



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 3, 2024 – 03:03 pm GMT

PDB ID : 9ERT
Title : Mouse CNPase catalytic domain with nano body 5E
Authors : Markusson, S.; Raasakka, A.; Opazo, F.; Kursula, P.
Deposited on : 2024-03-25
Resolution : 2.75 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 : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.003 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.40

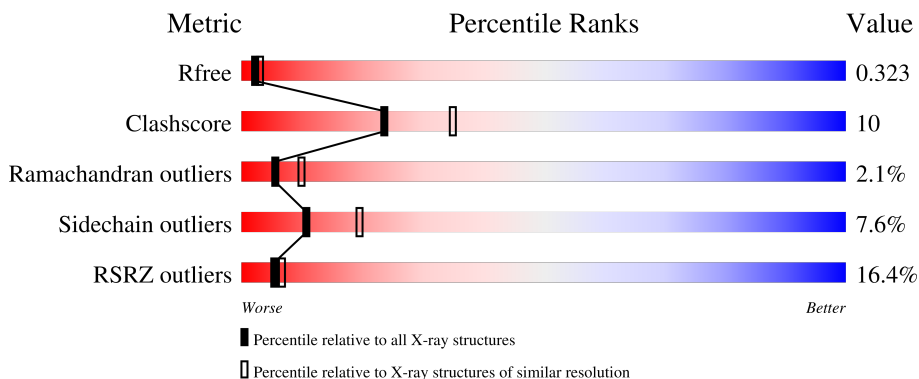
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.75 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}	164625	1606 (2.78-2.74)
Clashscore	180529	1689 (2.78-2.74)
Ramachandran outliers	177936	1665 (2.78-2.74)
Sidechain outliers	177891	1665 (2.78-2.74)
RSRZ outliers	164620	1606 (2.78-2.74)

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 $\leq 5\%$. 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	220	
2	B	132	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 5201 atoms, of which 2560 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.

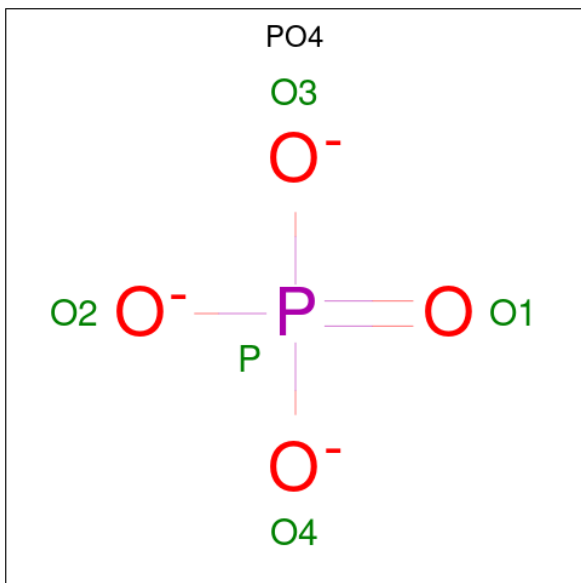
- Molecule 1 is a protein called 2',3'-cyclic-nucleotide 3'-phosphodiesterase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O				S
1	A	210	3292	1057	1653	275	302	5	0	0	0

- Molecule 2 is a protein called Chains: B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O				S
2	B	132	1904	616	907	168	208	5	0	0	0

- Molecule 3 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).

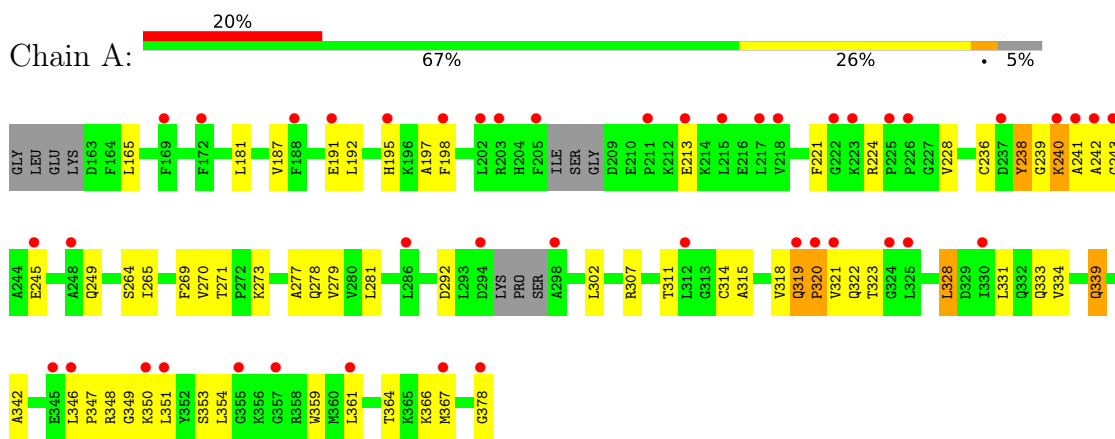


Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			O	P		
3	A	1	5	1	0	0

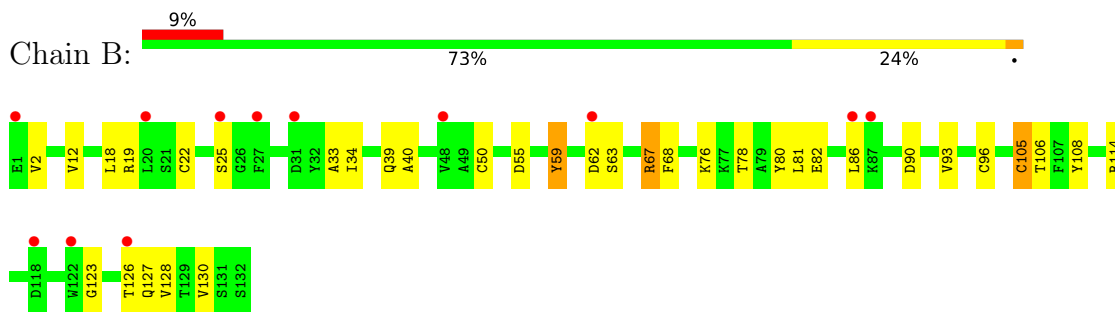
3 Residue-property plots [i](#)

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 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: 2',3'-cyclic-nucleotide 3'-phosphodiesterase



- Molecule 2: Chains: B



4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	110.83Å 110.83Å 83.28Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	47.99 – 2.75 47.99 – 2.75	Depositor EDS
% Data completeness (in resolution range)	69.8 (47.99-2.75) 64.4 (47.99-2.75)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.53 (at 2.77Å)	Xtrriage
Refinement program	PHENIX 1.21rc1_5127	Depositor
R, R_{free}	0.289 , 0.323 0.290 , 0.323	Depositor DCC
R_{free} test set	9849 reflections (10.21%)	wwPDB-VP
Wilson B-factor (Å ²)	59.8	Xtrriage
Anisotropy	0.022	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 57.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	0.046 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.84	EDS
Total number of atoms	5201	wwPDB-VP
Average B, all atoms (Å ²)	82.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.33% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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 [i](#)

5.1 Standard geometry [i](#)

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	0.26	0/1675	0.46	0/2253
2	B	0.27	0/1020	0.50	0/1383
All	All	0.26	0/2695	0.48	0/3636

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 [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	1639	1653	1652	36	0
2	B	997	907	907	17	0
3	A	5	0	0	0	0
All	All	2641	2560	2559	52	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 10.

All (52) 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)
2:B:67:ARG:NH2	2:B:90:ASP:OD2	2.21	0.73
1:A:165:LEU:HD23	1:A:236:CYS:SG	2.31	0.69
1:A:191:GLU:HB3	1:A:346:LEU:HD22	1.75	0.68
1:A:273:LYS:O	1:A:318:VAL:HG11	1.96	0.65
1:A:314:CYS:HB3	1:A:318:VAL:HG13	1.77	0.64
1:A:353:SER:C	1:A:354:LEU:HD12	2.19	0.62
2:B:39:GLN:NE2	2:B:40:ALA:O	2.33	0.62
2:B:93:VAL:HG22	2:B:127:GLN:HG2	1.80	0.62
1:A:350:LYS:O	1:A:361:LEU:HD12	2.03	0.57
1:A:315:ALA:O	1:A:318:VAL:HG12	2.04	0.57
2:B:33:ALA:O	2:B:108:TYR:OH	2.23	0.55
2:B:126:THR:HG23	2:B:126:THR:O	2.07	0.54
1:A:349:GLY:HA2	1:A:364:THR:HG23	1.90	0.53
1:A:333:GLN:HB3	1:A:354:LEU:HD23	1.91	0.52
1:A:165:LEU:HD21	1:A:245:GLU:HA	1.92	0.51
1:A:349:GLY:HA3	1:A:361:LEU:HD11	1.92	0.51
1:A:320:PRO:O	1:A:322:GLN:N	2.41	0.51
2:B:18:LEU:CD1	2:B:128:VAL:HG13	2.42	0.50
1:A:238:TYR:OH	1:A:378:GLY:OXT	2.20	0.50
1:A:278:GLN:NE2	1:A:331:LEU:HD21	2.27	0.49
2:B:59:TYR:HB3	2:B:105:CYS:SG	2.51	0.49
1:A:181:LEU:HD13	1:A:265:ILE:HD13	1.95	0.48
1:A:334:VAL:HG22	1:A:339:GLN:HG2	1.95	0.48
1:A:302:LEU:HD13	1:A:328:LEU:CD2	2.44	0.48
2:B:86:LEU:HB3	2:B:130:VAL:HG21	1.94	0.48
1:A:279:VAL:HG12	1:A:281:LEU:HD12	1.94	0.48
1:A:165:LEU:HB3	1:A:236:CYS:SG	2.54	0.47
1:A:348:ARG:NH2	1:A:367:MET:SD	2.87	0.47
1:A:195:HIS:CE1	1:A:197:ALA:HB3	2.51	0.46
1:A:240:LYS:HE3	1:A:243:GLY:HA2	1.98	0.46
1:A:228:VAL:HG11	2:B:106:THR:HG21	1.98	0.45
1:A:339:GLN:HA	1:A:354:LEU:HD21	1.99	0.45
1:A:354:LEU:HD12	1:A:354:LEU:N	2.32	0.45
1:A:346:LEU:HB3	1:A:347:PRO:HD2	1.98	0.44
2:B:22:CYS:SG	2:B:34:ILE:HD11	2.57	0.44
1:A:311:THR:HG23	1:A:323:THR:OG1	2.18	0.43
1:A:192:LEU:HD13	1:A:351:LEU:HD21	2.01	0.42
1:A:241:ALA:O	1:A:242:ALA:HB3	2.18	0.42
1:A:319:GLN:N	1:A:320:PRO:HD3	2.35	0.42
1:A:265:ILE:HG23	1:A:277:ALA:HB1	2.01	0.41
2:B:2:VAL:HA	2:B:25:SER:O	2.20	0.41
1:A:334:VAL:HG22	1:A:339:GLN:CG	2.51	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:19:ARG:NH1	2:B:82:GLU:OE2	2.53	0.41
2:B:68:PHE:HB3	2:B:81:LEU:HD11	2.02	0.41
2:B:68:PHE:N	2:B:68:PHE:CD1	2.88	0.41
2:B:96:CYS:O	2:B:123:GLY:N	2.49	0.41
1:A:269:PHE:HZ	1:A:323:THR:HG22	1.86	0.41
2:B:12:VAL:HG11	2:B:18:LEU:HG	2.02	0.40
2:B:76:LYS:O	2:B:78:THR:HG23	2.21	0.40
1:A:198:PHE:HA	1:A:359:TRP:CZ2	2.56	0.40
1:A:239:GLY:O	1:A:241:ALA:N	2.54	0.40
1:A:319:GLN:N	1:A:320:PRO:CD	2.85	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	204/220 (93%)	177 (87%)	20 (10%)	7 (3%)	3	4
2	B	130/132 (98%)	122 (94%)	8 (6%)	0	100	100
All	All	334/352 (95%)	299 (90%)	28 (8%)	7 (2%)	5	10

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	240	LYS
1	A	321	VAL
1	A	320	PRO
1	A	342	ALA
1	A	238	TYR
1	A	339	GLN
1	A	319	GLN

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	172/180 (96%)	160 (93%)	12 (7%)	12	23
2	B	104/104 (100%)	95 (91%)	9 (9%)	8	15
All	All	276/284 (97%)	255 (92%)	21 (8%)	11	19

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	187	VAL
1	A	213	GLU
1	A	221	PHE
1	A	224	ARG
1	A	249	GLN
1	A	264	SER
1	A	270	VAL
1	A	271	THR
1	A	292	ASP
1	A	307	ARG
1	A	328	LEU
1	A	366	LYS
2	B	50	CYS
2	B	55	ASP
2	B	59	TYR
2	B	62	ASP
2	B	63	SER
2	B	67	ARG
2	B	80	TYR
2	B	105	CYS
2	B	114	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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](#)

1 ligand is 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	$\# Z > 2$
3	PO4	A	401	-	4,4,4	1.52	1 (25%)	6,6,6	0.45	0

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	401	PO4	P-O1	2.61	1.57	1.50

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, 95th 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 ²)	Q<0.9
1	A	210/220 (95%)	1.40	44 (20%) 3 4	46, 91, 136, 226	0
2	B	132/132 (100%)	0.62	12 (9%) 16 19	43, 62, 84, 127	0
All	All	342/352 (97%)	1.10	56 (16%) 5 7	43, 75, 128, 226	0

All (56) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	319	GLN	9.5
1	A	205	PHE	6.5
1	A	351	LEU	6.3
1	A	346	LEU	5.3
1	A	321	VAL	5.1
1	A	240	LYS	4.8
1	A	350	LYS	4.3
1	A	217	LEU	4.2
2	B	86	LEU	4.0
1	A	320	PRO	3.9
1	A	211	PRO	3.8
2	B	1	GLU	3.7
1	A	248	ALA	3.6
1	A	378	GLY	3.6
1	A	298	ALA	3.4
1	A	245	GLU	3.3
1	A	195	HIS	3.3
2	B	126	THR	3.2
1	A	198	PHE	3.2
1	A	324	GLY	3.1
1	A	294	ASP	3.1
1	A	203	ARG	3.1
1	A	226	PRO	2.9
1	A	169	PHE	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	325	LEU	2.9
2	B	31	ASP	2.8
1	A	223	LYS	2.8
1	A	357	GLY	2.7
1	A	191	GLU	2.7
1	A	172	PHE	2.7
1	A	222	GLY	2.6
1	A	241	ALA	2.5
1	A	213	GLU	2.5
2	B	27	PHE	2.5
2	B	122	TRP	2.4
1	A	215	LEU	2.4
2	B	25	SER	2.4
2	B	20	LEU	2.3
1	A	330	ILE	2.3
1	A	202	LEU	2.3
1	A	312	LEU	2.3
1	A	355	GLY	2.3
1	A	367	MET	2.3
2	B	48	VAL	2.3
1	A	345	GLU	2.2
1	A	242	ALA	2.2
2	B	87	LYS	2.2
1	A	361	LEU	2.2
1	A	286	LEU	2.2
2	B	118	ASP	2.1
1	A	243	GLY	2.1
1	A	225	PRO	2.1
1	A	218	VAL	2.0
1	A	237	ASP	2.0
2	B	62	ASP	2.0
1	A	188	PHE	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 monosaccharides 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, 95th 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 ²)	Q<0.9
3	PO4	A	401	5/5	0.80	0.13	43,68,85,87	0

6.5 Other polymers [i](#)

There are no such residues in this entry.