W O R L D W I D E
wwPDB
P R O T E I N   D A T A   B A N K

wwPDB X-ray Structure Validation Summary Report (i)

Jan 31, 2016 – 08:02 PM GMT

PDB ID	:	1IGR
Title	:	Type 1 Insulin-like growth factor receptor (DOMAINS 1-3)
Authors	:	Garrett, T.P.J.; Mckern, N.M.; Lou, M.; Frenkel, M.J.; Bentley, J.D.; Lovrecz, G.O.; Elleman, T.C.; Cosgrove, L.J.; Ward, C.W.
Deposited on	:	1998-09-28
Resolution	:	2.60 Å(reported)

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

|		
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
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 (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	Percentile Ranks	Value
Clashscore		28
Ramachandran outliers		2.4%
Sidechain outliers		17.8%

Worse   *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution
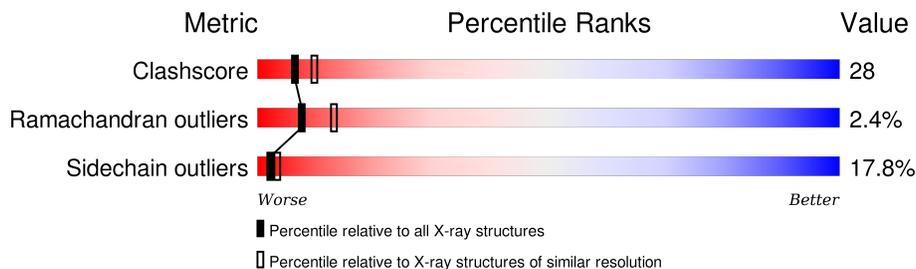
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	102246	2679 (2.60-2.60)
Ramachandran outliers	100387	2635 (2.60-2.60)
Sidechain outliers	100360	2635 (2.60-2.60)

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 >=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 <=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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	478	40% 41% 15% · ·

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	NAG	A	479(A)	X	-	-	-
3	FUC	A	481(B)	-	-	X	-
3	NAG	A	482(C)	-	-	X	-
4	NAG	A	486(C)	X	-	-	-
5	SO4	A	493	-	-	X	-

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	SO4	A	497	-	-	X	-

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 3900 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 INSULIN-LIKE GROWTH FACTOR RECEPTOR 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	471	Total 3686	C 2312	N 633	O 701	S 40	0	0	0

- Molecule 2 is SUGAR (N-ACETYL-D-GLUCOSAMINE) (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).
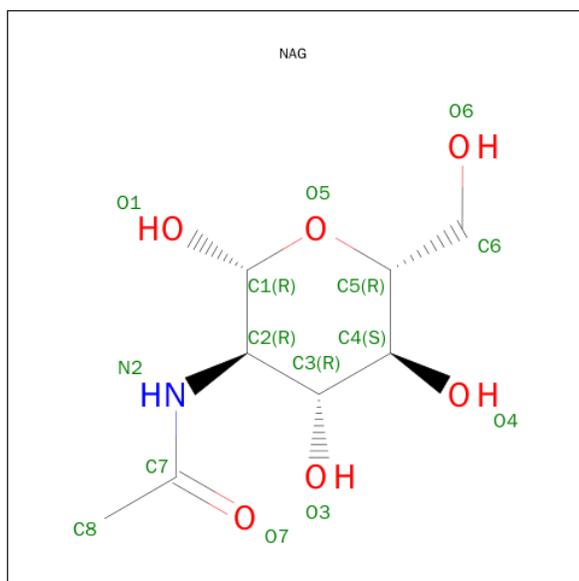
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total 14	C 8	N 1	O 5	0	0
2	A	1	Total 14	C 8	N 1	O 5	0	0

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

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	3	Total 38	C 22	N 2	O 14	0	0

- Molecule 4 is a polymer of unknown type called SUGAR (N-ACETYL-D-GLUCOSAMINE).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	5	Total 60	C 34	N 2	O 24	0	0

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total 5	O 4	S 1	0	0
5	A	1	Total 5	O 4	S 1	0	0
5	A	1	Total 5	O 4	S 1	0	0
5	A	1	Total 5	O 4	S 1	0	0
5	A	1	Total 5	O 4	S 1	0	0
5	A	1	Total 5	O 4	S 1	0	0
5	A	1	Total 5	O 4	S 1	0	0
5	A	1	Total 5	O 4	S 1	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	48	Total O 48 48		0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of 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.

Note EDS was not executed.

- Molecule 1: INSULIN-LIKE GROWTH FACTOR RECEPTOR 1
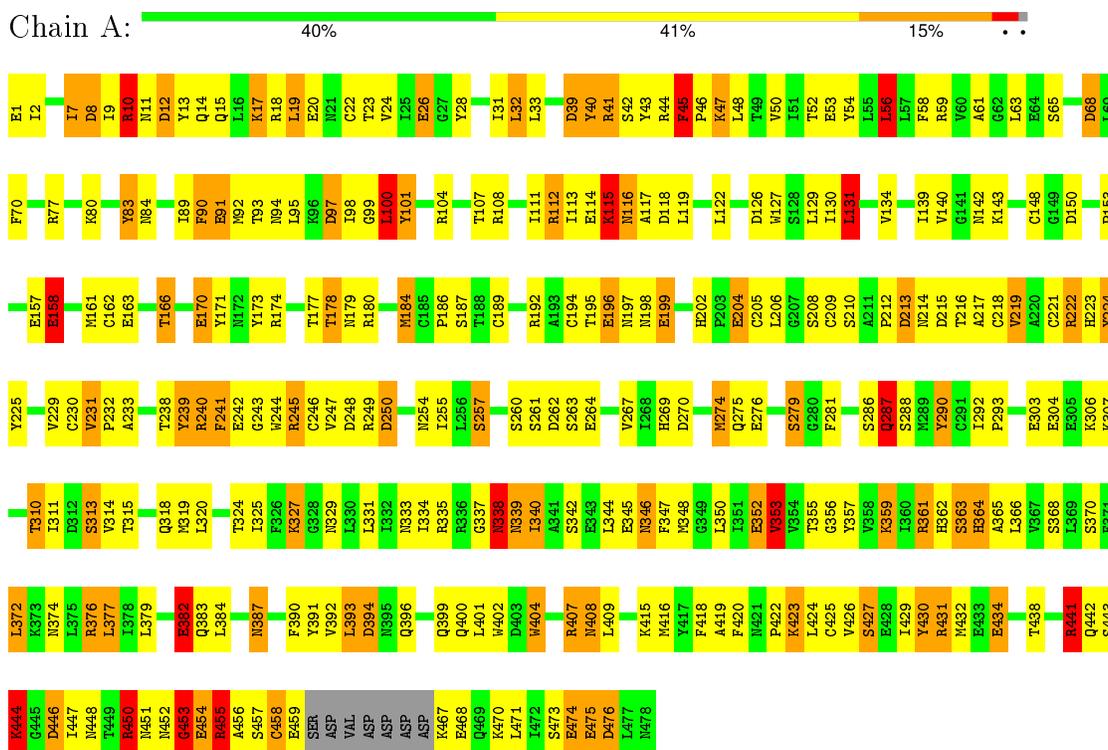
4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section will therefore be incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	77.39Å 99.72Å 120.29Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	7.00 − 2.60	Depositor
% Data completeness (in resolution range)	97.0 (7.00-2.60)	Depositor
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	REFMAC	Depositor
R, R_{free}	0.237 , 0.304	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3900	wwPDB-VP
Average B, all atoms (Å^2)	53.0	wwPDB-VP

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: MAN, SO4, BMA, NAG, FUC

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	0.85	0/3756	2.05	129/5082 (2.5%)

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
1	A	0	17
4	A	1	0
All	All	1	17

There are no bond length outliers.

The worst 5 of 129 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	431	ARG	NE-CZ-NH2	18.01	129.31	120.30
1	A	77	ARG	NE-CZ-NH1	17.56	129.08	120.30
1	A	112	ARG	NE-CZ-NH2	-16.58	112.01	120.30
1	A	97	ASP	CB-CG-OD1	16.50	133.15	118.30
1	A	245	ARG	NE-CZ-NH2	15.89	128.25	120.30

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	A	486(C)	NAG	C2

5 of 17 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	100	LEU	Mainchain
1	A	19	LEU	Mainchain
1	A	45	PHE	Mainchain
1	A	50	VAL	Mainchain
1	A	8	ASP	Mainchain

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	3686	0	3544	191	0
2	A	28	0	26	1	0
3	A	38	0	34	23	0
4	A	60	0	50	1	0
5	A	40	0	0	5	0
6	A	48	0	0	5	0
All	All	3900	0	3654	205	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 28.

The worst 5 of 205 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:222:ARG:HD3	3:A:481(B):FUC:H61	1.36	1.07
3:A:481(B):FUC:H3	3:A:482(C):NAG:H3	1.39	1.02
1:A:143:LYS:HG2	1:A:148:CYS:SG	2.07	0.94
3:A:481(B):FUC:H3	3:A:482(C):NAG:N2	1.88	0.89
3:A:481(B):FUC:H3	3:A:482(C):NAG:HN2	1.39	0.86

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	467/478 (98%)	396 (85%)	60 (13%)	11 (2%)	7	13

5 of 11 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	100	LEU
1	A	158	GLU
1	A	213	ASP
1	A	41	ARG
1	A	338	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	405/426 (95%)	333 (82%)	72 (18%)	2	3

5 of 72 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	304	GLU
1	A	338	ASN
1	A	458	CYS
1	A	306	LYS
1	A	315	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such

sidechains are listed below:

Mol	Chain	Res	Type
1	A	333	ASN
1	A	408	ASN
1	A	362	HIS
1	A	237	ASN
1	A	400	GLN

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)

8 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	480(A)	1,3	14,14,15	2.40	5 (35%)	15,19,21	2.85	7 (46%)
3	FUC	A	481(B)	3	10,10,11	1.29	1 (10%)	14,14,16	2.50	6 (42%)
3	NAG	A	482(C)	3	14,14,15	2.06	3 (21%)	15,19,21	1.78	2 (13%)
4	NAG	A	484(A)	1,4	14,14,15	1.42	2 (14%)	15,19,21	1.46	3 (20%)
4	FUC	A	485(B)	4	10,10,11	0.63	0	14,14,16	1.21	2 (14%)
4	NAG	A	486(C)	4	14,14,15	1.89	3 (21%)	15,19,21	2.27	5 (33%)
4	BMA	A	487(D)	4	11,11,12	1.73	2 (18%)	14,15,17	1.69	2 (14%)
4	MAN	A	488(E)	4	11,11,12	0.99	1 (9%)	14,15,17	1.39	2 (14%)

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	480(A)	1,3	-	0/6/23/26	0/1/1/1
3	FUC	A	481(B)	3	-	0/0/17/20	0/1/1/1
3	NAG	A	482(C)	3	-	0/6/23/26	0/1/1/1
4	NAG	A	484(A)	1,4	-	0/6/23/26	0/1/1/1
4	FUC	A	485(B)	4	-	0/0/17/20	0/1/1/1
4	NAG	A	486(C)	4	1/1/5/7	0/6/23/26	0/1/1/1
4	BMA	A	487(D)	4	-	0/2/19/22	0/1/1/1
4	MAN	A	488(E)	4	-	0/2/19/22	0/1/1/1

The worst 5 of 17 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	482(C)	NAG	C1-C2	-5.39	1.45	1.52
4	A	486(C)	NAG	C1-C2	-5.04	1.45	1.52
4	A	487(D)	BMA	C4-C5	-4.50	1.43	1.53
3	A	482(C)	NAG	O5-C1	-4.27	1.36	1.43
4	A	484(A)	NAG	C4-C5	-3.58	1.45	1.53

The worst 5 of 29 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	482(C)	NAG	C2-N2-C7	-5.13	116.45	123.04
3	A	480(A)	NAG	O7-C7-C8	-4.24	114.28	122.06
4	A	486(C)	NAG	O5-C5-C6	-3.65	99.45	107.35
4	A	486(C)	NAG	C4-C3-C2	-3.47	105.83	111.23
4	A	487(D)	BMA	C1-O5-C5	-2.98	108.47	112.25

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	A	486(C)	NAG	C2

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 24 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	480(A)	NAG	2	0
3	A	481(B)	FUC	21	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	482(C)	NAG	14	0
4	A	484(A)	NAG	1	0

5.6 Ligand geometry (i)

10 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
2	NAG	A	479(A)	1	14,14,15	1.42	3 (21%)	15,19,21	2.47	4 (26%)
2	NAG	A	483(A)	1	14,14,15	1.31	1 (7%)	15,19,21	2.19	3 (20%)
5	SO4	A	493	-	4,4,4	0.79	0	6,6,6	0.44	0
5	SO4	A	494	-	4,4,4	0.93	0	6,6,6	0.41	0
5	SO4	A	495	-	4,4,4	1.18	0	6,6,6	0.51	0
5	SO4	A	496	-	4,4,4	1.02	0	6,6,6	1.01	0
5	SO4	A	497	-	4,4,4	0.83	0	6,6,6	1.12	1 (16%)
5	SO4	A	498	-	4,4,4	0.74	0	6,6,6	1.21	1 (16%)
5	SO4	A	499	-	4,4,4	0.93	0	6,6,6	0.41	0
5	SO4	A	500	-	4,4,4	0.71	0	6,6,6	0.50	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	A	479(A)	1	1/1/5/7	0/6/23/26	0/1/1/1
2	NAG	A	483(A)	1	-	0/6/23/26	0/1/1/1
5	SO4	A	493	-	-	0/0/0/0	0/0/0/0
5	SO4	A	494	-	-	0/0/0/0	0/0/0/0
5	SO4	A	495	-	-	0/0/0/0	0/0/0/0
5	SO4	A	496	-	-	0/0/0/0	0/0/0/0
5	SO4	A	497	-	-	0/0/0/0	0/0/0/0
5	SO4	A	498	-	-	0/0/0/0	0/0/0/0

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	SO4	A	499	-	-	0/0/0/0	0/0/0/0
5	SO4	A	500	-	-	0/0/0/0	0/0/0/0

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	483(A)	NAG	O7-C7	-3.56	1.14	1.23
2	A	479(A)	NAG	O7-C7	-3.27	1.15	1.23
2	A	479(A)	NAG	C1-C2	-2.06	1.49	1.52
2	A	479(A)	NAG	C2-N2	2.09	1.50	1.46

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	479(A)	NAG	C2-N2-C7	-7.06	113.97	123.04
2	A	483(A)	NAG	C4-C3-C2	-5.20	103.15	111.23
2	A	483(A)	NAG	C2-N2-C7	-4.47	117.30	123.04
2	A	479(A)	NAG	O3-C3-C4	-3.10	103.36	110.34
2	A	479(A)	NAG	C4-C3-C2	-2.73	106.99	111.23

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	479(A)	NAG	C1

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	479(A)	NAG	1	0
5	A	493	SO4	2	0
5	A	497	SO4	3	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)

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates (i)

EDS was not executed - this section will therefore be empty.

6.4 Ligands (i)

EDS was not executed - this section will therefore be empty.

6.5 Other polymers (i)

EDS was not executed - this section will therefore be empty.