



# Full wwPDB X-ray Structure Validation Report ⓘ

Apr 20, 2024 – 12:02 pm BST

PDB ID : 5MN2  
Title : Cocrystal structure of Fc gamma receptor IIIa interacting with Affimer G3, a specific binding protein which blocks IgG binding to the receptor.  
Authors : Robinson, J.I.; Owen, R.L.; Tomlinson, D.C.; Baxter, E.W.; Nettleship, J.E.; Waterhouse, M.P.; Harris, S.A.; Owens, R.J.; McPherson, M.J.; Morgan, A.W.; Tiede, C.; Goldman, A.; Thomsen, M.  
Deposited on : 2016-12-12  
Resolution : 2.35 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>.

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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 : 1.8.4, CSD as541be (2020)  
Xtrriage (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

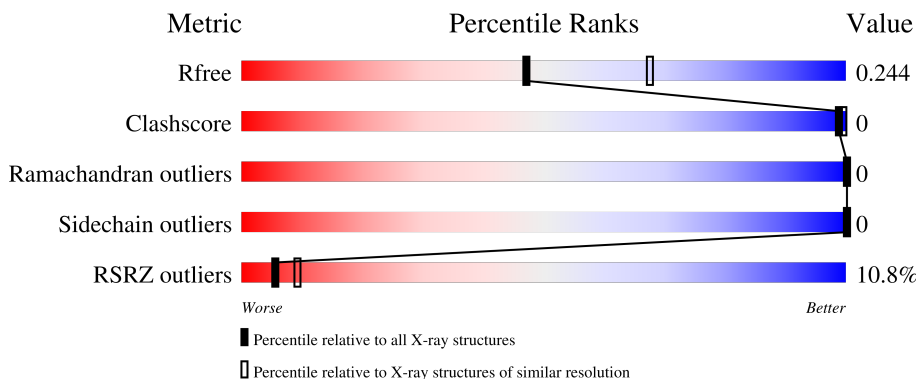
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.35 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	1164 (2.36-2.36)
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

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	175	 5% 97%
1	B	175	 25% 94%
2	C	101	 87% 13%
2	D	101	 4% 89% 11%

## 2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 8222 atoms, of which 3877 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.

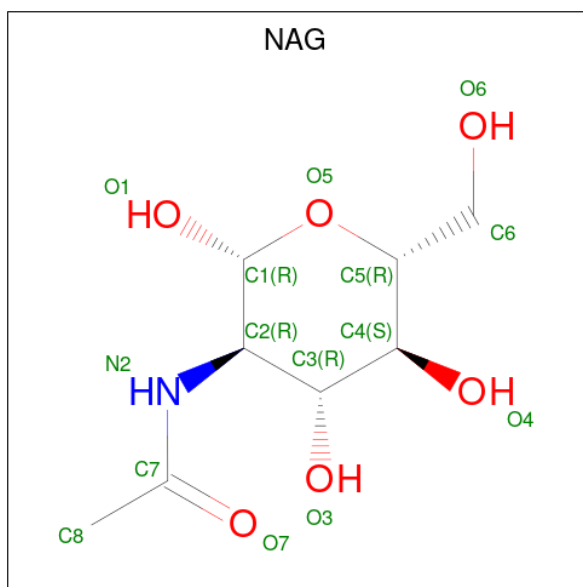
- Molecule 1 is a protein called Low affinity immunoglobulin gamma Fc region receptor III-A.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	172	Total	C	H	N	O	S	0	7	0
			2719	902	1303	241	269	4			
1	B	168	Total	C	H	N	O	S	0	1	0
			2354	792	1100	212	246	4			

- Molecule 2 is a protein called Affimer G3.

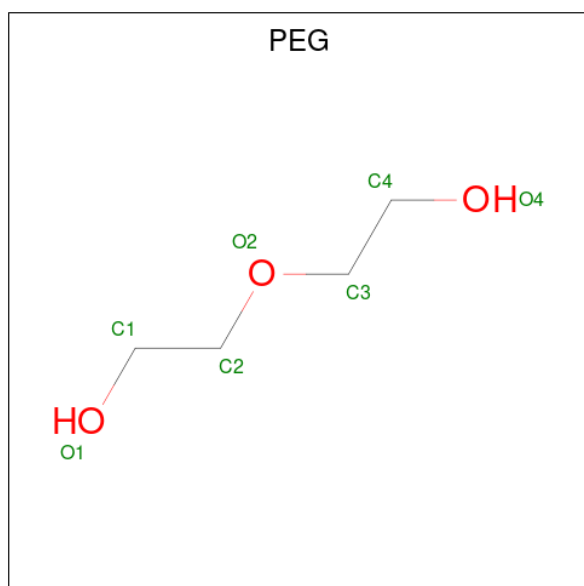
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
2	C	88	Total	C	H	N	O	S	0	0	0
			1395	454	690	119	129	3			
2	D	90	Total	C	H	N	O	S	0	0	0
			1346	448	649	116	130	3			

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula:  $C_8H_{15}NO_6$ ).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
3	A	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
3	A	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
3	A	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
3	A	1	Total	C	H	N	O	0	0
			27	8	13	1	5		
3	A	1	Total	C	H	N	O	0	0
			27	8	13	1	5		
3	B	1	Total	C	H	N	O	0	0
			28	8	14	1	5		
3	B	1	Total	C	H	N	O	0	0
			27	8	13	1	5		

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



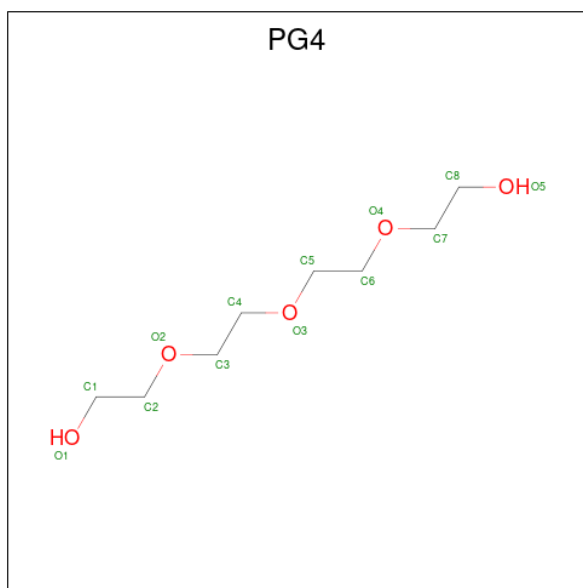
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	H	O	0	0
			17	4	10	3		
4	B	1	Total	C	H	O	0	0
			9	2	5	2		

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	H	O	0	0
			14	3	8	3		

- Molecule 6 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: C<sub>8</sub>H<sub>18</sub>O<sub>5</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	D	1	Total	C	H	O	0	0
			29	8	17	4		

- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	77	Total O 77 77	0	2
7	B	10	Total O 10 10	0	0
7	C	32	Total O 32 32	0	0
7	D	27	Total O 27 27	0	0

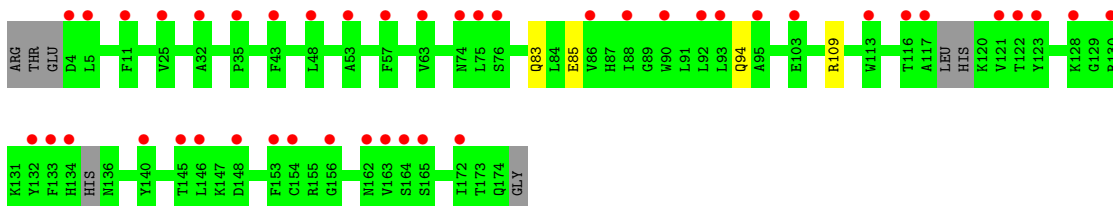
### 3 Residue-property plots [i](#)

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.

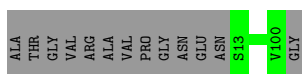
- Molecule 1: Low affinity immunoglobulin gamma Fc region receptor III-A



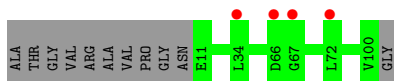
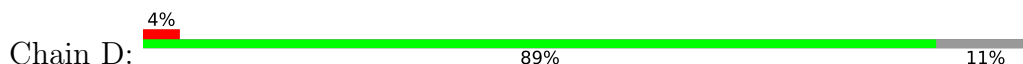
- Molecule 1: Low affinity immunoglobulin gamma Fc region receptor III-A



- Molecule 2: Affimer G3



- Molecule 2: Affimer G3



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	64.98Å 59.92Å 100.00Å 90.00° 102.09° 90.00°	Depositor
Resolution (Å)	43.39 – 2.35 43.39 – 2.35	Depositor EDS
% Data completeness (in resolution range)	95.5 (43.39-2.35) 95.5 (43.39-2.35)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	0.05	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.44 (at 2.34Å)	Xtrriage
Refinement program	PHENIX (1.12_2829: ???)	Depositor
R, $R_{free}$	0.205 , 0.244 0.206 , 0.244	Depositor DCC
$R_{free}$ test set	1510 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	58.5	Xtrriage
Anisotropy	0.128	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 60.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	8222	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	80.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.71% 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: PEG, NAG, GOL, PG4

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	0.25	0/1461	0.46	0/1995
1	B	0.24	0/1288	0.43	0/1765
2	C	0.26	0/719	0.43	0/969
2	D	0.25	0/711	0.44	0/966
All	All	0.25	0/4179	0.44	0/5695

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	1416	1303	1301	1	0
1	B	1254	1100	1096	2	0
2	C	705	690	690	0	0
2	D	697	649	645	0	0
3	A	70	68	65	0	0
3	B	28	27	26	0	0
4	A	7	10	10	0	0
4	B	4	5	5	0	0
5	A	6	8	8	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	D	12	17	15	0	0
7	A	77	0	0	0	0
7	B	10	0	0	0	0
7	C	32	0	0	0	0
7	D	27	0	0	0	0
All	All	4345	3877	3861	3	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 0.

All (3) 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:94:GLN:OE1	1:A:109:ARG:NH2	2.32	0.63
1:B:83:GLN:NE2	1:B:85:GLU:OE2	2.37	0.57
1:B:94:GLN:OE1	1:B:109:ARG:NH1	2.39	0.55

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	177/175 (101%)	174 (98%)	3 (2%)	0	100	100
1	B	163/175 (93%)	160 (98%)	3 (2%)	0	100	100
2	C	86/101 (85%)	83 (96%)	3 (4%)	0	100	100
2	D	88/101 (87%)	84 (96%)	4 (4%)	0	100	100
All	All	514/552 (93%)	501 (98%)	13 (2%)	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	152/158 (96%)	152 (100%)	0	100	100
1	B	126/158 (80%)	126 (100%)	0	100	100
2	C	71/84 (84%)	71 (100%)	0	100	100
2	D	66/84 (79%)	66 (100%)	0	100	100
All	All	415/484 (86%)	415 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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	111	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 monosaccharides in this entry.

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

11 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
3	NAG	A	401	1	14,14,15	0.15	0	17,19,21	0.49	0
6	PG4	D	501	-	11,11,12	0.50	0	10,10,11	0.27	0
3	NAG	B	401	1	14,14,15	0.20	0	17,19,21	0.51	0
5	GOL	A	407	-	5,5,5	0.95	0	5,5,5	0.93	0
3	NAG	A	405	1	14,14,15	0.21	0	17,19,21	0.41	0
3	NAG	A	403	1	14,14,15	0.23	0	17,19,21	0.38	0
3	NAG	A	402	1	14,14,15	0.28	0	17,19,21	0.53	0
4	PEG	A	406	-	6,6,6	0.42	0	5,5,5	0.29	0
4	PEG	B	403	-	3,3,6	0.43	0	2,2,5	0.35	0
3	NAG	A	404	1	14,14,15	0.18	0	17,19,21	0.47	0
3	NAG	B	402	1	14,14,15	0.23	0	17,19,21	0.42	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	NAG	A	401	1	-	2/6/23/26	0/1/1/1
6	PG4	D	501	-	-	1/9/9/10	-
3	NAG	B	401	1	-	2/6/23/26	0/1/1/1
5	GOL	A	407	-	-	2/4/4/4	-
3	NAG	A	405	1	-	2/6/23/26	0/1/1/1
3	NAG	A	403	1	-	2/6/23/26	0/1/1/1
3	NAG	A	402	1	-	2/6/23/26	0/1/1/1
4	PEG	A	406	-	-	0/4/4/4	-
4	PEG	B	403	-	-	0/1/1/4	-
3	NAG	A	404	1	-	0/6/23/26	0/1/1/1
3	NAG	B	402	1	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	407	GOL	O1-C1-C2-C3
3	B	402	NAG	C4-C5-C6-O6
3	A	401	NAG	C4-C5-C6-O6
3	A	405	NAG	O5-C5-C6-O6
3	B	402	NAG	O5-C5-C6-O6
3	B	401	NAG	O5-C5-C6-O6
3	A	401	NAG	O5-C5-C6-O6
3	A	405	NAG	C4-C5-C6-O6
6	D	501	PG4	O2-C3-C4-O3
3	B	401	NAG	C4-C5-C6-O6
5	A	407	GOL	O1-C1-C2-O2
3	A	403	NAG	C4-C5-C6-O6
3	A	403	NAG	O5-C5-C6-O6
3	A	402	NAG	O5-C5-C6-O6
3	A	402	NAG	C3-C2-N2-C7

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	172/175 (98%)	0.76	8 (4%) 31 44	39, 57, 76, 101	0
1	B	168/175 (96%)	1.38	44 (26%) 0 0	75, 96, 111, 122	0
2	C	88/101 (87%)	0.35	0 100 100	44, 68, 88, 100	0
2	D	90/101 (89%)	0.45	4 (4%) 34 46	43, 70, 93, 106	0
All	All	518/552 (93%)	0.84	56 (10%) 5 9	39, 73, 106, 122	0

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	121	VAL	7.6
1	B	5	LEU	6.0
1	B	164	SER	5.1
1	B	75	LEU	4.9
2	D	67	GLY	4.7
1	B	103	GLU	4.6
1	B	90	TRP	4.3
1	B	76[A]	SER	4.2
1	B	133	PHE	4.2
1	B	153	PHE	4.1
1	B	146	LEU	4.0
1	B	123	TYR	4.0
2	D	66	ASP	3.6
1	B	163	VAL	3.6
1	B	132	TYR	3.4
1	B	148	ASP	3.3
1	B	156	GLY	3.3
1	B	4	ASP	3.3
1	B	122	THR	3.3
1	B	165	SER	3.1
1	B	32	ALA	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	35	PRO	2.9
1	B	154	CYS	2.9
1	A	76[A]	SER	2.8
1	B	113	TRP	2.8
1	B	11	PHE	2.7
1	B	130	ARG	2.7
1	B	53	ALA	2.6
1	B	25	VAL	2.6
1	B	117	ALA	2.5
1	B	93	LEU	2.5
2	D	72	LEU	2.5
1	B	162	ASN	2.4
1	B	95	ALA	2.4
1	A	117[A]	ALA	2.4
1	B	172	ILE	2.4
1	A	116[A]	THR	2.4
1	A	11	PHE	2.4
1	B	74	ASN	2.3
1	B	145	THR	2.3
1	B	140	TYR	2.2
1	A	63	VAL	2.2
1	B	128	LYS	2.2
1	A	163	VAL	2.1
1	B	48	LEU	2.1
1	B	134	HIS	2.1
1	B	57	PHE	2.1
1	B	116	THR	2.1
1	B	92	LEU	2.1
1	B	43	PHE	2.1
2	D	34	LEU	2.1
1	A	17	TYR	2.1
1	B	63	VAL	2.0
1	B	86	VAL	2.0
1	A	84	LEU	2.0
1	B	88	ILE	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains

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 [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	NAG	B	402	14/15	0.66	0.39	97,130,159,165	0
3	NAG	A	404	14/15	0.78	0.35	88,108,133,152	0
4	PEG	B	403	4/7	0.78	0.27	74,88,103,105	0
4	PEG	A	406	7/7	0.79	0.35	65,90,109,112	0
6	PG4	D	501	12/13	0.81	0.25	67,94,117,129	0
3	NAG	A	405	14/15	0.82	0.42	93,112,135,138	0
5	GOL	A	407	6/6	0.87	0.23	72,90,105,109	0
3	NAG	A	403	14/15	0.87	0.19	91,107,124,128	0
3	NAG	B	401	14/15	0.91	0.19	81,97,109,118	0
3	NAG	A	402	14/15	0.92	0.20	56,75,96,100	0
3	NAG	A	401	14/15	0.95	0.22	45,69,93,95	0

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

There are no such residues in this entry.