wwPDB X-ray Structure Validation Summary Report (i)

May 22, 2023 – 07:53 PM EDT

PDB ID	:	1FAK
Title	:	HUMAN TISSUE FACTOR COMPLEXED WITH COAGULATION FACTOR VIIA INHIBITED WITH A BPTI-MUTANT
Authors	:	Zhang, E.; St Charles, R.; Tulinsky, A.
Deposited on	:	1998-12-28
Resolution	:	2.10 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) 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 (i)) were used in the production of this report:

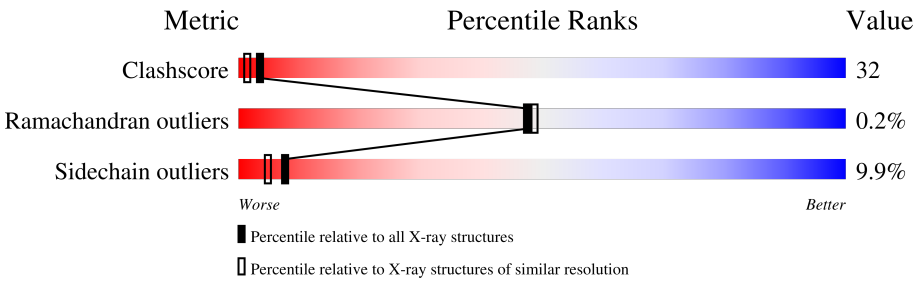
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.33

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 2.10 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))
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)

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 <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	L	152	36% 26% 7% • 29%
2	H	254	50% 37% 10% ••
3	T	206	35% 42% 11% 11%
4	I	55	20% 58% 20% •

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
5	GLC	L	600	X	-	-	-

2 Entry composition (i)

There are 8 unique types of molecules in this entry. The entry contains 5079 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 PROTEIN (BLOOD COAGULATION FACTOR VIIA).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	L	108	827	504	143	167	13	0	0	0

- Molecule 2 is a protein called PROTEIN (BLOOD COAGULATION FACTOR VIIA).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	H	251	1955	1242	348	352	13	0	0	0

- Molecule 3 is a protein called PROTEIN (SOLUBLE TISSUE FACTOR).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	T	183	1495	957	240	293	5	0	0	0

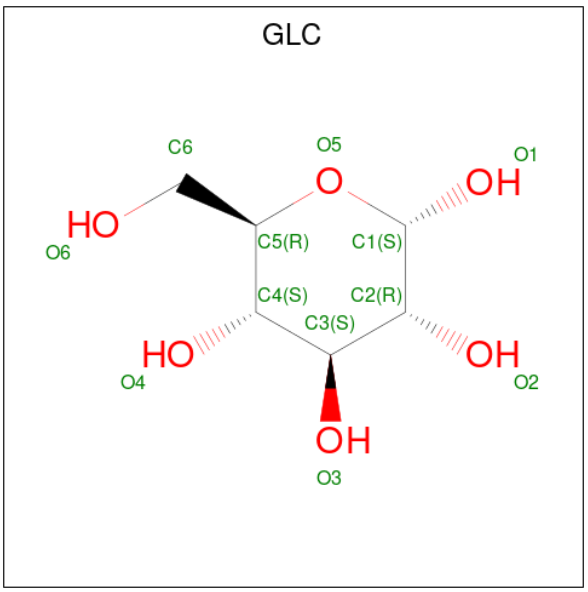
- Molecule 4 is a protein called PROTEIN (5L15).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	I	55	439	277	75	80	7	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

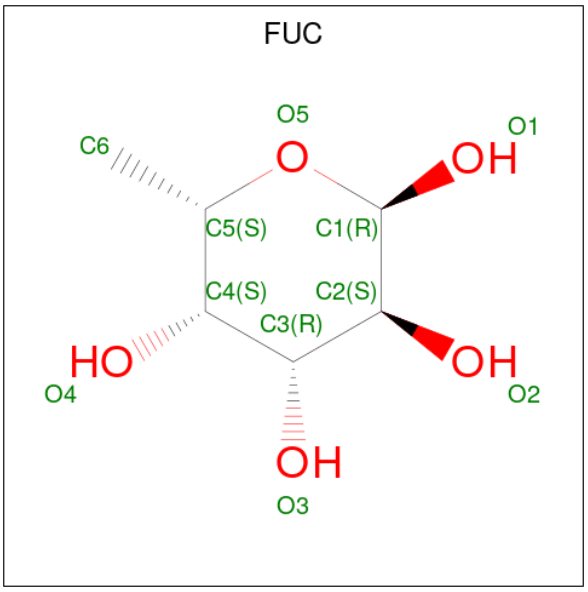
Chain	Residue	Modelled	Actual	Comment	Reference
I	11	ASP	THR	conflict	UNP P00974
I	15	ARG	LYS	conflict	UNP P00974
I	17	LEU	ARG	conflict	UNP P00974
I	18	HIS	ILE	conflict	UNP P00974
I	19	LEU	ILE	conflict	UNP P00974
I	34	TYR	VAL	conflict	UNP P00974
I	39	LEU	ARG	conflict	UNP P00974
I	46	GLU	LYS	conflict	UNP P00974

- Molecule 5 is alpha-D-glucopyranose (three-letter code: GLC) (formula: $C_6H_{12}O_6$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
5	L	1	11	6	5	0	0

- Molecule 6 is alpha-L-fucopyranose (three-letter code: FUC) (formula: $C_6H_{12}O_5$).



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

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Ca		
7	L	1	1	1	0	0
7	H	1	1	1	0	0

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
8	L	78	78	78	0	0
8	H	164	164	164	0	0
8	T	75	75	75	0	0
8	I	23	23	23	0	0

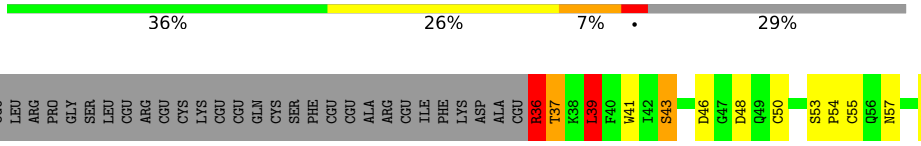
3 Residue-property plots (i)

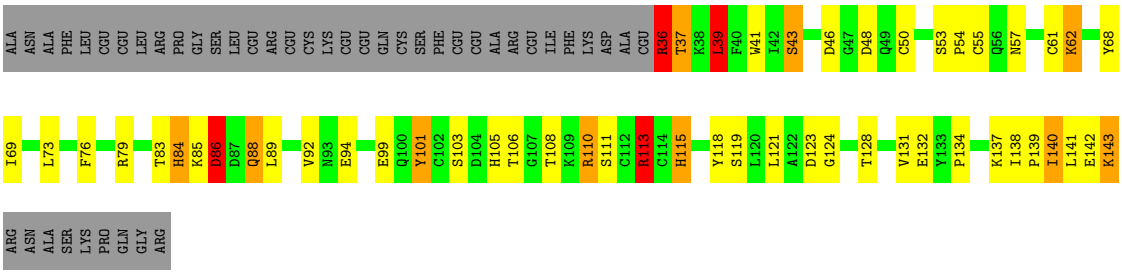
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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.

Note EDS was not executed.

• Molecule 1: PROTEIN (BLOOD COAGULATION FACTOR VIIA)

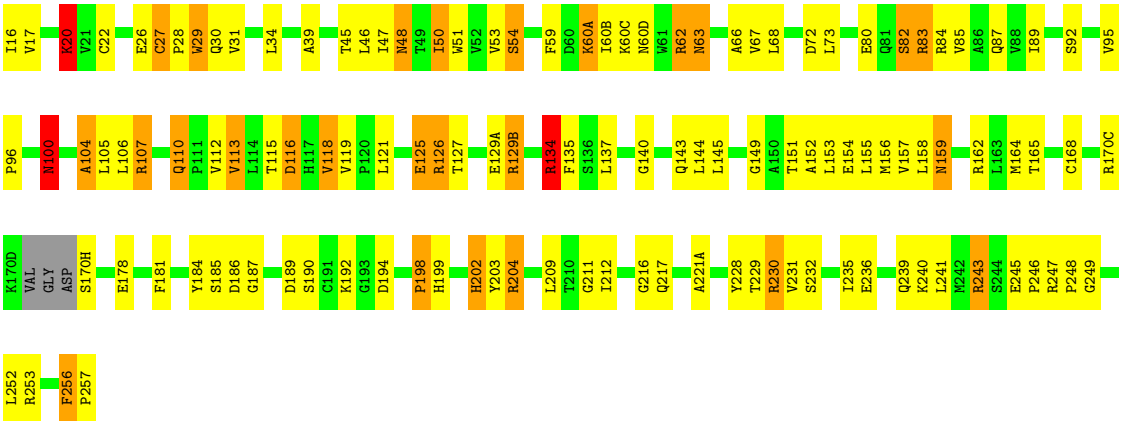
Chain L:





• Molecule 2: PROTEIN (BLOOD COAGULATION FACTOR VIIA)

Chain H:



• Molecule 3: PROTEIN (SOLUBLE TISSUE FACTOR)

Chain T:

SER ALA G90 E91 P92 L93 S97 F100 E105 T106 Q110 P111 Q114 S115 F116 E117 Q118 VAL GLY THR K122 V123 N124 V125 T126 V127 E128 D129 E130 R131 T132 L133 V134 R135 R136 N137 N138 T139 F140 L141 S142 L143 R144 F147 G148 K149 D150 L151 I152 Y153 T154 L155 Y156 Y157

W158 LYS SER SER SER SER G164 K165 K166 T167 A168 K169 T170 N171 E174 F175 L176 I177 D178 V179 ASP LYS GLY GLU ASN Y185 C186 F187 S188 V189 Q190 A191 V192 I193 P194 S195 R196 T197 V198 N199 R200 K201 S202 T203 D204 S205 P206 V207 E208 C209 M210

- Molecule 4: PROTEIN (5L15)

Chain I: 20% 58% 20% •

A1 P2 D3 F4 C5 L6 E7 P8 P9 Y10 D11 G12 P13 C14 R15 A16 L17 R20 Y21 F22 Y23 N24 A25 K26 A27 G28 L29 C30 Q31 T32 F33 Y34 Y35 G36 G37 C38 L39 A40 K41 R42 F45 E46 S47 A48 E49 D50 C51 M52 R53 T54 C55

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	63.49Å 190.00Å 175.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	9.00 – 2.10	Depositor
% Data completeness (in resolution range)	80.0 (9.00-2.10)	Depositor
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	PROLSQ	Depositor
R, R_{free}	0.237 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	5079	wwPDB-VP
Average B, all atoms ($Å^2$)	27.0	wwPDB-VP

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: GLC, FUC, CA

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	L	1.16	0/844	2.03	23/1139 (2.0%)
2	H	1.37	4/2004 (0.2%)	2.17	74/2726 (2.7%)
3	T	1.11	0/1527	1.85	30/2075 (1.4%)
4	I	1.14	0/452	1.98	12/609 (2.0%)
All	All	1.24	4/4827 (0.1%)	2.03	139/6549 (2.1%)

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
2	H	0	2
4	I	0	1
All	All	0	3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	92	SER	CB-OG	7.46	1.51	1.42
2	H	168	CYS	CB-SG	5.26	1.91	1.82
2	H	228	TYR	CA-CB	5.19	1.65	1.53
2	H	152	ALA	CA-CB	5.11	1.63	1.52

The worst 5 of 139 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	H	253	ARG	NE-CZ-NH1	20.24	130.42	120.30
2	H	107	ARG	CD-NE-CZ	18.48	149.47	123.60
1	L	36	ARG	NE-CZ-NH1	-15.34	112.63	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	H	126	ARG	NE-CZ-NH1	15.32	127.96	120.30
2	H	247	ARG	NE-CZ-NH1	15.17	127.89	120.30

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	H	134	ARG	Sidechain
2	H	230	ARG	Sidechain
4	I	53	ARG	Sidechain

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	L	827	0	755	44	0
2	H	1955	0	1933	92	0
3	T	1495	0	1455	134	0
4	I	439	0	401	54	0
5	L	11	0	10	1	0
6	L	10	0	10	0	0
7	H	1	0	0	0	0
7	L	1	0	0	0	0
8	H	164	0	0	9	0
8	I	23	0	0	2	0
8	L	78	0	0	0	0
8	T	75	0	0	6	0
All	All	5079	0	4564	298	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 32.

The worst 5 of 298 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:T:158:TRP:CH2	3:T:207:VAL:HG11	1.77	1.20

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:T:155:LEU:HB2	3:T:175:PHE:CE2	1.82	1.15
3:T:185:TYR:O	3:T:209:CYS:HA	1.44	1.14
3:T:186:CYS:HA	3:T:208:GLU:O	1.58	1.04
2:H:46:LEU:HD13	2:H:68:LEU:HD11	1.39	1.03

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	L	106/152 (70%)	100 (94%)	6 (6%)	0	100	100
2	H	247/254 (97%)	235 (95%)	11 (4%)	1 (0%)	34	32
3	T	173/206 (84%)	163 (94%)	10 (6%)	0	100	100
4	I	53/55 (96%)	50 (94%)	3 (6%)	0	100	100
All	All	579/667 (87%)	548 (95%)	30 (5%)	1 (0%)	47	49

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	249	GLY

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	L	95/122 (78%)	81 (85%)	14 (15%)	3 1
2	H	214/216 (99%)	203 (95%)	11 (5%)	24 22
3	T	172/190 (90%)	155 (90%)	17 (10%)	8 5
4	I	45/45 (100%)	35 (78%)	10 (22%)	1 0
All	All	526/573 (92%)	474 (90%)	52 (10%)	8 5

5 of 52 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	T	28	LYS
3	T	149	LYS
4	I	46	GLU
3	T	68	LYS
3	T	123	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
2	H	110	GLN
4	I	24	ASN
2	H	159	ASN
4	I	31	GLN
3	T	137	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 4 ligands modelled in this entry, 2 are monoatomic - leaving 2 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	$\#\|Z\| > 2$
5	GLC	L	600	1	11,11,12	1.30	1 (9%)	15,15,17	2.66	4 (26%)
6	FUC	L	601	1	10,10,11	1.45	1 (10%)	14,14,16	1.62	3 (21%)

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
5	GLC	L	600	1	1/1/4/5	2/2/19/22	0/1/1/1
6	FUC	L	601	1	-	-	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	L	601	FUC	C4-C5	2.26	1.57	1.52
5	L	600	GLC	C4-C5	2.14	1.57	1.53

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	L	600	GLC	C1-O5-C5	6.64	121.19	112.19
5	L	600	GLC	O5-C1-C2	5.30	118.95	110.77
5	L	600	GLC	O5-C5-C6	3.82	113.19	107.20
6	L	601	FUC	C1-O5-C5	3.57	120.86	112.78
6	L	601	FUC	O5-C1-C2	2.88	115.22	110.77

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
5	L	600	GLC	C1

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	L	600	GLC	C4-C5-C6-O6
5	L	600	GLC	O5-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	L	600	GLC	1	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 is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates (i)

EDS was not executed - this section is therefore empty.

6.4 Ligands (i)

EDS was not executed - this section is therefore empty.

6.5 Other polymers (i)

EDS was not executed - this section is therefore empty.