WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report (i)

Sep 23, 2025 – 10:29 pm BST

PDB ID	:	4UPV / pdb_00004upv
Title	:	Low X-ray dose structure of a Ni-A Ni-Sox mixture of the D. fructosovorans NiFe-hydrogenase L122A mutant
Authors	:	Volbeda, A.; Martin, L.; Barbier, E.; Gutierrez-Sanz, O.; DeLacey, A.L.; Liebgott, P.P.; Dementin, S.; Rousset, M.; Fontecilla-Camps, J.C.
Deposited on	:	2014-06-18
Resolution	:	1.52 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 (i) 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 (i)) were used in the production of this report:

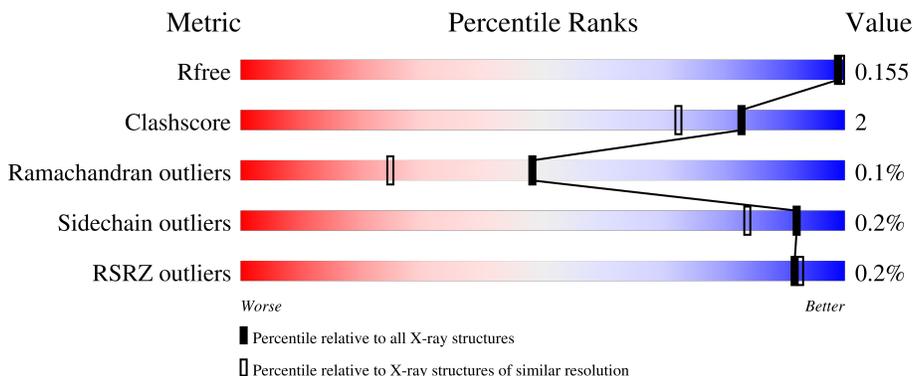|		
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

1   Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
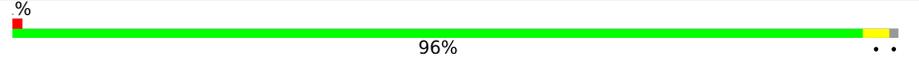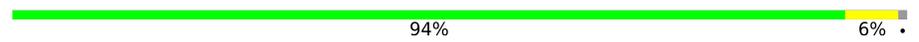*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.52 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	Percentile Ranks	Value
Rfree		0.155
Clashscore		2
Ramachandran outliers		0.1%
Sidechain outliers		0.2%
RSRZ outliers		0.2%

Worse — *Better*

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	5293 (1.54-1.50)
Clashscore	180529	5759 (1.54-1.50)
Ramachandran outliers	177936	5653 (1.54-1.50)
Sidechain outliers	177891	5650 (1.54-1.50)
RSRZ outliers	164620	5293 (1.54-1.50)

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 <=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	265	96%
1	B	265	94% 6%
2	Q	564	93%
2	R	564	92% 5%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	GOL	B	1269	-	-	X	-

2 Entry composition ⓘ

There are 13 unique types of molecules in this entry. The entry contains 14686 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 NIFE-HYDROGENASE SMALL SUBUNIT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	262	Total	C	N	O	S	0	11	0
			2026	1291	336	383	16			
1	B	263	Total	C	N	O	S	0	16	0
			2061	1316	339	390	16			

- Molecule 2 is a protein called NIFE-HYDROGENASE LARGE SUBUNIT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	Q	544	Total	C	N	O	S	0	31	0
			4304	2750	745	784	25			
2	R	545	Total	C	N	O	S	0	34	0
			4329	2765	743	796	25			

There are 34 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Q	-13	ALA	-	expression tag	UNP E1K247
Q	-12	SER	-	expression tag	UNP E1K247
Q	-11	TRP	-	expression tag	UNP E1K247
Q	-10	SER	-	expression tag	UNP E1K247
Q	-9	HIS	-	expression tag	UNP E1K247
Q	-8	PRO	-	expression tag	UNP E1K247
Q	-7	GLN	-	expression tag	UNP E1K247
Q	-6	PHE	-	expression tag	UNP E1K247
Q	-5	GLU	-	expression tag	UNP E1K247
Q	-4	LYS	-	expression tag	UNP E1K247
Q	-3	GLY	-	expression tag	UNP E1K247
Q	-2	ALA	-	expression tag	UNP E1K247
Q	-1	SER	-	expression tag	UNP E1K247
Q	0	GLY	-	expression tag	UNP E1K247
Q	1	ALA	-	expression tag	UNP E1K247
Q	122	ALA	LEU	engineered mutation	UNP E1K247

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Chain	Residue	Modelled	Actual	Comment	Reference
Q	543	CSS	CYS	microheterogeneity	UNP E1K247
R	-13	ALA	-	expression tag	UNP E1K247
R	-12	SER	-	expression tag	UNP E1K247
R	-11	TRP	-	expression tag	UNP E1K247
R	-10	SER	-	expression tag	UNP E1K247
R	-9	HIS	-	expression tag	UNP E1K247
R	-8	PRO	-	expression tag	UNP E1K247
R	-7	GLN	-	expression tag	UNP E1K247
R	-6	PHE	-	expression tag	UNP E1K247
R	-5	GLU	-	expression tag	UNP E1K247
R	-4	LYS	-	expression tag	UNP E1K247
R	-3	GLY	-	expression tag	UNP E1K247
R	-2	ALA	-	expression tag	UNP E1K247
R	-1	SER	-	expression tag	UNP E1K247
R	0	GLY	-	expression tag	UNP E1K247
R	1	ALA	-	expression tag	UNP E1K247
R	122	ALA	LEU	engineered mutation	UNP E1K247
R	543	CSS	CYS	microheterogeneity	UNP E1K247

- Molecule 3 is IRON/SULFUR CLUSTER (CCD ID: SF4) (formula: Fe_4S_4).
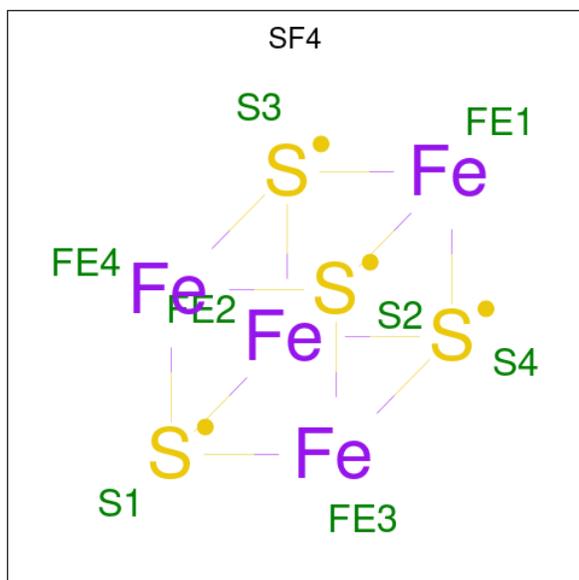
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	Fe	S	0	0
			8	4	4		
3	A	1	Total	Fe	S	0	0
			8	4	4		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total 8	Fe 4	S 4	0	0
3	B	1	Total 8	Fe 4	S 4	0	0

- Molecule 4 is FE3-S4 CLUSTER (CCD ID: F3S) (formula: Fe_3S_4).
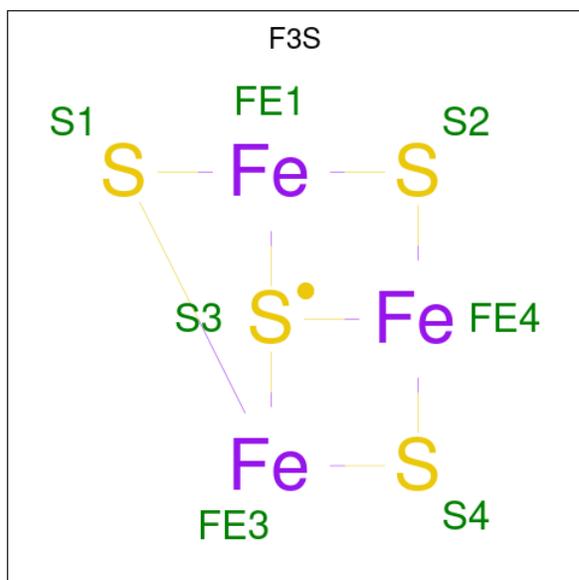
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total 7	Fe 3	S 4	0	0
4	B	1	Total 7	Fe 3	S 4	0	0

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).

GOL
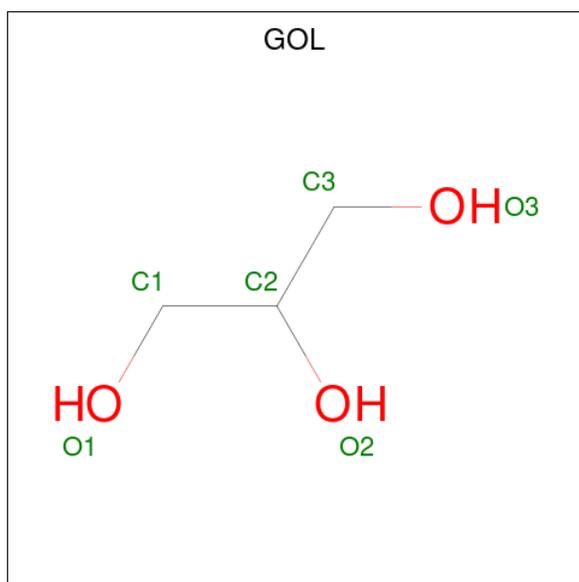
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total 6	C 3	O 3	0	0
5	A	1	Total 6	C 3	O 3	0	0
5	A	1	Total 6	C 3	O 3	0	0
5	B	1	Total 6	C 3	O 3	0	0
5	B	1	Total 6	C 3	O 3	0	0
5	B	1	Total 6	C 3	O 3	0	0
5	B	1	Total 6	C 3	O 3	0	0
5	Q	1	Total 6	C 3	O 3	0	0
5	R	1	Total 6	C 3	O 3	0	0
5	R	1	Total 6	C 3	O 3	0	0
5	R	1	Total 7	C 3	O 4	0	1
5	R	1	Total 6	C 3	O 3	0	0
5	R	1	Total 6	C 3	O 3	0	0
5	R	1	Total 6	C 3	O 3	0	0

- Molecule 6 is GLYCINE (CCD ID: GLY) (formula: $C_2H_5NO_2$).
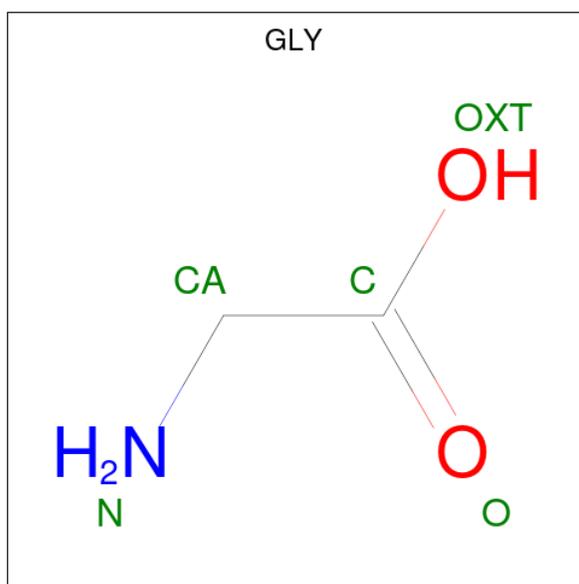
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	B	1	Total	C	N	O		0	0
			5	2	1	2			
6	R	1	Total	C	N	O		0	0
			5	2	1	2			

- Molecule 7 is morpholine-4-sulfonic acid (CCD ID: SOT) (formula: $C_4H_9NO_4S$).
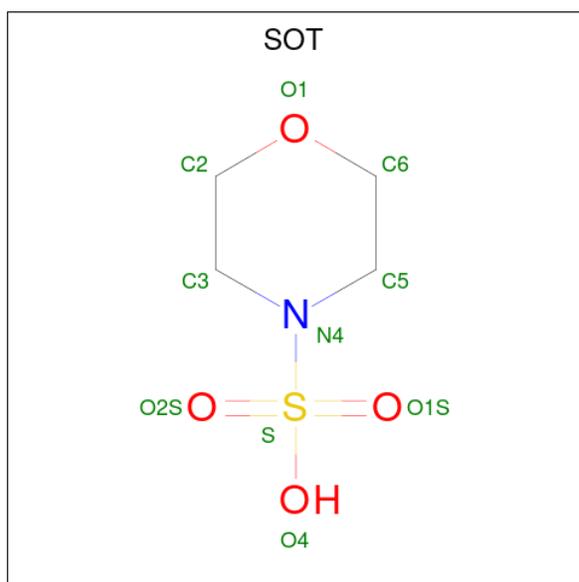
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	B	1	Total	C	N	O	S	0	1
			18	8	2	6	2		

- Molecule 8 is HYDROSULFURIC ACID (CCD ID: H2S) (formula: H_2S).
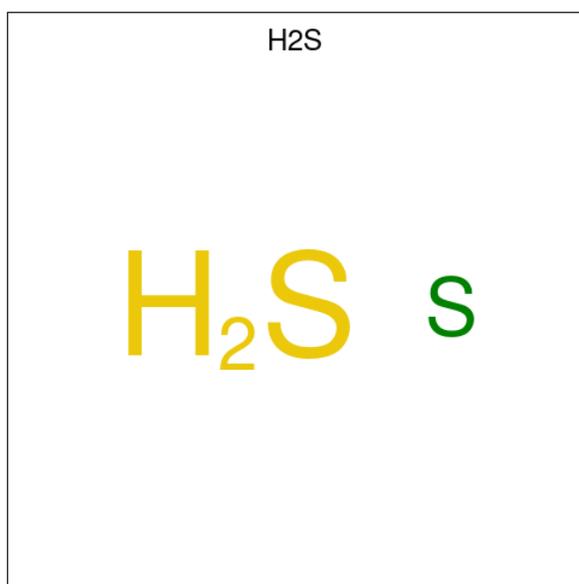
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	B	1	Total S 1 1		0	0

- Molecule 9 is CARBONMONOXIDE-(DICYANO) IRON (CCD ID: FCO) (formula: C_3FeN_2O).
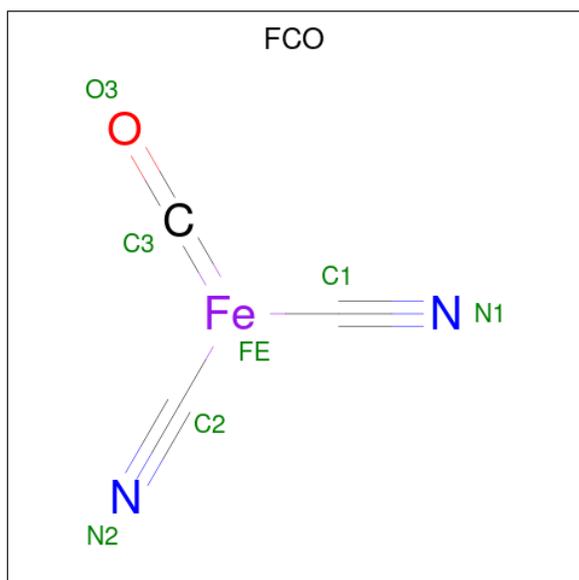
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	Q	1	Total 7	C 3	Fe 1	N 2	O 1	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
9	R	1	Total 7	C 3	Fe 1	N 2	O 1	0	0

- Molecule 10 is NICKEL (II) ION (CCD ID: NI) (formula: Ni).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	Q	1	Total 2	Ni 2	0	1
10	R	1	Total 2	Ni 2	0	1

- Molecule 11 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	Q	1	Total 1	Mg 1	0	0
11	R	1	Total 1	Mg 1	0	0

- Molecule 12 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	Q	1	Total 2	Cl 2	0	1

- Molecule 13 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
13	A	283	Total 295	O 295	0	12
13	B	302	Total 314	O 314	0	12
13	Q	541	Total 553	O 553	0	12
13	R	606	Total 622	O 622	0	16

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: NIFE-HYDROGENASE SMALL SUBUNIT

Chain A:
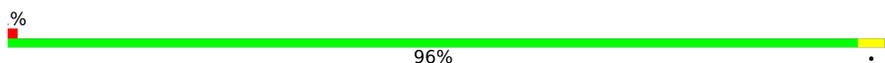
• Molecule 1: NIFE-HYDROGENASE SMALL SUBUNIT

Chain B:
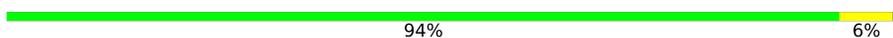
• Molecule 2: NIFE-HYDROGENASE LARGE SUBUNIT

Chain Q:

• Molecule 2: NIFE-HYDROGENASE LARGE SUBUNIT

Chain R:

4 Data and refinement statistics (i)

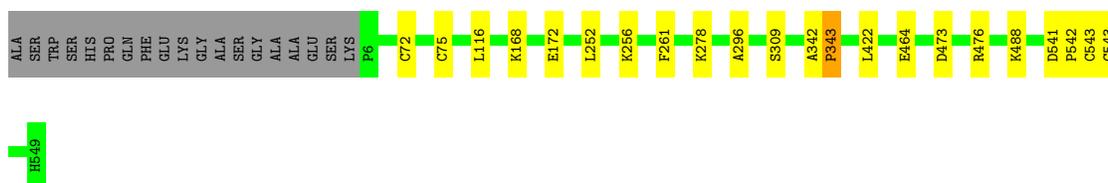| Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	64.69Å 100.85Å 116.70Å 90.00° 105.96° 90.00°	Depositor
Resolution (Å)	30.00 – 1.52 30.00 – 1.52	Depositor EDS
% Data completeness (in resolution range)	90.6 (30.00-1.52) 90.6 (30.00-1.52)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.08 (at 1.52Å)	Xtriage
Refinement program	REFMAC 5.8.0049	Depositor
R, R_{free}	0.120 , 0.154 0.121 , 0.155	Depositor DCC
R_{free} test set	10130 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å^2)	7.7	Xtriage
Anisotropy	0.389	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 57.7	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.019 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	14686	wwPDB-VP
Average B, all atoms (Å^2)	12.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.89% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: SOT, F3S, MG, H2S, FCO, CSS, SF4, GOL, CSX, CL, NI

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	0.72	0/2129	0.78	1/2893 (0.0%)
1	B	0.70	0/2181	0.79	1/2958 (0.0%)
2	Q	0.73	0/4501	0.79	0/6089
2	R	0.75	0/4555	0.80	1/6166 (0.0%)
All	All	0.73	0/13366	0.79	3/18106 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	R	497	VAL	N-CA-CB	-6.92	107.06	111.83
1	B	146	GLY	N-CA-C	-5.70	106.53	111.95
1	A	146	GLY	N-CA-C	-5.38	106.84	111.95

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	2026	0	1960	4	0
1	B	2061	0	1998	19	0
2	Q	4304	0	4315	12	0
2	R	4329	0	4314	22	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	16	0	0	0	0
3	B	16	0	0	0	0
4	A	7	0	0	0	0
4	B	7	0	0	0	0
5	A	18	0	24	2	0
5	B	24	0	32	5	0
5	Q	6	0	8	0	0
5	R	37	0	46	5	0
6	B	5	0	2	0	0
6	R	5	0	2	0	0
7	B	18	0	16	1	0
8	B	1	0	0	1	0
9	Q	7	0	0	0	0
9	R	7	0	0	0	0
10	Q	2	0	0	0	0
10	R	2	0	0	0	0
11	Q	1	0	0	0	0
11	R	1	0	0	0	0
12	Q	2	0	0	0	0
13	A	295	0	0	1	0
13	B	314	0	0	8	0
13	Q	553	0	0	2	0
13	R	622	0	0	2	0
All	All	14686	0	12717	59	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 (59) 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:Q:172[A]:GLU:HG2	13:Q:3204:HOH:O	1.64	0.98
2:R:324:VAL:HG11	2:R:395[B]:LYS:HE2	1.73	0.69
1:B:209[B]:LYS:NZ	5:B:1269:GOL:H31	2.06	0.69
2:R:396:GLY:HA2	2:R:401[A]:LYS:HE3	1.75	0.68
2:R:303[A]:GLU:HG2	5:R:1558:GOL:H2	1.75	0.68
2:R:509[A]:GLN:HG3	13:R:2841:HOH:O	1.92	0.68
8:B:1272:H2S:S	13:B:2488:HOH:O	2.53	0.67
2:R:72:CYS:HB3	2:R:75:CSX:OD	1.95	0.66
1:B:209[A]:LYS:NZ	13:B:2603:HOH:O	2.30	0.65
1:B:4[B]:LYS:HE3	13:B:2612:HOH:O	1.98	0.63

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:Q:72:CYS:HB3	2:Q:75:CSX:OD	1.97	0.63
1:B:209[B]:LYS:HE2	5:B:1269:GOL:H31	1.84	0.60
2:R:484[A]:ARG:HD2	13:R:3070:HOH:O	2.02	0.58
2:R:138:PRO:HG3	2:R:161[A]:LYS:HG2	1.85	0.58
2:R:303[A]:GLU:CG	5:R:1558:GOL:H2	2.36	0.56
1:B:62[A]:GLN:HG3	13:B:2563:HOH:O	2.05	0.56
1:A:62[B]:GLN:HG2	5:A:1269:GOL:H11	1.87	0.55
1:B:209[B]:LYS:CE	5:B:1269:GOL:H31	2.33	0.55
1:B:4[B]:LYS:NZ	13:B:2612:HOH:O	2.38	0.53
2:R:278[A]:LYS:HE3	2:R:413:VAL:HG12	1.89	0.53
1:A:28:ILE:HG13	1:A:29[B]:LYS:HG3	1.91	0.52
2:R:393:TYR:O	2:R:401[A]:LYS:CE	2.58	0.52
2:R:5:LYS:N	2:R:6:PRO:CD	2.74	0.51
2:Q:168:LYS:O	2:Q:172[A]:GLU:HG3	2.11	0.51
2:R:296:ALA:HA	2:R:309:SER:HA	1.92	0.50
2:Q:342[A]:ALA:HB1	2:Q:343[A]:PRO:HD2	1.94	0.50
1:B:165:GLY:HA2	13:B:2660:HOH:O	2.11	0.49
2:Q:464[B]:GLU:OE2	2:Q:488:LYS:HE3	2.12	0.49
2:R:278[A]:LYS:HE3	2:R:413:VAL:CG1	2.43	0.49
2:R:395[B]:LYS:HZ2	5:R:1554:GOL:C1	2.24	0.49
2:Q:278[B]:LYS:HE3	13:Q:3042:HOH:O	2.13	0.48
2:R:393:TYR:O	2:R:401[A]:LYS:HE2	2.14	0.48
1:B:4[B]:LYS:CE	13:B:2612:HOH:O	2.56	0.47
1:B:237:TRP:CZ2	1:B:239:VAL:HB	2.50	0.47
2:R:476:ARG:HD2	2:R:543[A]:CSS:SD	2.55	0.46
2:R:19:ASP:HB2	2:R:29:ARG:HG3	1.97	0.46
1:B:209[B]:LYS:HZ1	5:B:1269:GOL:H31	1.80	0.45
2:R:395[B]:LYS:NZ	5:R:1554:GOL:C1	2.78	0.45
1:B:237:TRP:CH2	1:B:239:VAL:HB	2.51	0.45
5:B:1271:GOL:H11	13:B:2444:HOH:O	2.16	0.45
1:B:221:PRO:HB3	7:B:1268[B]:SOT:H32	1.99	0.44
2:Q:296:ALA:HA	2:Q:309:SER:HA	1.99	0.44
1:A:237:TRP:CZ2	1:A:239:VAL:HB	2.52	0.44
1:B:106[B]:LYS:HB3	1:B:106[B]:LYS:HE3	1.84	0.44
5:A:1269:GOL:H2	13:A:2448:HOH:O	2.17	0.44
2:Q:476:ARG:HD2	2:Q:543[A]:CSS:SD	2.58	0.43
2:R:116[B]:LEU:HD11	2:R:261:PHE:CE2	2.53	0.43
2:Q:541:ASP:N	2:Q:542:PRO:HD3	2.33	0.43
1:B:258:THR:HA	1:B:259:PRO:C	2.44	0.43
2:R:138:PRO:HG3	2:R:161[A]:LYS:CG	2.48	0.42
2:Q:116[B]:LEU:HD11	2:Q:261:PHE:CE2	2.55	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:R:304:LYS:HE2	5:R:1558:GOL:H11	2.02	0.42
1:A:258:THR:HA	1:A:259:PRO:C	2.43	0.42
1:B:47:THR:O	2:R:23:ARG:HA	2.20	0.41
1:B:223:THR:OG1	1:B:247:GLY:HA2	2.20	0.41
2:Q:252:LEU:HD11	2:Q:256[A]:LYS:HE3	2.02	0.41
1:B:4[B]:LYS:HE3	1:B:4[B]:LYS:HB3	1.87	0.40
1:B:2:THR:CG2	1:B:4[A]:LYS:HE3	2.51	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	272/265 (103%)	265 (97%)	7 (3%)	0	100	100
1	B	277/265 (104%)	270 (98%)	7 (2%)	0	100	100
2	Q	570/564 (101%)	554 (97%)	14 (2%)	2 (0%)	30	12
2	R	575/564 (102%)	565 (98%)	10 (2%)	0	100	100
All	All	1694/1658 (102%)	1654 (98%)	38 (2%)	2 (0%)	48	25

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	Q	343[A]	PRO
2	Q	343[B]	PRO

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	220/210 (105%)	220 (100%)	0	100	100
1	B	225/210 (107%)	225 (100%)	0	100	100
2	Q	460/446 (103%)	459 (100%)	1 (0%)	92	84
2	R	467/446 (105%)	466 (100%)	1 (0%)	92	84
All	All	1372/1312 (105%)	1370 (100%)	2 (0%)	92	84

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	Q	473	ASP
2	R	473	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	14	ASN
1	A	85	GLN
1	A	240	GLN
1	B	5	HIS
1	B	14	ASN
1	B	129	GLN
1	B	240	GLN
2	Q	139	ASN
2	Q	241	GLN
2	Q	250	ASN
2	Q	509	GLN
2	R	47	GLN
2	R	139	ASN
2	R	241	GLN

5.3.3　RNA ⓘ

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues are 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	$\#|Z| > 2$
2	CSS	R	543[A]	10,2	4,6,7	0.74	0	1,6,8	0.34	0
2	CSS	Q	543[A]	10,2	4,6,7	0.96	0	1,6,8	0.01	0
2	CSX	Q	75	10,9,2	3,6,7	0.75	0	1,6,8	0.91	0
2	CSX	R	75	10,9,2	3,6,7	0.62	0	1,6,8	1.32	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
2	CSS	R	543[A]	10,2	-	0/1/5/7	-
2	CSS	Q	543[A]	10,2	-	0/1/5/7	-
2	CSX	Q	75	10,9,2	-	0/1/5/7	-
2	CSX	R	75	10,9,2	-	0/1/5/7	-

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.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	R	543[A]	CSS	1	0
2	Q	543[A]	CSS	1	0
2	Q	75	CSX	1	0
2	R	75	CSX	1	0

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 36 ligands modelled in this entry, 1 is modelled with single atom and 8 are monoatomic - leaving 27 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	GOL	A	1270	-	5,5,5	0.27	0	5,5,5	0.43	0
5	GOL	R	1555[B]	-	5,5,5	0.47	0	5,5,5	0.63	0
5	GOL	Q	1553	-	5,5,5	0.64	0	5,5,5	0.35	0
6	GLY	B	301	-	4,4,4	1.17	1 (25%)	3,4,4	1.84	2 (66%)
7	SOT	B	1268[B]	-	6,9,10	0.35	0	3,11,14	0.85	0
4	F3S	B	1266	1	0,9,9	-	-	-		
9	FCO	Q	1550	13,2	0,6,6	-	-	-		
5	GOL	B	1273	-	5,5,5	0.31	0	5,5,5	0.67	0
5	GOL	R	1553	-	5,5,5	0.63	0	5,5,5	0.23	0
5	GOL	R	1556	-	5,5,5	0.34	0	5,5,5	0.80	0
3	SF4	B	1265	1	0,12,12	-	-	-		
3	SF4	B	1267	1	0,12,12	-	-	-		
3	SF4	A	1267	1	0,12,12	-	-	-		
5	GOL	A	1268	-	5,5,5	0.23	0	5,5,5	0.84	0
5	GOL	R	1557	-	5,5,5	0.15	0	5,5,5	0.60	0
5	GOL	B	1269	-	5,5,5	0.24	0	5,5,5	0.80	0
5	GOL	R	1558	-	5,5,5	0.17	0	5,5,5	0.56	0
5	GOL	B	1271	-	5,5,5	0.21	0	5,5,5	0.53	0
5	GOL	R	1554	-	5,5,5	0.51	0	5,5,5	0.44	0
5	GOL	A	1269	-	5,5,5	0.56	0	5,5,5	0.80	0
5	GOL	R	1555[A]	-	5,5,5	0.46	0	5,5,5	0.54	0
6	GLY	R	601	-	4,4,4	1.03	0	3,4,4	1.29	0
7	SOT	B	1268[A]	1	6,9,10	0.64	0	3,11,14	3.23	3 (100%)
9	FCO	R	1550	13,2	0,6,6	-	-	-		
3	SF4	A	1265	1	0,12,12	-	-	-		
4	F3S	A	1266	1	0,9,9	-	-	-		
5	GOL	B	1270	-	5,5,5	0.16	0	5,5,5	0.56	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	GOL	A	1270	-	-	2/4/4/4	-
5	GOL	R	1555[B]	-	-	0/4/4/4	-
5	GOL	Q	1553	-	-	0/4/4/4	-
6	GLY	B	301	-	-	0/2/2/2	-
7	SOT	B	1268[B]	-	-	0/0/12/14	0/1/1/1
5	GOL	B	1270	-	-	2/4/4/4	-
4	F3S	B	1266	1	-	-	0/3/3/3
5	GOL	B	1273	-	-	0/4/4/4	-
5	GOL	R	1553	-	-	0/4/4/4	-
5	GOL	R	1556	-	-	1/4/4/4	-
3	SF4	B	1265	1	-	-	0/6/5/5
3	SF4	B	1267	1	-	-	0/6/5/5
3	SF4	A	1267	1	-	-	0/6/5/5
5	GOL	A	1268	-	-	0/4/4/4	-
5	GOL	R	1557	-	-	2/4/4/4	-
5	GOL	B	1269	-	-	4/4/4/4	-
5	GOL	B	1271	-	-	0/4/4/4	-
5	GOL	R	1554	-	-	0/4/4/4	-
5	GOL	A	1269	-	-	4/4/4/4	-
5	GOL	R	1555[A]	-	-	2/4/4/4	-
6	GLY	R	601	-	-	2/2/2/2	-
7	SOT	B	1268[A]	1	-	0/0/12/14	0/1/1/1
3	SF4	A	1265	1	-	-	0/6/5/5
4	F3S	A	1266	1	-	-	0/3/3/3
5	GOL	R	1558	-	-	3/4/4/4	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	301	GLY	OXT-C	-2.29	1.23	1.30

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
7	B	1268[A]	SOT	C6-O1-C2	3.63	122.02	109.89
7	B	1268[A]	SOT	O1-C2-C3	3.35	119.18	111.80
7	B	1268[A]	SOT	O1-C6-C5	2.60	117.53	111.80
6	B	301	GLY	OXT-C-O	-2.39	117.35	123.30
6	B	301	GLY	OXT-C-CA	2.08	121.73	113.45

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	1269	GOL	O1-C1-C2-C3
5	B	1269	GOL	O1-C1-C2-C3
5	B	1269	GOL	C1-C2-C3-O3
5	B	1270	GOL	C1-C2-C3-O3
5	R	1558	GOL	O1-C1-C2-O2
5	R	1558	GOL	O1-C1-C2-C3
6	R	601	GLY	O-C-CA-N
6	R	601	GLY	OXT-C-CA-N
5	A	1270	GOL	O2-C2-C3-O3
5	B	1269	GOL	O2-C2-C3-O3
5	A	1270	GOL	C1-C2-C3-O3
5	R	1555[A]	GOL	O1-C1-C2-C3
5	B	1269	GOL	O1-C1-C2-O2
5	B	1270	GOL	O2-C2-C3-O3
5	A	1269	GOL	O1-C1-C2-O2
5	A	1269	GOL	O2-C2-C3-O3
5	A	1269	GOL	C1-C2-C3-O3
5	R	1555[A]	GOL	O1-C1-C2-O2
5	R	1556	GOL	C1-C2-C3-O3
5	R	1558	GOL	C1-C2-C3-O3
5	R	1557	GOL	O2-C2-C3-O3
5	R	1557	GOL	C1-C2-C3-O3

There are no ring outliers.

6 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	1268[B]	SOT	1	0
5	B	1269	GOL	4	0
5	R	1558	GOL	3	0
5	B	1271	GOL	1	0
5	R	1554	GOL	2	0
5	A	1269	GOL	2	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	A	262/265 (98%)	-0.78	3 (1%)	77	81	5, 10, 20, 48	15 (5%)
1	B	263/265 (99%)	-0.85	1 (0%)	89	91	5, 9, 17, 34	19 (7%)
2	Q	542/564 (96%)	-0.82	0	100	100	5, 10, 19, 36	36 (6%)
2	R	543/564 (96%)	-0.91	0	100	100	5, 8, 16, 39	37 (6%)
All	All	1610/1658 (97%)	-0.85	4 (0%)	92	92	5, 9, 18, 48	107 (6%)

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	3	ALA	3.9
1	A	164[A]	LYS	2.6
1	B	2	THR	2.4
1	A	4	LYS	2.3

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

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
2	CSS	Q	543[A]	7/8	0.99	0.03	6,7,11,11	7
2	CSS	R	543[A]	7/8	0.99	0.03	5,6,10,10	7
2	CSX	R	75	7/8	1.00	0.03	5,6,7,7	1
2	CSX	Q	75	7/8	1.00	0.03	6,6,8,8	1

6.3 Carbohydrates ⓘ

There are no oligosaccharides 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. 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
5	GOL	R	1558	6/6	0.67	0.20	22,27,29,34	6
6	GLY	B	301	5/5	0.71	0.16	16,16,18,21	5
5	GOL	B	1270	6/6	0.80	0.22	24,25,27,32	6
5	GOL	B	1271	6/6	0.80	0.19	21,25,26,32	6
5	GOL	A	1270	6/6	0.83	0.17	24,28,29,30	6
5	GOL	A	1268	6/6	0.87	0.10	27,29,32,34	0
5	GOL	R	1557	6/6	0.87	0.18	16,24,26,26	6
6	GLY	R	601	5/5	0.88	0.13	10,12,12,16	5
5	GOL	B	1269	6/6	0.90	0.19	15,18,19,20	6
5	GOL	R	1556	6/6	0.92	0.14	12,14,16,17	6
5	GOL	A	1269	6/6	0.93	0.08	22,29,30,35	0
5	GOL	R	1554	6/6	0.94	0.09	16,17,19,23	1
5	GOL	B	1273	6/6	0.95	0.07	19,23,27,33	0
8	H2S	B	1272	1/1	0.96	0.15	31,31,31,31	1
5	GOL	R	1553	6/6	0.97	0.05	8,8,10,10	0
5	GOL	R	1555[A]	6/6	0.97	0.07	12,21,24,30	1
5	GOL	R	1555[B]	6/6	0.97	0.07	12,21,24,25	1
7	SOT	B	1268[A]	9/10	0.98	0.06	9,13,15,19	9
7	SOT	B	1268[B]	9/10	0.98	0.06	17,17,20,20	9
5	GOL	Q	1553	6/6	0.98	0.03	8,9,9,10	0
10	NI	R	1551[A]	1/1	0.99	0.04	9,9,9,9	1
10	NI	R	1551[B]	1/1	0.99	0.04	8,8,8,8	1
12	CL	Q	1554[A]	1/1	0.99	0.05	30,30,30,30	1
12	CL	Q	1554[B]	1/1	0.99	0.05	37,37,37,37	1
3	SF4	A	1265	8/8	1.00	0.01	7,7,8,8	0
3	SF4	A	1267	8/8	1.00	0.01	6,6,6,6	0
9	FCO	Q	1550	7/7	1.00	0.02	6,7,8,9	0
9	FCO	R	1550	7/7	1.00	0.02	6,7,7,7	0
10	NI	Q	1551[A]	1/1	1.00	0.03	9,9,9,9	1
10	NI	Q	1551[B]	1/1	1.00	0.03	8,8,8,8	1
3	SF4	B	1265	8/8	1.00	0.01	7,7,8,8	0
3	SF4	B	1267	8/8	1.00	0.01	6,6,6,6	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
11	MG	Q	1552	1/1	1.00	0.01	6,6,6,6	0
11	MG	R	1552	1/1	1.00	0.03	6,6,6,6	0
4	F3S	A	1266	7/7	1.00	0.01	6,6,7,7	0
4	F3S	B	1266	7/7	1.00	0.01	6,7,7,7	0

6.5 Other polymers ⓘ

There are no such residues in this entry.