



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 06:48 AM GMT

PDB ID : 2YGQ
Title : WIF DOMAIN-EPIDERMAL GROWTH FACTOR (EGF)-LIKE DOMAINS
1-3 OF HUMAN WNT INHIBITORY FACTOR 1 IN COMPLEX WITH 1,2
-DIPALMITOYLPHOSPHATIDYLCHOLINE
Authors : Malinauskas, T.; Aricescu, A.R.; Lu, W.; Siebold, C.; Jones, E.Y.
Deposited on : 2011-04-19
Resolution : 3.95 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
A user guide is available at
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>
with specific help available everywhere you see the ⓘ symbol.

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

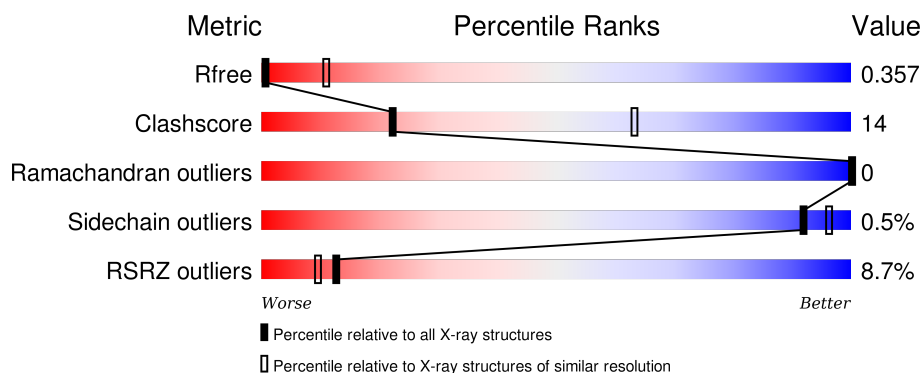
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.95 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	1011 (4.38-3.54)
Clashscore	102246	1025 (4.32-3.60)
Ramachandran outliers	100387	1008 (4.34-3.58)
Sidechain outliers	100360	1027 (4.36-3.56)
RSRZ outliers	91569	1015 (4.38-3.54)

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 $\leq 5\%$. 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	324	

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	PCF	A	1275	-	-	-	X

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	NAG	A	1276	-	-	-	X

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 1969 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.

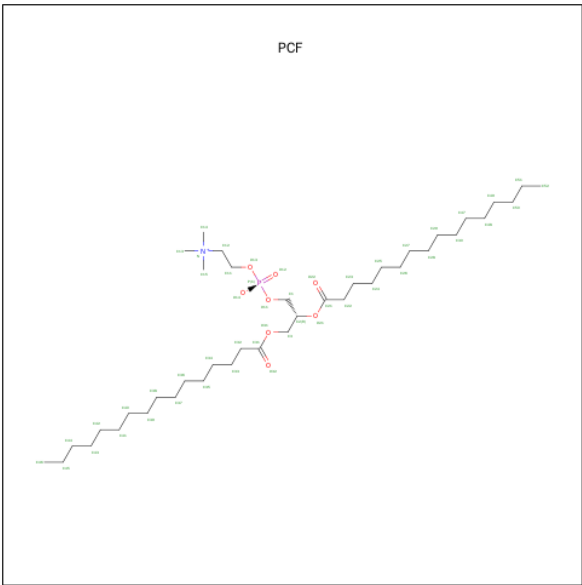
- Molecule 1 is a protein called WNT INHIBITORY FACTOR 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	241	Total	C	N	O	S	0	0	0
			1826	1153	312	335	26			

There are 13 discrepancies between the modelled and reference sequences:

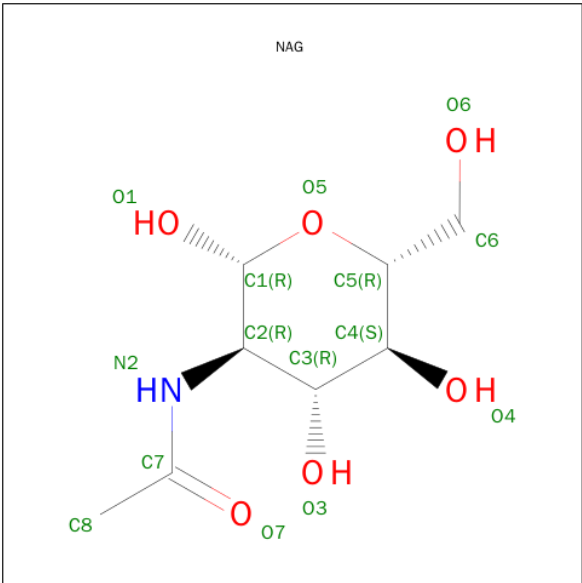
Chain	Residue	Modelled	Actual	Comment	Reference
A	32	GLU	-	EXPRESSION TAG	UNP Q9Y5W5
A	33	THR	-	EXPRESSION TAG	UNP Q9Y5W5
A	34	GLY	-	EXPRESSION TAG	UNP Q9Y5W5
A	166	LYS	GLN	VARIANT	UNP Q9Y5W5
A	347	GLY	-	EXPRESSION TAG	UNP Q9Y5W5
A	348	THR	-	EXPRESSION TAG	UNP Q9Y5W5
A	349	LYS	-	EXPRESSION TAG	UNP Q9Y5W5
A	350	HIS	-	EXPRESSION TAG	UNP Q9Y5W5
A	351	HIS	-	EXPRESSION TAG	UNP Q9Y5W5
A	352	HIS	-	EXPRESSION TAG	UNP Q9Y5W5
A	353	HIS	-	EXPRESSION TAG	UNP Q9Y5W5
A	354	HIS	-	EXPRESSION TAG	UNP Q9Y5W5
A	355	HIS	-	EXPRESSION TAG	UNP Q9Y5W5

- Molecule 2 is 1,2-DIACYL-SN-GLYCERO-3-PHOSHOCHOLINE (three-letter code: PCF) (formula: C₄₀H₈₀NO₈P).



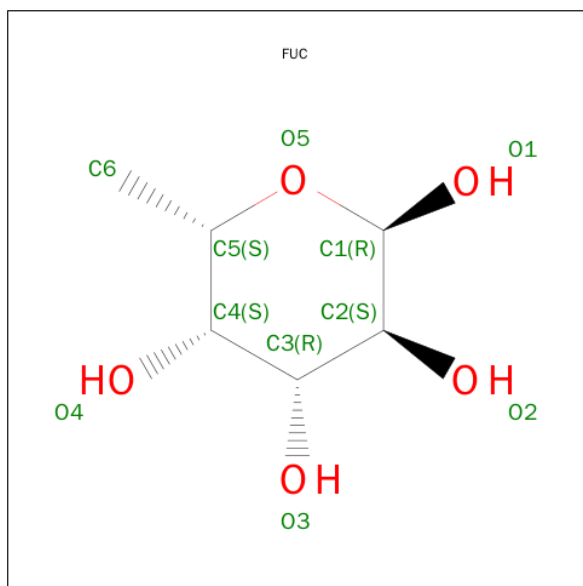
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			50	40	1	8	1		

- Molecule 3 is SUGAR (N-ACETYL-D-GLUCOSAMINE) (three-letter code: NAG) (formula: C₈H₁₅NO₆).



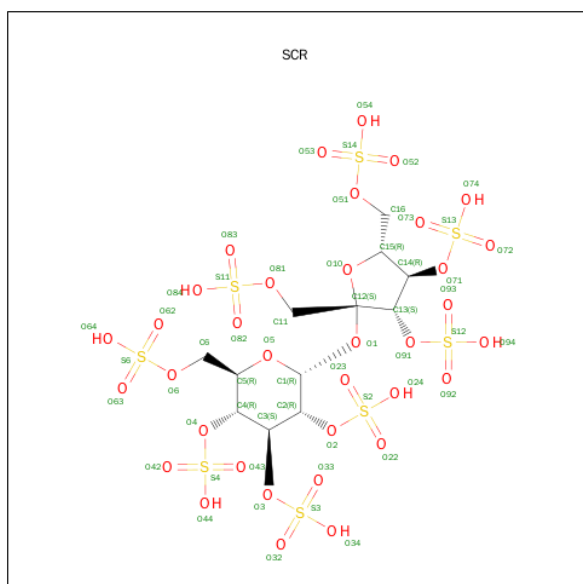
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			14	8	1	5		
3	A	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 4 is SUGAR (ALPHA-L-FUCOSE) (three-letter code: FUC) (formula: $C_6H_{12}O_5$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			10	6	4		

- Molecule 5 is SUGAR (SUCROSE OCTASULFATE) (three-letter code: SCR) (formula: $C_{12}H_{22}O_{35}S_8$).

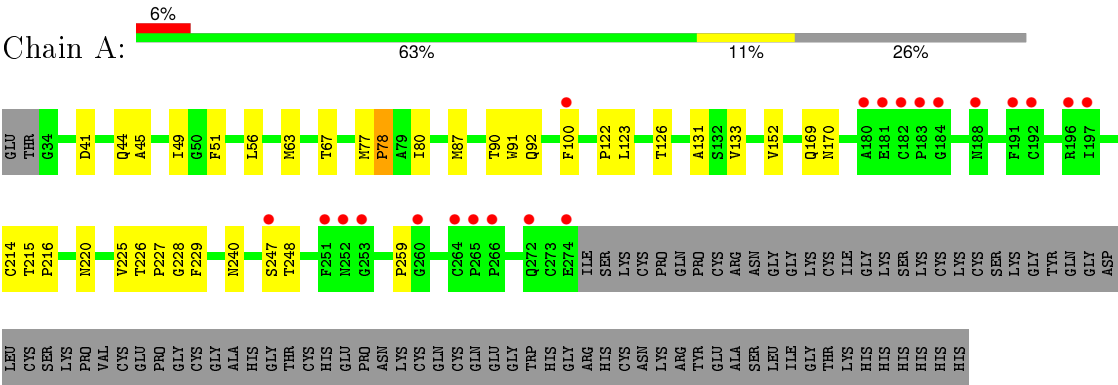


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	O	S	0	0
			55	12	35	8		

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: WNT INHIBITORY FACTOR 1



4 Data and refinement statistics

Property	Value	Source
Space group	I 21 3	Depositor
Cell constants a, b, c, α , β , γ	178.01Å 178.01Å 178.01Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.80 – 3.95 39.80 – 3.95	Depositor EDS
% Data completeness (in resolution range)	96.0 (39.80-3.95) 100.0 (39.80-3.95)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.51 (at 4.00Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE: 1.7_650)	Depositor
R, R_{free}	0.297 , 0.331 0.314 , 0.357	Depositor DCC
R_{free} test set	399 reflections (5.00%)	DCC
Wilson B-factor (Å ²)	147.7	Xtriage
Anisotropy	0.000	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 174.8	EDS
Estimated twinning fraction	0.032 for -l,-k,-h	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 8383 reflections	Xtriage
F_o, F_c correlation	0.85	EDS
Total number of atoms	1969	wwPDB-VP
Average B, all atoms (Å ²)	230.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.82% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: FUC, PCF, NAG, SCR

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	0.47	1/1874 (0.1%)	0.58	0/2541

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	78	PRO	N-CD	12.40	1.65	1.47

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	1826	0	1735	52	0
2	A	50	0	80	18	0
3	A	28	0	26	0	0
4	A	10	0	10	0	0
5	A	55	0	22	0	0
All	All	1969	0	1873	53	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 14.

All (53) 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:152:VAL:CG1	2:A:1275:PCF:H411	2.07	0.84
1:A:90:THR:HG22	1:A:133:VAL:HG22	1.59	0.84
1:A:152:VAL:HG11	2:A:1275:PCF:H411	1.61	0.83
1:A:152:VAL:CB	2:A:1275:PCF:H411	2.13	0.79
1:A:152:VAL:HG11	2:A:1275:PCF:H422	1.65	0.78
1:A:215:THR:HB	1:A:216:PRO:HD3	1.70	0.72
1:A:225:VAL:HG22	1:A:228:GLY:O	1.91	0.70
1:A:152:VAL:HG11	2:A:1275:PCF:C41	2.22	0.69
1:A:152:VAL:HB	2:A:1275:PCF:H411	1.73	0.69
2:A:1275:PCF:O13	2:A:1275:PCF:H143	1.91	0.69
1:A:152:VAL:HG11	2:A:1275:PCF:C42	2.22	0.68
1:A:216:PRO:HB2	1:A:240:ASN:OD1	1.94	0.67
1:A:247:SER:H	1:A:259:PRO:HB3	1.59	0.67
1:A:49:ILE:HG12	1:A:51:PHE:HD1	1.60	0.66
1:A:80:ILE:HD11	2:A:1275:PCF:H351	1.77	0.66
1:A:214:CYS:SG	1:A:229:PHE:O	2.56	0.64
1:A:63:MET:HB3	1:A:67:THR:OG1	1.97	0.64
1:A:215:THR:CB	1:A:216:PRO:HD3	2.29	0.63
1:A:90:THR:CG2	1:A:133:VAL:HG22	2.27	0.62
1:A:216:PRO:CB	1:A:240:ASN:OD1	2.48	0.62
1:A:49:ILE:O	2:A:1275:PCF:H142	2.00	0.61
1:A:90:THR:HG22	1:A:133:VAL:CG2	2.31	0.60
1:A:49:ILE:HG12	1:A:51:PHE:CD1	2.38	0.58
1:A:214:CYS:SG	1:A:229:PHE:N	2.77	0.57
1:A:56:LEU:N	1:A:56:LEU:HD12	2.21	0.56
1:A:92:GLN:OE1	1:A:131:ALA:N	2.39	0.56
1:A:152:VAL:HG21	2:A:1275:PCF:H392	1.89	0.55
1:A:215:THR:HB	1:A:216:PRO:CD	2.38	0.54
1:A:45:ALA:O	1:A:49:ILE:HG22	2.07	0.54
1:A:216:PRO:HB3	1:A:240:ASN:HD21	1.74	0.53
1:A:77:MET:CE	2:A:1275:PCF:H282	2.40	0.52
1:A:216:PRO:CB	1:A:240:ASN:HD21	2.24	0.51
1:A:225:VAL:CG2	1:A:228:GLY:O	2.58	0.51
1:A:248:THR:O	1:A:248:THR:HG23	2.12	0.49
1:A:92:GLN:OE1	1:A:131:ALA:HB2	2.11	0.49
1:A:152:VAL:CG1	2:A:1275:PCF:C41	2.82	0.49
1:A:56:LEU:N	1:A:56:LEU:CD1	2.76	0.49
1:A:226:THR:HB	1:A:227:PRO:HD3	1.95	0.48
1:A:80:ILE:HD11	2:A:1275:PCF:C35	2.44	0.47
1:A:100:PHE:HD1	1:A:126:THR:HG22	1.80	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:92:GLN:OE1	1:A:131:ALA:CA	2.64	0.45
1:A:152:VAL:CG1	2:A:1275:PCF:H422	2.42	0.44
1:A:41:ASP:OD1	1:A:44:GLN:HB3	2.18	0.44
1:A:215:THR:CB	1:A:216:PRO:CD	2.96	0.44
1:A:49:ILE:HG23	1:A:51:PHE:H	1.83	0.44
1:A:169:GLN:HG2	1:A:170:ASN:OD1	2.19	0.43
1:A:77:MET:HE2	2:A:1275:PCF:H282	2.01	0.42
1:A:78:PRO:HD2	2:A:1275:PCF:H32	2.01	0.42
1:A:87:MET:SD	2:A:1275:PCF:H361	2.61	0.41
1:A:123:LEU:HD22	1:A:123:LEU:H	1.86	0.41
1:A:100:PHE:CD1	1:A:126:THR:HG22	2.56	0.40
1:A:122:PRO:HG3	1:A:220:ASN:HB3	2.03	0.40
1:A:216:PRO:CB	1:A:240:ASN:ND2	2.84	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	239/324 (74%)	218 (91%)	21 (9%)	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	199/269 (74%)	198 (100%)	1 (0%)	92 96

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	91	TRP

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

5 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	PCF	A	1275	-	49,49,49	0.90	2 (4%)	53,57,57	1.21	6 (11%)
3	NAG	A	1276	1	14,14,15	0.37	0	15,19,21	1.25	1 (6%)
3	NAG	A	1277	1	14,14,15	0.45	0	15,19,21	1.17	1 (6%)
4	FUC	A	1278	1	10,10,11	0.46	0	14,14,16	1.07	1 (7%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	SCR	A	1279	-	56,56,56	0.82	0	79,92,92	1.79	15 (18%)

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	PCF	A	1275	-	-	0/53/53/53	0/0/0/0
3	NAG	A	1276	1	-	0/6/23/26	0/1/1/1
3	NAG	A	1277	1	-	0/6/23/26	0/1/1/1
4	FUC	A	1278	1	-	0/0/17/20	0/1/1/1
5	SCR	A	1279	-	-	0/48/88/88	0/2/2/2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1275	PCF	O31-C31	3.57	1.44	1.33
2	A	1275	PCF	O21-C21	3.75	1.45	1.34

All (24) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1279	SCR	C13-O91-S12	-5.51	108.85	118.36
5	A	1279	SCR	C14-O71-S13	-5.30	108.68	118.77
5	A	1279	SCR	C3-O3-S3	-5.10	109.05	118.77
5	A	1279	SCR	C2-O2-S2	-4.94	109.36	118.77
5	A	1279	SCR	C4-O4-S4	-4.81	109.61	118.77
2	A	1275	PCF	C3-C2-C1	-3.26	104.45	112.07
5	A	1279	SCR	C11-C12-C13	-3.19	108.10	115.31
5	A	1279	SCR	C12-O1-C1	-3.10	109.35	117.53
2	A	1275	PCF	C2-O21-C21	-2.58	111.70	117.89
3	A	1276	NAG	C4-C3-C2	-2.53	107.29	111.23
4	A	1278	FUC	C6-C5-C4	-2.18	108.79	113.08
3	A	1277	NAG	C4-C3-C2	-2.18	107.84	111.23
2	A	1275	PCF	C11-C12-N	-2.16	109.08	116.03
2	A	1275	PCF	O31-C31-O32	-2.05	118.19	123.49
2	A	1275	PCF	O31-C31-C32	2.28	118.86	111.90
5	A	1279	SCR	O63-S6-O62	2.74	124.38	112.46
5	A	1279	SCR	O93-S12-O92	2.78	124.55	112.46
5	A	1279	SCR	O33-S3-O32	2.79	124.62	112.46
5	A	1279	SCR	O23-S2-O22	2.80	124.65	112.46

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1279	SCR	O73-S13-O72	2.80	124.66	112.46
5	A	1279	SCR	O43-S4-O42	2.81	124.68	112.46
5	A	1279	SCR	O53-S14-O52	2.82	124.74	112.46
5	A	1279	SCR	O83-S11-O82	2.93	125.21	112.46
2	A	1275	PCF	O21-C21-C22	4.35	120.98	111.53

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 18 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1275	PCF	18	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, 95th 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 ²)	Q<0.9
1	A	241/324 (74%)	0.58	21 (8%) 13 9	104, 211, 329, 466	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	183	PRO	5.5
1	A	191	PHE	5.2
1	A	252	ASN	4.7
1	A	265	PRO	4.3
1	A	192	CYS	4.2
1	A	266	PRO	3.8
1	A	272	GLN	3.8
1	A	181	GLU	3.8
1	A	260	GLY	3.5
1	A	180	ALA	3.2
1	A	196	ARG	3.2
1	A	247	SER	3.2
1	A	188	ASN	3.1
1	A	184	GLY	2.8
1	A	182	CYS	2.6
1	A	264	CYS	2.4
1	A	253	GLY	2.3
1	A	197	ILE	2.2
1	A	274	GLU	2.2
1	A	251	PHE	2.2
1	A	100	PHE	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 carbohydrates 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. 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, 95th 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(\AA^2)	Q<0.9
3	NAG	A	1276	14/15	0.83	0.45	6.28	253,263,276,279	0
2	PCF	A	1275	50/50	0.81	0.46	1.56	102,185,344,362	0
3	NAG	A	1277	14/15	0.74	0.34	0.42	311,339,357,372	0
4	FUC	A	1278	10/11	0.71	0.49	-	287,299,315,315	0
5	SCR	A	1279	55/55	0.64	0.39	-	492,538,582,594	0

6.5 Other polymers [i](#)

There are no such residues in this entry.