



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2024 – 06:03 PM EST

PDB ID : 3QCA
Title : Crystal Structure of FAF1 UBX Domain In Complex with p97/VCP N Domain Reveals The Conserved FeisP Touch-Turn Motif of UBX Domain Suffering Conformational Change
Authors : Kim, K.H.; Kang, W.; Suh, S.W.; Yang, J.K.
Deposited on : 2011-01-15
Resolution : 2.90 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

<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
Xtriage (Phenix) : 1.13
EDS : 2.36
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

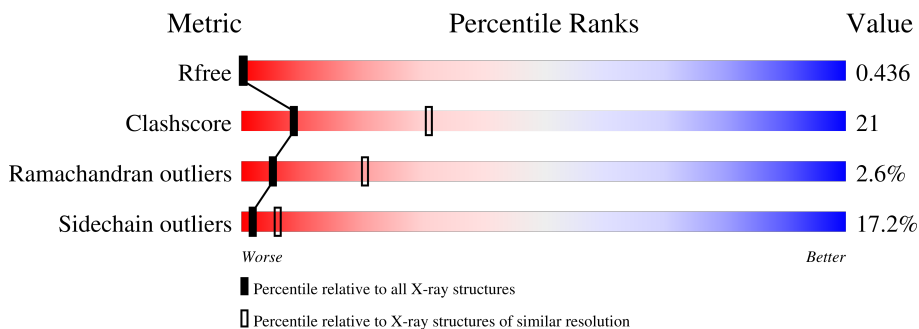
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)

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 ≥ 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 $\leq 5\%$

Mol	Chain	Length	Quality of chain
1	A	84	55% 31% 10% 5%
1	B	84	50% 39% 6% 5%
1	C	84	46% 40% 8% 5%
1	D	84	61% 25% 10% 5%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2577 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 FAS-associated factor 1.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
1	A	80	633	412	104	117	0	0	0
1	B	80	646	422	104	120	0	0	0
1	C	80	628	413	98	117	0	0	0
1	D	80	639	415	104	120	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	567	GLY	-	expression tag	UNP Q9UNN5
A	568	SER	-	expression tag	UNP Q9UNN5
A	569	GLU	-	expression tag	UNP Q9UNN5
A	570	PHE	-	expression tag	UNP Q9UNN5
B	567	GLY	-	expression tag	UNP Q9UNN5
B	568	SER	-	expression tag	UNP Q9UNN5
B	569	GLU	-	expression tag	UNP Q9UNN5
B	570	PHE	-	expression tag	UNP Q9UNN5
C	567	GLY	-	expression tag	UNP Q9UNN5
C	568	SER	-	expression tag	UNP Q9UNN5
C	569	GLU	-	expression tag	UNP Q9UNN5
C	570	PHE	-	expression tag	UNP Q9UNN5
D	567	GLY	-	expression tag	UNP Q9UNN5
D	568	SER	-	expression tag	UNP Q9UNN5
D	569	GLU	-	expression tag	UNP Q9UNN5
D	570	PHE	-	expression tag	UNP Q9UNN5

- Molecule 2 is water.

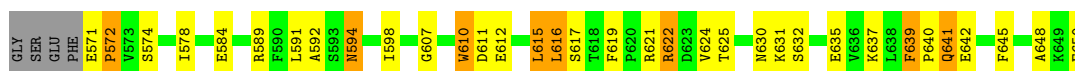
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	10	Total 10	O 10	0	0
2	B	5	Total 5	O 5	0	0
2	C	7	Total 7	O 7	0	0
2	D	9	Total 9	O 9	0	0

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. 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. 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.

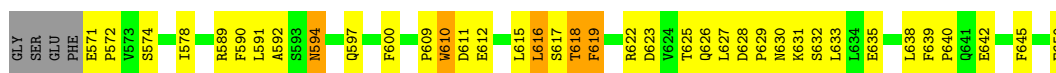
- Molecule 1: FAS-associated factor 1

Chain A: 



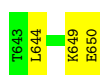
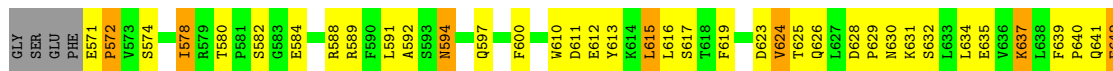
- Molecule 1: FAS-associated factor 1

Chain B: 



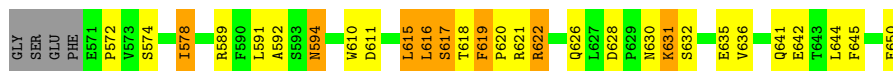
- Molecule 1: FAS-associated factor 1

Chain C: 



- Molecule 1: FAS-associated factor 1

Chain D: 



4 Data and refinement statistics i

Property	Value	Source
Space group	F 2 3	Depositor
Cell constants a, b, c, α , β , γ	175.73Å 175.73Å 175.73Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	30.00 – 2.90 29.70 – 2.90	Depositor EDS
% Data completeness (in resolution range)	100.0 (30.00-2.90) 98.7 (29.70-2.90)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.89 (at 2.90Å)	Xtriage
Refinement program	REFMAC 5.5.0072	Depositor
R, R_{free}	0.247 , 0.293 0.353 , 0.436	Depositor DCC
R_{free} test set	487 reflections (4.83%)	wwPDB-VP
Wilson B-factor (Å ²)	74.3	Xtriage
Anisotropy	0.000	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 39.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.58$, $\langle L^2 \rangle = 0.43$	Xtriage
Estimated twinning fraction	0.000 for k,h,-l	Xtriage
Reported twinning fraction	0.555 for H, K, L 0.445 for -K, -H, -L	Depositor
Outliers	0 of 10080 reflections	Xtriage
F_o, F_c correlation	0.86	EDS
Total number of atoms	2577	wwPDB-VP
Average B, all atoms (Å ²)	65.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.38% 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, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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	0.61	1/648 (0.2%)	0.66	0/877
1	B	0.64	0/662	0.65	0/896
1	C	0.59	0/644	0.63	0/873
1	D	0.57	0/654	0.64	0/886
All	All	0.60	1/2608 (0.0%)	0.65	0/3532

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	610	TRP	CB-CG	5.01	1.59	1.50

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	633	0	613	30	0
1	B	646	0	628	27	0
1	C	628	0	600	38	0
1	D	639	0	619	25	0
2	A	10	0	0	1	0
2	B	5	0	0	1	0
2	C	7	0	0	2	0
2	D	9	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	2577	0	2460	103	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 21.

All (103) 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:610:TRP:CD1	1:A:625:THR:HB	1.89	1.07
1:A:622:ARG:HG2	1:A:622:ARG:HH11	1.16	1.05
1:C:584:GLU:HB3	1:D:626:GLN:NE2	1.74	1.03
1:D:619:PHE:HA	1:D:620:PRO:C	1.89	0.90
1:B:571:GLU:N	1:B:572:PRO:HD3	1.86	0.90
1:D:572:PRO:HA	2:D:28:HOH:O	1.74	0.88
1:C:584:GLU:HB3	1:D:626:GLN:HE22	1.37	0.86
1:A:610:TRP:NE1	1:A:625:THR:HB	1.95	0.80
1:A:622:ARG:HH11	1:A:622:ARG:CG	1.95	0.78
1:C:582:SER:HB2	1:D:610:TRP:HZ2	1.49	0.77
1:C:612:GLU:OE1	1:D:631:LYS:NZ	2.18	0.75
1:D:572:PRO:HD2	2:D:7:HOH:O	1.87	0.74
1:A:622:ARG:HG2	1:A:622:ARG:NH1	1.95	0.72
1:C:637:LYS:HA	1:C:639:PHE:CE2	2.25	0.72
1:C:572:PRO:HD2	1:C:592:ALA:HB3	1.72	0.72
1:C:623:ASP:O	1:C:625:THR:N	2.24	0.71
1:A:584:GLU:HG2	1:B:626:GLN:OE1	1.90	0.71
1:C:584:GLU:CB	1:D:626:GLN:HE22	2.06	0.69
1:A:610:TRP:HD1	1:A:625:THR:HB	1.54	0.68
1:A:615:LEU:HB2	1:A:625:THR:HG23	1.77	0.66
1:D:617:SER:HB3	1:D:622:ARG:HG2	1.79	0.65
1:A:571:GLU:N	1:A:572:PRO:HD3	2.12	0.63
1:C:639:PHE:HB2	1:C:640:PRO:HA	1.80	0.63
1:A:611:ASP:OD2	1:A:612:GLU:HG3	1.97	0.63
1:B:639:PHE:CD1	1:B:640:PRO:HA	2.34	0.62
1:C:623:ASP:O	1:C:626:GLN:N	2.30	0.62
1:B:622:ARG:HD3	2:B:20:HOH:O	2.00	0.62
1:A:584:GLU:HB3	1:B:626:GLN:HE22	1.64	0.61
1:A:648:ALA:C	1:A:650:GLU:H	2.04	0.61
1:B:616:LEU:HB2	1:B:645:PHE:O	2.02	0.59
1:A:591:LEU:O	1:A:594:ASN:HB2	2.04	0.57
1:C:649:LYS:O	1:C:650:GLU:HB2	2.04	0.57
1:A:622:ARG:CG	1:A:622:ARG:NH1	2.59	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:574:SER:OG	1:D:592:ALA:HA	2.05	0.57
1:A:641:GLN:N	2:A:15:HOH:O	2.38	0.56
1:A:610:TRP:HE1	1:A:625:THR:HB	1.69	0.56
1:C:591:LEU:O	1:C:594:ASN:HB2	2.06	0.55
1:A:584:GLU:HB3	1:B:626:GLN:NE2	2.22	0.55
1:C:582:SER:OG	1:D:626:GLN:NE2	2.40	0.55
1:B:571:GLU:N	1:B:572:PRO:CD	2.65	0.55
1:D:591:LEU:O	1:D:594:ASN:HB2	2.07	0.55
1:B:591:LEU:O	1:B:594:ASN:HB2	2.07	0.54
1:C:582:SER:HB2	1:D:610:TRP:CZ2	2.39	0.54
1:C:623:ASP:O	1:C:624:VAL:C	2.47	0.54
1:D:615:LEU:HD22	1:D:644:LEU:HB3	1.91	0.53
1:D:619:PHE:HA	1:D:621:ARG:N	2.23	0.53
1:D:578:ILE:HG23	1:D:615:LEU:HD21	1.90	0.53
1:B:638:LEU:HD23	1:B:642:GLU:HG2	1.92	0.52
1:C:610:TRP:HB2	1:C:625:THR:CG2	2.40	0.52
1:A:571:GLU:HA	1:A:571:GLU:OE1	2.10	0.52
1:A:574:SER:OG	1:A:592:ALA:HA	2.10	0.52
1:A:617:SER:O	1:A:621:ARG:HA	2.11	0.51
1:C:574:SER:OG	1:C:592:ALA:HA	2.11	0.50
1:C:617:SER:HA	1:C:644:LEU:CD2	2.41	0.50
1:B:632:SER:HB3	1:B:635:GLU:HG3	1.94	0.50
1:A:598:ILE:HG13	1:C:588:ARG:HD2	1.93	0.49
1:A:615:LEU:O	1:A:624:VAL:N	2.39	0.49
1:B:574:SER:OG	1:B:592:ALA:HA	2.14	0.48
1:C:578:ILE:HG23	1:C:615:LEU:HD21	1.94	0.48
1:C:610:TRP:HB2	1:C:625:THR:HG21	1.96	0.48
1:A:607:GLY:HA3	1:B:627:LEU:HD21	1.96	0.48
1:D:616:LEU:HB2	1:D:645:PHE:HB2	1.95	0.48
1:A:592:ALA:O	1:A:632:SER:OG	2.32	0.47
1:C:623:ASP:C	1:C:625:THR:N	2.66	0.47
1:C:642:GLU:CG	2:C:16:HOH:O	2.63	0.47
1:C:580:THR:OG1	1:D:626:GLN:NE2	2.48	0.46
1:C:632:SER:HB3	1:C:635:GLU:HG3	1.98	0.46
1:C:634:LEU:HA	1:C:639:PHE:CE2	2.51	0.46
1:A:615:LEU:CB	1:A:625:THR:HG23	2.44	0.46
1:C:584:GLU:CB	1:D:626:GLN:NE2	2.61	0.45
1:C:592:ALA:O	1:C:632:SER:OG	2.34	0.45
1:B:594:ASN:O	1:B:633:LEU:HG	2.16	0.45
1:D:632:SER:HB3	1:D:635:GLU:HG3	1.98	0.45
1:A:639:PHE:HA	1:A:640:PRO:HA	1.73	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:597:GLN:O	1:B:600:PHE:HB2	2.17	0.45
1:B:623:ASP:OD1	1:B:625:THR:OG1	2.34	0.45
1:B:610:TRP:HE3	1:B:625:THR:HB	1.82	0.44
1:D:620:PRO:O	1:D:621:ARG:C	2.56	0.44
1:C:615:LEU:HD22	1:C:644:LEU:HB3	2.00	0.44
1:A:648:ALA:C	1:A:650:GLU:N	2.72	0.43
1:A:610:TRP:HD1	1:A:625:THR:CB	2.29	0.43
1:B:628:ASP:HA	1:B:629:PRO:HD3	1.88	0.43
1:D:622:ARG:NH2	1:D:636:VAL:O	2.51	0.43
1:B:611:ASP:OD2	1:B:612:GLU:N	2.51	0.43
1:A:632:SER:HB3	1:A:635:GLU:HG3	2.01	0.42
1:B:609:PRO:HG2	1:B:612:GLU:HB2	2.01	0.42
1:C:617:SER:HA	1:C:644:LEU:HD22	2.00	0.42
1:C:642:GLU:HG3	2:C:16:HOH:O	2.19	0.42
1:B:639:PHE:CD1	1:B:640:PRO:CA	3.02	0.42
1:B:617:SER:HB3	1:B:622:ARG:HG2	2.00	0.42
1:C:613:TYR:OH	1:D:628:ASP:HB2	2.20	0.42
1:C:597:GLN:O	1:C:600:PHE:HB2	2.20	0.41
1:B:639:PHE:CE1	1:B:640:PRO:HB3	2.56	0.41
1:C:628:ASP:HA	1:C:629:PRO:HD3	1.84	0.41
1:B:618:THR:O	1:B:619:PHE:C	2.59	0.41
1:B:619:PHE:CZ	1:C:611:ASP:HB3	2.55	0.41
1:A:616:LEU:HB2	1:A:645:PHE:O	2.20	0.41
1:B:623:ASP:CG	1:B:625:THR:OG1	2.59	0.41
1:C:634:LEU:O	1:C:639:PHE:HE2	2.03	0.41
1:D:615:LEU:CD2	1:D:644:LEU:HB3	2.51	0.41
1:C:634:LEU:HA	1:C:639:PHE:CD2	2.56	0.40
1:C:584:GLU:HB3	1:D:626:GLN:CD	2.38	0.40
1:B:590:PHE:CD2	1:B:590:PHE:N	2.89	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	78/84 (93%)	71 (91%)	4 (5%)	3 (4%)	3	13
1	B	78/84 (93%)	73 (94%)	4 (5%)	1 (1%)	12	37
1	C	78/84 (93%)	73 (94%)	2 (3%)	3 (4%)	3	13
1	D	78/84 (93%)	72 (92%)	5 (6%)	1 (1%)	12	37
All	All	312/336 (93%)	289 (93%)	15 (5%)	8 (3%)	5	20

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	624	VAL
1	B	619	PHE
1	C	572	PRO
1	A	572	PRO
1	A	619	PHE
1	D	619	PHE
1	C	619	PHE
1	A	639	PHE

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	66/78 (85%)	55 (83%)	11 (17%)	2	6
1	B	69/78 (88%)	59 (86%)	10 (14%)	3	9
1	C	65/78 (83%)	54 (83%)	11 (17%)	2	6
1	D	68/78 (87%)	54 (79%)	14 (21%)	1	3
All	All	268/312 (86%)	222 (83%)	46 (17%)	2	6

All (46) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	578	ILE
1	A	589	ARG
1	A	594	ASN

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Mol	Chain	Res	Type
1	A	615	LEU
1	A	616	LEU
1	A	622	ARG
1	A	630	ASN
1	A	631	LYS
1	A	637	LYS
1	A	641	GLN
1	A	642	GLU
1	B	578	ILE
1	B	589	ARG
1	B	594	ASN
1	B	610	TRP
1	B	615	LEU
1	B	616	LEU
1	B	618	THR
1	B	630	ASN
1	B	631	LYS
1	B	650	GLU
1	C	571	GLU
1	C	578	ILE
1	C	589	ARG
1	C	594	ASN
1	C	615	LEU
1	C	616	LEU
1	C	630	ASN
1	C	631	LYS
1	C	637	LYS
1	C	641	GLN
1	C	642	GLU
1	D	578	ILE
1	D	589	ARG
1	D	594	ASN
1	D	611	ASP
1	D	615	LEU
1	D	616	LEU
1	D	617	SER
1	D	618	THR
1	D	622	ARG
1	D	630	ASN
1	D	631	LYS
1	D	641	GLN
1	D	642	GLU

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Mol	Chain	Res	Type
1	D	650	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	594	ASN
1	B	594	ASN
1	C	594	ASN
1	D	594	ASN
1	D	626	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](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.