wwPDB X-ray Structure Validation Summary Report (i)

May 15, 2020 – 08:38 pm BST

PDB ID	:	1D0A
Title	:	STRUCTURE OF TNF RECEPTOR ASSOCIATED FACTOR 2 (TRAF2) IN COMPLEX WITH A HUMAN OX40 PEPTIDE
Authors	:	Ye, H.; Park, Y.C.; Kreishman, M.; Kieff, E.; Wu, H.
Deposited on	:	1999-09-09
Resolution	:	2.00 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 following versions of software and data (see references (i)) were used in the production of this report:

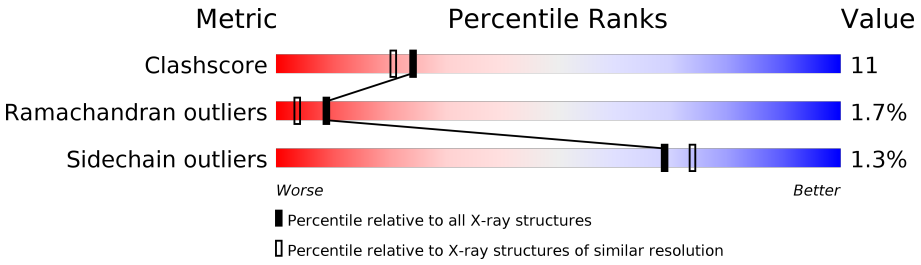
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 2.00 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	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)

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 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	A	168	74% 23% •
1	B	168	80% 18% •
1	C	168	80% 18% •
1	D	168	69% 29% •
1	E	168	77% 22% •
1	F	168	82% 16% •
2	G	6	83% 17%
2	H	6	83% 17%

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Mol	Chain	Length	Quality of chain
2	I	6	83% 17%
2	J	6	83% 17%
2	K	6	100%
2	L	6	100%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 8683 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 TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			
1	B	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			
1	C	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			
1	D	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			
1	E	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			
1	F	168	Total	C	N	O	S	0	0	0
			1282	825	217	231	9			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	365	ARG	LEU	CONFLICT	UNP Q12933
B	365	ARG	LEU	CONFLICT	UNP Q12933
C	365	ARG	LEU	CONFLICT	UNP Q12933
D	365	ARG	LEU	CONFLICT	UNP Q12933
E	365	ARG	LEU	CONFLICT	UNP Q12933
F	365	ARG	LEU	CONFLICT	UNP Q12933

- Molecule 2 is a protein called OX40L RECEPTOR PEPTIDE.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	G	6	Total	C	N	O	0	0	0
			46	28	6	12			
2	H	6	Total	C	N	O	0	0	0
			46	28	6	12			
2	I	6	Total	C	N	O	0	0	0
			46	28	6	12			

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf	Trace
2	J	6	Total C N O 46 28 6 12	0	0	0
2	K	6	Total C N O 46 28 6 12	0	0	0
2	L	6	Total C N O 46 28 6 12	0	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	109	Total O 109 109	0	0
3	B	123	Total O 123 123	0	0
3	C	124	Total O 124 124	0	0
3	D	68	Total O 68 68	0	0
3	E	116	Total O 116 116	0	0
3	F	153	Total O 153 153	0	0
3	G	4	Total O 4 4	0	0
3	H	3	Total O 3 3	0	0
3	I	7	Total O 7 7	0	0
3	K	4	Total O 4 4	0	0
3	L	4	Total O 4 4	0	0

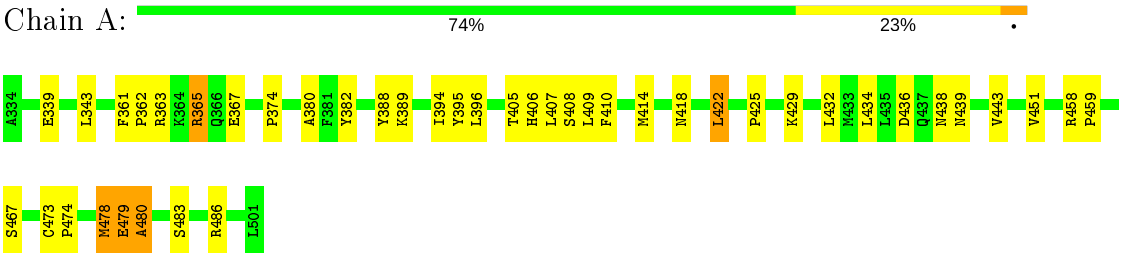
3 Residue-property plots (i)

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

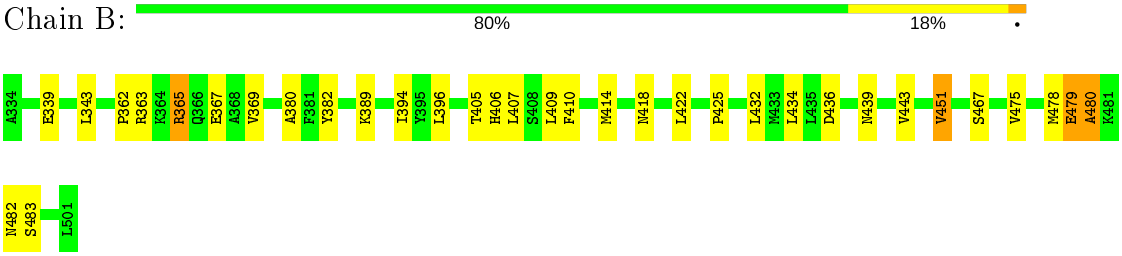
- Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2

Chain A:



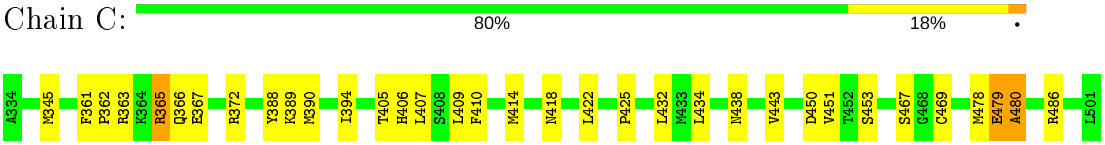
- Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2

Chain B:



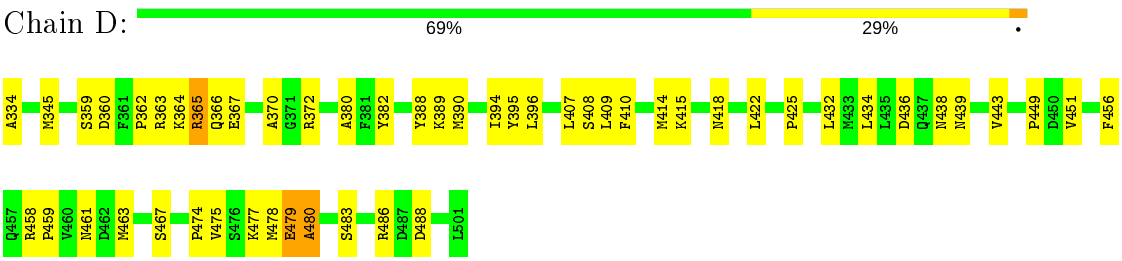
- Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2

Chain C:



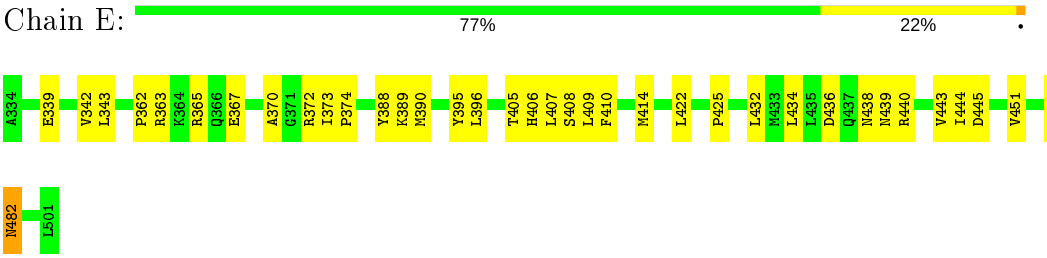
- Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2

Chain D:



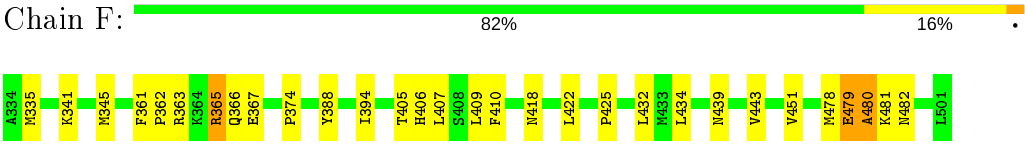
- Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2

Chain E:



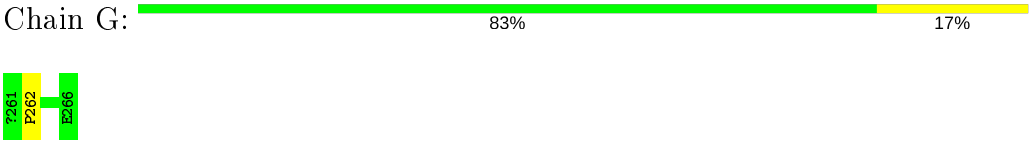
• Molecule 1: TUMOR NECROSIS FACTOR RECEPTOR ASSOCIATED PROTEIN 2

Chain F:



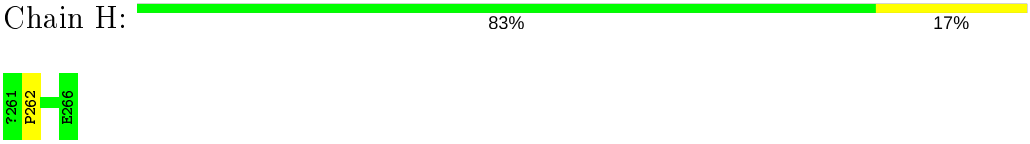
• Molecule 2: OX40L RECEPTOR PEPTIDE

Chain G:



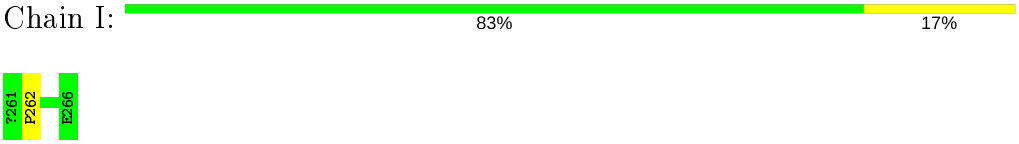
• Molecule 2: OX40L RECEPTOR PEPTIDE

Chain H:



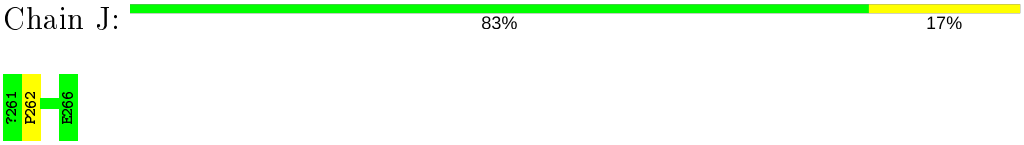
• Molecule 2: OX40L RECEPTOR PEPTIDE

Chain I:



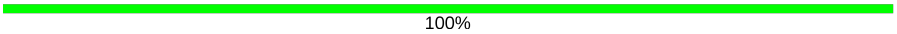
• Molecule 2: OX40L RECEPTOR PEPTIDE

Chain J:



• Molecule 2: OX40L RECEPTOR PEPTIDE

Chain K:



There are no outlier residues recorded for this chain.

• Molecule 2: OX40L RECEPTOR PEPTIDE

Chain L: 

There are no outlier residues recorded for this chain.

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	136.40Å 85.60Å 125.40Å 90.00° 118.90° 90.00°	Depositor
Resolution (Å)	20.00 – 2.00	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-2.00)	Depositor
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.225 , 0.251	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	8683	wwPDB-VP
Average B, all atoms (Å^2)	24.0	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: ACE

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	0.35	0/1312	0.68	1/1781 (0.1%)
1	B	0.37	0/1312	0.69	1/1781 (0.1%)
1	C	0.37	0/1312	0.68	1/1781 (0.1%)
1	D	0.35	0/1312	0.67	1/1781 (0.1%)
1	E	0.36	0/1312	0.69	1/1781 (0.1%)
1	F	0.37	0/1312	0.69	1/1781 (0.1%)
2	G	0.36	0/44	0.68	0/58
2	H	0.36	0/44	0.66	0/58
2	I	0.34	0/44	0.66	0/58
2	J	0.32	0/44	0.70	0/58
2	K	0.34	0/44	0.72	0/58
2	L	0.35	0/44	0.68	0/58
All	All	0.36	0/8136	0.68	6/11034 (0.1%)

There are no bond length outliers.

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	362	PRO	N-CA-CB	5.74	110.18	103.30
1	C	362	PRO	N-CA-CB	5.72	110.17	103.30
1	F	362	PRO	N-CA-CB	5.62	110.04	103.30
1	E	362	PRO	N-CA-CB	5.50	109.90	103.30
1	D	362	PRO	N-CA-CB	5.43	109.82	103.30

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	1282	0	1238	34	0
1	B	1282	0	1238	27	0
1	C	1282	0	1238	26	0
1	D	1282	0	1238	35	0
1	E	1282	0	1238	30	0
1	F	1282	0	1238	21	0
2	G	46	0	41	1	0
2	H	46	0	41	1	0
2	I	46	0	41	1	0
2	J	46	0	41	1	0
2	K	46	0	41	0	0
2	L	46	0	41	0	0
3	A	109	0	0	3	0
3	B	123	0	0	1	0
3	C	124	0	0	2	0
3	D	68	0	0	1	0
3	E	116	0	0	4	0
3	F	153	0	0	5	0
3	G	4	0	0	0	0
3	H	3	0	0	0	0
3	I	7	0	0	0	0
3	K	4	0	0	0	0
3	L	4	0	0	0	0
All	All	8683	0	7674	172	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 11.

The worst 5 of 172 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:E:425:PRO:HG3	1:E:451:VAL:HG13	1.46	0.94
1:A:425:PRO:HG3	1:A:451:VAL:HG13	1.50	0.93
1:F:425:PRO:HG3	1:F:451:VAL:HG13	1.50	0.92
1:D:436:ASP:OD1	1:D:483:SER:HB2	1.75	0.86

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:425:PRO:HG3	1:D:451:VAL:HG13	1.58	0.84

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	166/168 (99%)	154 (93%)	8 (5%)	4 (2%)	6 2
1	B	166/168 (99%)	155 (93%)	8 (5%)	3 (2%)	8 3
1	C	166/168 (99%)	156 (94%)	8 (5%)	2 (1%)	13 7
1	D	166/168 (99%)	153 (92%)	11 (7%)	2 (1%)	13 7
1	E	166/168 (99%)	155 (93%)	8 (5%)	3 (2%)	8 3
1	F	166/168 (99%)	155 (93%)	8 (5%)	3 (2%)	8 3
2	G	4/6 (67%)	4 (100%)	0	0	100 100
2	H	4/6 (67%)	4 (100%)	0	0	100 100
2	I	4/6 (67%)	4 (100%)	0	0	100 100
2	J	4/6 (67%)	4 (100%)	0	0	100 100
2	K	4/6 (67%)	4 (100%)	0	0	100 100
2	L	4/6 (67%)	4 (100%)	0	0	100 100
All	All	1020/1044 (98%)	952 (93%)	51 (5%)	17 (2%)	9 4

5 of 17 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	480	ALA
1	B	480	ALA
1	C	480	ALA
1	D	480	ALA

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Mol	Chain	Res	Type
1	E	480	ALA

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	132/145 (91%)	130 (98%)	2 (2%)	65 69
1	B	132/145 (91%)	129 (98%)	3 (2%)	50 53
1	C	132/145 (91%)	131 (99%)	1 (1%)	81 86
1	D	132/145 (91%)	130 (98%)	2 (2%)	65 69
1	E	132/145 (91%)	131 (99%)	1 (1%)	81 86
1	F	132/145 (91%)	130 (98%)	2 (2%)	65 69
2	G	5/5 (100%)	5 (100%)	0	100 100
2	H	5/5 (100%)	5 (100%)	0	100 100
2	I	5/5 (100%)	5 (100%)	0	100 100
2	J	5/5 (100%)	5 (100%)	0	100 100
2	K	5/5 (100%)	5 (100%)	0	100 100
2	L	5/5 (100%)	5 (100%)	0	100 100
All	All	822/900 (91%)	811 (99%)	11 (1%)	69 74

5 of 11 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	451	VAL
1	C	365	ARG
1	E	365	ARG
1	B	439	ASN
1	D	439	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	439	ASN
1	D	461	ASN
1	F	406	HIS
1	D	366	GLN
1	D	406	HIS

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

There are no ligands in this entry.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.