

wwPDB X-ray Structure Validation Summary Report (i)

Jan 13, 2024 – 01:04 pm GMT

PDB ID : 6QJC

Title: Dimethyl disulfide inhibited sulfur oxygenase reductase

Authors: Frazao, C.; Klezin, A.; Poell, U.

Deposited on : 2019-01-24

Resolution : 1.70 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (1)) were used in the production of this report:

MolProbity: 4.02b-467

Mogul : 1.8.4, CSD as541be (2020)

Xtriage (Phenix) : 1.13

EDS : 2.36

buster-report : 1.1.7 (2018)

Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)

 $Refmac \quad : \quad 5.8.0158$

CCP4 : 7.0.044 (Gargrove)

Ideal geometry (proteins) : Engh & Huber (2001) Ideal geometry (DNA, RNA) : Parkinson et al. (1996)

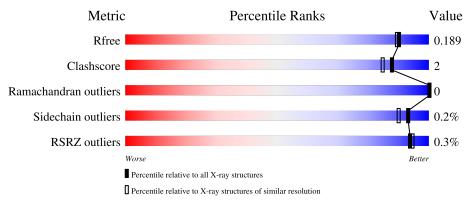
Validation Pipeline (wwPDB-VP) : 2.36

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 1.70 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	Similar resolution
Metric	$(\# \mathrm{Entries})$	$(\# ext{Entries}, ext{ resolution range}(ext{Å}))$
R_{free}	130704	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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	309	93%	6% ••
1	В	309	93%	6% •
1	С	309	95%	
1	D	309	95%	



2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 11015 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 Sulfur oxygenase/reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
1	٨	307	Total	С	N	О	S	0	10	19 0	0
1	A	307	2533	1631	414	462	26	U	19	0	
1	В	307	Total	С	N	О	S	0	18	0	
1		307	2531	1630	414	462	25	U	10	0	
1	1 0	C 307	Total	С	N	О	S	0	1.4	0	
1			2514	1621	411	456	26	U	14		
1	1 D	207	Total	С	N	О	S	0	15	0	
1		D 307	2514	1622	412	454	26	U	10	U	

• Molecule 2 is FE (III) ION (three-letter code: FE) (formula: Fe) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total Fe 1 1	0	0
2	В	1	Total Fe 1 1	0	0
2	С	1	Total Fe 1 1	0	0
2	D	1	Total Fe 1 1	0	0

• Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	211	Total O 211 211	0	0
3	В	234	Total O 234 234	0	0
3	С	215	Total O 215 215	0	0
3	D	259	Total O 259 259	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: Sulfur oxygenase/reductase





4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 63 2 2	Depositor
Cell constants	158.40Å 158.40Å 227.96Å	Depositor
a, b, c, α , β , γ	90.00° 90.00° 120.00°	Depositor
Resolution (Å)	79.20 - 1.70	Depositor
rtesolution (A)	79.20 - 1.70	EDS
% Data completeness	99.9 (79.20-1.70)	Depositor
(in resolution range)	99.9 (79.20-1.70)	EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.35	Depositor
$< I/\sigma(I) > 1$	1.42 (at 1.70Å)	Xtriage
Refinement program	PHENIX 1.9_1692	Depositor
D D.	0.165 , 0.188	Depositor
R, R_{free}	0.166 , 0.189	DCC
R_{free} test set	3233 reflections (1.76%)	wwPDB-VP
Wilson B-factor (Å ²)	18.5	Xtriage
Anisotropy	0.638	Xtriage
Bulk solvent $k_{sol}(e/Å^3)$, $B_{sol}(Å^2)$	0.35, 49.6	EDS
L-test for twinning ²	$ < L > = 0.49, < L^2> = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	11015	wwPDB-VP
Average B, all atoms $(Å^2)$	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: The largest off-origin peak in the Patterson function is 2.93% of the height of the origin peak. No significant pseudotranslation is detected.

²Theoretical 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.



¹Intensities estimated from amplitudes.

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: CSS, TSY, 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	
IVIOI		RMSZ	# Z > 5	RMSZ	# Z > 5
1	A	0.33	0/2674	0.50	0/3618
1	В	0.37	0/2667	0.52	0/3610
1	С	0.34	0/2625	0.50	0/3551
1	D	0.40	0/2630	0.54	0/3558
All	All	0.36	0/10596	0.52	0/14337

There are no bond length outliers.

There are no bond angle outliers.

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	A	2533	0	2479	14	0
1	В	2531	0	2476	14	0
1	С	2514	0	2463	7	0
1	D	2514	0	2465	8	0
2	A	1	0	0	0	0
2	В	1	0	0	0	0
2	С	1	0	0	0	0
2	D	1	0	0	0	0
3	A	211	0	0	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	В	234	0	0	3	1
3	С	215	0	0	1	0
3	D	259	0	0	2	2
All	All	11015	0	9883	40	2

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.

The worst 5 of 40 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	$\begin{array}{c} {\rm Interatomic} \\ {\rm distance} \ ({\rm \AA}) \end{array}$	Clash overlap (Å)
1:D:243[A]:ASN:ND2	3:D:501:HOH:O	2.05	0.88
1:B:132:ASP:OD1	3:B:501:HOH:O	1.93	0.83
1:D:247[B]:GLN:OE1	3:D:501:HOH:O	2.11	0.68
1:C:223:ASN:ND2	1:C:227:LEU:O	2.26	0.61
1:C:67:LYS:HE3	3:C:516:HOH:O	2.09	0.52

All (2) 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	$\begin{array}{c} {\rm Interatomic} \\ {\rm distance} \ ({\rm \AA}) \end{array}$	Clash overlap (Å)
3:D:724:HOH:O	3:D:750:HOH:O[9_557]	1.85	0.35
3:B:680:HOH:O	3:D:739:HOH:O[2_785]	2.19	0.01

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	Perce	\mathbf{ntiles}
1	A	$321/309\ (104\%)$	315 (98%)	6 (2%)	0	100	100
1	В	320/309 (104%)	314 (98%)	6 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Perce	ntiles
1	С	315/309 (102%)	309 (98%)	6 (2%)	0	100	100
1	D	316/309 (102%)	310 (98%)	6 (2%)	0	100	100
All	All	1272/1236 (103%)	1248 (98%)	24 (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	281/264 (106%)	279 (99%)	2 (1%)	84 77
1	В	280/264 (106%)	280 (100%)	0	100 100
1	С	$275/264\ (104\%)$	275 (100%)	0	100 100
1	D	$276/264\ (104\%)$	276 (100%)	0	100 100
All	All	1112/1056 (105%)	1110 (100%)	2 (0%)	93 90

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

Mol	Chain	Res	Type
1	A	139	LYS
1	A	147	LEU

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)

12 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).

Mal	Trino	Chain	Dag	T inle	В	ond leng	gths	Bond angles		
Mol	Type	Chain	Res	$\mathbf{s} \mid \mathbf{Link} \mid$	Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	CSS	D	104	1	4,6,7	1.46	0	1,6,8	0.94	0
1	CSS	A	101	1	4,6,7	1.31	0	1,6,8	0.87	0
1	CSS	D	101	1	4,6,7	1.32	0	1,6,8	1.04	0
1	CSS	В	101	1	4,6,7	1.39	0	1,6,8	0.85	0
1	CSS	С	101	1	4,6,7	1.42	0	1,6,8	1.31	0
1	CSS	С	104	1	4,6,7	1.39	0	1,6,8	1.25	0
1	CSS	В	104	1	4,6,7	1.46	0	1,6,8	1.09	0
1	TSY	A	31	1	5,7,8	1.08	0	2,7,9	1.09	0
1	TSY	С	31	1	5,7,8	1.03	0	2,7,9	0.95	0
1	TSY	В	31	1	5,7,8	1.04	0	2,7,9	1.22	0
1	TSY	D	31	1	5,7,8	1.12	0	2,7,9	1.42	0
1	CSS	A	104	1	4,6,7	1.41	0	1,6,8	0.95	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
1	CSS	D	104	1	-	0/1/5/7	-
1	CSS	A	101	1	-	0/1/5/7	-
1	CSS	D	101	1	-	0/1/5/7	-
1	CSS	В	101	1	-	0/1/5/7	-
1	CSS	С	101	1	-	0/1/5/7	-
1	CSS	С	104	1	-	0/1/5/7	-
1	CSS	В	104	1	-	0/1/5/7	-
1	TSY	A	31	1	-	0/2/6/8	-
1	TSY	С	31	1	-	0/2/6/8	-
1	TSY	В	31	1	-	0/2/6/8	-
1	TSY	D	31	1	-	0/2/6/8	-
1	CSS	A	104	1	-	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.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	104	CSS	1	0

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 4 ligands modelled in this entry, 4 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.

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 (i)

6.1 Protein, DNA and RNA chains (i)

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>	# RSRZ > 2	$OWAB(Å^2)$	Q<0.9
1	A	304/309 (98%)	-0.47	1 (0%) 94 94	16, 23, 38, 55	0
1	В	304/309 (98%)	-0.38	1 (0%) 94 94	14, 20, 37, 57	0
1	С	304/309 (98%)	-0.46	1 (0%) 94 94	15, 22, 38, 60	0
1	D	304/309 (98%)	-0.38	1 (0%) 94 94	13, 19, 35, 53	0
All	All	1216/1236 (98%)	-0.42	4 (0%) 94 94	13, 21, 37, 60	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ	
1	A	24	ALA	3.5	
1	В	308	GLU	3.0	
1	D	308	GLU	2.8	
1	С	24	ALA	2.5	

6.2 Non-standard residues in protein, DNA, RNA chains (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	$\operatorname{B-factors}(\mathring{\mathbf{A}}^2)$	Q < 0.9
1	CSS	С	104	7/8	0.85	0.11	29,31,44,65	0
1	CSS	D	104	7/8	0.85	0.08	31,37,53,58	0
1	CSS	С	101	7/8	0.89	0.10	27,31,41,58	0
1	CSS	A	104	7/8	0.90	0.09	25,30,47,58	0
1	CSS	A	101	7/8	0.90	0.08	25,29,42,58	0
1	CSS	В	104	7/8	0.91	0.08	30,31,46,62	0
1	CSS	D	101	7/8	0.92	0.09	26,30,42,64	0
1	CSS	В	101	7/8	0.95	0.07	24,29,40,55	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	$\mathbf{B} ext{-}\mathbf{factors}(\mathbf{\mathring{A}}^2)$	Q < 0.9
1	TSY	В	31	8/9	0.97	0.07	17,18,28,63	0
1	TSY	D	31	8/9	0.98	0.05	20,22,27,66	0
1	TSY	A	31	8/9	0.98	0.05	20,23,30,64	0
1	TSY	С	31	8/9	0.98	0.07	20,22,28,52	0

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

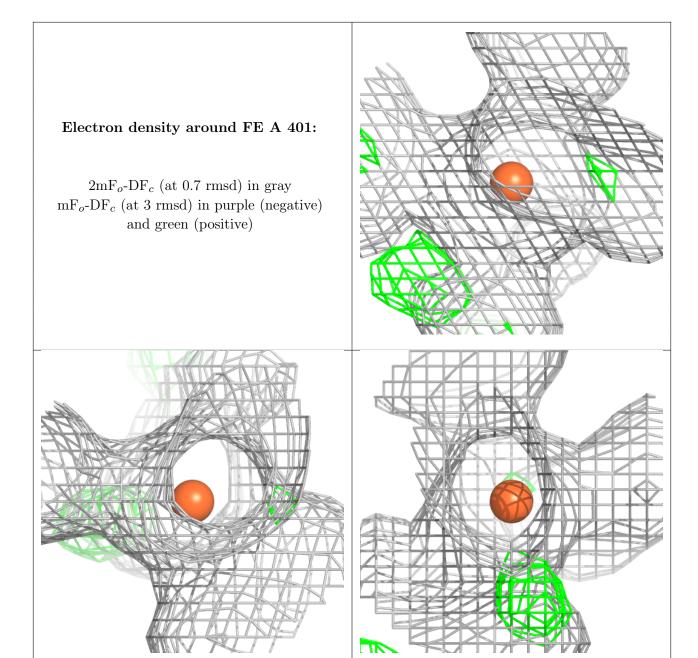
6.4 Ligands (i)

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.

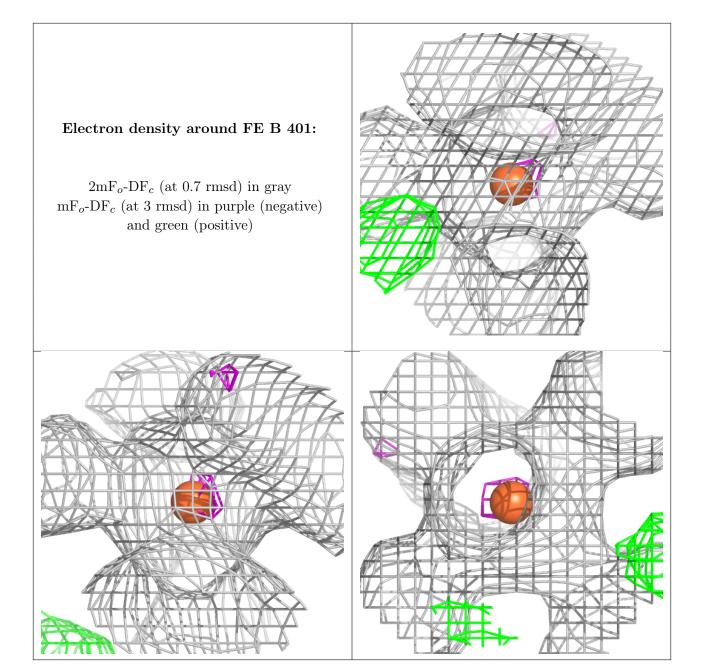
Mol	Type	Chain	Res	Atoms	RSCC	RSR	$\mathbf{B} ext{-}\mathbf{factors}(\mathbf{\mathring{A}}^2)$	Q<0.9
2	FE	A	401	1/1	0.99	0.05	23,23,23,23	1
2	FE	В	401	1/1	0.99	0.05	20,20,20,20	1
2	FE	С	401	1/1	0.99	0.06	24,24,24,24	1
2	FE	D	401	1/1	0.99	0.03	19,19,19,19	1

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.





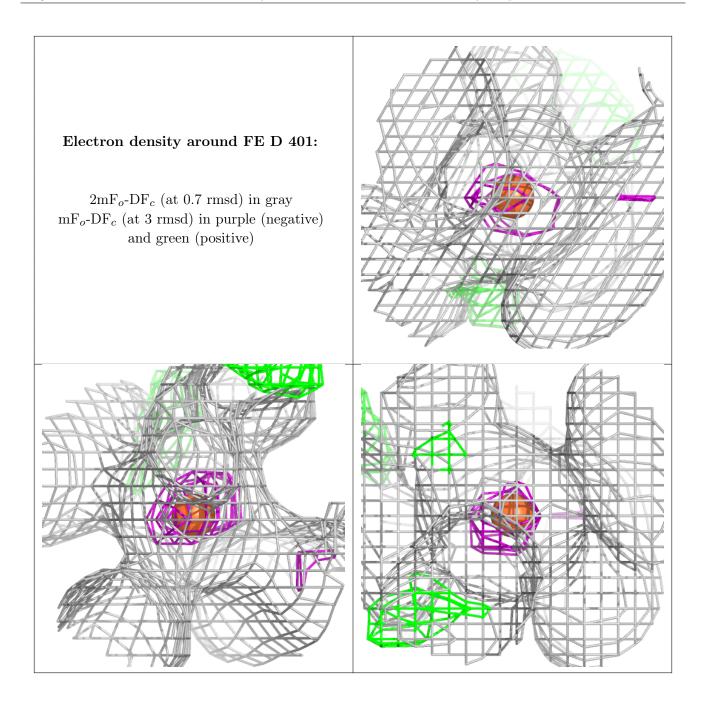






Electron density around FE C 401: $2 \mathrm{mF}_o\text{-}\mathrm{DF}_c$ (at 0.7 rmsd) in gray ${\rm mF}_o\text{-}{\rm DF}_c$ (at 3 rmsd) in purple (negative) and green (positive)





6.5 Other polymers (i)

There are no such residues in this entry.

