



Full wwPDB X-ray Structure Validation Report

Feb 27, 2014 – 02:47 PM GMT

PDB ID : 4IFR
Title : 2.40 Angstroms X-ray crystal structure of R239A 2-amino-3-carboxymuconate-6-semialdehydedecarboxylase from *Pseudomonas fluorescens*
Authors : Huo, L.; Davis, I.; Chen, L.; Liu, A.
Deposited on : 2012-12-14
Resolution : 2.39 Å(reported)

This is a full wwPDB validation 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>

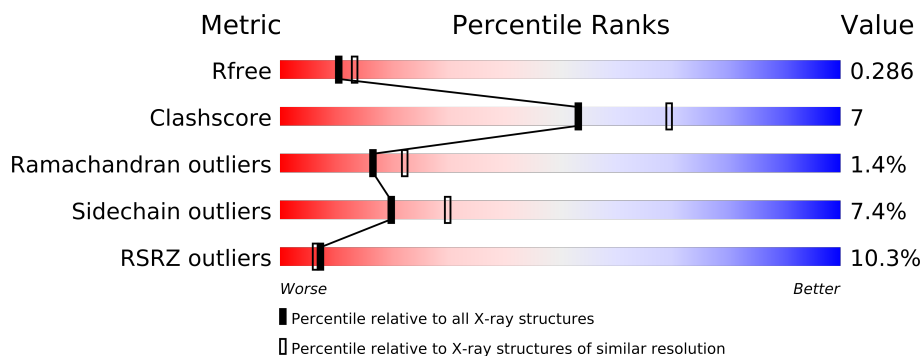
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : dev-1323
EDS : stable22639
Percentile statistics : 21963
Refmac : 5.8.0049
CCP4 : 6.3.0 (Settle)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 2.39 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}	66092	2207 (2.40-2.40)
Clashscore	79885	2789 (2.40-2.40)
Ramachandran outliers	78287	2736 (2.40-2.40)
Sidechain outliers	78261	2737 (2.40-2.40)
RSRZ outliers	66119	2210 (2.40-2.40)

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	330	
1	B	330	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5172 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 2-amino-3-carboxymuconate6-semialdehyde decarboxylase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	330	Total	C	N	O	S	1	0	0
			2572	1641	445	468	18			
1	B	330	Total	C	N	O	S	1	0	0
			2572	1641	445	468	18			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	239	ALA	ARG	engineered mutation	UNP Q83V25
B	239	ALA	ARG	engineered mutation	UNP Q83V25

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	B	1	Total	Zn	0	0
			1	1		
2	A	1	Total	Zn	0	0
			1	1		

- Molecule 3 is water.

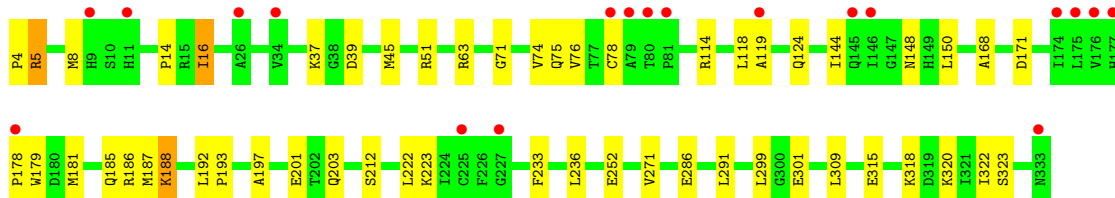
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	15	Total	O	0	0
			15	15		
3	B	11	Total	O	0	0
			11	11		

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.

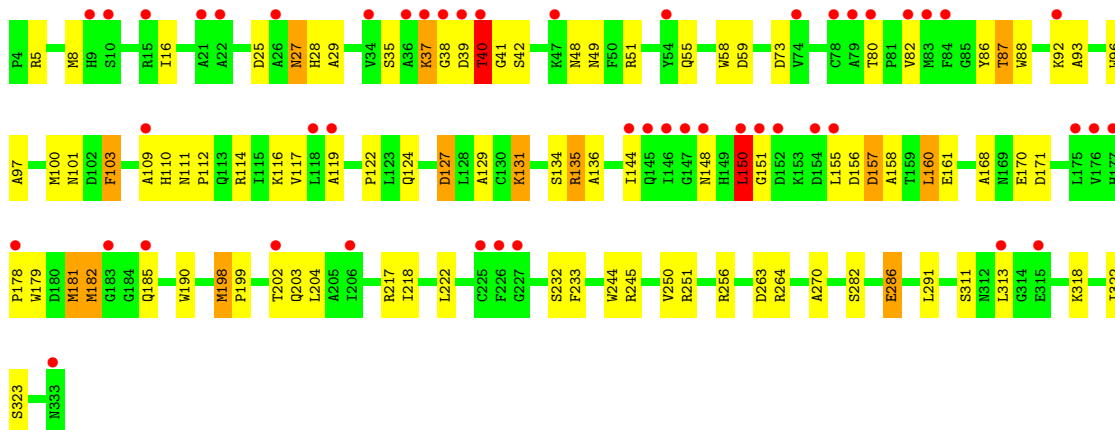
- Molecule 1: 2-amino-3-carboxymuconate6-semialdehyde decarboxylase

Chain A: 



- Molecule 1: 2-amino-3-carboxymuconate6-semialdehyde decarboxylase

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 42 21 2	Depositor
Cell constants a, b, c, α , β , γ	91.16Å 91.16Å 167.99Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	31.52 – 2.39 31.52 – 2.39	Depositor EDS
% Data completeness (in resolution range)	99.4 (31.52-2.39) 95.5 (31.52-2.39)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.66 (at 2.39Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.3_928)	Depositor
R, R_{free}	0.210 , 0.295 0.204 , 0.286	Depositor DCC
R_{free} test set	1401 reflections (5.10%)	DCC
Wilson B-factor (Å ²)	66.2	Xtriage
Anisotropy	0.060	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 46.0	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	1 of 28620 reflections (0.003%)	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	5172	wwPDB-VP
Average B, all atoms (Å ²)	78.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.77% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN

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	0.44	0/2639	0.60	0/3577
1	B	0.44	0/2639	0.61	0/3577
All	All	0.44	0/5278	0.60	0/7154

There are no bond length outliers.

There are no bond angle outliers.

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	2572	0	2512	25	0
1	B	2572	0	2512	49	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	15	0	0	1	0
3	B	11	0	0	0	0
All	All	5172	0	5024	71	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.

All (71) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:156:ASP:CB	1:B:160:LEU:HD23	2.02	0.90
1:B:87:THR:HG23	1:B:151:GLY:HA3	1.63	0.81
1:A:271:VAL:O	3:A:506:HOH:O	2.03	0.77
1:B:156:ASP:HB2	1:B:160:LEU:HD23	1.66	0.75
1:B:124:GLN:HA	1:B:150:LEU:HD11	1.74	0.70
1:B:127:ASP:N	1:B:127:ASP:OD1	2.25	0.67
1:B:135:ARG:HH21	1:B:136:ALA:HA	1.60	0.66
1:B:156:ASP:HB3	1:B:160:LEU:HD23	1.77	0.65
1:B:73:ASP:HA	1:B:114:ARG:HH21	1.61	0.65
1:B:97:ALA:O	1:B:101:ASN:ND2	2.35	0.60
1:A:168:ALA:HB2	1:A:222:LEU:HB2	1.82	0.60
1:B:40:THR:OG1	1:B:41:GLY:N	2.38	0.57
1:B:178:PRO:HB3	1:B:202:THR:OG1	2.06	0.56
1:A:124:GLN:HA	1:A:150:LEU:HD21	1.90	0.54
1:B:122:PRO:HD2	1:B:129:ALA:HA	1.90	0.54
1:B:119:ALA:HB3	1:B:144:ILE:HD13	1.90	0.53
1:A:4:PRO:O	1:A:323:SER:HB2	2.08	0.53
1:B:218:ILE:HG21	1:B:222:LEU:HD22	1.90	0.53
1:B:178:PRO:HB2	1:B:198:MET:HG2	1.91	0.52
1:A:119:ALA:HB3	1:A:144:ILE:HD13	1.90	0.52
1:B:244:TRP:HA	1:B:250:VAL:HB	1.91	0.52
1:B:311:SER:O	1:B:318:LYS:NZ	2.31	0.52
1:B:27:ASN:O	1:B:28:HIS:ND1	2.43	0.51
1:A:309:LEU:O	1:A:318:LYS:NZ	2.42	0.51
1:B:135:ARG:HE	1:B:135:ARG:C	2.14	0.51
1:A:74:VAL:HG22	1:A:114:ARG:HA	1.92	0.51
1:A:148:ASN:OD1	1:A:178:PRO:HA	2.13	0.49
1:B:8:MET:HG3	1:B:291:LEU:O	2.12	0.49
1:B:112:PRO:O	1:B:116:LYS:NZ	2.31	0.48
1:B:198:MET:HB3	1:B:199:PRO:HD3	1.94	0.48
1:A:187:MET:HE2	1:A:193:PRO:HA	1.96	0.48
1:B:127:ASP:O	1:B:131:LYS:HD2	2.13	0.48
1:A:212:SER:HA	1:B:190:TRP:CZ2	2.48	0.47
1:A:286:GLU:HG3	1:A:320:LYS:HD2	1.95	0.47
1:A:203:GLN:HG3	1:A:233:PHE:HA	1.96	0.47
1:A:181:MET:HG3	1:A:201:GLU:HG3	1.97	0.47
1:A:187:MET:HE1	1:A:197:ALA:H	1.80	0.46
1:B:5:ARG:HG3	1:B:322:ILE:HG23	1.97	0.46
1:A:14:PRO:HG2	1:A:16:ILE:HD11	1.98	0.46
1:B:86:TYR:HB3	1:B:150:LEU:HA	1.98	0.46
1:B:157:ASP:HB2	1:B:158:ALA:H	1.63	0.45
1:B:203:GLN:HG3	1:B:233:PHE:HA	1.97	0.45

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:37:LYS:O	1:B:39:ASP:N	2.46	0.45
1:A:188:LYS:HE2	1:A:188:LYS:HB3	1.72	0.45
1:B:311:SER:C	1:B:313:LEU:H	2.20	0.45
1:A:63:ARG:HD3	1:A:75:GLN:OE1	2.17	0.45
1:B:134:SER:OG	1:B:170:GLU:OE1	2.32	0.44
1:B:39:ASP:O	1:B:55:GLN:HB2	2.17	0.44
1:B:16:ILE:HG12	1:B:103:PHE:CE1	2.53	0.44
1:B:37:LYS:C	1:B:39:ASP:H	2.20	0.44
1:B:80:THR:HG22	1:B:82:VAL:HG23	1.99	0.44
1:B:55:GLN:HA	1:B:58:TRP:CH2	2.53	0.43
1:A:192:LEU:HD13	1:B:204:LEU:HD11	2.00	0.43
1:B:168:ALA:HB2	1:B:222:LEU:HD13	2.01	0.43
1:A:236:LEU:HD11	1:B:232:SER:HB3	2.00	0.43
1:B:110:HIS:O	1:B:111:ASN:HB2	2.19	0.43
1:B:181:MET:O	1:B:182:MET:HB2	2.19	0.43
1:B:42:SER:OG	1:B:49:ASN:OD1	2.24	0.43
1:B:25:ASP:HB3	1:B:29:ALA:H	1.84	0.42
1:B:155:LEU:HA	1:B:155:LEU:HD23	1.77	0.42
1:A:8:MET:HA	1:A:76:VAL:HB	2.01	0.42
1:A:37:LYS:HD3	1:A:39:ASP:OD1	2.20	0.42
1:A:78:CYS:HB3	1:A:118:LEU:HB2	2.02	0.41
1:B:96:TRP:O	1:B:100:MET:HG2	2.20	0.41
1:B:161:GLU:HG3	1:B:218:ILE:HD11	2.02	0.41
1:B:263:ASP:OD2	1:B:264:ARG:HG2	2.20	0.41
1:A:291:LEU:HD22	1:A:322:ILE:HD12	2.01	0.41
1:A:5:ARG:HD3	1:A:71:GLY:O	2.21	0.41
1:B:88:TRP:HB2	1:B:93:ALA:HB2	2.02	0.41
1:B:109:ALA:HA	1:B:112:PRO:HG3	2.02	0.41
1:A:45:MET:HE3	1:A:45:MET:HB3	1.95	0.40

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	328/330 (99%)	313 (95%)	14 (4%)	1 (0%)	50	68
1	B	328/330 (99%)	294 (90%)	26 (8%)	8 (2%)	9	9
All	All	656/660 (99%)	607 (92%)	40 (6%)	9 (1%)	16	22

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	182	MET
1	A	252	GLU
1	B	40	THR
1	B	270	ALA
1	B	37	LYS
1	B	150	LEU
1	B	59	ASP
1	B	286	GLU
1	B	38	GLY

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	269/269 (100%)	257 (96%)	12 (4%)	38	57
1	B	269/269 (100%)	241 (90%)	28 (10%)	10	14
All	All	538/538 (100%)	498 (93%)	40 (7%)	20	30

All (40) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	5	ARG
1	A	16	ILE
1	A	51	ARG
1	A	171	ASP
1	A	179	TRP
1	A	185	GLN
1	A	186	ARG
1	A	188	LYS

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Mol	Chain	Res	Type
1	A	223	LYS
1	A	299	LEU
1	A	301	GLU
1	A	315	GLU
1	B	27	ASN
1	B	35	SER
1	B	40	THR
1	B	48	ASN
1	B	51	ARG
1	B	87	THR
1	B	92	LYS
1	B	103	PHE
1	B	117	VAL
1	B	127	ASP
1	B	131	LYS
1	B	135	ARG
1	B	148	ASN
1	B	150	LEU
1	B	157	ASP
1	B	160	LEU
1	B	171	ASP
1	B	179	TRP
1	B	181	MET
1	B	185	GLN
1	B	198	MET
1	B	217	ARG
1	B	245	ARG
1	B	251	ARG
1	B	256	ARG
1	B	282	SER
1	B	286	GLU
1	B	323	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	120	GLN

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 2 ligands modelled in this entry, 2 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	330/330 (100%)	0.39	19 (5%)	22 20	50, 70, 93, 107	1 (0%)
1	B	330/330 (100%)	0.94	49 (14%)	3 2	50, 82, 119, 140	0
All	All	660/660 (100%)	0.67	68 (10%)	7 6	50, 75, 111, 140	1 (0%)

All (68) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	150	LEU	20.7
1	B	151	GLY	20.1
1	B	152	ASP	15.5
1	B	333	ASN	4.6
1	B	78	CYS	4.5
1	B	175	LEU	4.2
1	B	177	HIS	3.8
1	B	145	GLN	3.8
1	B	313	LEU	3.8
1	B	176	VAL	3.8
1	B	183	GLY	3.7
1	B	227	GLY	3.7
1	B	84	PHE	3.6
1	B	118	LEU	3.6
1	B	36	ALA	3.6
1	A	78	CYS	3.4
1	B	47	LYS	3.4
1	B	178	PRO	3.3
1	B	34	VAL	3.3
1	B	147	GLY	3.2
1	B	26	ALA	3.1
1	B	206	ILE	3.1
1	B	83	MET	3.1
1	B	37	LYS	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	79	ALA	3.0
1	A	333	ASN	3.0
1	B	185	GLN	3.0
1	B	10	SER	3.0
1	B	39	ASP	2.9
1	B	80	THR	2.9
1	B	15	ARG	2.9
1	B	92	LYS	2.9
1	A	225	CYS	2.8
1	B	38	GLY	2.8
1	B	54	TYR	2.8
1	A	11	HIS	2.7
1	B	148	ASN	2.7
1	B	144	ILE	2.6
1	A	79	ALA	2.6
1	B	40	THR	2.6
1	A	176	VAL	2.6
1	A	145	GLN	2.6
1	B	146	ILE	2.6
1	A	34	VAL	2.5
1	A	146	ILE	2.5
1	B	155	LEU	2.5
1	A	177	HIS	2.5
1	B	21	ALA	2.5
1	B	74	VAL	2.4
1	B	154	ASP	2.4
1	A	174	ILE	2.4
1	B	225	CYS	2.4
1	B	109	ALA	2.3
1	A	81	PRO	2.3
1	A	178	PRO	2.3
1	B	22	ALA	2.3
1	B	202	THR	2.2
1	B	226	PHE	2.2
1	B	119	ALA	2.2
1	B	315	GLU	2.1
1	B	9	HIS	2.1
1	A	175	LEU	2.1
1	B	82	VAL	2.1
1	A	119	ALA	2.1
1	A	9	HIS	2.1
1	A	80	THR	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	26	ALA	2.1
1	A	227	GLY	2.0

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
2	ZN	A	401	1/1	0.22	-0.70	60,60,60,60	0
2	ZN	B	401	1/1	0.21	-0.80	69,69,69,69	0

6.5 Other polymers ⓘ

There are no such residues in this entry.