



# Full wwPDB X-ray Structure Validation Report ⓘ

Apr 29, 2024 – 07:08 pm BST

PDB ID : 5FQE  
Title : The details of glycolipid glycan hydrolysis by the structural analysis of a family 123 glycoside hydrolase from *Clostridium perfringens*  
Authors : Noach, I.; Pluvinage, B.; Laurie, C.; Abe, K.T.; Alteen, M.; Vocadlo, D.J.; Boraston, A.B.  
Deposited on : 2015-12-10  
Resolution : 1.53 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

---

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36.2  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

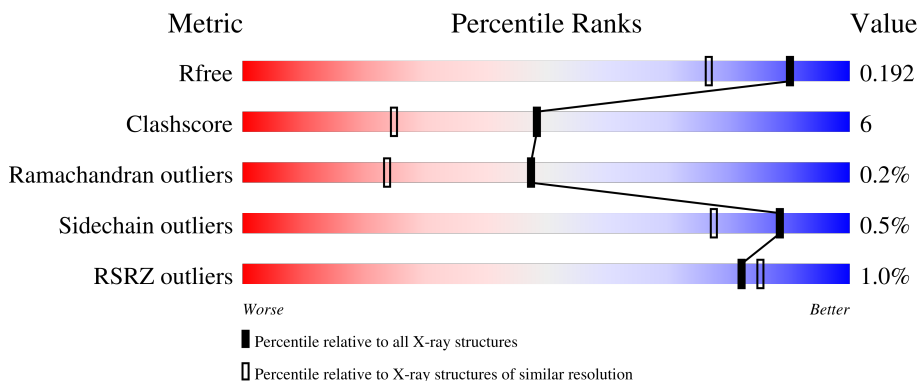
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.53 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	2556 (1.56-1.52)
Clashscore	141614	2634 (1.56-1.52)
Ramachandran outliers	138981	2580 (1.56-1.52)
Sidechain outliers	138945	2577 (1.56-1.52)
RSRZ outliers	127900	2524 (1.56-1.52)

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 of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	610	
1	B	610	

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
3	BR	A	1594	-	-	X	-
3	BR	A	1595	-	-	X	-
3	BR	A	1619	-	-	X	-
3	BR	A	1621	-	-	X	-
3	BR	A	1625	-	-	X	-
3	BR	A	1626	-	-	X	-
3	BR	A	1640	-	-	X	-
3	BR	A	1644	-	-	X	-
3	BR	A	1646	-	-	X	-
3	BR	B	1590	-	-	X	-
3	BR	B	1591	-	-	X	-
3	BR	B	1597	-	-	X	-
3	BR	B	1602	-	-	X	-
3	BR	B	1618	-	-	X	-
3	BR	B	1620	-	-	X	-
3	BR	B	1632	-	-	X	-
3	BR	B	1636	-	-	X	-

## 2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 11172 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 BETA-N-ACETYLGALACTOSAMINIDASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	580	4886	3103	806	963	14	0	25	0
1	B	579	4856	3085	804	953	14	10	22	0

There are 46 discrepancies between the modelled and reference sequences:

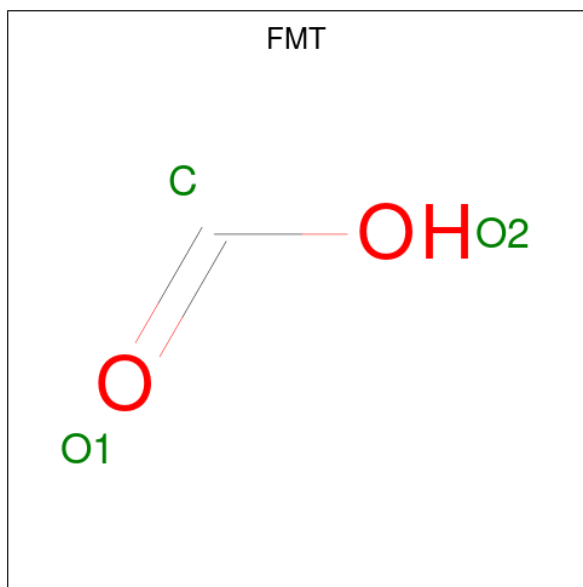
Chain	Residue	Modelled	Actual	Comment	Reference
A	-22	MET	-	expression tag	UNP A0A0H2YNR7
A	-21	GLY	-	expression tag	UNP A0A0H2YNR7
A	-20	SER	-	expression tag	UNP A0A0H2YNR7
A	-19	SER	-	expression tag	UNP A0A0H2YNR7
A	-18	HIS	-	expression tag	UNP A0A0H2YNR7
A	-17	HIS	-	expression tag	UNP A0A0H2YNR7
A	-16	HIS	-	expression tag	UNP A0A0H2YNR7
A	-15	HIS	-	expression tag	UNP A0A0H2YNR7
A	-14	HIS	-	expression tag	UNP A0A0H2YNR7
A	-13	HIS	-	expression tag	UNP A0A0H2YNR7
A	-12	SER	-	expression tag	UNP A0A0H2YNR7
A	-11	SER	-	expression tag	UNP A0A0H2YNR7
A	-10	GLY	-	expression tag	UNP A0A0H2YNR7
A	-9	LEU	-	expression tag	UNP A0A0H2YNR7
A	-8	VAL	-	expression tag	UNP A0A0H2YNR7
A	-7	PRO	-	expression tag	UNP A0A0H2YNR7
A	-6	ARG	-	expression tag	UNP A0A0H2YNR7
A	-5	GLY	-	expression tag	UNP A0A0H2YNR7
A	-4	SER	-	expression tag	UNP A0A0H2YNR7
A	-3	HIS	-	expression tag	UNP A0A0H2YNR7
A	-2	MET	-	expression tag	UNP A0A0H2YNR7
A	-1	ALA	-	expression tag	UNP A0A0H2YNR7
A	0	SER	-	expression tag	UNP A0A0H2YNR7
B	-22	MET	-	expression tag	UNP A0A0H2YNR7
B	-21	GLY	-	expression tag	UNP A0A0H2YNR7

*Continued on next page...*

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
B	-20	SER	-	expression tag	UNP A0A0H2YNR7
B	-19	SER	-	expression tag	UNP A0A0H2YNR7
B	-18	HIS	-	expression tag	UNP A0A0H2YNR7
B	-17	HIS	-	expression tag	UNP A0A0H2YNR7
B	-16	HIS	-	expression tag	UNP A0A0H2YNR7
B	-15	HIS	-	expression tag	UNP A0A0H2YNR7
B	-14	HIS	-	expression tag	UNP A0A0H2YNR7
B	-13	HIS	-	expression tag	UNP A0A0H2YNR7
B	-12	SER	-	expression tag	UNP A0A0H2YNR7
B	-11	SER	-	expression tag	UNP A0A0H2YNR7
B	-10	GLY	-	expression tag	UNP A0A0H2YNR7
B	-9	LEU	-	expression tag	UNP A0A0H2YNR7
B	-8	VAL	-	expression tag	UNP A0A0H2YNR7
B	-7	PRO	-	expression tag	UNP A0A0H2YNR7
B	-6	ARG	-	expression tag	UNP A0A0H2YNR7
B	-5	GLY	-	expression tag	UNP A0A0H2YNR7
B	-4	SER	-	expression tag	UNP A0A0H2YNR7
B	-3	HIS	-	expression tag	UNP A0A0H2YNR7
B	-2	MET	-	expression tag	UNP A0A0H2YNR7
B	-1	ALA	-	expression tag	UNP A0A0H2YNR7
B	0	SER	-	expression tag	UNP A0A0H2YNR7

- Molecule 2 is FORMIC ACID (three-letter code: FMT) (formula: CH<sub>2</sub>O<sub>2</sub>).



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

Continued on next page...

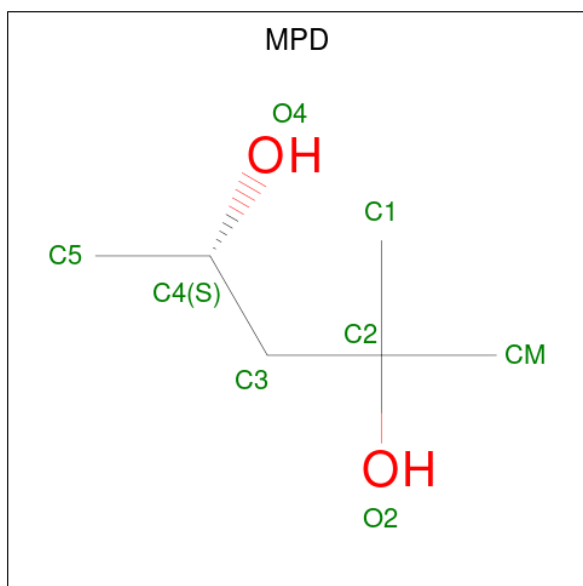
Continued from previous page...

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 3 1 2	0	0
2	B	1	Total C O 3 1 2	0	0
2	B	1	Total C O 3 1 2	0	0

- Molecule 3 is BROMIDE ION (three-letter code: BR) (formula: Br).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	73	Total Br 73 73	0	0
3	B	60	Total Br 60 60	0	0

- Molecule 4 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total C O 8 6 2	0	0

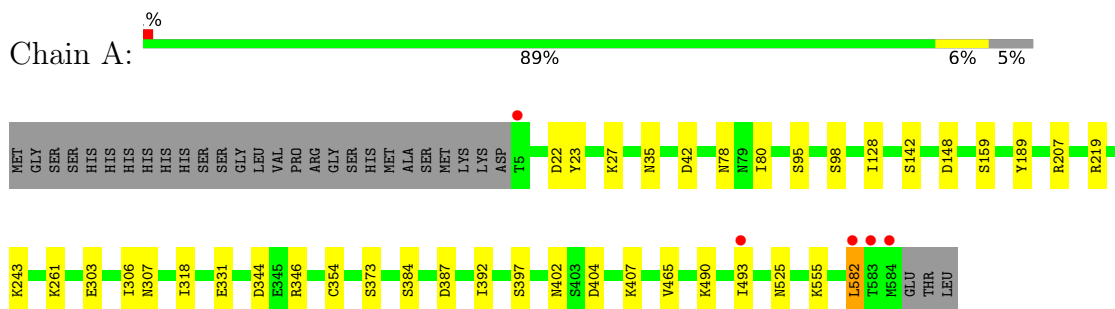
- Molecule 5 is water.

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
5	A	674	Total 674	O 674	0	0
5	B	603	Total 603	O 603	0	1

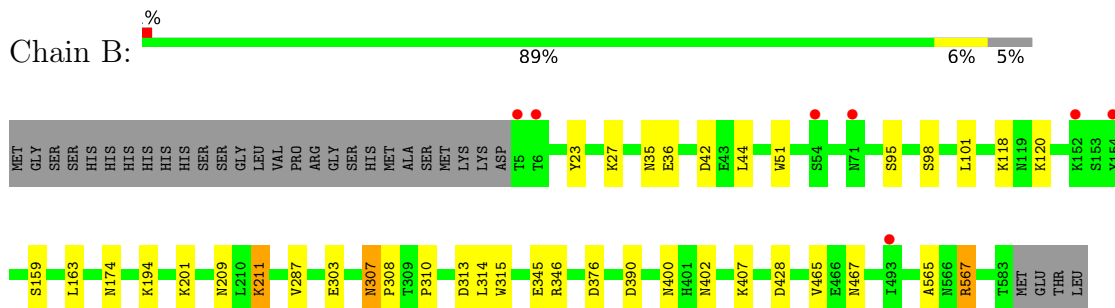
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide 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: BETA-N-ACETYL GALACTOSAMINIDASE



- Molecule 1: BETA-N-ACETYL GALACTOSAMINIDASE





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	85.42Å 115.03Å 135.58Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	87.71 – 1.53 42.71 – 1.53	Depositor EDS
% Data completeness (in resolution range)	98.5 (87.71-1.53) 98.5 (42.71-1.53)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.98 (at 1.53Å)	Xtrriage
Refinement program	REFMAC 5.8.0135	Depositor
R, $R_{free}$	0.158 , 0.185 0.168 , 0.192	Depositor DCC
$R_{free}$ test set	9845 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	13.7	Xtrriage
Anisotropy	0.009	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 50.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	11172	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	17.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.22% 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: BR, MPD, FMT

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	0.87	2/5027 (0.0%)	0.92	8/6828 (0.1%)
1	B	0.86	3/5003 (0.1%)	0.93	10/6792 (0.1%)
All	All	0.86	5/10030 (0.0%)	0.92	18/13620 (0.1%)

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	201	LYS	CD-CE	-9.35	1.27	1.51
1	B	118	LYS	CD-CE	-9.21	1.28	1.51
1	A	142	SER	CB-OG	-6.07	1.34	1.42
1	B	120	LYS	CD-CE	-5.38	1.37	1.51
1	A	354	CYS	CB-SG	-5.26	1.73	1.81

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	118	LYS	CD-CE-NZ	-9.34	90.23	111.70
1	B	567	ARG	NE-CZ-NH1	7.14	123.87	120.30
1	B	118	LYS	CG-CD-CE	6.68	131.93	111.90
1	A	42	ASP	CB-CG-OD1	6.43	124.09	118.30
1	B	346[A]	ARG	NE-CZ-NH2	-6.42	117.09	120.30
1	B	346[B]	ARG	NE-CZ-NH2	-6.42	117.09	120.30
1	B	390	ASP	CB-CG-OD1	-6.00	112.90	118.30
1	A	207	ARG	NE-CZ-NH2	-5.88	117.36	120.30
1	A	148	ASP	CB-CG-OD1	5.82	123.54	118.30
1	A	219	ARG	NE-CZ-NH2	-5.78	117.41	120.30
1	A	148	ASP	CB-CG-OD2	-5.52	113.33	118.30
1	B	101	LEU	CA-CB-CG	5.47	127.88	115.30
1	B	313	ASP	CB-CG-OD1	5.39	123.15	118.30
1	B	211	LYS	CD-CE-NZ	5.30	123.88	111.70

*Continued on next page...*

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	387	ASP	CB-CG-OD1	5.11	122.90	118.30
1	B	42	ASP	CB-CG-OD2	-5.07	113.73	118.30
1	A	404	ASP	CB-CG-OD1	5.04	122.84	118.30
1	A	219	ARG	NE-CZ-NH1	5.03	122.82	120.30

There are no chirality outliers.

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	4886	0	4632	37	1
1	B	4856	0	4619	40	0
2	A	6	0	2	0	0
2	B	6	0	2	0	0
3	A	73	0	0	39	0
3	B	60	0	0	35	2
4	B	8	0	14	2	0
5	A	674	0	0	17	3
5	B	603	0	0	22	2
All	All	11172	0	9269	115	4

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.

All (115) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:B:1597:BR:BR	3:B:1612:BR:BR	1.60	1.58
3:A:1618:BR:BR	3:A:1619:BR:BR	1.58	1.58
1:B:402[B]:ASN:HB3	3:B:1636:BR:BR	1.72	1.45
1:A:525[B]:ASN:ND2	3:A:1621:BR:BR	2.12	1.36
3:B:1595:BR:BR	3:B:1608:BR:BR	2.53	1.36
1:B:211:LYS:HE3	3:B:1620:BR:BR	1.87	1.29
3:A:1625:BR:BR	5:A:2159:HOH:O	2.07	1.27

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1636:BR:BR	5:A:2035:HOH:O	2.05	1.24
3:A:1804:BR:BR	5:A:2330:HOH:O	2.11	1.22
3:A:1632:BR:BR	3:A:1633:BR:BR	2.68	1.22
3:A:1597:BR:BR	5:A:2139:HOH:O	2.13	1.22
3:A:1640:BR:BR	5:A:2153:HOH:O	2.15	1.20
3:B:1602:BR:BR	5:B:2121:HOH:O	2.16	1.17
3:A:1613:BR:BR	3:A:1802:BR:BR	2.72	1.17
3:B:1616:BR:BR	5:B:2271:HOH:O	2.20	1.15
3:B:1594:BR:BR	5:B:2360:HOH:O	2.20	1.15
1:B:307[B]:ASN:ND2	3:B:1597:BR:BR	2.33	1.14
1:B:211:LYS:CE	3:B:1620:BR:BR	2.52	1.12
1:B:402[B]:ASN:CB	3:B:1636:BR:BR	2.56	1.09
1:A:525[B]:ASN:CG	3:A:1621:BR:BR	2.45	1.09
1:B:303:GLU:OE1	3:B:1591:BR:BR	2.25	1.09
3:A:1642:BR:BR	5:A:2559:HOH:O	2.25	1.08
3:A:1626:BR:BR	5:A:2124:HOH:O	2.23	1.07
3:A:1629:BR:BR	3:A:1646:BR:BR	2.85	1.04
1:A:331:GLU:OE1	3:A:1614:BR:BR	2.31	1.04
3:B:1638:BR:BR	5:B:2224:HOH:O	2.33	1.00
1:A:303[A]:GLU:OE1	3:A:1594:BR:BR	2.37	0.98
1:A:344[B]:ASP:OD2	1:A:346:ARG:NH1	1.97	0.96
1:A:525[B]:ASN:OD1	3:A:1621:BR:BR	2.39	0.95
1:B:307[B]:ASN:OD1	5:B:2359:HOH:O	1.84	0.95
3:B:1592:BR:BR	3:B:1801:BR:BR	3.00	0.90
1:A:402[B]:ASN:HB3	5:A:2527:HOH:O	1.70	0.89
3:B:1633:BR:BR	5:B:2339:HOH:O	2.46	0.88
3:B:1596:BR:BR	3:B:1806:BR:BR	3.02	0.88
1:B:467[A]:ASN:ND2	5:B:2510:HOH:O	2.08	0.87
3:A:1638:BR:BR	5:A:2380:HOH:O	2.47	0.86
1:B:98:SER:OG	3:B:1611:BR:BR	2.50	0.84
3:A:1800:BR:BR	3:A:1805:BR:BR	3.05	0.84
3:A:1626:BR:BR	3:A:1809:BR:BR	3.06	0.83
3:A:1595:BR:BR	3:A:1605:BR:BR	3.06	0.83
1:B:211:LYS:HE2	3:B:1620:BR:BR	2.35	0.82
3:B:1632:BR:BR	5:B:2489:HOH:O	2.54	0.80
3:A:1622:BR:BR	5:A:2316:HOH:O	2.57	0.78
1:A:307[B]:ASN:ND2	3:A:1595:BR:BR	2.74	0.74
3:B:1622:BR:BR	5:B:2341:HOH:O	2.60	0.74
1:B:402[B]:ASN:ND2	3:B:1636:BR:BR	2.78	0.72
1:B:307[B]:ASN:CG	3:B:1597:BR:BR	2.83	0.71
3:B:1591:BR:BR	3:B:1605:BR:BR	3.18	0.71

Continued on next page...

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:493:ILE:O	1:A:493:ILE:HG13	1.90	0.71
1:B:35[B]:ASN:OD1	5:B:2045:HOH:O	2.07	0.71
1:B:314:LEU:HD23	5:B:2360:HOH:O	1.91	0.71
3:A:1806:BR:BR	5:A:2276:HOH:O	2.63	0.70
1:A:243:LYS:HE3	5:A:2357:HOH:O	1.91	0.69
1:B:314:LEU:CD2	5:B:2360:HOH:O	2.40	0.68
3:A:1610:BR:BR	5:B:2570:HOH:O	2.67	0.66
1:B:307[B]:ASN:OD1	3:B:1597:BR:BR	2.68	0.66
1:A:555:LYS:HD3	3:A:1646:BR:BR	2.51	0.66
3:B:1597:BR:BR	5:B:2359:HOH:O	2.69	0.65
3:A:1645:BR:BR	5:A:2531:HOH:O	2.69	0.65
3:B:1631:BR:BR	5:B:2465:HOH:O	2.70	0.65
1:A:261[B]:LYS:HD2	3:A:1644:BR:BR	2.52	0.65
1:A:243:LYS:CE	5:A:2357:HOH:O	2.46	0.64
1:A:582:LEU:HG	3:A:1620:BR:BR	2.55	0.62
1:B:35[A]:ASN:ND2	1:B:159:SER:OG	2.33	0.61
1:A:261[B]:LYS:CE	3:A:1644:BR:BR	3.04	0.60
1:A:344[B]:ASP:OD2	1:A:346:ARG:CZ	2.51	0.59
1:A:98:SER:OG	3:A:1611:BR:BR	2.76	0.58
3:A:1594:BR:BR	3:A:1609:BR:BR	3.33	0.57
1:A:397:SER:O	3:A:1643:BR:BR	2.79	0.55
1:B:174[B]:ASN:OD1	3:B:1590:BR:BR	2.80	0.55
4:B:1639:MPD:H52	5:B:2392:HOH:O	2.09	0.53
1:A:306:ILE:CD1	1:A:318:ILE:HD13	2.40	0.52
1:A:407[A]:LYS:NZ	1:A:407[A]:LYS:CB	2.74	0.51
1:A:407[A]:LYS:HZ2	1:A:407[A]:LYS:HB2	1.77	0.50
1:B:23:TYR:CE2	1:B:27:LYS:HD2	2.45	0.50
1:B:23:TYR:CZ	1:B:27:LYS:HD2	2.46	0.50
1:B:174[B]:ASN:ND2	3:B:1590:BR:BR	3.00	0.49
5:A:2494:HOH:O	3:B:1636:BR:BR	2.75	0.49
1:A:407[A]:LYS:CB	1:A:407[A]:LYS:HZ2	2.26	0.49
1:B:95:SER:OG	3:B:1602:BR:BR	2.83	0.49
1:A:23:TYR:CE2	1:A:27:LYS:HD2	2.48	0.48
1:B:567:ARG:HA	3:B:1618:BR:BR	2.68	0.48
1:A:22:ASP:OD1	3:A:1628:BR:BR	2.87	0.48
1:A:303[A]:GLU:CD	3:A:1594:BR:BR	3.07	0.48
1:A:23:TYR:CZ	1:A:27:LYS:HD2	2.49	0.48
4:B:1639:MPD:H53	5:B:2272:HOH:O	2.14	0.48
1:B:565:ALA:CB	5:B:2498:HOH:O	2.60	0.48
1:A:95:SER:OG	3:A:1625:BR:BR	2.85	0.47
1:B:345:GLU:CD	1:B:376[B]:ASP:OD1	2.53	0.47

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:402[A]:ASN:HB2	3:B:1636:BR:BR	2.69	0.47
5:A:2213:HOH:O	1:B:400:ASN:HB2	2.14	0.46
1:A:261[B]:LYS:CD	3:A:1644:BR:BR	3.19	0.46
1:B:428:ASP:HA	3:B:1632:BR:BR	2.72	0.45
1:A:261[B]:LYS:HE3	3:A:1644:BR:BR	2.72	0.45
1:B:565:ALA:HB3	5:B:2588:HOH:O	2.18	0.44
1:A:384:SER:HB2	3:A:1619:BR:BR	2.72	0.44
1:B:194:LYS:HG3	3:B:1599:BR:BR	2.72	0.44
1:B:402[B]:ASN:CG	3:B:1636:BR:BR	3.11	0.44
1:A:189:TYR:CZ	1:A:490[A]:LYS:HG3	2.54	0.43
1:B:27:LYS:HG2	1:B:51:TRP:CD1	2.54	0.43
1:B:314:LEU:HD21	5:B:2360:HOH:O	2.11	0.43
1:B:174[B]:ASN:CG	3:B:1590:BR:BR	3.12	0.42
1:B:407[A]:LYS:HE2	5:B:2468:HOH:O	2.19	0.42
1:A:80:ILE:HD12	1:A:128:ILE:HG12	2.02	0.42
1:A:373:SER:O	1:A:392:ILE:HA	2.19	0.42
1:A:35:ASN:HA	1:A:159:SER:O	2.20	0.42
1:A:80:ILE:HD13	1:A:128:ILE:HG23	2.02	0.42
1:B:565:ALA:HB2	5:B:2498:HOH:O	2.18	0.42
1:A:582:LEU:HD22	1:A:582:LEU:O	2.20	0.41
1:A:189:TYR:CE1	1:A:490[A]:LYS:HE3	2.55	0.41
1:B:307[A]:ASN:HA	1:B:308:PRO:HD2	1.92	0.41
1:B:36[B]:GLU:HG2	1:B:44:LEU:HD22	2.03	0.41
1:B:310:PRO:HA	1:B:315:TRP:CD2	2.55	0.41
1:B:35[B]:ASN:HA	1:B:159:SER:O	2.20	0.40
3:A:1640:BR:BR	5:A:2155:HOH:O	2.78	0.40

All (4) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:78:ASN:ND2	5:B:2581:HOH:O[3_757]	1.49	0.71
5:A:2183:HOH:O	5:B:2378:HOH:O[1_455]	2.17	0.03
3:B:1804:BR:BR	5:A:2130:HOH:O[3_747]	2.19	0.01
3:B:1618:BR:BR	5:A:2195:HOH:O[3_747]	2.19	0.01

## 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	603/610 (99%)	590 (98%)	12 (2%)	1 (0%)	47	24
1	B	599/610 (98%)	587 (98%)	11 (2%)	1 (0%)	47	24
All	All	1202/1220 (98%)	1177 (98%)	23 (2%)	2 (0%)	47	24

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	465	VAL
1	A	465	VAL

### 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	542/549 (99%)	541 (100%)	1 (0%)	93	86
1	B	539/549 (98%)	534 (99%)	5 (1%)	78	60
All	All	1081/1098 (98%)	1075 (99%)	6 (1%)	88	72

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	582	LEU
1	B	163	LEU
1	B	209	ASN
1	B	287	VAL

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	B	307[A]	ASN
1	B	307[B]	ASN

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

Mol	Chain	Res	Type
1	B	400	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](#)

There are no monosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 138 ligands modelled in this entry, 133 are monoatomic - leaving 5 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	$\# Z  > 2$
4	MPD	B	1639	-	7,7,7	0.39	0	9,10,10	0.99	0
2	FMT	B	1800	-	2,2,2	0.90	0	1,1,1	0.88	0
2	FMT	B	1584	-	2,2,2	0.47	0	1,1,1	0.79	0
2	FMT	A	1585	-	2,2,2	1.11	0	1,1,1	0.59	0
2	FMT	A	1586	-	2,2,2	0.57	0	1,1,1	0.81	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	MPD	B	1639	-	-	2/5/5/5	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	1639	MPD	C2-C3-C4-O4
4	B	1639	MPD	C2-C3-C4-C5

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	1639	MPD	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	580/610 (95%)	-0.34	5 (0%) 84 86	7, 14, 26, 62	0
1	B	579/610 (94%)	-0.23	7 (1%) 79 83	9, 15, 30, 50	5 (0%)
All	All	1159/1220 (95%)	-0.29	12 (1%) 82 85	7, 14, 28, 62	5 (0%)

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	493	ILE	5.6
1	A	584	MET	4.8
1	B	5	THR	3.7
1	A	582	LEU	3.5
1	A	5	THR	3.1
1	B	152	LYS	2.9
1	B	154	TYR	2.7
1	B	71	ASN	2.4
1	B	54	SER	2.3
1	B	493	ILE	2.3
1	A	583	THR	2.2
1	B	6	THR	2.1

### 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 monosaccharides 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	BR	B	1636	1/1	0.55	0.31	74,74,74,74	1
2	FMT	B	1800	3/3	0.69	0.13	37,37,40,44	0
3	BR	A	1628	1/1	0.74	0.30	69,69,69,69	1
4	MPD	B	1639	8/8	0.79	0.16	31,33,38,39	0
3	BR	A	1807	1/1	0.81	0.12	53,53,53,53	1
2	FMT	A	1585	3/3	0.82	0.11	31,31,33,35	0
3	BR	A	1637	1/1	0.84	0.15	51,51,51,51	1
3	BR	A	1612	1/1	0.85	0.11	38,38,38,38	1
3	BR	A	1812	1/1	0.85	0.07	42,42,42,42	1
3	BR	A	1635	1/1	0.85	0.07	37,37,37,37	1
3	BR	A	1617	1/1	0.85	0.21	47,47,47,47	1
3	BR	B	1617	1/1	0.86	0.10	48,48,48,48	1
3	BR	B	1627	1/1	0.86	0.15	52,52,52,52	1
3	BR	A	1643	1/1	0.87	0.22	62,62,62,62	1
3	BR	B	1628	1/1	0.87	0.17	52,52,52,52	1
3	BR	B	1634	1/1	0.88	0.10	42,42,42,42	1
3	BR	B	1618	1/1	0.89	0.12	33,33,33,33	1
2	FMT	A	1586	3/3	0.89	0.09	41,41,44,45	0
3	BR	A	1605	1/1	0.90	0.11	30,30,30,30	1
3	BR	B	1615	1/1	0.90	0.07	30,30,30,30	1
3	BR	A	1805	1/1	0.90	0.05	32,32,32,32	1
3	BR	A	1616	1/1	0.90	0.06	28,28,28,28	1
3	BR	B	1624	1/1	0.90	0.06	25,25,25,25	1
3	BR	A	1646	1/1	0.91	0.11	49,49,49,49	1
3	BR	A	1631	1/1	0.91	0.11	36,36,36,36	1
3	BR	A	1641	1/1	0.91	0.07	27,27,27,27	1
3	BR	B	1619	1/1	0.91	0.06	27,27,27,27	1
3	BR	A	1595	1/1	0.91	0.08	35,35,35,35	1
3	BR	A	1638	1/1	0.92	0.07	26,26,26,26	1
3	BR	A	1611	1/1	0.92	0.11	36,36,36,36	1
3	BR	A	1808	1/1	0.92	0.06	38,38,38,38	1
3	BR	B	1623	1/1	0.92	0.06	31,31,31,31	1
3	BR	A	1608	1/1	0.92	0.17	56,56,56,56	1
3	BR	B	1601	1/1	0.92	0.05	28,28,28,28	1
3	BR	B	1604	1/1	0.92	0.06	29,29,29,29	1
3	BR	B	1607	1/1	0.92	0.05	27,27,27,27	1
3	BR	B	1611	1/1	0.92	0.09	37,37,37,37	1

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	BR	A	1613	1/1	0.92	0.07	27,27,27,27	1
3	BR	B	1621	1/1	0.93	0.07	28,28,28,28	1
3	BR	A	1609	1/1	0.93	0.07	23,23,23,23	1
3	BR	A	1810	1/1	0.93	0.05	29,29,29,29	1
3	BR	A	1811	1/1	0.93	0.08	38,38,38,38	1
3	BR	A	1636	1/1	0.93	0.07	25,25,25,25	1
3	BR	B	1598	1/1	0.93	0.05	30,30,30,30	1
3	BR	B	1599	1/1	0.93	0.06	30,30,30,30	1
3	BR	A	1623	1/1	0.93	0.05	33,33,33,33	1
3	BR	B	1625	1/1	0.94	0.05	28,28,28,28	1
3	BR	A	1626	1/1	0.94	0.05	23,23,23,23	1
3	BR	B	1596	1/1	0.94	0.06	33,33,33,33	1
3	BR	B	1629	1/1	0.94	0.05	21,21,21,21	1
3	BR	A	1633	1/1	0.94	0.07	34,34,34,34	1
3	BR	A	1590	1/1	0.94	0.04	25,25,25,25	0
3	BR	B	1803	1/1	0.94	0.08	31,31,31,31	1
3	BR	A	1640	1/1	0.94	0.05	26,26,26,26	1
3	BR	A	1809	1/1	0.95	0.04	22,22,22,22	1
3	BR	A	1806	1/1	0.95	0.05	26,26,26,26	1
3	BR	B	1613	1/1	0.95	0.06	32,32,32,32	1
3	BR	B	1626	1/1	0.95	0.12	40,40,40,40	1
3	BR	A	1600	1/1	0.95	0.06	27,27,27,27	1
3	BR	B	1616	1/1	0.95	0.05	23,23,23,23	1
3	BR	B	1600	1/1	0.95	0.05	21,21,21,21	1
3	BR	A	1601	1/1	0.95	0.09	31,31,31,31	1
3	BR	B	1589	1/1	0.95	0.04	25,25,25,25	1
3	BR	B	1638	1/1	0.95	0.04	26,26,26,26	1
3	BR	B	1620	1/1	0.95	0.05	24,24,24,24	1
3	BR	B	1606	1/1	0.95	0.05	19,19,19,19	1
2	FMT	B	1584	3/3	0.96	0.09	34,34,36,37	0
3	BR	A	1588	1/1	0.96	0.04	19,19,19,19	0
3	BR	A	1634	1/1	0.96	0.06	19,19,19,19	1
3	BR	A	1618	1/1	0.96	0.05	23,23,23,23	1
3	BR	A	1804	1/1	0.96	0.05	22,22,22,22	1
3	BR	A	1602	1/1	0.96	0.05	30,30,30,30	1
3	BR	B	1609	1/1	0.96	0.13	36,36,36,36	1
3	BR	B	1622	1/1	0.96	0.06	26,26,26,26	1
3	BR	A	1599	1/1	0.96	0.05	34,34,34,34	1
3	BR	A	1607	1/1	0.96	0.07	33,33,33,33	1
3	BR	B	1586	1/1	0.97	0.06	17,17,17,17	0
3	BR	A	1625	1/1	0.97	0.04	21,21,21,21	1
3	BR	B	1591	1/1	0.97	0.04	24,24,24,24	1

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	BR	B	1610	1/1	0.97	0.06	23,23,23,23	1
3	BR	B	1592	1/1	0.97	0.04	27,27,27,27	1
3	BR	B	1594	1/1	0.97	0.04	23,23,23,23	1
3	BR	A	1596	1/1	0.97	0.04	25,25,25,25	1
3	BR	B	1597	1/1	0.97	0.06	21,21,21,21	1
3	BR	A	1642	1/1	0.97	0.04	24,24,24,24	1
3	BR	A	1606	1/1	0.97	0.13	39,39,39,39	1
3	BR	B	1637	1/1	0.97	0.12	37,37,37,37	1
3	BR	A	1621	1/1	0.97	0.04	22,22,22,22	1
3	BR	A	1604	1/1	0.97	0.04	27,27,27,27	1
3	BR	B	1807	1/1	0.97	0.05	23,23,23,23	1
3	BR	A	1639	1/1	0.97	0.04	26,26,26,26	1
3	BR	A	1645	1/1	0.98	0.05	27,27,27,27	1
3	BR	B	1602	1/1	0.98	0.04	21,21,21,21	1
3	BR	B	1603	1/1	0.98	0.05	27,27,27,27	1
3	BR	A	1598	1/1	0.98	0.03	17,17,17,17	0
3	BR	B	1605	1/1	0.98	0.04	17,17,17,17	1
3	BR	B	1587	1/1	0.98	0.04	17,17,17,17	0
3	BR	B	1588	1/1	0.98	0.07	42,42,42,42	1
3	BR	B	1608	1/1	0.98	0.08	33,33,33,33	1
3	BR	A	1800	1/1	0.98	0.03	16,16,16,16	0
3	BR	A	1627	1/1	0.98	0.17	44,44,44,44	1
3	BR	B	1631	1/1	0.98	0.06	30,30,30,30	1
3	BR	B	1632	1/1	0.98	0.04	21,21,21,21	1
3	BR	B	1633	1/1	0.98	0.06	31,31,31,31	1
3	BR	A	1619	1/1	0.98	0.06	19,19,19,19	1
3	BR	A	1629	1/1	0.98	0.07	33,33,33,33	1
3	BR	A	1620	1/1	0.98	0.03	19,19,19,19	1
3	BR	A	1591	1/1	0.98	0.03	19,19,19,19	1
3	BR	B	1801	1/1	0.98	0.03	23,23,23,23	1
3	BR	A	1610	1/1	0.98	0.12	33,33,33,33	1
3	BR	B	1805	1/1	0.98	0.07	15,15,15,15	0
3	BR	A	1597	1/1	0.98	0.03	21,21,21,21	1
3	BR	A	1644	1/1	0.98	0.07	26,26,26,26	1
3	BR	A	1587	1/1	0.99	0.05	12,12,12,12	0
3	BR	A	1632	1/1	0.99	0.02	18,18,18,18	1
3	BR	B	1585	1/1	0.99	0.06	11,11,11,11	0
3	BR	A	1589	1/1	0.99	0.03	18,18,18,18	1
3	BR	A	1622	1/1	0.99	0.04	21,21,21,21	1
3	BR	A	1614	1/1	0.99	0.04	23,23,23,23	1
3	BR	A	1801	1/1	0.99	0.03	19,19,19,19	1
3	BR	B	1590	1/1	0.99	0.03	17,17,17,17	1

*Continued on next page...*

*Continued from previous page...*

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	BR	B	1630	1/1	0.99	0.07	27,27,27,27	1
3	BR	A	1802	1/1	0.99	0.02	16,16,16,16	1
3	BR	A	1803	1/1	0.99	0.08	27,27,27,27	1
3	BR	B	1612	1/1	0.99	0.06	21,21,21,21	1
3	BR	B	1593	1/1	0.99	0.03	24,24,24,24	1
3	BR	B	1635	1/1	0.99	0.03	22,22,22,22	1
3	BR	B	1614	1/1	0.99	0.11	41,41,41,41	1
3	BR	A	1624	1/1	0.99	0.04	25,25,25,25	1
3	BR	A	1615	1/1	0.99	0.03	25,25,25,25	1
3	BR	A	1592	1/1	0.99	0.04	16,16,16,16	1
3	BR	A	1603	1/1	0.99	0.04	15,15,15,15	1
3	BR	A	1593	1/1	0.99	0.03	22,22,22,22	1
3	BR	B	1806	1/1	0.99	0.03	19,19,19,19	0
3	BR	A	1594	1/1	0.99	0.03	24,24,24,24	1
3	BR	A	1630	1/1	0.99	0.08	26,26,26,26	1
3	BR	B	1595	1/1	1.00	0.01	20,20,20,20	1
3	BR	B	1804	1/1	1.00	0.02	15,15,15,15	1

## 6.5 Other polymers [i](#)

There are no such residues in this entry.