



wwPDB X-ray Structure Validation Summary Report

Nov 20, 2014 – 08:33 PM EST

PDB ID : 4CYB
Title : DpsC from Streptomyces coelicolor
Authors : Townsend, P.D.; Hitchings, M.D.; Del Sol, R.; Pohl, E.
Deposited on : 2014-04-10
Resolution : 1.78 Å(reported)

This is a wwPDB validation summary 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/ValidationPDFNotes.html>

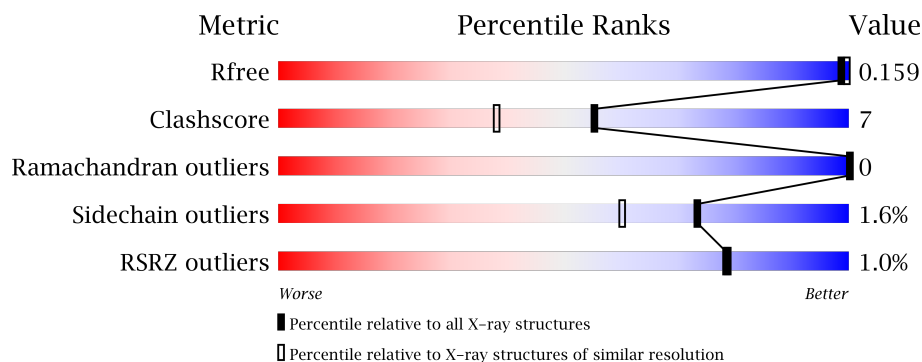
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.16 November 2013
Xtriage (Phenix) : dev-1439
EDS : trunk24195
Percentile statistics : 23426
Refmac : 5.8.0049
CCP4 : 6.1.3
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : trunk24195

1 Overall quality at a glance

The reported resolution of this entry is 1.78 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}	77520	5713 (1.80-1.76)
Clashscore	88313	6707 (1.80-1.76)
Ramachandran outliers	86584	6624 (1.80-1.76)
C α geometry	86677	6618 (1.80-1.76)
Sidechain outliers	86556	6623 (1.80-1.76)
RSRZ outliers	77580	5716 (1.80-1.76)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Mol	Chain	Length	Quality of chain
1	A	173	
1	B	173	
1	C	173	
1	D	173	
1	E	173	
1	F	173	
1	G	173	
1	H	173	
1	I	173	
1	J	173	
1	K	173	
1	L	173	

The following table lists non-polymeric compounds that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Geometry	Electron density
2	FE	A	1200	-	X
2	FE	B	1200	-	X
2	FE	C	1200	-	X
2	FE	D	1200	-	X
2	FE	E	1200	-	X
2	FE	F	1200	-	X
2	FE	G	1200	-	X
2	FE	H	1200	-	X
2	FE	I	1200	-	X
2	FE	J	1201	-	X
2	FE	K	1200	-	X
2	FE	L	1200	-	X
3	NA	J	1300	-	X
3	NA	K	1300	-	X

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 18131 atoms, of which 0 are hydrogen and 0 are deuterium.

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 PUTATIVE DNA PROTECTION PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	172	Total	C	N	O	S	0	2	0
			1373	869	238	260	6			
1	B	172	Total	C	N	O	S	0	4	0
			1394	883	245	260	6			
1	C	172	Total	C	N	O	S	0	2	0
			1374	871	238	259	6			
1	D	171	Total	C	N	O	S	0	3	0
			1375	872	237	260	6			
1	E	171	Total	C	N	O	S	0	1	0
			1368	866	238	259	5			
1	F	172	Total	C	N	O	S	0	2	0
			1375	873	238	259	5			
1	G	172	Total	C	N	O	S	0	2	0
			1385	876	242	262	5			
1	H	172	Total	C	N	O	S	0	2	0
			1376	871	239	261	5			
1	I	172	Total	C	N	O	S	0	6	0
			1400	888	243	262	7			
1	J	173	Total	C	N	O	S	0	1	0
			1378	872	240	261	5			
1	K	171	Total	C	N	O	S	0	6	0
			1388	882	238	262	6			
1	L	172	Total	C	N	O	S	0	5	0
			1388	882	239	262	5			

- Molecule 2 is FE (III) ION (three-letter code: FE) (formula: Fe).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	G	1	Total	Fe	0	0
			1	1		
2	J	1	Total	Fe	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	D	1	Total 1	Fe 1	0	0
2	K	1	Total 1	Fe 1	0	0
2	E	1	Total 1	Fe 1	0	0
2	H	1	Total 1	Fe 1	0	0
2	B	1	Total 1	Fe 1	0	0
2	I	1	Total 1	Fe 1	0	0
2	C	1	Total 1	Fe 1	0	0
2	A	1	Total 1	Fe 1	0	0
2	L	1	Total 1	Fe 1	0	0
2	F	1	Total 1	Fe 1	0	0

- Molecule 3 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	J	1	Total 1	Na 1	0	0
3	L	1	Total 1	Na 1	0	0
3	C	1	Total 1	Na 1	0	0
3	K	1	Total 1	Na 1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	145	Total 145	O 145	0	0
4	B	130	Total 130	O 130	0	0
4	C	166	Total 166	O 166	0	0

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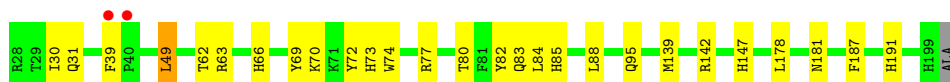
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	126	Total 126	O 126	0	0
4	E	136	Total 136	O 136	0	0
4	F	89	Total 89	O 89	0	0
4	G	136	Total 136	O 136	0	0
4	H	101	Total 101	O 101	0	0
4	I	157	Total 157	O 157	0	0
4	J	113	Total 113	O 113	0	0
4	K	140	Total 140	O 140	0	0
4	L	102	Total 102	O 102	0	0

3 Residue-property plots

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.

- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain A: 



- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain B: 



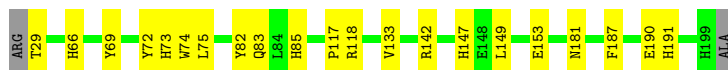
- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain C: 



- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain D: 



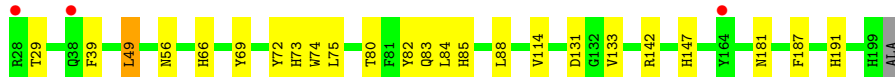
- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain E: 

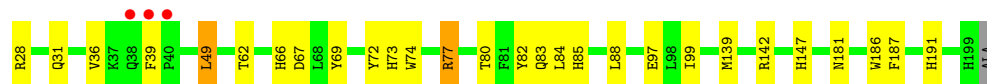


- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain F: 



- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain G: 

- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain H: 

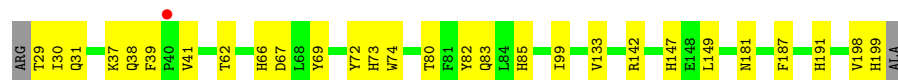
- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain I: 

- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain J: 

- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain K: 

- Molecule 1: PUTATIVE DNA PROTECTION PROTEIN

Chain L: 

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	92.22Å 153.12Å 170.28Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	153.12 – 1.78 76.56 – 1.78	Depositor EDS
% Data completeness (in resolution range)	100.0 (153.12-1.78) 100.0 (76.56-1.78)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.59 (at 1.78Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.159 , 0.194 0.160 , 0.159	Depositor DCC
R_{free} test set	11455 reflections (5.28%)	DCC
Wilson B-factor (Å ²)	25.9	Xtriage
Anisotropy	0.107	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 33.0	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 228516 reflections	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	18131	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.57% 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, 0.375 respectively for untwinned datasets, and 0.333, 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: NA, FE

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	0.92	1/1407 (0.1%)	0.89	3/1917 (0.2%)
1	B	0.93	0/1434	0.88	3/1952 (0.2%)
1	C	0.92	2/1408 (0.1%)	0.88	3/1919 (0.2%)
1	D	0.93	1/1412 (0.1%)	0.84	1/1924 (0.1%)
1	E	0.93	2/1399 (0.1%)	0.86	0/1906
1	F	0.93	1/1409 (0.1%)	0.85	1/1921 (0.1%)
1	G	0.95	2/1419 (0.1%)	0.86	1/1932 (0.1%)
1	H	0.87	1/1410 (0.1%)	0.84	1/1921 (0.1%)
1	I	0.89	1/1446 (0.1%)	0.86	1/1968 (0.1%)
1	J	0.93	1/1409 (0.1%)	0.83	0/1920
1	K	0.99	1/1434 (0.1%)	0.93	0/1954
1	L	0.98	2/1431 (0.1%)	0.88	2/1951 (0.1%)
All	All	0.93	15/17018 (0.1%)	0.87	16/23185 (0.1%)

The worst 5 of 15 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	F	74	TRP	CD2-CE2	7.58	1.50	1.41
1	J	74	TRP	CD2-CE2	6.70	1.49	1.41
1	E	186	TRP	CD2-CE2	6.58	1.49	1.41
1	D	74	TRP	CD2-CE2	6.52	1.49	1.41
1	G	74	TRP	CD2-CE2	6.51	1.49	1.41

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	178	LEU	CA-CB-CG	6.35	129.91	115.30
1	C	48	ARG	NE-CZ-NH1	5.92	123.26	120.30
1	L	75	LEU	CB-CG-CD2	5.78	120.82	111.00
1	B	131	ASP	CB-CG-OD1	5.61	123.34	118.30
1	A	49	LEU	CA-CB-CG	5.58	128.14	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1373	0	1361	29	0
1	B	1394	0	1397	30	0
1	C	1374	0	1365	21	0
1	D	1375	0	1369	18	0
1	E	1368	0	1357	27	0
1	F	1375	0	1369	20	0
1	G	1385	0	1376	26	0
1	H	1376	0	1364	32	0
1	I	1400	0	1406	29	0
1	J	1378	0	1364	20	0
1	K	1388	0	1391	33	0
1	L	1388	0	1389	30	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
2	E	1	0	0	0	0
2	F	1	0	0	0	0
2	G	1	0	0	0	0
2	H	1	0	0	0	0
2	I	1	0	0	0	0
2	J	1	0	0	0	0
2	K	1	0	0	0	0
2	L	1	0	0	0	0
3	C	1	0	0	0	0
3	J	1	0	0	0	0
3	K	1	0	0	0	0
3	L	1	0	0	0	0
4	A	145	0	0	1	0
4	B	130	0	0	4	0
4	C	166	0	0	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	126	0	0	1	0
4	E	136	0	0	3	0
4	F	89	0	0	1	0
4	G	136	0	0	2	0
4	H	101	0	0	2	0
4	I	157	0	0	3	0
4	J	113	0	0	2	0
4	K	140	0	0	5	0
4	L	102	0	0	3	0
All	All	18131	0	16508	228	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 7.

The worst 5 of 228 close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:I:36:VAL:HG23	1:I:45[A]:MET:SD	1.93	1.08
1:C:194:ASP:HB2	1:K:198:VAL:HG11	1.45	0.94
1:I:36:VAL:CG2	1:I:45[A]:MET:SD	2.68	0.81
4:B:2117:HOH:O	1:K:41:VAL:HG11	1.80	0.81
1:K:31:GLN:HB3	1:L:133[A]:VAL:HG12	1.69	0.74

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	172/173 (99%)	170 (99%)	2 (1%)	0	100	100
1	B	174/173 (101%)	171 (98%)	3 (2%)	0	100	100
1	C	172/173 (99%)	171 (99%)	1 (1%)	0	100	100
1	D	172/173 (99%)	171 (99%)	1 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	E	170/173 (98%)	167 (98%)	3 (2%)	0	100	100
1	F	172/173 (99%)	167 (97%)	5 (3%)	0	100	100
1	G	172/173 (99%)	169 (98%)	3 (2%)	0	100	100
1	H	172/173 (99%)	170 (99%)	2 (1%)	0	100	100
1	I	176/173 (102%)	175 (99%)	1 (1%)	0	100	100
1	J	172/173 (99%)	171 (99%)	1 (1%)	0	100	100
1	K	175/173 (101%)	171 (98%)	4 (2%)	0	100	100
1	L	175/173 (101%)	171 (98%)	4 (2%)	0	100	100
All	All	2074/2076 (100%)	2044 (99%)	30 (1%)	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	151/150 (101%)	149 (99%)	2 (1%)	79	69
1	B	154/150 (103%)	152 (99%)	2 (1%)	79	69
1	C	151/150 (101%)	149 (99%)	2 (1%)	79	69
1	D	152/150 (101%)	151 (99%)	1 (1%)	90	86
1	E	150/150 (100%)	148 (99%)	2 (1%)	79	69
1	F	151/150 (101%)	148 (98%)	3 (2%)	66	49
1	G	152/150 (101%)	150 (99%)	2 (1%)	79	69
1	H	151/150 (101%)	149 (99%)	2 (1%)	79	69
1	I	156/150 (104%)	152 (97%)	4 (3%)	57	37
1	J	150/150 (100%)	148 (99%)	2 (1%)	79	69
1	K	155/150 (103%)	153 (99%)	2 (1%)	79	69
1	L	154/150 (103%)	149 (97%)	5 (3%)	50	28
All	All	1827/1800 (102%)	1798 (98%)	29 (2%)	73	60

5 of 29 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	49	LEU
1	I	39	PHE
1	L	45	MET
1	H	39	PHE
1	I	49	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 65 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	147	HIS
1	G	170	ASN
1	L	66	HIS
1	F	170	ASN
1	G	66	HIS

5.3.3 RNA ⓘ

There are no RNA chains 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 carbohydrates in this entry.

5.6 Ligand geometry ⓘ

Of 16 ligands modelled in this entry, 16 are monoatomic - leaving 0 for Mogul analysis.

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.

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 ⓘ

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	172/173 (99%)	-0.39	2 (1%) 75 75	19, 27, 45, 65	0
1	B	172/173 (99%)	-0.41	1 (0%) 86 87	18, 25, 41, 68	0
1	C	172/173 (99%)	-0.32	3 (1%) 66 66	18, 26, 48, 70	0
1	D	171/173 (98%)	-0.50	0 100 100	17, 25, 39, 55	0
1	E	171/173 (98%)	-0.26	2 (1%) 75 75	20, 27, 45, 65	0
1	F	172/173 (99%)	-0.27	3 (1%) 66 66	23, 30, 50, 81	0
1	G	172/173 (99%)	-0.35	3 (1%) 66 66	19, 26, 45, 70	0
1	H	172/173 (99%)	-0.41	2 (1%) 75 75	19, 27, 44, 60	0
1	I	172/173 (99%)	-0.55	0 100 100	18, 24, 37, 67	0
1	J	173/173 (100%)	-0.44	2 (1%) 75 75	19, 24, 42, 60	0
1	K	171/173 (98%)	-0.11	1 (0%) 86 87	18, 23, 39, 78	0
1	L	172/173 (99%)	-0.20	2 (1%) 75 75	18, 25, 42, 67	0
All	All	2062/2076 (99%)	-0.35	21 (1%) 78 79	17, 26, 45, 81	0

The worst 5 of 21 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	G	40	PRO	6.5
1	K	40	PRO	5.9
1	J	200	ALA	4.2
1	J	40	PRO	4.0
1	C	40	PRO	3.3

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

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

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	RSR	LLDF	B-factors(Å ²)	Q<0.9
3	NA	J	1300	1/1	0.08	16.33	28,28,28,28	0
2	FE	A	1200	1/1	0.14	12.26	15,15,15,15	1
2	FE	H	1200	1/1	0.15	11.39	15,15,15,15	1
2	FE	B	1200	1/1	0.14	9.85	17,17,17,17	1
2	FE	D	1200	1/1	0.15	8.66	13,13,13,13	1
2	FE	G	1200	1/1	0.11	8.65	16,16,16,16	1
2	FE	J	1201	1/1	0.15	7.51	14,14,14,14	1
2	FE	I	1200	1/1	0.13	6.60	14,14,14,14	1
2	FE	E	1200	1/1	0.12	5.20	18,18,18,18	1
2	FE	L	1200	1/1	0.16	4.93	13,13,13,13	1
3	NA	K	1300	1/1	0.12	4.87	23,23,23,23	0
2	FE	C	1200	1/1	0.11	4.63	18,18,18,18	1
2	FE	K	1200	1/1	0.14	4.52	14,14,14,14	1
2	FE	F	1200	1/1	0.12	3.97	17,17,17,17	1
3	NA	C	1300	1/1	0.08	0.63	27,27,27,27	0
3	NA	L	1300	1/1	0.04	-4.82	27,27,27,27	0

6.5 Other polymers ⓘ

There are no such residues in this entry.