Full wwPDB X-ray Structure Validation Report ⓘ

Sep 24, 2020 – 02:14 PM BST

PDB ID	:	6ZJK
Title	:	Ribonucleotide reductase R2 subunit from Clostridium botulinum
Authors	:	Martinez-Carranza, M.; Stenmark, P.
Deposited on	:	2020-06-29
Resolution	:	2.00 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 following versions of software and data (see references ⓘ) were used in the production of this report:

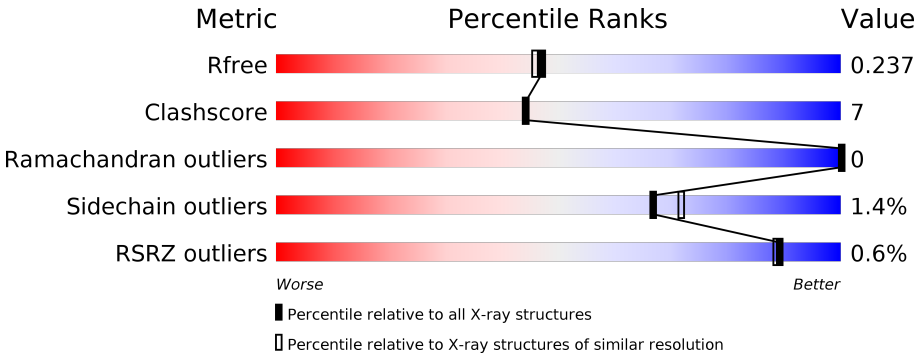
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.14.6
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.14.6

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.00 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}	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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 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	364	% 70% 16% • 13%
1	B	364	73% 12% • 13%
1	C	364	74% 12% 13%
1	D	364	73% 12% • 13%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 10892 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 Ribonucleoside-diphosphate reductase subunit beta.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	C	316	Total	C	N	O	S	0	1	0
			2666	1716	441	498	11			
1	A	317	Total	C	N	O	S	0	1	0
			2673	1719	443	501	10			
1	D	315	Total	C	N	O	S	0	3	0
			2667	1718	440	498	11			
1	B	316	Total	C	N	O	S	0	0	0
			2661	1712	441	498	10			

There are 88 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-21	MET	-	initiating methionine	UNP B1KYY8
C	-20	HIS	-	expression tag	UNP B1KYY8
C	-19	HIS	-	expression tag	UNP B1KYY8
C	-18	HIS	-	expression tag	UNP B1KYY8
C	-17	HIS	-	expression tag	UNP B1KYY8
C	-16	HIS	-	expression tag	UNP B1KYY8
C	-15	HIS	-	expression tag	UNP B1KYY8
C	-14	SER	-	expression tag	UNP B1KYY8
C	-13	SER	-	expression tag	UNP B1KYY8
C	-12	GLY	-	expression tag	UNP B1KYY8
C	-11	VAL	-	expression tag	UNP B1KYY8
C	-10	ASP	-	expression tag	UNP B1KYY8
C	-9	LEU	-	expression tag	UNP B1KYY8
C	-8	GLY	-	expression tag	UNP B1KYY8
C	-7	THR	-	expression tag	UNP B1KYY8
C	-6	GLU	-	expression tag	UNP B1KYY8
C	-5	ASN	-	expression tag	UNP B1KYY8
C	-4	LEU	-	expression tag	UNP B1KYY8
C	-3	TYR	-	expression tag	UNP B1KYY8
C	-2	PHE	-	expression tag	UNP B1KYY8
C	-1	GLN	-	expression tag	UNP B1KYY8

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Chain	Residue	Modelled	Actual	Comment	Reference
C	0	SER	-	expression tag	UNP B1KYY8
A	-21	MET	-	initiating methionine	UNP B1KYY8
A	-20	HIS	-	expression tag	UNP B1KYY8
A	-19	HIS	-	expression tag	UNP B1KYY8
A	-18	HIS	-	expression tag	UNP B1KYY8
A	-17	HIS	-	expression tag	UNP B1KYY8
A	-16	HIS	-	expression tag	UNP B1KYY8
A	-15	HIS	-	expression tag	UNP B1KYY8
A	-14	SER	-	expression tag	UNP B1KYY8
A	-13	SER	-	expression tag	UNP B1KYY8
A	-12	GLY	-	expression tag	UNP B1KYY8
A	-11	VAL	-	expression tag	UNP B1KYY8
A	-10	ASP	-	expression tag	UNP B1KYY8
A	-9	LEU	-	expression tag	UNP B1KYY8
A	-8	GLY	-	expression tag	UNP B1KYY8
A	-7	THR	-	expression tag	UNP B1KYY8
A	-6	GLU	-	expression tag	UNP B1KYY8
A	-5	ASN	-	expression tag	UNP B1KYY8
A	-4	LEU	-	expression tag	UNP B1KYY8
A	-3	TYR	-	expression tag	UNP B1KYY8
A	-2	PHE	-	expression tag	UNP B1KYY8
A	-1	GLN	-	expression tag	UNP B1KYY8
A	0	SER	-	expression tag	UNP B1KYY8
D	-21	MET	-	initiating methionine	UNP B1KYY8
D	-20	HIS	-	expression tag	UNP B1KYY8
D	-19	HIS	-	expression tag	UNP B1KYY8
D	-18	HIS	-	expression tag	UNP B1KYY8
D	-17	HIS	-	expression tag	UNP B1KYY8
D	-16	HIS	-	expression tag	UNP B1KYY8
D	-15	HIS	-	expression tag	UNP B1KYY8
D	-14	SER	-	expression tag	UNP B1KYY8
D	-13	SER	-	expression tag	UNP B1KYY8
D	-12	GLY	-	expression tag	UNP B1KYY8
D	-11	VAL	-	expression tag	UNP B1KYY8
D	-10	ASP	-	expression tag	UNP B1KYY8
D	-9	LEU	-	expression tag	UNP B1KYY8
D	-8	GLY	-	expression tag	UNP B1KYY8
D	-7	THR	-	expression tag	UNP B1KYY8
D	-6	GLU	-	expression tag	UNP B1KYY8
D	-5	ASN	-	expression tag	UNP B1KYY8
D	-4	LEU	-	expression tag	UNP B1KYY8
D	-3	TYR	-	expression tag	UNP B1KYY8

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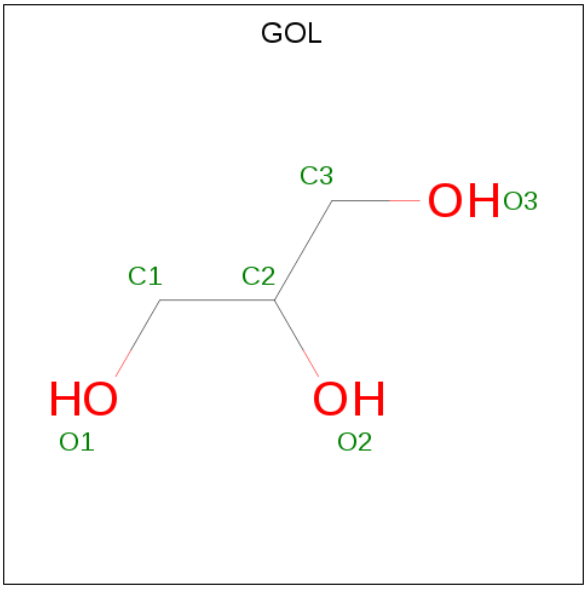
Chain	Residue	Modelled	Actual	Comment	Reference
D	-2	PHE	-	expression tag	UNP B1KYY8
D	-1	GLN	-	expression tag	UNP B1KYY8
D	0	SER	-	expression tag	UNP B1KYY8
B	-21	MET	-	initiating methionine	UNP B1KYY8
B	-20	HIS	-	expression tag	UNP B1KYY8
B	-19	HIS	-	expression tag	UNP B1KYY8
B	-18	HIS	-	expression tag	UNP B1KYY8
B	-17	HIS	-	expression tag	UNP B1KYY8
B	-16	HIS	-	expression tag	UNP B1KYY8
B	-15	HIS	-	expression tag	UNP B1KYY8
B	-14	SER	-	expression tag	UNP B1KYY8
B	-13	SER	-	expression tag	UNP B1KYY8
B	-12	GLY	-	expression tag	UNP B1KYY8
B	-11	VAL	-	expression tag	UNP B1KYY8
B	-10	ASP	-	expression tag	UNP B1KYY8
B	-9	LEU	-	expression tag	UNP B1KYY8
B	-8	GLY	-	expression tag	UNP B1KYY8
B	-7	THR	-	expression tag	UNP B1KYY8
B	-6	GLU	-	expression tag	UNP B1KYY8
B	-5	ASN	-	expression tag	UNP B1KYY8
B	-4	LEU	-	expression tag	UNP B1KYY8
B	-3	TYR	-	expression tag	UNP B1KYY8
B	-2	PHE	-	expression tag	UNP B1KYY8
B	-1	GLN	-	expression tag	UNP B1KYY8
B	0	SER	-	expression tag	UNP B1KYY8

- Molecule 2 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	C	1	Total C O 6 3 3	0	0
2	C	1	Total C O 6 3 3	0	0
2	A	1	Total C O 6 3 3	0	0
2	B	1	Total C O 6 3 3	0	0

- Molecule 3 is FE (III) ION (three-letter code: FE) (formula: Fe) (labeled as "Ligand of Interest" by author).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	B	2	Total Fe 2 2	0	0
3	A	2	Total Fe 2 2	0	0
3	D	2	Total Fe 2 2	0	0
3	C	2	Total Fe 2 2	0	0

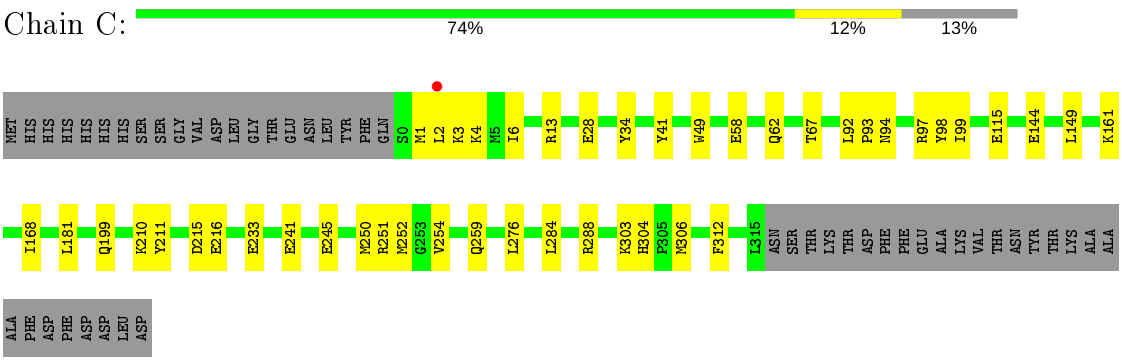
- Molecule 4 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	C	75	Total O 75 75	0	0
4	A	40	Total O 40 40	0	0
4	D	38	Total O 38 38	0	0
4	B	40	Total O 40 40	0	0

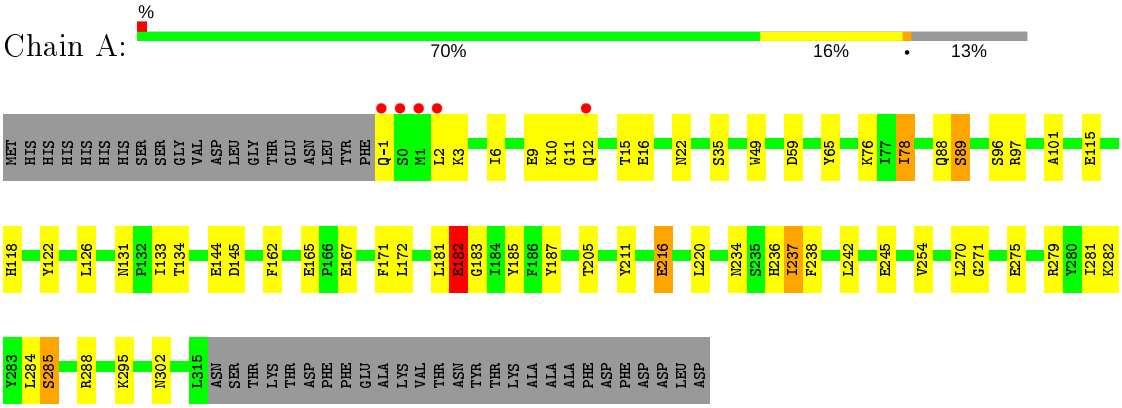
3 Residue-property plots (i)

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.

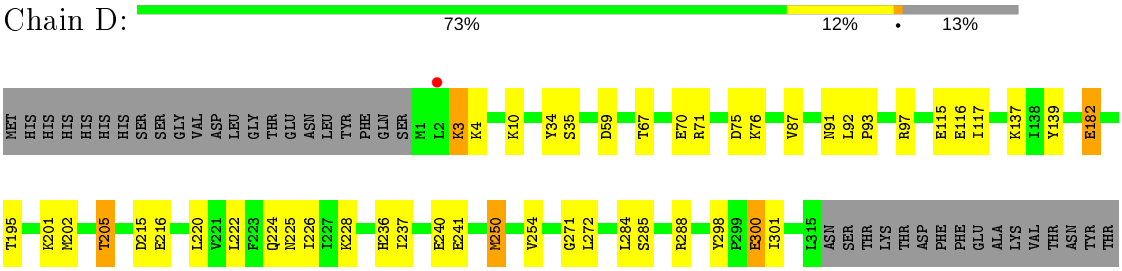
- Molecule 1: Ribonucleoside-diphosphate reductase subunit beta



- Molecule 1: Ribonucleoside-diphosphate reductase subunit beta

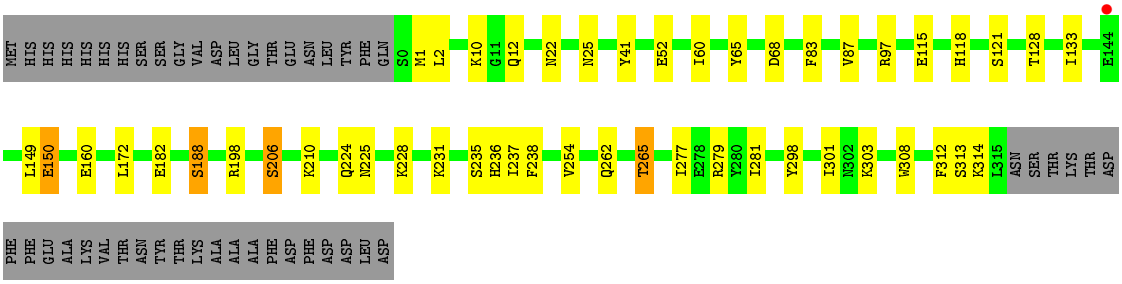


- Molecule 1: Ribonucleoside-diphosphate reductase subunit beta



- Molecule 1: Ribonucleoside-diphosphate reductase subunit beta

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	210.83Å 61.85Å 154.34Å 90.00° 127.46° 90.00°	Depositor
Resolution (Å)	83.67 – 2.00 83.67 – 2.00	Depositor EDS
% Data completeness (in resolution range)	98.8 (83.67-2.00) 86.1 (83.67-2.00)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.72 (at 2.00Å)	Xtriage
Refinement program	PHENIX 1.18rc4-3812-000	Depositor
R, R_{free}	0.222 , 0.237 0.222 , 0.237	Depositor DCC
R_{free} test set	5488 reflections (5.15%)	wwPDB-VP
Wilson B-factor (Å^2)	34.0	Xtriage
Anisotropy	0.518	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 43.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	10892	wwPDB-VP
Average B, all atoms (Å^2)	54.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.66% of the height of the origin peak. No significant pseudotranslation is detected.*

[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: GOL, 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	0.97	5/2739 (0.2%)	0.78	2/3699 (0.1%)
1	B	0.88	5/2724 (0.2%)	0.78	5/3679 (0.1%)
1	C	1.12	5/2732 (0.2%)	0.76	1/3689 (0.0%)
1	D	0.91	4/2739 (0.1%)	0.79	7/3699 (0.2%)
All	All	0.98	19/10934 (0.2%)	0.78	15/14766 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	3
1	B	0	4
1	C	0	2
1	D	0	1
All	All	0	10

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	115	GLU	CD-OE2	-9.18	1.15	1.25
1	A	115	GLU	CD-OE1	-7.94	1.17	1.25
1	B	182	GLU	CD-OE2	-7.08	1.17	1.25
1	D	182	GLU	CD-OE1	-6.83	1.18	1.25
1	B	41	TYR	CE1-CZ	-6.72	1.29	1.38
1	A	182	GLU	CD-OE1	-6.70	1.18	1.25
1	C	115	GLU	CD-OE1	-6.53	1.18	1.25
1	A	216	GLU	CD-OE2	-6.50	1.18	1.25
1	D	115	GLU	CD-OE1	-6.34	1.18	1.25
1	C	98	TYR	CE1-CZ	-6.18	1.30	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	216	GLU	CD-OE2	-6.16	1.18	1.25
1	D	34	TYR	CE1-CZ	-5.98	1.30	1.38
1	B	115	GLU	CD-OE1	-5.90	1.19	1.25
1	B	182	GLU	CD-OE1	-5.85	1.19	1.25
1	A	122	TYR	CE1-CZ	-5.61	1.31	1.38
1	C	28	GLU	CD-OE2	-5.45	1.19	1.25
1	A	187	TYR	CE1-CZ	-5.33	1.31	1.38
1	D	116	GLU	CD-OE1	-5.30	1.19	1.25
1	C	41	TYR	CZ-OH	-5.15	1.29	1.37

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	182	GLU	OE1-CD-OE2	-6.61	115.37	123.30
1	B	206	SER	O-C-N	-6.61	112.13	122.70
1	C	215	ASP	CB-CG-OD1	6.39	124.05	118.30
1	D	215	ASP	CB-CG-OD1	6.27	123.94	118.30
1	A	89[A]	SER	CA-C-O	6.22	133.16	120.10
1	A	89[B]	SER	CA-C-O	6.22	133.16	120.10
1	D	250[A]	MET	CA-C-O	6.00	132.71	120.10
1	D	250[B]	MET	CA-C-O	6.00	132.71	120.10
1	D	139	TYR	CA-CB-CG	5.54	123.92	113.40
1	D	115	GLU	OE1-CD-OE2	-5.32	116.92	123.30
1	B	150	GLU	O-C-N	-5.30	114.22	122.70
1	B	25	ASN	N-CA-CB	5.26	120.06	110.60
1	D	250[A]	MET	N-CA-C	5.20	125.04	111.00
1	D	250[B]	MET	N-CA-C	5.20	125.04	111.00
1	B	149	LEU	C-N-CA	-5.09	108.96	121.70

There are no chirality outliers.

All (10) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	144	GLU	Mainchain
1	A	237	ILE	Mainchain
1	A	285	SER	Mainchain
1	B	150	GLU	Mainchain
1	B	206	SER	Mainchain
1	B	235	SER	Mainchain
1	B	265	THR	Mainchain
1	C	144	GLU	Mainchain
1	C	161	LYS	Mainchain

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Mol	Chain	Res	Type	Group
1	D	35	SER	Mainchain

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	2673	0	2611	40	1
1	B	2661	0	2598	34	0
1	C	2666	0	2607	34	1
1	D	2667	0	2614	40	0
2	A	6	0	8	0	0
2	B	6	0	8	0	0
2	C	12	0	16	0	0
3	A	2	0	0	0	0
3	B	2	0	0	0	0
3	C	2	0	0	0	0
3	D	2	0	0	0	0
4	A	40	0	0	1	0
4	B	40	0	0	3	0
4	C	75	0	0	0	0
4	D	38	0	0	0	0
All	All	10892	0	10462	140	1

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 7.

All (140) 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)
1:D:250[B]:MET:HE2	1:D:285:SER:OG	1.24	1.33
1:D:250[B]:MET:CE	1:D:285:SER:OG	2.10	1.00
1:D:97:ARG:HG3	1:D:97:ARG:HH11	1.31	0.95
1:A:282:LYS:O	1:A:285:SER:OG	1.86	0.93
1:A:11:GLY:HA2	1:A:22:ASN:OD1	1.68	0.93
1:B:133:ILE:H	1:B:133:ILE:HD12	1.44	0.82
1:A:88:GLN:NE2	1:A:182:GLU:OE2	2.14	0.80

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:303:LYS:NZ	1:C:304:HIS:H	1.82	0.77
1:B:279:ARG:HH12	1:B:303:LYS:HE3	1.52	0.75
1:A:275:GLU:O	1:A:279:ARG:HG3	1.86	0.75
1:D:250[B]:MET:HE2	1:D:285:SER:CB	2.17	0.75
1:B:118:HIS:O	1:B:121:SER:OG	2.02	0.75
1:C:3:LYS:HD2	1:C:97:ARG:HD2	1.69	0.74
1:C:6:ILE:CG2	1:D:87:VAL:HG23	2.17	0.73
1:D:271:GLY:C	1:D:272:LEU:HD12	2.09	0.73
1:C:303:LYS:HZ1	1:C:304:HIS:H	1.34	0.73
1:B:313:SER:OG	1:B:314:LYS:HE3	1.90	0.71
1:B:279:ARG:NH1	1:B:303:LYS:HE3	2.05	0.71
1:D:240:GLU:HG2	1:D:241:GLU:OE1	1.91	0.71
1:A:59:ASP:OD1	1:A:205:THR:HG23	1.89	0.71
1:D:298:TYR:HB3	1:D:301:ILE:HD12	1.73	0.70
1:A:12:GLN:HG2	1:A:22:ASN:O	1.91	0.69
1:D:97:ARG:NH1	1:D:97:ARG:HG3	2.05	0.69
1:A:216:GLU:OE2	1:A:216:GLU:HA	1.90	0.69
1:B:188:SER:HB2	1:B:281:ILE:HD11	1.76	0.67
1:D:67:THR:OG1	1:D:70:GLU:HG3	1.95	0.66
1:B:133:ILE:HD12	1:B:133:ILE:N	2.12	0.64
1:D:271:GLY:O	1:D:272:LEU:HD12	1.97	0.64
1:C:1:MET:O	1:C:2:LEU:HD23	1.97	0.64
1:D:195:THR:HG21	1:D:272:LEU:CD1	2.27	0.64
1:D:236:HIS:CD2	1:D:237:ILE:HG13	2.33	0.62
1:D:59:ASP:OD2	1:D:205[B]:THR:HG23	1.99	0.62
1:A:131:ASN:OD1	1:A:133:ILE:HG22	2.00	0.61
1:C:250:MET:O	1:C:254:VAL:HG23	1.99	0.61
1:D:222:LEU:O	1:D:226:ILE:HG13	2.01	0.60
1:D:59:ASP:OD2	1:D:205[A]:THR:HG22	2.02	0.60
1:B:224:GLN:NE2	4:B:501:HOH:O	2.21	0.60
1:D:250[B]:MET:CE	1:D:285:SER:CB	2.77	0.59
1:A:162:PHE:CE1	1:A:171:PHE:HB2	2.38	0.59
1:A:165:GLU:HG3	1:A:167:GLU:HG3	1.84	0.58
1:B:231:LYS:HD2	1:B:238:PHE:CD2	2.41	0.56
1:C:303:LYS:HZ1	1:C:304:HIS:CB	2.18	0.56
1:C:276:LEU:HD11	1:C:306[B]:MET:HG3	1.86	0.56
1:B:60:ILE:HD11	1:B:128:THR:HG22	1.88	0.55
1:B:225:ASN:HA	1:B:228:LYS:HG2	1.89	0.55
1:A:270:LEU:HD12	1:A:271:GLY:N	2.21	0.54
1:D:284:LEU:O	1:D:288:ARG:HG2	2.08	0.54
1:D:70:GLU:OE1	1:D:201:LYS:HE3	2.08	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:224:GLN:O	1:D:228:LYS:HG3	2.09	0.53
1:A:118:HIS:CE1	4:A:524:HOH:O	2.62	0.53
1:C:303:LYS:HZ1	1:C:304:HIS:HB2	1.73	0.52
1:B:133:ILE:CD1	1:B:133:ILE:H	2.17	0.52
1:D:137:LYS:HA	1:D:137:LYS:HE2	1.92	0.51
1:C:284:LEU:O	1:C:288:ARG:HG2	2.10	0.51
1:B:262:GLN:HA	1:B:265:THR:OG1	2.11	0.51
1:C:3:LYS:HD3	1:C:97:ARG:NH1	2.25	0.51
1:B:1:MET:O	1:B:2:LEU:HD23	2.11	0.51
1:A:236:HIS:CD2	1:A:237:ILE:HG23	2.47	0.50
1:B:298:TYR:HB3	1:B:301:ILE:HD12	1.94	0.50
1:A:9:GLU:HG3	1:A:10:LYS:N	2.26	0.50
1:D:97:ARG:NH1	1:D:97:ARG:CG	2.74	0.49
1:A:76:LYS:NZ	1:A:145:ASP:OD2	2.40	0.49
1:B:265:THR:HG21	1:B:277:ILE:HD11	1.94	0.49
1:C:3:LYS:CD	1:C:97:ARG:NH1	2.76	0.49
1:A:270:LEU:HD12	1:A:271:GLY:H	1.75	0.49
1:A:3:LYS:HE2	1:A:97:ARG:NH1	2.28	0.49
1:A:242:LEU:O	1:A:245:GLU:HB2	2.12	0.49
1:C:13:ARG:HH21	1:C:13:ARG:HG3	1.78	0.49
1:A:254:VAL:HG13	1:A:281:ILE:HG22	1.94	0.49
1:B:60:ILE:HD11	1:B:128:THR:CG2	2.43	0.49
1:A:181:LEU:HA	1:A:185:TYR:CD2	2.48	0.48
1:D:202:MET:HB3	1:D:205[A]:THR:CG2	2.43	0.48
1:A:172:LEU:HD11	1:A:237:ILE:HD13	1.95	0.48
1:A:12:GLN:OE1	1:A:16:GLU:HB2	2.13	0.48
1:C:3:LYS:CD	1:C:97:ARG:HD2	2.41	0.48
1:A:9:GLU:HG3	1:A:10:LYS:HG2	1.95	0.48
1:C:1:MET:C	1:C:2:LEU:HD23	2.34	0.48
1:A:284:LEU:O	1:A:288:ARG:HG2	2.14	0.47
1:C:34:TYR:OH	1:C:233:GLU:OE2	2.27	0.47
1:A:15:THR:HG21	1:A:101:ALA:CB	2.45	0.47
1:A:165:GLU:OE1	1:A:167:GLU:OE2	2.32	0.47
1:B:188:SER:HB2	1:B:281:ILE:CD1	2.45	0.47
1:B:254:VAL:HG22	1:B:281:ILE:HG22	1.97	0.47
1:A:78:ILE:HG21	1:A:126:LEU:HD21	1.97	0.47
1:C:251:ARG:NH2	1:C:252:MET:CE	2.78	0.47
1:D:272:LEU:N	1:D:272:LEU:HD12	2.30	0.47
1:C:181:LEU:HD23	1:C:181:LEU:C	2.35	0.46
1:C:3:LYS:HD2	1:C:97:ARG:HH11	1.79	0.46
1:B:231:LYS:HB2	1:B:238:PHE:CD2	2.49	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:210:LYS:HE2	1:C:312:PHE:O	2.15	0.46
1:C:3:LYS:CD	1:C:97:ARG:HH11	2.29	0.45
1:B:265:THR:HB	4:B:527:HOH:O	2.15	0.45
1:B:12:GLN:HG2	1:B:22:ASN:O	2.17	0.44
1:B:314:LYS:HE2	1:B:314:LYS:HA	1.98	0.44
1:C:58:GLU:O	1:C:62:GLN:HG3	2.18	0.44
1:B:231:LYS:HB2	1:B:238:PHE:CE2	2.52	0.44
1:C:94:ASN:OD1	1:D:97:ARG:NH1	2.51	0.44
1:A:49:TRP:CE2	1:A:211:TYR:HB3	2.53	0.43
1:A:234:ASN:O	1:A:237:ILE:HG13	2.18	0.43
1:A:237:ILE:HD12	1:A:237:ILE:C	2.38	0.43
1:B:210:LYS:HE2	1:B:312:PHE:O	2.18	0.43
1:D:10:LYS:HD3	1:D:10:LYS:HA	1.72	0.43
1:D:182:GLU:HA	1:D:182:GLU:OE1	2.18	0.43
1:C:67:THR:HG21	1:A:302:ASN:ND2	2.33	0.43
1:A:6:ILE:HD12	1:B:160:GLU:HA	2.00	0.43
1:B:236:HIS:CD2	1:B:237:ILE:CD1	3.01	0.43
1:D:298:TYR:CB	1:D:301:ILE:HD12	2.44	0.43
1:C:199:GLN:O	1:A:295:LYS:HG3	2.18	0.43
1:D:92:LEU:HD23	1:D:92:LEU:HA	1.83	0.43
1:A:133:ILE:HG23	1:A:134:THR:N	2.34	0.43
1:B:172:LEU:HD23	1:B:172:LEU:HA	1.85	0.43
1:C:251:ARG:HH22	1:C:252:MET:HE1	1.84	0.43
1:C:303:LYS:HZ1	1:C:304:HIS:N	2.10	0.43
1:A:131:ASN:OD1	1:A:133:ILE:CG2	2.66	0.42
1:D:3:LYS:H	1:D:3:LYS:HG2	1.50	0.42
1:A:65:TYR:CD2	1:A:65:TYR:N	2.87	0.42
1:C:6:ILE:HD12	1:D:91:ASN:HB2	2.01	0.42
1:B:52:GLU:HG3	4:B:514:HOH:O	2.19	0.42
1:A:97:ARG:HD3	1:B:97:ARG:HH22	1.84	0.42
1:D:92:LEU:HB2	1:D:93:PRO:HD3	2.02	0.42
1:B:83:PHE:O	1:B:87:VAL:HG22	2.20	0.41
1:D:225:ASN:HA	1:D:228:LYS:HE2	2.02	0.41
1:D:220:LEU:HD12	1:D:220:LEU:HA	1.87	0.41
1:B:313:SER:OG	1:B:314:LYS:CE	2.64	0.41
1:B:198:ARG:HD3	1:B:308:TRP:CZ3	2.56	0.41
1:A:237:ILE:HD12	1:A:238:PHE:CD1	2.56	0.41
1:C:1:MET:SD	1:C:168:ILE:HA	2.61	0.41
1:C:49:TRP:CE2	1:C:211:TYR:HB3	2.56	0.41
1:C:97:ARG:HH22	1:D:3:LYS:NZ	2.19	0.41
1:D:71:ARG:NH1	1:D:75:ASP:OD1	2.53	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:241:GLU:O	1:C:245:GLU:HG3	2.21	0.41
1:D:240:GLU:CG	1:D:241:GLU:OE1	2.66	0.41
1:B:65:TYR:CD2	1:B:65:TYR:N	2.89	0.40
1:A:183:GLY:CA	1:A:220:LEU:HD11	2.51	0.40
1:A:279:ARG:HB3	1:A:279:ARG:HE	1.79	0.40
1:C:92:LEU:HB2	1:C:93:PRO:HD3	2.02	0.40
1:D:300:GLU:H	1:D:300:GLU:CD	2.24	0.40
1:D:4:LYS:HE2	1:D:97:ARG:O	2.21	0.40
1:C:4:LYS:HE2	1:C:99:ILE:O	2.21	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:259:GLN:NE2	1:A:-1:GLN:OE1[1_545]	1.97	0.23

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	316/364 (87%)	312 (99%)	4 (1%)	0	100	100
1	B	314/364 (86%)	308 (98%)	6 (2%)	0	100	100
1	C	315/364 (86%)	308 (98%)	7 (2%)	0	100	100
1	D	316/364 (87%)	311 (98%)	5 (2%)	0	100	100
All	All	1261/1456 (87%)	1239 (98%)	22 (2%)	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	A	294/334 (88%)	287 (98%)	7 (2%)	49	51
1	B	292/334 (87%)	289 (99%)	3 (1%)	76	81
1	C	293/334 (88%)	292 (100%)	1 (0%)	92	95
1	D	294/334 (88%)	287 (98%)	7 (2%)	49	51
All	All	1173/1336 (88%)	1155 (98%)	18 (2%)	67	69

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	149	LEU
1	A	2	LEU
1	A	35	SER
1	A	78	ILE
1	A	89[A]	SER
1	A	89[B]	SER
1	A	96	SER
1	A	182	GLU
1	D	3	LYS
1	D	76	LYS
1	D	117	ILE
1	D	205[A]	THR
1	D	205[B]	THR
1	D	216	GLU
1	D	300	GLU
1	B	10	LYS
1	B	68	ASP
1	B	188	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	259	GLN

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Mol	Chain	Res	Type
1	A	-1	GLN
1	A	30	ASN
1	A	259	GLN
1	A	266	ASN
1	A	302	ASN
1	D	62	GLN
1	B	46	ASN
1	B	94	ASN
1	B	224	GLN

5.3.3 RNA

There are no RNA molecules 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 monosaccharides in this entry.

5.6 Ligand geometry

Of 12 ligands modelled in this entry, 8 are monoatomic - leaving 4 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	$\#\|Z\| > 2$
2	GOL	A	401	-	5,5,5	0.27	0	5,5,5	0.72	0
2	GOL	B	401	-	5,5,5	0.81	0	5,5,5	1.00	0
2	GOL	C	402	-	5,5,5	0.43	0	5,5,5	0.65	0
2	GOL	C	401	-	5,5,5	0.51	0	5,5,5	0.99	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	GOL	A	401	-	-	0/4/4/4	-
2	GOL	B	401	-	-	0/4/4/4	-
2	GOL	C	402	-	-	0/4/4/4	-
2	GOL	C	401	-	-	0/4/4/4	-

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.

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, 95^{th} 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	317/364 (87%)	-0.16	5 (1%)	72	70	37, 50, 74, 101	0
1	B	316/364 (86%)	-0.25	1 (0%)	94	93	39, 58, 83, 97	0
1	C	316/364 (86%)	-0.39	1 (0%)	94	93	34, 46, 69, 93	0
1	D	315/364 (86%)	-0.29	1 (0%)	94	93	39, 56, 77, 101	0
All	All	1264/1456 (86%)	-0.27	8 (0%)	89	88	34, 53, 77, 101	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	2	LEU	4.9
1	A	2	LEU	4.8
1	A	-1	GLN	4.3
1	C	2	LEU	2.9
1	A	0	SER	2.4
1	A	12	GLN	2.4
1	B	144	GLU	2.1
1	A	1	MET	2.1

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 monosaccharides in this entry.

6.4 Ligands (i)

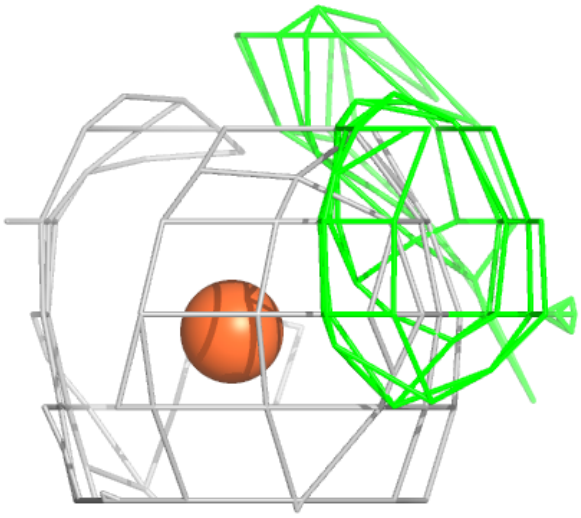
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

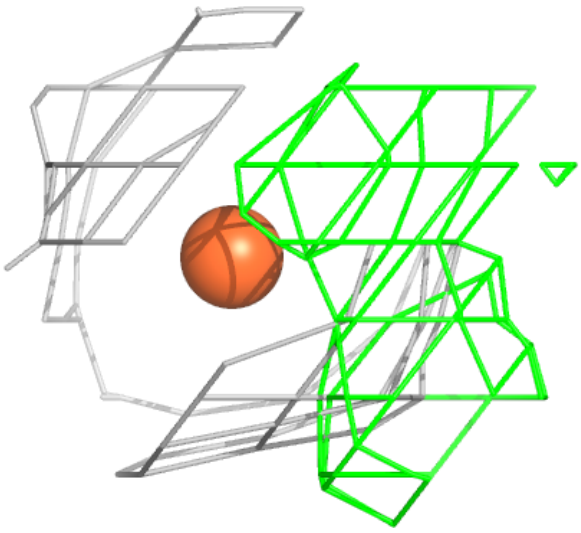
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	FE	B	403	1/1	0.85	0.11	57,57,57,57	1
2	GOL	C	401	6/6	0.90	0.09	45,47,50,52	0
2	GOL	B	401	6/6	0.90	0.20	59,62,65,70	0
3	FE	A	403	1/1	0.91	0.17	48,48,48,48	1
2	GOL	C	402	6/6	0.92	0.10	43,47,51,54	6
2	GOL	A	401	6/6	0.92	0.13	47,48,49,49	6
3	FE	D	401	1/1	0.94	0.11	58,58,58,58	1
3	FE	B	402	1/1	0.96	0.11	52,52,52,52	1
3	FE	D	402	1/1	0.97	0.11	52,52,52,52	0
3	FE	A	402	1/1	0.98	0.11	46,46,46,46	1
3	FE	C	403	1/1	0.99	0.13	43,43,43,43	0
3	FE	C	404	1/1	0.99	0.10	48,48,48,48	1

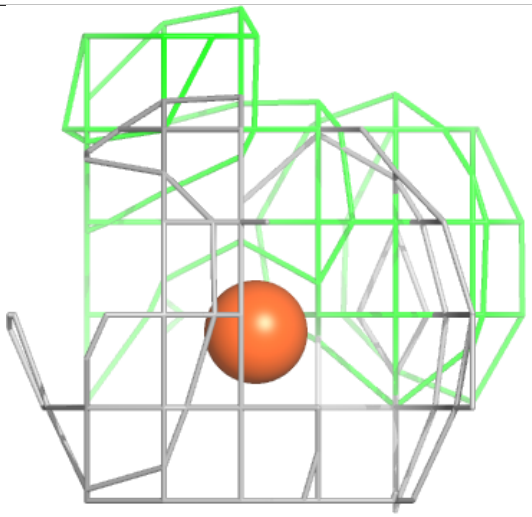
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around FE B 403:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

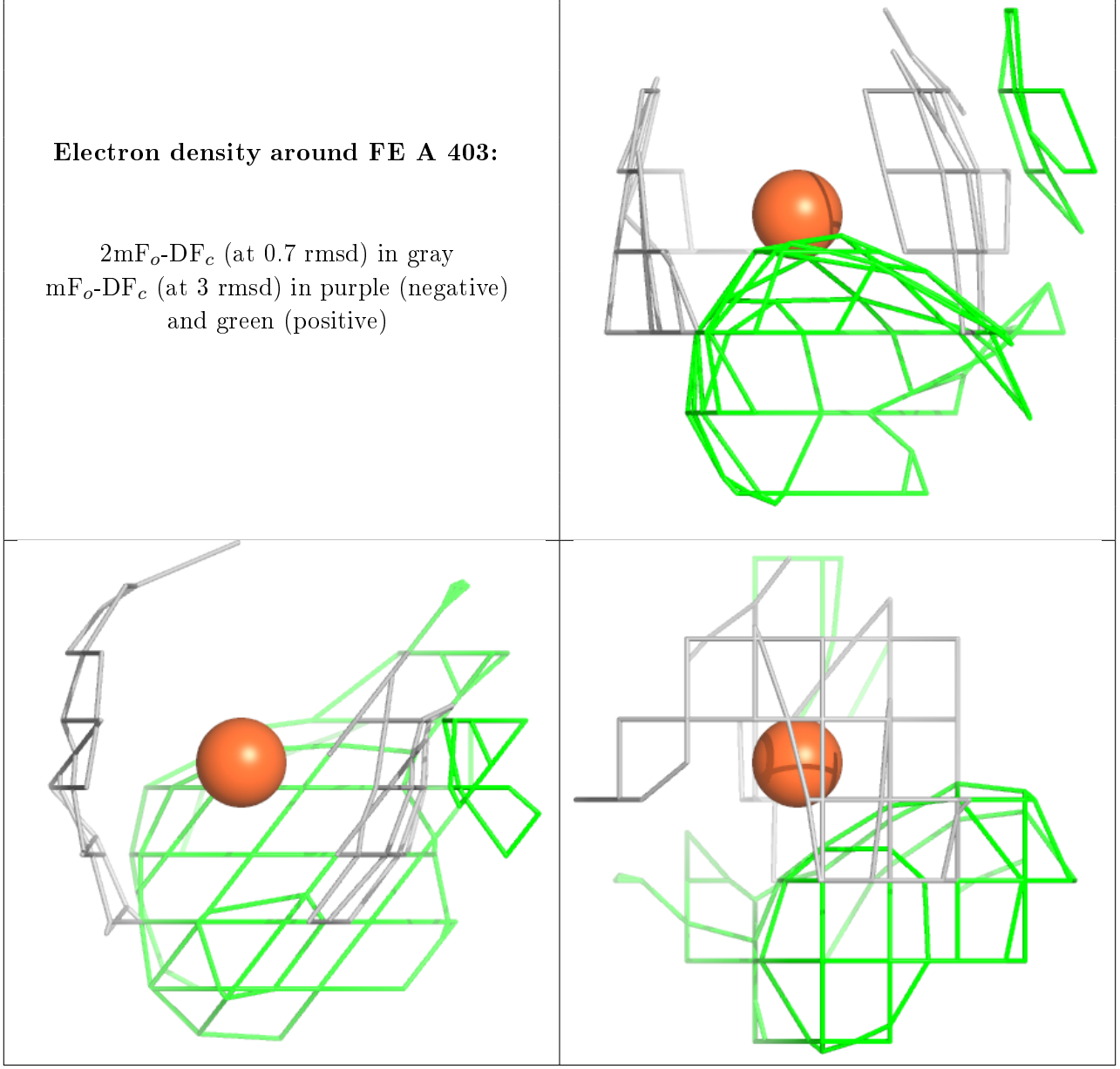






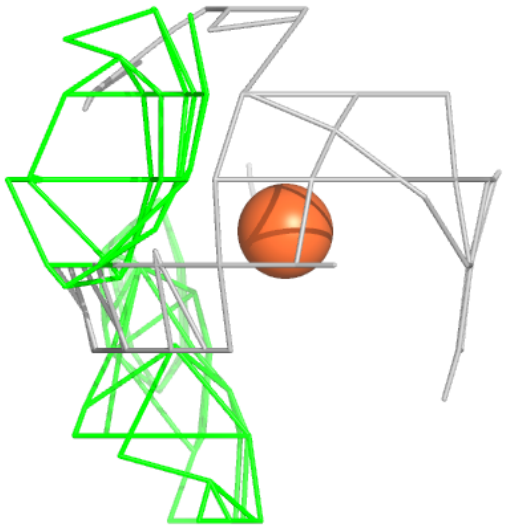
Electron density around FE A 403:

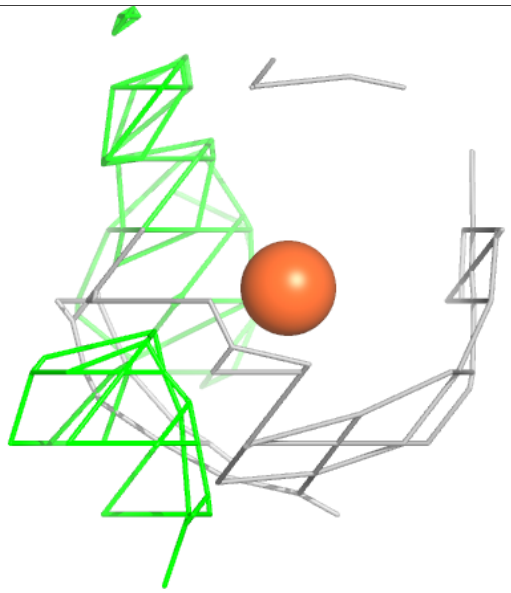
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

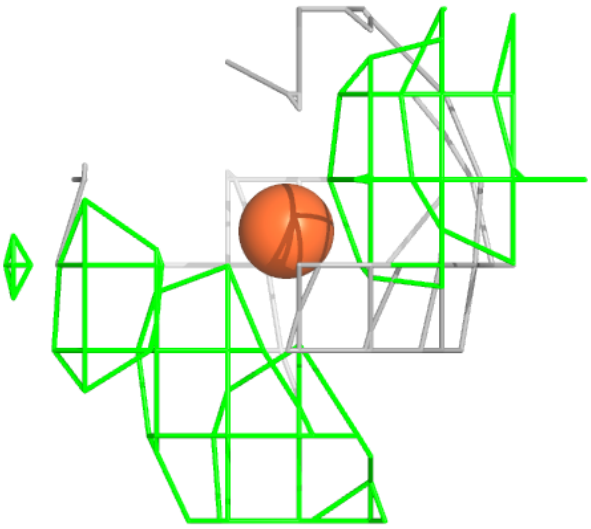


Electron density around FE D 401:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

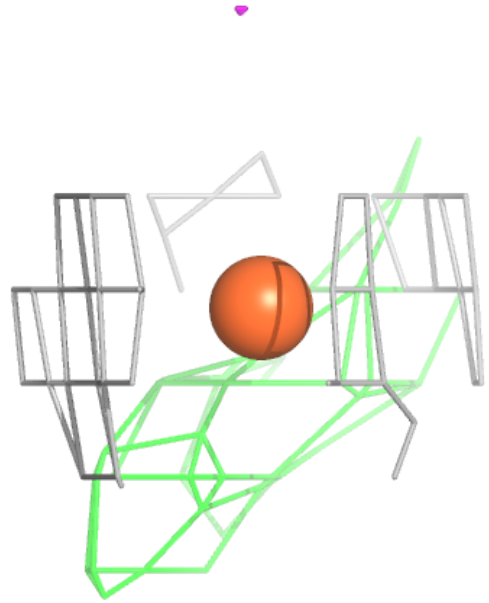


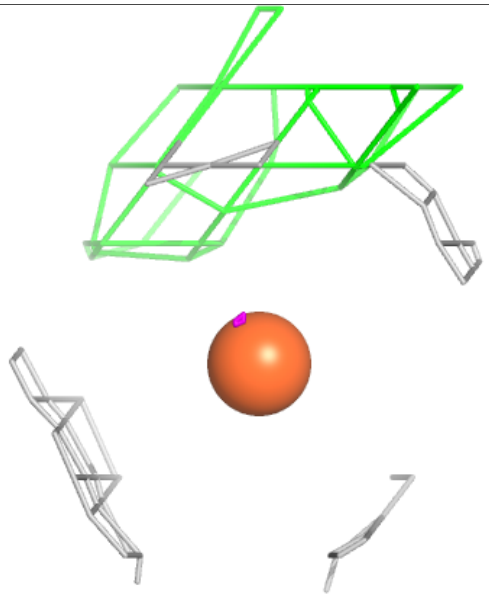


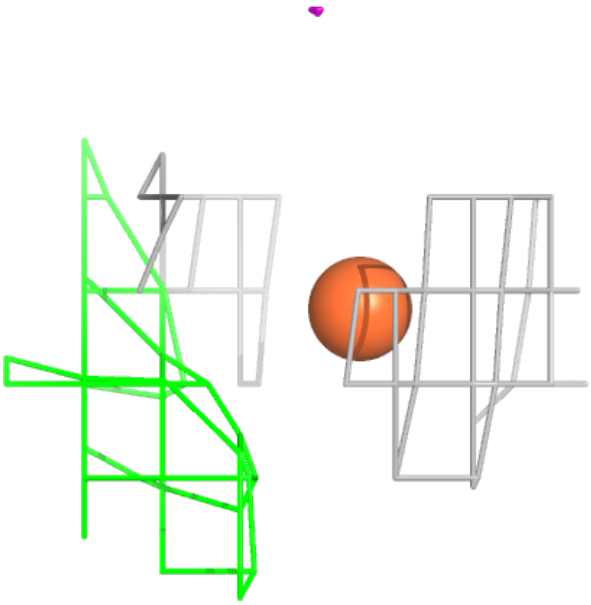


Electron density around FE B 402:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)





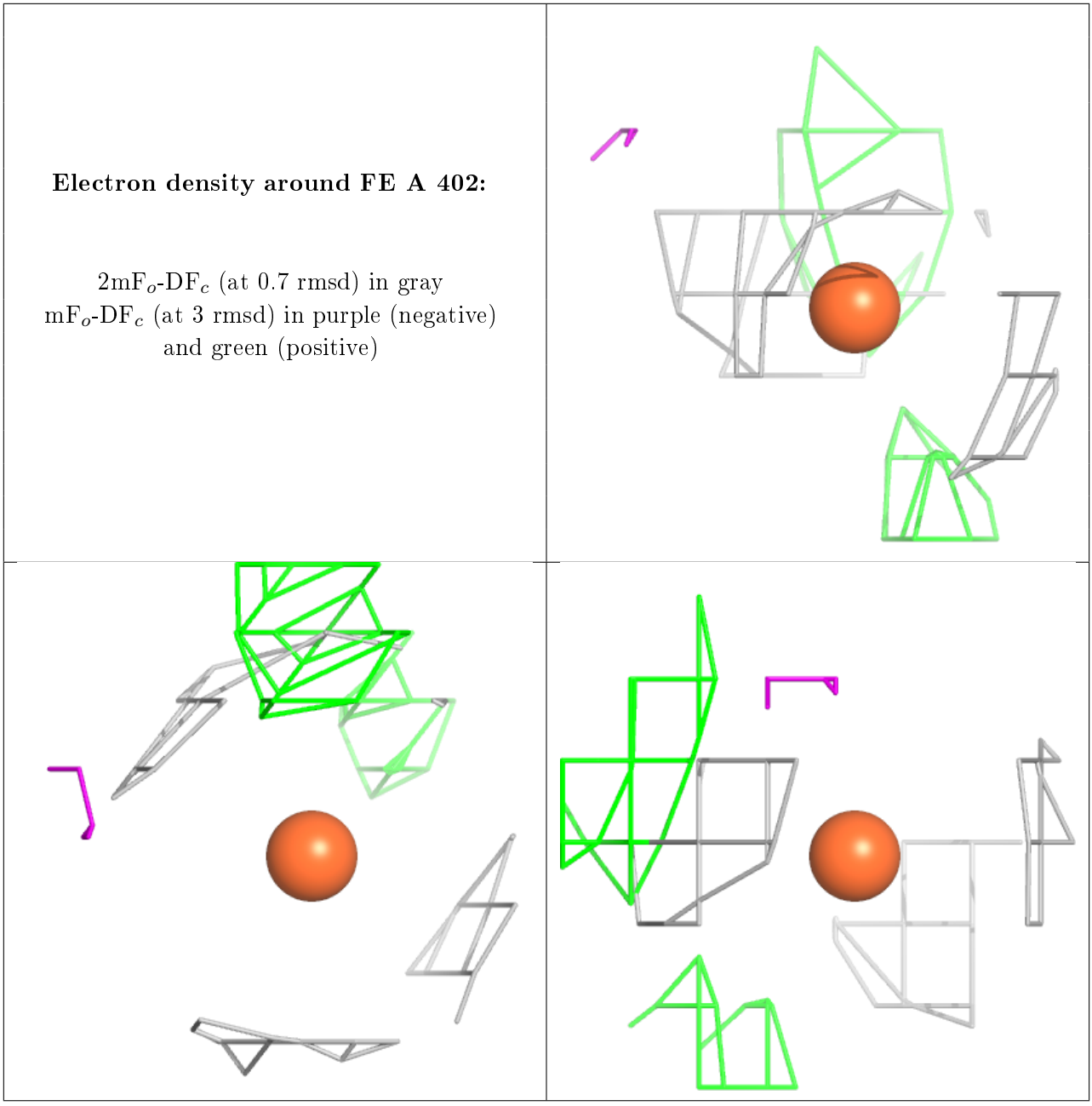


Electron density around FE D 402:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

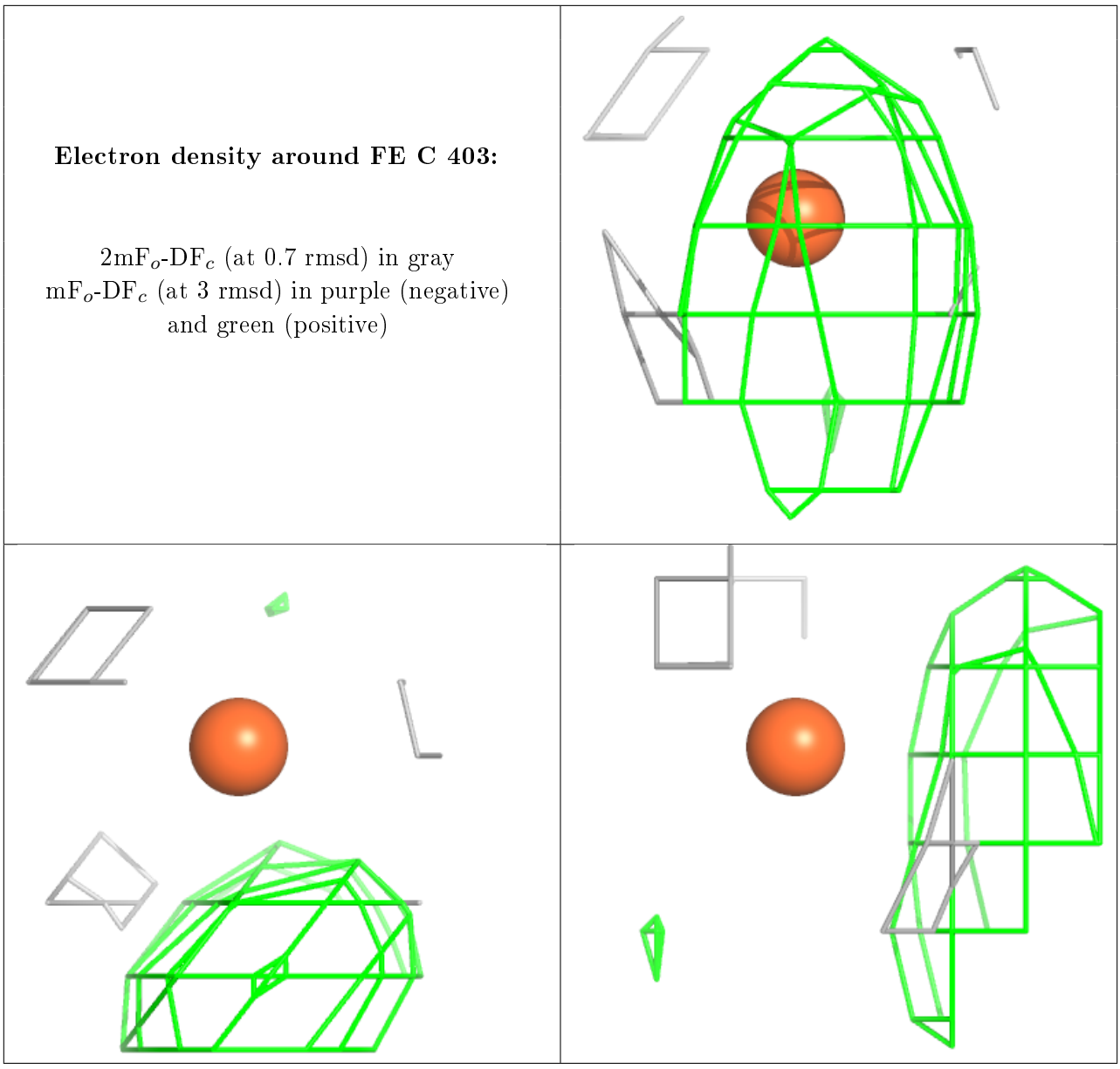
Electron density around FE A 402:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)



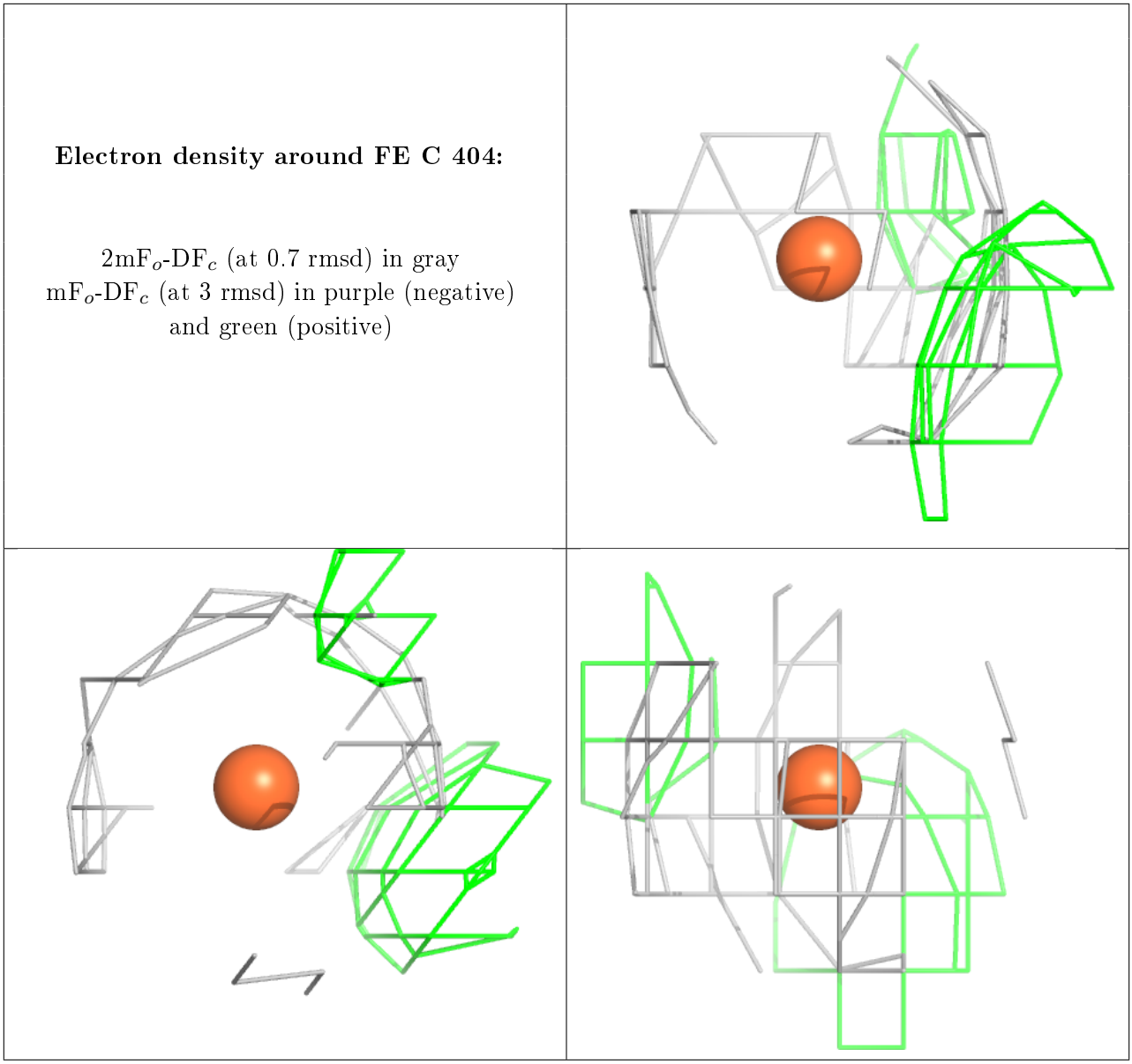
Electron density around FE C 403:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)



Electron density around FE C 404:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)



6.5 Other polymers

There are no such residues in this entry.