



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 06:28 PM UTC

PDB ID : 7OUE / pdb\_00007oue  
Title : Crystal structure of a trapped Pab-AGOG/single-standed DNA covalent intermediate  
Authors : Coste, F.; Goffinont, S.; Flament, D.; Castaing, B.  
Deposited on : 2021-06-11  
Resolution : 2.04 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](mailto: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)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

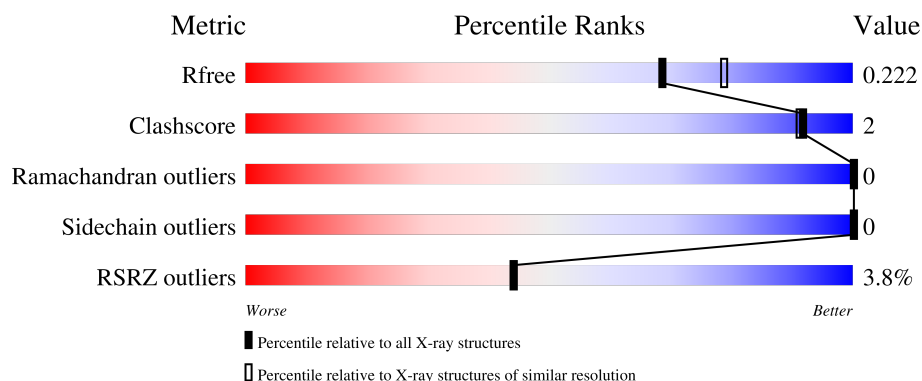
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.04 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))
$R_{free}$	180053	2260 (2.04-2.04)
Clashscore	190562	2333 (2.04-2.04)
Ramachandran outliers	187476	2318 (2.04-2.04)
Sidechain outliers	187428	2318 (2.04-2.04)
RSRZ outliers	180081	2260 (2.04-2.04)

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  $\geq 3$ , 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  $\leq 5\%$ . 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.

Mol	Chain	Length	Quality of chain
1	A	242	97%
1	C	242	96%
1	E	242	7%  93%
1	G	242	8%  94%
2	B	9	100%

*Continued on next page...*

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	D	9	<div><div></div>100%</div>
2	F	9	<div><div></div>78%<div></div>22%</div>
2	H	9	<div><div></div>11%<div></div>67%<div></div>11%<div></div>22%</div>

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 8993 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 N-glycosylase/DNA lyase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	242	Total	C	N	O	S	0	0	0
			1932	1259	320	348	5			
1	C	242	Total	C	N	O	S	0	0	0
			1924	1253	318	348	5			
1	E	242	Total	C	N	O	S	0	0	0
			1900	1236	314	346	4			
1	G	241	Total	C	N	O	S	0	0	0
			1876	1226	311	335	4			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP Q9UZY0
A	-1	SER	-	expression tag	UNP Q9UZY0
A	0	HIS	-	expression tag	UNP Q9UZY0
C	-2	GLY	-	expression tag	UNP Q9UZY0
C	-1	SER	-	expression tag	UNP Q9UZY0
C	0	HIS	-	expression tag	UNP Q9UZY0
E	-2	GLY	-	expression tag	UNP Q9UZY0
E	-1	SER	-	expression tag	UNP Q9UZY0
E	0	HIS	-	expression tag	UNP Q9UZY0
G	-2	GLY	-	expression tag	UNP Q9UZY0
G	-1	SER	-	expression tag	UNP Q9UZY0
G	0	HIS	-	expression tag	UNP Q9UZY0

- Molecule 2 is a DNA chain called DNA (5'-D(\*TP\*TP\*TP\*(PED)P\*TP\*TP\*TP\*CP\*T)-3').

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	9	Total	C	N	O	P	0	2	0
			161	78	15	59	9			

*Continued on next page...*

Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	9	Total	C	N	O	P	0	2	0
			161	78	15	59	9			
2	F	9	Total	C	N	O	P	0	0	0
			167	84	17	58	8			
2	H	7	Total	C	N	O	P	0	2	0
			140	68	13	51	8			

- Molecule 3 is PHOSPHATE ION (CCD ID: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	C	1	Total	O	P	0	0
			5	4	1		
3	G	1	Total	O	P	0	0
			5	4	1		

- Molecule 4 is POTASSIUM ION (CCD ID: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	E	1	Total	K	0	0
			1	1		

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	217	Total	O	0	0
			217	217		

Continued on next page...

*Continued from previous page...*

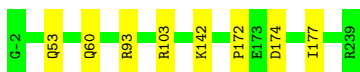
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	21	Total 21	O 21	0	0
5	C	206	Total 206	O 206	0	0
5	D	16	Total 16	O 16	0	0
5	E	112	Total 112	O 112	0	0
5	F	13	Total 13	O 13	0	0
5	G	130	Total 130	O 130	0	0
5	H	6	Total 6	O 6	0	0

### 3 Residue-property plots

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 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.

- Molecule 1: N-glycosylase/DNA lyase

Chain A:  97%




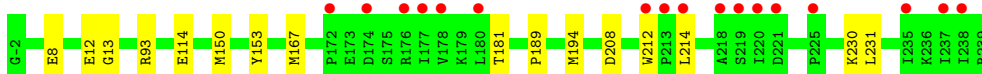
- Molecule 1: N-glycosylase/DNA lyase

Chain C:  96%



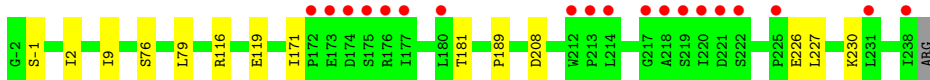
- Molecule 1: N-glycosylase/DNA lyase

Chain E:  7% 93% 7%



- Molecule 1: N-glycosylase/DNA lyase

Chain G:  8% 94% 6%



- Molecule 2: DNA (5'-D(\*TP\*TP\*TP\*(PED)P\*TP\*TP\*TP\*CP\*T)-3')

Chain B:  100%


There are no outlier residues recorded for this chain.

- Molecule 2: DNA (5'-D(\*TP\*TP\*TP\*(PED)P\*TP\*TP\*TP\*CP\*T)-3')

Chain D:  100%

There are no outlier residues recorded for this chain.

- Molecule 2: DNA (5'-D(\*TP\*TP\*TP\*(PED)P\*TP\*TP\*TP\*CP\*T)-3')

Chain F:  78% 22%



- Molecule 2: DNA (5'-D(\*TP\*TP\*TP\*(PED)P\*TP\*TP\*TP\*CP\*T)-3')

Chain H:  11% 67% 11% 22%





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	39.74Å 74.26Å 101.73Å 92.48° 100.74° 105.46°	Depositor
Resolution (Å)	71.23 – 2.04 71.23 – 2.04	Depositor EDS
% Data completeness (in resolution range)	98.1 (71.23-2.04) 92.8 (71.23-2.04)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.23 (at 2.03Å)	Xtriage
Refinement program	PHENIX 1.18.2_3874	Depositor
R, $R_{free}$	0.175 , 0.223 (Not available) , 0.222	Depositor DCC
$R_{free}$ test set	3345 reflections (4.78%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	25.3	Xtriage
Anisotropy	0.465	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 50.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.097 for h,-h-k,-h-l	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	8993	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	33.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.55% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PED, K, 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	0.31	0/1979	0.50	0/2679
1	C	0.30	0/1971	0.48	0/2671
1	E	0.28	0/1947	0.49	1/2643 (0.0%)
1	G	0.32	0/1923	0.44	0/2614
2	B	0.37	0/173	0.63	0/261
2	D	0.35	0/173	0.61	0/261
2	F	0.31	0/170	0.55	0/258
2	H	0.31	0/150	0.55	0/224
All	All	0.30	0/8486	0.49	1/11611 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	114	GLU	CA-CB-CG	5.16	124.42	114.10

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	1932	0	1932	5	0
1	C	1924	0	1909	5	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	1900	0	1855	8	0
1	G	1876	0	1830	7	0
2	B	161	0	90	0	0
2	D	161	0	90	0	0
2	F	167	0	106	1	0
2	H	140	0	78	1	0
3	C	5	0	0	0	0
3	G	5	0	0	0	0
4	E	1	0	0	0	0
5	A	217	0	0	2	0
5	B	21	0	0	0	0
5	C	206	0	0	0	0
5	D	16	0	0	0	0
5	E	112	0	0	0	0
5	F	13	0	0	0	0
5	G	130	0	0	0	0
5	H	6	0	0	0	0
All	All	8993	0	7890	26	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 2.

All (26) 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:174:ASP:H	1:A:177:ILE:HG22	1.62	0.63
1:C:174:ASP:H	1:C:177:ILE:HG22	1.65	0.60
1:E:12:GLU:HG3	1:E:13:GLY:N	2.17	0.59
1:C:158:VAL:HG23	1:C:159:LEU:HG	1.85	0.57
1:E:208:ASP:OD1	1:E:212:TRP:NE1	2.34	0.57
1:E:181:THR:HG21	1:E:189:PRO:HA	1.88	0.55
1:A:53:GLN:HE21	1:A:93:ARG:HH11	1.55	0.55
1:G:76:SER:HB3	1:G:79:LEU:HB2	1.93	0.51
1:C:79:LEU:O	1:C:83:GLU:HG3	2.13	0.49
1:E:214:LEU:HD21	1:E:231:LEU:HB3	1.94	0.49
1:E:8:GLU:HB3	1:E:230:LYS:HD3	1.95	0.47
2:F:2:DT:H5''	2:F:3:DT:H5'	1.96	0.47
1:G:9:ILE:HG23	1:G:227:LEU:HD11	1.96	0.47
1:G:116:ARG:O	1:G:119:GLU:HG3	2.15	0.47
1:A:60:GLN:HG3	5:A:466:HOH:O	2.15	0.46
1:A:103:ARG:NH2	5:A:309:HOH:O	2.48	0.46

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:-1:SER:HA	1:G:2:ILE:HD12	1.97	0.46
1:A:142:LYS:HA	1:A:172:PRO:HG3	2.00	0.43
1:C:63:TRP:O	1:C:67:LYS:HE3	2.18	0.43
1:C:142:LYS:HA	1:C:172:PRO:HG3	1.99	0.43
1:E:150:MET:HE1	1:E:153:TYR:CE2	2.54	0.43
1:E:93:ARG:HD2	2:H:7:DT:H2"	2.01	0.42
1:G:171:ILE:HG13	1:G:208:ASP:HB2	2.03	0.41
1:G:226:GLU:O	1:G:230:LYS:HG3	2.20	0.41
1:E:167:MET:O	1:E:194:MET:HE1	2.21	0.41
1:G:181:THR:HG21	1:G:189:PRO:HA	2.03	0.41

There are no symmetry-related clashes.

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

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	240/242 (99%)	235 (98%)	5 (2%)	0	100	100
1	C	240/242 (99%)	236 (98%)	4 (2%)	0	100	100
1	E	240/242 (99%)	232 (97%)	8 (3%)	0	100	100
1	G	239/242 (99%)	234 (98%)	5 (2%)	0	100	100
All	All	959/968 (99%)	937 (98%)	22 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 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	202/213 (95%)	202 (100%)	0	100	100
1	C	200/213 (94%)	200 (100%)	0	100	100
1	E	194/213 (91%)	194 (100%)	0	100	100
1	G	188/213 (88%)	188 (100%)	0	100	100
All	All	784/852 (92%)	784 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	53	GLN
1	C	97	GLN
1	E	0	HIS
1	E	97	GLN

### 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 oligosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 3 ligands modelled in this entry, 1 is 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	$\# Z  > 2$
3	PO4	C	301	-	4,4,4	0.91	0	6,6,6	0.69	0
3	PO4	G	301	-	4,4,4	0.88	0	6,6,6	0.46	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.

No monomer is involved in short contacts.

## 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 ⓘ

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	242/242 (100%)	-0.40	0 100 100	14, 24, 39, 50	0
1	C	242/242 (100%)	-0.27	1 (0%) 88 90	15, 26, 41, 49	0
1	E	242/242 (100%)	0.19	17 (7%) 22 22	18, 32, 74, 103	0
1	G	241/242 (99%)	0.24	19 (7%) 18 19	19, 32, 76, 97	0
2	B	8/9 (88%)	0.43	0 100 100	28, 36, 59, 78	1 (12%)
2	D	8/9 (88%)	0.34	0 100 100	30, 37, 62, 69	1 (12%)
2	F	8/9 (88%)	0.60	0 100 100	38, 54, 92, 95	0
2	H	6/9 (66%)	0.71	1 (16%) 4 4	37, 40, 69, 123	1 (16%)
All	All	997/1004 (99%)	-0.04	38 (3%) 44 44	14, 29, 67, 123	3 (0%)

All (38) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	212	TRP	4.5
1	G	173	GLU	4.2
1	G	212	TRP	4.2
1	G	175	SER	3.7
1	G	177	ILE	3.7
1	E	238	ILE	3.6
1	G	220	ILE	3.5
1	E	213	PRO	3.4
1	E	235	ILE	3.2
1	E	219	SER	3.1
1	G	218	ALA	3.1
1	E	176	ARG	3.0
1	G	238	ILE	3.0
1	E	172	PRO	3.0
1	G	172	PRO	3.0
1	E	220	ILE	2.9

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	E	214	LEU	2.9
1	E	180	LEU	2.9
1	G	214	LEU	2.8
1	G	221	ASP	2.8
1	G	174	ASP	2.8
1	G	180	LEU	2.8
1	E	174	ASP	2.7
1	E	221	ASP	2.7
1	E	225	PRO	2.7
1	G	225	PRO	2.6
1	E	178	VAL	2.6
1	G	213	PRO	2.6
1	E	237	ILE	2.5
2	H	9	DT	2.4
1	E	177	ILE	2.4
1	G	231	LEU	2.3
1	G	219	SER	2.3
1	E	218	ALA	2.3
1	G	176	ARG	2.2
1	G	217	GLY	2.2
1	C	-2	GLY	2.2
1	G	222	SER	2.0

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

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	PO4	G	301	5/5	0.81	0.10	60,67,74,80	0

*Continued on next page...*



*Continued from previous page...*

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	PO4	C	301	5/5	0.95	0.07	35,40,47,49	0
4	K	E	301	1/1	0.98	0.15	44,44,44,44	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.