



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 09:59 PM UTC

PDB ID : 1GG0 / pdb_00001gg0
Title : CRYSTAL STRUCTURE ANALYSIS OF KDOP SYNTHASE AT 3.0 Å
Authors : Wagner, T.; Kretsinger, R.H.; Bauerle, R.; Tolbert, W.D.
Deposited on : 2000-08-04
Resolution : 3.00 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	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

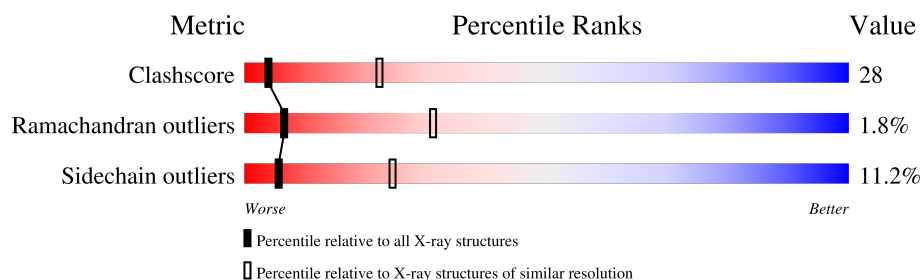
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)

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 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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	284	 60% 25% 11% . .

2 Entry composition [i](#)

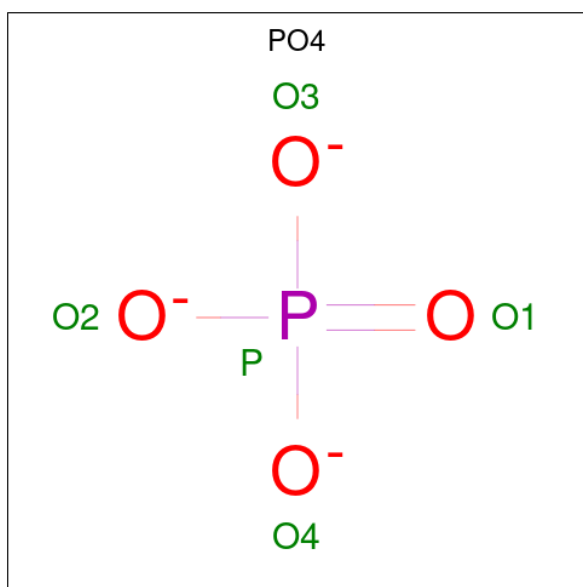
There are 2 unique types of molecules in this entry. The entry contains 2028 atoms, of which 0 are hydrogens and 0 are deuteriums.

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-DEOXY-D-MANNO-OCTULOSONATE 8-PHOSPHATE SYNTHASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	275	2018	1285	342	378	13	0	0	0

- Molecule 2 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).

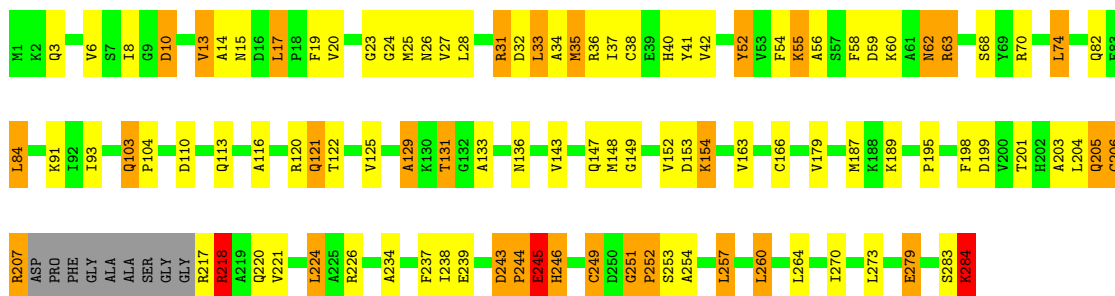


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	O	P		
2	A	1	5	4	1	0	0
2	A	1	5	4	1	0	0

i

Note EDS was not executed.

Chain A: 60% 25% 11% ..



4 Data and refinement statistics

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

Property	Value	Source
Space group	I 2 3	Depositor
Cell constants a, b, c, α , β , γ	118.17Å 118.17Å 118.17Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 3.00	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-3.00)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.227 , 0.265	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2028	wwPDB-VP
Average B, all atoms (Å ²)	47.0	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: PO4

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	0.88	6/2053 (0.3%)	1.38	25/2784 (0.9%)

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	284	LYS	C-OXT	8.80	1.41	1.23
1	A	205	GLN	CA-C	-7.74	1.43	1.52
1	A	204	LEU	CA-C	-5.30	1.47	1.53
1	A	206	CYS	CA-C	-5.21	1.47	1.53
1	A	245	GLU	CA-C	-5.08	1.46	1.53
1	A	206	CYS	N-CA	-5.08	1.37	1.45

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	249	CYS	CA-C-N	-12.69	103.31	122.09
1	A	249	CYS	C-N-CA	-12.69	103.31	122.09
1	A	218	ARG	N-CA-C	12.41	137.23	110.80
1	A	217	ARG	CA-C-N	11.47	143.46	121.54
1	A	217	ARG	C-N-CA	11.47	143.46	121.54
1	A	207	ARG	N-CA-C	-10.16	82.54	111.00
1	A	84	LEU	N-CA-C	-9.31	101.14	111.28
1	A	206	CYS	CA-C-O	8.60	128.17	119.91
1	A	122	THR	N-CA-C	7.20	119.75	111.11
1	A	217	ARG	O-C-N	7.14	134.42	123.00
1	A	217	ARG	N-CA-C	6.64	129.59	111.00
1	A	206	CYS	O-C-N	6.41	129.99	123.13
1	A	249	CYS	N-CA-C	6.35	124.33	110.80
1	A	163	VAL	N-CA-C	6.03	116.98	108.36
1	A	206	CYS	N-CA-C	-5.82	101.09	109.29

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	243	ASP	CB-CA-C	-5.80	101.84	110.71
1	A	129	ALA	N-CA-C	5.62	117.09	111.07
1	A	244	PRO	CA-C-N	-5.32	115.90	123.03
1	A	244	PRO	C-N-CA	-5.32	115.90	123.03
1	A	103	GLN	CB-CA-C	-5.28	104.43	113.04
1	A	52	TYR	N-CA-C	5.20	117.91	109.06
1	A	189	LYS	N-CA-C	5.19	117.34	111.11
1	A	3	GLN	N-CA-C	-5.15	101.30	109.96
1	A	113	GLN	N-CA-C	5.07	117.23	109.07
1	A	152	VAL	N-CA-C	-5.04	105.48	110.62

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	2018	0	1962	112	0
2	A	10	0	0	1	0
All	All	2028	0	1962	112	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 28.

All (112) 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:218:ARG:NH1	1:A:244:PRO:HB2	1.36	1.41
1:A:218:ARG:NH1	1:A:244:PRO:CB	2.00	1.23
1:A:218:ARG:HH12	1:A:244:PRO:CB	1.56	1.11
1:A:201:THR:HG21	1:A:239:GLU:H	1.36	0.89
1:A:60:LYS:HE2	1:A:60:LYS:HA	1.53	0.87
1:A:24:GLY:CA	1:A:41:TYR:HE2	1.88	0.86
1:A:31:ARG:O	1:A:35:MET:HG2	1.77	0.85
1:A:148:MET:HG3	1:A:187:MET:HE3	1.58	0.84

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:24:GLY:HA2	1:A:41:TYR:HE2	1.44	0.81
1:A:245:GLU:O	1:A:246:HIS:CD2	2.35	0.80
1:A:63:ARG:HH11	1:A:63:ARG:HG2	1.45	0.80
1:A:52:TYR:OH	1:A:54:PHE:HD1	1.66	0.79
1:A:218:ARG:NH1	1:A:244:PRO:HB3	1.98	0.78
1:A:41:TYR:HD1	1:A:260:LEU:HD11	1.47	0.77
1:A:218:ARG:HH12	1:A:244:PRO:HB2	0.68	0.75
1:A:218:ARG:HH11	1:A:244:PRO:CB	1.97	0.74
1:A:218:ARG:C	1:A:220:GLN:H	1.92	0.74
1:A:15:ASN:OD1	1:A:195:PRO:HA	1.88	0.73
1:A:24:GLY:HA2	1:A:41:TYR:CE2	2.23	0.73
1:A:131:THR:CG2	1:A:133:ALA:H	2.03	0.72
1:A:63:ARG:HD3	1:A:68:SER:CB	2.19	0.71
1:A:33:LEU:HD22	1:A:33:LEU:O	1.90	0.71
1:A:218:ARG:O	1:A:221:VAL:HG23	1.92	0.70
1:A:218:ARG:HH11	1:A:244:PRO:HB3	1.57	0.68
1:A:55:LYS:HB2	1:A:93:ILE:HG23	1.76	0.68
1:A:24:GLY:N	1:A:41:TYR:HE2	1.91	0.68
1:A:40:HIS:ND1	1:A:257:LEU:HD22	2.09	0.67
1:A:34:ALA:O	1:A:35:MET:C	2.38	0.67
1:A:218:ARG:C	1:A:220:GLN:N	2.50	0.67
1:A:199:ASP:HA	1:A:237:PHE:HB3	1.76	0.66
1:A:149:GLY:O	1:A:153:ASP:OD1	2.14	0.66
1:A:41:TYR:CD1	1:A:260:LEU:HD11	2.31	0.66
1:A:63:ARG:HG2	1:A:63:ARG:NH1	2.12	0.65
1:A:24:GLY:N	1:A:41:TYR:CE2	2.65	0.64
1:A:74:LEU:C	1:A:74:LEU:CD1	2.72	0.63
1:A:245:GLU:O	1:A:246:HIS:CG	2.52	0.62
1:A:60:LYS:HB2	1:A:70:ARG:HA	1.82	0.61
1:A:74:LEU:C	1:A:74:LEU:HD12	2.25	0.61
1:A:38:CYS:O	1:A:42:VAL:HG23	2.01	0.60
1:A:131:THR:HG22	1:A:133:ALA:H	1.66	0.60
1:A:14:ALA:HB3	1:A:17:LEU:HB2	1.82	0.60
1:A:10:ASP:OD2	1:A:10:ASP:N	2.29	0.58
1:A:252:PRO:C	1:A:254:ALA:H	2.12	0.58
1:A:103:GLN:HE22	1:A:131:THR:HA	1.68	0.57
1:A:131:THR:HG23	1:A:133:ALA:H	1.69	0.57
1:A:59:ASP:OD1	1:A:60:LYS:N	2.37	0.57
1:A:103:GLN:O	1:A:104:PRO:C	2.48	0.56
1:A:60:LYS:HE2	1:A:60:LYS:CA	2.33	0.55
1:A:15:ASN:OD1	1:A:234:ALA:HB2	2.07	0.54

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:201:THR:CG2	1:A:238:ILE:HG13	2.37	0.54
1:A:24:GLY:CA	1:A:41:TYR:CE2	2.79	0.53
1:A:125:VAL:O	1:A:129:ALA:N	2.41	0.53
1:A:91:LYS:HA	1:A:110:ASP:OD2	2.09	0.53
1:A:198:PHE:HZ	1:A:224:LEU:HD13	1.74	0.52
1:A:41:TYR:CD2	1:A:52:TYR:OH	2.62	0.52
1:A:136:ASN:HD21	1:A:166:CYS:HB2	1.75	0.51
1:A:226:ARG:HG2	1:A:270:ILE:CD1	2.40	0.51
1:A:218:ARG:O	1:A:220:GLN:N	2.44	0.51
1:A:59:ASP:HA	1:A:70:ARG:O	2.10	0.51
1:A:251:GLY:C	1:A:252:PRO:O	2.50	0.51
1:A:59:ASP:OD1	1:A:59:ASP:C	2.54	0.50
1:A:279:GLU:N	1:A:279:GLU:OE2	2.45	0.50
1:A:60:LYS:HA	1:A:60:LYS:CE	2.35	0.50
1:A:31:ARG:HG3	1:A:32:ASP:N	2.26	0.49
1:A:34:ALA:O	1:A:36:ARG:N	2.46	0.49
1:A:201:THR:HG21	1:A:239:GLU:N	2.18	0.48
1:A:116:ALA:HB2	2:A:290:PO4:O1	2.13	0.48
1:A:41:TYR:HD2	1:A:52:TYR:HH	1.52	0.48
1:A:55:LYS:HE2	1:A:239:GLU:OE2	2.14	0.48
1:A:41:TYR:HD1	1:A:260:LEU:CD1	2.23	0.47
1:A:82:GLN:HA	1:A:82:GLN:OE1	2.14	0.47
1:A:52:TYR:OH	1:A:54:PHE:CD1	2.57	0.47
1:A:27:VAL:HG22	1:A:28:LEU:N	2.30	0.47
1:A:143:VAL:CG1	1:A:147:GLN:HB2	2.45	0.47
1:A:6:VAL:O	1:A:13:VAL:N	2.37	0.46
1:A:62:ASN:H	1:A:62:ASN:HD22	1.63	0.46
1:A:26:ASN:ND2	1:A:239:GLU:OE1	2.41	0.46
1:A:226:ARG:HG2	1:A:270:ILE:HD12	1.98	0.46
1:A:24:GLY:HA3	1:A:55:LYS:O	2.17	0.45
1:A:25:MET:O	1:A:55:LYS:HE3	2.17	0.45
1:A:55:LYS:HD2	1:A:56:ALA:N	2.32	0.45
1:A:252:PRO:C	1:A:254:ALA:N	2.70	0.45
1:A:62:ASN:HD22	1:A:62:ASN:N	2.15	0.44
1:A:121:GLN:N	1:A:121:GLN:OE1	2.50	0.44
1:A:62:ASN:HD22	1:A:62:ASN:C	2.26	0.44
1:A:41:TYR:HB3	1:A:52:TYR:CZ	2.53	0.43
1:A:60:LYS:CA	1:A:60:LYS:CE	2.96	0.43
1:A:34:ALA:O	1:A:37:ILE:N	2.50	0.43
1:A:252:PRO:O	1:A:253:SER:CB	2.65	0.43
1:A:13:VAL:HG22	1:A:20:VAL:HG21	2.00	0.43

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:206:CYS:HB3	1:A:207:ARG:H	1.23	0.43
1:A:27:VAL:HG11	1:A:249:CYS:SG	2.58	0.43
1:A:41:TYR:HE1	1:A:260:LEU:HG	1.82	0.43
1:A:283:SER:OG	1:A:284:LYS:HG3	2.18	0.43
1:A:62:ASN:C	1:A:62:ASN:ND2	2.76	0.43
1:A:41:TYR:HD2	1:A:52:TYR:OH	1.99	0.43
1:A:23:GLY:HA2	1:A:238:ILE:O	2.18	0.42
1:A:260:LEU:HD22	1:A:264:LEU:HG	2.01	0.42
1:A:251:GLY:O	1:A:252:PRO:O	2.37	0.42
1:A:8:ILE:HD12	1:A:13:VAL:HG21	2.01	0.42
1:A:84:LEU:HD23	1:A:84:LEU:HA	1.81	0.42
1:A:148:MET:HG3	1:A:187:MET:CE	2.40	0.42
1:A:41:TYR:CE1	1:A:260:LEU:HG	2.55	0.42
1:A:120:ARG:HE	1:A:120:ARG:HB3	1.73	0.42
1:A:201:THR:HG23	1:A:238:ILE:HG13	2.02	0.42
1:A:59:ASP:OD2	1:A:70:ARG:NH2	2.41	0.42
1:A:60:LYS:N	1:A:70:ARG:O	2.45	0.41
1:A:179:VAL:CG2	1:A:203:ALA:HB1	2.51	0.41
1:A:58:PHE:CD1	1:A:58:PHE:C	2.99	0.41
1:A:41:TYR:CD1	1:A:260:LEU:CD1	3.02	0.41
1:A:198:PHE:CZ	1:A:224:LEU:HD13	2.55	0.40
1:A:153:ASP:O	1:A:154:LYS:C	2.63	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	271/284 (95%)	244 (90%)	22 (8%)	5 (2%)	6	31

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	218	ARG
1	A	246	HIS
1	A	251	GLY
1	A	35	MET
1	A	252	PRO

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	205/233 (88%)	182 (89%)	23 (11%)	6 24

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	10	ASP
1	A	13	VAL
1	A	17	LEU
1	A	19	PHE
1	A	31	ARG
1	A	33	LEU
1	A	55	LYS
1	A	62	ASN
1	A	63	ARG
1	A	74	LEU
1	A	121	GLN
1	A	131	THR
1	A	154	LYS
1	A	205	GLN
1	A	218	ARG
1	A	224	LEU
1	A	243	ASP
1	A	245	GLU
1	A	257	LEU
1	A	260	LEU
1	A	273	LEU
1	A	279	GLU

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	284	LYS

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	62	ASN
1	A	103	GLN
1	A	136	ASN
1	A	176	ASN
1	A	220	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

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	PO4	A	291	-	4,4,4	1.04	0	6,6,6	0.48	0
2	PO4	A	290	-	4,4,4	1.04	0	6,6,6	0.52	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	290	PO4	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

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.