



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 20, 2024 – 12:59 pm BST

PDB ID : 5N1Q
Title : METHYL-COENZYME M REDUCTASE III FROM METHANOTHERMO-
COCCUS THERMOLITHOTROPHICUS AT 1.9 Å RESOLUTION
Authors : Wagner, T.; Wegner, C.E.; Ermler, U.; Shima, S.
Deposited on : 2017-02-06
Resolution : 1.90 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 types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36.2
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) : 2.36.2

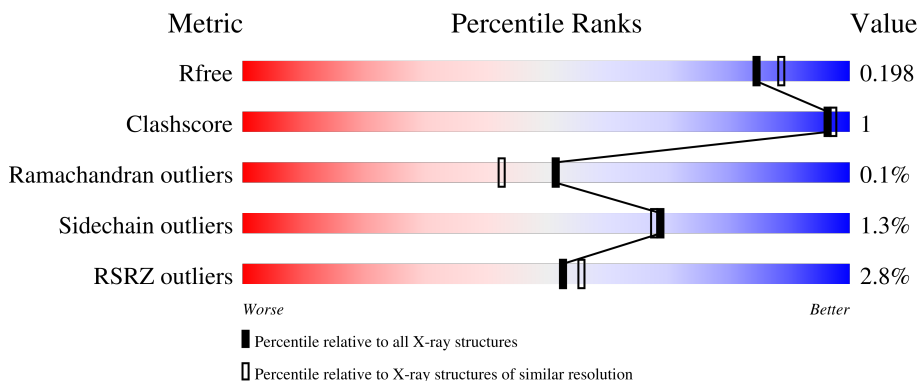
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.90 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.



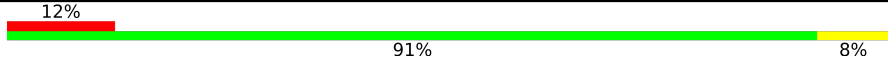
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	6207 (1.90-1.90)
Clashscore	141614	6847 (1.90-1.90)
Ramachandran outliers	138981	6760 (1.90-1.90)
Sidechain outliers	138945	6760 (1.90-1.90)
RSRZ outliers	127900	6082 (1.90-1.90)

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 $\leq 5\%$. 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	553	 2% 95%
1	D	553	 % 96%
2	B	443	 % 98%
2	E	443	 % 98%
3	C	261	 5% 96%

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Mol	Chain	Length	Quality of chain
3	F	261	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into three segments: a red segment on the left labeled '12%', a large green segment in the middle labeled '91%', and a yellow segment on the right labeled '8%'.</p>

2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 20909 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 METHYL-COENZYME M REDUCTASE III FROM METHANOTHERMOCOCCUS THERMOLITHOTROPHICUS SUBUNIT ALPHA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	549	Total 4280	C 2714	N 721	O 821	S 24	0	2	0
1	D	549	Total 4268	C 2706	N 719	O 819	S 24	0	0	0

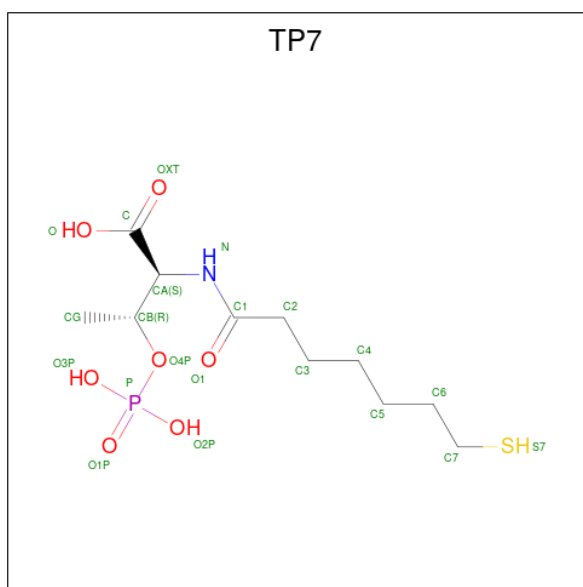
- Molecule 2 is a protein called METHYL-COENZYME M REDUCTASE III FROM METHANOTHERMOCOCCUS THERMOLITHOTROPHICUS SUBUNIT BETA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	442	Total 3312	C 2102	N 551	O 639	S 20	0	1	0
2	E	442	Total 3312	C 2102	N 551	O 639	S 20	0	1	0

- Molecule 3 is a protein called METHYL-COENZYME M REDUCTASE III FROM METHANOTHERMOCOCCUS THERMOLITHOTROPHICUS SUBUNIT GAMMA.

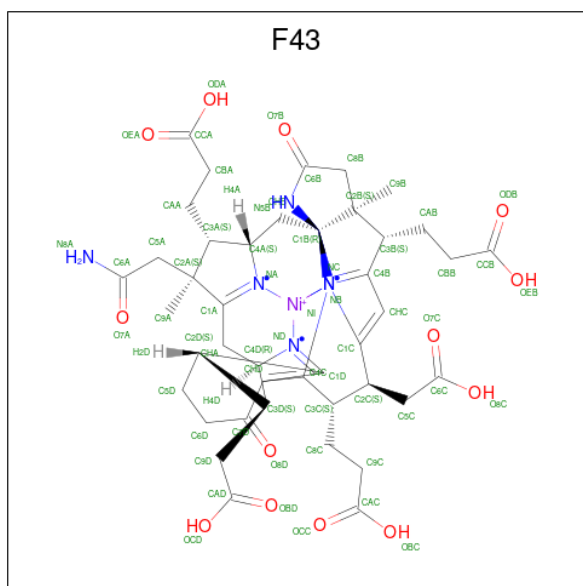
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	C	260	Total 2130	C 1341	N 376	O 402	S 11	0	1	0
3	F	260	Total 2124	C 1337	N 376	O 400	S 11	0	0	0

- Molecule 4 is Coenzyme B (three-letter code: TP7) (formula: C₁₁H₂₂NO₇PS).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	N	O	P			S
4	A	1	Total	C	N	O	P	S	0	0
			21	11	1	7	1	1		
4	D	1	Total	C	N	O	P	S	0	0
			21	11	1	7	1	1		

- Molecule 5 is FACTOR 430 (three-letter code: F43) (formula: $C_{42}H_{51}N_6NiO_{13}$).

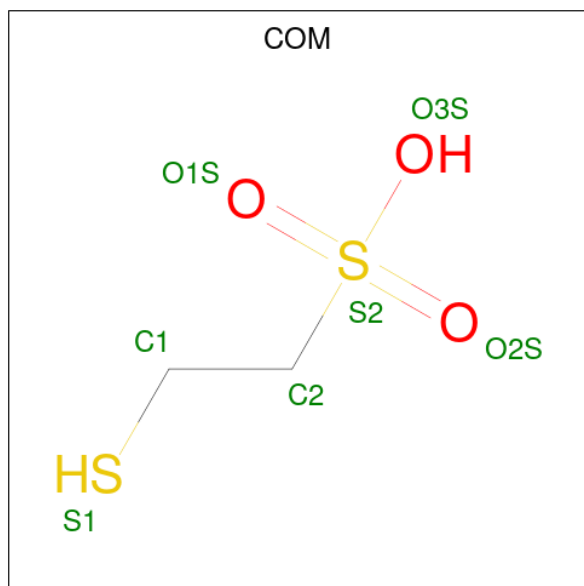


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	Ni			O
5	A	1	Total	C	N	Ni	O	0	0
			62	42	6	1	13		
5	D	1	Total	C	N	Ni	O	0	0
			62	42	6	1	13		

- Molecule 6 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total K 1 1	0	0

- Molecule 7 is 1-THIOETHANESULFONIC ACID (three-letter code: COM) (formula: C₂H₆O₃S₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total C O S 7 2 3 2	0	0
7	D	1	Total C O S 7 2 3 2	0	0

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total C O 6 3 3	0	0
8	D	1	Total C O 6 3 3	0	0
8	F	1	Total C O 6 3 3	0	0

- Molecule 9 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	E	1	Total Mg 1 1	0	0

- Molecule 10 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	273	Total O 273 273	0	0
10	B	272	Total O 272 272	0	0
10	C	144	Total O 144 144	0	0
10	D	267	Total O 267 267	0	0
10	E	225	Total O 225 225	0	0

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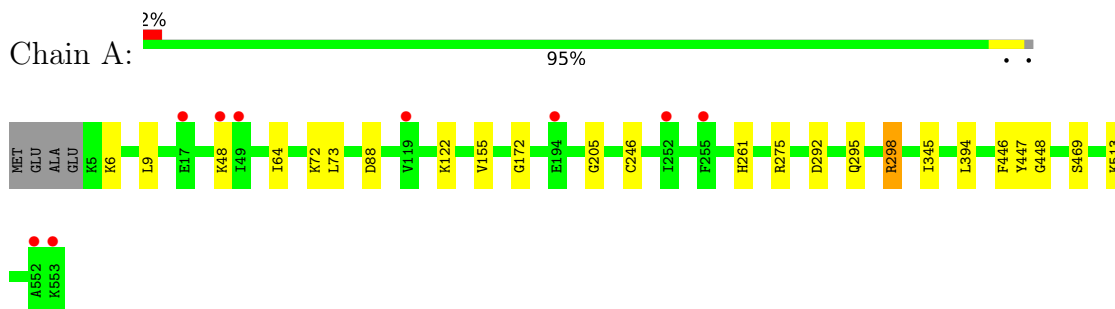
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	F	102	Total 102	O 102	0	0

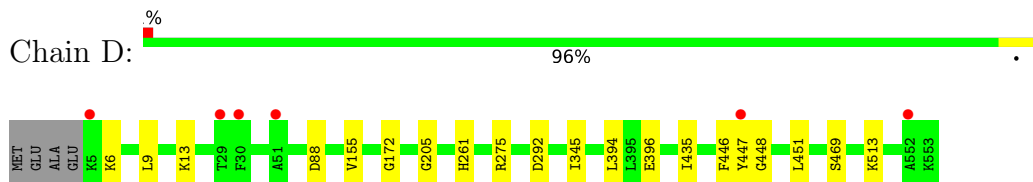
3 Residue-property plots [i](#)

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.

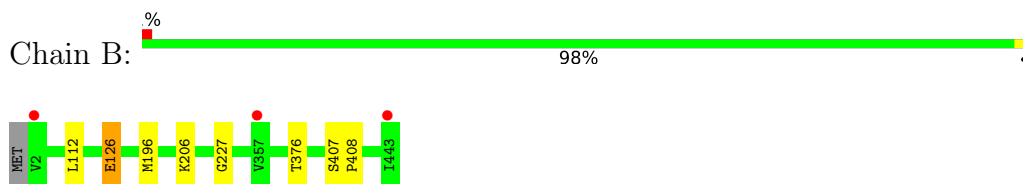
- Molecule 1: METHYL-COENZYME M REDUCTASE III FROM METHANOTHERMOCOCUS THERMOLITHOTROPHICUS SUBUNIT ALPHA



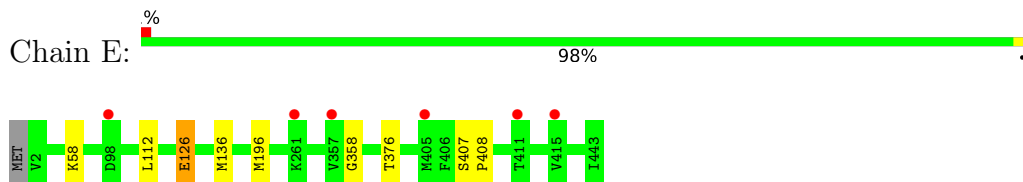
- Molecule 1: METHYL-COENZYME M REDUCTASE III FROM METHANOTHERMOCOCUS THERMOLITHOTROPHICUS SUBUNIT ALPHA



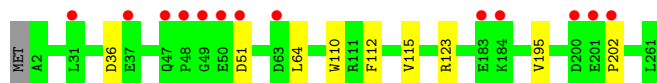
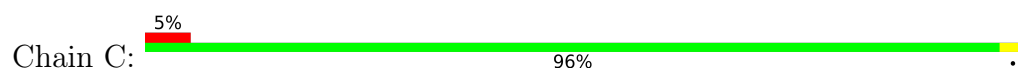
- Molecule 2: METHYL-COENZYME M REDUCTASE III FROM METHANOTHERMOCOCUS THERMOLITHOTROPHICUS SUBUNIT BETA



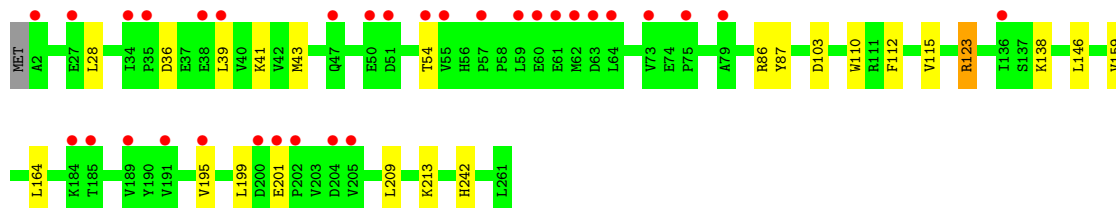
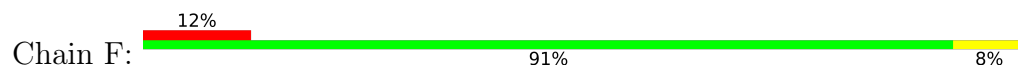
- Molecule 2: METHYL-COENZYME M REDUCTASE III FROM METHANOTHERMOCOCUS THERMOLITHOTROPHICUS SUBUNIT BETA



- Molecule 3: METHYL-COENZYME M REDUCTASE III FROM METHANOTHERMOCOCUS THERMOLITHOTROPHICUS SUBUNIT GAMMA



- Molecule 3: METHYL-COENZYME M REDUCTASE III FROM METHANOTHERMOCOCCUS THERMOLITHOTROPHICUS SUBUNIT GAMMA



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	111.81Å 77.22Å 145.46Å 90.00° 107.01° 90.00°	Depositor
Resolution (Å)	45.63 – 1.90 45.63 – 1.90	Depositor EDS
% Data completeness (in resolution range)	99.0 (45.63-1.90) 99.0 (45.63-1.90)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.24 (at 1.89Å)	Xtrriage
Refinement program	BUSTER 2.10.1	Depositor
R, R_{free}	0.169 , 0.190 0.175 , 0.198	Depositor DCC
R_{free} test set	9074 reflections (4.91%)	wwPDB-VP
Wilson B-factor (Å ²)	29.2	Xtrriage
Anisotropy	0.381	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 45.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	20909	wwPDB-VP
Average B, all atoms (Å ²)	35.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.83% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ 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: GL3, TP7, COM, MHS, MG, GOL, F43, AGM, MGN, K

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	0.48	0/4339	0.62	0/5871
1	D	0.48	0/4321	0.61	0/5847
2	B	0.49	0/3369	0.60	0/4565
2	E	0.49	0/3369	0.60	0/4565
3	C	0.45	0/2181	0.63	0/2945
3	F	0.45	0/2172	0.63	0/2933
All	All	0.48	0/19751	0.61	0/26726

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	4280	0	4166	10	0
1	D	4268	0	4150	12	0
2	B	3312	0	3344	4	0
2	E	3312	0	3344	5	0
3	C	2130	0	2091	1	0
3	F	2124	0	2085	13	0
4	A	21	0	19	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	21	0	19	0	0
5	A	62	0	43	0	0
5	D	62	0	43	0	0
6	A	1	0	0	0	0
7	A	7	0	5	1	0
7	D	7	0	5	1	0
8	B	6	0	8	1	0
8	D	6	0	8	2	0
8	F	6	0	8	0	0
9	E	1	0	0	0	0
10	A	273	0	0	0	0
10	B	272	0	0	0	0
10	C	144	0	0	0	0
10	D	267	0	0	0	0
10	E	225	0	0	1	0
10	F	102	0	0	0	0
All	All	20909	0	19338	38	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 1.

All (38) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:196:MET:HA	2:B:376:THR:HG22	1.82	0.62
8:B:501:GOL:H31	10:E:771:HOH:O	2.00	0.61
3:F:41:LYS:HZ1	3:F:201:GLU:H	1.49	0.59
2:E:196:MET:HA	2:E:376:THR:HG22	1.83	0.59
1:A:6:LYS:HB2	1:A:9:LEU:HG	1.86	0.58
1:A:446:PHE:HB2	7:D:601:COM:O2S	2.08	0.54
3:F:39:LEU:HG	3:F:43:MET:HE3	1.90	0.53
1:A:73:LEU:HB3	8:D:604:GOL:H12	1.91	0.52
3:F:28:LEU:HD22	3:F:146:LEU:CD2	2.41	0.51
3:F:39:LEU:HG	3:F:43:MET:CE	2.41	0.51
1:A:345:ILE:HG12	1:A:394:LEU:HD11	1.93	0.50
1:D:345:ILE:HG12	1:D:394:LEU:HD11	1.95	0.48
1:D:155:VAL:HG12	8:D:604:GOL:H2	1.95	0.48
2:B:227:GLY:O	2:E:136:MET:HG3	2.14	0.48
7:A:604:COM:O2S	1:D:446:PHE:HB2	2.15	0.47
1:D:6:LYS:HB2	1:D:9:LEU:HG	1.97	0.46
1:A:292:ASP:HA	1:A:513:LYS:HE2	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:F:41:LYS:NZ	3:F:201:GLU:H	2.13	0.46
3:F:28:LEU:HD22	3:F:146:LEU:HD21	1.98	0.46
1:D:292:ASP:HA	1:D:513:LYS:HE2	1.98	0.45
2:B:126:GLU:HB3	2:E:126:GLU:HB3	1.98	0.45
3:F:112:PHE:HB2	3:F:115:VAL:HG21	1.99	0.45
3:F:209:LEU:HD22	3:F:213:LYS:HG2	1.99	0.45
3:F:41:LYS:HG2	3:F:199:LEU:HD22	2.01	0.43
1:D:396:GLU:HG3	3:F:164:LEU:HG	2.02	0.42
3:C:112:PHE:HB2	3:C:115:VAL:HG21	2.01	0.42
3:F:123:ARG:HD2	3:F:159:VAL:HG11	2.01	0.42
1:A:246:CYS:HB2	3:F:87:TYR:CE1	2.55	0.41
2:B:407:SER:HB2	2:B:408:PRO:HD2	2.02	0.41
2:E:407:SER:HB2	2:E:408:PRO:HD2	2.03	0.41
1:A:295:GLN:OE1	1:A:298:ARG:HD3	2.21	0.41
1:D:13:LYS:HD2	1:D:13:LYS:HA	1.88	0.41
1:D:435:ILE:HD11	3:F:242:HIS:HB2	2.02	0.41
1:A:155:VAL:HB	1:D:88:ASP:HA	2.03	0.40
1:D:451:LEU:HD12	2:E:358:GLY:HA3	2.03	0.40
1:A:88:ASP:HA	1:D:155:VAL:HB	2.03	0.40
1:A:172:GLY:HA3	1:A:205:GLY:O	2.21	0.40
1:D:172:GLY:HA3	1:D:205:GLY:O	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	545/553 (99%)	526 (96%)	17 (3%)	2 (0%)	34 24
1	D	543/553 (98%)	525 (97%)	17 (3%)	1 (0%)	47 38
2	B	441/443 (100%)	431 (98%)	10 (2%)	0	100 100
2	E	441/443 (100%)	432 (98%)	9 (2%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	C	259/261 (99%)	250 (96%)	9 (4%)	0	100	100
3	F	258/261 (99%)	248 (96%)	10 (4%)	0	100	100
All	All	2487/2514 (99%)	2412 (97%)	72 (3%)	3 (0%)	51	42

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	469	SER
1	D	469	SER
1	A	48	LYS

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	440/441 (100%)	435 (99%)	5 (1%)	73	73
1	D	438/441 (99%)	437 (100%)	1 (0%)	93	94
2	B	350/350 (100%)	347 (99%)	3 (1%)	78	79
2	E	350/350 (100%)	347 (99%)	3 (1%)	78	79
3	C	231/231 (100%)	224 (97%)	7 (3%)	41	33
3	F	230/231 (100%)	222 (96%)	8 (4%)	36	27
All	All	2039/2044 (100%)	2012 (99%)	27 (1%)	69	68

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	64	ILE
1	A	72	LYS
1	A	122	LYS
1	A	298	ARG
1	A	447	TYR
2	B	112	LEU
2	B	126	GLU

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Mol	Chain	Res	Type
2	B	206	LYS
3	C	36	ASP
3	C	51	ASP
3	C	64	LEU
3	C	110	TRP
3	C	123	ARG
3	C	195	VAL
3	C	202	PRO
1	D	447	TYR
2	E	58	LYS
2	E	112	LEU
2	E	126	GLU
3	F	36	ASP
3	F	54	THR
3	F	86	ARG
3	F	103	ASP
3	F	110	TRP
3	F	123	ARG
3	F	138	LYS
3	F	195	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	210	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](#)

8 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	GL3	D	448	1	2,3,4	2.49	1 (50%)	1,2,4	0.11	0
1	MGN	D	403	1	6,9,10	0.62	0	5,12,14	0.39	0
1	MHS	A	261	1	7,11,12	0.72	0	6,14,16	1.80	3 (50%)
1	AGM	A	275	1	10,11,12	0.52	0	6,13,15	1.09	1 (16%)
1	MGN	A	403	1	6,9,10	0.61	0	5,12,14	0.33	0
1	MHS	D	261	1	7,11,12	0.72	0	6,14,16	1.76	3 (50%)
1	AGM	D	275	1	10,11,12	0.48	0	6,13,15	1.13	1 (16%)
1	GL3	A	448	1	2,3,4	2.45	1 (50%)	1,2,4	0.16	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	GL3	D	448	1	-	0/1/1/2	-
1	MGN	D	403	1	-	0/7/9/12	-
1	MHS	A	261	1	-	0/5/6/8	0/1/1/1
1	AGM	A	275	1	-	4/10/11/13	-
1	MGN	A	403	1	-	0/7/9/12	-
1	MHS	D	261	1	-	0/5/6/8	0/1/1/1
1	AGM	D	275	1	-	4/10/11/13	-
1	GL3	A	448	1	-	0/1/1/2	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	448	GL3	C-S	-3.53	1.68	1.80
1	A	448	GL3	C-S	-3.47	1.68	1.80

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	261	MHS	CM-ND1-CG	2.72	128.07	124.44
1	D	261	MHS	CM-ND1-CG	2.53	127.81	124.44
1	D	275	AGM	CG-CD-NE1	2.35	114.64	110.49
1	A	275	AGM	CG-CD-NE1	2.25	114.46	110.49
1	D	261	MHS	NE2-CE1-ND1	-2.14	109.08	112.26
1	D	261	MHS	CB-CA-C	-2.13	107.47	111.47
1	A	261	MHS	CB-CA-C	-2.13	107.47	111.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	261	MHS	NE2-CE1-ND1	-2.06	109.21	112.26

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	275	AGM	O-C-CA-CB
1	A	275	AGM	CE2-CD-CG-CB
1	D	275	AGM	O-C-CA-CB
1	D	275	AGM	CE2-CD-CG-CB
1	A	275	AGM	CE2-CD-NE1-CZ
1	D	275	AGM	CE2-CD-NE1-CZ
1	A	275	AGM	NE1-CD-CG-CB
1	D	275	AGM	NE1-CD-CG-CB

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 11 ligands modelled in this entry, 2 are monoatomic - leaving 9 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
4	TP7	D	603	-	19,20,20	0.63	0	24,26,26	0.68	0
8	GOL	F	301	-	5,5,5	0.06	0	5,5,5	0.26	0
7	COM	A	604	5	6,6,6	1.25	1 (16%)	7,8,8	2.79	3 (42%)
5	F43	A	602	1,7	61,71,71	2.15	7 (11%)	64,118,118	1.37	11 (17%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	TP7	A	601	-	19,20,20	0.61	0	24,26,26	0.74	0
7	COM	D	601	5	6,6,6	1.17	1 (16%)	7,8,8	3.13	3 (42%)
5	F43	D	602	1,7	61,71,71	2.18	6 (9%)	64,118,118	1.35	10 (15%)
8	GOL	D	604	-	5,5,5	0.07	0	5,5,5	0.28	0
8	GOL	B	501	-	5,5,5	0.08	0	5,5,5	0.10	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
4	TP7	D	603	-	-	0/24/24/24	-
8	GOL	F	301	-	-	0/4/4/4	-
7	COM	A	604	5	-	0/4/4/4	-
5	F43	A	602	1,7	-	8/28/185/185	-
4	TP7	A	601	-	-	0/24/24/24	-
7	COM	D	601	5	-	2/4/4/4	-
5	F43	D	602	1,7	-	7/28/185/185	-
8	GOL	D	604	-	-	4/4/4/4	-
8	GOL	B	501	-	-	2/4/4/4	-

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	602	F43	NI-NA	9.10	2.09	1.89
5	A	602	F43	NI-NA	8.92	2.08	1.89
5	A	602	F43	NI-NB	8.34	2.07	1.89
5	D	602	F43	NI-NB	8.30	2.07	1.89
5	D	602	F43	NI-ND	7.36	2.05	1.89
5	A	602	F43	NI-ND	6.99	2.04	1.89
5	A	602	F43	CHD-C1D	-5.38	1.36	1.43
5	D	602	F43	CHD-C1D	-5.34	1.36	1.43
5	A	602	F43	CHC-C4B	2.92	1.47	1.39
5	D	602	F43	CHC-C4B	2.83	1.47	1.39
7	A	604	COM	O1S-S2	2.41	1.52	1.45
5	D	602	F43	CHD-C7D	2.29	1.51	1.46
5	A	602	F43	CHD-C7D	2.19	1.51	1.46
5	A	602	F43	C6A-N8A	-2.05	1.26	1.32
7	D	601	COM	O1S-S2	2.05	1.51	1.45

All (27) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	D	601	COM	O3S-S2-C2	5.72	115.02	105.77
7	A	604	COM	O3S-S2-C2	4.71	113.39	105.77
7	D	601	COM	O3S-S2-O1S	-4.26	100.85	111.27
7	A	604	COM	O2S-S2-C2	3.93	111.65	106.92
5	A	602	F43	O8D-C7D-C6D	-3.71	114.78	120.86
5	D	602	F43	O8D-C7D-C6D	-3.56	115.02	120.86
7	D	601	COM	O2S-S2-C2	3.56	111.20	106.92
7	A	604	COM	O3S-S2-O1S	-3.08	103.75	111.27
5	D	602	F43	O7B-C6B-C8B	-3.01	122.92	126.59
5	A	602	F43	O7B-C6B-C8B	-2.98	122.95	126.59
5	A	602	F43	C4D-ND-C1D	2.76	112.15	108.51
5	D	602	F43	C4D-ND-C1D	2.68	112.03	108.51
5	D	602	F43	C9A-C2A-C3A	2.65	116.89	112.98
5	A	602	F43	CAB-C3B-C2B	-2.59	113.61	119.09
5	A	602	F43	C9A-C2A-C3A	2.57	116.77	112.98
5	A	602	F43	C6D-C7D-CHD	2.41	121.49	116.95
5	D	602	F43	ODA-CCA-CBA	2.39	121.70	114.03
5	D	602	F43	CAB-C3B-C2B	-2.37	114.08	119.09
5	D	602	F43	C6D-C7D-CHD	2.35	121.37	116.95
5	D	602	F43	OEA-CCA-CBA	-2.28	115.76	123.08
5	A	602	F43	ODA-CCA-CBA	2.19	121.06	114.03
5	A	602	F43	C9B-C2B-C8B	-2.14	105.05	110.45
5	A	602	F43	C2B-C1B-NB	2.13	105.03	101.84
5	A	602	F43	OEA-CCA-CBA	-2.09	116.35	123.08
5	D	602	F43	OBC-CAC-C9C	2.09	120.74	114.03
5	D	602	F43	C9B-C2B-C8B	-2.04	105.30	110.45
5	A	602	F43	OBC-CAC-C9C	2.03	120.56	114.03

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	D	601	COM	C1-C2-S2-O2S
8	D	604	GOL	O1-C1-C2-O2
8	D	604	GOL	C1-C2-C3-O3
8	B	501	GOL	O1-C1-C2-C3
8	D	604	GOL	O1-C1-C2-C3
8	D	604	GOL	O2-C2-C3-O3
7	D	601	COM	C1-C2-S2-O3S
5	A	602	F43	C3A-CAA-CBA-CCA
5	A	602	F43	CAB-CBB-CCB-OEB

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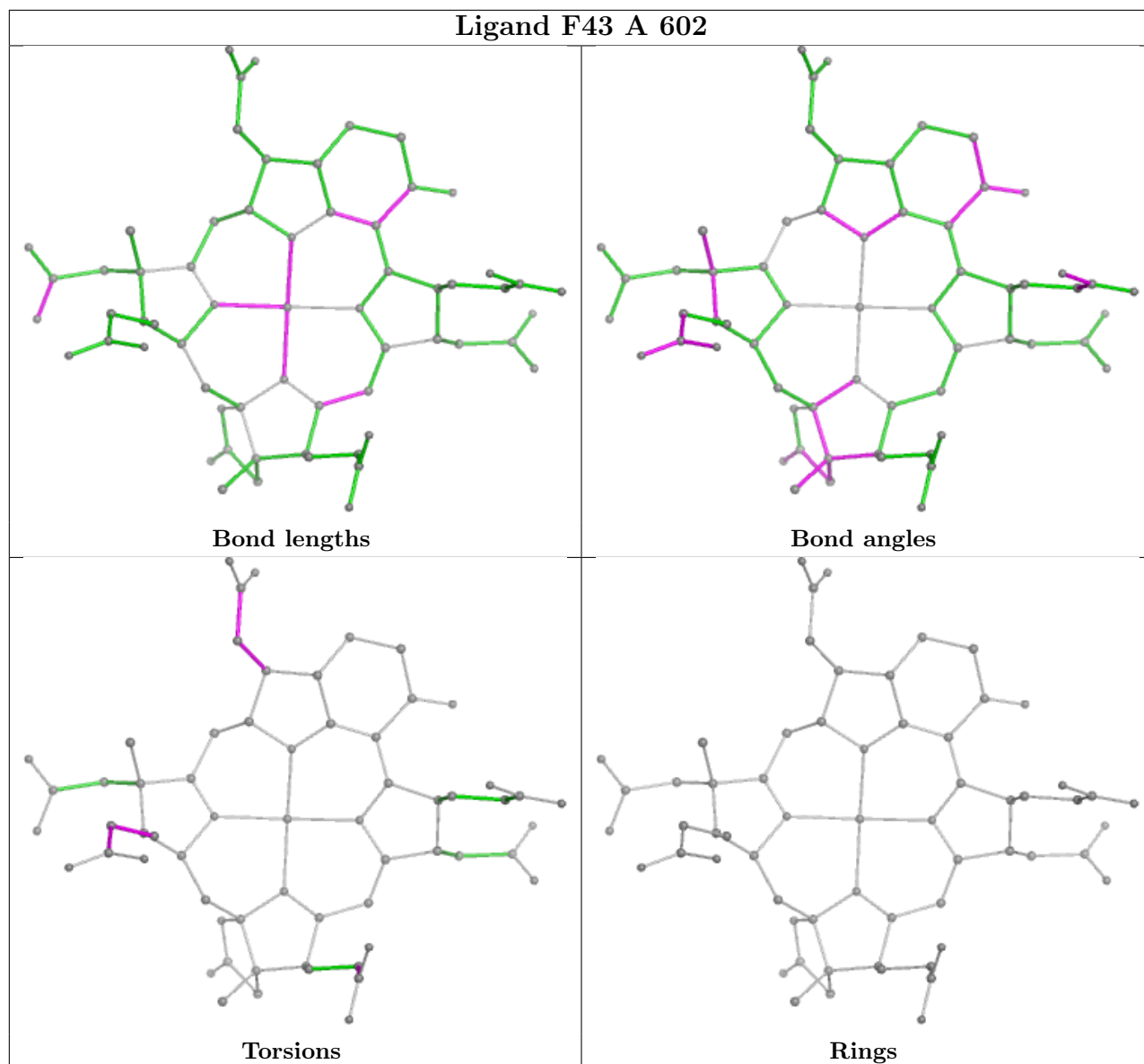
Mol	Chain	Res	Type	Atoms
5	A	602	F43	CAB-CBB-CCB-ODB
5	D	602	F43	C3A-CAA-CBA-CCA
8	B	501	GOL	O1-C1-C2-O2
5	A	602	F43	CAA-CBA-CCA-OEA
5	D	602	F43	CAB-CBB-CCB-OEB
5	D	602	F43	CAA-CBA-CCA-OEA
5	D	602	F43	CAB-CBB-CCB-ODB
5	D	602	F43	CAA-CBA-CCA-ODA
5	A	602	F43	C3D-C9D-CAD-OBD
5	A	602	F43	CAA-CBA-CCA-ODA
5	A	602	F43	C3D-C9D-CAD-OCD
5	A	602	F43	C2D-C3D-C9D-CAD
5	D	602	F43	C2D-C3D-C9D-CAD
5	D	602	F43	C3D-C9D-CAD-OBD

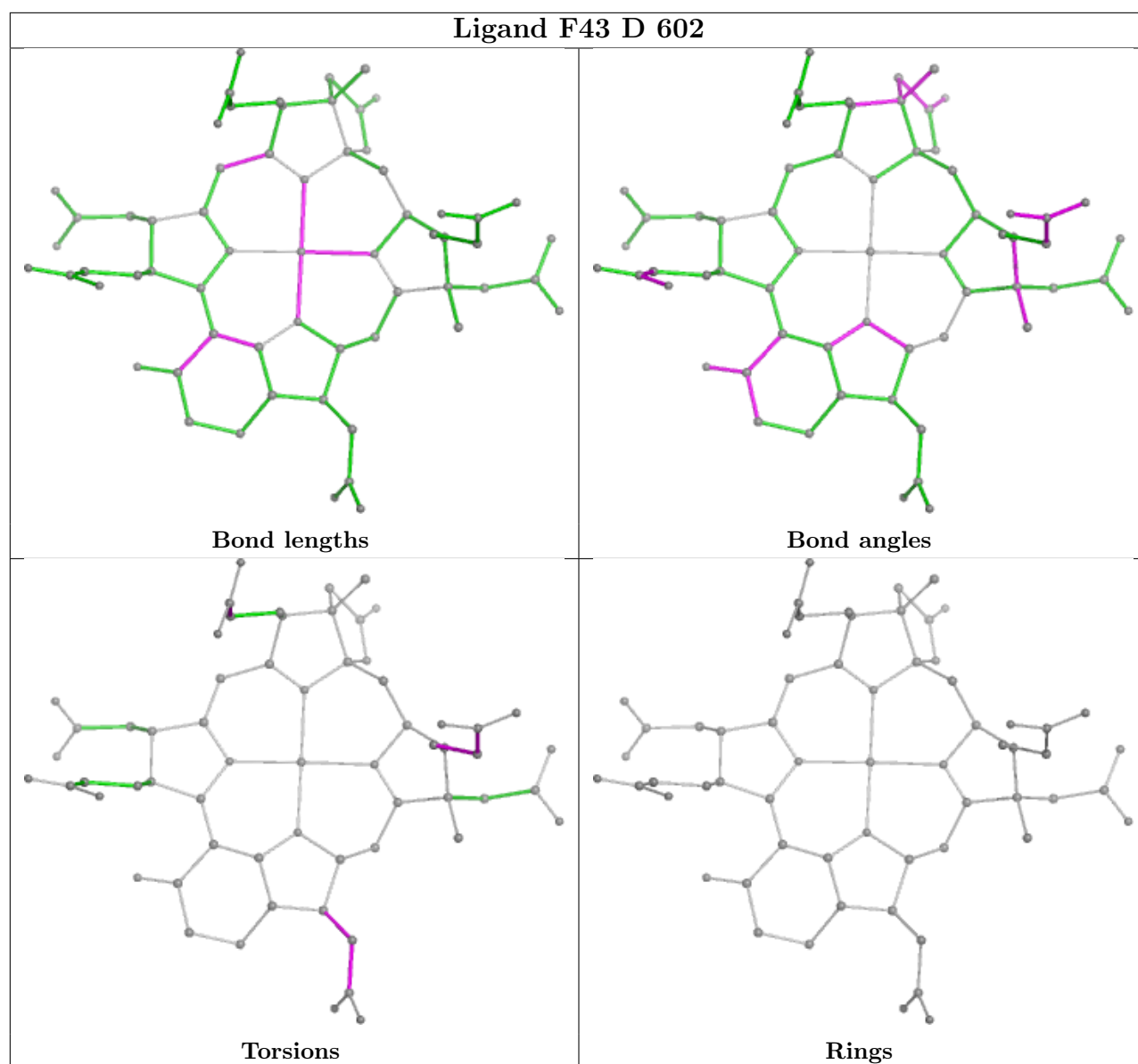
There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	604	COM	1	0
7	D	601	COM	1	0
8	D	604	GOL	2	0
8	B	501	GOL	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 than 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.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	545/553 (98%)	-0.15	9 (1%) 70 72	19, 30, 55, 105	0
1	D	545/553 (98%)	-0.13	6 (1%) 80 82	20, 29, 54, 78	0
2	B	442/443 (99%)	-0.33	3 (0%) 87 88	21, 28, 46, 65	0
2	E	442/443 (99%)	-0.19	6 (1%) 75 77	21, 31, 50, 64	0
3	C	260/261 (99%)	-0.06	13 (5%) 28 32	22, 35, 64, 94	0
3	F	260/261 (99%)	0.67	32 (12%) 4 4	23, 47, 79, 112	0
All	All	2494/2514 (99%)	-0.09	69 (2%) 53 56	19, 31, 57, 112	0

All (69) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	49	ILE	9.3
3	C	49	GLY	7.9
3	F	61	GLU	6.3
3	C	48	PRO	5.8
1	A	553	LYS	5.2
3	F	47	GLN	5.0
2	B	2	VAL	4.9
1	D	29	THR	4.5
3	F	63	ASP	4.5
3	F	55	VAL	4.3
3	F	50	GLU	4.0
3	F	34	ILE	4.0
3	F	200	ASP	4.0
3	F	191	VAL	3.7
3	F	57	PRO	3.6
3	C	47	GLN	3.5
3	F	54	THR	3.4
3	F	2	ALA	3.4
3	F	38	GLU	3.4

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Mol	Chain	Res	Type	RSRZ
3	F	184	LYS	3.3
3	F	59	LEU	3.2
3	C	51	ASP	3.2
2	E	261	LYS	3.2
3	F	51	ASP	3.1
3	F	60	GLU	3.1
1	D	552	ALA	3.1
3	F	79	ALA	3.0
3	F	136	ILE	3.0
2	E	357	VAL	2.9
3	F	201	GLU	2.9
2	E	98	ASP	2.9
1	A	17	GLU	2.8
3	F	62	MET	2.8
3	F	204	ASP	2.7
1	D	5	LYS	2.7
3	C	201	GLU	2.7
3	C	200	ASP	2.6
1	A	48	LYS	2.6
1	A	119	VAL	2.6
1	D	51	ALA	2.6
3	C	184	LYS	2.6
1	A	194	GLU	2.5
3	C	183	GLU	2.5
3	F	202	PRO	2.5
3	F	35	PRO	2.5
3	C	31	LEU	2.4
2	E	405	MET	2.4
2	E	411	THR	2.4
2	B	357	VAL	2.4
1	A	252	ILE	2.4
3	F	189	VAL	2.4
3	F	195	VAL	2.3
3	F	73	VAL	2.3
3	C	37	GLU	2.3
3	F	75	PRO	2.3
3	F	205	VAL	2.2
2	E	415	VAL	2.2
3	C	202	PRO	2.2
3	F	185	THR	2.2
3	C	63	ASP	2.1
1	A	255	PHE	2.1

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Mol	Chain	Res	Type	RSRZ
2	B	443	ILE	2.1
3	F	64	LEU	2.1
1	D	447	TYR	2.1
3	C	50	GLU	2.1
1	D	30	PHE	2.0
1	A	552	ALA	2.0
3	F	39	LEU	2.0
3	F	27	GLU	2.0

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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
1	MHS	D	261	11/12	0.90	0.13	35,41,43,44	0
1	MHS	A	261	11/12	0.93	0.11	34,40,44,44	0
1	AGM	D	275	12/13	0.94	0.14	27,29,30,30	0
1	AGM	A	275	12/13	0.96	0.11	24,26,28,28	0
1	MGN	A	403	10/11	0.97	0.13	20,21,25,26	0
1	MGN	D	403	10/11	0.97	0.14	23,26,28,28	0
1	GL3	A	448	4/5	0.97	0.13	22,23,23,24	0
1	GL3	D	448	4/5	0.98	0.15	27,28,28,29	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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

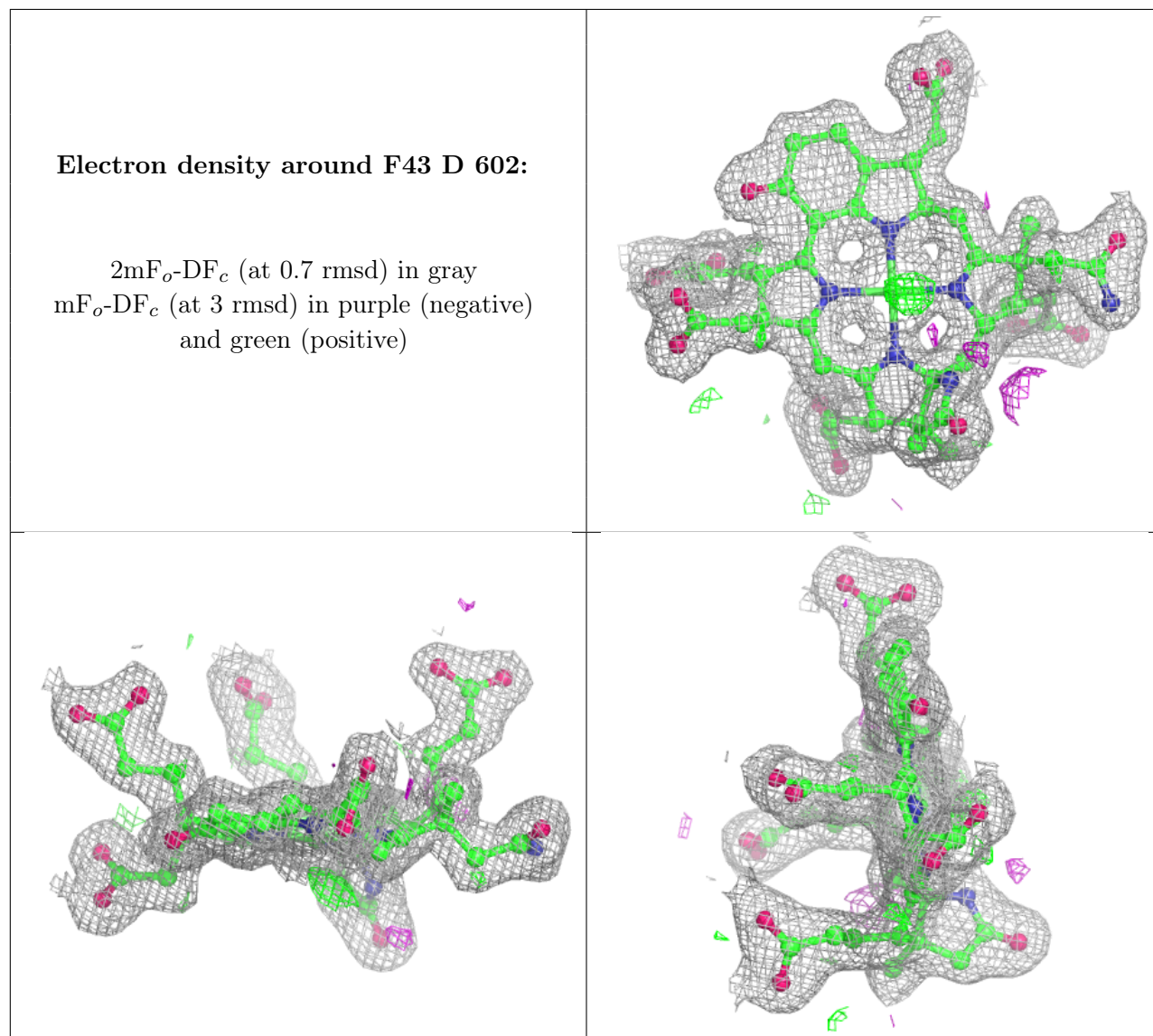
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
8	GOL	F	301	6/6	0.85	0.18	60,62,63,64	0
8	GOL	D	604	6/6	0.88	0.16	49,52,54,56	0

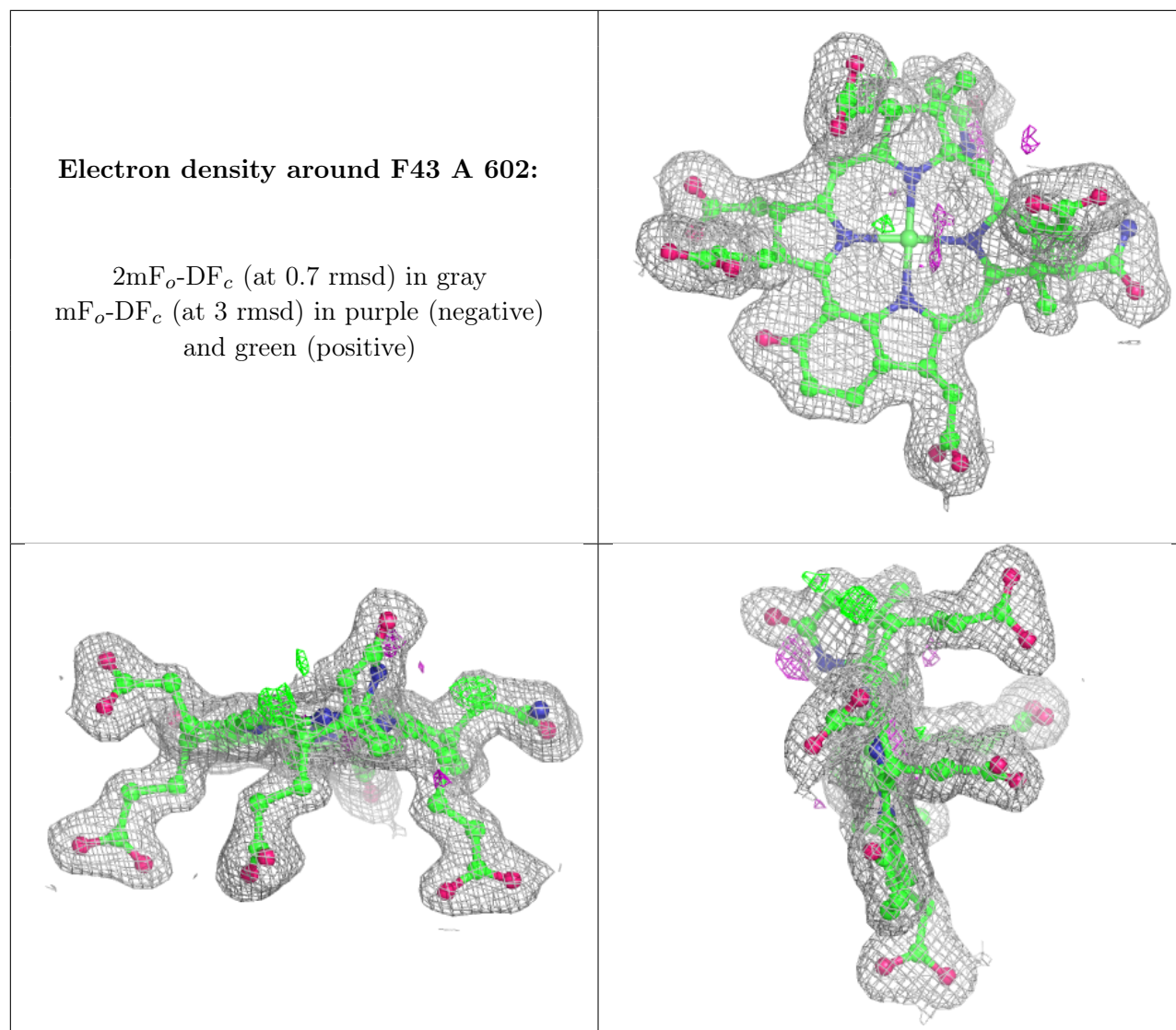
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
8	GOL	B	501	6/6	0.92	0.18	57,58,59,60	0
4	TP7	A	601	21/21	0.93	0.13	33,36,39,40	0
4	TP7	D	603	21/21	0.94	0.12	30,35,41,42	0
7	COM	D	601	7/7	0.96	0.15	24,26,30,32	7
7	COM	A	604	7/7	0.96	0.22	28,29,32,32	7
5	F43	D	602	62/62	0.97	0.12	20,23,29,30	0
5	F43	A	602	62/62	0.97	0.12	23,27,32,32	0
9	MG	E	501	1/1	0.98	0.17	41,41,41,41	0
6	K	A	603	1/1	1.00	0.08	24,24,24,24	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.





6.5 Other polymers [i](#)

There are no such residues in this entry.