



Full wwPDB EM Validation Report ⓘ

Mar 9, 2026 – 08:30 AM UTC

PDB ID : 7RFE / pdb_00007rfe
EMDB ID : EMD-24439
Title : HUMAN IMPDH1 TREATED WITH GTP, IMP, AND NAD⁺; INTERFACE-CENTERED
Authors : Burrell, A.L.; Kollman, J.M.
Deposited on : 2021-07-14
Resolution : 2.60 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp>
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:

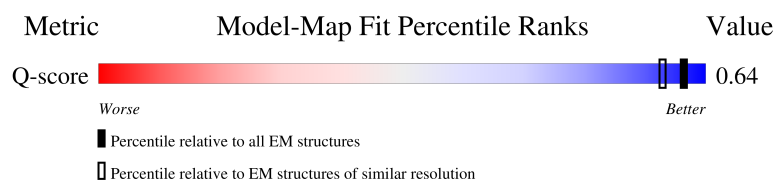
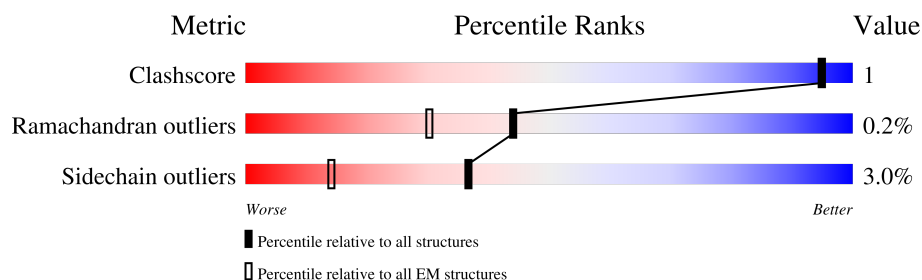
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data 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) : 2.49

1 Overall quality at a glance

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

The reported resolution of this entry is 2.60 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	8728 (2.10 - 3.10)

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 $\leq 5\%$. 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	504	
1	B	504	
1	C	504	
1	D	504	

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Mol	Chain	Length	Quality of chain
1	E	504	31% 88% 7% 6%
1	F	504	31% 89% 5% 6%
1	G	504	31% 88% 7% 6%
1	H	504	31% 89% 5% 6%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 59096 atoms, of which 29576 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 Inosine-5'-monophosphate dehydrogenase 1.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	475	Total	C	H	N	O	S	0	0
			7222	2256	3650	615	677	24		
1	B	475	Total	C	H	N	O	S	0	0
			7222	2256	3650	615	677	24		
1	C	475	Total	C	H	N	O	S	0	0
			7222	2256	3650	615	677	24		
1	D	475	Total	C	H	N	O	S	0	0
			7222	2256	3650	615	677	24		
1	E	475	Total	C	H	N	O	S	0	0
			7222	2256	3650	615	677	24		
1	F	475	Total	C	H	N	O	S	0	0
			7222	2256	3650	615	677	24		
1	G	475	Total	C	H	N	O	S	0	0
			7222	2256	3650	615	677	24		
1	H	475	Total	C	H	N	O	S	0	0
			7222	2256	3650	615	677	24		

- Molecule 2 is GUANOSINE-5'-TRIPHOSPHATE (CCD ID: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$) (labeled as "Ligand of Interest" by depositor).



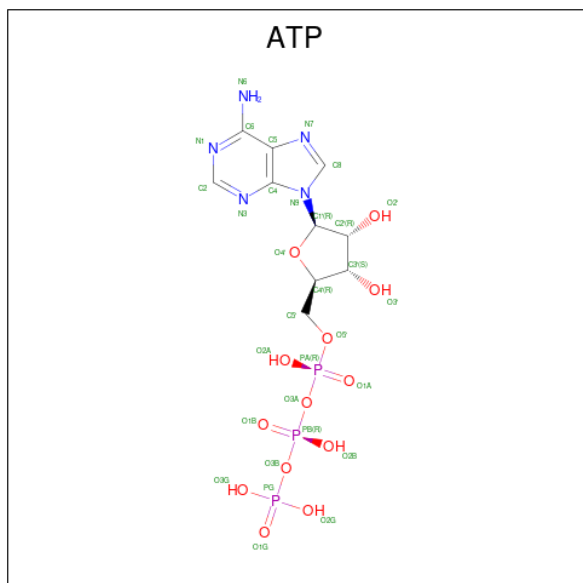
Mol	Chain	Residues	Atoms						AltConf
2	A	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	A	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	B	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	B	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	C	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	C	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	D	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	D	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	E	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	E	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	F	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	F	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	G	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	G	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	

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Mol	Chain	Residues	Atoms						AltConf
2	H	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	
2	H	1	Total	C	H	N	O	P	0
			44	10	12	5	14	3	

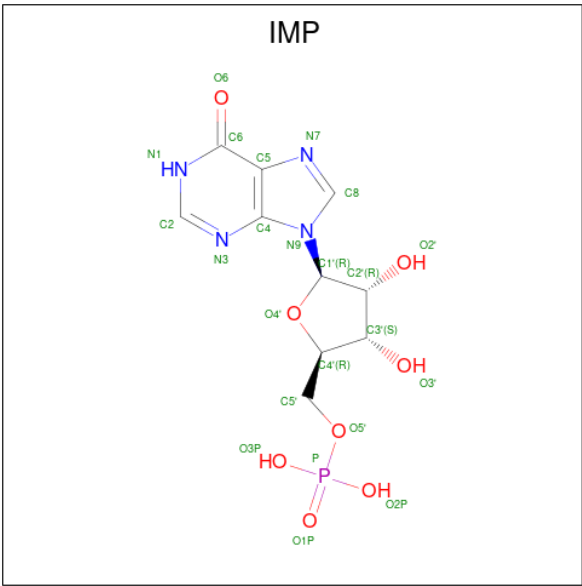
- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						AltConf
3	A	1	Total 43	C 10	H 12	N 5	O 13	P 3	0
3	B	1	Total 43	C 10	H 12	N 5	O 13	P 3	0
3	C	1	Total 43	C 10	H 12	N 5	O 13	P 3	0
3	D	1	Total 43	C 10	H 12	N 5	O 13	P 3	0
3	E	1	Total 43	C 10	H 12	N 5	O 13	P 3	0
3	F	1	Total 43	C 10	H 12	N 5	O 13	P 3	0
3	G	1	Total 43	C 10	H 12	N 5	O 13	P 3	0
3	H	1	Total 43	C 10	H 12	N 5	O 13	P 3	0

- Molecule 4 is INOSINIC ACID (CCD ID: IMP) (formula: $C_{10}H_{13}N_4O_8P$) (labeled as "Ligand

of Interest" by depositor).

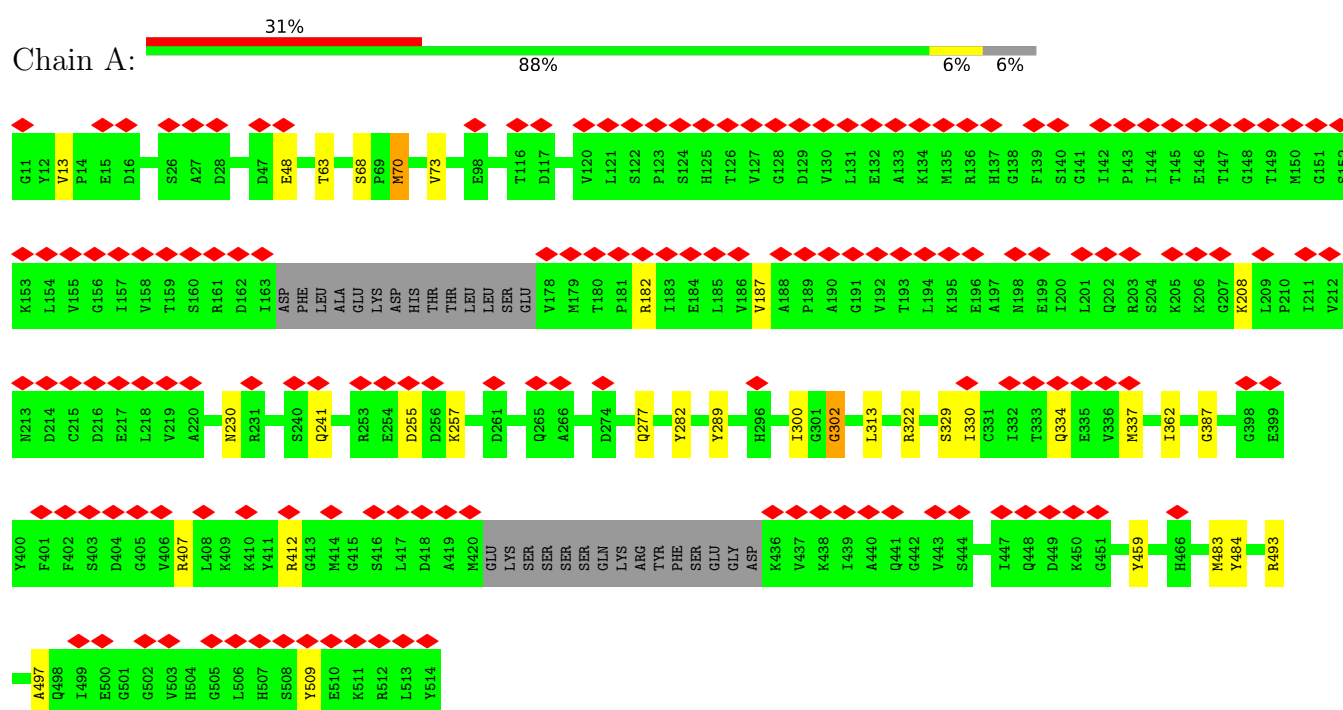


Mol	Chain	Residues	Atoms						AltConf
4	A	1	Total	C	H	N	O	P	0
			34	10	11	4	8	1	
4	B	1	Total	C	H	N	O	P	0
			34	10	11	4	8	1	
4	C	1	Total	C	H	N	O	P	0
			34	10	11	4	8	1	
4	D	1	Total	C	H	N	O	P	0
			34	10	11	4	8	1	
4	E	1	Total	C	H	N	O	P	0
			34	10	11	4	8	1	
4	F	1	Total	C	H	N	O	P	0
			34	10	11	4	8	1	
4	G	1	Total	C	H	N	O	P	0
			34	10	11	4	8	1	
4	H	1	Total	C	H	N	O	P	0
			34	10	11	4	8	1	

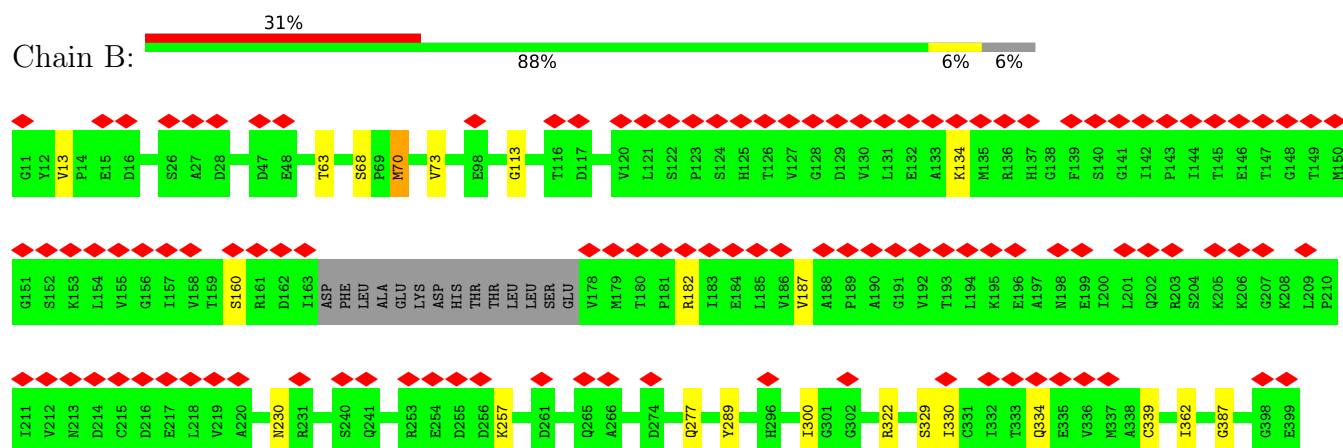
3 Residue-property plots

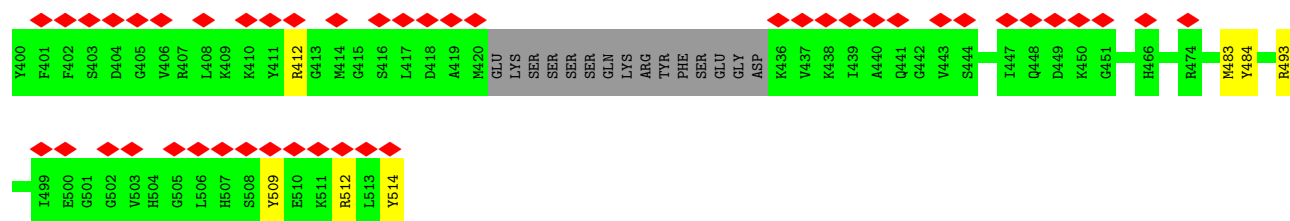
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Inosine-5'-monophosphate dehydrogenase 1

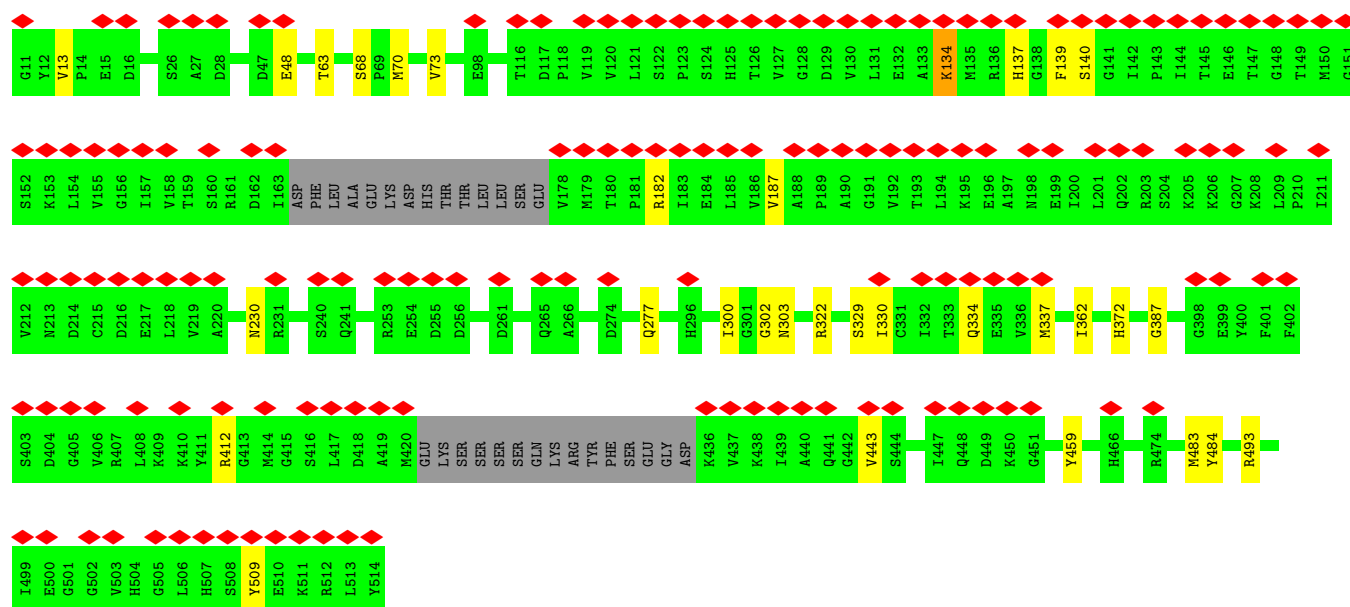
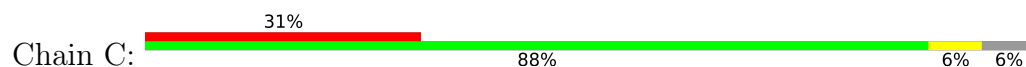


• Molecule 1: Inosine-5'-monophosphate dehydrogenase 1

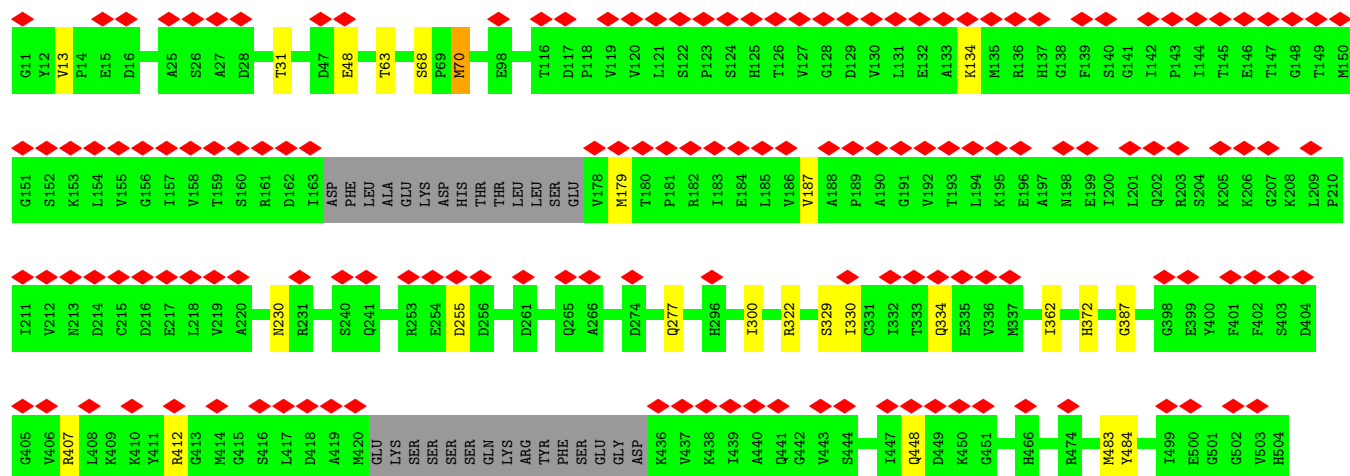
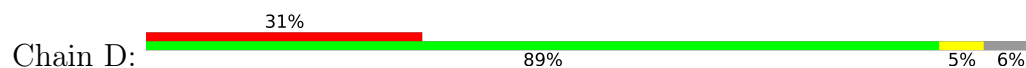




• Molecule 1: Inosine-5'-monophosphate dehydrogenase 1

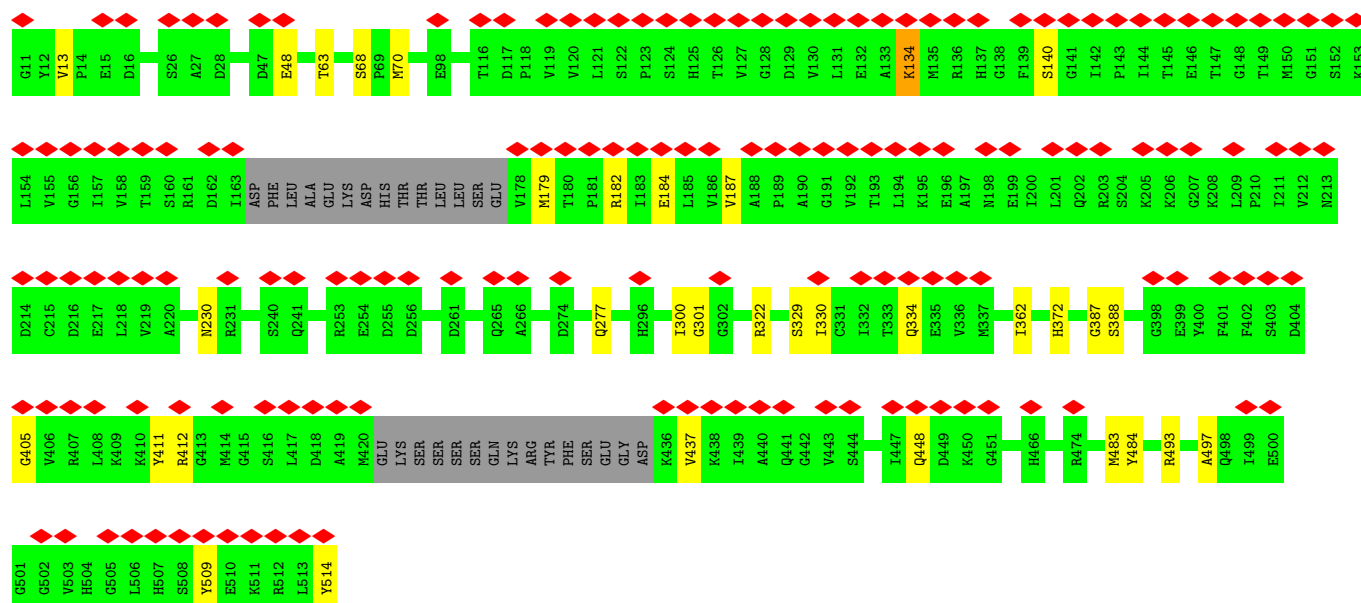
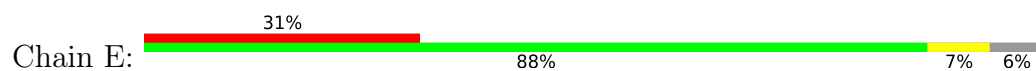


• Molecule 1: Inosine-5'-monophosphate dehydrogenase 1

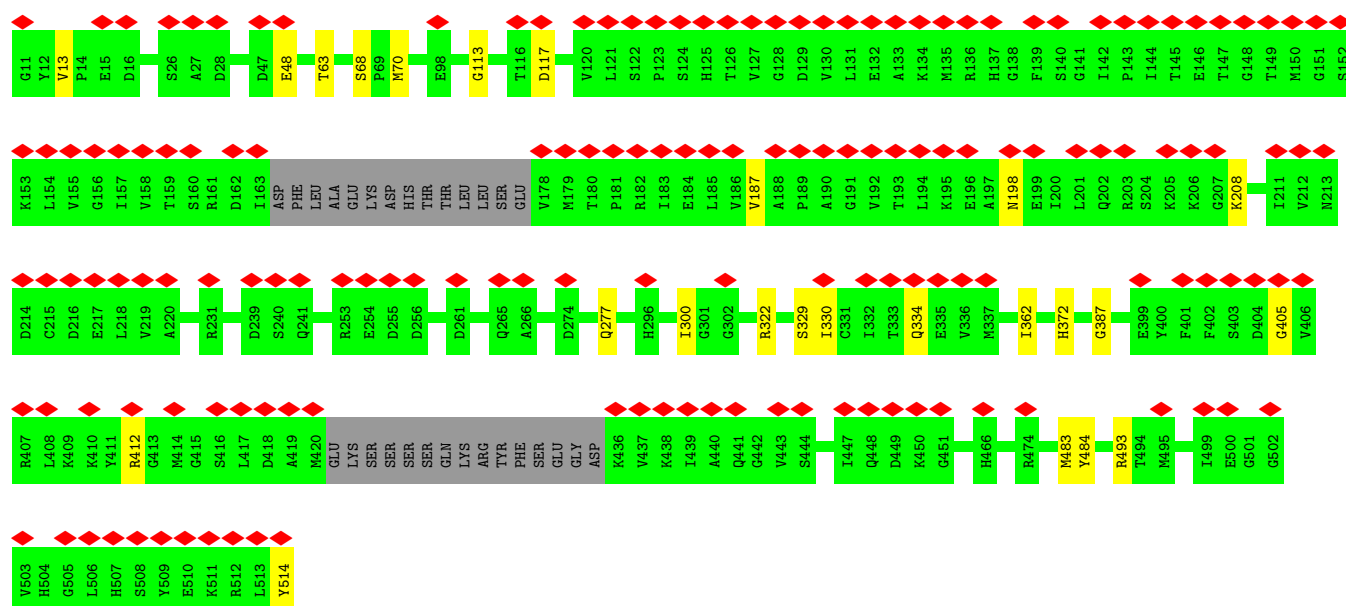
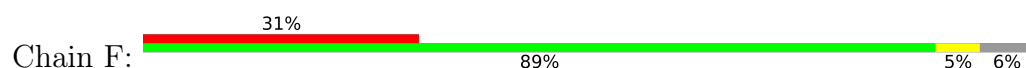




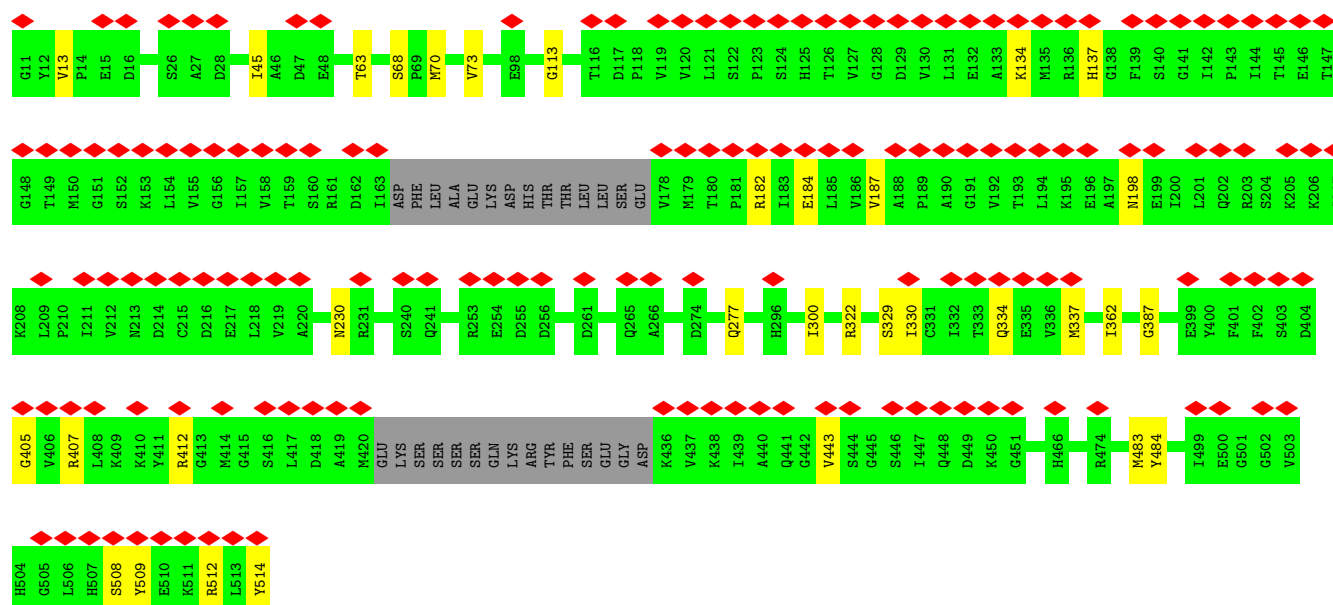
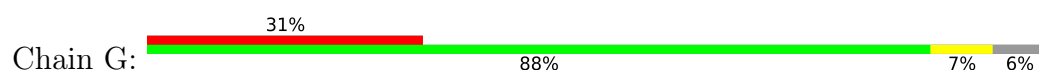
• Molecule 1: Inosine-5'-monophosphate dehydrogenase 1



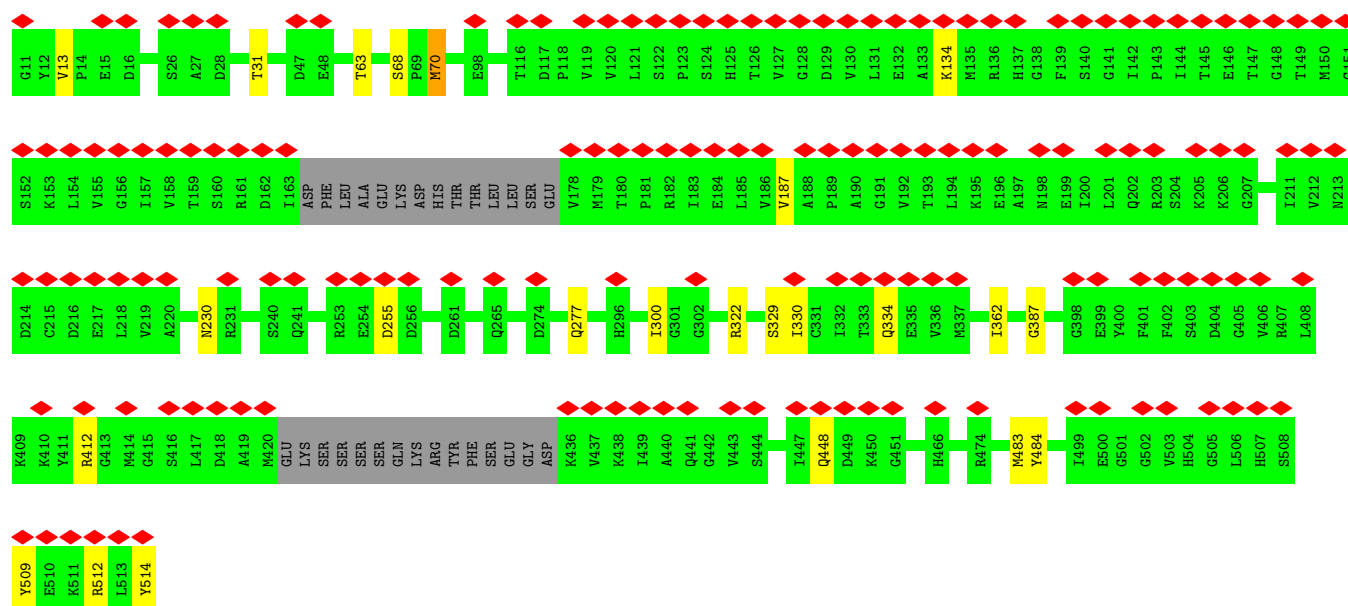
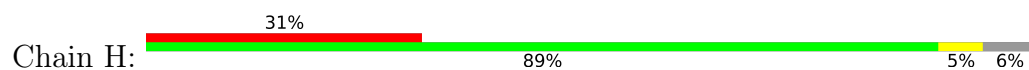
• Molecule 1: Inosine-5'-monophosphate dehydrogenase 1



• Molecule 1: Inosine-5'-monophosphate dehydrogenase 1



• Molecule 1: Inosine-5'-monophosphate dehydrogenase 1



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, D4	Depositor
Number of particles used	42500	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 ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.278	Depositor
Minimum map value	-0.117	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.009	Depositor
Recommended contour level	0.0605	Depositor
Map size (Å)	336.0, 336.0, 336.0	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.05, 1.05, 1.05	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GTP, ATP, IMP

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	0.78	0/3625	1.36	6/4891 (0.1%)
1	B	0.75	0/3625	1.34	5/4891 (0.1%)
1	C	0.76	0/3625	1.35	6/4891 (0.1%)
1	D	0.76	0/3625	1.36	8/4891 (0.2%)
1	E	0.77	0/3625	1.35	6/4891 (0.1%)
1	F	0.77	0/3625	1.35	3/4891 (0.1%)
1	G	0.76	0/3625	1.36	7/4891 (0.1%)
1	H	0.76	0/3625	1.35	5/4891 (0.1%)
All	All	0.77	0/29000	1.35	46/39128 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	5
1	B	0	3
1	C	0	4
1	D	0	3
1	E	0	5
1	F	0	3
1	G	0	3
1	H	0	3
All	All	0	29

There are no bond length outliers.

All (46) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	198	ASN	CA-CB-CG	6.47	119.07	112.60
1	G	198	ASN	CA-CB-CG	6.41	119.01	112.60
1	F	334	GLN	OE1-CD-NE2	-6.23	116.37	122.60
1	E	334	GLN	OE1-CD-NE2	-6.12	116.48	122.60
1	A	334	GLN	OE1-CD-NE2	-5.96	116.64	122.60
1	H	70	MET	CA-C-N	5.90	129.00	120.38
1	H	70	MET	C-N-CA	5.90	129.00	120.38
1	A	407	ARG	NE-CZ-NH2	5.86	124.47	119.20
1	C	182	ARG	NE-CZ-NH2	5.76	124.38	119.20
1	B	334	GLN	OE1-CD-NE2	-5.69	116.91	122.60
1	D	334	GLN	OE1-CD-NE2	-5.66	116.94	122.60
1	H	334	GLN	OE1-CD-NE2	-5.66	116.94	122.60
1	G	334	GLN	OE1-CD-NE2	-5.66	116.94	122.60
1	E	372	HIS	CB-CG-CD2	-5.64	123.86	131.20
1	H	448	GLN	OE1-CD-NE2	-5.56	117.04	122.60
1	A	70	MET	CA-C-N	5.51	128.43	120.38
1	A	70	MET	C-N-CA	5.51	128.43	120.38
1	G	137	HIS	CB-CG-CD2	-5.48	124.08	131.20
1	G	512	ARG	NE-CZ-NH2	5.45	124.11	119.20
1	D	70	MET	CA-C-N	5.44	128.33	120.38
1	D	70	MET	C-N-CA	5.44	128.33	120.38
1	C	303	ASN	N-CA-C	-5.44	96.75	107.69
1	D	372	HIS	CB-CG-CD2	-5.42	124.16	131.20
1	G	182	ARG	NE-CZ-NH2	5.41	124.07	119.20
1	D	448	GLN	OE1-CD-NE2	-5.37	117.23	122.60
1	A	182	ARG	NE-CZ-NH2	5.36	124.03	119.20
1	D	512	ARG	NE-CZ-NH2	5.34	124.01	119.20
1	B	70	MET	CA-C-N	5.33	128.17	120.38
1	B	70	MET	C-N-CA	5.33	128.17	120.38
1	D	407	ARG	NE-CZ-NH2	5.33	124.00	119.20
1	B	182	ARG	NE-CZ-NH2	5.30	123.97	119.20
1	C	372	HIS	CB-CG-CD2	-5.29	124.32	131.20
1	A	241	GLN	OE1-CD-NE2	-5.23	117.37	122.60
1	G	407	ARG	NE-CZ-NH2	5.22	123.90	119.20
1	D	509	TYR	CA-CB-CG	5.20	123.26	113.90
1	H	512	ARG	NE-CZ-NH2	5.17	123.86	119.20
1	E	182	ARG	NE-CZ-NH2	5.15	123.83	119.20
1	E	301	GLY	CA-C-N	5.05	127.62	121.06
1	E	301	GLY	C-N-CA	5.05	127.62	121.06
1	F	372	HIS	CB-CG-CD2	-5.05	124.64	131.20
1	G	443	VAL	N-CA-C	5.04	119.83	109.34
1	C	334	GLN	OE1-CD-NE2	-5.02	117.58	122.60
1	E	448	GLN	OE1-CD-NE2	-5.02	117.58	122.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	512	ARG	NE-CZ-NH2	5.01	123.71	119.20
1	C	443	VAL	N-CA-C	5.01	119.76	109.34
1	C	137	HIS	CB-CG-CD2	-5.00	124.69	131.20

There are no chirality outliers.

All (29) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	282	TYR	Sidechain
1	A	322	ARG	Sidechain
1	A	412	ARG	Sidechain
1	A	459	TYR	Sidechain
1	A	493	ARG	Sidechain
1	B	322	ARG	Sidechain
1	B	412	ARG	Sidechain
1	B	493	ARG	Sidechain
1	C	302	GLY	Peptide
1	C	412	ARG	Sidechain
1	C	459	TYR	Sidechain
1	C	493	ARG	Sidechain
1	D	179	MET	Peptide
1	D	322	ARG	Sidechain
1	D	412	ARG	Sidechain
1	E	179	MET	Peptide
1	E	322	ARG	Sidechain
1	E	412	ARG	Sidechain
1	E	493	ARG	Sidechain
1	E	514	TYR	Sidechain
1	F	322	ARG	Sidechain
1	F	412	ARG	Sidechain
1	F	493	ARG	Sidechain
1	G	322	ARG	Sidechain
1	G	412	ARG	Sidechain
1	G	509	TYR	Sidechain
1	H	322	ARG	Sidechain
1	H	412	ARG	Sidechain
1	H	514	TYR	Sidechain

5.2 Too-close contacts ⓘ

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	3572	3650	3642	13	0
1	B	3572	3650	3642	9	0
1	C	3572	3650	3642	8	0
1	D	3572	3650	3642	7	0
1	E	3572	3650	3642	10	0
1	F	3572	3650	3642	7	0
1	G	3572	3650	3642	8	0
1	H	3572	3650	3642	7	0
2	A	64	24	24	1	0
2	B	64	24	24	0	0
2	C	64	24	24	0	0
2	D	64	24	24	0	0
2	E	64	24	24	0	0
2	F	64	24	24	1	0
2	G	64	24	24	0	0
2	H	64	24	24	0	0
3	A	31	12	12	0	0
3	B	31	12	12	0	0
3	C	31	12	12	0	0
3	D	31	12	12	0	0
3	E	31	12	12	0	0
3	F	31	12	12	0	0
3	G	31	12	12	0	0
3	H	31	12	12	0	0
4	A	23	11	11	0	0
4	B	23	11	11	0	0
4	C	23	11	11	0	0
4	D	23	11	11	0	0
4	E	23	11	11	0	0
4	F	23	11	11	0	0
4	G	23	11	11	0	0
4	H	23	11	11	0	0
All	All	29520	29576	29512	67	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 (67) close contacts within the same asymmetric unit are listed below, sorted by their clash

magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:70:MET:HE1	1:D:387:GLY:HA3	1.71	0.73
1:A:70:MET:HE1	1:A:387:GLY:HA3	1.70	0.72
1:C:70:MET:HE1	1:C:387:GLY:HA3	1.72	0.70
1:B:70:MET:HE1	1:B:387:GLY:HA3	1.73	0.69
1:E:70:MET:HE1	1:E:387:GLY:HA3	1.73	0.69
1:F:70:MET:HE1	1:F:387:GLY:HA3	1.74	0.68
1:H:70:MET:HE1	1:H:387:GLY:HA3	1.76	0.68
1:G:70:MET:HE1	1:G:387:GLY:HA3	1.74	0.67
1:D:68:SER:OG	1:D:70:MET:HE2	2.03	0.59
1:C:68:SER:OG	1:C:70:MET:HE2	2.03	0.58
1:A:68:SER:OG	1:A:70:MET:HE2	2.05	0.56
1:F:68:SER:OG	1:F:70:MET:HE2	2.06	0.56
1:G:68:SER:OG	1:G:70:MET:HE2	2.05	0.56
1:B:483:MET:HE1	1:B:484:TYR:CE2	2.41	0.56
1:H:68:SER:OG	1:H:70:MET:HE2	2.06	0.56
1:E:483:MET:HE1	1:E:484:TYR:CE2	2.41	0.56
1:B:68:SER:OG	1:B:70:MET:HE2	2.07	0.55
1:E:68:SER:OG	1:E:70:MET:HE2	2.07	0.54
1:F:483:MET:HE1	1:F:484:TYR:CE2	2.42	0.54
1:H:483:MET:HE1	1:H:484:TYR:CE2	2.42	0.54
1:A:483:MET:HE1	1:A:484:TYR:CE2	2.43	0.54
1:C:483:MET:HE1	1:C:484:TYR:CE2	2.43	0.54
1:D:483:MET:HE1	1:D:484:TYR:CE2	2.43	0.54
1:G:483:MET:HE1	1:G:484:TYR:CE2	2.43	0.54
1:A:300:ILE:HD13	1:A:362:ILE:HD11	1.90	0.53
1:C:300:ILE:HD13	1:C:362:ILE:HD11	1.91	0.52
1:A:70:MET:HE1	1:A:387:GLY:CA	2.41	0.50
1:A:68:SER:CB	1:A:70:MET:HE2	2.41	0.49
1:C:68:SER:CB	1:C:70:MET:HE2	2.43	0.49
1:D:68:SER:CB	1:D:70:MET:HE2	2.44	0.48
1:G:68:SER:CB	1:G:70:MET:HE2	2.44	0.48
1:F:68:SER:CB	1:F:70:MET:HE2	2.43	0.47
1:F:300:ILE:HD13	1:F:362:ILE:HD11	1.97	0.47
1:H:68:SER:CB	1:H:70:MET:HE2	2.45	0.47
1:E:300:ILE:HD13	1:E:362:ILE:HD11	1.97	0.46
1:H:300:ILE:HD13	1:H:362:ILE:HD11	1.96	0.46
1:E:68:SER:CB	1:E:70:MET:HE2	2.45	0.46
1:C:134:LYS:HZ2	1:C:140:SER:N	2.15	0.45
1:D:70:MET:HE1	1:D:387:GLY:CA	2.44	0.45
1:B:300:ILE:HD13	1:B:362:ILE:HD11	1.99	0.44
1:A:70:MET:HE3	1:A:73:VAL:HG21	2.00	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:68:SER:CB	1:B:70:MET:HE2	2.46	0.44
1:E:134:LYS:HZ2	1:E:140:SER:N	2.15	0.44
1:G:70:MET:HE1	1:G:387:GLY:CA	2.45	0.43
1:G:300:ILE:HD13	1:G:362:ILE:HD11	2.01	0.43
1:D:300:ILE:HD13	1:D:362:ILE:HD11	1.99	0.43
1:H:70:MET:HE1	1:H:387:GLY:CA	2.46	0.43
1:A:208:LYS:HE3	2:A:602:GTP:O1A	2.19	0.42
1:B:70:MET:HE3	1:B:73:VAL:HG21	2.00	0.42
1:C:70:MET:HE3	1:C:73:VAL:HG21	2.01	0.42
1:C:70:MET:HE1	1:C:387:GLY:CA	2.45	0.42
1:E:483:MET:HE1	1:E:484:TYR:CZ	2.54	0.42
1:B:483:MET:HE1	1:B:484:TYR:CZ	2.53	0.42
1:E:70:MET:HE1	1:E:387:GLY:CA	2.45	0.42
1:A:497:ALA:HA	1:D:31:THR:CG2	2.50	0.41
1:A:257:LYS:HE3	1:A:289:TYR:CG	2.55	0.41
1:A:68:SER:HB3	1:A:70:MET:HE2	2.03	0.41
1:G:483:MET:HE1	1:G:484:TYR:CZ	2.54	0.41
1:B:257:LYS:HE3	1:B:289:TYR:CG	2.56	0.41
1:A:302:GLY:HA3	1:A:313:LEU:CD1	2.51	0.41
1:A:483:MET:HE1	1:A:484:TYR:CZ	2.56	0.41
1:B:70:MET:HE1	1:B:387:GLY:CA	2.45	0.41
1:G:70:MET:HE3	1:G:73:VAL:HG21	2.03	0.41
1:F:70:MET:HE1	1:F:387:GLY:CA	2.46	0.41
1:F:208:LYS:HE3	2:F:602:GTP:O1A	2.21	0.41
1:E:497:ALA:HA	1:H:31:THR:CG2	2.52	0.40
1:E:388:SER:HB3	1:E:411:TYR:CE1	2.56	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 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	469/504 (93%)	448 (96%)	20 (4%)	1 (0%)	43	66
1	B	469/504 (93%)	455 (97%)	13 (3%)	1 (0%)	43	66
1	C	469/504 (93%)	454 (97%)	15 (3%)	0	100	100
1	D	469/504 (93%)	451 (96%)	18 (4%)	0	100	100
1	E	469/504 (93%)	448 (96%)	19 (4%)	2 (0%)	30	51
1	F	469/504 (93%)	450 (96%)	17 (4%)	2 (0%)	30	51
1	G	469/504 (93%)	450 (96%)	17 (4%)	2 (0%)	30	51
1	H	469/504 (93%)	455 (97%)	14 (3%)	0	100	100
All	All	3752/4032 (93%)	3611 (96%)	133 (4%)	8 (0%)	44	66

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	302	GLY
1	E	437	VAL
1	G	405	GLY
1	E	405	GLY
1	F	405	GLY
1	B	113	GLY
1	F	113	GLY
1	G	113	GLY

5.3.2 Protein sidechains ⓘ

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	383/412 (93%)	372 (97%)	11 (3%)	37	65
1	B	383/412 (93%)	371 (97%)	12 (3%)	35	63
1	C	383/412 (93%)	370 (97%)	13 (3%)	32	60
1	D	383/412 (93%)	371 (97%)	12 (3%)	35	63
1	E	383/412 (93%)	372 (97%)	11 (3%)	37	65
1	F	383/412 (93%)	374 (98%)	9 (2%)	44	71

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	G	383/412 (93%)	370 (97%)	13 (3%)	32	60
1	H	383/412 (93%)	373 (97%)	10 (3%)	40	68
All	All	3064/3296 (93%)	2973 (97%)	91 (3%)	37	64

All (91) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	VAL
1	A	48	GLU
1	A	63	THR
1	A	187	VAL
1	A	230	ASN
1	A	255	ASP
1	A	277	GLN
1	A	329	SER
1	A	330	ILE
1	A	337	MET
1	A	509	TYR
1	B	13	VAL
1	B	63	THR
1	B	134	LYS
1	B	160	SER
1	B	187	VAL
1	B	230	ASN
1	B	277	GLN
1	B	329	SER
1	B	330	ILE
1	B	339	CYS
1	B	509	TYR
1	B	514	TYR
1	C	13	VAL
1	C	48	GLU
1	C	63	THR
1	C	134	LYS
1	C	139	PHE
1	C	187	VAL
1	C	230	ASN
1	C	277	GLN
1	C	322	ARG
1	C	329	SER
1	C	330	ILE

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Mol	Chain	Res	Type
1	C	337	MET
1	C	509	TYR
1	D	13	VAL
1	D	48	GLU
1	D	63	THR
1	D	134	LYS
1	D	187	VAL
1	D	230	ASN
1	D	255	ASP
1	D	277	GLN
1	D	329	SER
1	D	330	ILE
1	D	509	TYR
1	D	514	TYR
1	E	13	VAL
1	E	48	GLU
1	E	63	THR
1	E	134	LYS
1	E	184	GLU
1	E	187	VAL
1	E	230	ASN
1	E	277	GLN
1	E	329	SER
1	E	330	ILE
1	E	509	TYR
1	F	13	VAL
1	F	48	GLU
1	F	63	THR
1	F	117	ASP
1	F	187	VAL
1	F	277	GLN
1	F	329	SER
1	F	330	ILE
1	F	514	TYR
1	G	13	VAL
1	G	45	ILE
1	G	63	THR
1	G	134	LYS
1	G	184	GLU
1	G	187	VAL
1	G	230	ASN
1	G	277	GLN

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Mol	Chain	Res	Type
1	G	329	SER
1	G	330	ILE
1	G	337	MET
1	G	508	SER
1	G	514	TYR
1	H	13	VAL
1	H	63	THR
1	H	134	LYS
1	H	187	VAL
1	H	230	ASN
1	H	255	ASP
1	H	277	GLN
1	H	329	SER
1	H	330	ILE
1	H	509	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (42) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	94	ASN
1	A	137	HIS
1	A	288	HIS
1	A	448	GLN
1	A	465	GLN
1	B	94	ASN
1	B	137	HIS
1	B	288	HIS
1	B	465	GLN
1	C	21	GLN
1	C	33	ASN
1	C	94	ASN
1	C	137	HIS
1	C	230	ASN
1	C	241	GLN
1	C	243	GLN
1	C	288	HIS
1	C	296	HIS
1	C	303	ASN
1	C	465	GLN
1	D	21	GLN
1	D	94	ASN
1	D	137	HIS

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Mol	Chain	Res	Type
1	D	288	HIS
1	D	448	GLN
1	D	465	GLN
1	E	94	ASN
1	E	137	HIS
1	E	288	HIS
1	E	465	GLN
1	F	94	ASN
1	F	288	HIS
1	F	465	GLN
1	G	94	ASN
1	G	288	HIS
1	G	296	HIS
1	G	465	GLN
1	H	94	ASN
1	H	137	HIS
1	H	288	HIS
1	H	448	GLN
1	H	465	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](#)

32 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	$\# Z > 2$
2	GTP	D	601	-	33,34,34	0.84	0	50,54,54	0.87	3 (6%)
2	GTP	E	601	-	33,34,34	0.84	0	50,54,54	0.87	3 (6%)
2	GTP	H	602	-	33,34,34	0.87	0	50,54,54	0.97	2 (4%)
2	GTP	A	602	-	33,34,34	0.86	0	50,54,54	1.17	4 (8%)
2	GTP	G	601	-	33,34,34	0.86	0	50,54,54	0.98	4 (8%)
3	ATP	A	603	-	32,33,33	1.00	0	48,52,52	1.14	4 (8%)
4	IMP	C	604	-	25,25,25	0.96	0	37,38,38	0.98	2 (5%)
2	GTP	F	601	-	33,34,34	0.86	0	50,54,54	1.00	2 (4%)
3	ATP	B	603	-	32,33,33	1.16	2 (6%)	48,52,52	1.19	5 (10%)
2	GTP	E	602	-	33,34,34	0.86	1 (3%)	50,54,54	0.96	2 (4%)
4	IMP	D	604	-	25,25,25	0.97	0	37,38,38	1.02	3 (8%)
2	GTP	C	602	-	33,34,34	0.87	1 (3%)	50,54,54	0.96	2 (4%)
4	IMP	E	604	-	25,25,25	0.96	0	37,38,38	1.00	4 (10%)
3	ATP	D	603	-	32,33,33	1.01	0	48,52,52	1.19	7 (14%)
2	GTP	H	601	-	33,34,34	0.83	0	50,54,54	0.88	3 (6%)
2	GTP	A	601	-	33,34,34	0.79	0	50,54,54	0.89	3 (6%)
2	GTP	D	602	-	33,34,34	0.88	0	50,54,54	0.97	1 (2%)
2	GTP	C	601	-	33,34,34	0.84	0	50,54,54	0.89	3 (6%)
4	IMP	B	604	-	25,25,25	0.95	0	37,38,38	1.00	2 (5%)
3	ATP	F	603	-	32,33,33	1.07	1 (3%)	48,52,52	1.20	6 (12%)
3	ATP	H	603	-	32,33,33	1.12	1 (3%)	48,52,52	1.15	5 (10%)
2	GTP	B	602	-	33,34,34	0.89	0	50,54,54	1.02	2 (4%)
2	GTP	F	602	-	33,34,34	0.88	2 (6%)	50,54,54	1.03	2 (4%)
4	IMP	G	604	-	25,25,25	0.96	0	37,38,38	0.99	2 (5%)
2	GTP	G	602	-	33,34,34	0.85	1 (3%)	50,54,54	1.01	2 (4%)
3	ATP	C	603	-	32,33,33	0.98	0	48,52,52	1.23	6 (12%)
4	IMP	F	604	-	25,25,25	0.96	0	37,38,38	0.96	2 (5%)
3	ATP	E	603	-	32,33,33	1.10	2 (6%)	48,52,52	1.21	5 (10%)
3	ATP	G	603	-	32,33,33	1.03	0	48,52,52	1.11	5 (10%)
2	GTP	B	601	-	33,34,34	0.84	0	50,54,54	0.94	3 (6%)
4	IMP	H	604	-	25,25,25	0.96	0	37,38,38	1.01	2 (5%)
4	IMP	A	604	-	25,25,25	0.96	0	37,38,38	1.07	3 (8%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GTP	D	601	-	-	5/22/38/38	0/3/3/3
2	GTP	E	601	-	-	5/22/38/38	0/3/3/3
2	GTP	H	602	-	-	3/22/38/38	0/3/3/3
2	GTP	A	602	-	-	4/22/38/38	0/3/3/3
2	GTP	G	601	-	-	2/22/38/38	0/3/3/3
3	ATP	A	603	-	-	1/22/38/38	0/3/3/3
4	IMP	C	604	-	-	0/10/26/26	0/3/3/3
2	GTP	F	601	-	-	2/22/38/38	0/3/3/3
3	ATP	B	603	-	-	2/22/38/38	0/3/3/3
2	GTP	E	602	-	-	3/22/38/38	0/3/3/3
4	IMP	D	604	-	-	0/10/26/26	0/3/3/3
2	GTP	C	602	-	-	3/22/38/38	0/3/3/3
4	IMP	E	604	-	-	0/10/26/26	0/3/3/3
3	ATP	D	603	-	-	1/22/38/38	0/3/3/3
2	GTP	H	601	-	-	4/22/38/38	0/3/3/3
2	GTP	A	601	-	-	5/22/38/38	0/3/3/3
2	GTP	D	602	-	-	3/22/38/38	0/3/3/3
2	GTP	C	601	-	-	3/22/38/38	0/3/3/3
4	IMP	B	604	-	-	0/10/26/26	0/3/3/3
3	ATP	F	603	-	-	2/22/38/38	0/3/3/3
3	ATP	H	603	-	-	4/22/38/38	0/3/3/3
2	GTP	B	602	-	-	3/22/38/38	0/3/3/3
2	GTP	F	602	-	-	1/22/38/38	0/3/3/3
4	IMP	G	604	-	-	0/10/26/26	0/3/3/3
2	GTP	G	602	-	-	5/22/38/38	0/3/3/3
3	ATP	C	603	-	-	4/22/38/38	0/3/3/3
4	IMP	F	604	-	-	0/10/26/26	0/3/3/3
3	ATP	E	603	-	-	2/22/38/38	0/3/3/3
3	ATP	G	603	-	-	3/22/38/38	0/3/3/3
2	GTP	B	601	-	-	3/22/38/38	0/3/3/3
4	IMP	H	604	-	-	0/10/26/26	0/3/3/3
4	IMP	A	604	-	-	0/10/26/26	0/3/3/3

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	603	ATP	PA-O3A	-2.73	1.56	1.59
3	E	603	ATP	PA-O3A	-2.27	1.57	1.59
3	H	603	ATP	C5-C4	-2.26	1.35	1.39
2	F	602	GTP	PG-O3G	-2.19	1.46	1.54
3	F	603	ATP	C5-C4	-2.07	1.35	1.39
2	F	602	GTP	PG-O2G	-2.05	1.47	1.54
3	B	603	ATP	C5-C4	-2.04	1.35	1.39
2	C	602	GTP	PG-O3G	-2.04	1.47	1.54
2	E	602	GTP	PG-O3G	-2.01	1.47	1.54
2	G	602	GTP	PG-O3G	-2.01	1.47	1.54
3	E	603	ATP	C5-C4	-2.00	1.35	1.39

All (104) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	601	GTP	O2A-PA-O3A	3.72	117.34	107.27
3	C	603	ATP	O2A-PA-O3A	3.43	116.53	107.27
2	A	602	GTP	C5'-C4'-C3'	-3.10	104.07	115.21
2	A	602	GTP	O2A-PA-O3A	2.88	115.05	107.27
2	F	602	GTP	O2A-PA-O3A	2.80	114.85	107.27
2	A	602	GTP	O4'-C1'-N9	2.76	114.62	108.36
2	G	602	GTP	O4'-C1'-N9	2.71	114.49	108.36
4	A	604	IMP	C5-C4-N3	-2.69	123.32	127.27
3	D	603	ATP	O2A-PA-O3A	2.66	114.47	107.27
3	F	603	ATP	C4-C5-N7	2.62	113.58	110.58
2	B	601	GTP	O3A-PA-O1A	-2.61	102.84	110.70
3	B	603	ATP	C4-C5-N7	2.61	113.57	110.58
2	G	602	GTP	O3A-PA-O1A	2.59	118.50	110.70
3	E	603	ATP	C4-C5-N7	2.59	113.54	110.58
3	A	603	ATP	C4-C5-N7	2.58	113.54	110.58
3	D	603	ATP	C4-C5-N7	2.58	113.53	110.58
2	G	601	GTP	O6-C6-N1	-2.56	115.30	120.11
4	H	604	IMP	C5-C4-N3	-2.55	123.51	127.27
3	H	603	ATP	C4-C5-N7	2.54	113.49	110.58
2	G	601	GTP	O3A-PA-O1A	-2.52	103.11	110.70
3	C	603	ATP	C4-C5-N7	2.52	113.47	110.58
2	F	602	GTP	O4'-C1'-N9	2.50	114.03	108.36
4	G	604	IMP	C5-C4-N3	-2.48	123.62	127.27
4	B	604	IMP	C5-C4-N3	-2.46	123.65	127.27
4	D	604	IMP	C5-C4-N3	-2.44	123.68	127.27
2	E	601	GTP	O3A-PA-O1A	-2.44	103.38	110.70
3	B	603	ATP	O2G-PG-O3B	2.43	112.77	104.64
3	E	603	ATP	O2G-PG-O3B	2.42	112.75	104.64

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	F	603	ATP	O2G-PG-O3B	2.42	112.75	104.64
2	H	601	GTP	O3A-PA-O1A	-2.42	103.43	110.70
2	F	601	GTP	O3A-PB-O1B	-2.42	103.43	110.70
3	C	603	ATP	C5-C4-N3	-2.40	123.41	126.72
2	A	601	GTP	O6-C6-N1	-2.40	115.61	120.11
3	A	603	ATP	C5-C4-N3	-2.40	123.42	126.72
3	G	603	ATP	C5-C4-N3	-2.38	123.43	126.72
2	B	602	GTP	O4'-C1'-N9	2.38	113.75	108.36
4	E	604	IMP	C5-C4-N3	-2.38	123.77	127.27
2	D	601	GTP	O3A-PA-O1A	-2.38	103.56	110.70
3	F	603	ATP	C5-C4-N3	-2.36	123.47	126.72
3	A	603	ATP	O2G-PG-O3B	2.36	112.54	104.64
2	C	602	GTP	O4'-C1'-N9	2.35	113.67	108.36
3	D	603	ATP	C5-C4-N3	-2.34	123.49	126.72
2	B	602	GTP	O3A-PA-O1A	2.34	117.75	110.70
4	C	604	IMP	C5-C4-N3	-2.34	123.83	127.27
3	H	603	ATP	C5-C4-N3	-2.34	123.49	126.72
3	H	603	ATP	O2G-PG-O3B	2.33	112.44	104.64
2	C	601	GTP	O3A-PA-O1A	-2.31	103.75	110.70
3	A	603	ATP	O2A-PA-O3A	2.31	113.51	107.27
3	E	603	ATP	O3G-PG-O3B	2.31	112.37	104.64
2	C	601	GTP	O6-C6-N1	-2.30	115.78	120.11
2	E	602	GTP	O4'-C1'-N9	2.30	113.57	108.36
3	C	603	ATP	O2B-PB-O3A	2.30	113.49	107.27
2	D	602	GTP	O3A-PA-O1A	2.29	117.61	110.70
3	B	603	ATP	O3G-PG-O3B	2.29	112.33	104.64
3	E	603	ATP	C5-C4-N3	-2.29	123.57	126.72
3	B	603	ATP	C5-C4-N3	-2.29	123.57	126.72
2	A	601	GTP	O3A-PA-O1A	-2.27	103.89	110.70
2	H	602	GTP	O3A-PA-O1A	2.26	117.50	110.70
2	B	601	GTP	O3G-PG-O2G	2.25	116.24	107.80
2	G	601	GTP	O3G-PG-O2G	2.25	116.24	107.80
3	C	603	ATP	O2G-PG-O3B	2.24	112.15	104.64
3	D	603	ATP	O2B-PB-O3A	2.24	113.32	107.27
3	G	603	ATP	O2B-PB-O3A	2.23	113.31	107.27
4	D	604	IMP	O4'-C4'-C3'	-2.23	100.73	105.15
2	A	602	GTP	O2B-PB-O3B	2.22	113.27	107.27
2	E	601	GTP	O3G-PG-O2G	2.22	116.11	107.80
4	F	604	IMP	O4'-C4'-C3'	-2.21	100.76	105.15
2	E	602	GTP	O2A-PA-O3A	2.21	113.25	107.27
3	D	603	ATP	O3A-PB-O1B	2.21	117.35	110.70
2	D	601	GTP	O6-C6-N1	-2.21	115.97	120.11

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	603	ATP	O2A-PA-O3A	2.20	113.23	107.27
3	B	603	ATP	O2A-PA-O3A	2.19	113.20	107.27
2	B	601	GTP	O6-C6-N1	-2.18	116.01	120.11
3	D	603	ATP	O2G-PG-O3B	2.18	111.95	104.64
2	C	601	GTP	O3G-PG-O2G	2.18	115.97	107.80
4	A	604	IMP	O4'-C4'-C3'	-2.18	100.83	105.15
3	F	603	ATP	O3G-PG-O3B	2.18	111.93	104.64
2	H	601	GTP	O3G-PG-O2G	2.16	115.90	107.80
3	G	603	ATP	O2G-PG-O3B	2.15	111.86	104.64
2	D	601	GTP	O3G-PG-O2G	2.15	115.87	107.80
4	F	604	IMP	C5-C4-N3	-2.15	124.11	127.27
3	H	603	ATP	O2B-PB-O3A	2.15	113.07	107.27
2	C	602	GTP	O2A-PA-O3A	2.13	113.04	107.27
4	C	604	IMP	O4'-C4'-C3'	-2.12	100.94	105.15
4	H	604	IMP	O4'-C4'-C3'	-2.12	100.94	105.15
4	B	604	IMP	O4'-C4'-C3'	-2.12	100.95	105.15
3	G	603	ATP	C4-C5-N7	2.10	112.98	110.58
3	H	603	ATP	O2A-PA-O3A	2.09	112.92	107.27
2	A	601	GTP	O3G-PG-O2G	2.09	115.62	107.80
4	E	604	IMP	O5'-P-O1P	2.08	112.06	106.44
2	H	601	GTP	O6-C6-N1	-2.08	116.21	120.11
4	E	604	IMP	O4'-C4'-C3'	-2.07	101.05	105.15
3	D	603	ATP	N6-C6-N1	-2.05	113.81	118.38
2	G	601	GTP	O3A-PB-O1B	-2.05	104.54	110.70
2	E	601	GTP	O6-C6-N1	-2.04	116.27	120.11
4	E	604	IMP	O2P-P-O5'	2.04	111.98	106.67
4	G	604	IMP	O4'-C4'-C3'	-2.03	101.12	105.15
2	H	602	GTP	O4'-C1'-N9	2.03	112.96	108.36
3	F	603	ATP	O2B-PB-O3A	2.02	112.74	107.27
3	C	603	ATP	N6-C6-N1	-2.02	113.89	118.38
3	F	603	ATP	N6-C6-N1	-2.02	113.89	118.38
4	A	604	IMP	O2P-P-O5'	2.01	111.92	106.67
4	D	604	IMP	O3P-P-O5'	2.01	111.90	106.67
3	G	603	ATP	N6-C6-N1	-2.00	113.92	118.38

There are no chirality outliers.

All (73) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	GTP	C5'-O5'-PA-O1A
2	A	602	GTP	C5'-O5'-PA-O3A
2	B	601	GTP	C5'-O5'-PA-O3A

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Mol	Chain	Res	Type	Atoms
2	H	601	GTP	PB-O3A-PA-O5'
3	H	603	ATP	PB-O3A-PA-O5'
2	B	602	GTP	O4'-C4'-C5'-O5'
2	C	602	GTP	O4'-C4'-C5'-O5'
2	F	601	GTP	O4'-C4'-C5'-O5'
2	B	602	GTP	C3'-C4'-C5'-O5'
2	C	602	GTP	C3'-C4'-C5'-O5'
2	D	602	GTP	O4'-C4'-C5'-O5'
2	E	602	GTP	O4'-C4'-C5'-O5'
2	G	602	GTP	O4'-C4'-C5'-O5'
2	H	602	GTP	O4'-C4'-C5'-O5'
2	A	601	GTP	PB-O3B-PG-O1G
2	D	601	GTP	PB-O3B-PG-O1G
2	G	601	GTP	PB-O3B-PG-O1G
2	H	601	GTP	PB-O3B-PG-O1G
2	E	602	GTP	C3'-C4'-C5'-O5'
2	A	601	GTP	PB-O3A-PA-O5'
2	B	601	GTP	PB-O3A-PA-O5'
2	C	601	GTP	PB-O3A-PA-O5'
2	D	601	GTP	PB-O3A-PA-O5'
2	E	601	GTP	PB-O3A-PA-O5'
2	G	601	GTP	PB-O3A-PA-O5'
3	G	603	ATP	PB-O3A-PA-O5'
2	C	601	GTP	PB-O3B-PG-O1G
2	E	601	GTP	PB-O3B-PG-O1G
2	H	602	GTP	C3'-C4'-C5'-O5'
3	B	603	ATP	C2'-C1'-N9-C8
3	E	603	ATP	C2'-C1'-N9-C8
3	H	603	ATP	C2'-C1'-N9-C8
3	H	603	ATP	PG-O3B-PB-O1B
3	C	603	ATP	C2'-C1'-N9-C8
2	D	602	GTP	C3'-C4'-C5'-O5'
2	E	601	GTP	O4'-C4'-C5'-O5'
2	A	601	GTP	C5'-O5'-PA-O2A
2	C	601	GTP	C5'-O5'-PA-O2A
2	C	602	GTP	C5'-O5'-PA-O1A
2	D	601	GTP	C5'-O5'-PA-O2A
2	D	602	GTP	C5'-O5'-PA-O1A
2	E	601	GTP	C5'-O5'-PA-O2A
2	E	602	GTP	C5'-O5'-PA-O1A
2	G	602	GTP	C5'-O5'-PA-O1A
2	H	601	GTP	C5'-O5'-PA-O2A

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Mol	Chain	Res	Type	Atoms
2	B	601	GTP	PB-O3B-PG-O1G
2	F	602	GTP	O4'-C4'-C5'-O5'
3	D	603	ATP	C2'-C1'-N9-C8
2	D	601	GTP	O4'-C4'-C5'-O5'
2	H	601	GTP	O4'-C4'-C5'-O5'
2	G	602	GTP	PB-O3A-PA-O1A
3	E	603	ATP	O4'-C1'-N9-C8
2	E	601	GTP	C3'-C4'-C5'-O5'
2	G	602	GTP	C3'-C4'-C5'-O5'
3	H	603	ATP	O4'-C1'-N9-C8
3	A	603	ATP	C2'-C1'-N9-C8
3	F	603	ATP	C2'-C1'-N9-C8
3	G	603	ATP	C2'-C1'-N9-C8
2	F	601	GTP	PB-O3A-PA-O2A
3	C	603	ATP	PA-O3A-PB-O2B
2	A	602	GTP	O4'-C1'-N9-C8
2	A	601	GTP	O4'-C4'-C5'-O5'
2	D	601	GTP	C3'-C4'-C5'-O5'
3	B	603	ATP	O4'-C1'-N9-C8
3	C	603	ATP	O4'-C1'-N9-C8
2	G	602	GTP	O4'-C1'-N9-C8
2	A	602	GTP	PG-O3B-PB-O2B
2	B	602	GTP	PB-O3A-PA-O2A
2	H	602	GTP	PB-O3A-PA-O2A
3	C	603	ATP	PA-O3A-PB-O1B
3	F	603	ATP	PG-O3B-PB-O2B
3	G	603	ATP	PG-O3B-PB-O2B
2	A	602	GTP	C3'-C4'-C5'-O5'

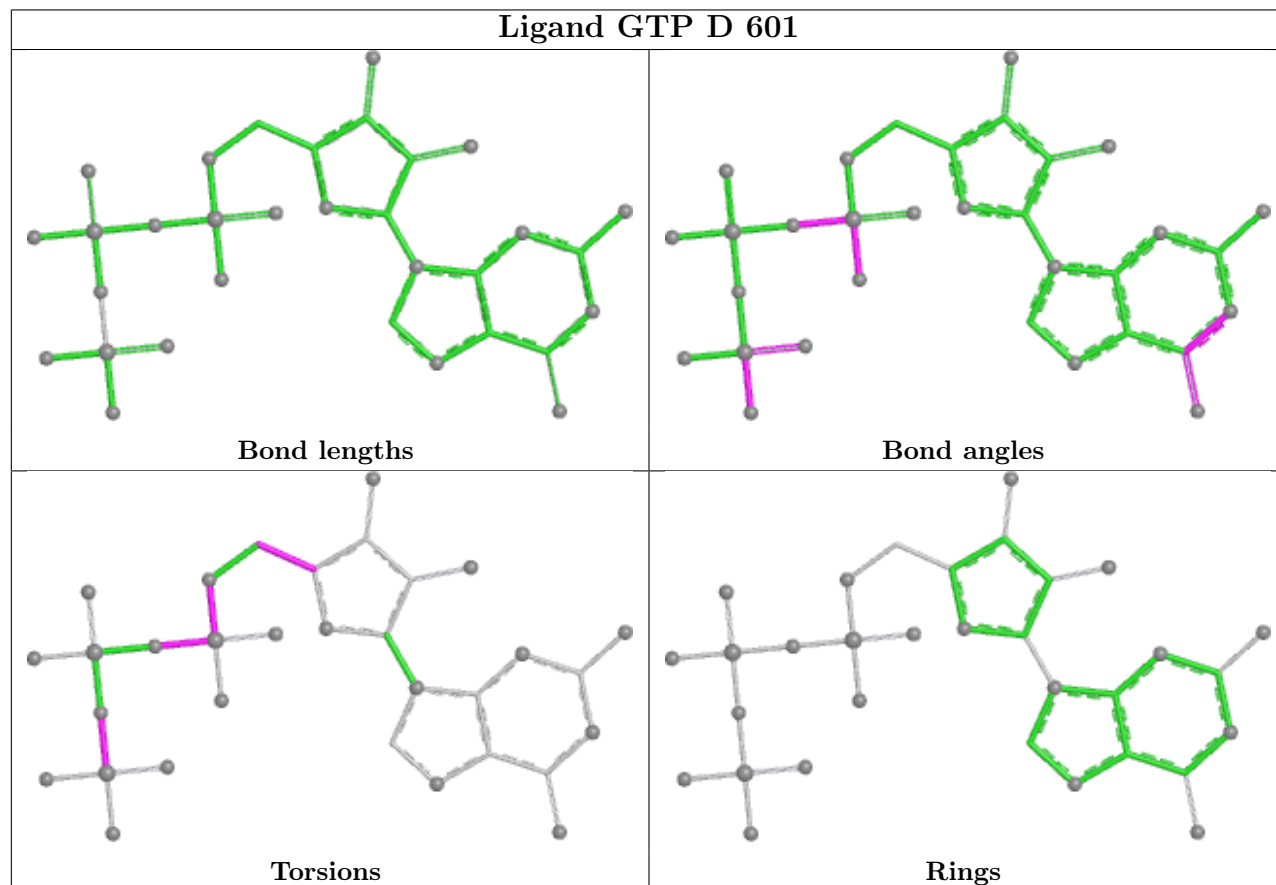
There are no ring outliers.

2 monomers are involved in 2 short contacts:

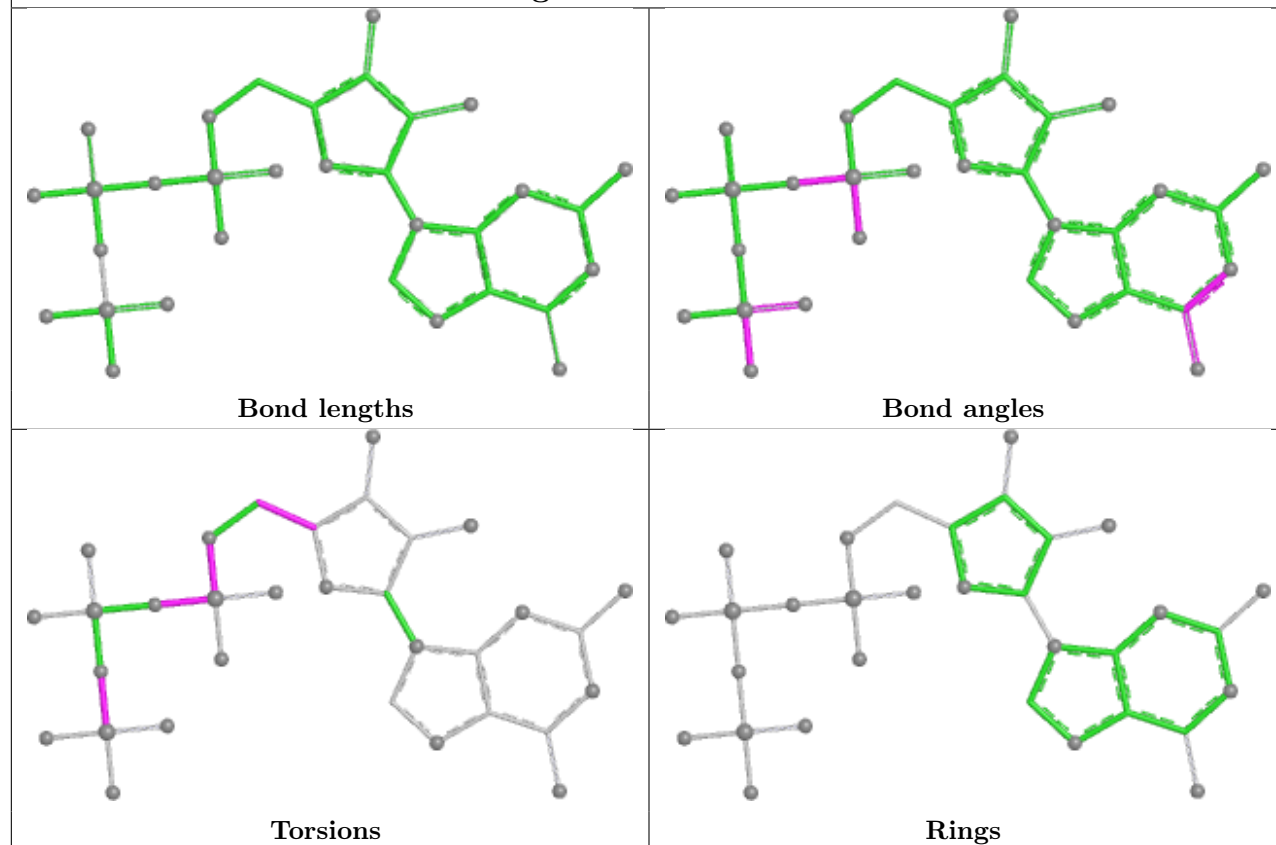
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	602	GTP	1	0
2	F	602	GTP	1	0

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

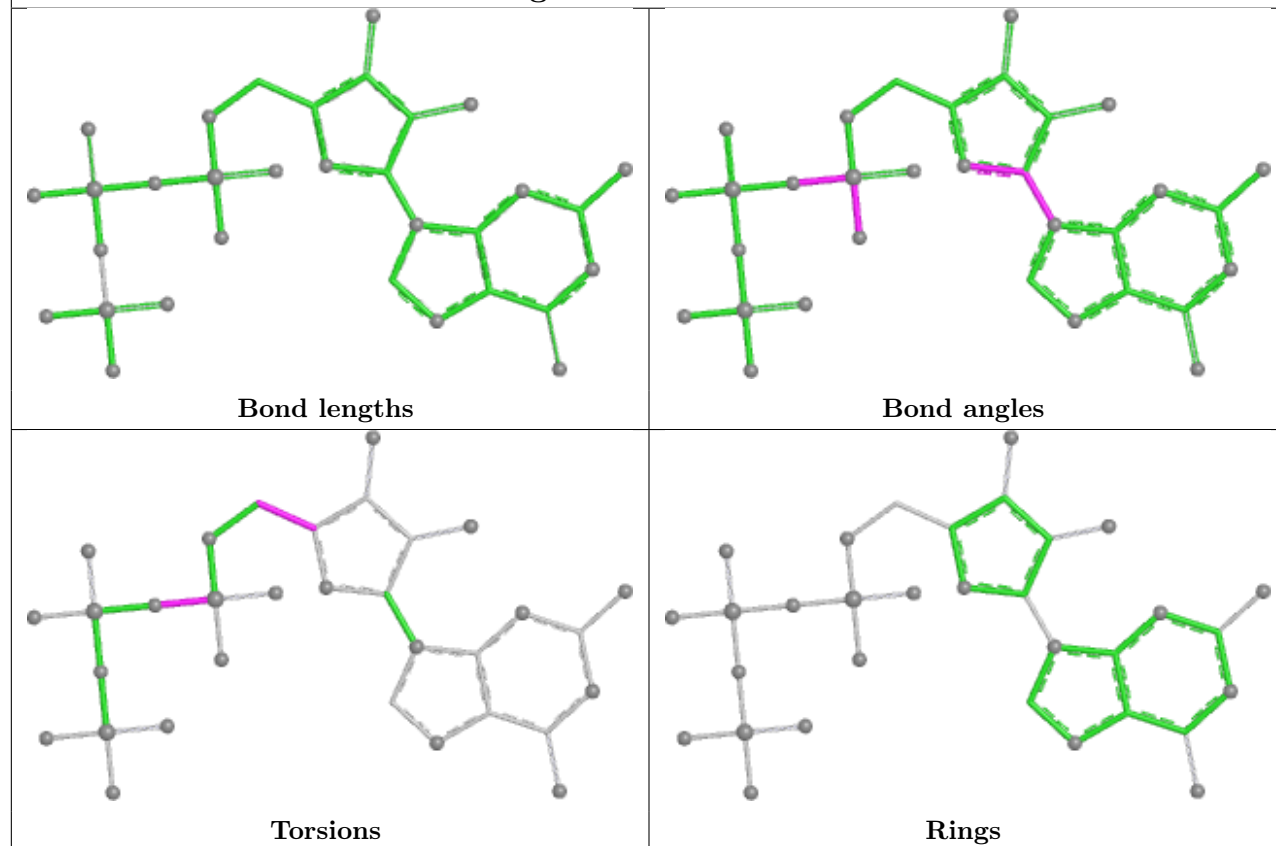
highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified 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.

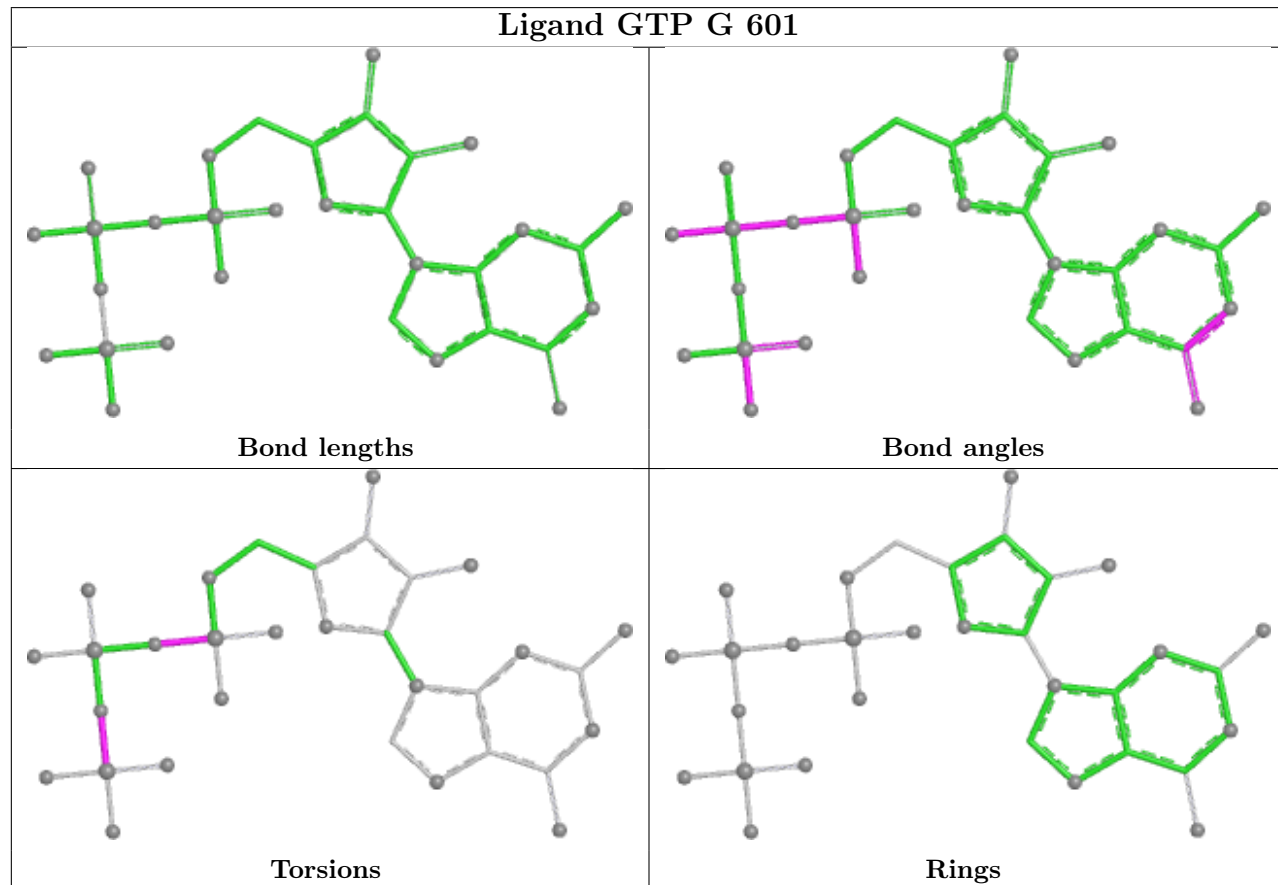
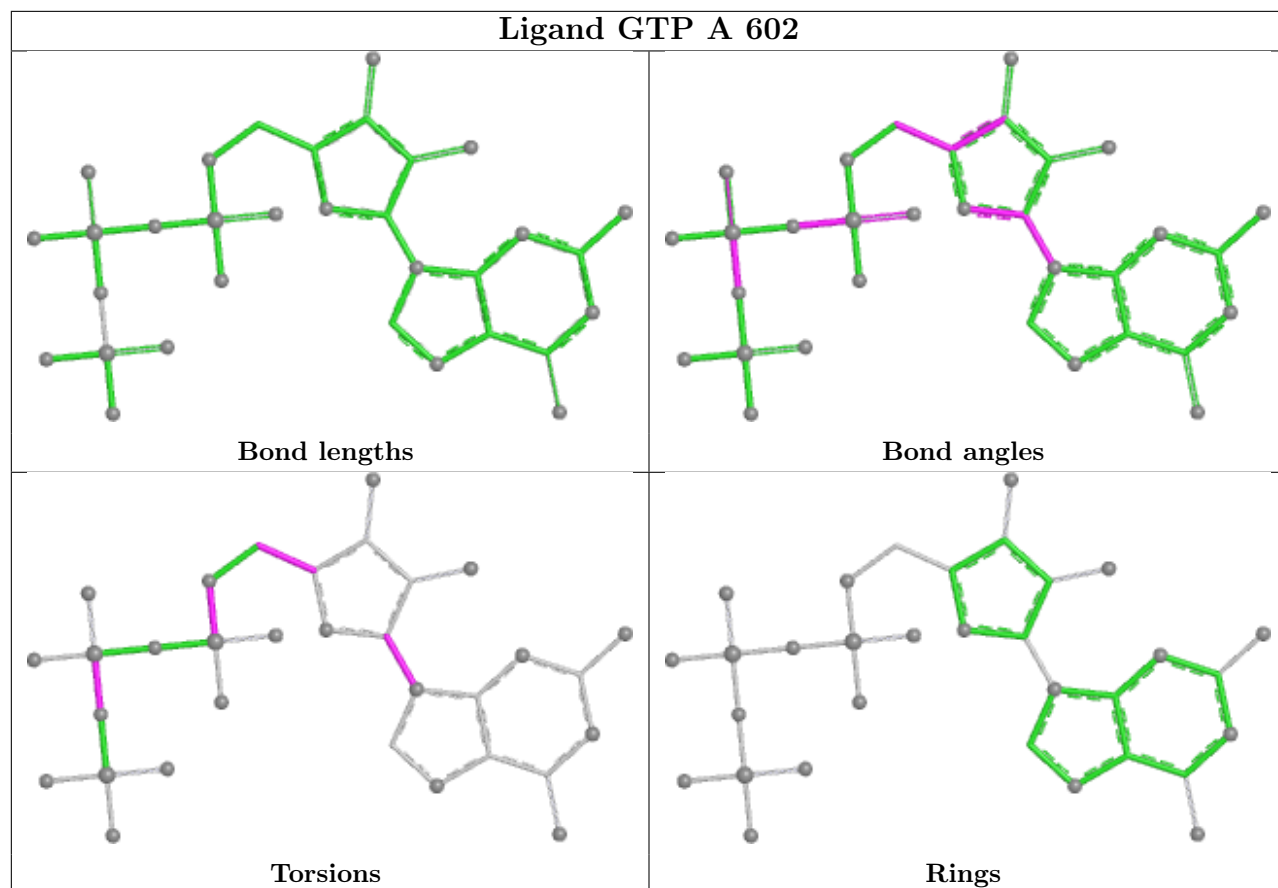


Ligand GTP E 601

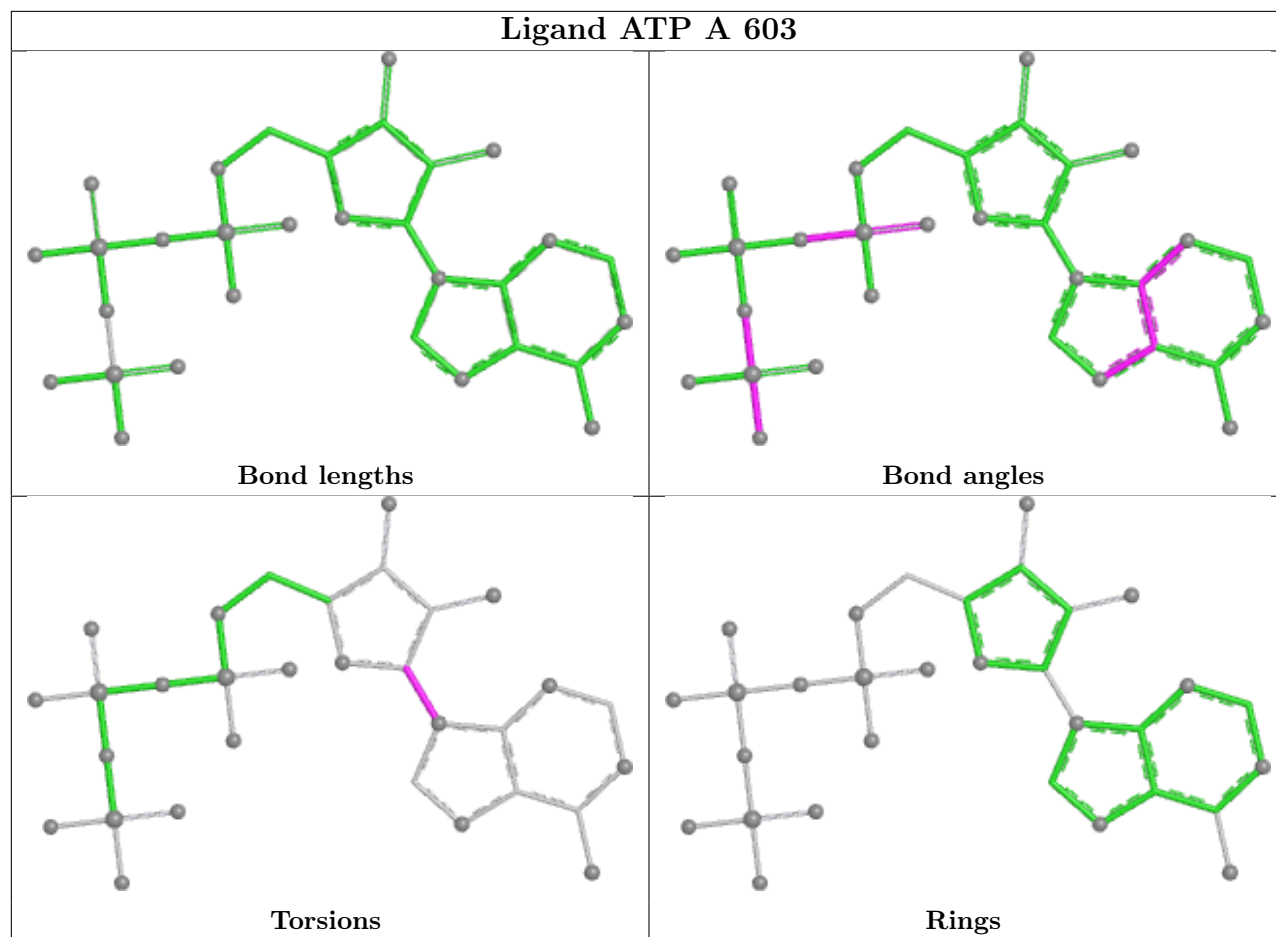


Ligand GTP H 602

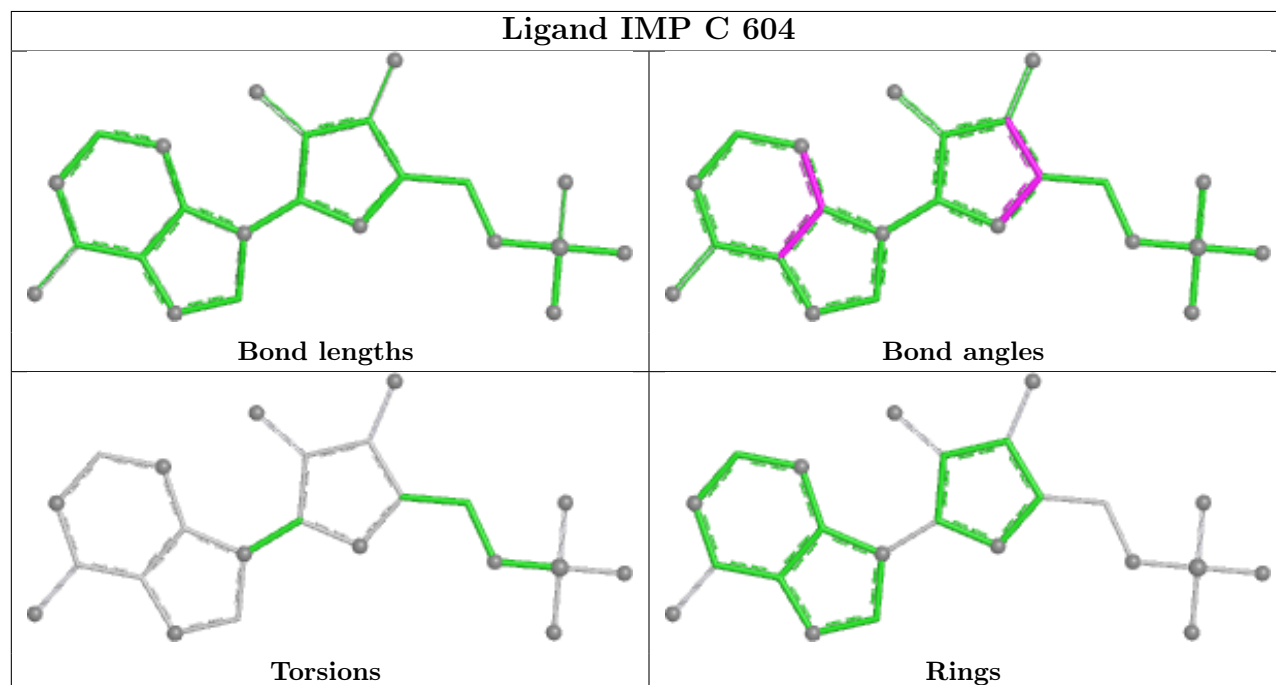


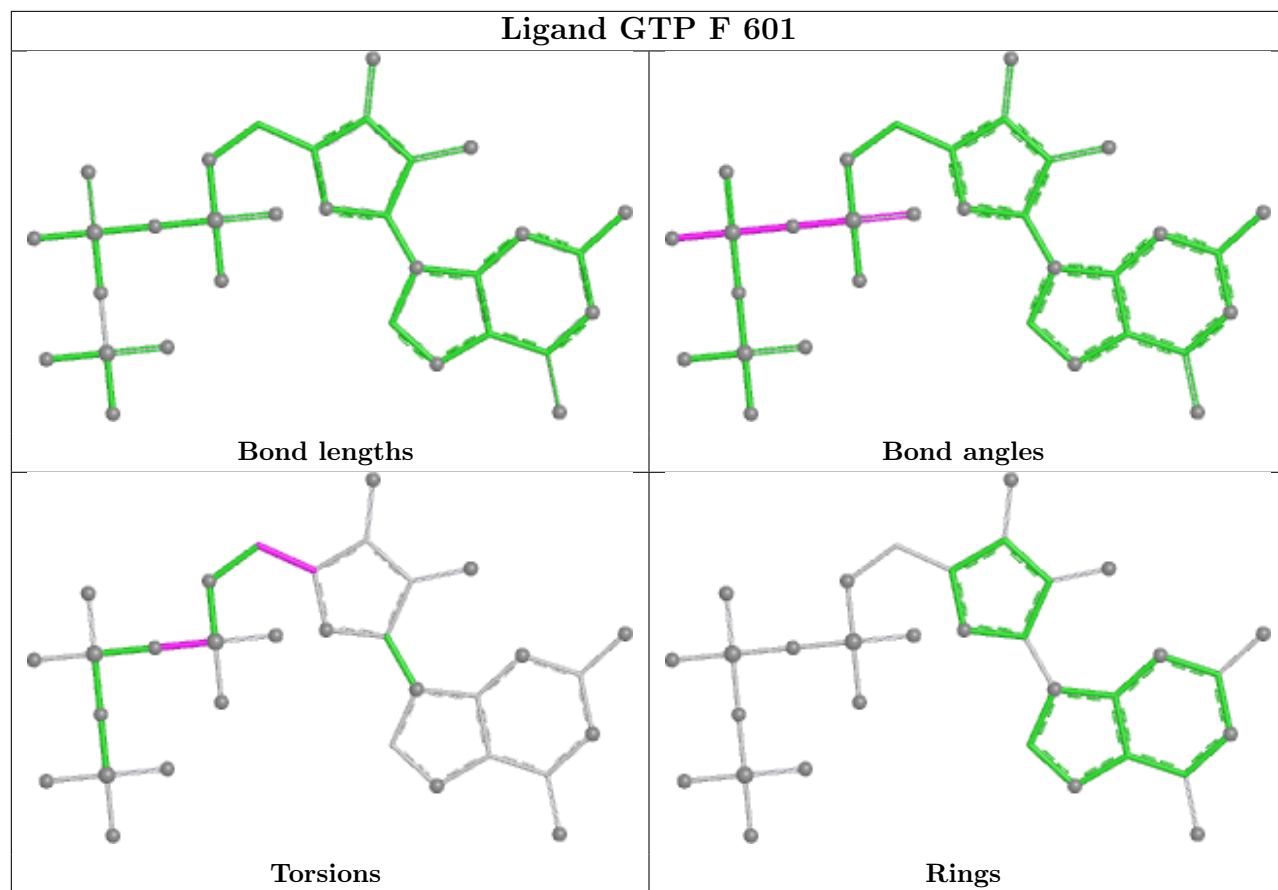


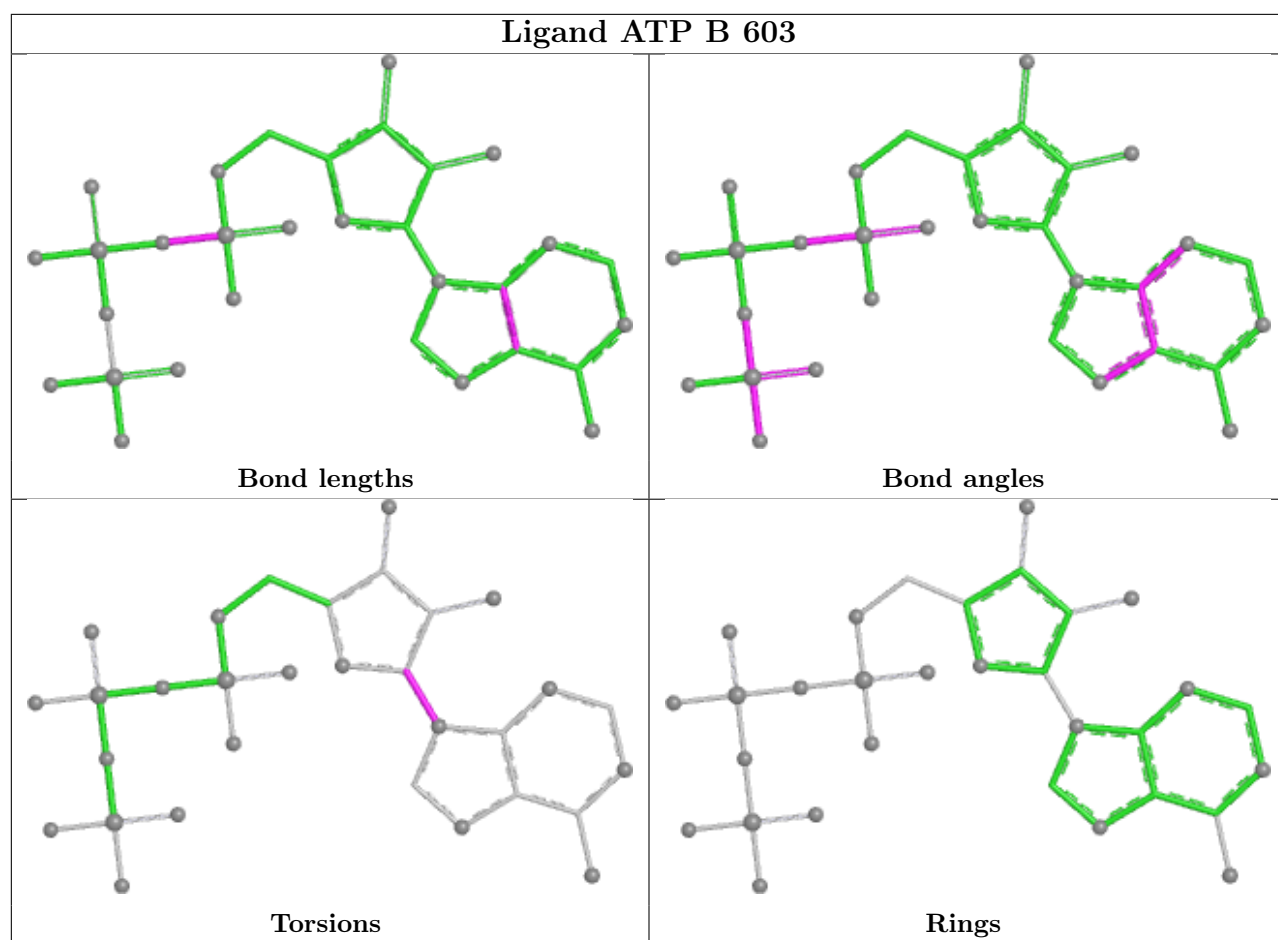
Ligand ATP A 603



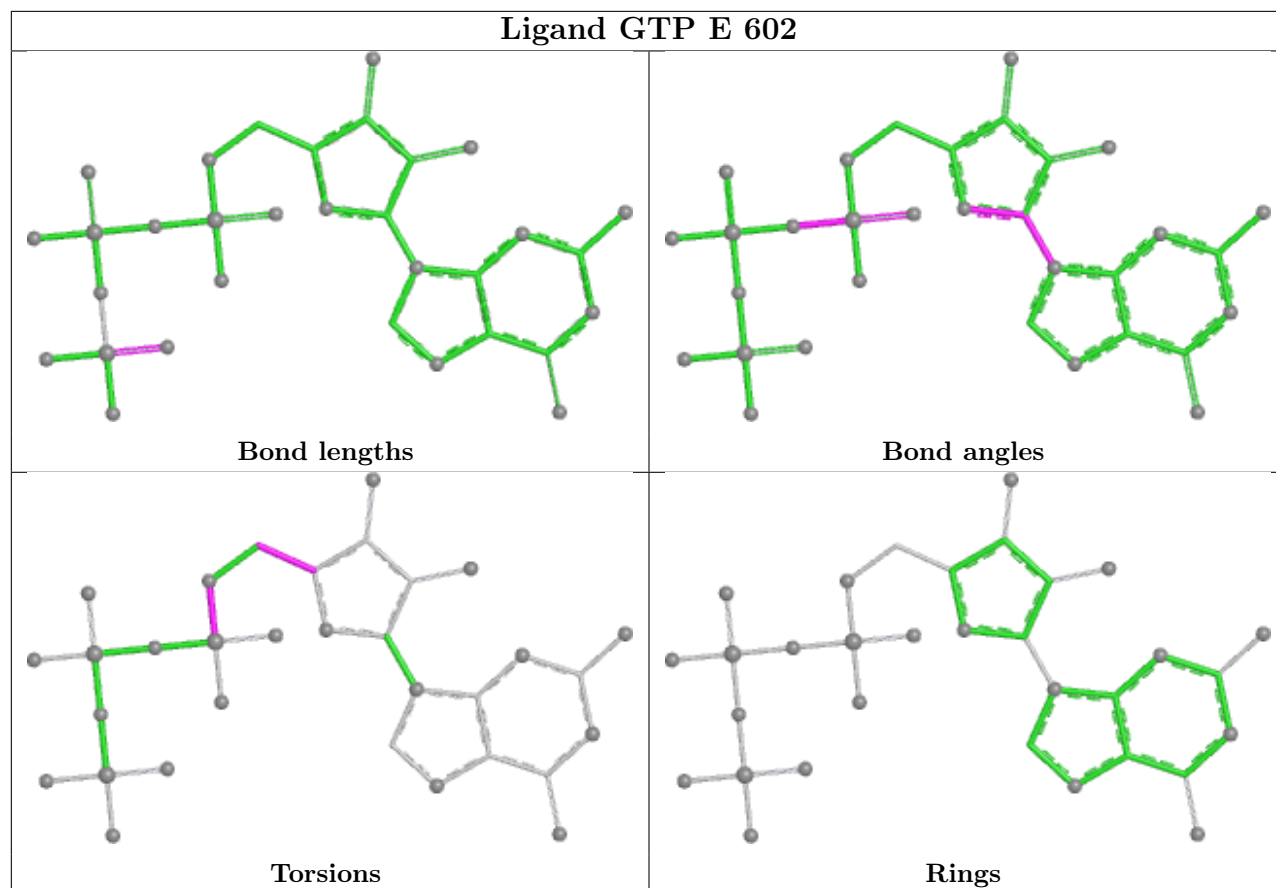
Ligand IMP C 604



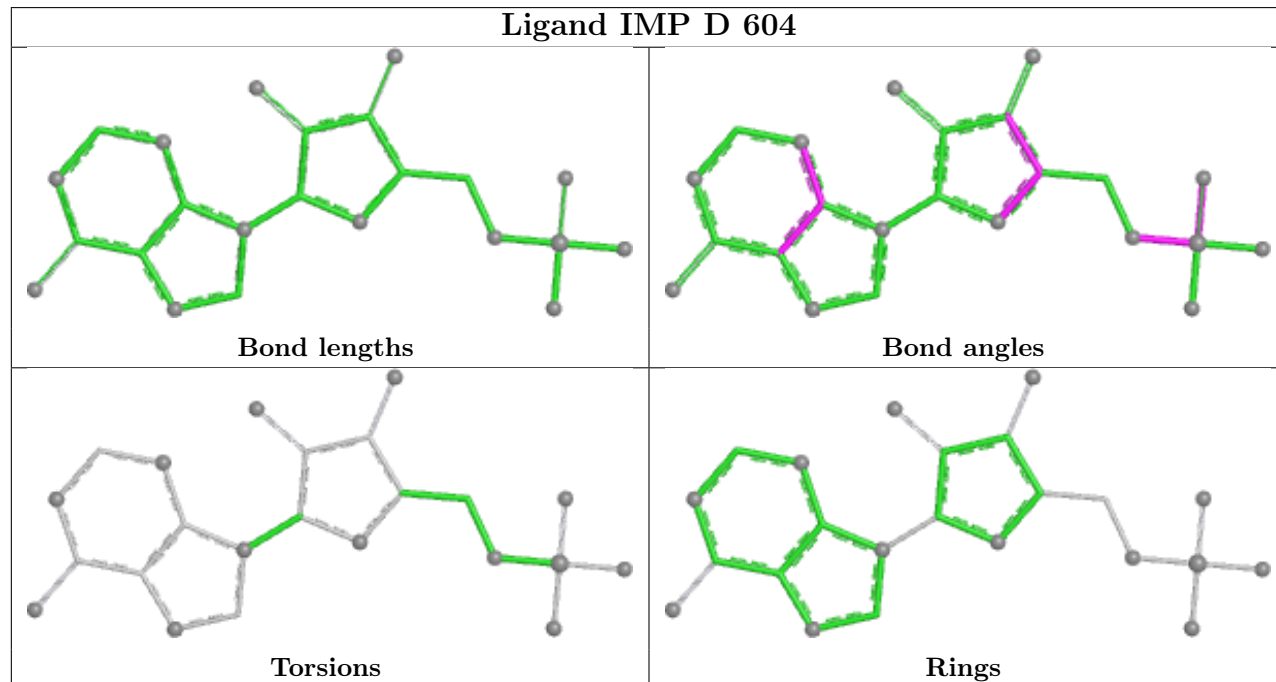


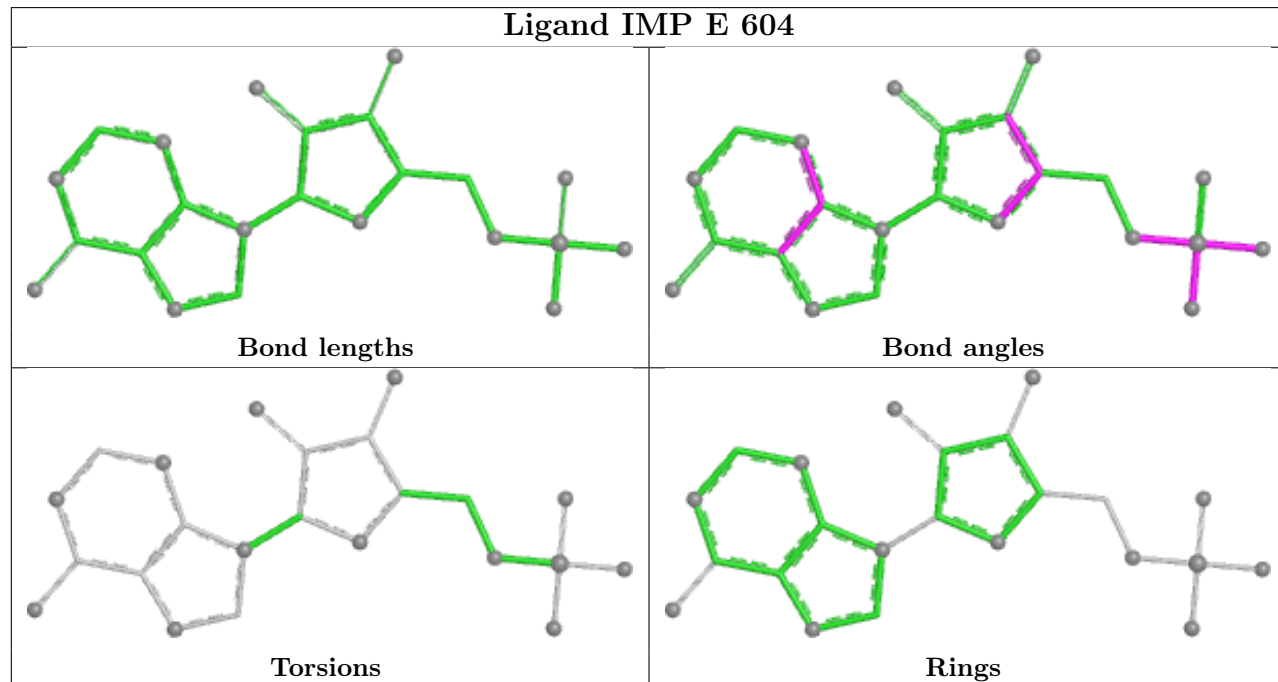
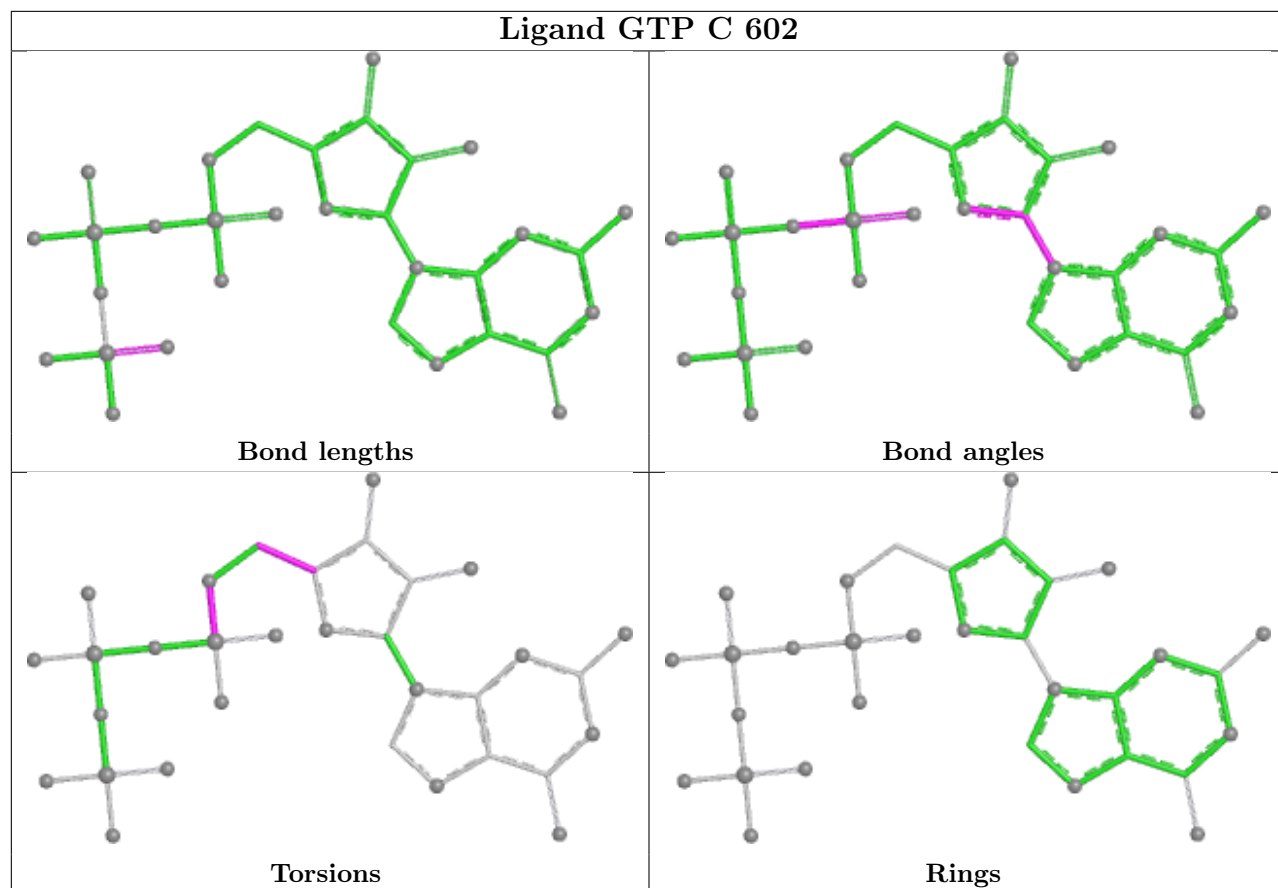


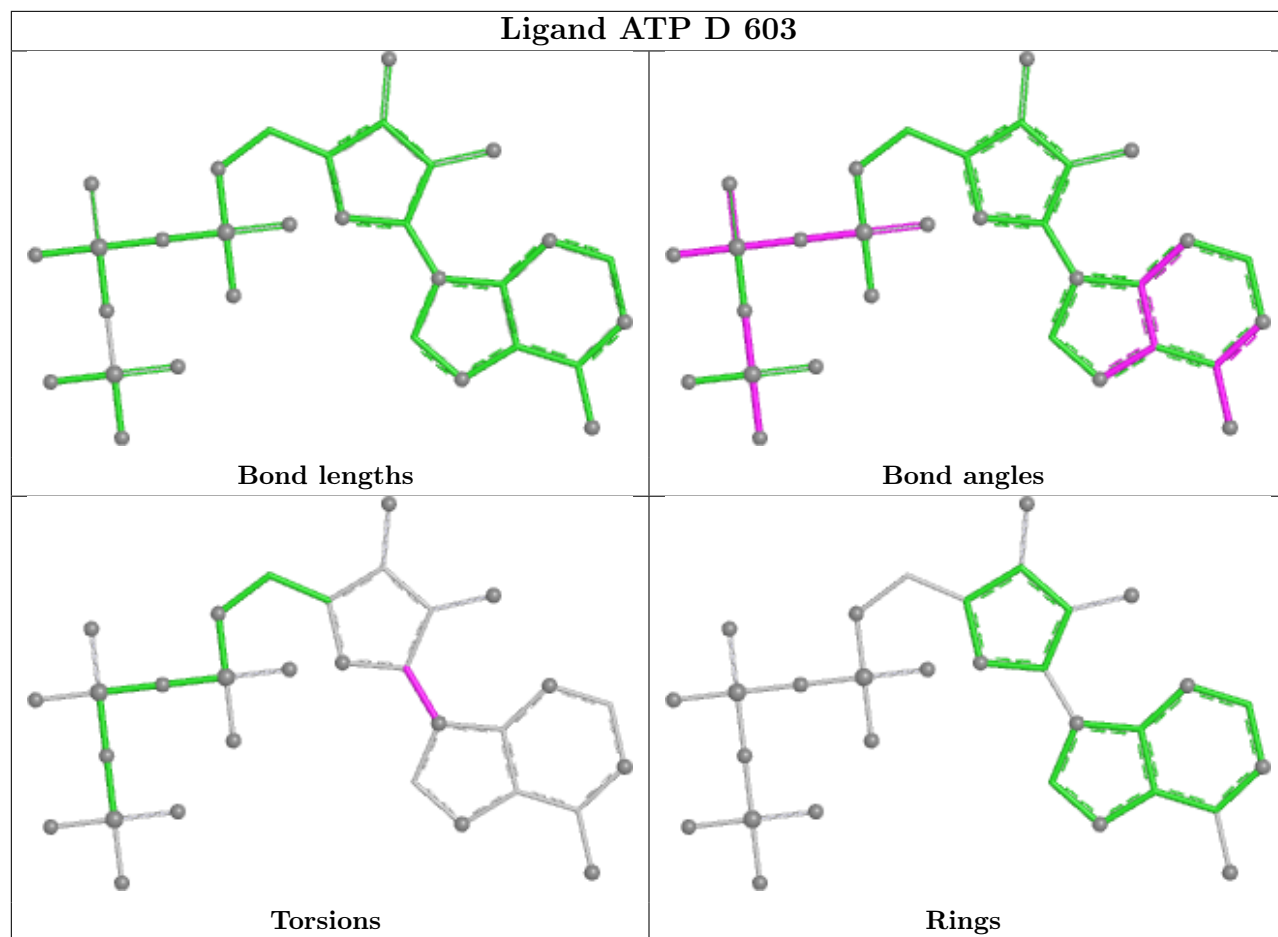
Ligand GTP E 602

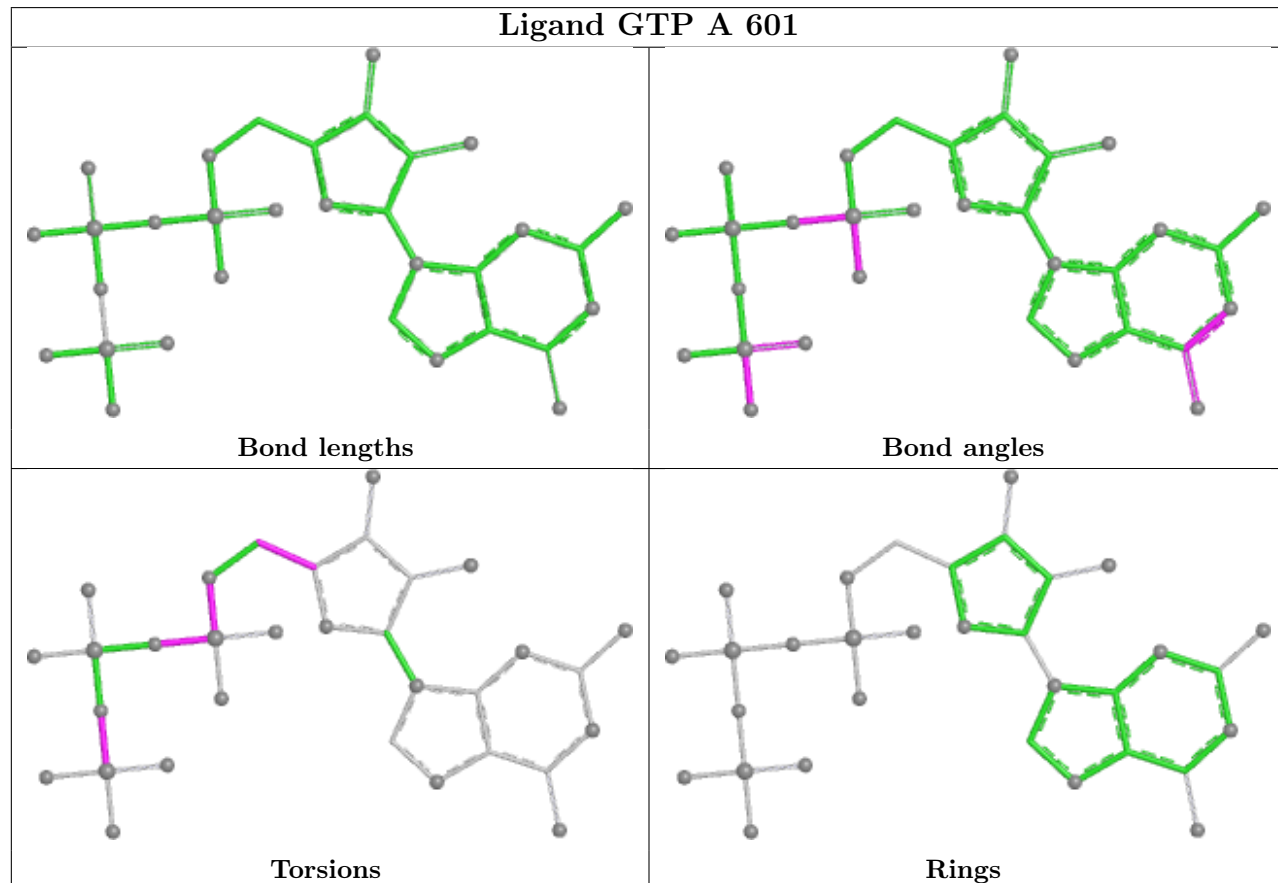
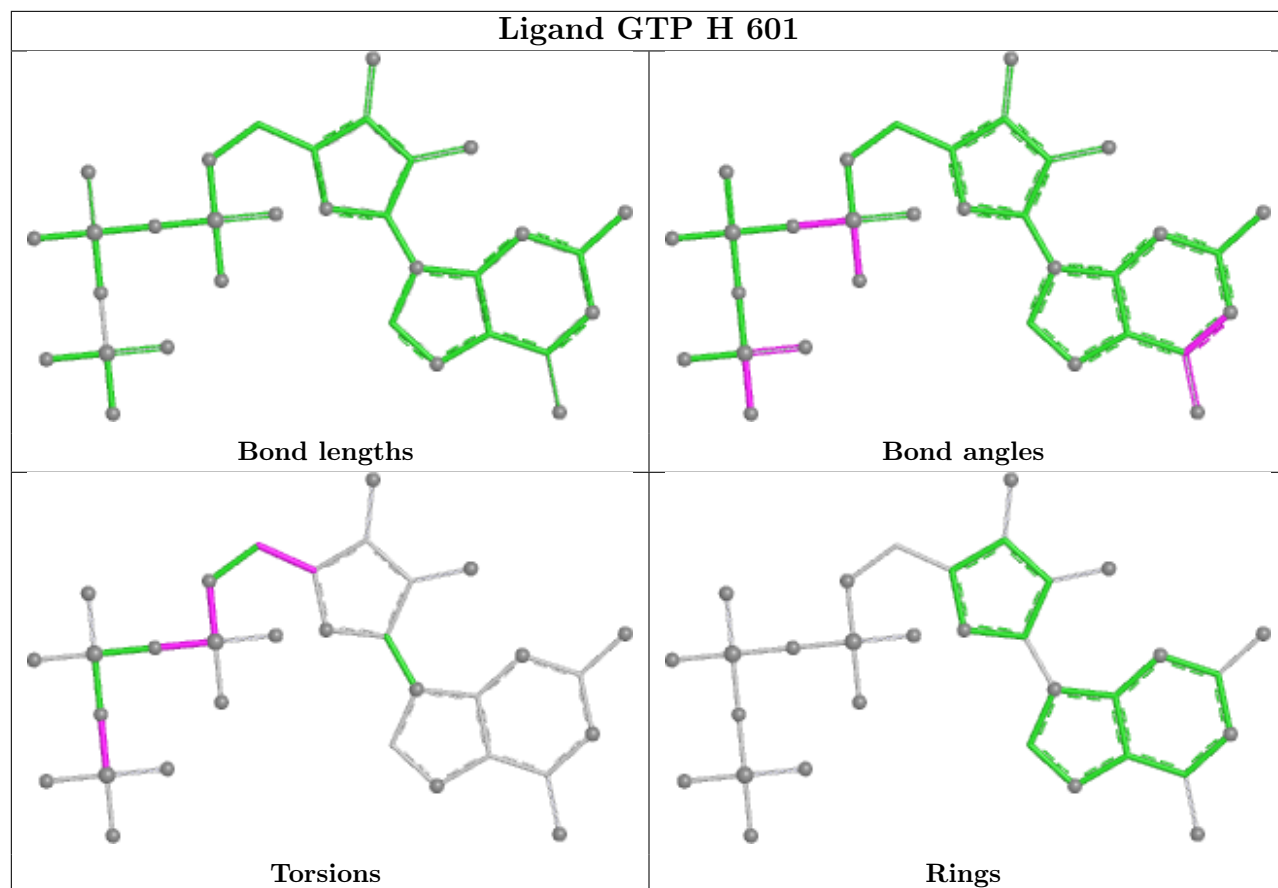


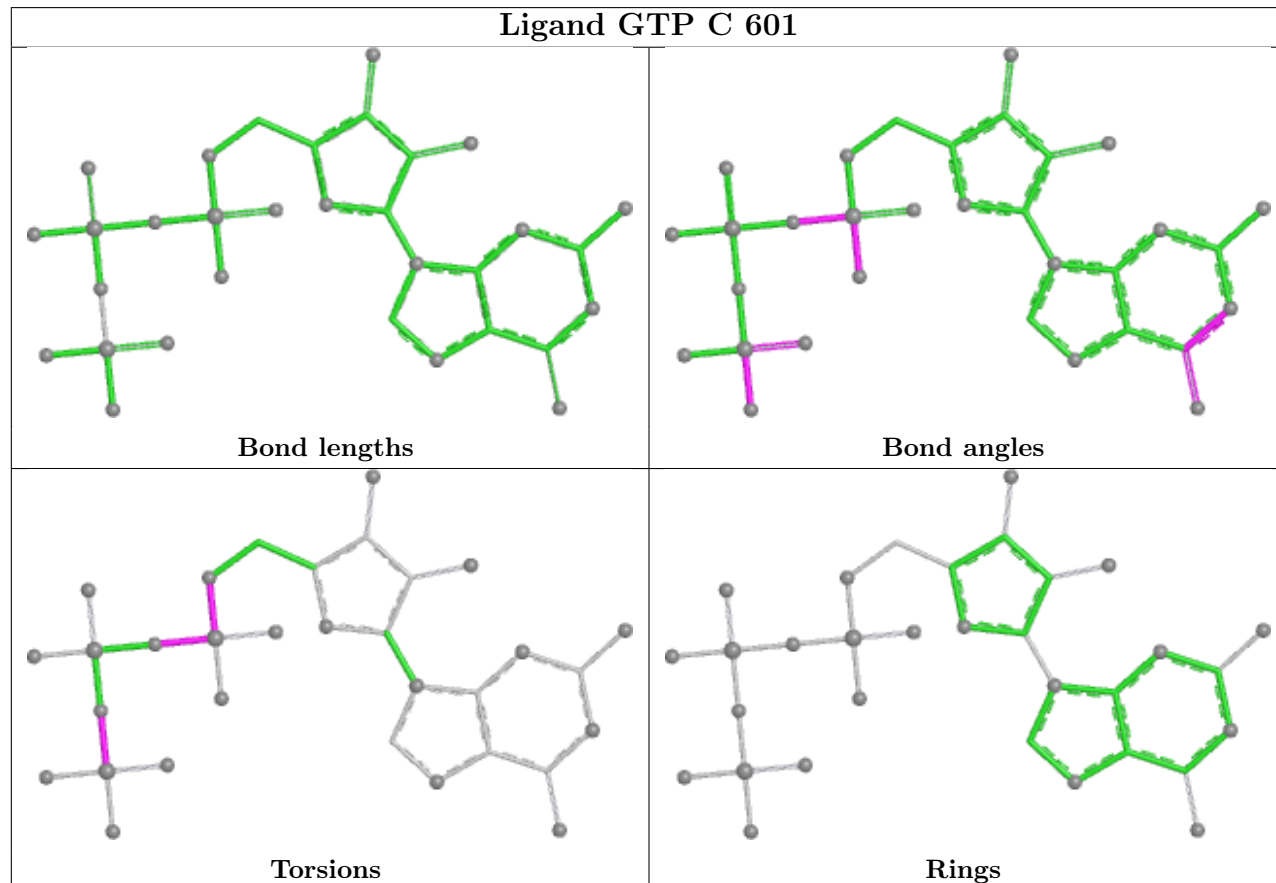
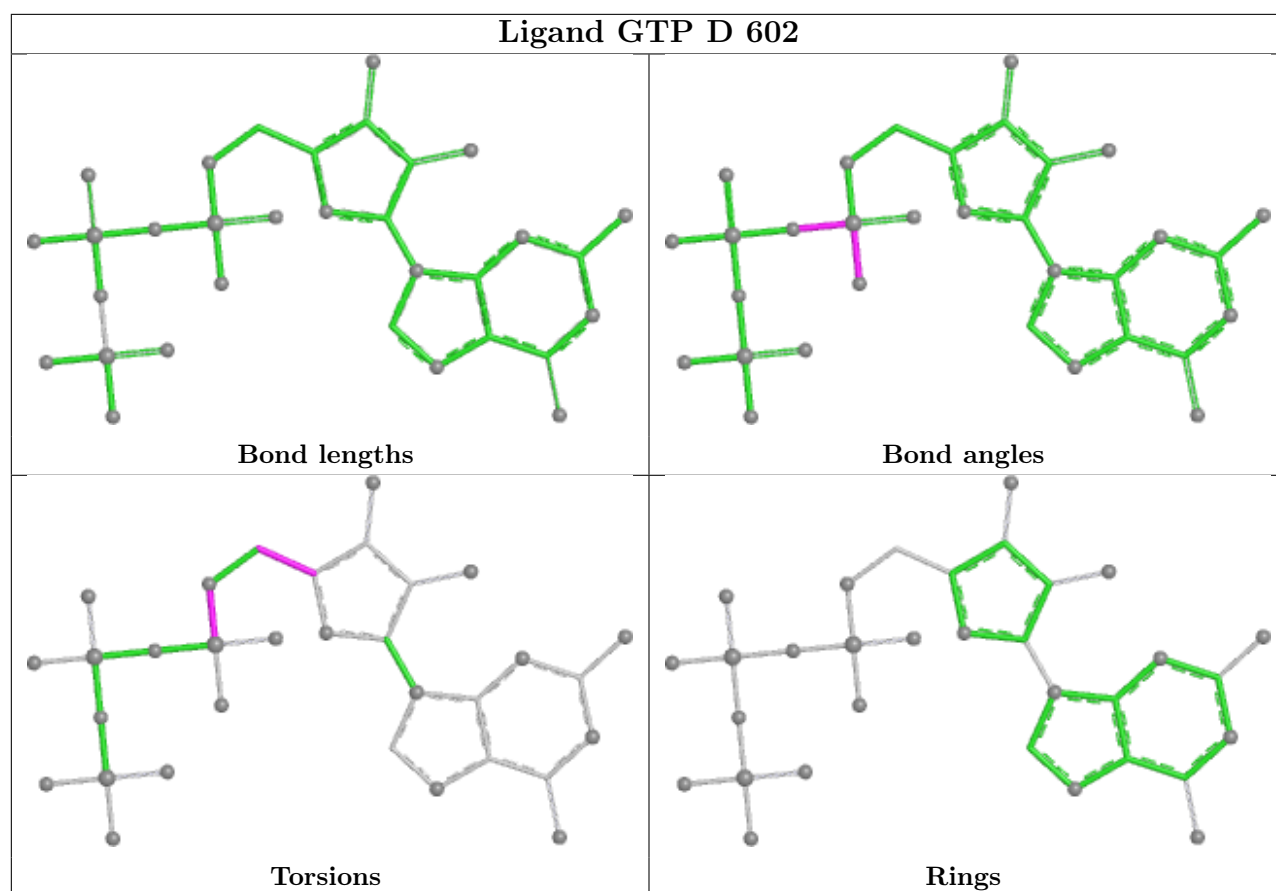
Ligand IMP D 604



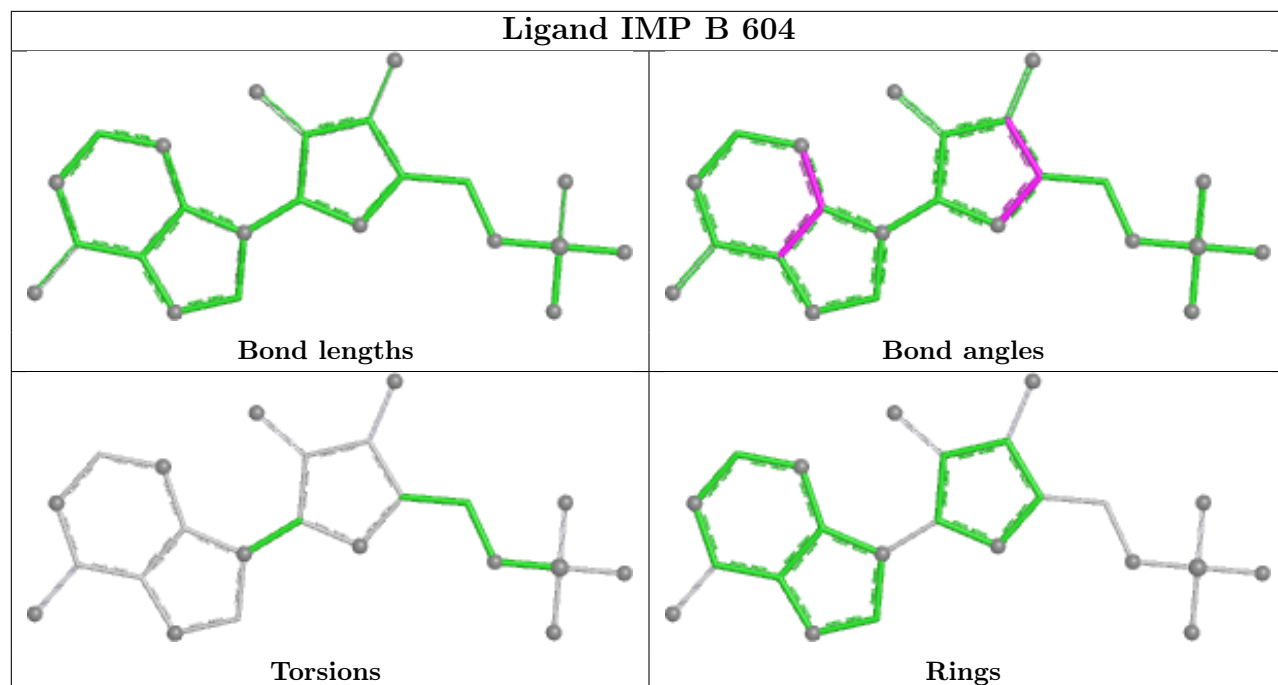




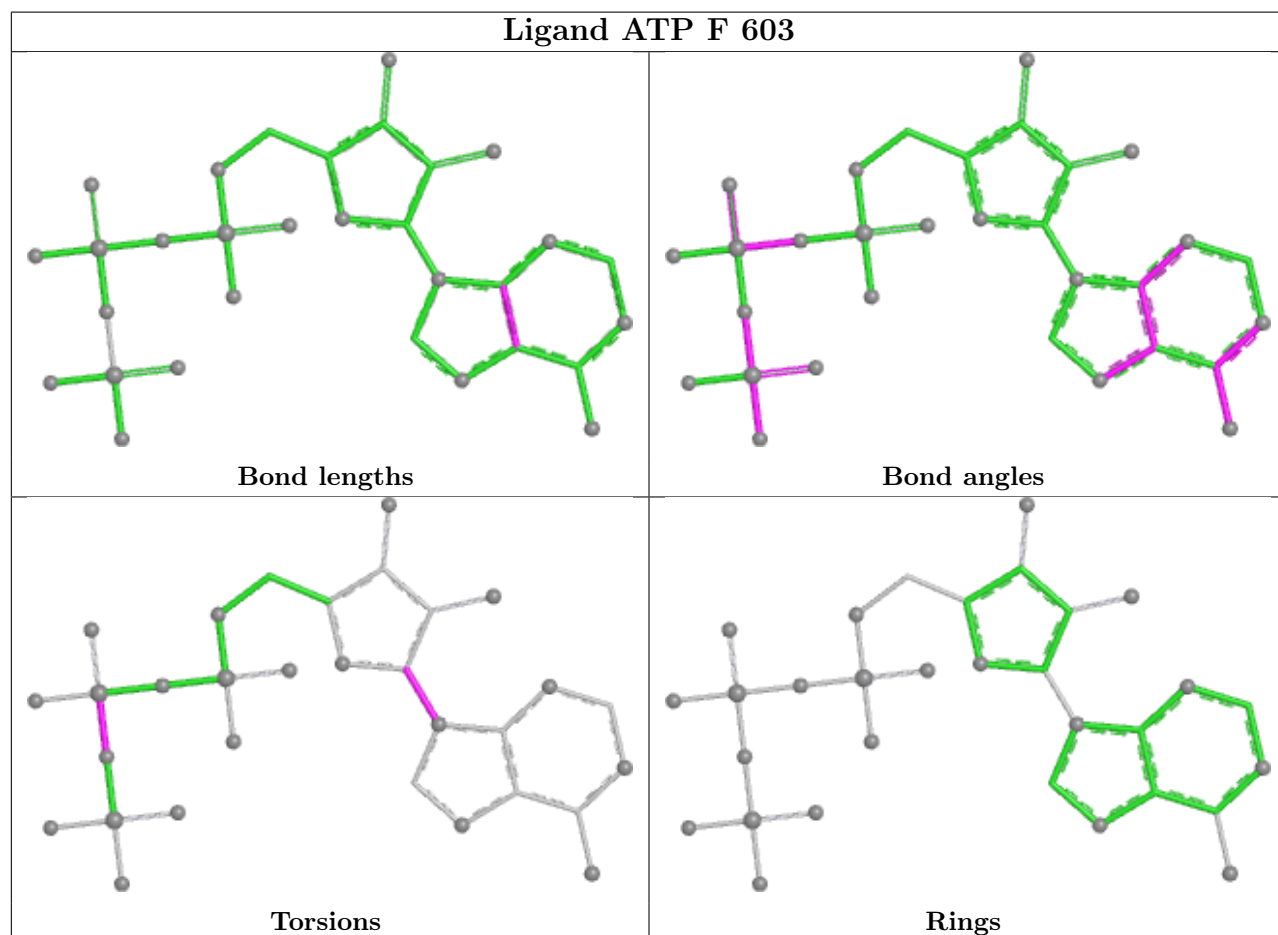


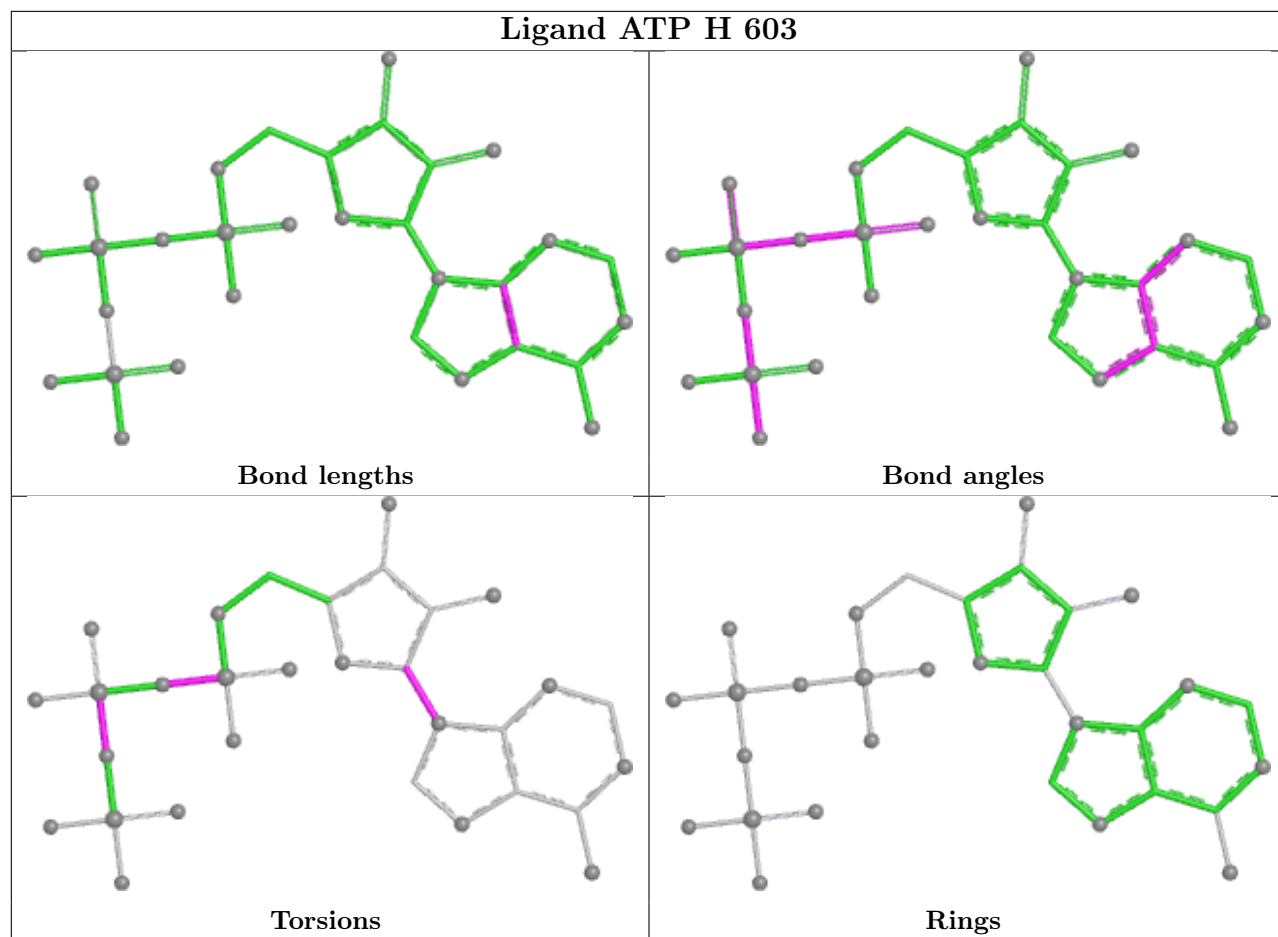


Ligand IMP B 604

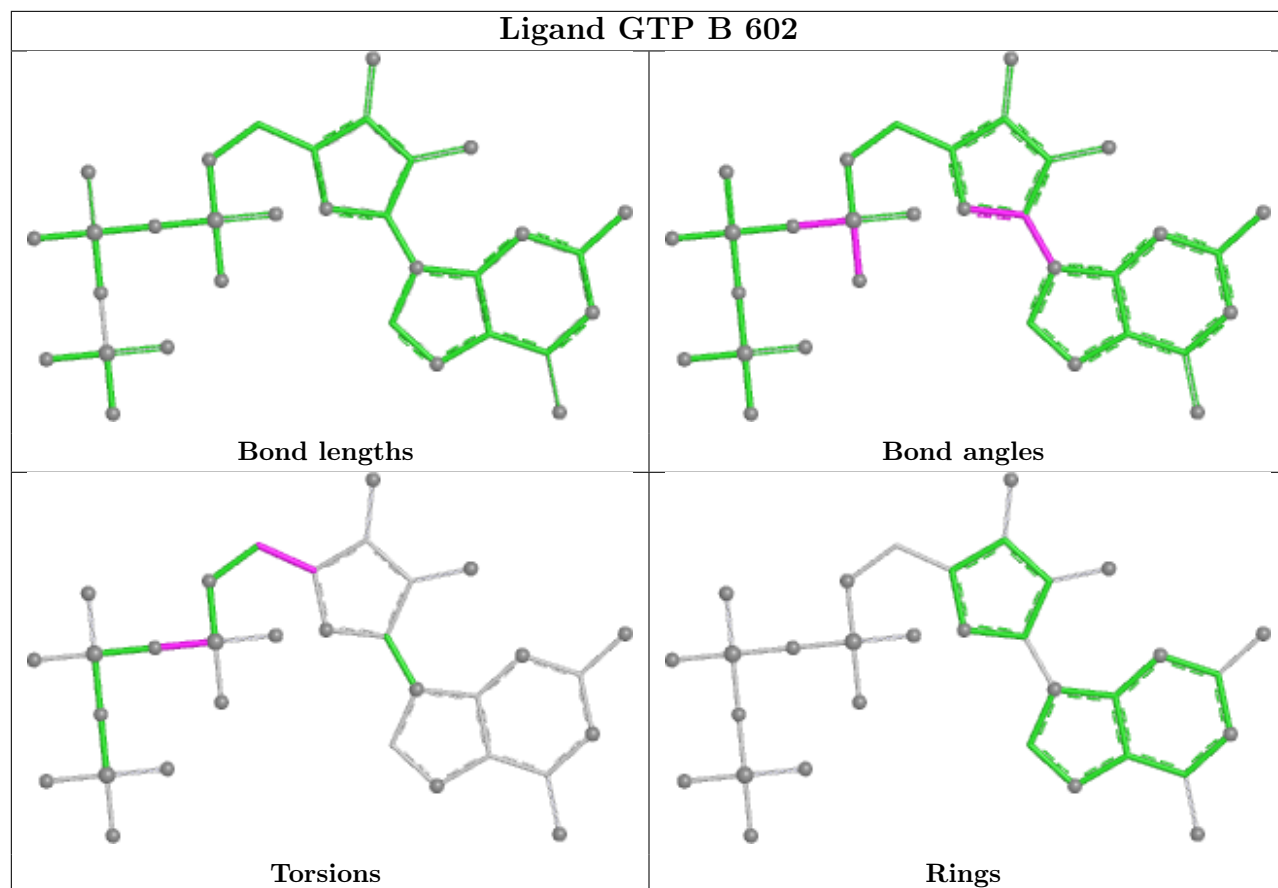


Ligand ATP F 603

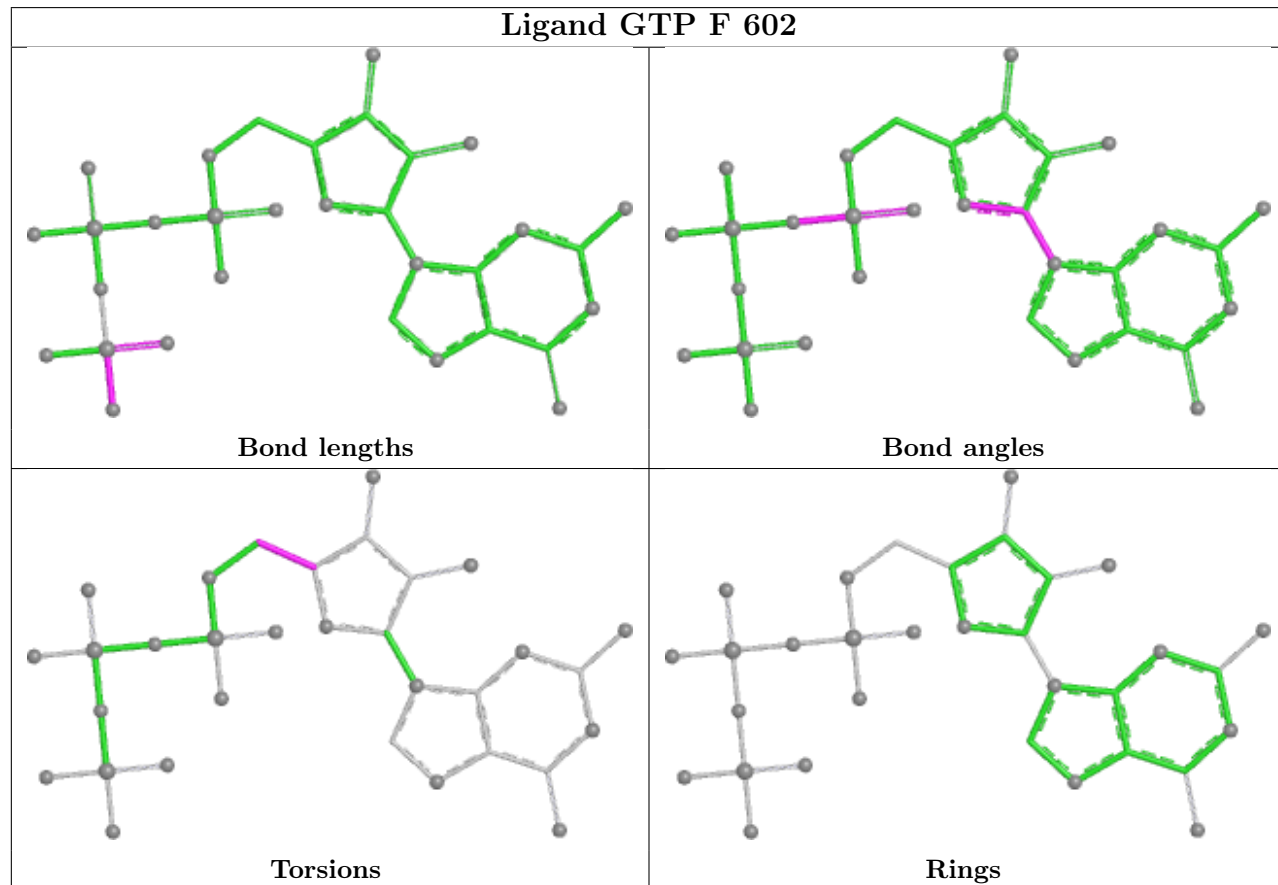




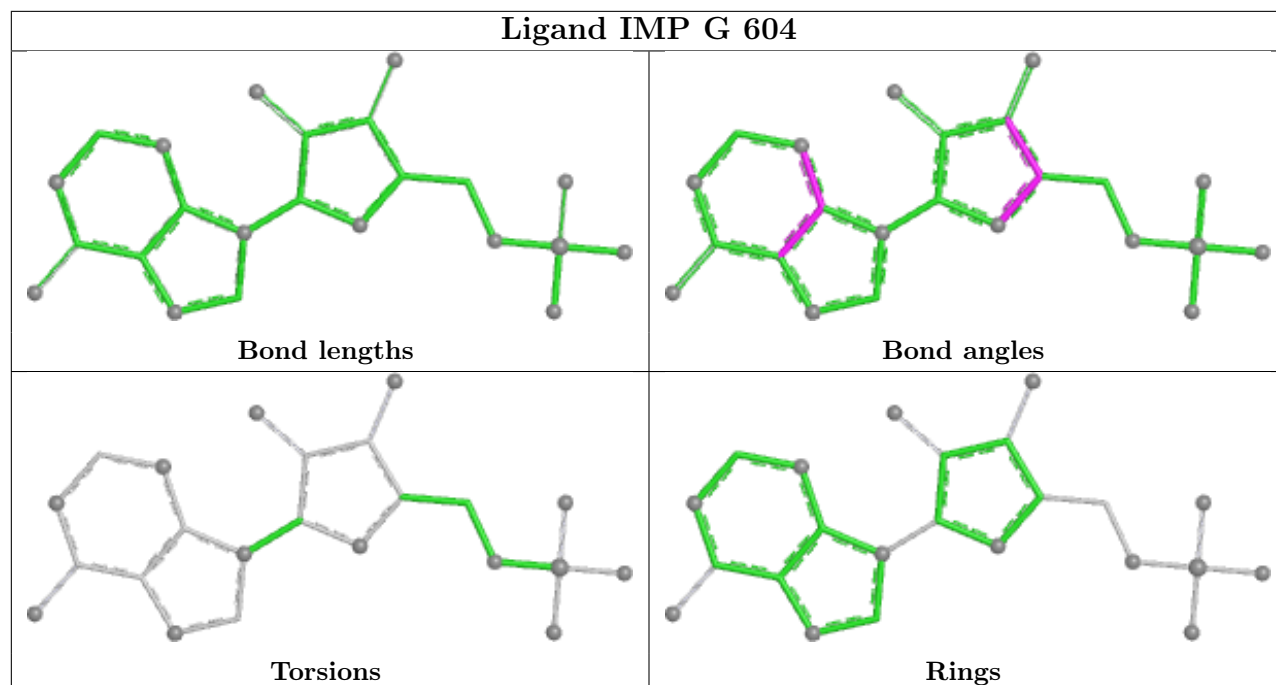
Ligand GTP B 602



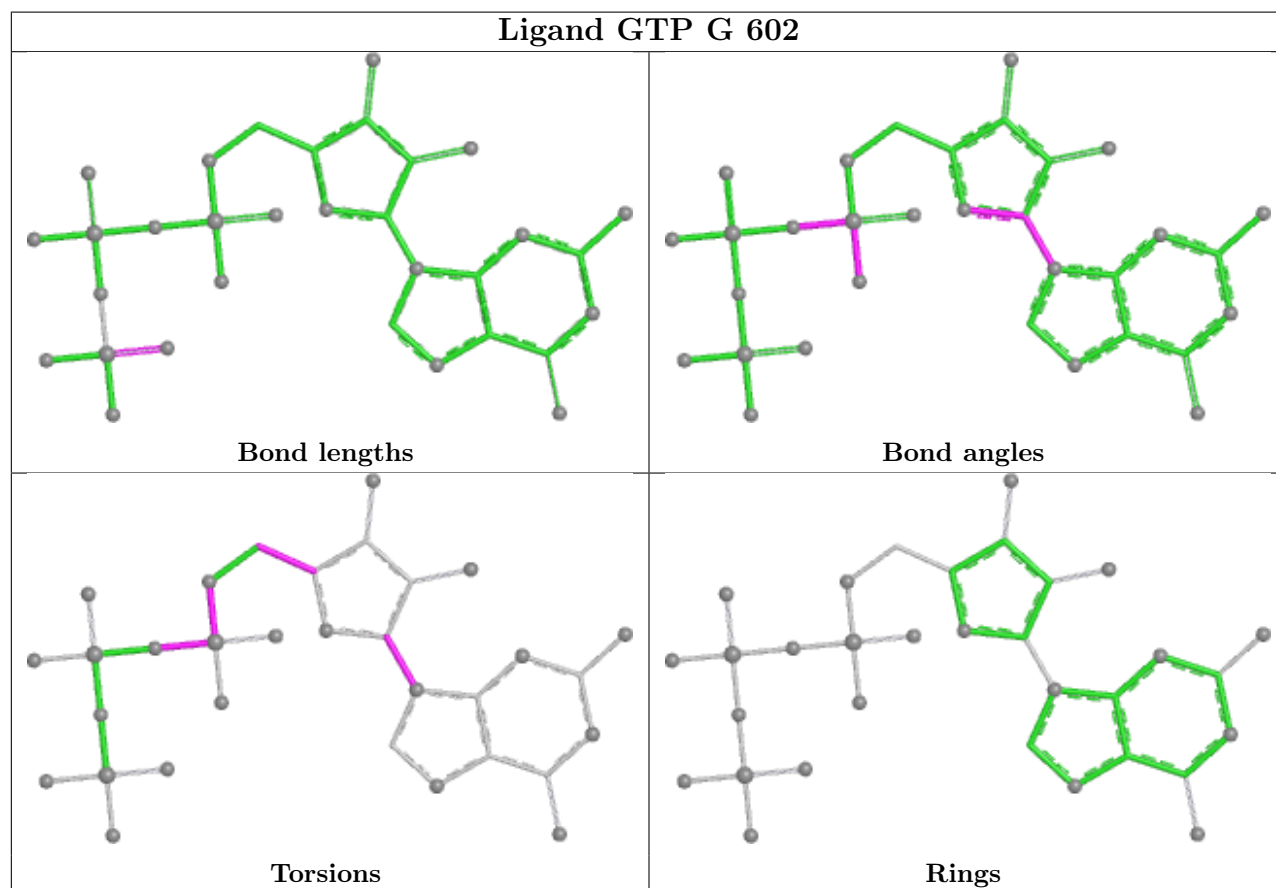
Ligand GTP F 602



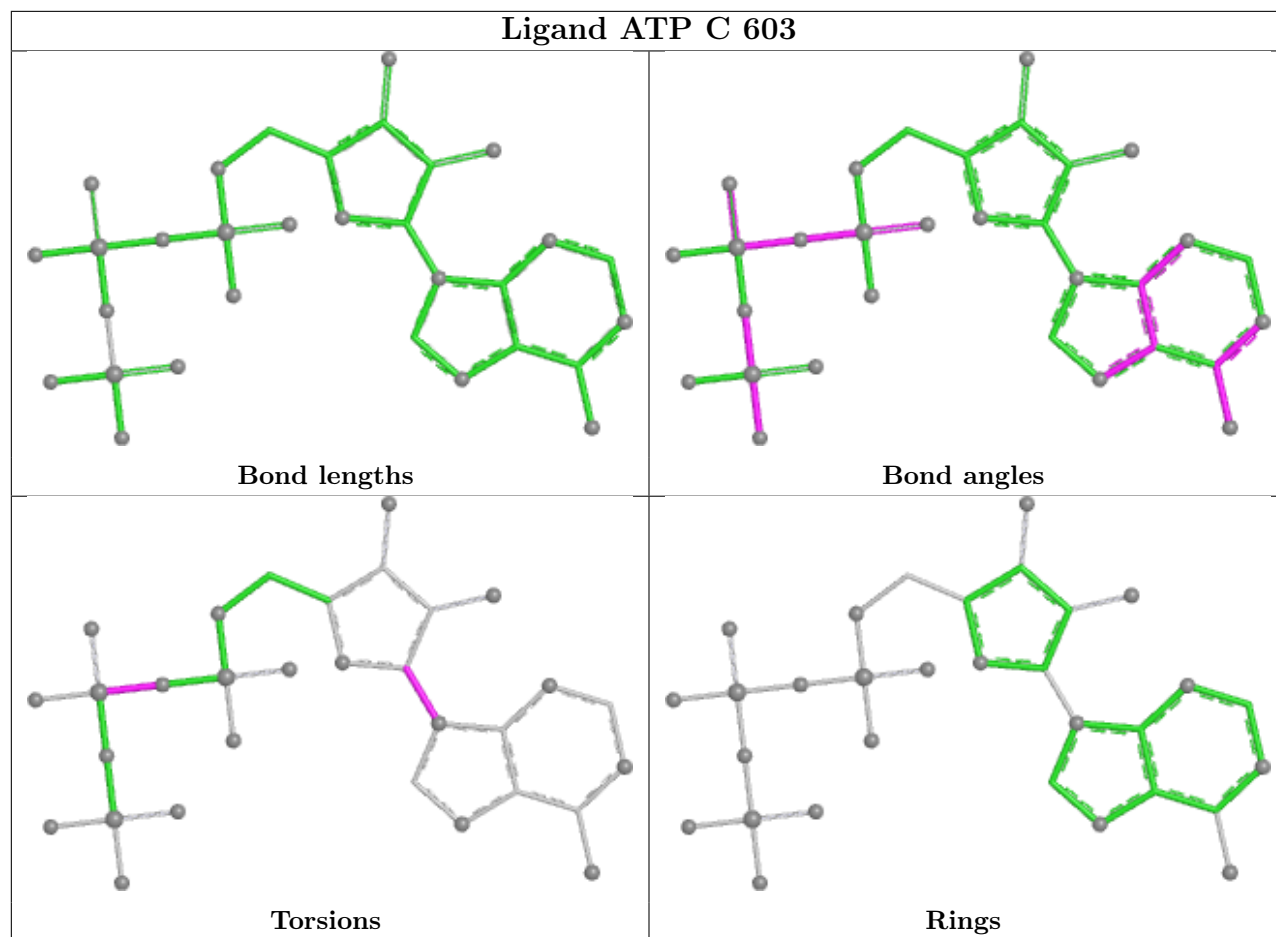
Ligand IMP G 604



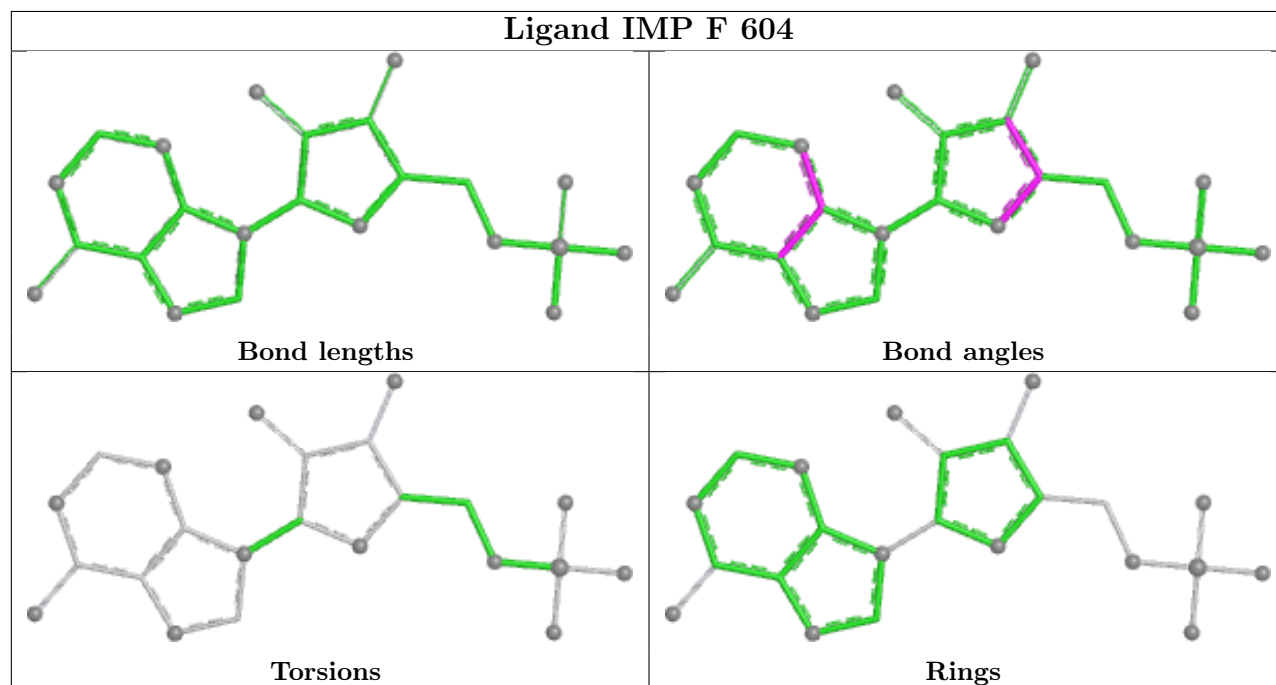
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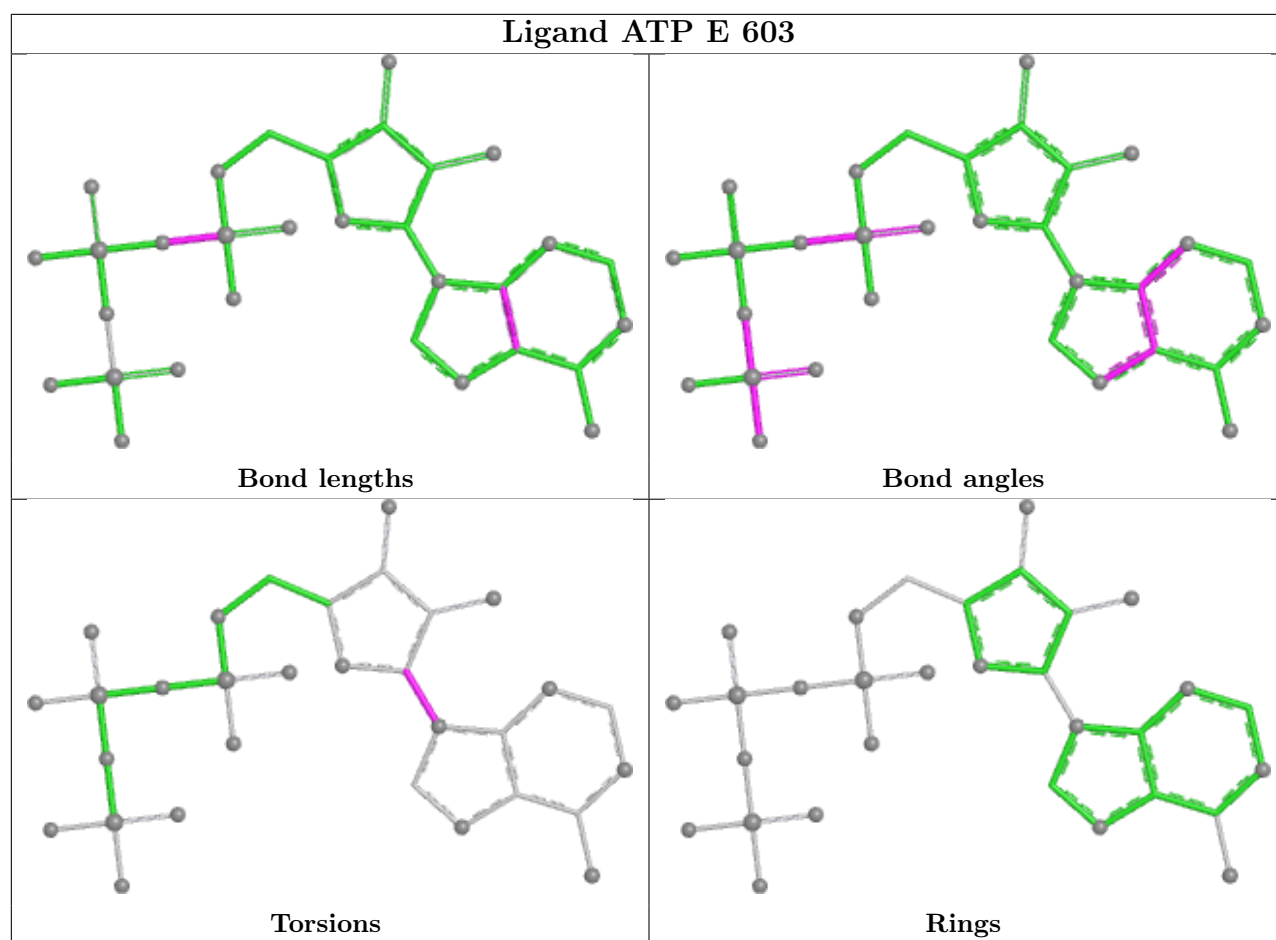


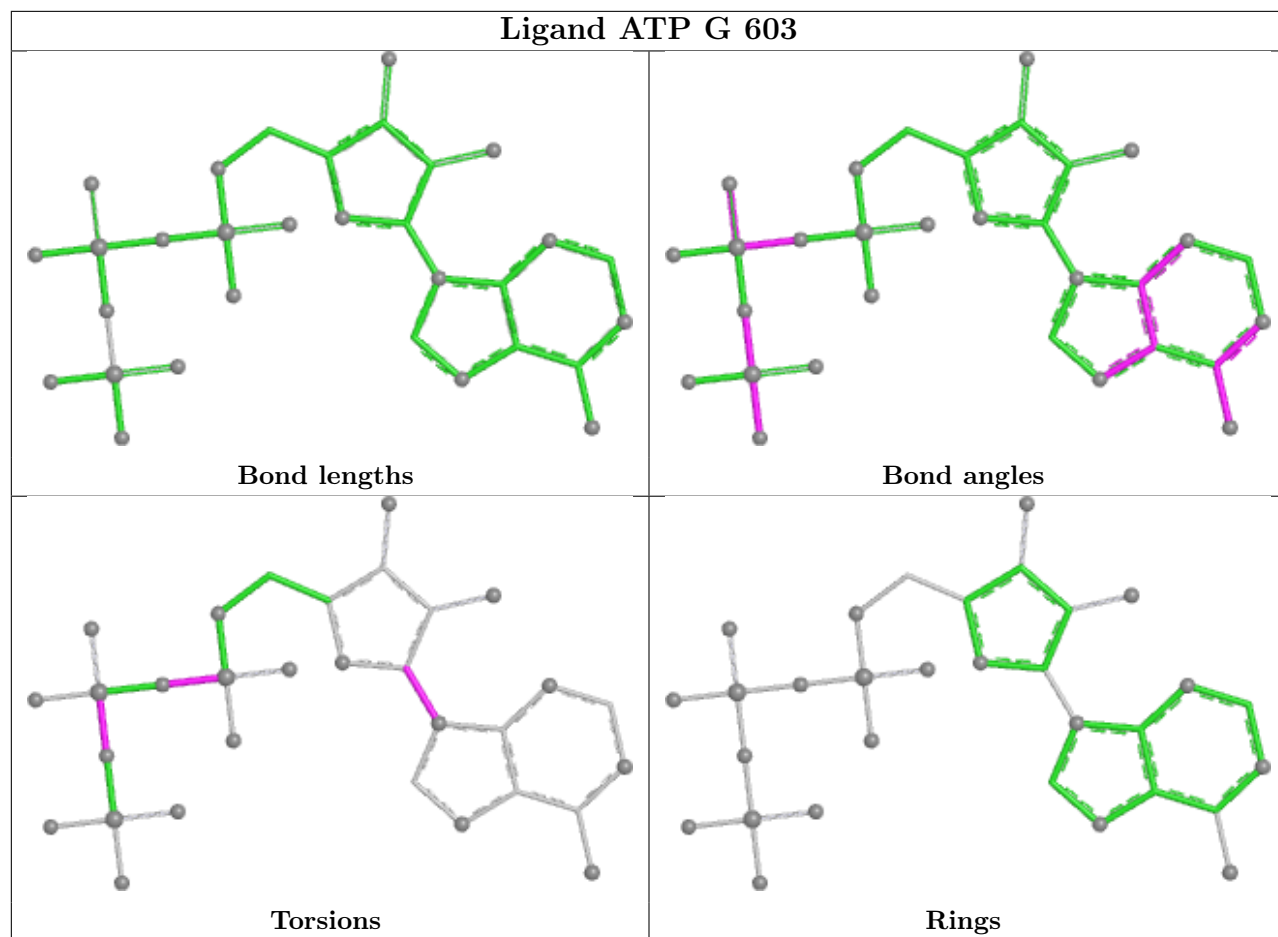
Ligand ATP C 603

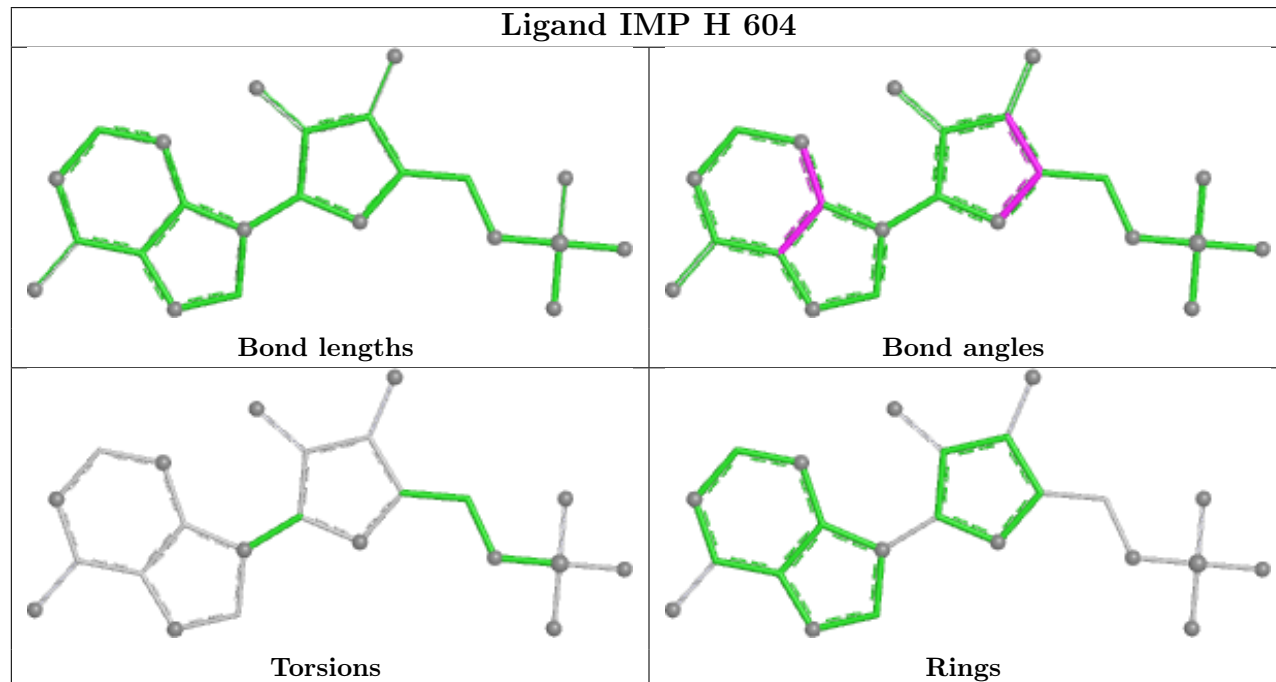
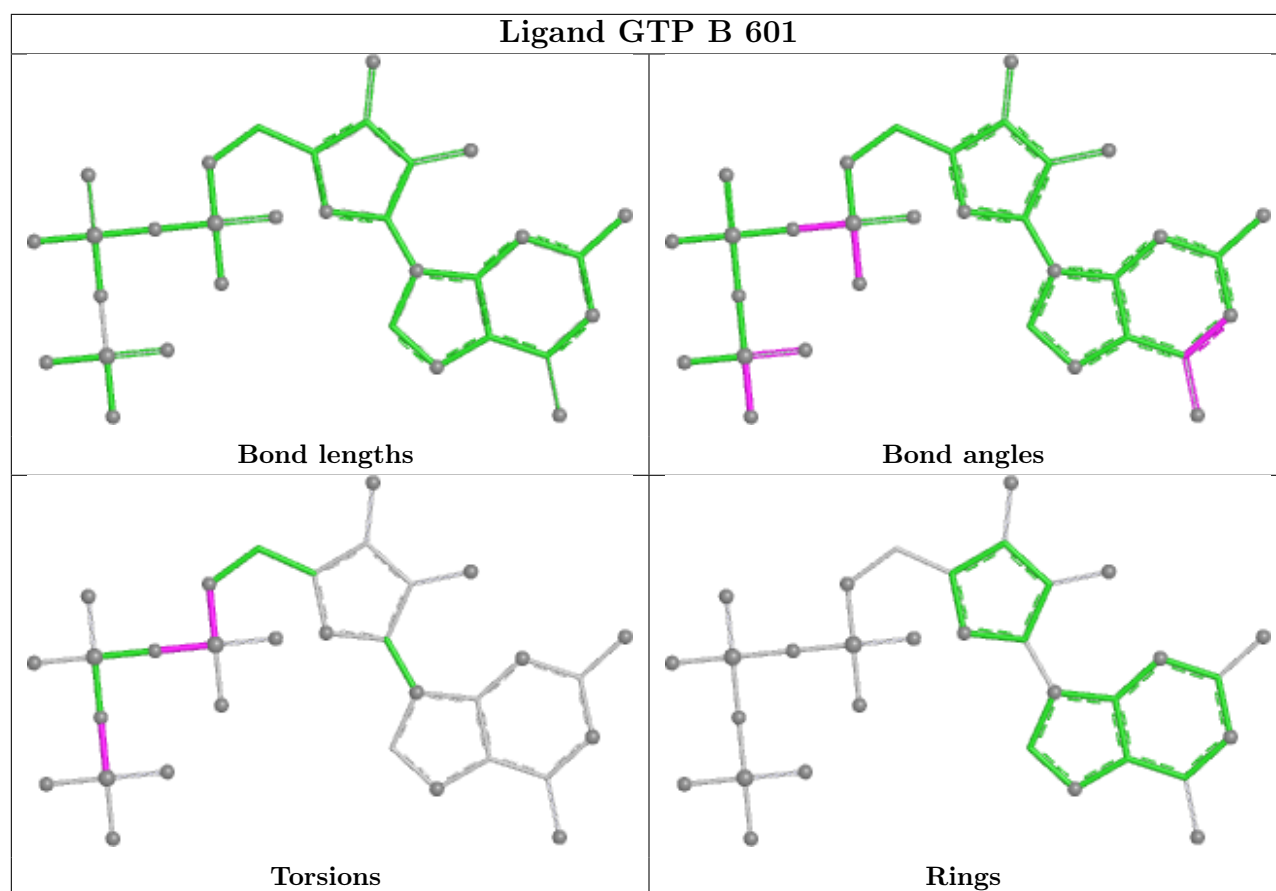


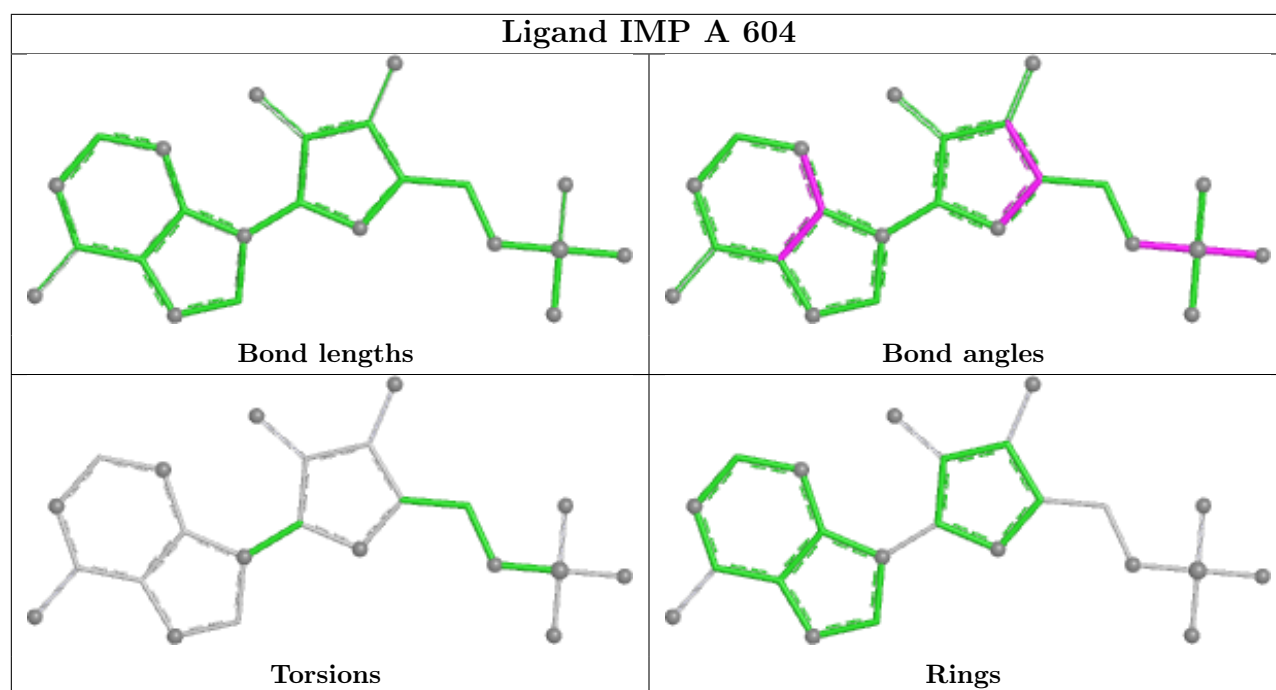
Ligand IMP F 604











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.

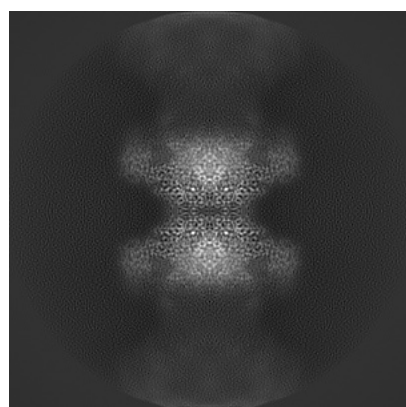
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-24439. These allow visual inspection of the internal detail of the map and identification of artifacts.

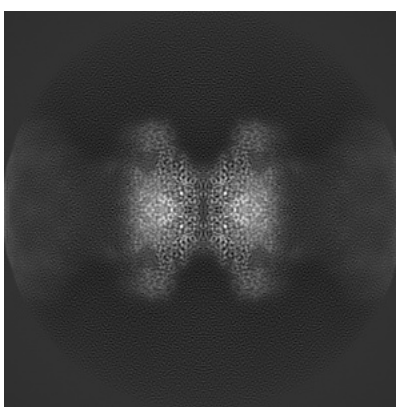
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

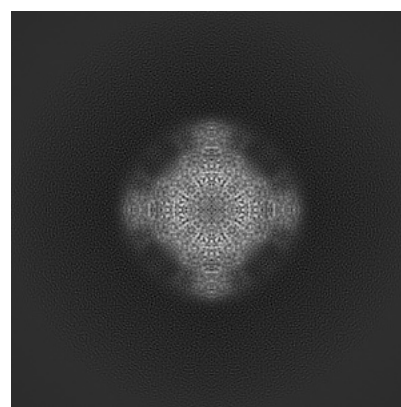
6.1.1 Primary map



X



Y

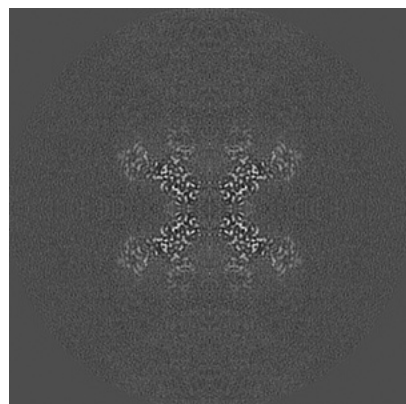


Z

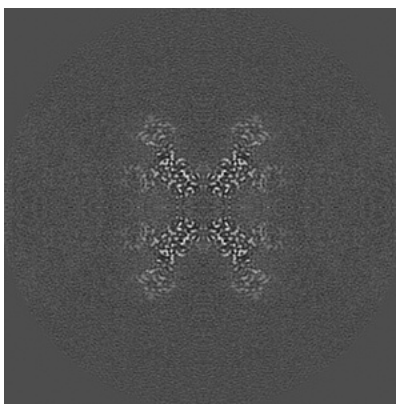
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

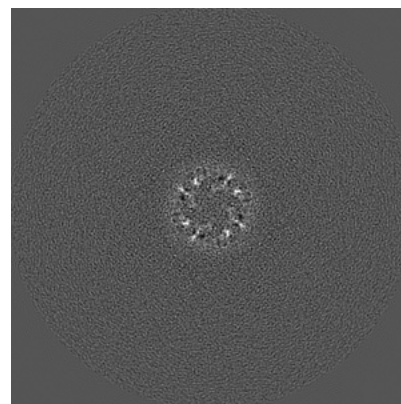
6.2.1 Primary map



X Index: 160



Y Index: 160

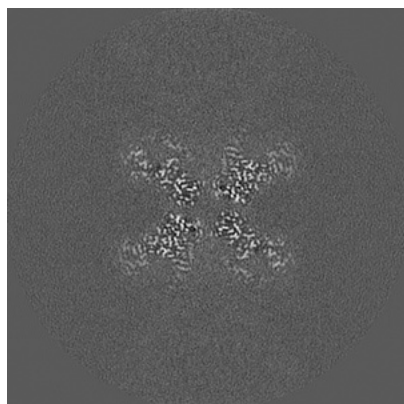


Z Index: 160

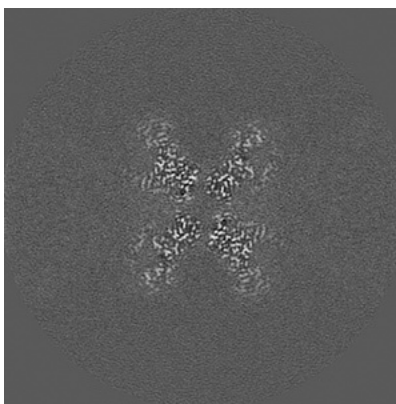
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

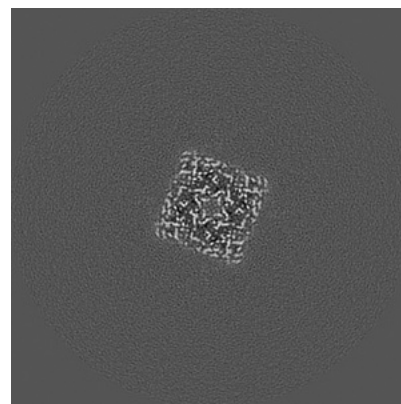
6.3.1 Primary map



X Index: 156



Y Index: 156

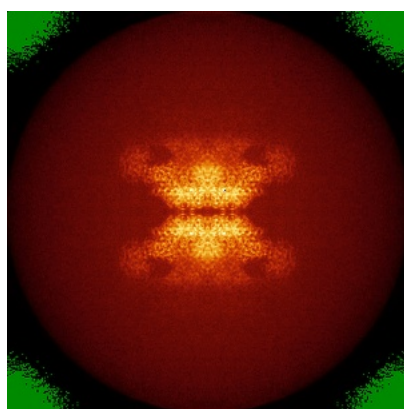


Z Index: 176

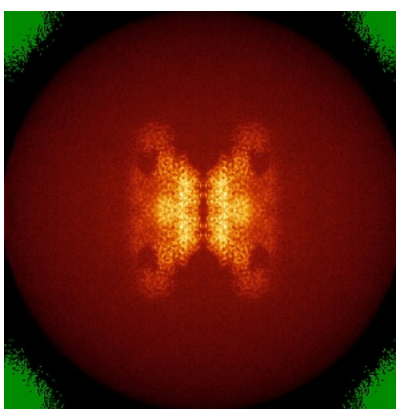
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

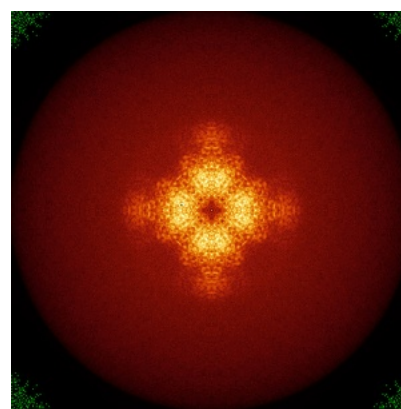
6.4.1 Primary map



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

This section was not generated.

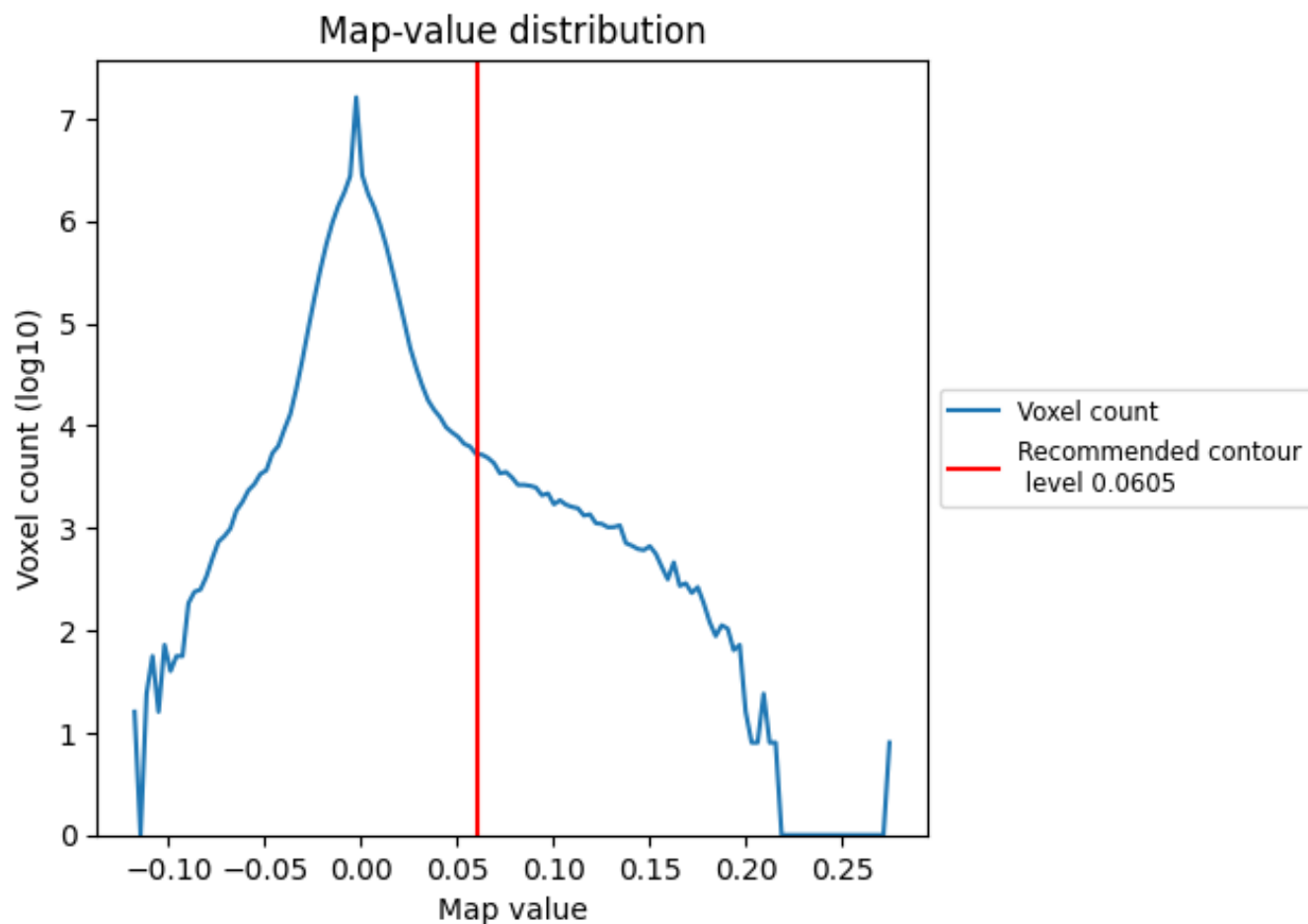
6.6 Mask visualisation

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

7 Map analysis [i](#)

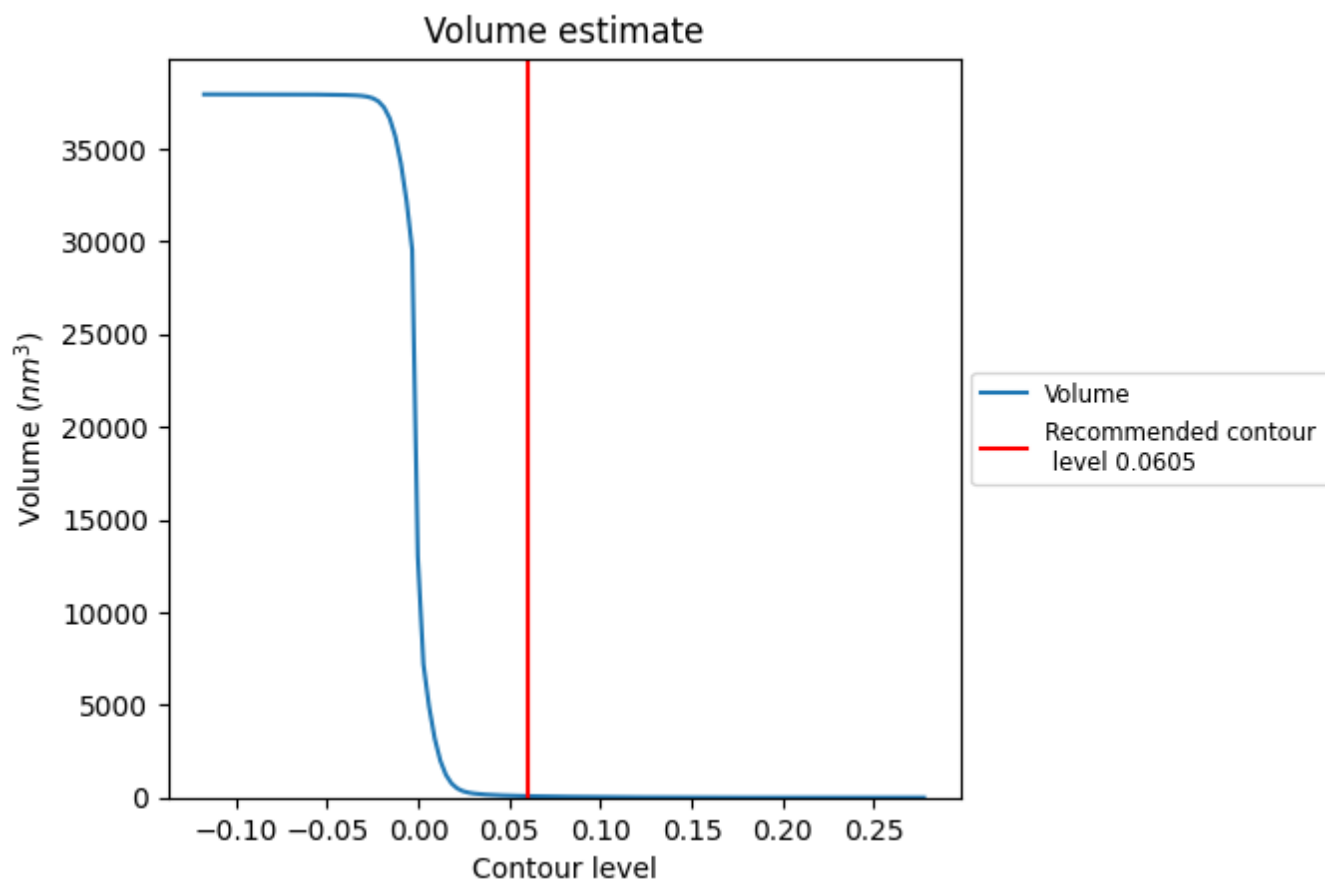
This section contains the results of statistical analysis of the map.

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.

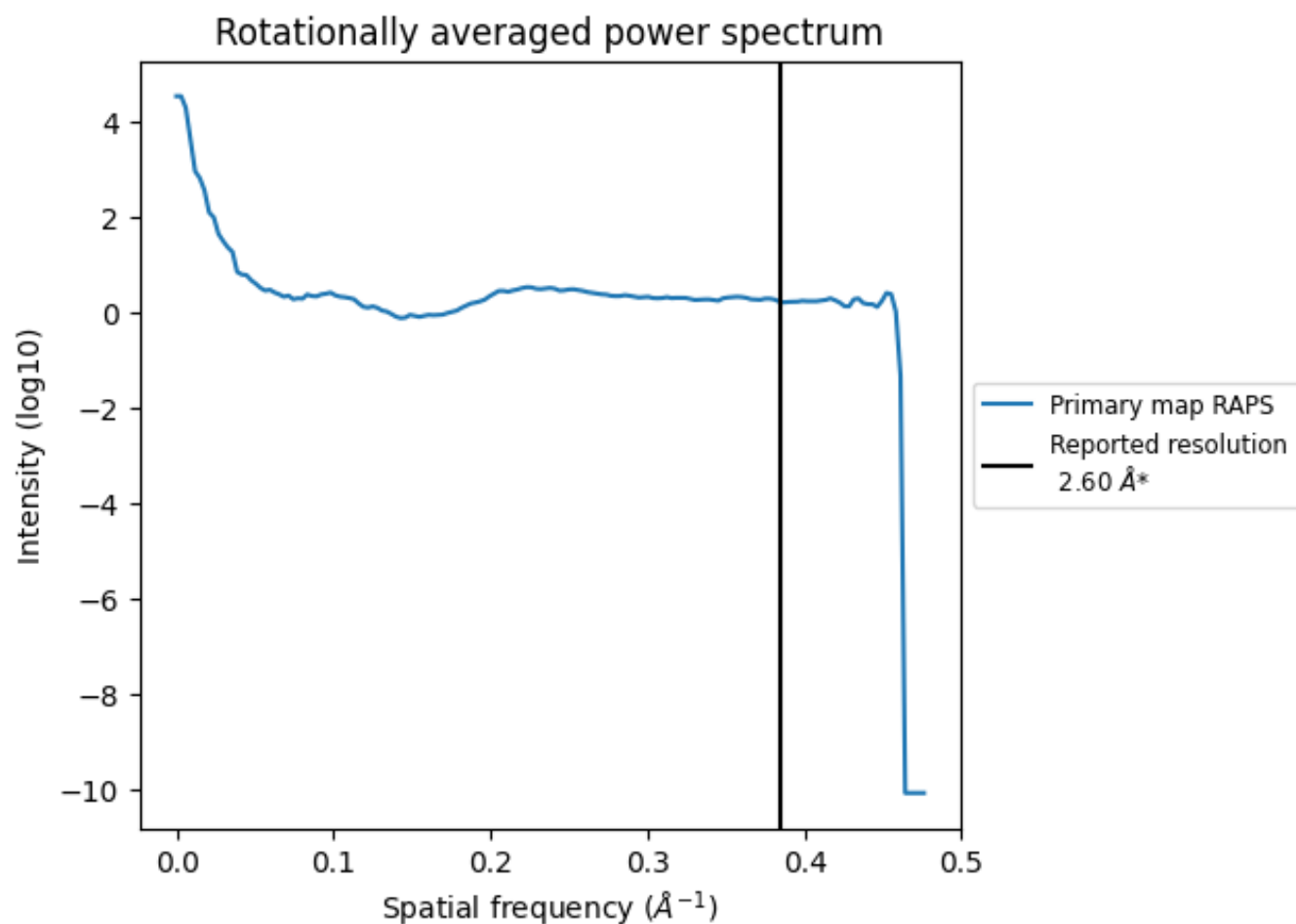
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 77 nm³; this corresponds to an approximate mass of 69 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 ⓘ



*Reported resolution corresponds to spatial frequency of 0.385 $\text{\AA}^{-1}$

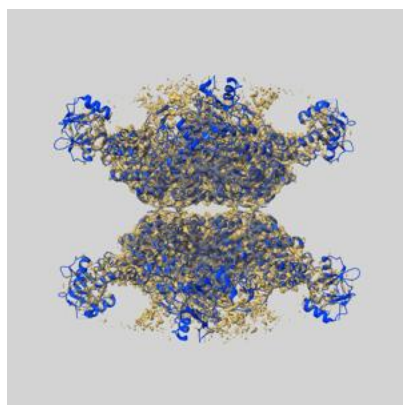
8 Fourier-Shell correlation ⓘ

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

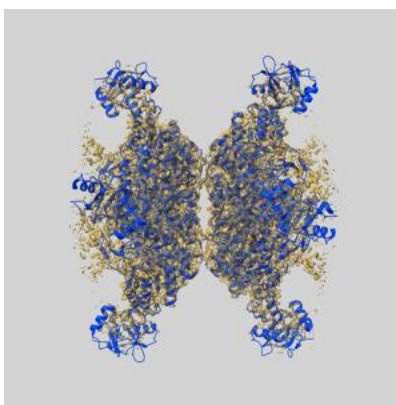
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-24439 and PDB model 7RFE. Per-residue inclusion information can be found in section 3 on page 8.

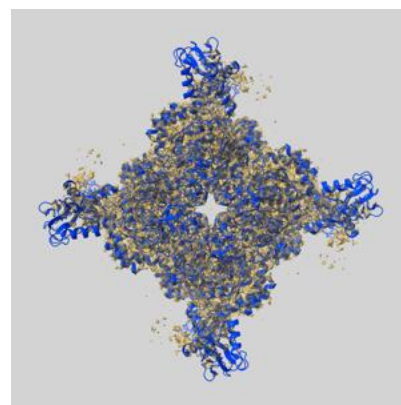
9.1 Map-model overlay [i](#)



X



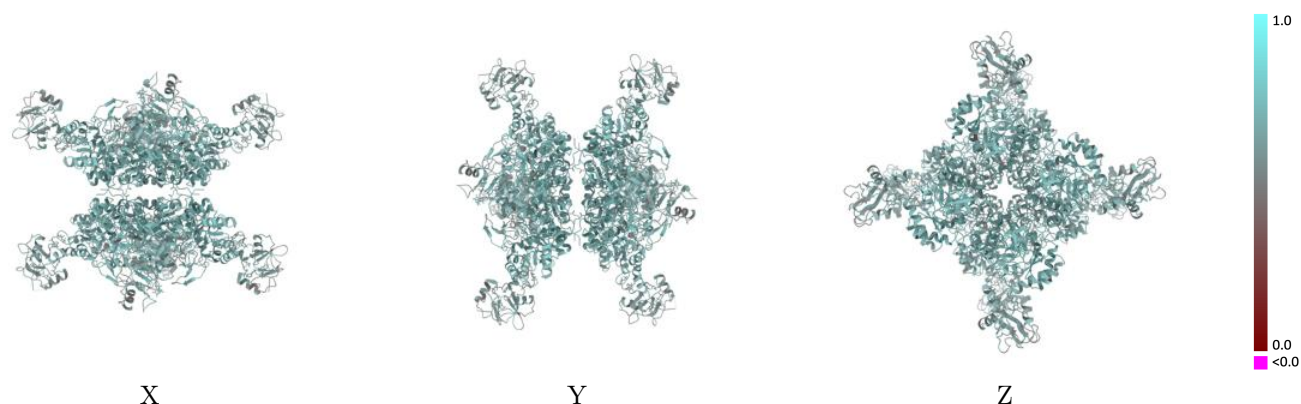
Y



Z

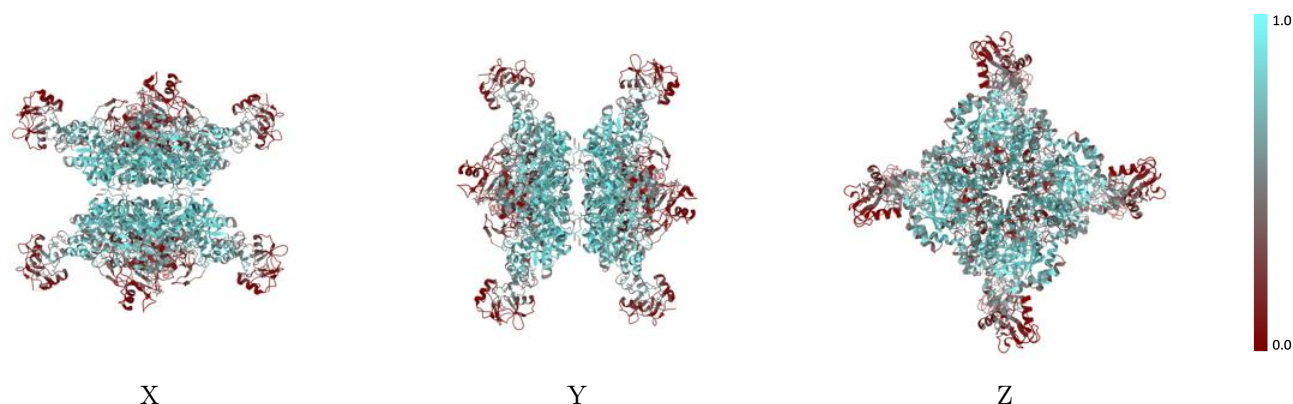
The images above show the 3D surface view of the map at the recommended contour level 0.0605 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



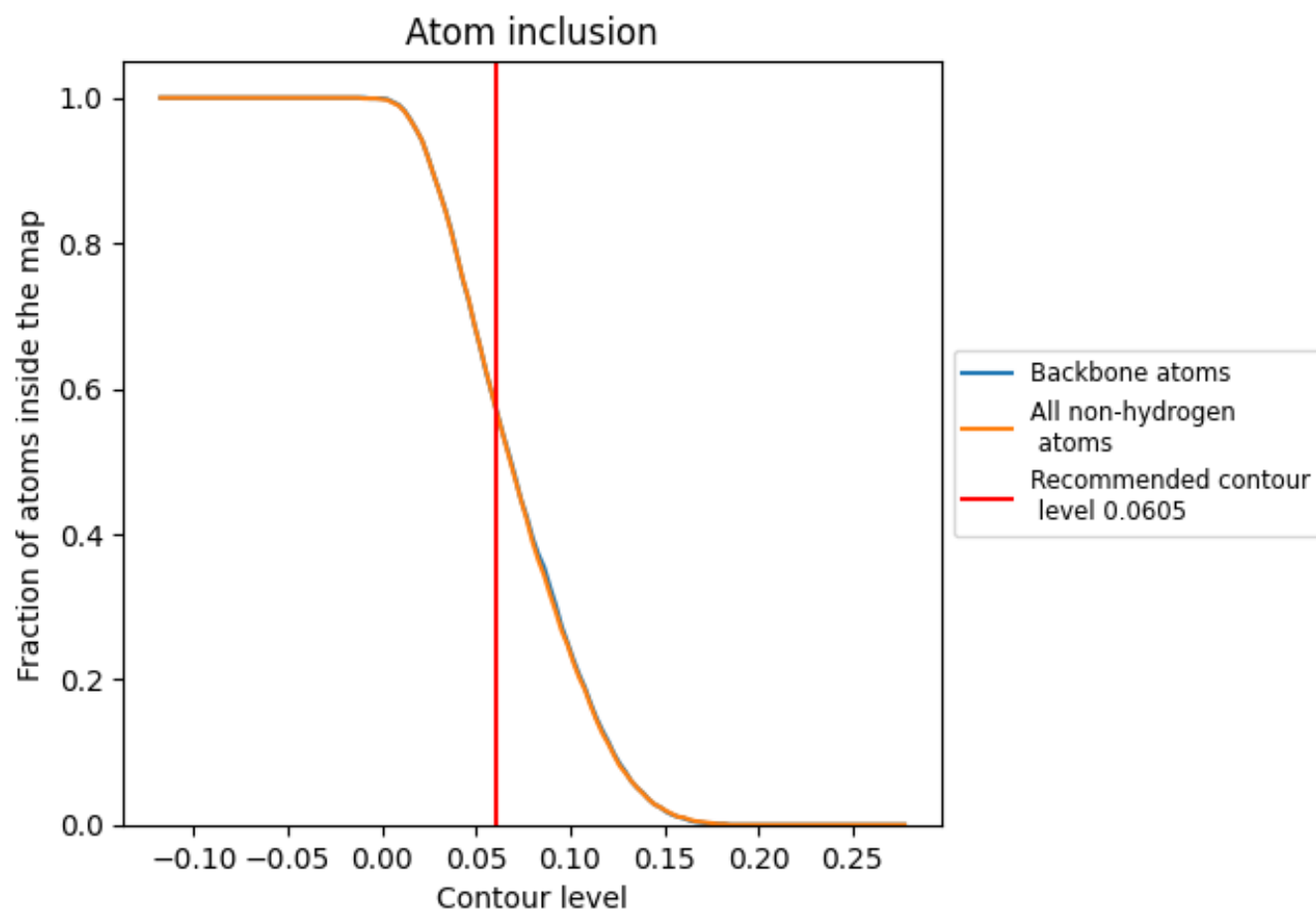
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0605).

9.4 Atom inclusion [i](#)



At the recommended contour level, 57% of all backbone atoms, 57% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.0605) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5730	0.6400
A	0.5800	0.6400
B	0.5820	0.6420
C	0.5810	0.6400
D	0.5780	0.6410
E	0.5810	0.6400
F	0.5790	0.6400
G	0.5810	0.6390
H	0.5820	0.6410

1.0

0.0

<0.0