wwPDB X-ray Structure Validation Summary Report (i)

Aug 22, 2023 – 06:34 PM EDT

PDB ID	:	3CIR
Title	:	E. coli Quinol fumarate reductase FrdA T234A mutation
Authors	:	Tomasiak, T.M.; Maklashina, E.; Cecchini, G.; Iverson, T.M.
Deposited on	:	2008-03-11
Resolution	:	3.65 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 (i)) were used in the production of this report:

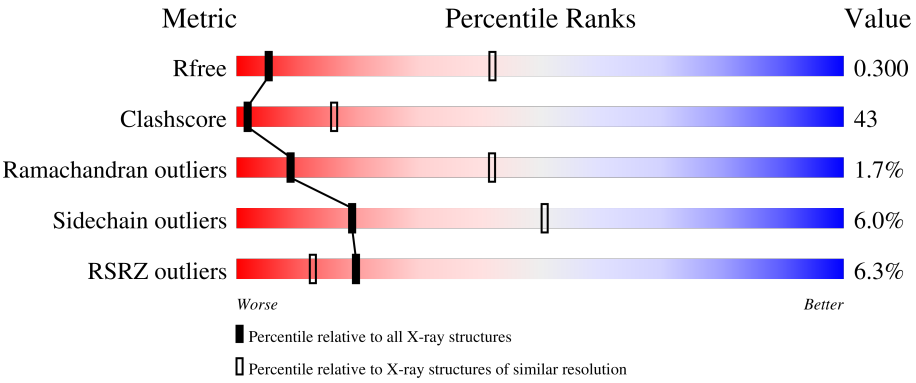
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

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 3.65 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	1557 (3.82-3.50)
Clashscore	141614	1037 (3.80-3.52)
Ramachandran outliers	138981	1004 (3.80-3.52)
Sidechain outliers	138945	1002 (3.80-3.52)
RSRZ outliers	127900	1441 (3.82-3.50)

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	602	7% 42% 44% . 10%
1	M	602	13% 30% 50% . 16%
2	B	243	50% 47% .
2	N	243	2% 47% 49% .
3	C	130	42% 48% 8% .

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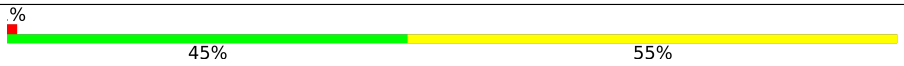
Mol	Chain	Length	Quality of chain
3	O	130	
4	D	119	
4	P	119	

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	FAD	M	601	-	-	X	-
8	SF4	B	246	-	-	X	-

2 Entry composition (i)

There are 8 unique types of molecules in this entry. The entry contains 15746 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 Fumarate reductase flavoprotein subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	541	Total	C	N	O	S	0	0	0
			4140	2576	752	783	29			
1	M	504	Total	C	N	O	S	0	0	0
			3718	2295	682	715	26			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	234	ALA	THR	engineered mutation	UNP P00363
M	234	ALA	THR	engineered mutation	UNP P00363

- Molecule 2 is a protein called Fumarate reductase iron-sulfur subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	243	Total	C	N	O	S	0	0	0
			1888	1189	323	357	19			
2	N	243	Total	C	N	O	S	0	0	0
			1888	1189	323	357	19			

- Molecule 3 is a protein called Fumarate reductase subunit C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	130	Total	C	N	O	S	0	0	0
			1058	720	166	169	3			
3	O	130	Total	C	N	O	S	0	0	0
			1058	720	166	169	3			

- Molecule 4 is a protein called Fumarate reductase subunit D.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	119	Total	C	N	O	S	0	0	0
			926	626	151	142	7			

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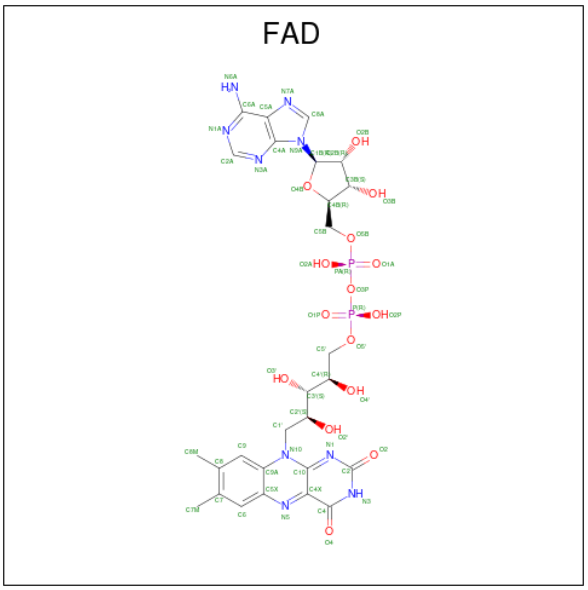
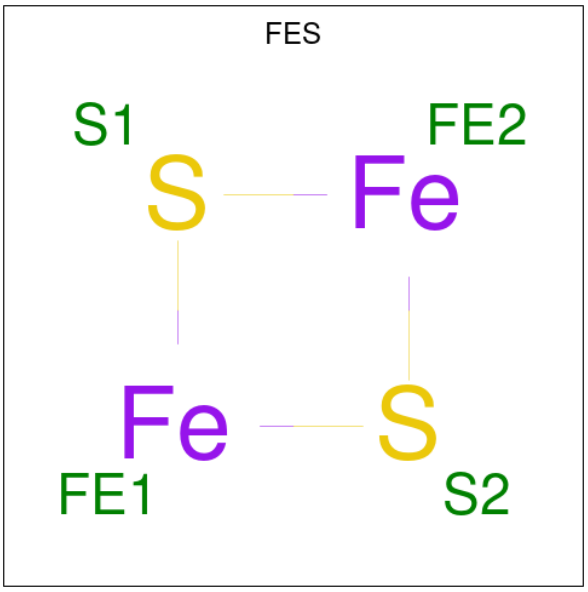
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	P	119	Total	C	N	O	S	0	0	0
			926	626	151	142	7			

- Molecule 5 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



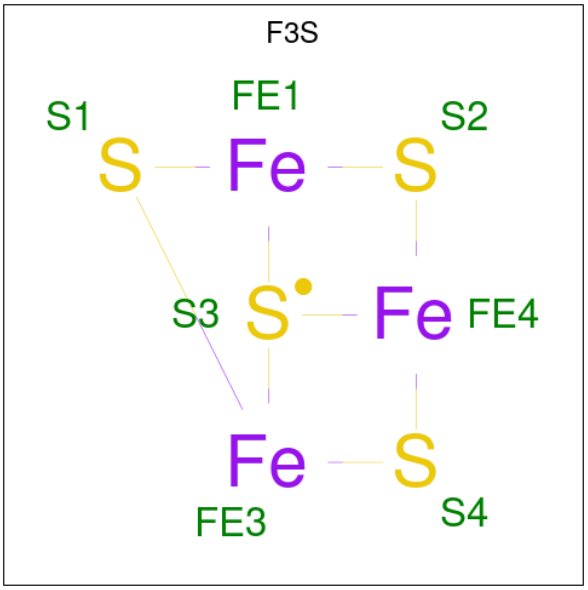
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
5	M	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 6 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2).



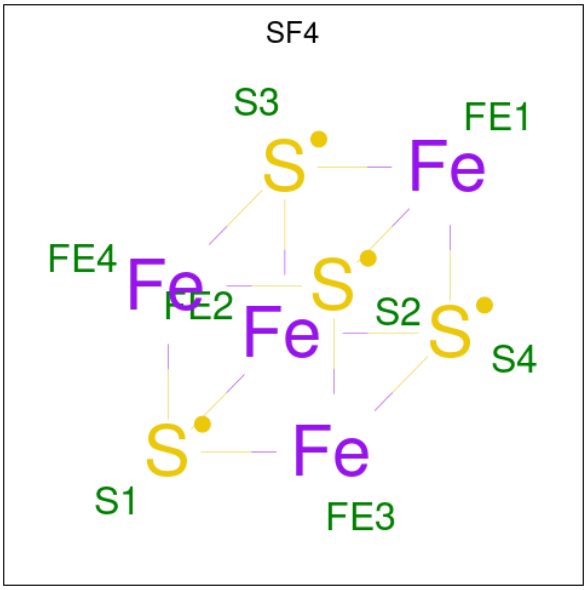
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	B	1	Total Fe S 4 2 2	0	0
6	N	1	Total Fe S 4 2 2	0	0

- Molecule 7 is FE3-S4 CLUSTER (three-letter code: F3S) (formula: Fe_3S_4).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	B	1	Total Fe S 7 3 4	0	0
7	N	1	Total Fe S 7 3 4	0	0

- Molecule 8 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4).



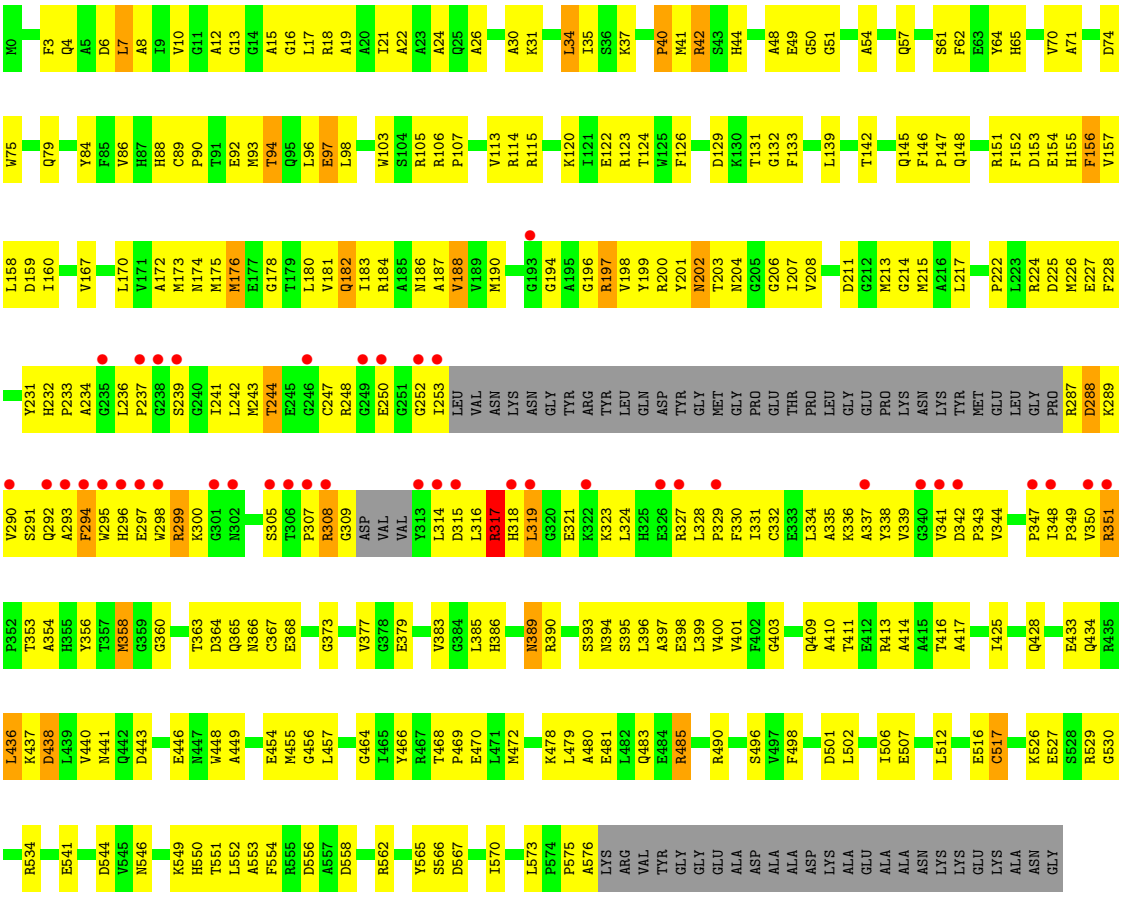
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total Fe S 8 4 4	0	0
8	N	1	Total Fe S 8 4 4	0	0

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.

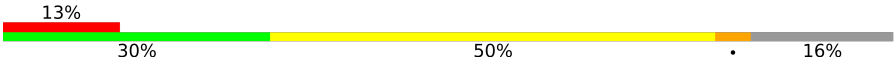
• Molecule 1: Fumarate reductase flavoprotein subunit

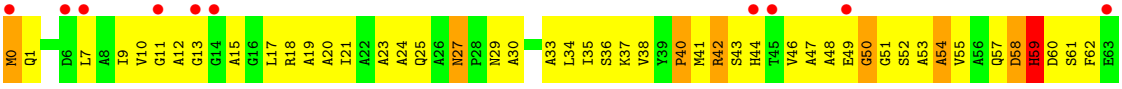
Chain A:

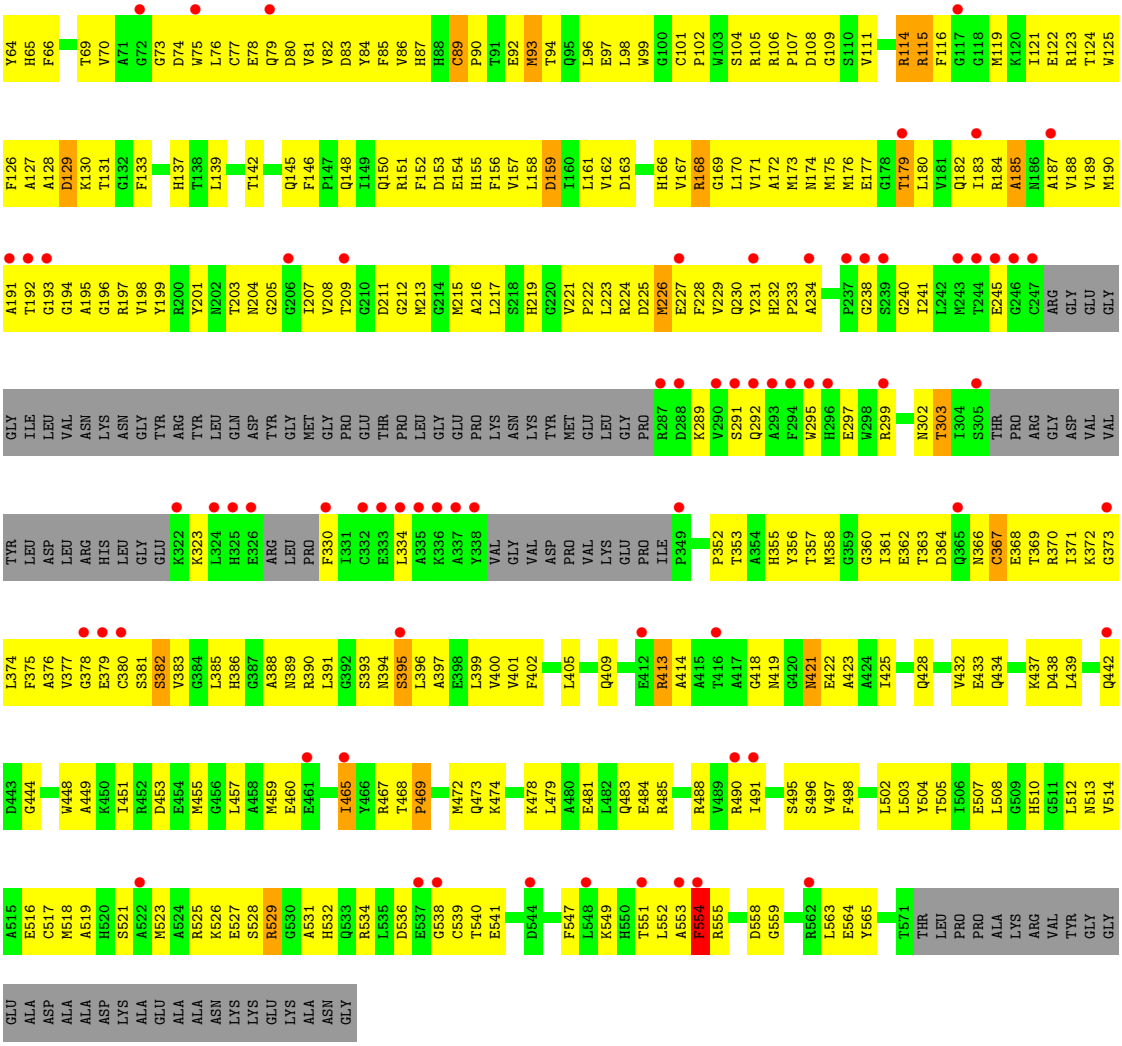


• Molecule 1: Fumarate reductase flavoprotein subunit

Chain M:

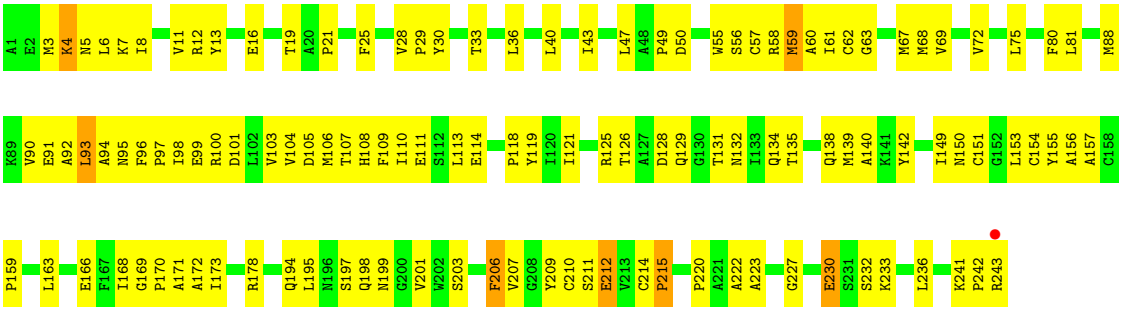






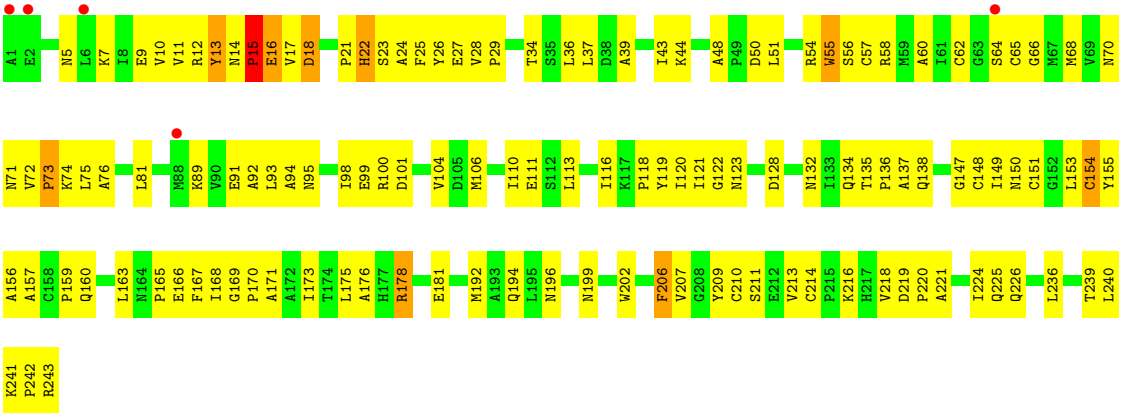
• Molecule 2: Fumarate reductase iron-sulfur subunit

Chain B:

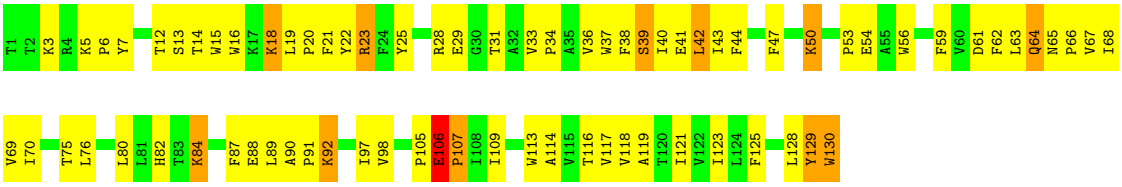


• Molecule 2: Fumarate reductase iron-sulfur subunit

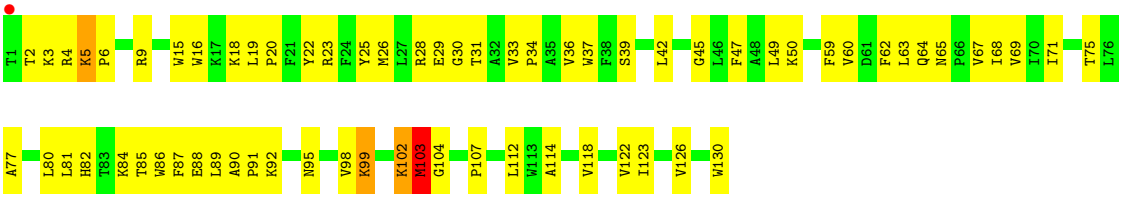
Chain N:



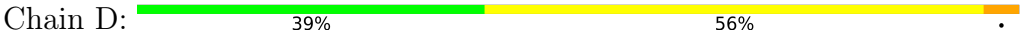
• Molecule 3: Fumarate reductase subunit C

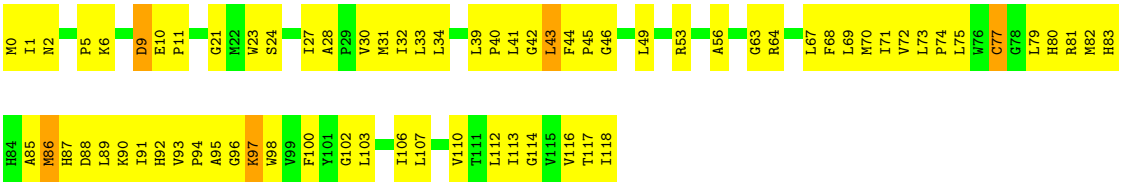


• Molecule 3: Fumarate reductase subunit C

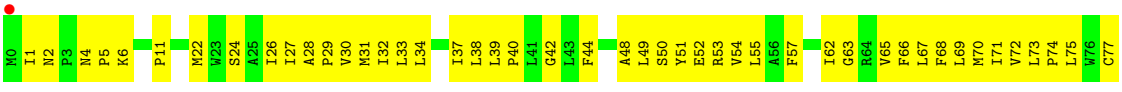


• Molecule 4: Fumarate reductase subunit D





• Molecule 4: Fumarate reductase subunit D




G78
L79
H80
R81
M82
H92
V93
P94
A95
W98
V99
F100
Y101
G102
L103
A104
A105
I106
V109
L112
I113
G114
V115
V116
T117
I118

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	96.86Å 135.47Å 266.02Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	266.00 – 3.65 42.62 – 3.30	Depositor EDS
% Data completeness (in resolution range)	80.8 (266.00-3.65) 78.8 (42.62-3.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.39	Depositor
$< I/\sigma(I) >$ [1]	0.00 (at 3.32Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.261 , 0.296 0.252 , 0.300	Depositor DCC
R_{free} test set	1038 reflections (1.96%)	wwPDB-VP
Wilson B-factor (Å^2)	79.8	Xtriage
Anisotropy	0.269	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.26 , 77.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.40$, $< L^2 > = 0.22$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.87	EDS
Total number of atoms	15746	wwPDB-VP
Average B, all atoms (Å^2)	120.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.76% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: FAD, F3S, FES, SF4

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	0.56	4/4221 (0.1%)	0.79	1/5705 (0.0%)
1	M	0.52	0/3778	0.81	7/5107 (0.1%)
2	B	0.58	1/1931 (0.1%)	0.79	1/2617 (0.0%)
2	N	0.44	0/1931	0.70	3/2617 (0.1%)
3	C	0.57	1/1094 (0.1%)	0.70	2/1496 (0.1%)
3	O	0.52	0/1094	0.74	2/1496 (0.1%)
4	D	0.50	0/956	0.72	0/1303
4	P	0.43	0/956	0.68	0/1303
All	All	0.53	6/15961 (0.0%)	0.77	16/21644 (0.1%)

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	300	LYS	N-CA	7.04	1.60	1.46
3	C	106	GLU	C-N	6.50	1.46	1.34
1	A	299	ARG	CA-C	6.22	1.69	1.52
1	A	182	GLN	CG-CD	5.40	1.63	1.51
2	B	215	PRO	N-CD	-5.33	1.40	1.47

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	M	323	LYS	N-CA-C	8.75	134.62	111.00
1	M	114	ARG	NE-CZ-NH2	-6.90	116.85	120.30
3	C	107	PRO	CA-N-CD	-6.35	102.61	111.50
1	M	303	THR	N-CA-C	-6.26	94.09	111.00
2	B	93	LEU	CA-C-N	-6.24	103.47	117.20

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	4140	0	4014	343	0
1	M	3718	0	3461	445	0
2	B	1888	0	1837	168	0
2	N	1888	0	1837	163	0
3	C	1058	0	1108	108	1
3	O	1058	0	1108	85	1
4	D	926	0	971	85	0
4	P	926	0	971	74	0
5	A	53	0	31	12	0
5	M	53	0	31	26	0
6	B	4	0	0	1	0
6	N	4	0	0	1	0
7	B	7	0	0	1	0
7	N	7	0	0	1	0
8	B	8	0	0	2	0
8	N	8	0	0	1	0
All	All	15746	0	15369	1323	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 43.

The worst 5 of 1323 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:A:44:HIS:NE2	5:A:601:FAD:C8M	1.77	1.48
1:M:44:HIS:NE2	5:M:601:FAD:C8M	1.78	1.44
1:A:243:MET:SD	1:A:331:ILE:HG23	1.61	1.41
1:M:44:HIS:NE2	5:M:601:FAD:HM82	1.09	1.39
2:B:4:LYS:H	2:B:4:LYS:NZ	1.17	1.38

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)
3:C:129:TYR:OH	3:O:80:LEU:CB[3_654]	2.13	0.07

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	535/602 (89%)	487 (91%)	41 (8%)	7 (1%)	12 47
1	M	494/602 (82%)	437 (88%)	44 (9%)	13 (3%)	5 34
2	B	241/243 (99%)	220 (91%)	19 (8%)	2 (1%)	19 56
2	N	241/243 (99%)	204 (85%)	30 (12%)	7 (3%)	4 32
3	C	128/130 (98%)	113 (88%)	13 (10%)	2 (2%)	9 43
3	O	128/130 (98%)	116 (91%)	9 (7%)	3 (2%)	6 36
4	D	117/119 (98%)	98 (84%)	19 (16%)	0	100 100
4	P	117/119 (98%)	100 (86%)	17 (14%)	0	100 100
All	All	2001/2188 (92%)	1775 (89%)	192 (10%)	34 (2%)	9 42

5 of 34 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	C	18	LYS
2	N	15	PRO
1	A	244	THR
1	A	530	GLY
2	B	56	SER

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	424/474 (90%)	393 (93%)	31 (7%)	14	44
1	M	355/474 (75%)	331 (93%)	24 (7%)	16	47
2	B	205/205 (100%)	195 (95%)	10 (5%)	25	56
2	N	205/205 (100%)	197 (96%)	8 (4%)	32	60
3	C	111/111 (100%)	101 (91%)	10 (9%)	9	37
3	O	111/111 (100%)	104 (94%)	7 (6%)	18	49
4	D	97/97 (100%)	90 (93%)	7 (7%)	14	45
4	P	97/97 (100%)	97 (100%)	0	100	100
All	All	1605/1774 (90%)	1508 (94%)	97 (6%)	19	51

5 of 97 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	D	97	LYS
1	M	159	ASP
1	M	27	ASN
1	M	89	CYS
1	M	395	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 43 such sidechains are listed below:

Mol	Chain	Res	Type
1	M	434	GLN
2	N	150	ASN
1	M	510	HIS
2	N	22	HIS
2	N	196	ASN

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 (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

8 ligands 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	$\#\|Z\| > 2$
6	FES	N	244	2	0,4,4	-	-	-		
7	F3S	N	245	2	0,9,9	-	-	-		
5	FAD	M	601	-	53,58,58	3.68	29 (54%)	68,89,89	1.53	13 (19%)
5	FAD	A	601	-	53,58,58	3.21	24 (45%)	68,89,89	1.37	9 (13%)
7	F3S	B	245	2	0,9,9	-	-	-		
8	SF4	B	246	2	0,12,12	-	-	-		
6	FES	B	244	2	0,4,4	-	-	-		
8	SF4	N	246	2	0,12,12	-	-	-		

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
6	FES	N	244	2	-	-	0/1/1/1
7	F3S	N	245	2	-	-	0/3/3/3
5	FAD	M	601	-	-	8/30/50/50	0/6/6/6
5	FAD	A	601	-	-	4/30/50/50	0/6/6/6
7	F3S	B	245	2	-	-	0/3/3/3
8	SF4	B	246	2	-	-	0/6/5/5
6	FES	B	244	2	-	-	0/1/1/1
8	SF4	N	246	2	-	-	0/6/5/5

The worst 5 of 53 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	M	601	FAD	C9A-C5X	9.14	1.56	1.41
5	M	601	FAD	C4A-N3A	8.36	1.47	1.35
5	A	601	FAD	C4X-N5	8.32	1.46	1.30
5	M	601	FAD	C4X-N5	8.23	1.46	1.30
5	A	601	FAD	C9A-C5X	8.17	1.54	1.41

The worst 5 of 22 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	M	601	FAD	O4B-C4B-C3B	4.23	113.49	105.11
5	A	601	FAD	N3A-C2A-N1A	-3.68	122.93	128.68
5	M	601	FAD	P-O3P-PA	3.14	143.62	132.83
5	A	601	FAD	O4'-C4'-C5'	-3.10	102.95	109.92
5	M	601	FAD	N3A-C2A-N1A	-3.06	123.89	128.68

There are no chirality outliers.

5 of 12 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	601	FAD	N10-C1'-C2'-O2'
5	A	601	FAD	N10-C1'-C2'-C3'
5	A	601	FAD	PA-O3P-P-O5'
5	M	601	FAD	N10-C1'-C2'-O2'
5	M	601	FAD	N10-C1'-C2'-C3'

There are no ring outliers.

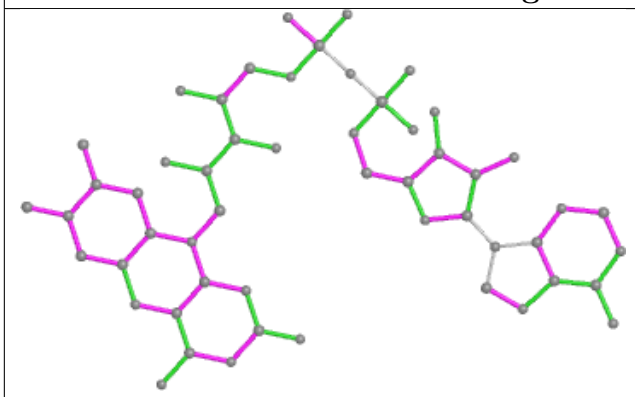
8 monomers are involved in 45 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	N	244	FES	1	0
7	N	245	F3S	1	0
5	M	601	FAD	26	0
5	A	601	FAD	12	0
7	B	245	F3S	1	0
8	B	246	SF4	2	0
6	B	244	FES	1	0
8	N	246	SF4	1	0

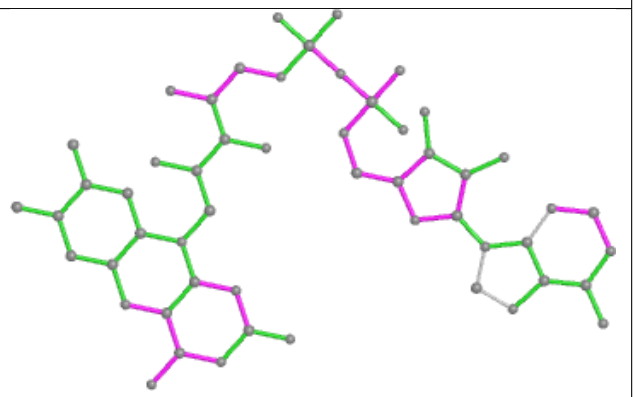
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is

within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

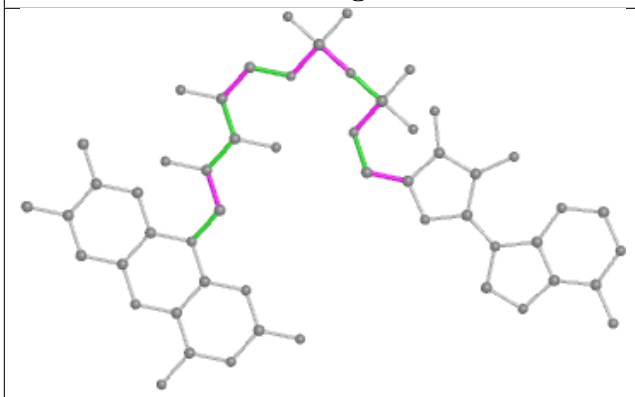
Ligand FAD M 601



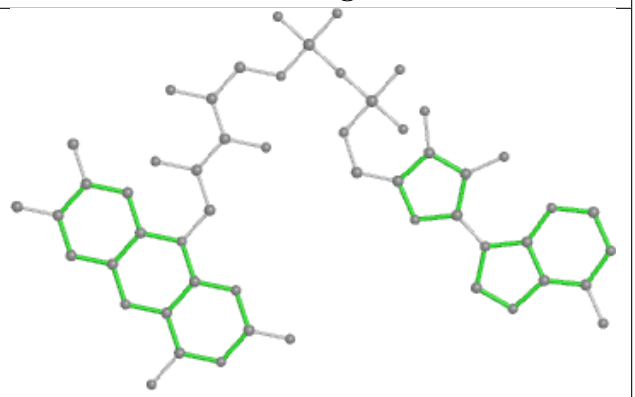
Bond lengths



Bond angles

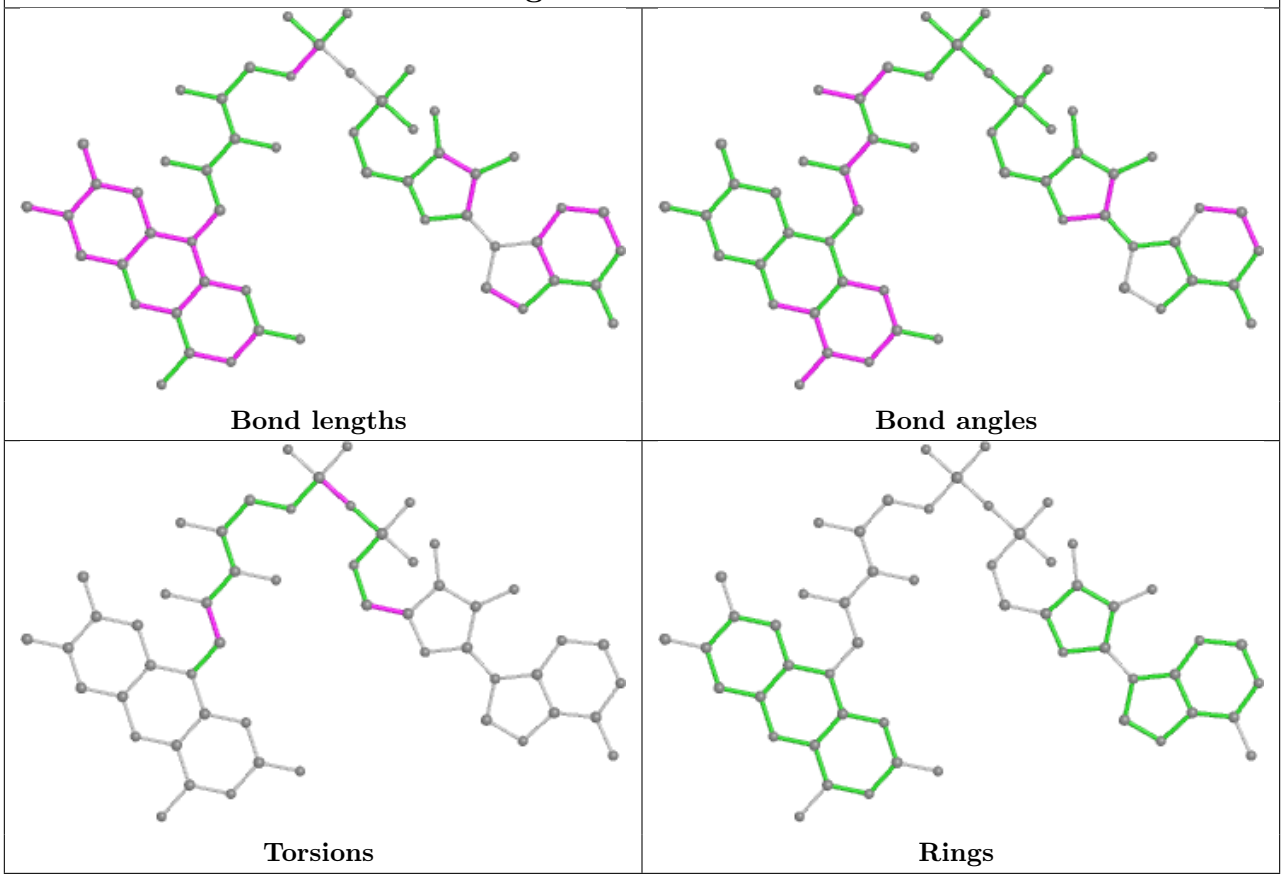


Torsions



Rings

Ligand FAD A 601



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	541/602 (89%)	-0.23	41 (7%) 13 9	23, 82, 161, 206	0
1	M	504/602 (83%)	0.64	79 (15%) 2 1	117, 184, 208, 208	0
2	B	243/243 (100%)	-0.73	1 (0%) 92 88	19, 76, 126, 205	0
2	N	243/243 (100%)	-0.25	5 (2%) 63 50	100, 161, 195, 206	0
3	C	130/130 (100%)	-0.84	0 100 100	38, 87, 136, 196	0
3	O	130/130 (100%)	-0.55	1 (0%) 86 77	44, 105, 153, 182	0
4	D	119/119 (100%)	-0.94	0 100 100	24, 84, 143, 159	0
4	P	119/119 (100%)	-0.79	1 (0%) 86 77	47, 90, 131, 208	0
All	All	2029/2188 (92%)	-0.21	128 (6%) 20 12	19, 113, 201, 208	0

The worst 5 of 128 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	M	326	GLU	16.2
1	M	325	HIS	10.7
1	M	238	GLY	9.3
1	A	307	PRO	8.1
1	M	237	PRO	6.3

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)

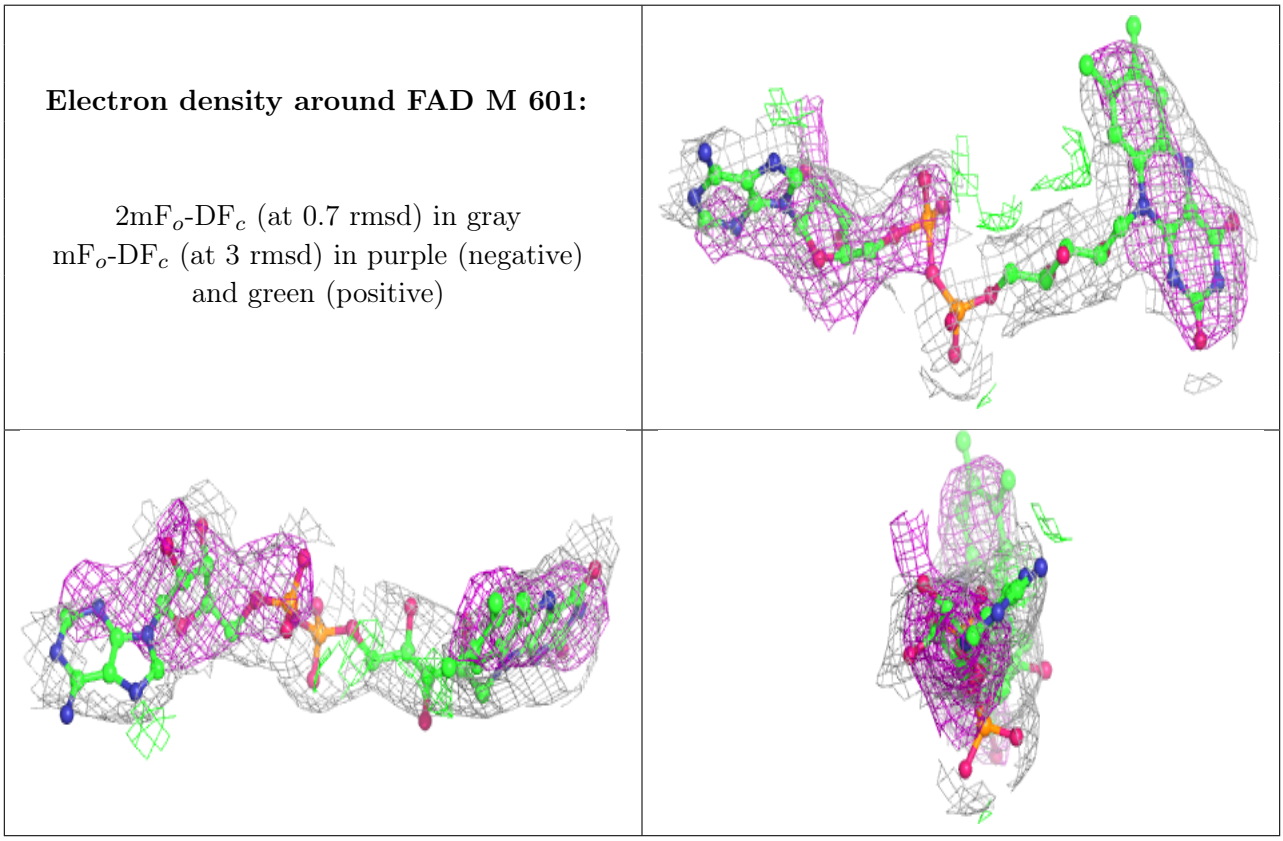
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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
5	FAD	M	601	53/53	0.86	0.18	55,71,78,80	0
5	FAD	A	601	53/53	0.95	0.23	37,41,51,56	0
6	FES	N	244	4/4	0.98	0.21	123,126,146,154	0
6	FES	B	244	4/4	0.99	0.33	102,105,107,110	0
7	F3S	B	245	7/7	0.99	0.27	109,113,117,126	0
7	F3S	N	245	7/7	0.99	0.22	116,118,131,151	0
8	SF4	B	246	8/8	0.99	0.32	111,123,129,129	0
8	SF4	N	246	8/8	0.99	0.25	122,131,151,155	0

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.

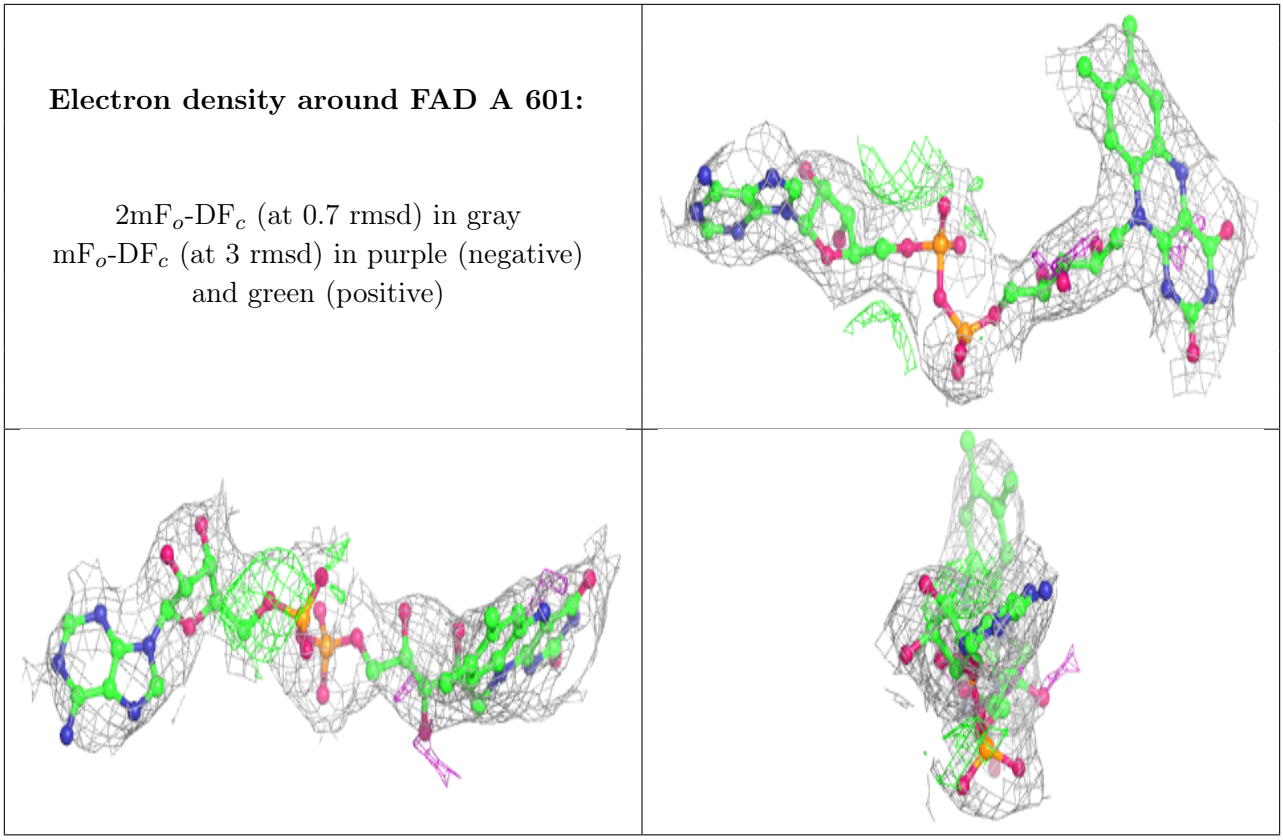
Electron density around FAD M 601:

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



Electron density around FAD A 601:

$2mF_o$-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 (i)

There are no such residues in this entry.