

There are no torsion outliers.

All (3) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	E	704	MAN	C1-C2-C3-C4-C5-O5
4	F	704	MAN	C1-C2-C3-C4-C5-O5
4	A	704	MAN	C1-C2-C3-C4-C5-O5

15 monomers are involved in 20 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	711	NAG	1	0
3	A	712	BMA	1	0
2	A	716	NAG	2	0
6	A	722	PEG	1	0
2	B	707	NAG	2	0
2	B	709	NAG	1	0
2	B	712	NAG	2	0
2	C	710	NAG	3	0
2	E	705	NAG	1	0
2	E	713	NAG	1	0
2	E	714	NAG	1	0
2	F	701	NAG	1	0
2	F	716	NAG	3	0
2	F	717	NAG	1	0
6	F	723	PEG	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	393/423 (92%)	-0.45	1 (0%) 93 83	41, 69, 107, 127	0
1	B	393/423 (92%)	-0.41	6 (1%) 73 46	46, 75, 107, 146	0
1	C	378/423 (89%)	-0.07	11 (2%) 51 23	60, 116, 161, 195	0
1	D	389/423 (91%)	-0.40	4 (1%) 82 59	43, 81, 128, 149	0
1	E	390/423 (92%)	-0.45	2 (0%) 90 74	37, 68, 115, 140	0
1	F	390/423 (92%)	-0.44	0 100 100	48, 78, 118, 139	0
All	All	2333/2538 (91%)	-0.37	24 (1%) 82 59	37, 78, 134, 195	0

The worst 5 of 24 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	106	GLY	4.1
1	C	425	LEU	3.2
1	B	317	ASN	3.0
1	C	102	PHE	2.9
1	D	108	THR	2.7

### 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 ⓘ

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
3	BMA	C	705	11/12	0.57	0.41	144,146,149,151	0
3	BMA	B	714	11/12	0.59	0.36	129,134,140,143	0
3	BMA	F	712	11/12	0.64	0.39	148,155,159,159	0
2	NAG	D	707	14/15	0.69	0.58	121,128,133,136	0
2	NAG	B	707	14/15	0.70	0.31	157,160,162,163	0
4	MAN	B	708	11/12	0.71	0.22	143,150,160,164	0
3	BMA	D	710	11/12	0.72	0.24	147,151,155,155	0
2	NAG	A	715	14/15	0.75	0.31	126,136,143,146	0
2	NAG	E	709	14/15	0.75	0.51	137,144,148,149	0
4	MAN	F	704	11/12	0.77	0.27	120,124,126,128	0
2	NAG	B	715	14/15	0.77	0.37	120,130,144,146	0
3	BMA	D	705	11/12	0.78	0.25	86,94,100,101	0
2	NAG	F	715	14/15	0.78	0.26	139,155,159,161	0
2	NAG	F	720	14/15	0.79	0.22	157,164,167,167	0
4	MAN	E	710	11/12	0.79	0.33	98,102,105,106	0
3	BMA	E	715	11/12	0.79	0.27	109,117,122,122	0
2	NAG	C	710	14/15	0.79	0.44	123,139,161,165	0
2	NAG	C	704	14/15	0.80	0.30	123,131,142,143	0
3	BMA	A	718	11/12	0.81	0.30	107,115,124,132	0
4	MAN	F	709	11/12	0.81	0.27	110,118,122,125	0
4	MAN	D	706	11/12	0.81	0.31	100,108,114,121	0
2	NAG	A	709	14/15	0.81	0.34	94,115,120,123	0
2	NAG	C	702	14/15	0.81	0.50	135,142,147,148	0
2	NAG	C	701	14/15	0.82	0.19	128,135,138,138	0
2	NAG	D	715	14/15	0.82	0.42	149,156,161,162	0
3	BMA	F	718	11/12	0.82	0.26	148,154,159,161	0
2	NAG	A	719	14/15	0.82	0.36	100,106,113,113	0
2	NAG	B	711	14/15	0.82	0.30	97,111,121,125	0
2	NAG	C	711	14/15	0.82	0.28	131,141,147,149	0
2	NAG	A	720	14/15	0.83	0.21	89,104,113,114	0
3	BMA	E	707	11/12	0.83	0.20	86,93,99,108	0
3	BMA	A	707	11/12	0.83	0.27	80,84,93,101	0
3	BMA	A	712	11/12	0.84	0.24	121,125,133,133	0
2	NAG	F	719	14/15	0.84	0.46	152,161,166,167	0
4	MAN	A	704	11/12	0.84	0.38	126,131,135,137	0
2	NAG	C	707	14/15	0.84	0.28	159,165,174,174	0
2	NAG	F	721	14/15	0.84	0.17	109,114,118,118	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	BMA	E	718	11/12	0.84	0.34	102,107,112,112	0
2	NAG	F	716	14/15	0.85	0.22	86,110,120,125	0
2	NAG	B	702	14/15	0.86	0.32	88,100,119,123	0
2	NAG	D	714	14/15	0.86	0.26	95,101,106,106	0
2	NAG	E	720	14/15	0.86	0.45	123,129,136,139	0
2	NAG	D	702	14/15	0.86	0.20	77,86,90,95	0
2	NAG	E	717	14/15	0.86	0.39	108,112,118,118	0
3	BMA	F	707	11/12	0.86	0.21	94,103,113,114	0
4	MAN	F	708	11/12	0.86	0.50	123,127,133,134	0
2	NAG	C	708	14/15	0.87	0.19	162,164,167,168	0
4	MAN	A	708	11/12	0.87	0.35	105,106,115,118	0
3	BMA	B	705	11/12	0.87	0.20	120,136,143,146	0
2	NAG	F	711	14/15	0.87	0.25	116,129,134,140	0
2	NAG	A	714	14/15	0.88	0.36	97,105,113,115	0
2	NAG	D	712	14/15	0.88	0.40	121,126,130,130	0
2	NAG	C	709	14/15	0.88	0.39	119,124,130,140	0
2	NAG	D	711	14/15	0.89	0.20	92,102,108,114	0
2	NAG	F	714	14/15	0.89	0.28	114,116,123,123	0
2	NAG	E	712	14/15	0.90	0.33	108,111,121,124	0
2	NAG	F	717	14/15	0.90	0.33	110,133,140,145	0
2	NAG	D	713	14/15	0.90	0.17	89,92,95,100	0
4	MAN	E	708	11/12	0.90	0.30	117,124,127,132	0
4	MAN	E	704	11/12	0.91	0.26	83,91,95,95	0
2	NAG	E	713	14/15	0.92	0.19	80,84,90,96	0
2	NAG	C	703	14/15	0.92	0.19	115,125,129,129	0
2	NAG	A	716	14/15	0.92	0.14	83,95,100,102	0
5	PO4	D	716	5/5	0.92	0.34	55,58,60,60	5
2	NAG	B	709	14/15	0.93	0.16	83,89,91,93	0
6	PEG	A	722	7/7	0.93	0.49	30,33,37,38	7
2	NAG	A	711	14/15	0.93	0.14	92,99,105,111	0
6	PEG	F	723	7/7	0.93	0.63	40,43,45,45	7
2	NAG	D	704	14/15	0.93	0.17	66,79,89,95	0
2	NAG	A	717	14/15	0.93	0.24	93,110,120,120	0
4	MAN	E	719	11/12	0.93	0.23	89,95,103,104	0
2	NAG	E	706	14/15	0.93	0.18	60,65,75,80	0
2	NAG	B	712	14/15	0.93	0.18	97,103,109,109	0
2	NAG	B	701	14/15	0.93	0.18	80,84,88,89	0
3	BMA	F	703	11/12	0.93	0.18	89,100,105,111	0
5	PO4	E	721	5/5	0.94	0.16	92,95,99,100	0
4	MAN	B	706	11/12	0.94	0.20	131,145,147,153	0
2	NAG	E	716	14/15	0.94	0.22	90,94,99,105	0
2	NAG	B	703	14/15	0.94	0.17	63,70,76,80	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	BMA	A	703	11/12	0.94	0.12	93,100,110,120	0
2	NAG	B	710	14/15	0.94	0.16	76,93,98,100	0
2	NAG	B	704	14/15	0.94	0.13	80,88,98,109	0
2	NAG	E	714	14/15	0.94	0.18	97,107,117,118	0
2	NAG	F	706	14/15	0.94	0.15	43,66,76,85	0
2	NAG	A	706	14/15	0.94	0.13	44,54,66,71	0
2	NAG	B	713	14/15	0.95	0.28	89,114,127,128	0
2	NAG	D	703	14/15	0.95	0.11	45,64,67,69	0
2	NAG	D	709	14/15	0.95	0.21	120,130,138,141	0
2	NAG	A	705	14/15	0.95	0.17	39,48,65,69	0
3	BMA	E	703	11/12	0.95	0.17	68,75,82,88	0
2	NAG	F	702	14/15	0.96	0.16	52,62,70,76	0
2	NAG	D	701	14/15	0.96	0.14	59,67,70,71	0
2	NAG	A	702	14/15	0.96	0.15	56,63,71,83	0
2	NAG	C	706	14/15	0.96	0.14	95,122,135,150	0
2	NAG	E	705	14/15	0.96	0.12	47,58,61,61	0
2	NAG	F	713	14/15	0.96	0.17	80,91,107,109	0
2	NAG	A	713	14/15	0.96	0.11	64,73,81,92	0
2	NAG	A	701	14/15	0.96	0.12	48,51,54,57	0
5	PO4	B	716	5/5	0.96	0.35	93,93,95,95	0
2	NAG	E	702	14/15	0.97	0.15	51,59,70,72	0
5	PO4	C	712	5/5	0.97	0.31	92,95,99,101	0
2	NAG	F	710	14/15	0.97	0.13	77,87,93,103	0
2	NAG	F	701	14/15	0.97	0.15	49,52,67,67	0
5	PO4	A	721	5/5	0.97	0.30	37,38,39,41	5
2	NAG	E	711	14/15	0.97	0.14	72,84,93,103	0
2	NAG	D	708	14/15	0.97	0.12	75,94,102,111	0
2	NAG	F	705	14/15	0.97	0.15	47,62,66,69	0
2	NAG	E	701	14/15	0.97	0.13	42,44,55,56	0
2	NAG	A	710	14/15	0.98	0.15	81,84,90,92	0
5	PO4	F	722	5/5	0.98	0.18	82,84,86,88	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.