wwPDB EM Validation Summary Report (i)

Aug 5, 2026 – 06:55 AM EDT

PDB ID	:	7MFM / pdb_00007mfm
EMDB ID	:	EMD-23817
Title	:	Glutamate synthase, glutamate dehydrogenase counter-enzyme complex
Authors	:	Jayaraman, V.; Lee, D.J.; Elad, N.; Fraser, J.S.; Tawfik, D.S.
Deposited on	:	2021-04-10
Resolution	:	2.42 Å(reported)
Based on initial models	:	6S6T, 3K8Z, 1OFD

This is a wwPDB EM 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/EMValidationReportHelp
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:

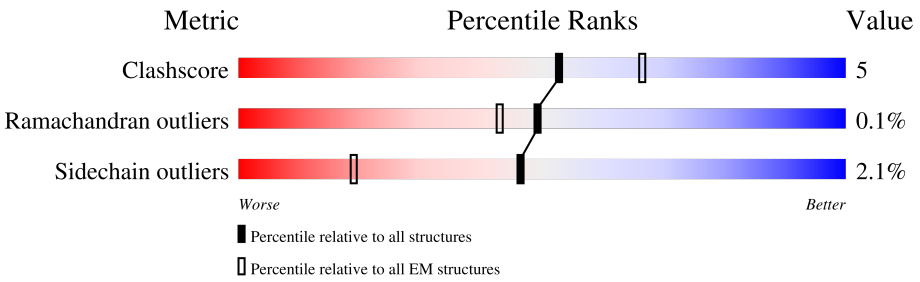
EMDB validation analysis	:	0.0.1.dev133
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

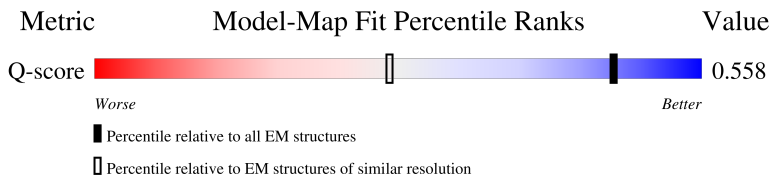
1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 2.42 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)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	5729 (1.92 - 2.92)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	424	85% 11% • •
1	B	424	5% 82% 14% • •
1	C	424	7% 83% 13% • •
1	D	424	7% 83% 13% • •

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Mol	Chain	Length	Quality of chain
1	E	424	5%, 82%, 13%
1	F	424	85%, 11%
2	G	1520	84%, 13%
2	H	1520	84%, 13%
3	I	524	78%, 15%, 6%
3	J	524	78%, 15%, 6%

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 100125 atoms, of which 49885 are hydrogens and 0 are deuteriums.

In the tables below, 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 Glutamate dehydrogenase.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
1	A	410	6400	2023	3206	549	604	18	0	0
1	B	410	6400	2023	3206	549	604	18	0	0
1	C	410	6399	2023	3205	549	604	18	0	0
1	D	410	6400	2023	3206	549	604	18	0	0
1	E	410	6400	2023	3206	549	604	18	0	0
1	F	410	6400	2023	3206	549	604	18	0	0

- Molecule 2 is a protein called Glutamate synthase (NADPH) large chain.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
2	G	1483	23054	7320	11459	1998	2233	44	0	0
2	H	1483	23054	7320	11459	1998	2233	44	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	1181	VAL	ALA	conflict	UNP A0A164XVV7
H	1181	VAL	ALA	conflict	UNP A0A164XVV7

- Molecule 3 is a protein called Glutamate synthase (NADPH) small chain.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
3	I	490	7652	2420	3816	675	724	17	0	0

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Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
3	J	490	7652	2420	3816	675	724	17	0	0

There are 64 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
I	78	GLY	ASP	engineered mutation	UNP A0A164XVU4
I	494	GLY	-	expression tag	UNP A0A164XVU4
I	495	SER	-	expression tag	UNP A0A164XVU4
I	496	TRP	-	expression tag	UNP A0A164XVU4
I	497	SER	-	expression tag	UNP A0A164XVU4
I	498	HIS	-	expression tag	UNP A0A164XVU4
I	499	PRO	-	expression tag	UNP A0A164XVU4
I	500	GLN	-	expression tag	UNP A0A164XVU4
I	501	PHE	-	expression tag	UNP A0A164XVU4
I	502	GLU	-	expression tag	UNP A0A164XVU4
I	503	LYS	-	expression tag	UNP A0A164XVU4
I	504	GLY	-	expression tag	UNP A0A164XVU4
I	505	GLY	-	expression tag	UNP A0A164XVU4
I	506	GLY	-	expression tag	UNP A0A164XVU4
I	507	SER	-	expression tag	UNP A0A164XVU4
I	508	GLY	-	expression tag	UNP A0A164XVU4
I	509	GLY	-	expression tag	UNP A0A164XVU4
I	510	GLY	-	expression tag	UNP A0A164XVU4
I	511	SER	-	expression tag	UNP A0A164XVU4
I	512	GLY	-	expression tag	UNP A0A164XVU4
I	513	GLY	-	expression tag	UNP A0A164XVU4
I	514	SER	-	expression tag	UNP A0A164XVU4
I	515	ALA	-	expression tag	UNP A0A164XVU4
I	516	TRP	-	expression tag	UNP A0A164XVU4
I	517	SER	-	expression tag	UNP A0A164XVU4
I	518	HIS	-	expression tag	UNP A0A164XVU4
I	519	PRO	-	expression tag	UNP A0A164XVU4
I	520	GLN	-	expression tag	UNP A0A164XVU4
I	521	PHE	-	expression tag	UNP A0A164XVU4
I	522	GLU	-	expression tag	UNP A0A164XVU4
I	523	ASN	-	expression tag	UNP A0A164XVU4
I	524	LYS	-	expression tag	UNP A0A164XVU4
J	78	GLY	ASP	engineered mutation	UNP A0A164XVU4
J	494	GLY	-	expression tag	UNP A0A164XVU4
J	495	SER	-	expression tag	UNP A0A164XVU4
J	496	TRP	-	expression tag	UNP A0A164XVU4

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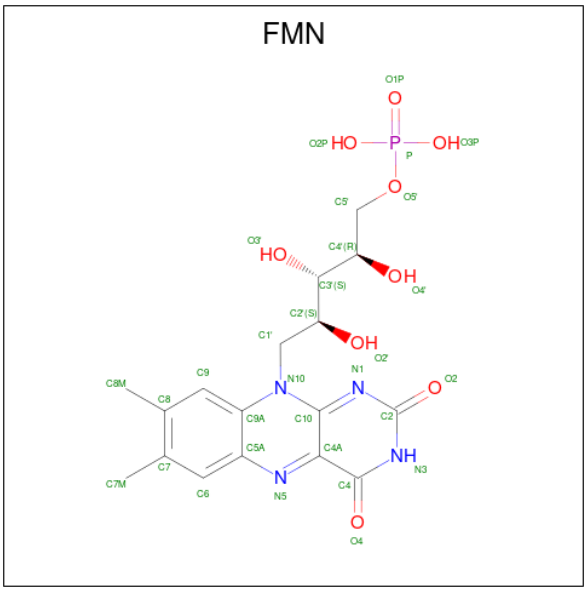
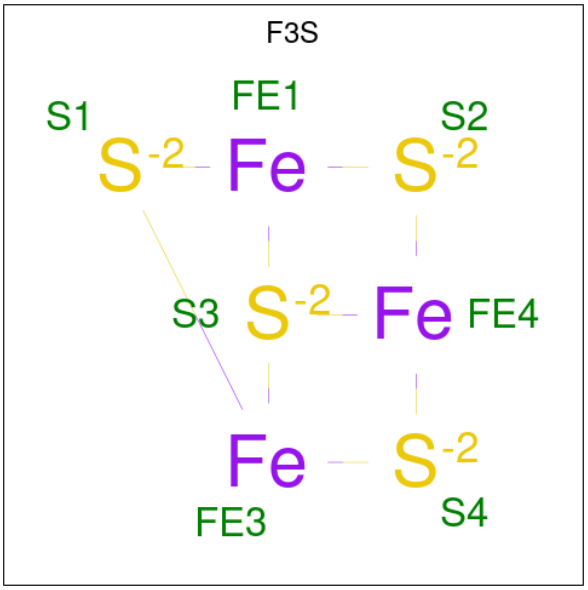
Chain	Residue	Modelled	Actual	Comment	Reference
J	497	SER	-	expression tag	UNP A0A164XVU4
J	498	HIS	-	expression tag	UNP A0A164XVU4
J	499	PRO	-	expression tag	UNP A0A164XVU4
J	500	GLN	-	expression tag	UNP A0A164XVU4
J	501	PHE	-	expression tag	UNP A0A164XVU4
J	502	GLU	-	expression tag	UNP A0A164XVU4
J	503	LYS	-	expression tag	UNP A0A164XVU4
J	504	GLY	-	expression tag	UNP A0A164XVU4
J	505	GLY	-	expression tag	UNP A0A164XVU4
J	506	GLY	-	expression tag	UNP A0A164XVU4
J	507	SER	-	expression tag	UNP A0A164XVU4
J	508	GLY	-	expression tag	UNP A0A164XVU4
J	509	GLY	-	expression tag	UNP A0A164XVU4
J	510	GLY	-	expression tag	UNP A0A164XVU4
J	511	SER	-	expression tag	UNP A0A164XVU4
J	512	GLY	-	expression tag	UNP A0A164XVU4
J	513	GLY	-	expression tag	UNP A0A164XVU4
J	514	SER	-	expression tag	UNP A0A164XVU4
J	515	ALA	-	expression tag	UNP A0A164XVU4
J	516	TRP	-	expression tag	UNP A0A164XVU4
J	517	SER	-	expression tag	UNP A0A164XVU4
J	518	HIS	-	expression tag	UNP A0A164XVU4
J	519	PRO	-	expression tag	UNP A0A164XVU4
J	520	GLN	-	expression tag	UNP A0A164XVU4
J	521	PHE	-	expression tag	UNP A0A164XVU4
J	522	GLU	-	expression tag	UNP A0A164XVU4
J	523	ASN	-	expression tag	UNP A0A164XVU4
J	524	LYS	-	expression tag	UNP A0A164XVU4

- Molecule 4 is FLAVIN MONONUCLEOTIDE (CCD ID: FMN) (formula: $C_{17}H_{21}N_4O_9P$).



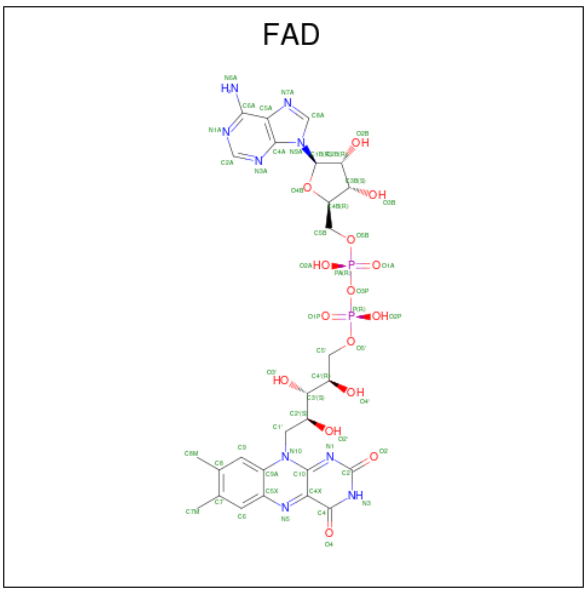
Mol	Chain	Residues	Atoms						AltConf
			Total	C	H	N	O	P	
4	G	1	50	17	19	4	9	1	0
4	H	1	50	17	19	4	9	1	0

- Molecule 5 is FE3-S4 CLUSTER (CCD ID: F3S) (formula: Fe_3S_4).



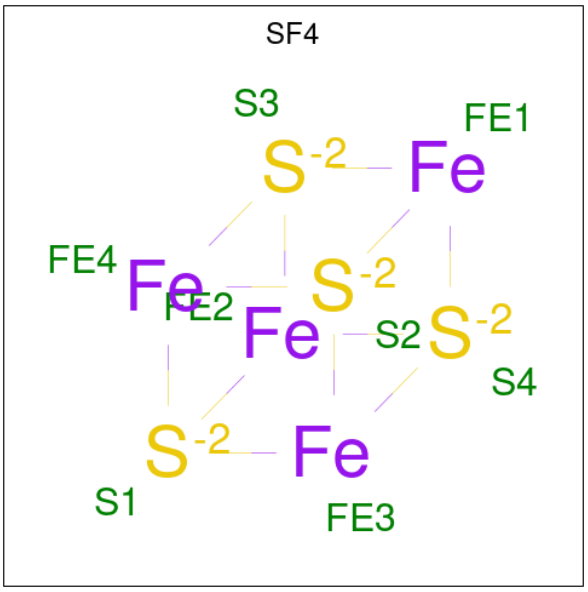
Mol	Chain	Residues	Atoms			AltConf
			Total	Fe	S	
5	G	1	7	3	4	0
5	H	1	7	3	4	0

- Molecule 6 is FLAVIN-ADENINE DINUCLEOTIDE (CCD ID: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



Mol	Chain	Residues	Atoms						AltConf
			Total	C	H	N	O	P	
6	I	1	84	27	31	9	15	2	0
6	J	1	84	27	31	9	15	2	0

- Molecule 7 is IRON/SULFUR CLUSTER (CCD ID: SF4) (formula: Fe_4S_4).



Mol	Chain	Residues	Atoms			AltConf
			Total	Fe	S	
7	I	1	8	4	4	0

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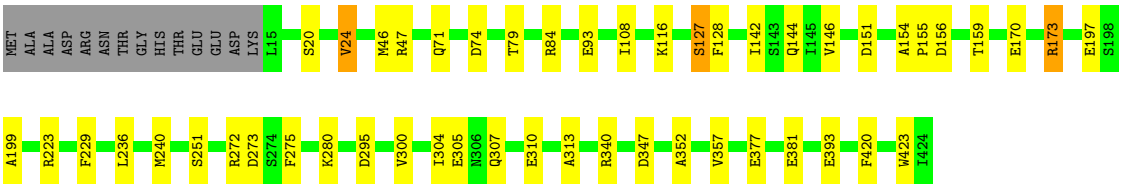
Mol	Chain	Residues	Atoms			AltConf
			Total	Fe	S	
7	I	1	8	4	4	0
			Total	Fe	S	
7	J	1	8	4	4	0
			Total	Fe	S	
7	J	1	8	4	4	0

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 atom inclusion in map 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 diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). 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.

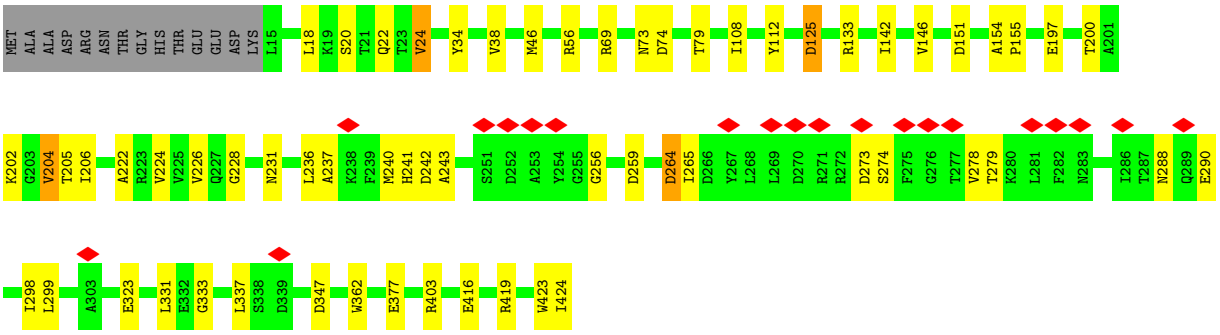
• Molecule 1: Glutamate dehydrogenase

Chain A:



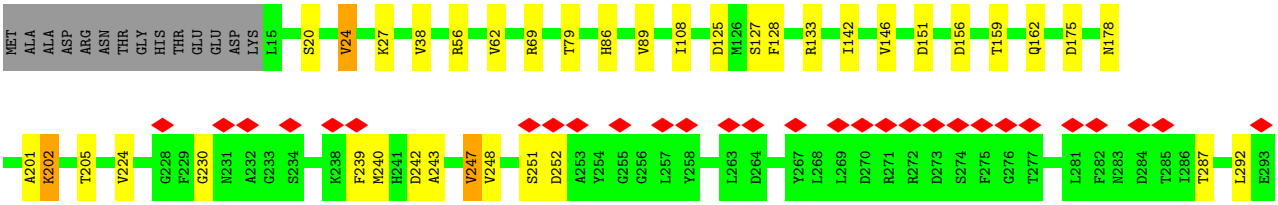
• Molecule 1: Glutamate dehydrogenase

Chain B:



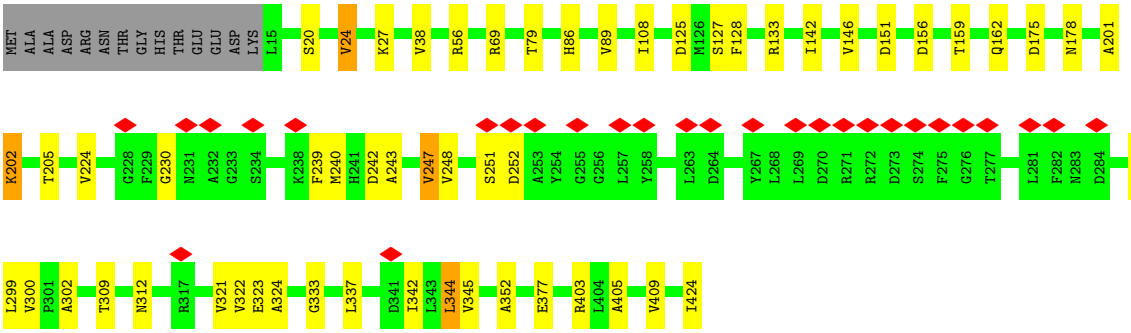
• Molecule 1: Glutamate dehydrogenase

Chain C:



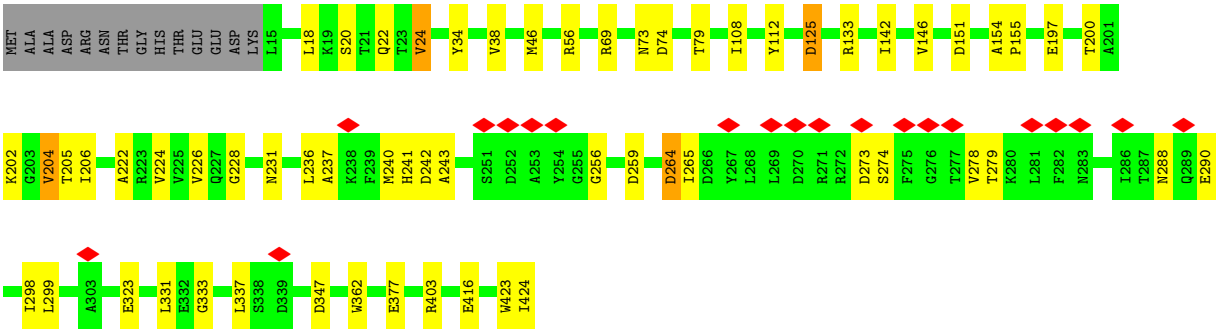
• Molecule 1: Glutamate dehydrogenase

Chain D:



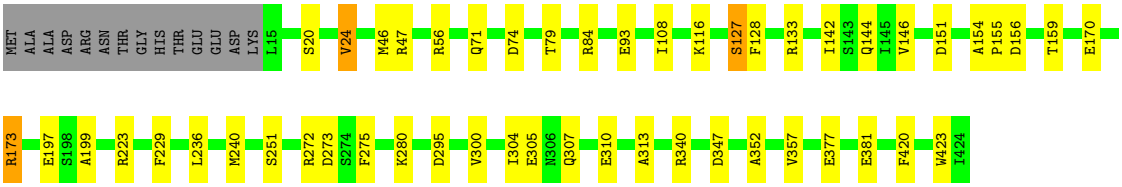
• Molecule 1: Glutamate dehydrogenase

Chain E:



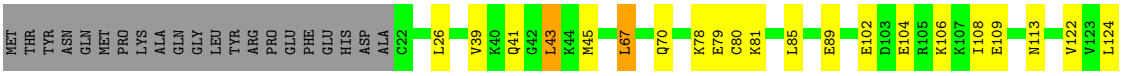
• Molecule 1: Glutamate dehydrogenase

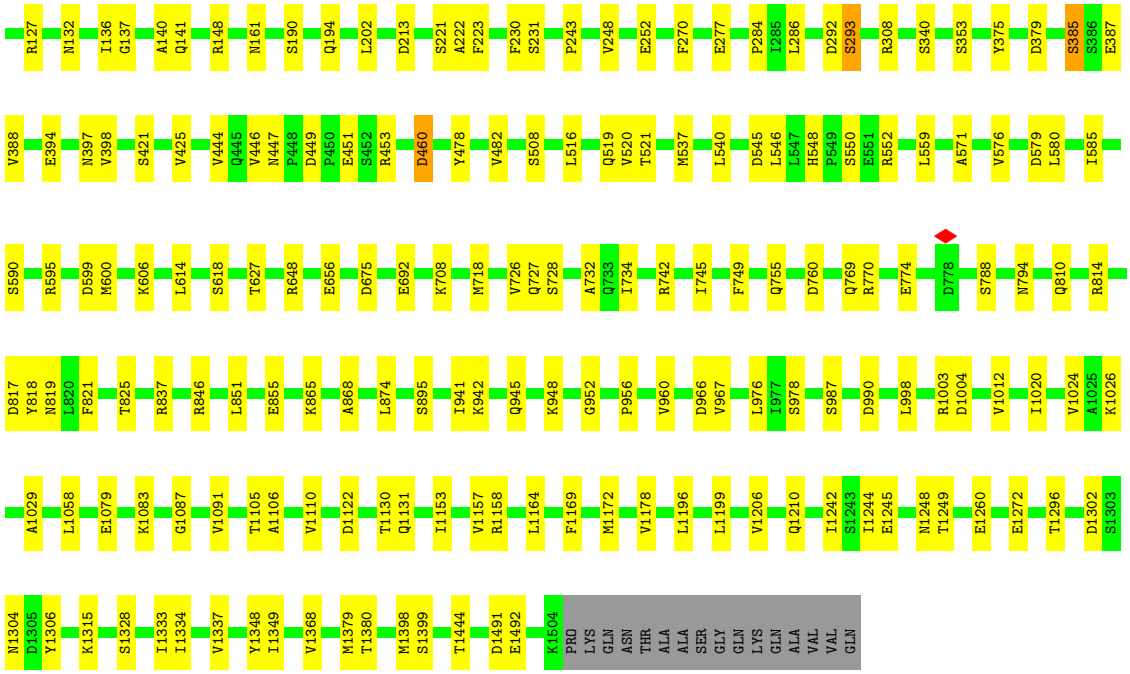
Chain F:



• Molecule 2: Glutamate synthase (NADPH) large chain

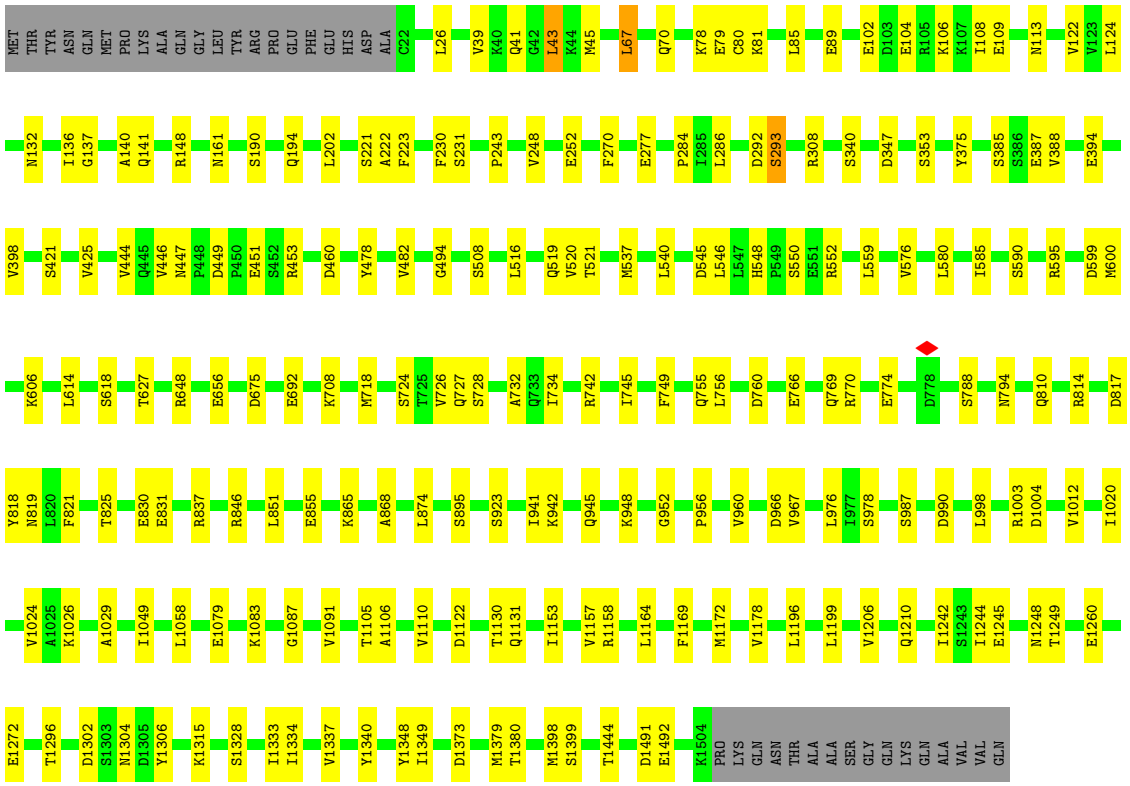
Chain G:





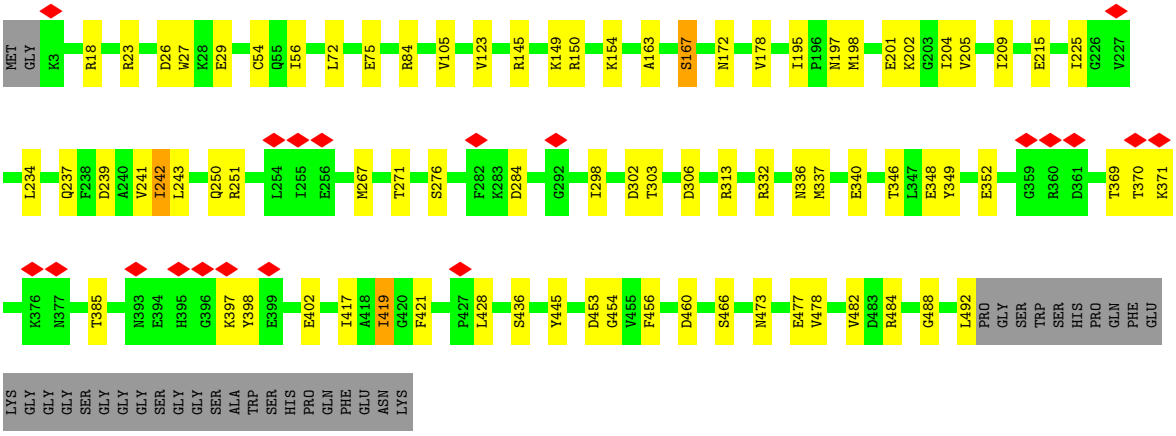
• Molecule 2: Glutamate synthase (NADPH) large chain

Chain H:



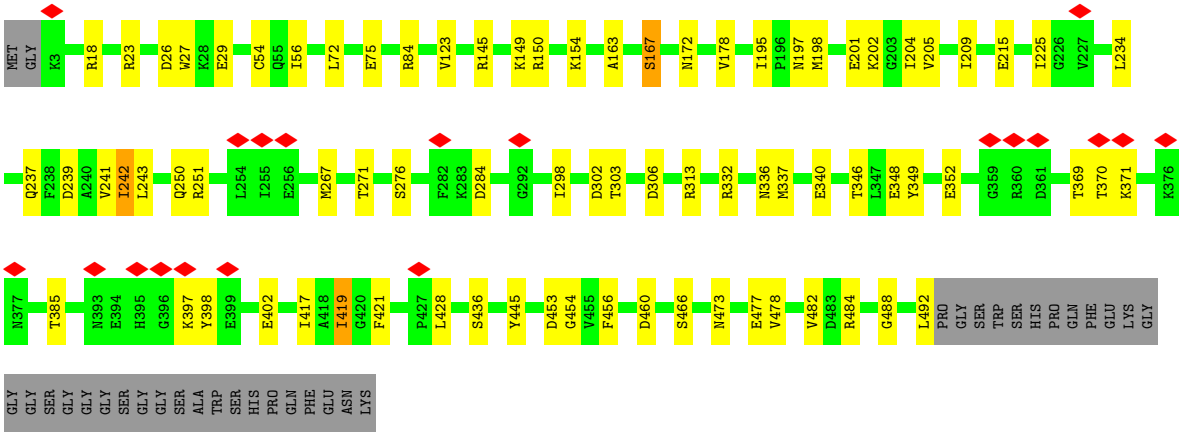
• Molecule 3: Glutamate synthase (NADPH) small chain

Chain I:



- Molecule 3: Glutamate synthase (NADPH) small chain

Chain J:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C2	Depositor
Number of particles used	718672	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	47.7	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	47.481	Depositor
Minimum map value	-20.379	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	1.000	Depositor
Recommended contour level	3.2	Depositor
Map size (Å)	421.888, 421.888, 421.888	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.824, 0.824, 0.824	Depositor

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: SF4, F3S, FAD, FMN

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	0.14	0/3253	0.27	0/4393
1	B	0.13	0/3253	0.29	0/4393
1	C	0.13	0/3253	0.27	0/4393
1	D	0.13	0/3253	0.27	0/4393
1	E	0.13	0/3253	0.29	0/4393
1	F	0.14	0/3253	0.27	0/4393
2	G	0.12	0/11822	0.28	0/15965
2	H	0.12	0/11822	0.28	0/15965
3	I	0.11	0/3914	0.30	0/5282
3	J	0.11	0/3914	0.30	0/5282
All	All	0.12	0/50990	0.28	0/68852

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	3194	3206	3206	33	0
1	B	3194	3206	3206	37	0
1	C	3194	3205	3206	38	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	3194	3206	3206	39	0
1	E	3194	3206	3206	36	0
1	F	3194	3206	3206	32	0
2	G	11595	11459	11460	115	0
2	H	11595	11459	11460	115	0
3	I	3836	3816	3815	50	0
3	J	3836	3816	3815	50	0
4	G	31	19	19	2	0
4	H	31	19	19	2	0
5	G	7	0	0	0	0
5	H	7	0	0	0	0
6	I	53	31	31	2	0
6	J	53	31	31	1	0
7	I	16	0	0	0	0
7	J	16	0	0	0	0
All	All	50240	49885	49886	532	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 5.

The worst 5 of 532 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)
3:J:369:THR:HG1	3:J:385:THR:HG1	1.22	0.87
2:G:375:TYR:OH	2:G:1302:ASP:OD2	1.94	0.86
2:H:375:TYR:OH	2:H:1302:ASP:OD2	1.94	0.86
3:J:445:TYR:OH	3:J:473:ASN:OD1	2.03	0.77
2:G:817:ASP:OD1	2:G:818:TYR:N	2.19	0.76

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 PDB entries followed by that with respect to all EM entries.

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	408/424 (96%)	396 (97%)	12 (3%)	0	100	100
1	B	408/424 (96%)	384 (94%)	23 (6%)	1 (0%)	43	57
1	C	408/424 (96%)	384 (94%)	24 (6%)	0	100	100
1	D	408/424 (96%)	384 (94%)	24 (6%)	0	100	100
1	E	408/424 (96%)	384 (94%)	23 (6%)	1 (0%)	43	57
1	F	408/424 (96%)	396 (97%)	12 (3%)	0	100	100
2	G	1481/1520 (97%)	1407 (95%)	73 (5%)	1 (0%)	48	63
2	H	1481/1520 (97%)	1408 (95%)	72 (5%)	1 (0%)	48	63
3	I	488/524 (93%)	455 (93%)	32 (7%)	1 (0%)	43	57
3	J	488/524 (93%)	455 (93%)	32 (7%)	1 (0%)	43	57
All	All	6386/6632 (96%)	6053 (95%)	327 (5%)	6 (0%)	49	63

5 of 6 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	G	576	VAL
2	H	576	VAL
3	I	242	ILE
3	J	242	ILE
1	B	231	ASN

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 PDB entries followed by that with respect to all EM entries.

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	343/354 (97%)	334 (97%)	9 (3%)	40	61
1	B	343/354 (97%)	335 (98%)	8 (2%)	44	64
1	C	343/354 (97%)	334 (97%)	9 (3%)	40	61
1	D	343/354 (97%)	334 (97%)	9 (3%)	40	61
1	E	343/354 (97%)	335 (98%)	8 (2%)	44	64
1	F	343/354 (97%)	335 (98%)	8 (2%)	44	64

Continued on next page...

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	G	1239/1269 (98%)	1216 (98%)	23 (2%)	50	70
2	H	1239/1269 (98%)	1218 (98%)	21 (2%)	53	73
3	I	405/428 (95%)	396 (98%)	9 (2%)	45	66
3	J	405/428 (95%)	396 (98%)	9 (2%)	45	66
All	All	5346/5518 (97%)	5233 (98%)	113 (2%)	46	67

5 of 113 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	I	419	ILE
1	F	251	SER
1	B	24	VAL
1	F	197	GLU
1	E	197	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 27 such sidechains are listed below:

Mol	Chain	Res	Type
2	H	1365	ASN
3	J	248	GLN
1	E	289	GLN
2	H	1393	ASN
1	B	289	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

10 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	$\#\|Z\| > 2$
5	F3S	G	1602	2	0,9,9	-	-	-		
5	F3S	H	1602	2	0,9,9	-	-	-		
7	SF4	J	603	3	0,12,12	-	-	-		
7	SF4	J	602	3	0,12,12	-	-	-		
4	FMN	G	1601	-	33,33,33	1.04	2 (6%)	48,50,50	1.23	7 (14%)
4	FMN	H	1601	-	33,33,33	1.04	2 (6%)	48,50,50	1.24	7 (14%)
7	SF4	I	603	3	0,12,12	-	-	-		
6	FAD	I	601	-	58,58,58	0.32	0	85,89,89	0.30	0
6	FAD	J	601	-	58,58,58	0.32	0	85,89,89	0.30	0
7	SF4	I	602	3	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
5	F3S	G	1602	2	-	-	0/3/3/3
5	F3S	H	1602	2	-	-	0/3/3/3
7	SF4	J	603	3	-	-	0/6/5/5
7	SF4	J	602	3	-	-	0/6/5/5
4	FMN	G	1601	-	-	0/18/18/18	0/3/3/3
4	FMN	H	1601	-	-	0/18/18/18	0/3/3/3
7	SF4	I	603	3	-	-	0/6/5/5
6	FAD	I	601	-	-	13/34/50/50	0/6/6/6
6	FAD	J	601	-	-	13/34/50/50	0/6/6/6
7	SF4	I	602	3	-	-	0/6/5/5

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	G	1601	FMN	C4A-N5	3.34	1.38	1.30
4	H	1601	FMN	C4A-N5	3.30	1.37	1.30
4	G	1601	FMN	C10-N1	2.55	1.38	1.33
4	H	1601	FMN	C10-N1	2.55	1.38	1.33

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	G	1601	FMN	C4-N3-C2	-3.26	119.85	125.64
4	H	1601	FMN	C4-N3-C2	-3.25	119.87	125.64
4	G	1601	FMN	C4A-C10-N10	2.75	120.42	116.48
4	H	1601	FMN	C4A-C10-N10	2.74	120.41	116.48
4	H	1601	FMN	C4A-C4-N3	2.64	119.97	113.25

There are no chirality outliers.

5 of 26 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	I	601	FAD	C5B-O5B-PA-O1A
6	I	601	FAD	C2B-C1B-N9A-C8A
6	I	601	FAD	C2B-C1B-N9A-C4A
6	I	601	FAD	N10-C1'-C2'-O2'
6	J	601	FAD	C5B-O5B-PA-O1A

There are no ring outliers.

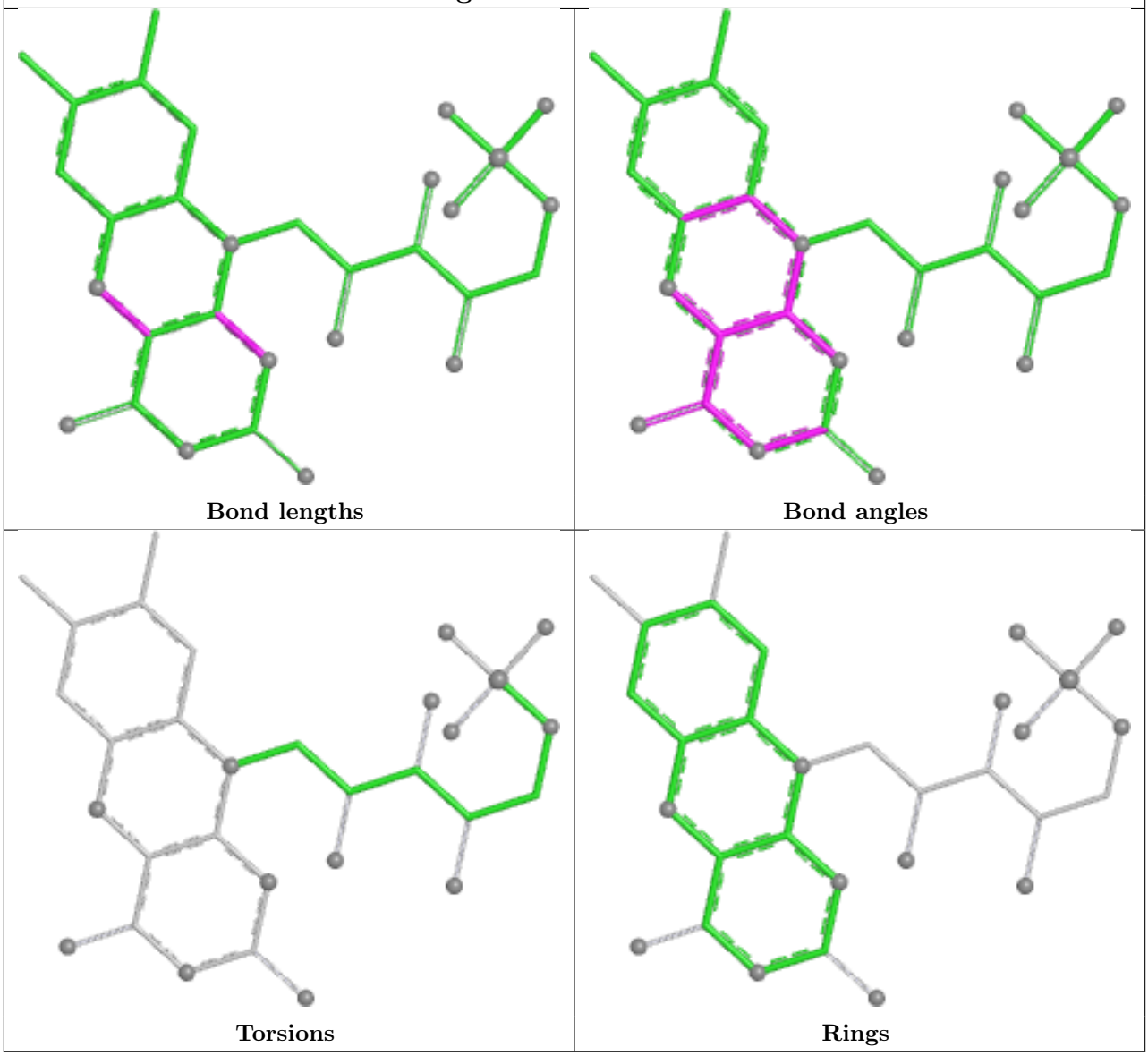
4 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	G	1601	FMN	2	0
4	H	1601	FMN	2	0
6	I	601	FAD	2	0
6	J	601	FAD	1	0

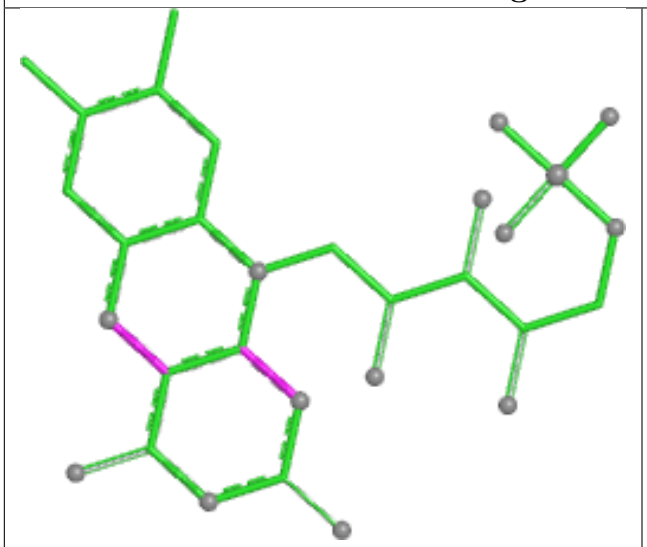
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

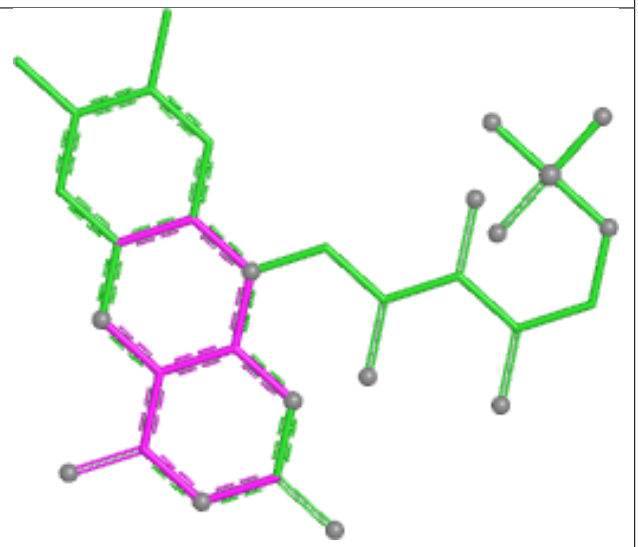
Ligand FMN G 1601



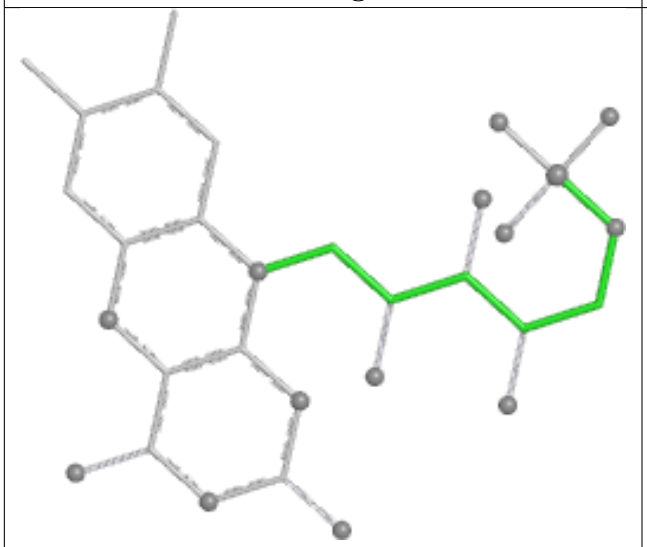
Ligand FMN H 1601



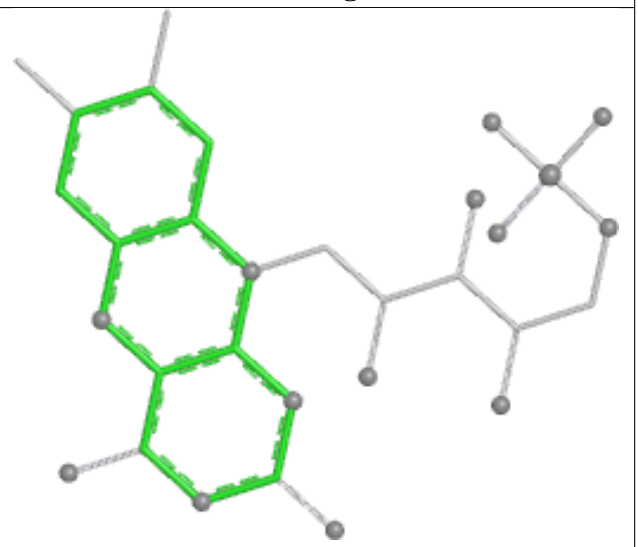
Bond lengths



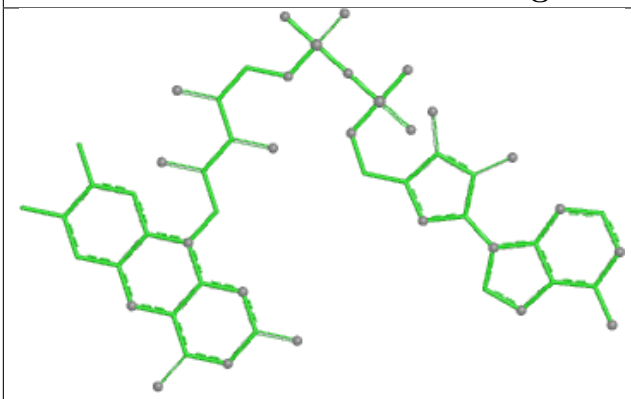
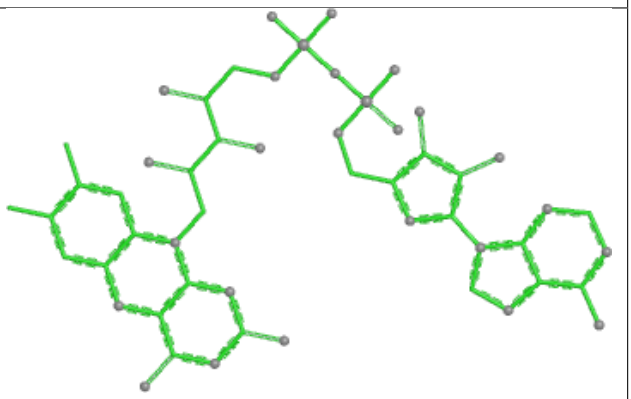
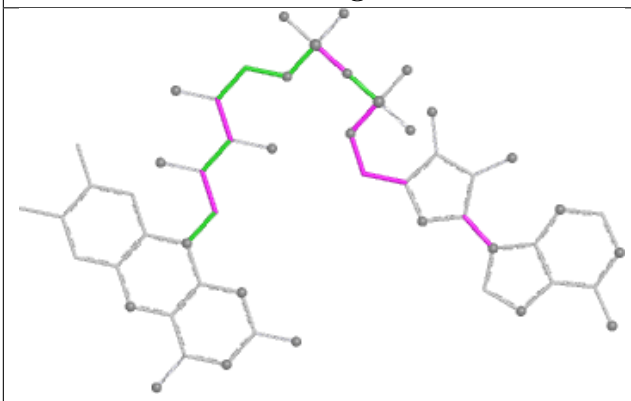
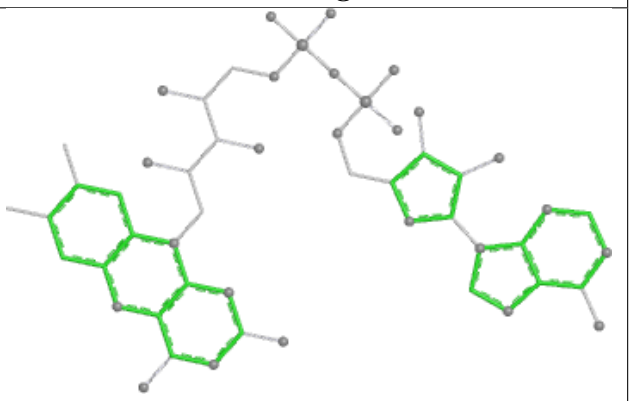
Bond angles

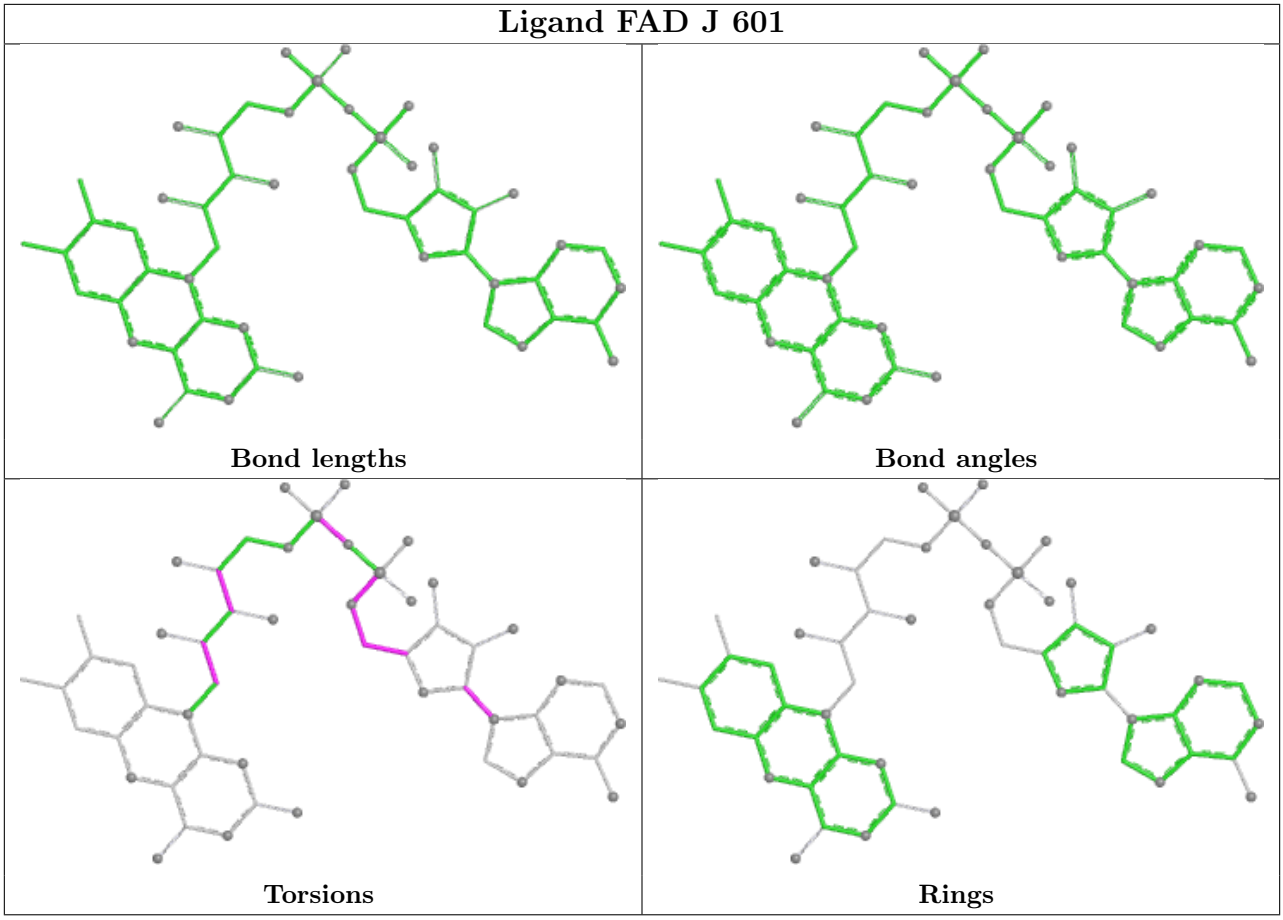


Torsions



Rings

Ligand FAD I 601	
 Bond lengths	 Bond angles
 Torsions	 Rings



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.

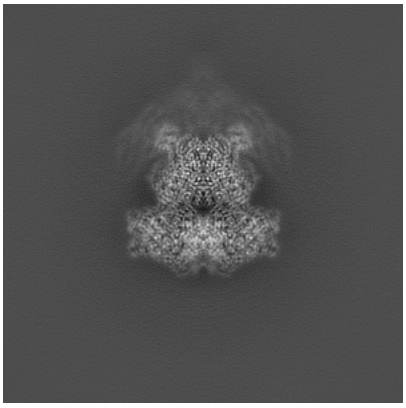
6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-23817. These allow visual inspection of the internal detail of the map and identification of artifacts.

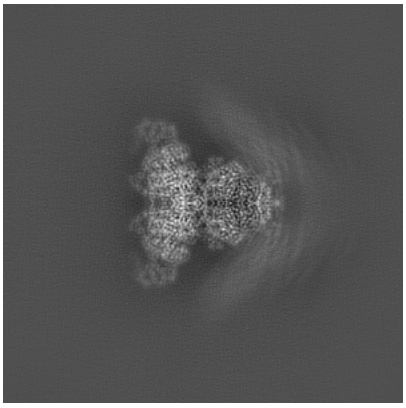
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections (i)

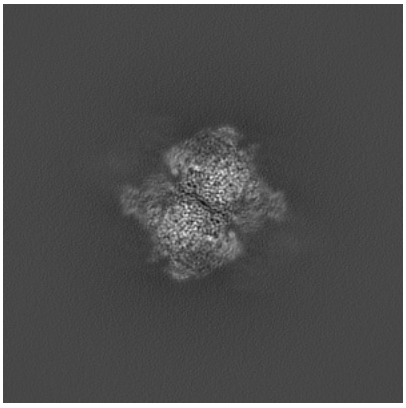
6.1.1 Primary map



X



Y

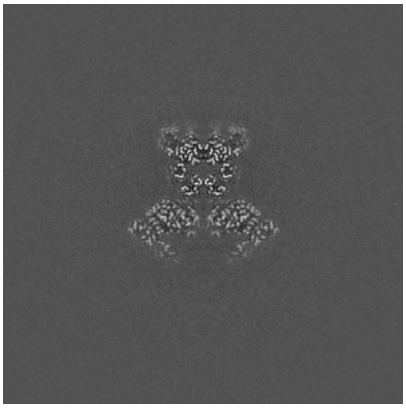


Z

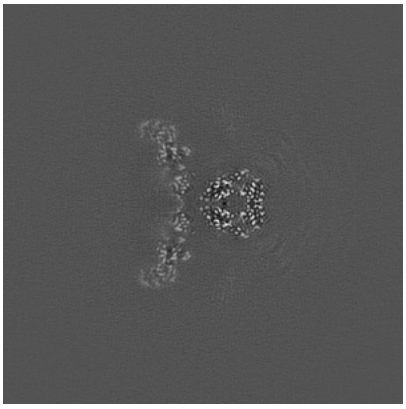
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

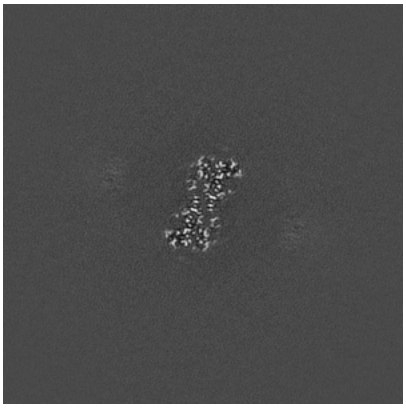
6.2.1 Primary map



X Index: 256



Y Index: 256

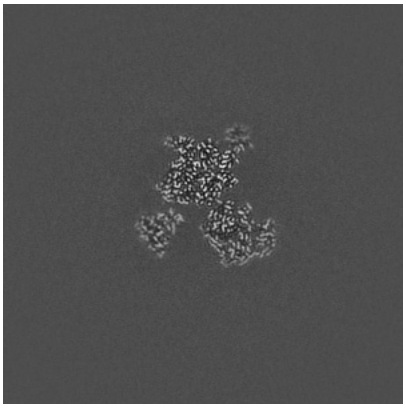


Z Index: 256

The images above show central slices of the map in three orthogonal directions.

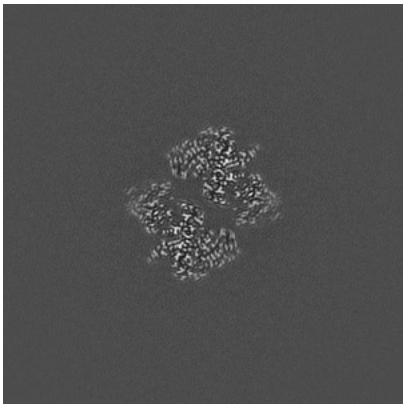
6.3 Largest variance slices (i)

6.3.1 Primary map



X Index: 268

Y Index: 241

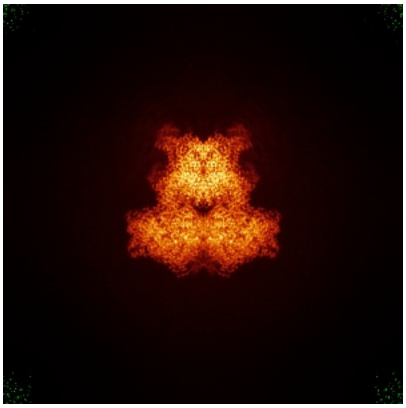


Z Index: 220

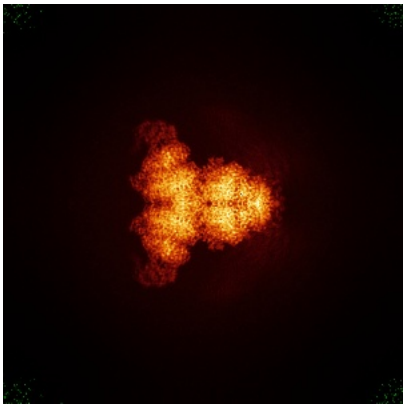
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

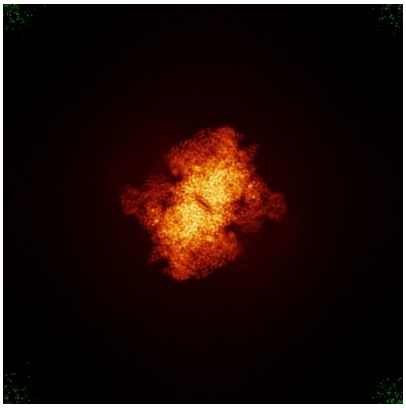
6.4.1 Primary map



X



Y



Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 3.2. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

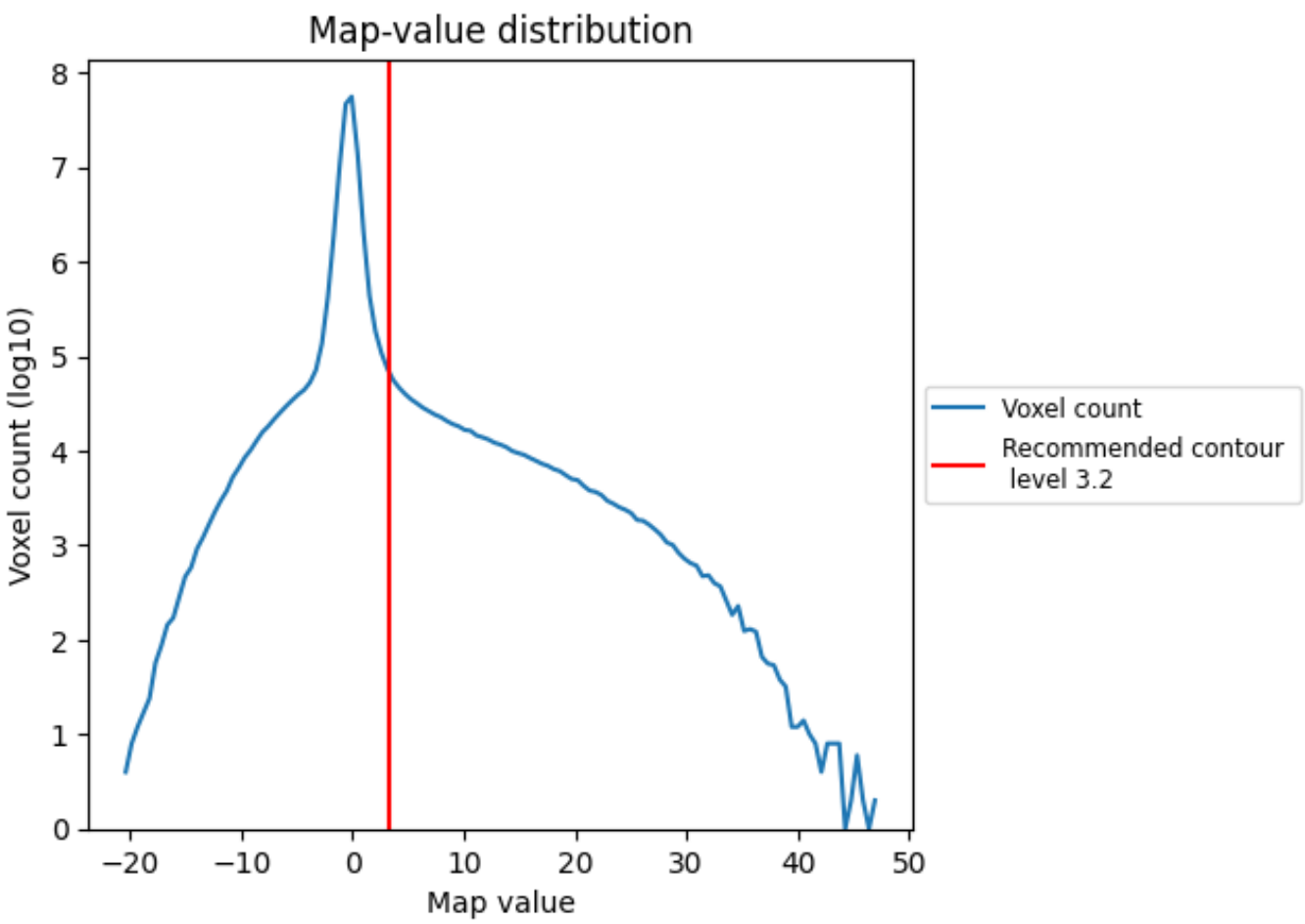
6.6 Mask visualisation (i)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis (i)

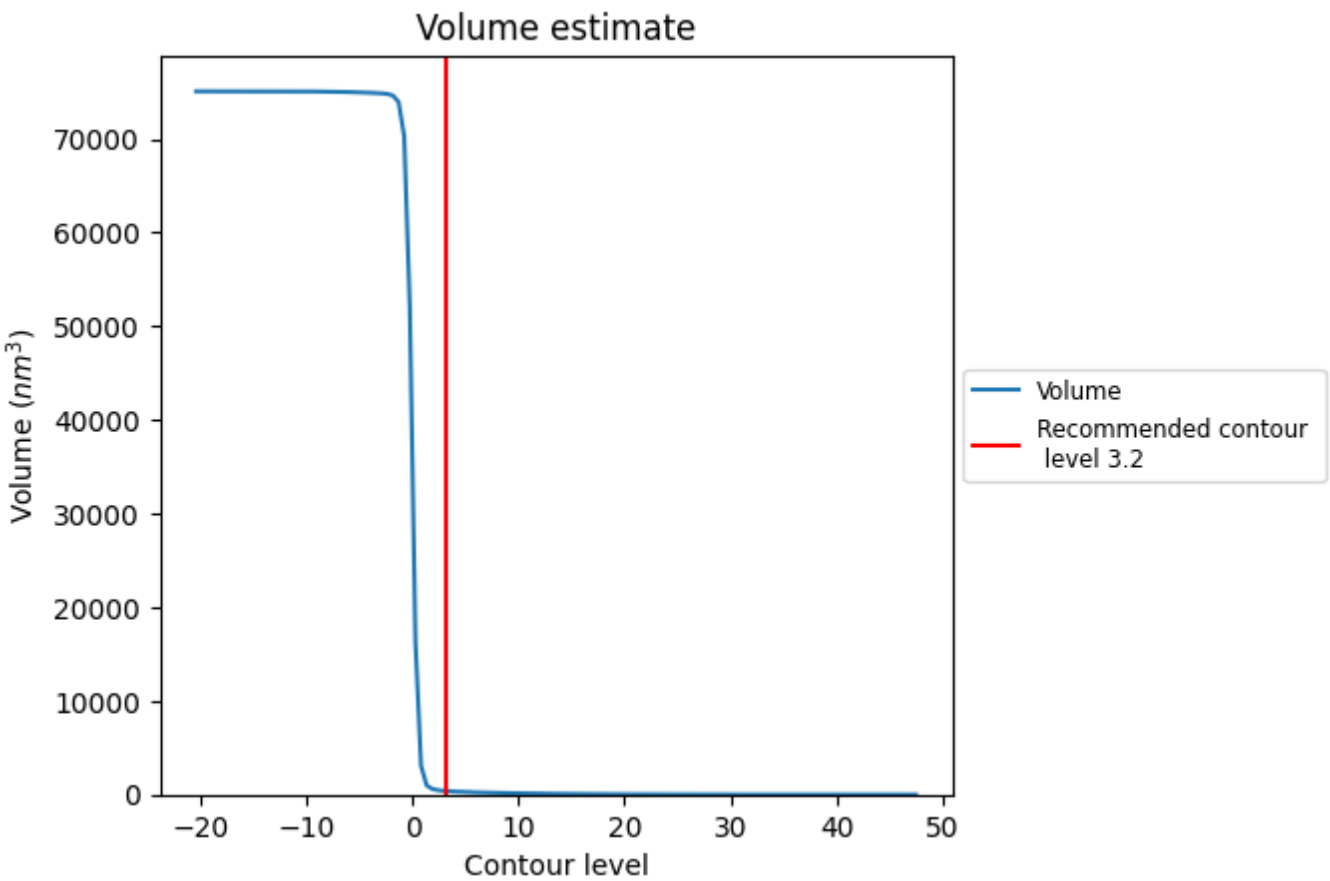
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution (i)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

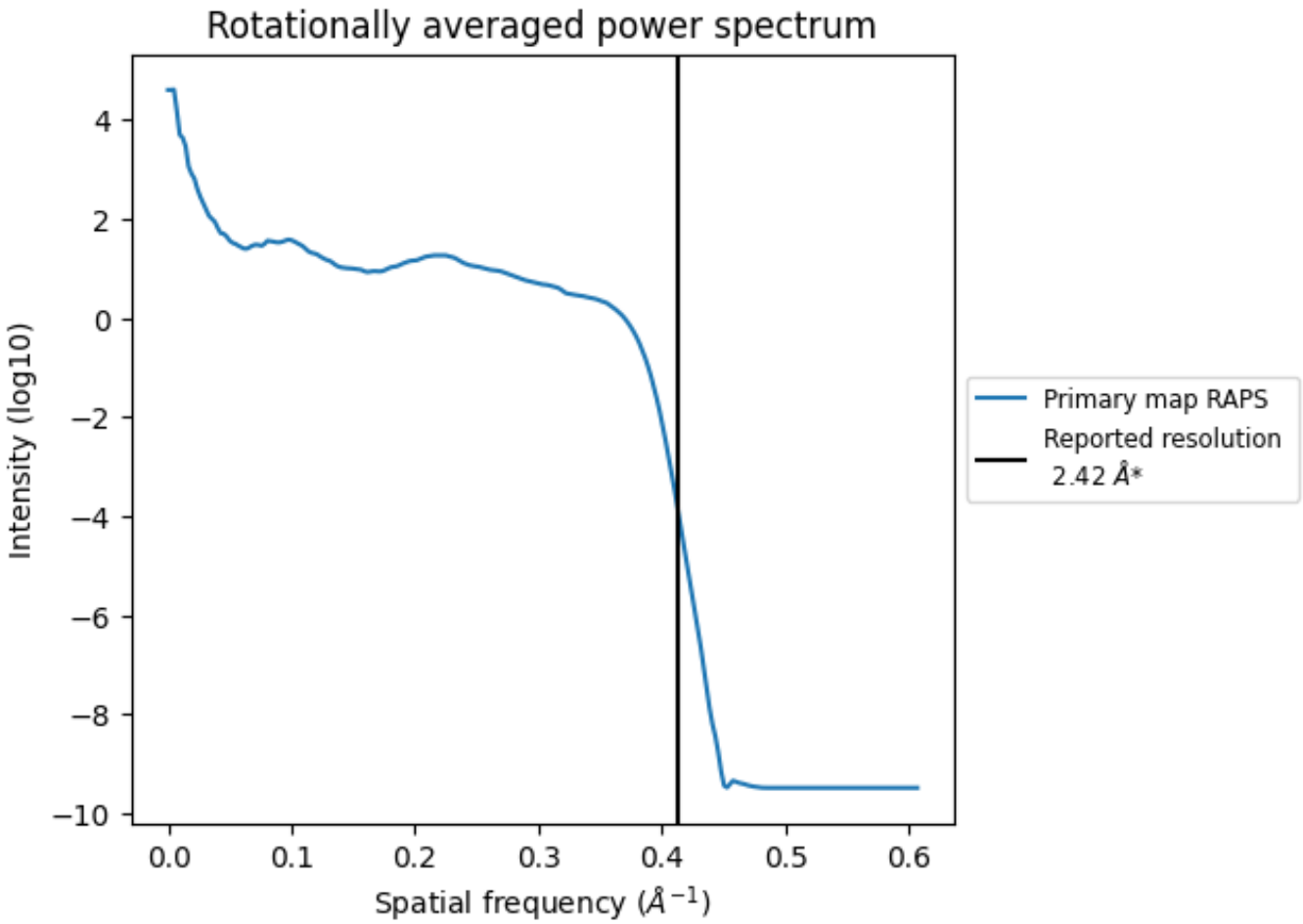
7.2 Volume estimate (i)



The volume at the recommended contour level is 379 nm^3; this corresponds to an approximate mass of 342 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum (i)



*Reported resolution corresponds to spatial frequency of 0.413 Å^{-1}

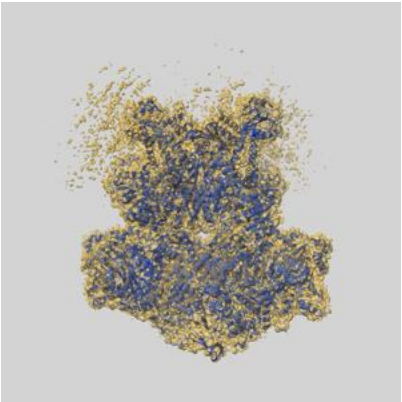
8 Fourier-Shell correlation (i)

This section was not generated. No FSC curve or half-maps provided.

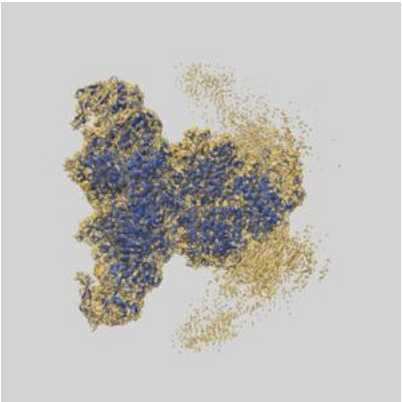
9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-23817 and PDB model 7MFM. Per-residue inclusion information can be found in section 3 on page 10.

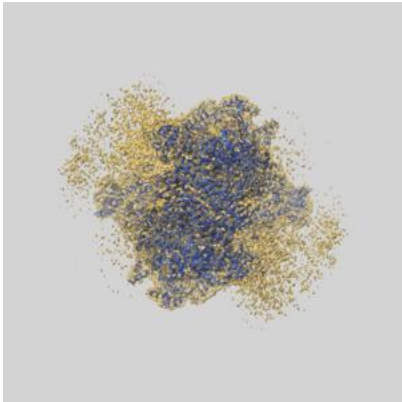
9.1 Map-model overlay (i)



X



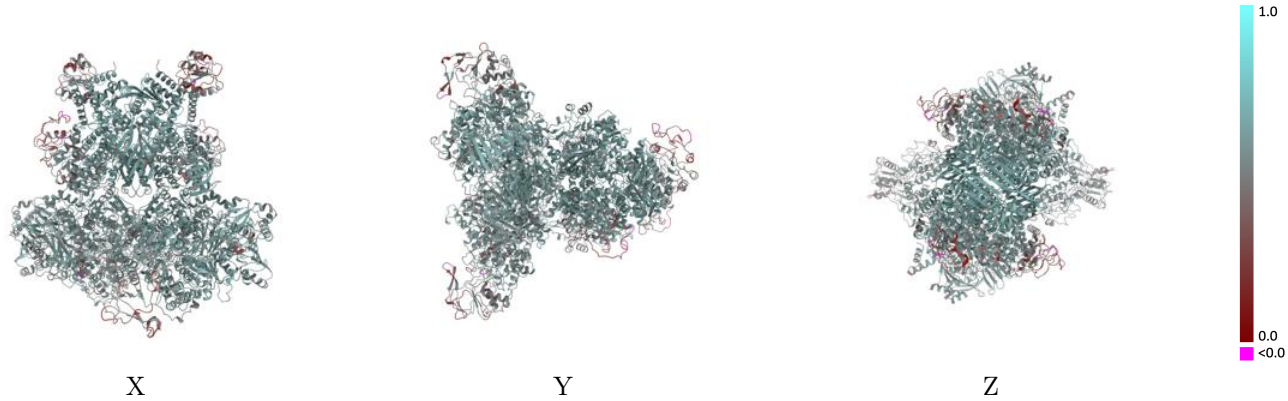
Y



Z

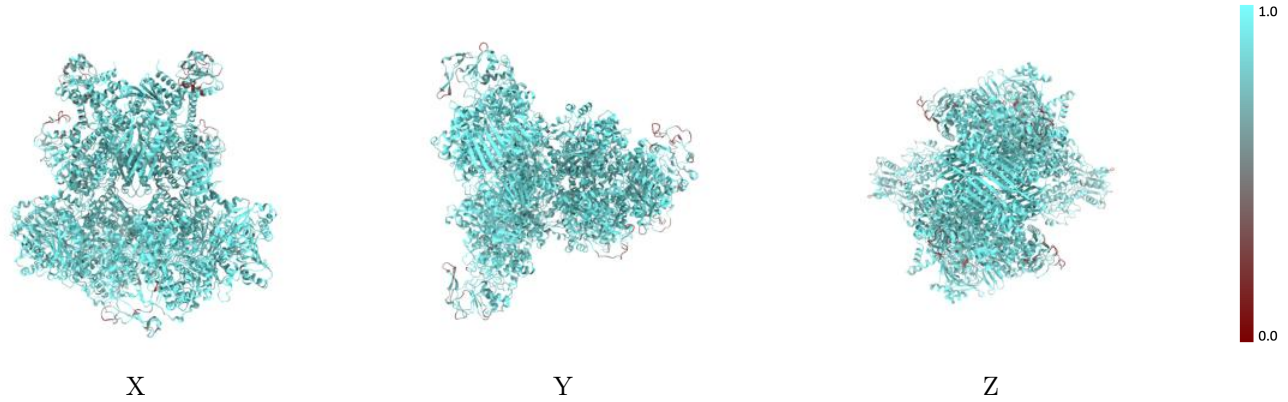
The images above show the 3D surface view of the map at the recommended contour level 3.2 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model (i)



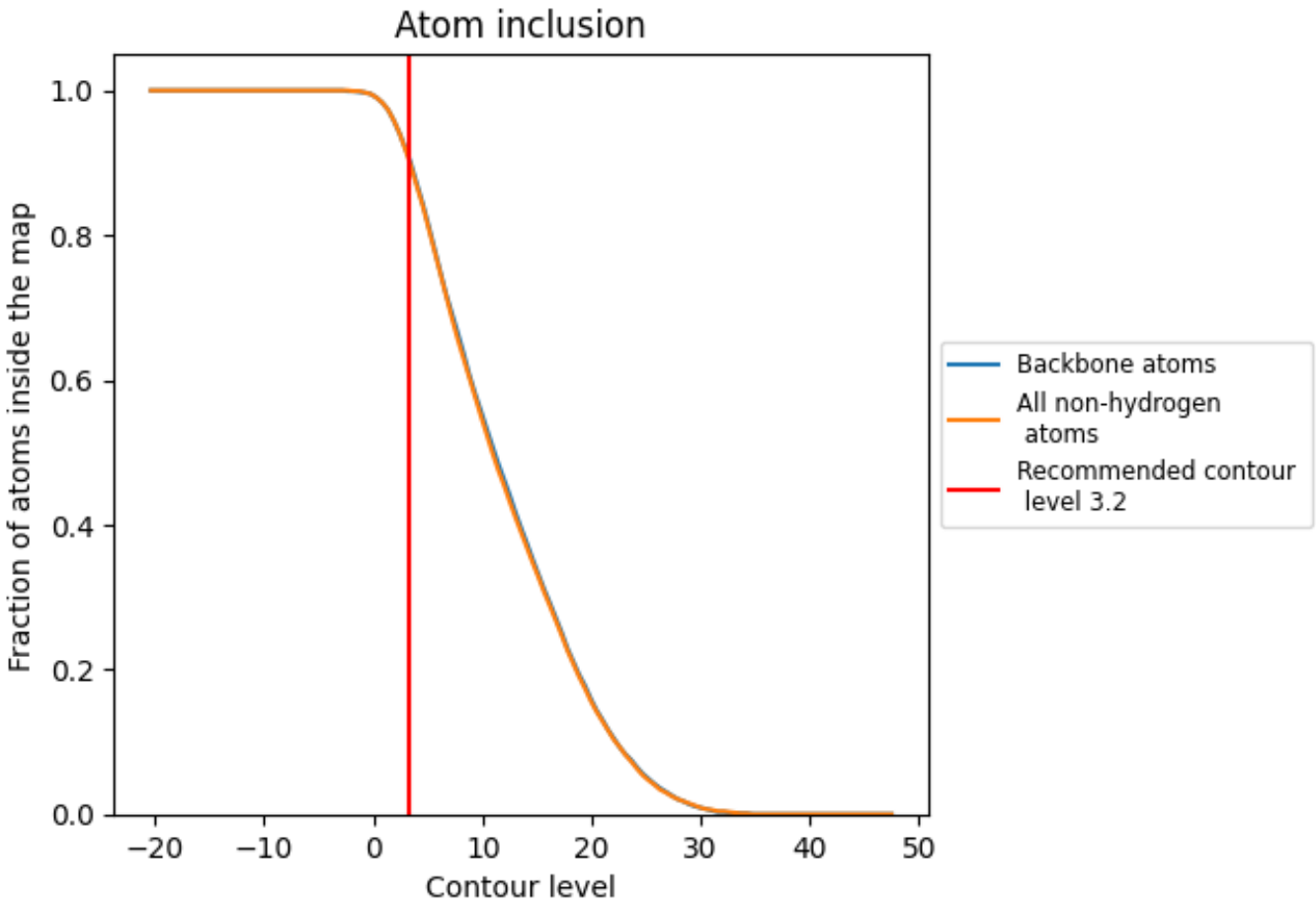
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model (i)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (3.2).

9.4 Atom inclusion (i)



At the recommended contour level, 91% of all backbone atoms, 91% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (3.2) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9070	0.5580
A	0.9470	0.6050
B	0.8690	0.5290
C	0.8570	0.5280
D	0.8560	0.5270
E	0.8710	0.5290
F	0.9470	0.6050
G	0.9360	0.5820
H	0.9370	0.5830
I	0.8510	0.4950
J	0.8510	0.4960