Full wwPDB X-ray Structure Validation Report (i)

Apr 28, 2024 – 01:56 am BST

PDB ID	:	1W1H
Title	:	Crystal Structure of the PDK1 Pleckstrin Homology (PH) domain
Authors	:	Komander, D.; Deak, M.; Alessi, D.R.; Van Aalten, D.M.F.
Deposited on	:	2004-06-21
Resolution	:	1.45 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 (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:

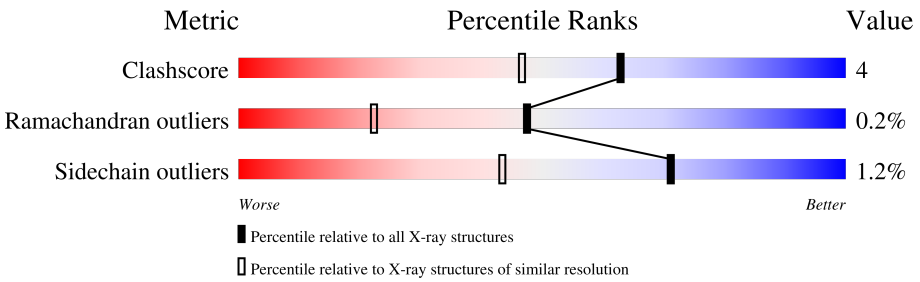
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

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 1.45 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	1202 (1.46-1.46)
Ramachandran outliers	138981	1178 (1.46-1.46)
Sidechain outliers	138945	1178 (1.46-1.46)

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	A	151	92% 5% •
1	B	151	89% 10% •
1	C	151	85% 7% 9%
1	D	151	81% 9% • 9%

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	GOL	B	1557	-	-	X	-

2 Entry composition (i)

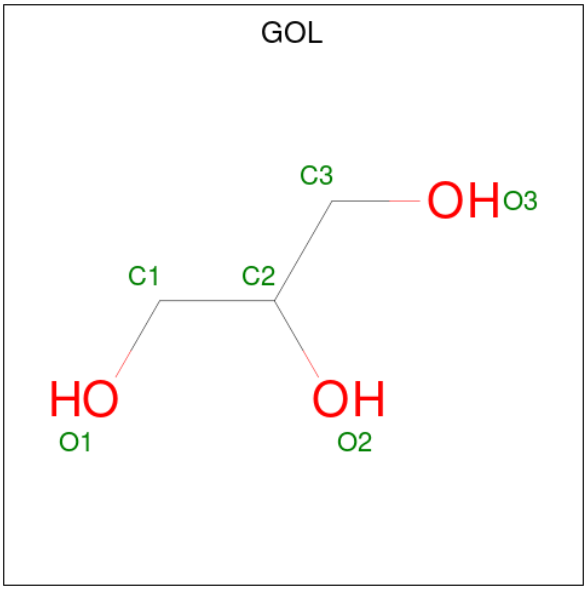
There are 4 unique types of molecules in this entry. The entry contains 5616 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 3-PHOSPHOINOSITIDE DEPENDENT PROTEIN KINASE-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	147	1232	785	222	222	3	0	1	0
1	B	151	1267	806	227	230	4	0	5	0
1	C	138	1175	753	211	207	4	0	1	0
1	D	137	1153	743	207	199	4	0	2	0

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



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

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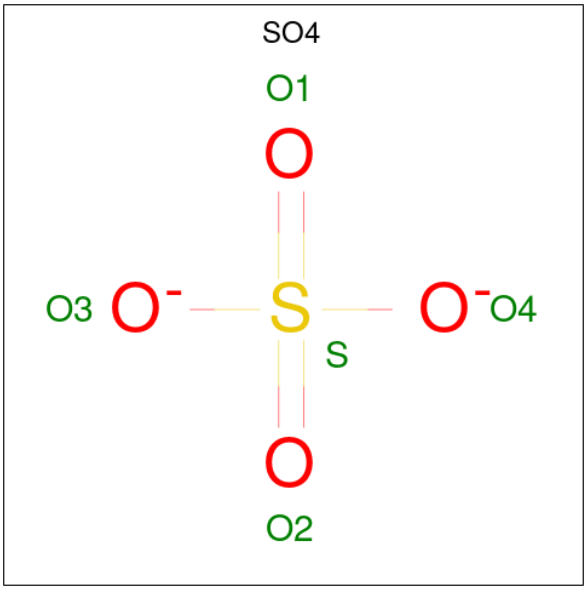
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
2	B	1	6	3	3	0	0
			Total	C	O		
2	C	1	6	3	3	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O_4S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
3	A	1	5	4	1	0	0
			Total	O	S		
3	A	1	5	4	1	0	0
			Total	O	S		
3	A	1	5	4	1	0	0
			Total	O	S		
3	B	1	5	4	1	0	0
			Total	O	S		
3	B	1	5	4	1	0	0
			Total	O	S		
3	B	1	5	4	1	0	0
			Total	O	S		
3	C	1	5	4	1	0	0
			Total	O	S		
3	C	1	5	4	1	0	0
			Total	O	S		
3	D	1	5	4	1	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	S		
3	D	1	5	4	1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	A	201	201	201	0	0
			Total	O		
4	B	191	191	191	0	0
			Total	O		
4	C	182	182	182	0	0
			Total	O		
4	D	141	141	141	0	0

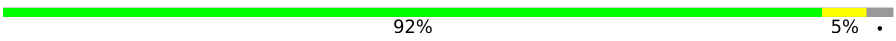
3 Residue-property plots (i)

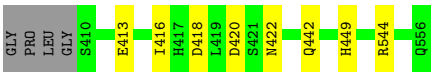
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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: 3-PHOSPHOINOSITIDE DEPENDENT PROTEIN KINASE-1

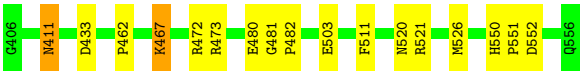
Chain A:





• Molecule 1: 3-PHOSPHOINOSITIDE DEPENDENT PROTEIN KINASE-1

Chain B:



• Molecule 1: 3-PHOSPHOINOSITIDE DEPENDENT PROTEIN KINASE-1

Chain C:

• Molecule 1: 3-PHOSPHOINOSITIDE DEPENDENT PROTEIN KINASE-1

Chain D:

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	42.69Å 65.28Å 101.12Å 90.00° 97.49° 90.00°	Depositor
Resolution (Å)	30.00 – 1.45	Depositor
% Data completeness (in resolution range)	97.4 (30.00-1.45)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	REFMAC 5.2.0003	Depositor
R, R_{free}	0.156 , 0.206	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	5616	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: GOL, SO4

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	0.73	0/1271	0.83	1/1720 (0.1%)
1	B	0.74	0/1325	0.86	1/1792 (0.1%)
1	C	0.74	0/1212	0.91	4/1637 (0.2%)
1	D	0.70	0/1194	0.83	3/1615 (0.2%)
All	All	0.73	0/5002	0.86	9/6764 (0.1%)

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	464	ASP	CB-CG-OD2	7.06	124.65	118.30
1	C	521	ARG	NE-CZ-NH1	7.03	123.81	120.30
1	A	418	ASP	CB-CG-OD2	6.75	124.37	118.30
1	C	418	ASP	CB-CG-OD2	6.50	124.15	118.30
1	B	552	ASP	CB-CG-OD2	6.39	124.05	118.30
1	C	544	ARG	NE-CZ-NH2	-6.32	117.14	120.30
1	D	433	ASP	CB-CG-OD2	6.28	123.95	118.30
1	D	418	ASP	CB-CG-OD2	6.14	123.83	118.30
1	D	464	ASP	CB-CG-OD2	6.14	123.82	118.30

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	1232	0	1189	5	0
1	B	1267	0	1218	19	0
1	C	1175	0	1152	6	0
1	D	1153	0	1120	12	0
2	A	6	0	8	0	0
2	B	12	0	16	5	0
2	C	6	0	8	0	0
3	A	15	0	0	0	0
3	B	15	0	0	1	0
3	C	10	0	0	0	0
3	D	10	0	0	0	0
4	A	201	0	0	2	0
4	B	191	0	0	8	0
4	C	182	0	0	5	0
4	D	141	0	0	4	0
All	All	5616	0	4711	41	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 4.

All (41) 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:442:GLN:HE21	1:A:449:HIS:HD2	1.18	0.88
1:B:503[A]:GLU:OE2	4:B:2112:HOH:O	2.07	0.71
1:B:521:ARG:HH12	2:B:1557:GOL:C2	2.09	0.65
1:C:482:PRO:HG2	1:C:500:TRP:CE2	2.31	0.65
1:D:420:ASP:HB2	1:D:423:SER:HB2	1.79	0.64
1:B:521:ARG:HH22	2:B:1557:GOL:H11	1.64	0.63
1:B:411:ASN:H	1:B:411:ASN:HD22	1.48	0.61
1:B:480:GLU:CD	4:B:2091:HOH:O	2.39	0.60
1:B:526[B]:MET:HG2	4:B:2122:HOH:O	2.03	0.58
1:B:521:ARG:HH12	2:B:1557:GOL:H2	1.69	0.57
1:C:411:ASN:C	4:C:2003:HOH:O	2.41	0.57
1:B:526[B]:MET:HE1	4:B:2077:HOH:O	2.05	0.56
1:D:435:LYS:HD2	1:D:480:GLU:OE1	2.07	0.55
1:B:433:ASP:HB2	4:B:2040:HOH:O	2.06	0.54
1:A:442:GLN:HE21	1:A:449:HIS:CD2	2.10	0.53
1:D:417:HIS:NE2	1:D:427:ASP:OD2	2.32	0.53
1:C:436:ARG:HD3	1:D:467:LYS:HG2	1.91	0.52
1:D:483:HIS:HD2	1:D:497:GLU:OE1	1.92	0.52
1:B:521:ARG:NH1	2:B:1557:GOL:H2	2.25	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:482:PRO:HG2	1:C:500:TRP:CD2	2.45	0.51
1:B:411:ASN:ND2	3:B:1559:SO4:O4	2.44	0.50
1:C:411:ASN:N	4:C:2003:HOH:O	2.43	0.49
1:B:526[B]:MET:SD	4:B:2122:HOH:O	2.60	0.49
1:B:481:GLY:N	1:B:482:PRO:HA	2.29	0.48
1:B:526[B]:MET:CG	4:B:2122:HOH:O	2.60	0.47
1:D:483:HIS:HE1	4:D:2048:HOH:O	1.97	0.46
1:A:420:ASP:HB2	4:A:2022:HOH:O	2.16	0.46
1:D:420:ASP:HB2	1:D:423:SER:CB	2.45	0.46
1:D:521:ARG:NE	4:D:2111:HOH:O	2.50	0.45
1:D:521:ARG:NH2	4:D:2111:HOH:O	2.49	0.44
1:A:413:GLU:HA	1:A:416:ILE:HD12	2.00	0.43
1:B:467:LYS:NZ	2:B:1557:GOL:O3	2.52	0.43
1:B:462:PRO:HB3	1:B:473:ARG:HD2	2.01	0.43
1:B:467:LYS:HB3	1:B:472:ARG:NH1	2.34	0.42
1:C:490:VAL:HB	4:C:2102:HOH:O	2.20	0.42
4:C:2063:HOH:O	1:D:466:ARG:CD	2.68	0.42
1:A:544:ARG:HD3	4:A:2158:HOH:O	2.20	0.41
1:B:480:GLU:CD	4:B:2090:HOH:O	2.58	0.41
1:B:550:HIS:N	1:B:551:PRO:CD	2.84	0.41
4:C:2063:HOH:O	1:D:466:ARG:HD2	2.21	0.40
1:D:521:ARG:CZ	4:D:2111:HOH:O	2.69	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	146/151 (97%)	140 (96%)	6 (4%)	0	100	100
1	B	154/151 (102%)	151 (98%)	3 (2%)	0	100	100
1	C	137/151 (91%)	134 (98%)	3 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	D	137/151 (91%)	133 (97%)	3 (2%)	1 (1%)	22 5
All	All	574/604 (95%)	558 (97%)	15 (3%)	1 (0%)	47 22

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	420	ASP

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	133/136 (98%)	132 (99%)	1 (1%)	81 62
1	B	138/136 (102%)	133 (96%)	5 (4%)	35 6
1	C	128/136 (94%)	127 (99%)	1 (1%)	81 62
1	D	122/136 (90%)	122 (100%)	0	100 100
All	All	521/544 (96%)	514 (99%)	7 (1%)	71 40

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	422	ASN
1	B	411	ASN
1	B	467	LYS
1	B	511	PHE
1	B	520[A]	ASN
1	B	520[B]	ASN
1	C	524	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	422	ASN

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Mol	Chain	Res	Type
1	A	449	HIS
1	A	454	ASN
1	A	545	GLN
1	B	411	ASN
1	B	533	HIS
1	C	429	GLN
1	C	454	ASN
1	C	533	HIS
1	D	455	ASN
1	D	483	HIS

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)

14 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	GOL	A	1557	-	5,5,5	0.75	0	5,5,5	0.29	0
2	GOL	B	1558	-	5,5,5	0.58	0	5,5,5	0.33	0
3	SO4	C	1551	-	4,4,4	0.19	0	6,6,6	0.18	0
3	SO4	A	1558	-	4,4,4	0.44	0	6,6,6	0.38	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	SO4	B	1561	-	4,4,4	0.17	0	6,6,6	0.16	0
3	SO4	D	1549	-	4,4,4	0.17	0	6,6,6	0.31	0
2	GOL	B	1557	-	5,5,5	0.80	0	5,5,5	0.94	0
3	SO4	A	1559	-	4,4,4	0.28	0	6,6,6	0.41	0
2	GOL	C	1549	-	5,5,5	0.81	0	5,5,5	1.61	2 (40%)
3	SO4	A	1560	-	4,4,4	0.23	0	6,6,6	0.46	0
3	SO4	B	1559	-	4,4,4	0.08	0	6,6,6	0.51	0
3	SO4	B	1560	-	4,4,4	0.25	0	6,6,6	0.24	0
3	SO4	D	1550	-	4,4,4	0.15	0	6,6,6	0.19	0
3	SO4	C	1550	-	4,4,4	0.08	0	6,6,6	0.44	0

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	GOL	A	1557	-	-	2/4/4/4	-
2	GOL	C	1549	-	-	3/4/4/4	-
2	GOL	B	1557	-	-	2/4/4/4	-
2	GOL	B	1558	-	-	0/4/4/4	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	1549	GOL	O2-C2-C1	2.41	119.73	109.12
2	C	1549	GOL	O3-C3-C2	-2.03	100.49	110.20

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	1557	GOL	O1-C1-C2-C3
2	C	1549	GOL	C1-C2-C3-O3
2	C	1549	GOL	O2-C2-C3-O3
2	A	1557	GOL	C1-C2-C3-O3
2	B	1557	GOL	O1-C1-C2-O2
2	A	1557	GOL	O2-C2-C3-O3
2	C	1549	GOL	O1-C1-C2-O2

There are no ring outliers.

2 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	1557	GOL	5	0
3	B	1559	SO4	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.