Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 05:01 AM GMT

PDB ID	:	2P4I
Title	:	Evolution of a highly Selective and Potent 2-(Pyridin-2-yl)-1,3,5-triazine Tie-2 Kinase Inhibitor
Authors	:	Bellon, S.F.
Deposited on	:	2007-03-12
Resolution	:	2.50 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:

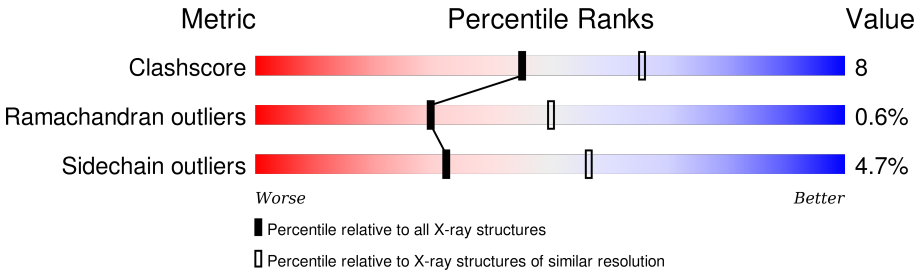
MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
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 2.50 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	102246	4242 (2.50-2.50)
Ramachandran outliers	100387	4156 (2.50-2.50)
Sidechain outliers	100360	4158 (2.50-2.50)

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	317	65% 14% • 21%
1	B	317	65% 15% • 19%

2 Entry composition

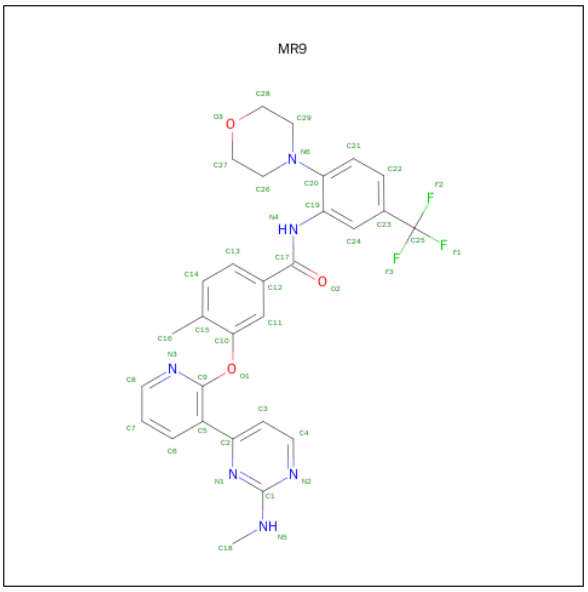
There are 3 unique types of molecules in this entry. The entry contains 4225 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Angiopoietin-1 receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	252	Total	C	N	O	S	0	0	0
			1970	1258	335	365	12			
1	B	258	Total	C	N	O	S	0	0	0
			1995	1273	338	372	12			

- Molecule 2 is 4-METHYL-3-({3-[2-(METHYLAMINO)PYRIMIDIN-4-YL]PYRIDIN-2-YL}OXY)-N-[2-MORPHOLIN-4-YL-5-(TRIFLUOROMETHYL)PHENYL]BENZAMIDE (three-letter code: MR9) (formula: $C_{29}H_{27}F_3N_6O_3$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			41	29	3	6	3		
2	B	1	Total	C	F	N	O	0	0
			41	29	3	6	3		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	106	Total O 106 106	0	0
3	B	72	Total O 72 72	0	0

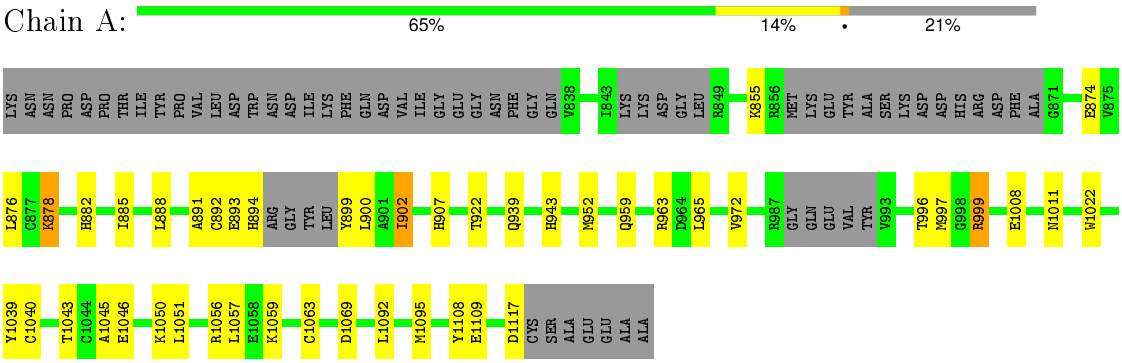
3 Residue-property plots (i)

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

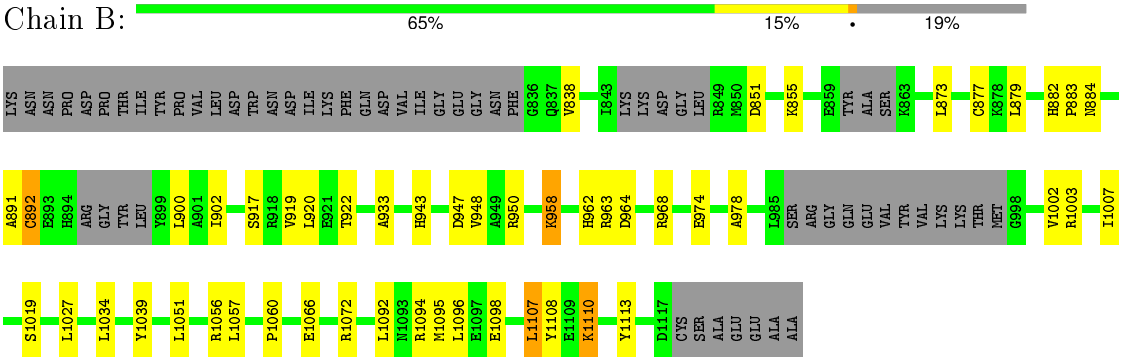
- Molecule 1: Angiopoietin-1 receptor

Chain A:



- Molecule 1: Angiopoietin-1 receptor

Chain B:



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	64.26Å 63.19Å 175.57Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.50	Depositor
% Data completeness (in resolution range)	94.2 (20.00-2.50)	Depositor
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.246 , 0.303	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4225	wwPDB-VP
Average B, all atoms (Å^2)	48.0	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: MR9

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	0.49	0/2008	0.64	0/2720
1	B	0.49	0/2035	0.58	0/2761
All	All	0.49	0/4043	0.61	0/5481

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	1970	0	1918	31	0
1	B	1995	0	1906	29	0
2	A	41	0	27	3	0
2	B	41	0	27	3	0
3	A	106	0	0	8	0
3	B	72	0	0	2	0
All	All	4225	0	3878	62	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 8.

All (62) 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:943:HIS:HB3	3:A:91:HOH:O	1.64	0.97
1:A:1069:ASP:HB3	3:A:155:HOH:O	1.81	0.79
1:A:997:MET:HE2	3:A:203:HOH:O	1.82	0.78
1:A:902:ILE:HD11	2:A:301:MR9:H3	1.64	0.78
2:A:301:MR9:O1	2:A:301:MR9:H3	1.84	0.78
1:A:999:ARG:NH1	3:A:72:HOH:O	2.04	0.73
1:B:1092:LEU:HD23	1:B:1095:MET:HE3	1.71	0.72
1:A:1040:CYS:SG	3:A:5:HOH:O	2.49	0.70
2:B:302:MR9:H3	2:B:302:MR9:O1	1.90	0.70
1:A:999:ARG:HB3	3:A:72:HOH:O	1.91	0.69
1:B:919:VAL:HA	1:B:922:THR:HB	1.77	0.67
1:A:963:ARG:HE	1:A:997:MET:HE3	1.65	0.60
1:A:893:GLU:HG2	1:A:894:HIS:H	1.66	0.60
1:A:1051:LEU:O	1:A:1056:ARG:NH2	2.37	0.57
1:A:1046:GLU:O	1:A:1050:LYS:HG3	2.07	0.55
1:A:1043:THR:HG22	1:A:1045:ALA:H	1.71	0.55
1:B:902:ILE:HD11	2:B:302:MR9:H3	1.87	0.55
1:B:1060:PRO:HA	3:B:191:HOH:O	2.05	0.55
1:A:1039:TYR:H	1:A:1057:LEU:HD21	1.72	0.55
1:B:855:LYS:HB3	1:B:900:LEU:HB3	1.89	0.54
1:B:1092:LEU:HD23	1:B:1095:MET:CE	2.39	0.53
1:A:1008:GLU:O	1:A:1011:ASN:O	2.28	0.52
1:B:948:VAL:HG11	1:B:1027:LEU:CD1	2.41	0.51
1:B:884:ASN:OD1	1:B:950:ARG:HD2	2.10	0.51
1:A:855:LYS:O	1:A:899:TYR:HA	2.11	0.51
1:A:1092:LEU:HA	1:A:1095:MET:HE3	1.92	0.51
1:B:1027:LEU:HD23	1:B:1027:LEU:O	2.10	0.51
1:A:876:LEU:HD13	1:A:888:LEU:HD13	1.93	0.50
1:B:1066:GLU:OE2	1:B:1094:ARG:NH2	2.44	0.50
1:A:902:ILE:HD11	2:A:301:MR9:C3	2.38	0.50
1:B:855:LYS:HB2	2:B:302:MR9:H163	1.94	0.50
1:B:1108:TYR:CD1	1:B:1110:LYS:HG3	2.49	0.48
1:B:948:VAL:HG11	1:B:1027:LEU:HD13	1.95	0.48
1:B:964:ASP:OD1	1:B:968:ARG:NH2	2.46	0.47
1:A:878:LYS:NZ	3:A:114:HOH:O	2.47	0.47
1:B:962:HIS:O	1:B:963:ARG:HB2	2.15	0.47
1:B:873:LEU:HD13	1:B:891:ALA:HB2	1.98	0.46
1:B:1019:SER:HB2	3:B:216:HOH:O	2.16	0.45
1:A:963:ARG:HG3	1:A:963:ARG:HH21	1.81	0.45
1:B:1056:ARG:HG3	1:B:1072:ARG:NH1	2.32	0.45
1:A:1022:TRP:C	1:A:1022:TRP:CD1	2.90	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1039:TYR:CE1	1:A:1057:LEU:HG	2.53	0.43
1:B:882:HIS:CG	1:B:883:PRO:HD2	2.53	0.43
1:A:997:MET:HA	1:A:997:MET:HE2	2.00	0.43
1:B:1003:ARG:HE	1:B:1003:ARG:HB2	1.73	0.43
1:A:943:HIS:CG	3:A:91:HOH:O	2.72	0.43
1:B:879:LEU:O	1:B:958:LYS:NZ	2.52	0.43
1:A:1059:LYS:HE2	1:A:1063:CYS:O	2.18	0.43
1:A:907:HIS:HB2	1:A:972:VAL:HB	2.01	0.42
1:A:996:THR:O	1:A:997:MET:HE3	2.21	0.41
1:B:947:ASP:HB2	1:B:978:ALA:HB3	2.02	0.41
1:B:873:LEU:O	1:B:877:CYS:HB2	2.21	0.41
1:B:920:LEU:HD13	1:B:1107:LEU:HD11	2.03	0.41
1:B:943:HIS:CD2	1:B:1096:LEU:HD22	2.55	0.41
1:B:1051:LEU:O	1:B:1056:ARG:NH2	2.54	0.41
1:B:882:HIS:CD2	1:B:883:PRO:HD2	2.56	0.41
1:B:933:ALA:O	1:B:1113:TYR:OH	2.29	0.41
1:A:1108:TYR:O	1:A:1109:GLU:C	2.60	0.40
1:A:952:MET:HG3	1:A:965:LEU:HD11	2.03	0.40
1:B:1039:TYR:H	1:B:1057:LEU:HD21	1.85	0.40
1:A:882:HIS:HB3	1:A:885:ILE:HG12	2.03	0.40
1:A:891:ALA:HB2	1:A:900:LEU:HD23	2.03	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	242/317 (76%)	231 (96%)	10 (4%)	1 (0%)	39 61
1	B	248/317 (78%)	237 (96%)	9 (4%)	2 (1%)	24 41
All	All	490/634 (77%)	468 (96%)	19 (4%)	3 (1%)	30 50

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	892	CYS
1	B	892	CYS
1	B	1002	VAL

5.3.2 Protein sidechains

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	204/271 (75%)	196 (96%)	8 (4%)	39	66
1	B	203/271 (75%)	192 (95%)	11 (5%)	27	49
All	All	407/542 (75%)	388 (95%)	19 (5%)	32	56

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	874	GLU
1	A	878	LYS
1	A	902	ILE
1	A	922	THR
1	A	939	GLN
1	A	959	GLN
1	A	999	ARG
1	A	1117	ASP
1	B	838	VAL
1	B	851	ASP
1	B	892	CYS
1	B	917	SER
1	B	958	LYS
1	B	974	GLU
1	B	1007	ILE
1	B	1034	LEU
1	B	1098	GLU
1	B	1107	LEU
1	B	1110	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	881	HIS
1	A	907	HIS
1	A	939	GLN
1	A	975	ASN
1	A	1018	ASN
1	A	1053	GLN
1	B	943	HIS
1	B	1018	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 carbohydrates in this entry.

5.6 Ligand geometry (i)

2 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	MR9	A	301	-	45,45,45	1.10	4 (8%)	62,64,64	1.95	13 (20%)
2	MR9	B	302	-	45,45,45	1.14	4 (8%)	62,64,64	1.90	12 (19%)

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	MR9	A	301	-	-	0/28/36/36	0/5/5/5
2	MR9	B	302	-	-	0/28/36/36	0/5/5/5

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	302	MR9	C19-N4	-3.98	1.34	1.41
2	A	301	MR9	C19-N4	-3.46	1.35	1.41
2	A	301	MR9	C20-N6	-2.81	1.34	1.41
2	B	302	MR9	C20-N6	-2.71	1.35	1.41
2	A	301	MR9	C5-C2	-2.15	1.41	1.48
2	B	302	MR9	C5-C2	-2.02	1.41	1.48
2	A	301	MR9	C12-C17	2.05	1.54	1.50
2	B	302	MR9	C25-C23	2.13	1.54	1.49

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	302	MR9	N2-C1-N1	-5.98	120.30	126.67
2	A	301	MR9	N2-C1-N1	-5.88	120.41	126.67
2	A	301	MR9	C3-C4-N2	-4.07	119.25	123.90
2	B	302	MR9	C3-C4-N2	-3.53	119.87	123.90
2	B	302	MR9	C3-C2-N1	-3.45	117.25	122.01
2	A	301	MR9	C18-N5-C1	-3.08	119.60	123.07
2	A	301	MR9	F2-C25-C23	-2.92	106.70	112.95
2	A	301	MR9	C3-C2-N1	-2.80	118.15	122.01
2	B	302	MR9	C26-N6-C20	-2.70	110.15	116.42
2	A	301	MR9	C26-N6-C20	-2.60	110.38	116.42
2	B	302	MR9	F3-C25-C23	-2.29	108.05	112.95
2	A	301	MR9	C28-C29-N6	-2.25	106.06	110.02
2	B	302	MR9	C7-C8-N3	-2.14	119.87	123.44
2	A	301	MR9	C7-C8-N3	-2.11	119.91	123.44
2	B	302	MR9	N5-C1-N2	2.06	119.41	117.02
2	A	301	MR9	N5-C1-N1	2.13	119.41	116.94
2	B	302	MR9	C8-N3-C9	2.26	122.32	116.57
2	A	301	MR9	C8-N3-C9	2.34	122.54	116.57
2	B	302	MR9	C4-C3-C2	2.46	119.62	117.26
2	A	301	MR9	N5-C1-N2	2.72	120.17	117.02
2	B	302	MR9	N5-C1-N1	2.89	120.29	116.94

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	302	MR9	C4-N2-C1	6.16	120.85	115.49
2	A	301	MR9	C2-N1-C1	6.54	121.38	116.49
2	A	301	MR9	C4-N2-C1	7.24	121.78	115.49
2	B	302	MR9	C2-N1-C1	7.52	122.10	116.49

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

2 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	301	MR9	3	0
2	B	302	MR9	3	0

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 will therefore be empty.

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

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

6.3 Carbohydrates

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

6.4 Ligands

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

6.5 Other polymers

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