



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 06:54 PM GMT

PDB ID : 4N5J  
Title : Crystal structure of hemagglutinin from an H7N9 influenza virus  
Authors : Xu, R.; Wilson, I.A.  
Deposited on : 2013-10-10  
Resolution : 2.70 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

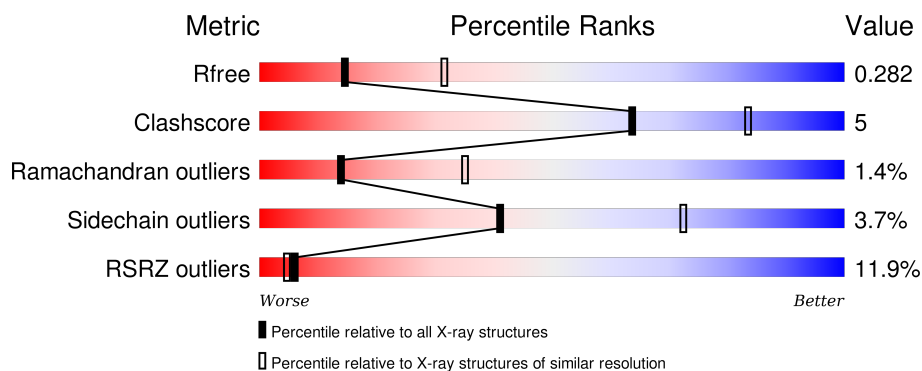
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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	2103 (2.70-2.70)
Clashscore	102246	2422 (2.70-2.70)
Ramachandran outliers	100387	2382 (2.70-2.70)
Sidechain outliers	100360	2382 (2.70-2.70)
RSRZ outliers	91569	2107 (2.70-2.70)

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	321	<div> <div>17%</div> <div>82%</div> <div>16%</div> <div>..</div> </div>
1	C	321	<div> <div>17%</div> <div>78%</div> <div>18%</div> <div>..</div> </div>
2	B	183	<div> <div>85%</div> <div>7%</div> <div>8%</div> <div>.</div> </div>
2	D	183	<div> <div>31%</div> <div>82%</div> <div>5%</div> <div>12%</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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	NAG	B	201	-	-	-	X

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 7664 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 Hemagglutinin HA1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	318	Total	C	N	O	S	0	0	0
			2427	1509	438	465	15			
1	C	317	Total	C	N	O	S	0	0	0
			2419	1505	437	462	15			

- Molecule 2 is a protein called Hemagglutinin HA2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	169	Total	C	N	O	S	0	0	0
			1373	845	241	280	7			
2	D	161	Total	C	N	O	S	0	0	0
			1319	812	229	271	7			

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	177	SER	-	EXPRESSION TAG	UNP R4NN21
B	178	GLY	-	EXPRESSION TAG	UNP R4NN21
B	179	ARG	-	EXPRESSION TAG	UNP R4NN21
B	180	LEU	-	EXPRESSION TAG	UNP R4NN21
B	181	VAL	-	EXPRESSION TAG	UNP R4NN21
B	182	PRO	-	EXPRESSION TAG	UNP R4NN21
B	183	ARG	-	EXPRESSION TAG	UNP R4NN21
D	177	SER	-	EXPRESSION TAG	UNP R4NN21
D	178	GLY	-	EXPRESSION TAG	UNP R4NN21
D	179	ARG	-	EXPRESSION TAG	UNP R4NN21
D	180	LEU	-	EXPRESSION TAG	UNP R4NN21
D	181	VAL	-	EXPRESSION TAG	UNP R4NN21
D	182	PRO	-	EXPRESSION TAG	UNP R4NN21
D	183	ARG	-	EXPRESSION TAG	UNP R4NN21

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

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	3	Total	C	N	O	0	0
			39	22	2	15		

- Molecule 4 is SUGAR (N-ACETYL-D-GLUCOSAMINE) (three-letter code: NAG) (formula:  $C_8H_{15}NO_6$ ).



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

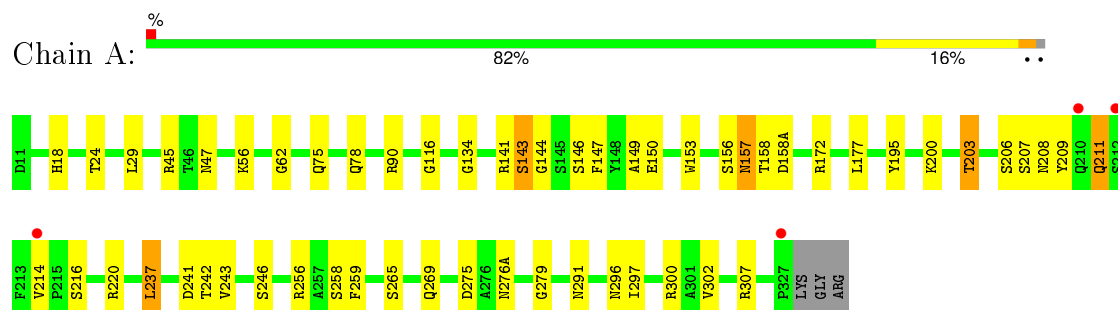
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	30	Total	O	0	0
			30	30		
5	B	26	Total	O	0	0
			26	26		
5	C	2	Total	O	0	0
			2	2		
5	D	1	Total	O	0	0
			1	1		

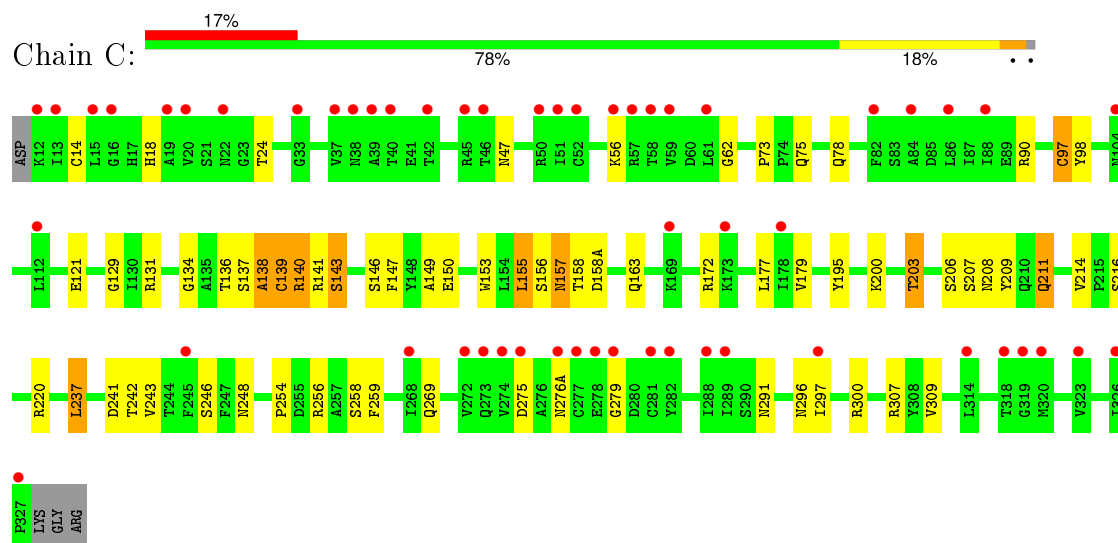
### 3 Residue-property plots [i](#)

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.

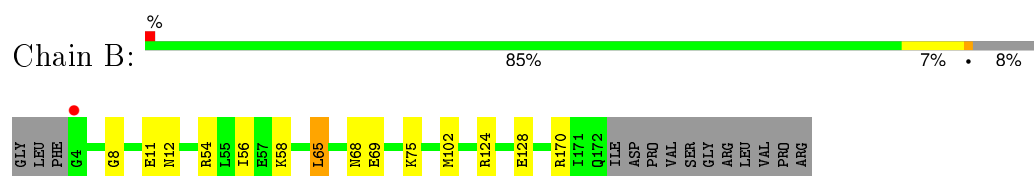
- Molecule 1: Hemagglutinin HA1



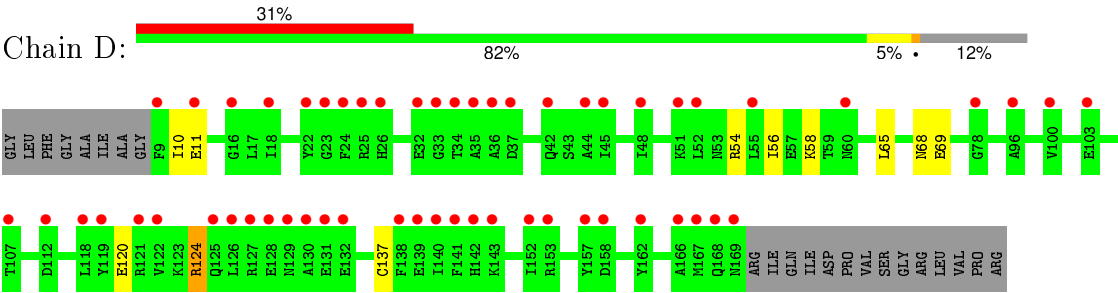
- Molecule 1: Hemagglutinin HA1



- Molecule 2: Hemagglutinin HA2



- Molecule 2: Hemagglutinin HA2



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 3	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	154.51Å 154.51Å 154.51Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.59 – 2.70 46.59 – 2.70	Depositor EDS
% Data completeness (in resolution range)	99.8 (46.59-2.70) 99.6 (46.59-2.70)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.47 (at 2.69Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, $R_{free}$	0.225 , 0.277 0.231 , 0.282	Depositor DCC
$R_{free}$ test set	1718 reflections (5.35%)	DCC
Wilson B-factor (Å <sup>2</sup> )	63.3	Xtriage
Anisotropy	0.000	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.27 , 51.4	EDS
Estimated twinning fraction	0.031 for l,-k,h	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 33873 reflections	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	7664	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	112.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.87% 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: BMA, NAG

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	0.24	0/2474	0.42	0/3345
1	C	0.25	0/2466	0.42	0/3334
2	B	0.24	0/1396	0.39	0/1881
2	D	0.22	0/1342	0.36	0/1809
All	All	0.24	0/7678	0.40	0/10369

There are no bond length outliers.

There are no bond angle outliers.

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	2427	0	2387	31	0
1	C	2419	0	2385	40	0
2	B	1373	0	1273	12	0
2	D	1319	0	1215	8	0
3	A	39	0	34	0	0
4	A	14	0	13	0	0
4	B	14	0	13	1	0
5	A	30	0	0	0	0
5	B	26	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	C	2	0	0	0	0
5	D	1	0	0	0	0
All	All	7664	0	7320	77	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 (77) 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:C:291:ASN:OD1	2:D:58:LYS:NZ	2.13	0.81
1:C:195:TYR:O	1:C:200:LYS:NZ	2.16	0.75
1:C:56:LYS:NZ	1:C:279:GLY:O	2.20	0.75
1:A:216:SER:O	1:A:220:ARG:NH2	2.19	0.75
1:C:275:ASP:OD1	1:C:276(A):ASN:ND2	2.21	0.73
1:A:291:ASN:OD1	2:B:58:LYS:NZ	2.20	0.72
2:B:128:GLU:HG3	2:B:170:ARG:NH1	2.04	0.72
1:A:275:ASP:OD1	1:A:276(A):ASN:ND2	2.22	0.72
1:A:56:LYS:NZ	1:A:279:GLY:O	2.21	0.72
1:C:216:SER:O	1:C:220:ARG:NH2	2.24	0.70
1:C:138:ALA:O	1:C:140:ARG:N	2.26	0.69
2:B:128:GLU:HG3	2:B:170:ARG:HH12	1.58	0.69
2:B:12:ASN:ND2	5:B:320:HOH:O	2.26	0.66
1:C:140:ARG:HH11	1:C:140:ARG:HG2	1.63	0.64
1:A:156:SER:O	1:A:157:ASN:HB2	1.98	0.64
1:A:195:TYR:O	1:A:200:LYS:NZ	2.27	0.61
1:C:296:ASN:ND2	1:C:309:VAL:O	2.30	0.61
2:D:120:GLU:HB3	2:D:124:ARG:NH1	2.16	0.60
1:C:129:GLY:O	1:C:157:ASN:ND2	2.39	0.55
1:C:134:GLY:HA3	1:C:153:TRP:HB3	1.88	0.55
1:A:203:THR:HG23	1:A:246:SER:HB3	1.87	0.55
1:A:150:GLU:OE1	1:A:256:ARG:HD3	2.07	0.55
1:C:146:SER:OG	1:C:147:PHE:N	2.40	0.54
1:A:241:ASP:OD1	1:A:242:THR:N	2.38	0.53
1:A:45:ARG:NH1	1:A:296:ASN:OD1	2.41	0.53
1:C:98:TYR:N	1:C:139:CYS:SG	2.82	0.53
1:A:177:LEU:HB3	1:A:258:SER:HB2	1.91	0.53
1:A:206:SER:HB3	1:A:209:TYR:HB3	1.90	0.53
1:C:177:LEU:HB3	1:C:258:SER:HB2	1.91	0.52
1:A:146:SER:OG	1:A:147:PHE:N	2.41	0.52
1:C:206:SER:OG	1:C:207:SER:N	2.40	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:134:GLY:HA3	1:A:153:TRP:HB3	1.92	0.52
1:C:47:ASN:HB2	1:C:297:ILE:HD13	1.92	0.51
1:A:237:LEU:HG	1:A:243:VAL:HG13	1.92	0.51
1:A:206:SER:OG	1:A:207:SER:N	2.43	0.51
1:C:203:THR:HG23	1:C:246:SER:HB3	1.93	0.50
1:A:300:ARG:NH1	2:B:69:GLU:OE2	2.35	0.49
1:C:241:ASP:OD1	1:C:242:THR:N	2.40	0.49
1:C:131:ARG:HB2	1:C:155:LEU:HB2	1.95	0.49
1:C:163:GLN:NE2	1:C:248:ASN:HB3	2.28	0.49
1:C:206:SER:HB3	1:C:209:TYR:HB3	1.95	0.48
1:A:291:ASN:HB3	2:B:56:ILE:HG13	1.96	0.48
1:C:150:GLU:OE1	1:C:256:ARG:HD3	2.13	0.48
1:C:291:ASN:HA	2:D:58:LYS:HZ2	1.79	0.47
1:C:209:TYR:CZ	1:C:211:GLN:HB2	2.49	0.47
1:A:237:LEU:HD22	1:A:241:ASP:HB3	1.96	0.47
1:A:307:ARG:HH11	1:A:307:ARG:HG2	1.80	0.47
1:A:172:ARG:HD3	1:A:259:PHE:CZ	2.50	0.46
1:C:291:ASN:HB3	2:D:56:ILE:HG13	1.97	0.46
1:C:269:GLN:HE22	2:D:68:ASN:CG	2.19	0.46
1:C:141:ARG:HH12	1:C:149:ALA:HB2	1.80	0.46
1:A:302:VAL:HG11	2:B:65:LEU:HD13	1.97	0.46
1:C:73:PRO:HB3	1:C:97:CYS:SG	2.57	0.45
1:A:291:ASN:HA	2:B:58:LYS:HZ2	1.81	0.45
1:C:207:SER:HB2	1:C:241:ASP:OD2	2.17	0.45
1:C:14:CYS:HA	2:D:137:CYS:HA	1.99	0.45
1:C:121:GLU:OE2	1:C:172:ARG:HD2	2.15	0.45
1:C:307:ARG:HG2	1:C:307:ARG:HH11	1.81	0.45
1:A:47:ASN:HB2	1:A:297:ILE:HD13	1.97	0.44
1:C:141:ARG:O	1:C:143:SER:OG	2.30	0.44
1:A:209:TYR:CZ	1:A:211:GLN:HB2	2.53	0.44
1:C:300:ARG:NH1	2:D:69:GLU:OE2	2.36	0.44
1:A:143:SER:OG	1:A:144:GLY:N	2.51	0.44
1:A:141:ARG:HH12	1:A:149:ALA:HB2	1.84	0.43
2:B:8:GLY:O	2:B:12:ASN:HB3	2.18	0.43
1:C:172:ARG:HD3	1:C:259:PHE:CZ	2.53	0.43
1:C:237:LEU:HG	1:C:243:VAL:HG13	2.00	0.43
1:C:140:ARG:NH1	1:C:140:ARG:HG2	2.31	0.43
1:C:62:GLY:HA2	1:C:90:ARG:HG3	2.00	0.43
1:A:116:GLY:HA2	1:A:265:SER:HB3	2.01	0.43
1:C:179:VAL:O	1:C:254:PRO:HB3	2.18	0.43
1:A:269:GLN:HE22	2:B:68:ASN:CG	2.21	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:291:ASN:HA	2:D:58:LYS:NZ	2.33	0.42
1:A:29:LEU:HD21	2:B:102:MET:HA	2.01	0.42
2:B:75:LYS:HD3	4:B:201:NAG:H81	2.01	0.42
1:A:62:GLY:HA2	1:A:90:ARG:HG3	2.02	0.41
1:C:140:ARG:HH11	1:C:140:ARG:CG	2.33	0.41

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	316/321 (98%)	295 (93%)	17 (5%)	4 (1%)	15	37
1	C	315/321 (98%)	292 (93%)	17 (5%)	6 (2%)	10	25
2	B	167/183 (91%)	159 (95%)	7 (4%)	1 (1%)	30	59
2	D	159/183 (87%)	151 (95%)	6 (4%)	2 (1%)	15	37
All	All	957/1008 (95%)	897 (94%)	47 (5%)	13 (1%)	14	35

All (13) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	157	ASN
1	A	158(A)	ASP
1	C	138	ALA
1	C	139	CYS
1	C	157	ASN
1	C	158(A)	ASP
2	D	10	ILE
2	D	11	GLU
1	A	208	ASN
1	A	143	SER

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Mol	Chain	Res	Type
2	B	11	GLU
1	C	208	ASN
1	C	143	SER

### 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	267/269 (99%)	258 (97%)	9 (3%)	44	75
1	C	266/269 (99%)	251 (94%)	15 (6%)	26	54
2	B	145/157 (92%)	142 (98%)	3 (2%)	61	87
2	D	141/157 (90%)	138 (98%)	3 (2%)	61	87
All	All	819/852 (96%)	789 (96%)	30 (4%)	41	72

All (30) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	HIS
1	A	24	THR
1	A	75	GLN
1	A	78	GLN
1	A	158	THR
1	A	203	THR
1	A	211	GLN
1	A	214	VAL
1	A	237	LEU
2	B	54	ARG
2	B	65	LEU
2	B	124	ARG
1	C	18	HIS
1	C	24	THR
1	C	75	GLN
1	C	78	GLN
1	C	97	CYS
1	C	136	THR

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Mol	Chain	Res	Type
1	C	137	SER
1	C	140	ARG
1	C	155	LEU
1	C	156	SER
1	C	158	THR
1	C	203	THR
1	C	211	GLN
1	C	214	VAL
1	C	237	LEU
2	D	54	ARG
2	D	65	LEU
2	D	124	ARG

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	276(A)	ASN
1	C	157	ASN
1	C	276(A)	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 5.5 Carbohydrates [i](#)

3 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
3	NAG	A	401	1,3	14,14,15	0.63	1 (7%)	15,19,21	0.51	0
3	NAG	A	402	3	14,14,15	0.23	0	15,19,21	0.46	0
3	BMA	A	403	3	11,11,12	0.83	0	14,15,17	0.86	1 (7%)

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	NAG	A	401	1,3	-	0/6/23/26	0/1/1/1
3	NAG	A	402	3	-	0/6/23/26	0/1/1/1
3	BMA	A	403	3	-	0/2/19/22	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	401	NAG	O5-C1	-2.27	1.39	1.43

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	403	BMA	O2-C2-C3	-2.06	105.98	110.12

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 [i](#)

2 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
4	NAG	A	404	1	14,14,15	0.28	0	15,19,21	0.36	0
4	NAG	B	201	2	14,14,15	0.34	0	15,19,21	0.28	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
4	NAG	A	404	1	-	0/6/23/26	0/1/1/1
4	NAG	B	201	2	-	0/6/23/26	0/1/1/1

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.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	201	NAG	1	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 ⓘ

### 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	318/321 (99%)	-0.09	4 (1%) 79 79	40, 66, 112, 167	0
1	C	317/321 (98%)	1.03	54 (17%) 2 1	77, 132, 201, 258	0
2	B	169/183 (92%)	-0.00	1 (0%) 90 91	37, 62, 100, 145	0
2	D	161/183 (87%)	1.91	56 (34%) 0 0	101, 190, 249, 272	0
All	All	965/1008 (95%)	0.63	115 (11%) 6 5	37, 99, 214, 272	0

All (115) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	327	PRO	12.9
1	C	319	GLY	10.6
2	D	138	PHE	10.3
2	D	168	GLN	8.7
1	C	289	ILE	8.7
2	D	122	VAL	8.7
2	D	126	LEU	8.2
2	D	130	ALA	7.1
1	C	58	THR	7.1
2	D	35	ALA	7.1
2	D	24	PHE	7.0
2	B	4	GLY	6.2
2	D	143	LYS	6.2
2	D	131	GLU	6.2
2	D	36	ALA	6.1
1	C	288	ILE	5.9
1	C	13	ILE	5.9
2	D	23	GLY	5.8
2	D	140	ILE	5.7
2	D	157	TYR	5.5
1	C	326	ILE	5.4

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Mol	Chain	Res	Type	RSRZ
1	C	51	ILE	5.1
2	D	16	GLY	4.9
1	C	86	LEU	4.3
1	C	22	ASN	4.3
1	C	37	VAL	4.1
1	C	84	ALA	4.1
1	C	320	MET	3.9
2	D	166	ALA	3.9
2	D	26	HIS	3.9
1	C	16	GLY	3.9
1	C	272	VAL	3.8
2	D	52	LEU	3.7
2	D	60	ASN	3.7
2	D	129	ASN	3.7
1	C	173	LYS	3.7
1	C	274	VAL	3.7
1	C	15	LEU	3.6
1	C	279	GLY	3.6
2	D	121	ARG	3.5
2	D	33	GLY	3.5
2	D	18	ILE	3.4
2	D	119	TYR	3.4
2	D	9	PHE	3.4
1	C	323	VAL	3.4
1	A	212	SER	3.3
2	D	100	VAL	3.3
2	D	132	GLU	3.2
2	D	44	ALA	3.2
2	D	139	GLU	3.2
2	D	167	MET	3.2
1	C	57	ARG	3.1
1	C	297	ILE	3.1
2	D	48	ILE	3.1
1	C	169	LYS	3.1
1	C	277	CYS	3.1
1	C	82	PHE	3.1
2	D	107	THR	3.0
2	D	152	ILE	3.0
1	C	33	GLY	3.0
2	D	118	LEU	3.0
2	D	51	LYS	3.0
1	C	112	LEU	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	327	PRO	2.9
2	D	112	ASP	2.9
1	C	45	ARG	2.9
2	D	25	ARG	2.9
1	C	104	ASN	2.9
2	D	34	THR	2.8
2	D	153	ARG	2.8
2	D	11	GLU	2.7
1	C	40	THR	2.7
1	C	314	LEU	2.7
2	D	127	ARG	2.7
2	D	55	LEU	2.7
1	C	56	LYS	2.7
1	C	88	ILE	2.7
2	D	32	GLU	2.7
2	D	169	ASN	2.7
2	D	158	ASP	2.7
2	D	37	ASP	2.6
1	C	42	THR	2.6
1	C	281	CYS	2.6
2	D	103	GLU	2.6
1	C	278	GLU	2.6
1	C	61	LEU	2.6
2	D	142	HIS	2.5
1	C	12	LYS	2.5
2	D	42	GLN	2.5
2	D	162	TYR	2.5
1	C	275	ASP	2.5
1	C	276(A)	ASN	2.4
2	D	96	ALA	2.4
1	C	38	ASN	2.4
2	D	45	ILE	2.4
1	C	268	ILE	2.3
1	C	178	ILE	2.3
1	C	318	THR	2.3
1	C	39	ALA	2.3
2	D	78	GLY	2.3
1	C	46	THR	2.3
1	C	282	TYR	2.3
2	D	125	GLN	2.3
1	C	52	CYS	2.2
1	C	20	VAL	2.2

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Mol	Chain	Res	Type	RSRZ
1	C	273	GLN	2.2
1	C	245	PHE	2.2
2	D	128	GLU	2.2
1	A	214	VAL	2.2
1	C	50	ARG	2.1
1	C	19	ALA	2.1
2	D	22	TYR	2.1
1	C	59	VAL	2.0
2	D	141	PHE	2.0
1	A	210	GLN	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 6.3 Carbohydrates [i](#)

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
3	BMA	A	403	11/12	0.80	0.15	-	119,150,157,159	0
3	NAG	A	402	14/15	0.74	0.30	-	119,141,156,156	0
3	NAG	A	401	14/15	0.90	0.17	-	93,112,127,137	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
4	NAG	B	201	14/15	0.85	0.26	2.64	76,92,111,115	0
4	NAG	A	404	14/15	0.72	0.22	-	144,161,171,174	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.