



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 01:20 AM UTC

PDB ID : 7R5C / pdb_00007r5c
Title : Structure of E.coli Class 2 L-asparaginase EcAIII, mutant RDM1-29 (G206C, R207S, D210L, S211V)
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Deposited on : 2022-02-10
Resolution : 2.20 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) : 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

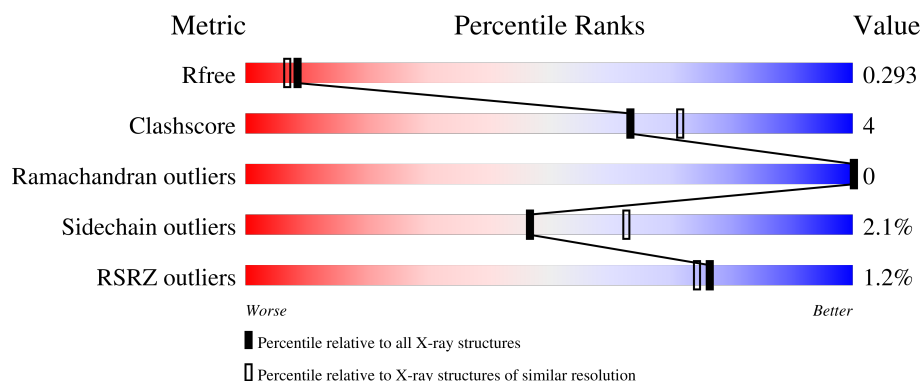
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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	AAA	178	
1	CCC	178	
2	BBB	143	
2	DDD	143	

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 4324 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 Isoaspartyl peptidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	AAA	154	Total	C	N	O	S	0	1	0
			1156	721	204	221	10			
1	CCC	154	Total	C	N	O	S	0	1	0
			1156	721	204	221	10			

- Molecule 2 is a protein called Isoaspartyl peptidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	BBB	134	Total	C	N	O	S	0	0	0
			941	590	157	186	8			
2	DDD	135	Total	C	N	O	S	0	0	0
			950	595	158	189	8			

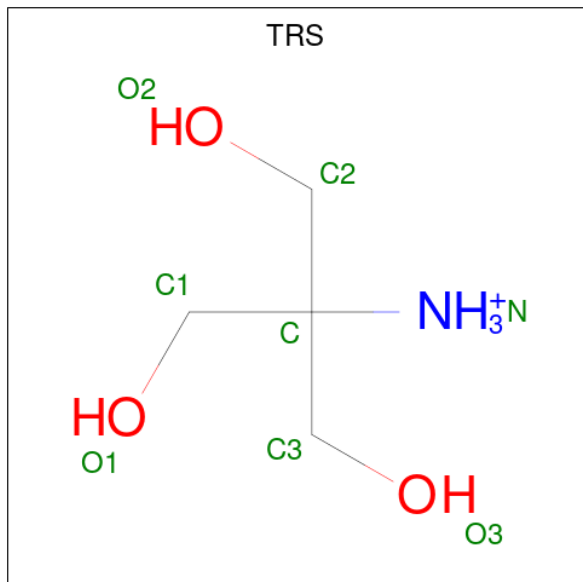
There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
BBB	206	CYS	GLY	engineered mutation	UNP P37595
BBB	207	SER	ARG	engineered mutation	UNP P37595
BBB	210	LEU	ASP	engineered mutation	UNP P37595
BBB	211	VAL	SER	engineered mutation	UNP P37595
DDD	206	CYS	GLY	engineered mutation	UNP P37595
DDD	207	SER	ARG	engineered mutation	UNP P37595
DDD	210	LEU	ASP	engineered mutation	UNP P37595
DDD	211	VAL	SER	engineered mutation	UNP P37595

- Molecule 3 is SODIUM ION (CCD ID: NA) (formula: Na).

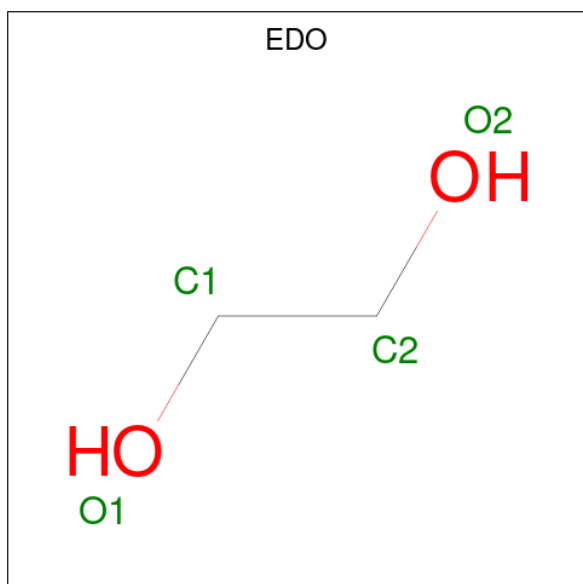
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	AAA	1	Total	Na	0	0
			1	1		
3	CCC	1	Total	Na	0	0
			1	1		

- Molecule 4 is 2-AMINO-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: TRS) (formula: $C_4H_{12}NO_3$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	CCC	1	Total	C	N	O	0	0
			8	4	1	3		

- Molecule 5 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	DDD	1	Total	C	O	0	0
			4	2	2		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	AAA	26	Total 26	O 26	0	0
6	BBB	22	Total 22	O 22	0	0
6	CCC	36	Total 36	O 36	0	0
6	DDD	23	Total 23	O 23	0	0

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- Molecule 1: Isoaspartyl peptidase



- | |
|------|
| MET |
| GLY |
| LVS |
| A4 |
| H9 |
| A14 |
| I16 |
| S16 |
| R17 |
| Q23 |
| A34 |
| V57 |
| L60 |
| E81 |
| E82 |
| R104 |
| M122 |
| G126 |
| F130 |
| L148 |
| L154 |
| A155 |
| A156 |
| R157 |
| LVS |
| GLU |
| GLY |
| THR |
| VAL |
| LEU |
| ASP |
| HIS |
| SER |
| GLY |
| ALA |
| PRO |
| LEU |
| ASP |
| GLU |
| LVS |
| GLN |
| LVS |
| MET |
| GLY |

- | | | | | | | | | |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| T179 | V183 | D186 | T197 | G198 | L204 | P205 | C206 | V211 | P212 | L213 | T230 | E234 | I237 | R238 | R262 | E266 | I280 | L288 | T292 | D304 | Y311 | R312 | GLU | LYS | GLY | ASP | THR | VAL | ALA | THR | GLN |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|

- | | | | | | | |
|------|-----|-----|-----|-----|-----|-----|-----|
| T179 | V180 | V183 | D186 | A194 | T197 | V211 | P212 | L213 | T230 | E234 | L237 | R262 | E266 | L277 | L280 | D281 | H282 | L288 | P289 | G300 | Y301 | E313 | L315 | GLY | ASP | THR | VAL | ALA | THR | GLN |
|------|-----|-----|-----|-----|-----|-----|-----|

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	51.79Å 77.86Å 148.36Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	21.48 – 2.20 21.48 – 2.20	Depositor EDS
% Data completeness (in resolution range)	97.0 (21.48-2.20) 97.0 (21.48-2.20)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.22 (at 2.19Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.249 , 0.301 (Not available) , 0.293	Depositor DCC
R_{free} test set	1039 reflections (3.33%)	wwPDB-VP
Wilson B-factor (Å ²)	35.7	Xtriage
Anisotropy	0.194	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 32.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.41$, $\langle L^2 \rangle = 0.24$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	4324	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 15.15% 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: TRS, EDO, NA

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	AAA	1.17	0/1173	1.50	1/1583 (0.1%)
1	CCC	1.23	2/1173 (0.2%)	1.51	0/1583
2	BBB	1.22	1/956 (0.1%)	1.47	2/1303 (0.2%)
2	DDD	1.17	1/965 (0.1%)	1.50	1/1315 (0.1%)
All	All	1.20	4/4267 (0.1%)	1.50	4/5784 (0.1%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	BBB	292	THR	C-O	5.36	1.30	1.23
1	CCC	104	ARG	C-O	5.29	1.30	1.24
2	DDD	194	ALA	C-O	5.26	1.30	1.23
1	CCC	34	ALA	C-O	5.16	1.30	1.24

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	BBB	186	ASP	CA-CB-CG	5.45	118.05	112.60
1	AAA	120	VAL	N-CA-C	-5.30	107.25	111.81
2	BBB	304	ASP	CA-CB-CG	5.28	117.88	112.60
2	DDD	186	ASP	CA-CB-CG	5.24	117.84	112.60

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	AAA	1156	0	1162	7	0
1	CCC	1156	0	1162	6	0
2	BBB	941	0	926	15	0
2	DDD	950	0	932	15	0
3	AAA	1	0	0	0	0
3	CCC	1	0	0	0	0
4	CCC	8	0	12	0	0
5	DDD	4	0	6	1	0
6	AAA	26	0	0	1	0
6	BBB	22	0	0	0	0
6	CCC	36	0	0	0	0
6	DDD	23	0	0	0	0
All	All	4324	0	4200	34	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 4.

All (34) 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:BBB:213:LEU:HD22	2:DDD:213:LEU:HD22	1.83	0.60
2:BBB:183:VAL:HG23	2:BBB:280:ILE:HD12	1.84	0.60
2:BBB:262:ARG:O	2:BBB:266:GLU:HB2	2.05	0.56
1:CCC:62:GLU:OE1	1:CCC:104:ARG:NH2	2.34	0.56
1:AAA:25:GLU:O	1:AAA:29:ILE:HG12	2.06	0.56
1:AAA:119:HIS:HD2	6:AAA:307:HOH:O	1.88	0.55
2:BBB:213:LEU:CD2	2:DDD:213:LEU:HD22	2.37	0.55
2:DDD:213:LEU:HD12	2:DDD:237:ILE:HG12	1.88	0.53
2:DDD:183:VAL:HG23	2:DDD:280:ILE:HD12	1.89	0.53
2:DDD:197:THR:HB	2:DDD:211:VAL:HG21	1.90	0.53
2:BBB:197:THR:HB	2:BBB:211:VAL:HG21	1.90	0.52
2:BBB:183:VAL:HG23	2:BBB:280:ILE:CD1	2.39	0.52
1:CCC:122[B]:MET:HE1	1:CCC:130:PHE:HB2	1.91	0.52
2:DDD:183:VAL:HG23	2:DDD:280:ILE:CD1	2.39	0.51
2:BBB:311:TYR:O	2:BBB:312:ARG:HB3	2.10	0.50
2:BBB:206:CYS:HB2	1:CCC:126:GLY:HA3	1.94	0.49
1:AAA:9:HIS:CE1	2:BBB:230:THR:HB	2.47	0.48
2:BBB:197:THR:CG2	2:BBB:211:VAL:HG21	2.43	0.48
2:BBB:213:LEU:HD12	2:BBB:237:ILE:HG12	1.95	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:DDD:197:THR:CG2	2:DDD:211:VAL:HG21	2.45	0.47
1:CCC:9:HIS:CE1	2:DDD:230:THR:HB	2.50	0.47
2:DDD:262:ARG:O	2:DDD:266:GLU:HB2	2.16	0.46
1:CCC:57:VAL:HG21	2:DDD:194:ALA:HB3	1.97	0.44
1:AAA:120:VAL:HG23	2:DDD:234:GLU:HG2	1.99	0.44
2:DDD:277:LEU:HG	2:DDD:289:PRO:HG2	2.00	0.44
1:AAA:50:LEU:HD21	1:AAA:114:MET:HE1	1.99	0.43
1:AAA:111:ARG:O	1:AAA:115:GLU:HG3	2.18	0.43
1:AAA:82:LEU:CD2	2:BBB:198:GLY:HA2	2.47	0.43
2:BBB:288:LEU:N	2:BBB:288:LEU:HD12	2.33	0.42
2:BBB:234:GLU:CD	2:BBB:238:ARG:HH11	2.28	0.42
2:BBB:204:LEU:HD23	2:BBB:204:LEU:HA	1.96	0.42
2:DDD:300:GLY:HA2	5:DDD:401:EDO:H22	2.03	0.41
2:DDD:288:LEU:HD12	2:DDD:288:LEU:N	2.35	0.41
1:CCC:60:LEU:HD13	2:DDD:180:VAL:HB	2.03	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	AAA	153/178 (86%)	148 (97%)	5 (3%)	0	100	100
1	CCC	153/178 (86%)	150 (98%)	3 (2%)	0	100	100
2	BBB	132/143 (92%)	126 (96%)	6 (4%)	0	100	100
2	DDD	133/143 (93%)	126 (95%)	7 (5%)	0	100	100
All	All	571/642 (89%)	550 (96%)	21 (4%)	0	100	100

There are no Ramachandran outliers to report.

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	AAA	119/136 (88%)	117 (98%)	2 (2%)	53	69
1	CCC	119/136 (88%)	115 (97%)	4 (3%)	32	44
2	BBB	93/100 (93%)	91 (98%)	2 (2%)	45	61
2	DDD	94/100 (94%)	93 (99%)	1 (1%)	65	79
All	All	425/472 (90%)	416 (98%)	9 (2%)	47	63

All (9) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	AAA	111	ARG
1	AAA	148	LEU
2	BBB	234	GLU
2	BBB	312	ARG
1	CCC	16	SER
1	CCC	17	ARG
1	CCC	154	LEU
1	CCC	157	ARG
2	DDD	230	THR

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

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 4 ligands modelled in this entry, 2 are 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	$\# Z > 2$
5	EDO	DDD	401	-	3,3,3	0.19	0	2,2,2	0.30	0
4	TRS	CCC	201	-	7,7,7	0.40	0	9,9,9	0.74	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	DDD	401	-	-	0/1/1/1	-
4	TRS	CCC	201	-	-	0/9/9/9	-

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
5	DDD	401	EDO	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 ⓘ

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	AAA	154/178 (86%)	0.37	0 100 100	18, 37, 60, 72	1 (0%)
1	CCC	154/178 (86%)	0.41	5 (3%) 50 47	17, 36, 61, 69	1 (0%)
2	BBB	134/143 (93%)	0.49	0 100 100	29, 39, 54, 66	0
2	DDD	135/143 (94%)	0.45	2 (1%) 72 69	26, 37, 54, 72	0
All	All	577/642 (89%)	0.43	7 (1%) 76 74	17, 37, 58, 72	2 (0%)

All (7) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	CCC	148	LEU	3.3
1	CCC	156	ALA	3.2
1	CCC	14	ALA	3.1
1	CCC	157	ARG	2.5
1	CCC	23	GLN	2.4
2	DDD	282	HIS	2.3
2	DDD	301	TYR	2.2

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 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, 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
4	TRS	CCC	201	8/8	0.82	0.12	34,38,40,41	0
5	EDO	DDD	401	4/4	0.86	0.14	48,50,53,54	0
3	NA	AAA	201	1/1	0.95	0.09	37,37,37,37	0
3	NA	CCC	202	1/1	0.95	0.09	29,29,29,29	0

6.5 Other polymers [i](#)

There are no such residues in this entry.