



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 02:46 PM GMT

PDB ID : 4AH4  
Title : Crystal Structure of Fucose binding lectin from Aspergillus Fumigatus (AFL) in complex with BGA Oligosaccharide.  
Authors : Houser, J.; Komarek, J.; Kostlanova, N.; Lahmann, M.; Cioci, G.; Varrot, A.; Imberty, A.; Wimmerova, M.  
Deposited on : 2012-02-03  
Resolution : 1.75 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

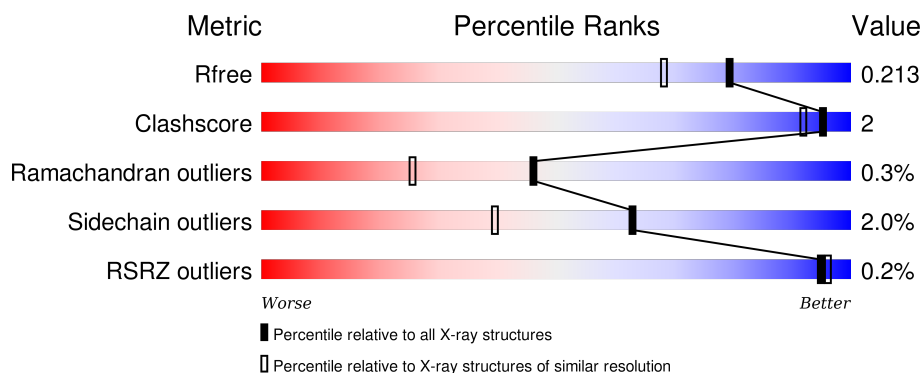
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.75 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	1609 (1.76-1.76)
Clashscore	102246	1730 (1.76-1.76)
Ramachandran outliers	100387	1711 (1.76-1.76)
Sidechain outliers	100360	1711 (1.76-1.76)
RSRZ outliers	91569	1610 (1.76-1.76)

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	315	<div><div></div><div>95%</div><div>.</div></div>
1	B	315	<div><div></div><div>96%</div><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	FUC	A	940	-	-	-	X
2	GAL	A	941	X	-	-	X
2	GAL	A	951	X	-	-	-
2	GAL	A	961	-	-	-	X
2	GAL	B	911	X	-	-	-
2	GAL	B	941	X	-	-	X
2	GAL	B	951	X	-	-	-
2	A2G	B	952	-	-	-	X
2	GAL	B	961	X	-	-	-

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 5813 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 FUCOSE-SPECIFIC LECTIN FLEA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	314	Total	C	N	O	S	0	2	0
			2454	1562	423	464	5			
1	B	314	Total	C	N	O	S	0	0	0
			2445	1557	422	462	4			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	20	SER	LEU	CONFLICT	UNP Q4WW81
A	111	CYS	ARG	CONFLICT	UNP Q4WW81
B	20	SER	LEU	CONFLICT	UNP Q4WW81
B	111	CYS	ARG	CONFLICT	UNP Q4WW81

- Molecule 2 is a polymer of unknown type called SUGAR (3-MER).

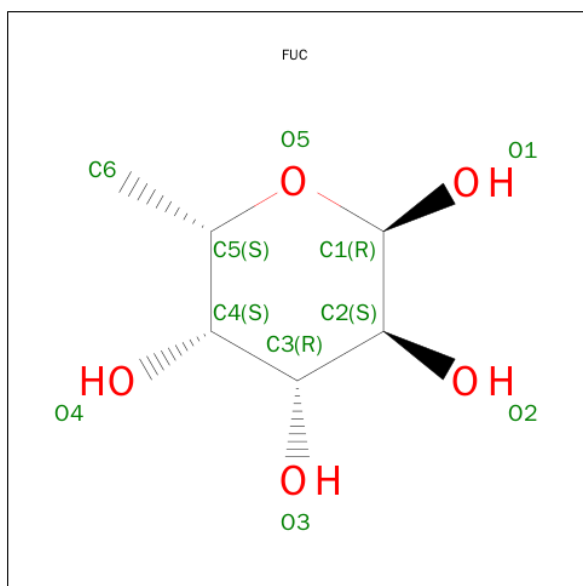
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	3	Total	C	N	O	0	0
			36	20	1	15		
2	A	3	Total	C	N	O	0	0
			36	20	1	15		
2	A	3	Total	C	N	O	0	0
			36	20	1	15		
2	A	3	Total	C	N	O	0	0
			36	20	1	15		
2	A	3	Total	C	N	O	0	0
			36	20	1	15		
2	B	3	Total	C	N	O	0	0
			36	20	1	15		
2	B	3	Total	C	N	O	0	0
			36	20	1	15		
2	B	3	Total	C	N	O	0	0
			36	20	1	15		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	B	3	Total	C	N	O	0	0
			36	20	1	15		

- Molecule 3 is SUGAR (ALPHA-L-FUCOSE) (three-letter code: FUC) (formula:  $C_6H_{12}O_5$ ).



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		

- Molecule 4 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	291	Total	O	0	0
			291	291		
5	B	265	Total	O	0	0
			265	265		

### 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 (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: FUCOSE-SPECIFIC LECTIN FLEA

Chain A:  95%



#### • Molecule 1: FUCOSE-SPECIFIC LECTIN FLEA

Chain B:  96%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	46.42Å 47.44Å 80.09Å 103.61° 91.96° 113.08°	Depositor
Resolution (Å)	77.15 – 1.75 42.02 – 1.75	Depositor EDS
% Data completeness (in resolution range)	94.1 (77.15-1.75) 85.3 (42.02-1.75)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.50 (at 1.75Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, $R_{free}$	0.168 , 0.211 0.172 , 0.213	Depositor DCC
$R_{free}$ test set	2897 reflections (5.32%)	DCC
Wilson B-factor (Å <sup>2</sup> )	15.8	Xtriage
Anisotropy	0.611	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 37.8	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 57392 reflections	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	5813	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	18.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.82% 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: A2G, CSD, GAL, FUC, CL

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	0.83	3/2520 (0.1%)	0.80	1/3435 (0.0%)
1	B	0.82	1/2508 (0.0%)	0.82	0/3419
All	All	0.82	4/5028 (0.1%)	0.81	1/6854 (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
2	A	2	0
2	B	4	0
All	All	6	0

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	271	TRP	CD2-CE2	6.53	1.49	1.41
1	A	141	TRP	CD2-CE2	5.35	1.47	1.41
1	B	179	TRP	CD2-CE2	5.25	1.47	1.41
1	A	241	TRP	CD2-CE2	5.17	1.47	1.41

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	A	39	LEU	CA-CB-CG	5.73	128.48	115.30

All (6) chirality outliers are listed below:



Mol	Chain	Res	Type	Atom
2	A	941	GAL	C1
2	A	951	GAL	C1
2	B	911	GAL	C1
2	B	941	GAL	C1
2	B	951	GAL	C1
2	B	961	GAL	C1

There are no planarity outliers.

## 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	2454	0	2336	7	0
1	B	2445	0	2327	5	0
2	A	180	0	165	4	0
2	B	144	0	132	1	0
3	A	11	0	12	0	0
3	B	22	0	24	0	0
4	A	1	0	0	1	0
5	A	291	0	0	5	0
5	B	265	0	0	2	0
All	All	5813	0	4996	16	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 2.

All (16) 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:111[B]:CYS:SG	5:A:2134:HOH:O	2.22	0.96
2:A:941:GAL:H1	5:A:2173:HOH:O	1.95	0.66
1:B:49:GLU:CD	1:B:49:GLU:H	2.04	0.59
2:A:961:GAL:H2	5:A:2013:HOH:O	2.02	0.58
1:A:49:GLU:HG2	5:A:2071:HOH:O	2.05	0.56
1:A:39:LEU:HD21	2:A:912:A2G:H8B	1.89	0.53
2:B:942:A2G:C1	5:B:2261:HOH:O	2.61	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:200:PRO:HD2	5:B:2169:HOH:O	2.12	0.49
1:A:119:GLY:HA3	1:A:167:ARG:HD3	2.01	0.43
1:B:39:LEU:C	1:B:39:LEU:HD12	2.39	0.43
1:B:242:GLN:O	1:B:254:LYS:HA	2.19	0.43
1:A:111[B]:CYS:SG	5:A:2135:HOH:O	2.24	0.43
1:A:50:LYS:HE3	4:A:1000:CL:CL	2.57	0.42
1:B:156:LEU:CD1	1:B:185:LEU:HD23	2.51	0.41
1:A:87:ALA:O	1:A:94:TRP:HA	2.21	0.40
2:A:921:GAL:O4	2:A:922:A2G:N2	2.53	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	313/315 (99%)	306 (98%)	6 (2%)	1 (0%)	46	25
1	B	311/315 (99%)	305 (98%)	5 (2%)	1 (0%)	46	25
All	All	624/630 (99%)	611 (98%)	11 (2%)	2 (0%)	46	25

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	46	ASN
1	A	46	ASN

### 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	250/249 (100%)	246 (98%)	4 (2%)	70	52
1	B	248/249 (100%)	242 (98%)	6 (2%)	57	31
All	All	498/498 (100%)	488 (98%)	10 (2%)	63	39

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	39	LEU
1	A	50	LYS
1	A	254	LYS
1	A	280	ASP
1	B	39	LEU
1	B	49	GLU
1	B	140	MET
1	B	195	HIS
1	B	280	ASP
1	B	310	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	105	GLN
1	A	303	HIS
1	B	105	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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	$\# Z  > 2$
1	CSD	A	244	1	3,7,8	1.18	0	3,8,10	1.60	1 (33%)
1	CSD	B	244	1	3,7,8	1.36	0	3,8,10	1.28	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
1	CSD	A	244	1	-	0/2/6/8	0/0/0/0
1	CSD	B	244	1	-	0/2/6/8	0/0/0/0

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	244	CSD	OD1-SG-CB	2.37	109.35	105.40

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 5.5 Carbohydrates

27 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	$\# Z  > 2$
2	FUC	A	910	2	10,10,11	0.70	0	14,14,16	1.24	2 (14%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	GAL	A	911	2	12,12,12	0.62	0	17,17,17	1.68	2 (11%)
2	A2G	A	912	2	14,14,15	0.44	0	15,19,21	0.92	0
2	FUC	A	920	2	10,10,11	0.55	0	14,14,16	1.20	1 (7%)
2	GAL	A	921	2	12,12,12	0.72	0	17,17,17	2.21	8 (47%)
2	A2G	A	922	2	14,14,15	0.59	0	15,19,21	1.88	2 (13%)
2	FUC	A	940	2	10,10,11	1.02	0	14,14,16	0.93	1 (7%)
2	GAL	A	941	2	12,12,12	0.61	0	17,17,17	0.90	0
2	A2G	A	942	2	14,14,15	0.33	0	15,19,21	0.98	1 (6%)
2	FUC	A	950	2	10,10,11	0.58	0	14,14,16	1.12	1 (7%)
2	GAL	A	951	2	12,12,12	0.63	0	17,17,17	1.43	2 (11%)
2	A2G	A	952	2	14,14,15	0.62	0	15,19,21	0.92	0
2	FUC	A	960	2	10,10,11	0.89	1 (10%)	14,14,16	1.46	4 (28%)
2	GAL	A	961	2	12,12,12	0.84	0	17,17,17	2.39	8 (47%)
2	A2G	A	962	2	14,14,15	0.73	0	15,19,21	1.18	1 (6%)
2	FUC	B	910	2	10,10,11	0.71	0	14,14,16	1.46	2 (14%)
2	GAL	B	911	2	12,12,12	0.72	0	17,17,17	1.09	0
2	A2G	B	912	2	14,14,15	0.44	0	15,19,21	1.00	1 (6%)
2	FUC	B	940	2	10,10,11	0.88	1 (10%)	14,14,16	1.46	3 (21%)
2	GAL	B	941	2	12,12,12	0.65	0	17,17,17	1.19	3 (17%)
2	A2G	B	942	2	14,14,15	0.42	0	15,19,21	0.90	0
2	FUC	B	950	2	10,10,11	0.60	0	14,14,16	1.32	1 (7%)
2	GAL	B	951	2	12,12,12	0.50	0	17,17,17	1.00	1 (5%)
2	A2G	B	952	2	14,14,15	0.63	0	15,19,21	1.21	3 (20%)
2	FUC	B	960	2	10,10,11	0.63	0	14,14,16	0.63	0
2	GAL	B	961	2	12,12,12	0.66	0	17,17,17	1.24	1 (5%)
2	A2G	B	962	2	14,14,15	0.36	0	15,19,21	1.01	1 (6%)

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	FUC	A	910	2	-	0/0/17/20	0/1/1/1
2	GAL	A	911	2	-	0/2/22/22	0/1/1/1
2	A2G	A	912	2	-	0/6/23/26	0/1/1/1
2	FUC	A	920	2	-	0/0/17/20	0/1/1/1
2	GAL	A	921	2	-	0/2/22/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	A2G	A	922	2	-	0/6/23/26	0/1/1/1
2	FUC	A	940	2	-	0/0/17/20	0/1/1/1
2	GAL	A	941	2	1/1/5/5	0/2/22/22	0/1/1/1
2	A2G	A	942	2	-	0/6/23/26	0/1/1/1
2	FUC	A	950	2	-	0/0/17/20	0/1/1/1
2	GAL	A	951	2	1/1/5/5	0/2/22/22	0/1/1/1
2	A2G	A	952	2	-	0/6/23/26	0/1/1/1
2	FUC	A	960	2	-	0/0/17/20	0/1/1/1
2	GAL	A	961	2	-	0/2/22/22	0/1/1/1
2	A2G	A	962	2	-	0/6/23/26	0/1/1/1
2	FUC	B	910	2	-	0/0/17/20	0/1/1/1
2	GAL	B	911	2	1/1/5/5	0/2/22/22	0/1/1/1
2	A2G	B	912	2	-	0/6/23/26	0/1/1/1
2	FUC	B	940	2	-	0/0/17/20	0/1/1/1
2	GAL	B	941	2	1/1/5/5	0/2/22/22	0/1/1/1
2	A2G	B	942	2	-	0/6/23/26	0/1/1/1
2	FUC	B	950	2	-	0/0/17/20	0/1/1/1
2	GAL	B	951	2	1/1/5/5	0/2/22/22	0/1/1/1
2	A2G	B	952	2	-	0/6/23/26	0/1/1/1
2	FUC	B	960	2	-	0/0/17/20	0/1/1/1
2	GAL	B	961	2	1/1/5/5	0/2/22/22	0/1/1/1
2	A2G	B	962	2	-	0/6/23/26	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	960	FUC	O5-C1	-2.22	1.40	1.43
2	B	940	FUC	C2-C3	2.09	1.55	1.52

All (49) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	961	GAL	O3-C3-C4	-5.59	97.75	110.34
2	A	911	GAL	C1-C2-C3	-5.40	102.40	110.43
2	A	922	A2G	C1-O-C5	-5.13	105.74	112.25
2	A	921	GAL	O3-C3-C4	-4.20	100.89	110.34
2	A	951	GAL	C1-C2-C3	-3.95	104.55	110.43
2	A	921	GAL	O1-C1-O5	-3.04	101.93	110.25
2	B	940	FUC	C3-C4-C5	-3.00	104.67	109.72
2	A	961	GAL	O5-C5-C4	-2.89	104.26	109.68
2	A	921	GAL	C1-C2-C3	-2.77	106.31	110.43
2	A	961	GAL	O2-C2-C3	-2.69	104.27	110.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	921	GAL	O5-C1-C2	-2.54	105.74	109.80
2	A	961	GAL	C1-C2-C3	-2.52	106.67	110.43
2	B	941	GAL	O3-C3-C4	-2.50	104.70	110.34
2	B	940	FUC	C6-C5-C4	-2.41	108.33	113.08
2	A	911	GAL	O6-C6-C5	-2.35	103.56	111.33
2	A	921	GAL	O5-C5-C4	-2.32	105.32	109.68
2	B	941	GAL	O5-C1-C2	-2.27	106.17	109.80
2	A	961	GAL	C6-C5-C4	-2.24	107.49	113.02
2	A	960	FUC	C3-C4-C5	-2.15	106.09	109.72
2	A	920	FUC	C2-C3-C4	-2.11	107.46	111.04
2	B	912	A2G	O6-C6-C5	-2.00	104.72	111.33
2	B	910	FUC	O4-C4-C3	2.10	115.06	110.34
2	A	950	FUC	C1-C2-C3	2.11	112.04	109.54
2	B	941	GAL	O4-C4-C5	2.18	115.03	109.24
2	A	960	FUC	O3-C3-C4	2.20	115.28	110.34
2	B	952	A2G	C1-O-C5	2.22	115.06	112.25
2	A	960	FUC	C1-O5-C5	2.23	115.83	112.38
2	A	910	FUC	C1-O5-C5	2.25	115.86	112.38
2	B	952	A2G	C3-C2-N2	2.28	116.03	110.56
2	A	940	FUC	O2-C2-C1	2.34	113.89	109.21
2	B	952	A2G	C2-N2-C7	2.35	126.06	123.04
2	A	921	GAL	O5-C5-C6	2.36	112.33	106.36
2	B	961	GAL	O2-C2-C1	2.38	115.07	109.82
2	A	942	A2G	O-C5-C6	2.39	112.51	107.35
2	B	962	A2G	C1-O-C5	2.51	115.43	112.25
2	A	951	GAL	O5-C5-C6	2.54	112.77	106.36
2	B	910	FUC	O3-C3-C4	2.54	116.05	110.34
2	A	961	GAL	O5-C5-C6	2.64	113.02	106.36
2	B	940	FUC	O2-C2-C3	2.64	115.43	110.12
2	B	950	FUC	C1-C2-C3	2.64	112.67	109.54
2	B	951	GAL	O5-C5-C6	2.69	113.16	106.36
2	A	960	FUC	C1-C2-C3	2.76	112.81	109.54
2	A	961	GAL	O5-C1-C2	2.77	114.22	109.80
2	A	921	GAL	O1-C1-C2	2.79	116.70	109.21
2	A	962	A2G	O-C5-C6	2.88	113.58	107.35
2	A	910	FUC	O5-C5-C6	3.04	111.16	106.13
2	A	922	A2G	C6-C5-C4	3.33	121.24	113.02
2	A	921	GAL	O2-C2-C1	3.39	117.29	109.82
2	A	961	GAL	C4-C3-C2	3.69	117.67	110.79

All (6) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	B	951	GAL	C1
2	A	941	GAL	C1
2	A	951	GAL	C1
2	B	911	GAL	C1
2	B	941	GAL	C1
2	B	961	GAL	C1

There are no torsion outliers.

There are no ring outliers.

6 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	912	A2G	1	0
2	A	921	GAL	1	0
2	A	922	A2G	1	0
2	A	941	GAL	1	0
2	A	961	GAL	1	0
2	B	942	A2G	1	0

## 5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 1 is monoatomic - leaving 3 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	FUC	A	930	-	11,11,11	0.61	0	16,16,16	0.96	0
3	FUC	B	920	-	11,11,11	0.61	0	16,16,16	1.15	3 (18%)
3	FUC	B	930	-	11,11,11	0.52	0	16,16,16	0.89	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	FUC	A	930	-	-	0/0/20/20	0/1/1/1
3	FUC	B	920	-	-	0/0/20/20	0/1/1/1
3	FUC	B	930	-	-	0/0/20/20	0/1/1/1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	920	FUC	O5-C5-C6	2.14	111.33	106.64
3	B	920	FUC	O5-C1-C2	2.28	113.43	109.80
3	B	920	FUC	C1-O5-C5	2.49	118.23	113.57

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 [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	313/315 (99%)	-0.46	0 100 100	9, 16, 28, 35	0
1	B	313/315 (99%)	-0.47	1 (0%) 94 95	10, 16, 28, 37	0
All	All	626/630 (99%)	-0.47	1 (0%) 95 96	9, 16, 28, 37	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	277	ASN	2.0

### 6.2 Non-standard residues in protein, DNA, RNA chains [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
1	CSD	B	244	8/9	0.95	0.07	-	17,18,23,29	0
1	CSD	A	244	8/9	0.97	0.06	-	16,17,21,28	0

### 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( $\text{\AA}^2$ )	Q<0.9
2	GAL	A	941	12/12	0.79	0.21	10.72	30,40,42,44	0
2	GAL	A	961	12/12	0.80	0.20	9.83	27,45,48,55	0
2	GAL	B	941	12/12	0.88	0.14	8.38	27,32,34,35	0
2	FUC	A	940	10/11	0.91	0.10	4.16	18,21,24,24	0
2	A2G	B	952	14/15	0.85	0.24	3.24	41,43,45,45	0
2	FUC	B	950	10/11	0.94	0.08	1.42	15,17,21,22	0
2	FUC	B	940	10/11	0.93	0.08	1.33	17,20,23,24	0
2	FUC	A	950	10/11	0.97	0.08	0.95	15,17,21,22	0
2	A2G	A	962	14/15	0.86	0.13	0.93	32,38,43,45	0
2	FUC	A	960	10/11	0.96	0.08	0.48	15,16,20,20	0
2	FUC	B	910	10/11	0.94	0.07	0.25	20,21,24,24	0
2	FUC	B	960	10/11	0.94	0.07	-0.59	16,19,24,26	0
2	FUC	A	920	10/11	0.96	0.06	-0.69	15,17,18,19	0
2	FUC	A	910	10/11	0.97	0.05	-2.08	14,16,17,17	0
2	GAL	A	951	12/12	0.82	0.24	-	28,41,46,46	0
2	A2G	B	962	14/15	0.78	0.17	-	42,52,57,57	0
2	GAL	B	911	12/12	0.89	0.12	-	30,35,41,45	0
2	A2G	B	942	14/15	0.82	0.20	-	41,45,55,59	0
2	A2G	A	952	14/15	0.66	0.38	-	41,53,60,61	0
2	GAL	B	951	12/12	0.84	0.21	-	24,37,44,44	0
2	A2G	A	942	14/15	0.83	0.26	-	42,47,52,53	0
2	GAL	A	921	12/12	0.82	0.18	-	22,36,42,44	0
2	A2G	A	912	14/15	0.80	0.18	-	34,37,40,43	0
2	A2G	B	912	14/15	0.75	0.22	-	42,49,53,53	0
2	A2G	A	922	14/15	0.86	0.17	-	40,42,48,50	0
2	GAL	B	961	12/12	0.84	0.17	-	30,48,52,53	0
2	GAL	A	911	12/12	0.90	0.15	-	22,34,37,38	0

## 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
3	FUC	B	920	11/11	0.97	0.07	-0.03	17,18,19,20	0
3	FUC	A	930	11/11	0.96	0.06	-0.81	14,16,18,20	0
3	FUC	B	930	11/11	0.95	0.06	-1.94	13,16,18,19	0
4	CL	A	1000	1/1	0.98	0.08	-	35,35,35,35	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.