



# wwPDB X-ray Structure Validation Summary Report ⓘ

Dec 15, 2024 – 09:26 AM EST

PDB ID : 6DHN  
Title : Bovine glutamate dehydrogenase complexed with Eu3+  
Authors : Smith, T.J.  
Deposited on : 2018-05-20  
Resolution : 3.30 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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

MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

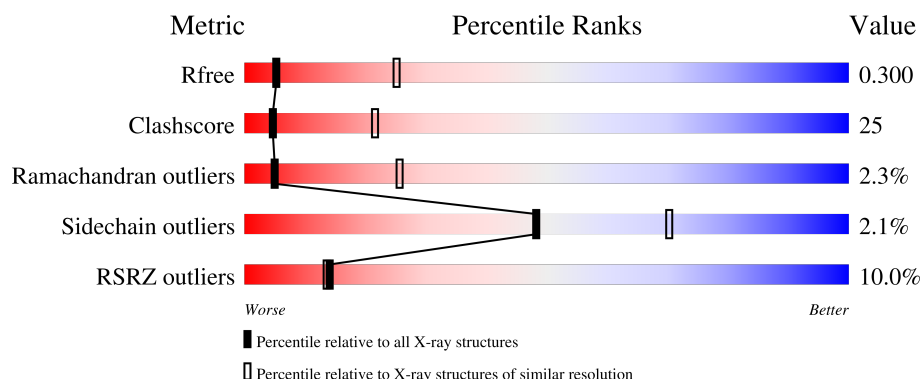
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.30 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))
$R_{free}$	164625	1085 (3.32-3.28)
Clashscore	180529	1128 (3.32-3.28)
Ramachandran outliers	177936	1125 (3.32-3.28)
Sidechain outliers	177891	1124 (3.32-3.28)
RSRZ outliers	164620	1085 (3.32-3.28)

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  $\geq 3$ , 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	582	<p>9% 47% 35% 14%</p>
1	B	582	<p>6% 47% 35% 14%</p>
1	C	582	<p>10% 46% 36% 14%</p>
1	D	582	<p>6% 48% 34% 14%</p>
1	E	582	<p>12% 45% 37% 14%</p>

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Mol	Chain	Length	Quality of chain
1	F	582	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	GLU	A	601	-	-	X	-
2	GLU	B	601	-	-	X	-
2	GLU	C	601	-	-	X	-
2	GLU	D	601	-	-	X	-
2	GLU	E	601	-	-	X	-
2	GLU	F	602	-	-	X	-
3	GTP	A	602	-	-	X	-

## 2 Entry composition [i](#)

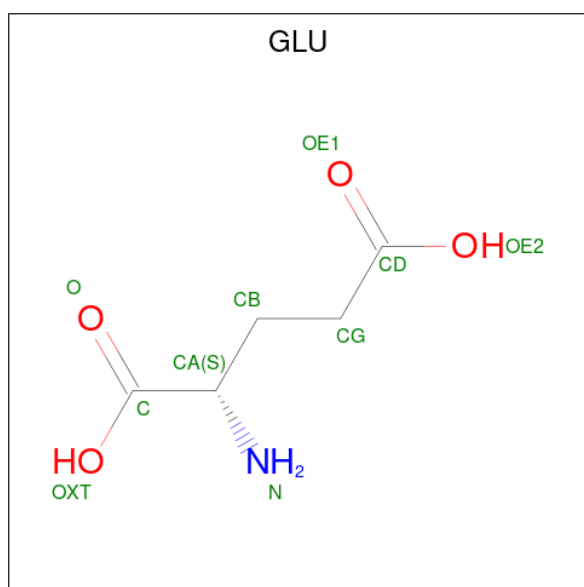
There are 4 unique types of molecules in this entry. The entry contains 24276 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Glutamate dehydrogenase 1, mitochondrial.

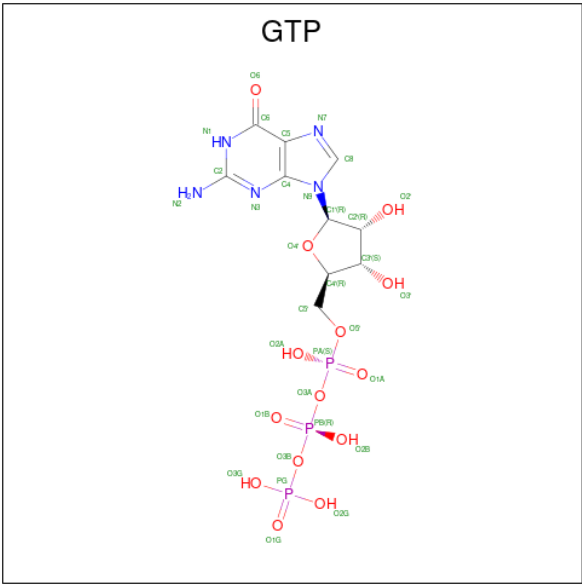
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	501	Total	C	N	O	S	0	0	0
			3916	2473	687	737	19			
1	B	501	Total	C	N	O	S	0	0	0
			3916	2473	687	737	19			
1	C	501	Total	C	N	O	S	0	0	0
			3916	2473	687	737	19			
1	D	501	Total	C	N	O	S	0	0	0
			3916	2473	687	737	19			
1	E	501	Total	C	N	O	S	0	0	0
			3916	2473	687	737	19			
1	F	501	Total	C	N	O	S	0	0	0
			3916	2473	687	737	19			

- Molecule 2 is GLUTAMIC ACID (three-letter code: GLU) (formula: C<sub>5</sub>H<sub>9</sub>NO<sub>4</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			10	5	1	4		
2	B	1	Total	C	N	O	0	0
			10	5	1	4		
2	C	1	Total	C	N	O	0	0
			10	5	1	4		
2	D	1	Total	C	N	O	0	0
			10	5	1	4		
2	E	1	Total	C	N	O	0	0
			10	5	1	4		
2	F	1	Total	C	N	O	0	0
			10	5	1	4		

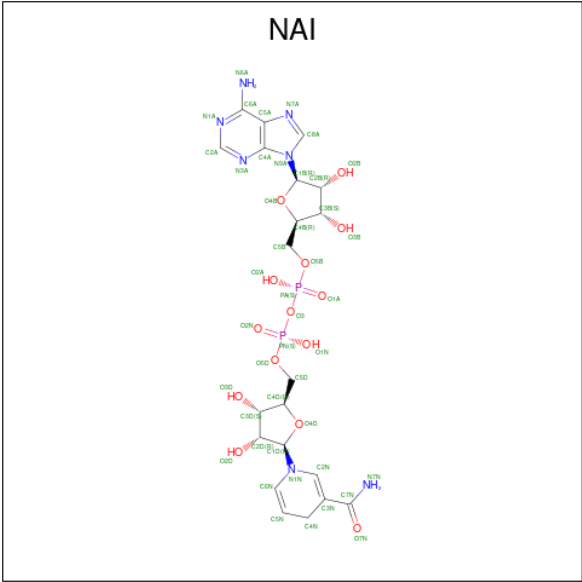
- Molecule 3 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: C<sub>10</sub>H<sub>16</sub>N<sub>5</sub>O<sub>14</sub>P<sub>3</sub>).



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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
3	F	1	32	10	5	14	3	0	0

- Molecule 4 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (three-letter code: NAI) (formula: C<sub>21</sub>H<sub>29</sub>N<sub>7</sub>O<sub>14</sub>P<sub>2</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
4	A	1	Total 44	21	7	14	2	0	0
4	A	1	Total 44	21	7	14	2	12	0
4	B	1	Total 44	21	7	14	2	0	0
4	B	1	Total 44	21	7	14	2	11	0
4	C	1	Total 44	21	7	14	2	16	0
4	C	1	Total 44	21	7	14	2	0	0
4	D	1	Total 44	21	7	14	2	0	0
4	D	1	Total 44	21	7	14	2	10	0
4	E	1	Total 44	21	7	14	2	0	0
4	F	1	Total 44	21	7	14	2	13	0

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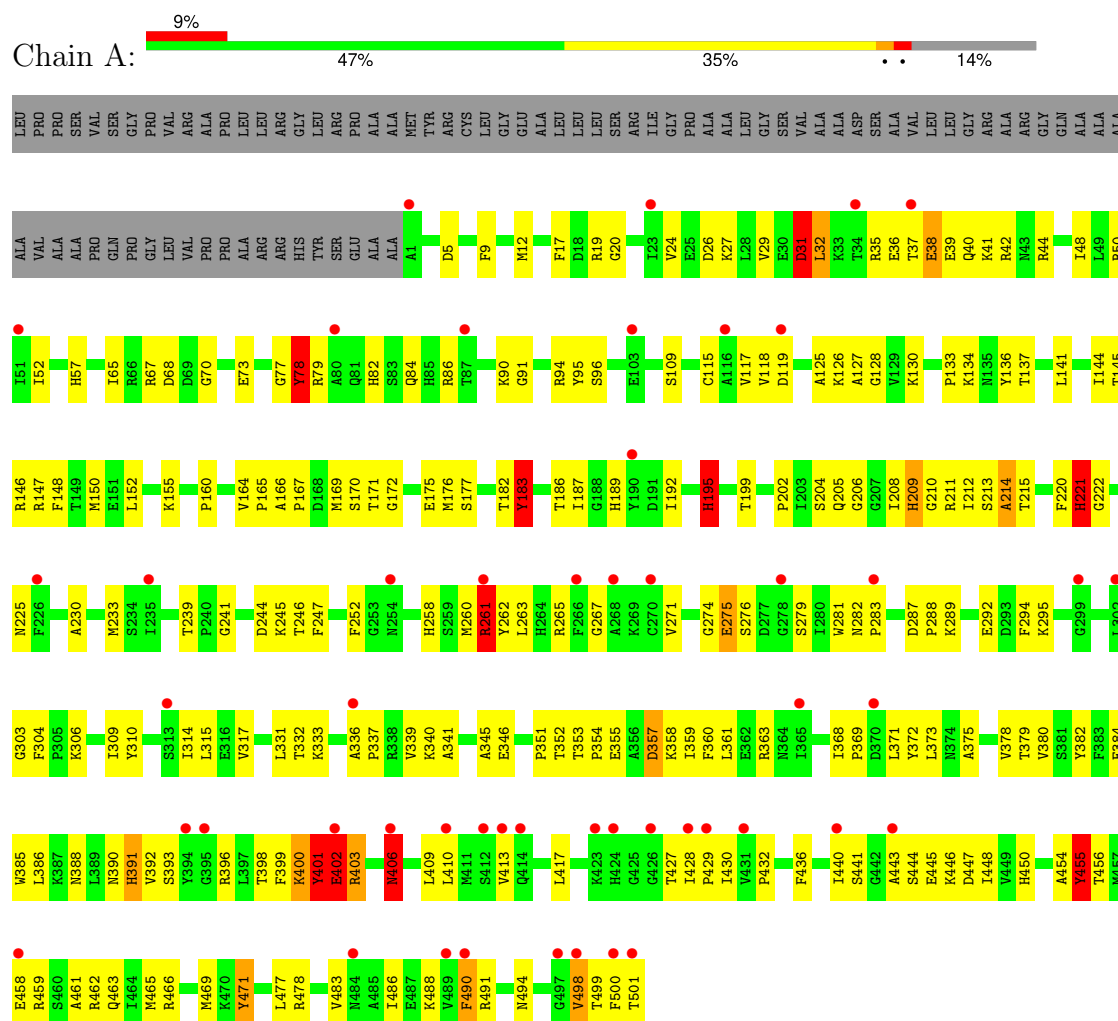
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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	F	1	Total	C	N	O	P	16	0
			44	21	7	14	2		
4	F	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

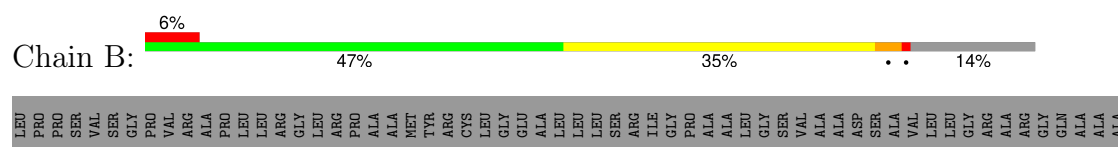
### 3 Residue-property plots

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 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.

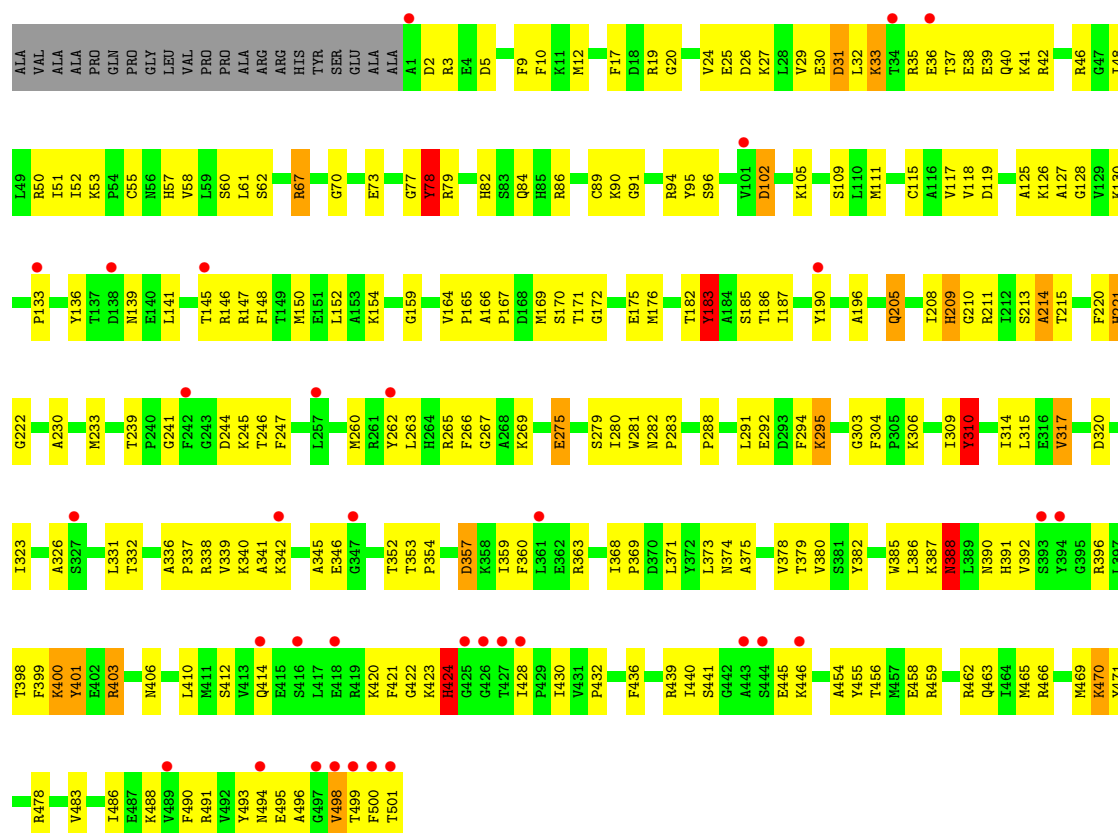
- Molecule 1: Glutamate dehydrogenase 1, mitochondrial



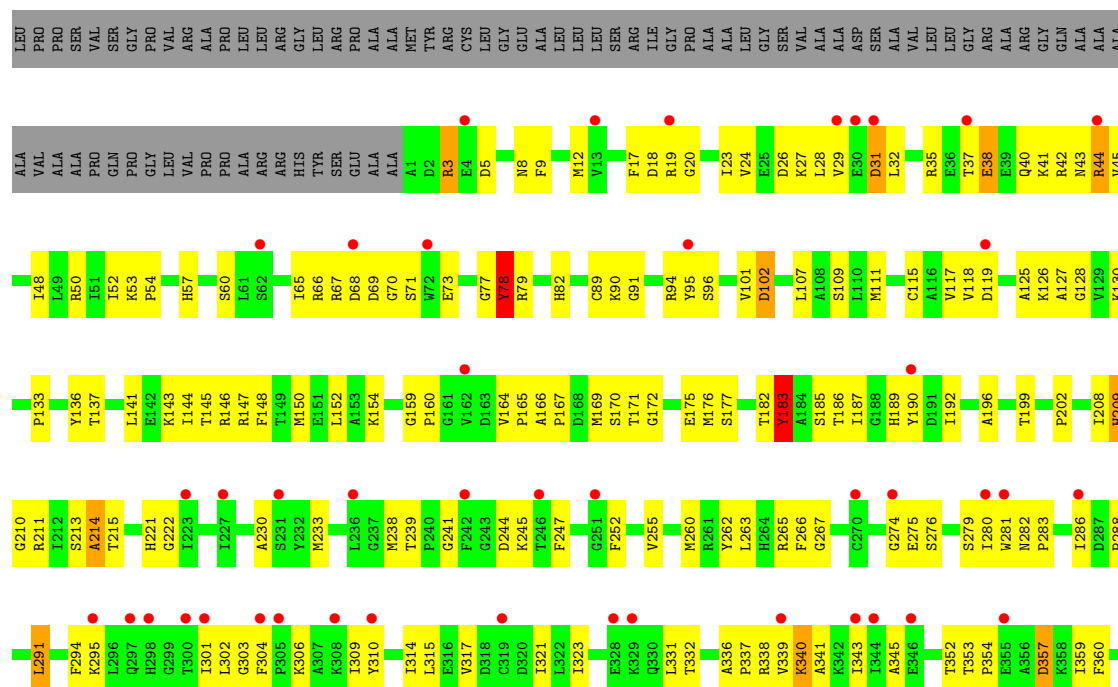
- Molecule 1: Glutamate dehydrogenase 1, mitochondrial

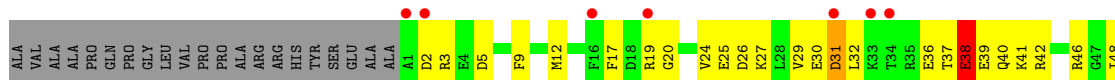


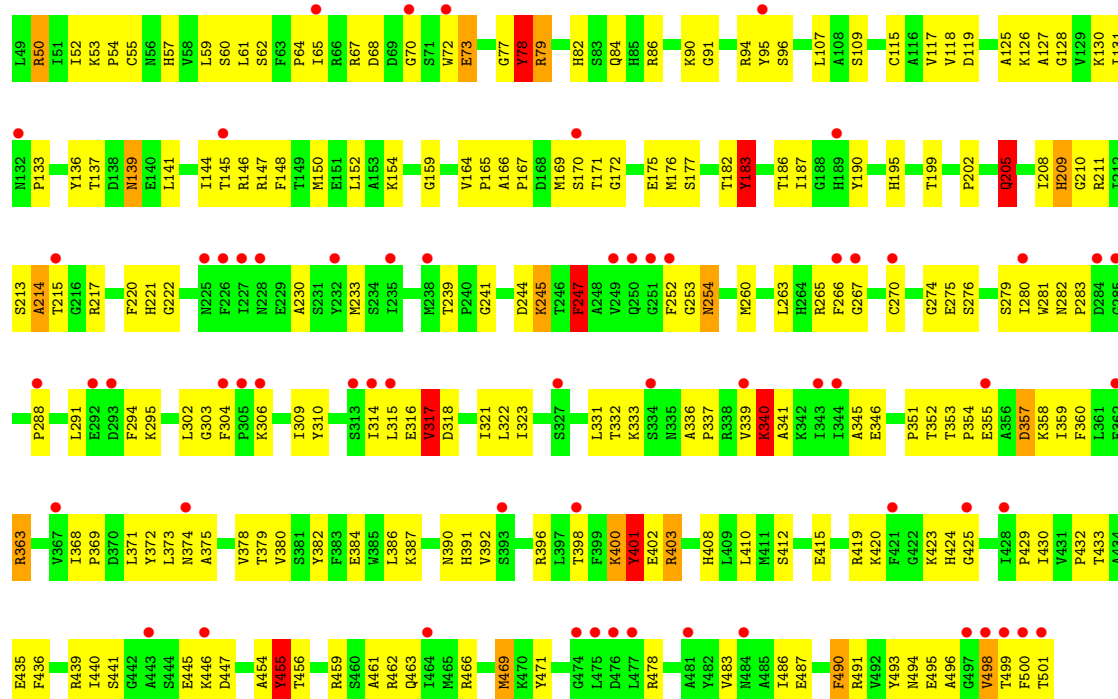




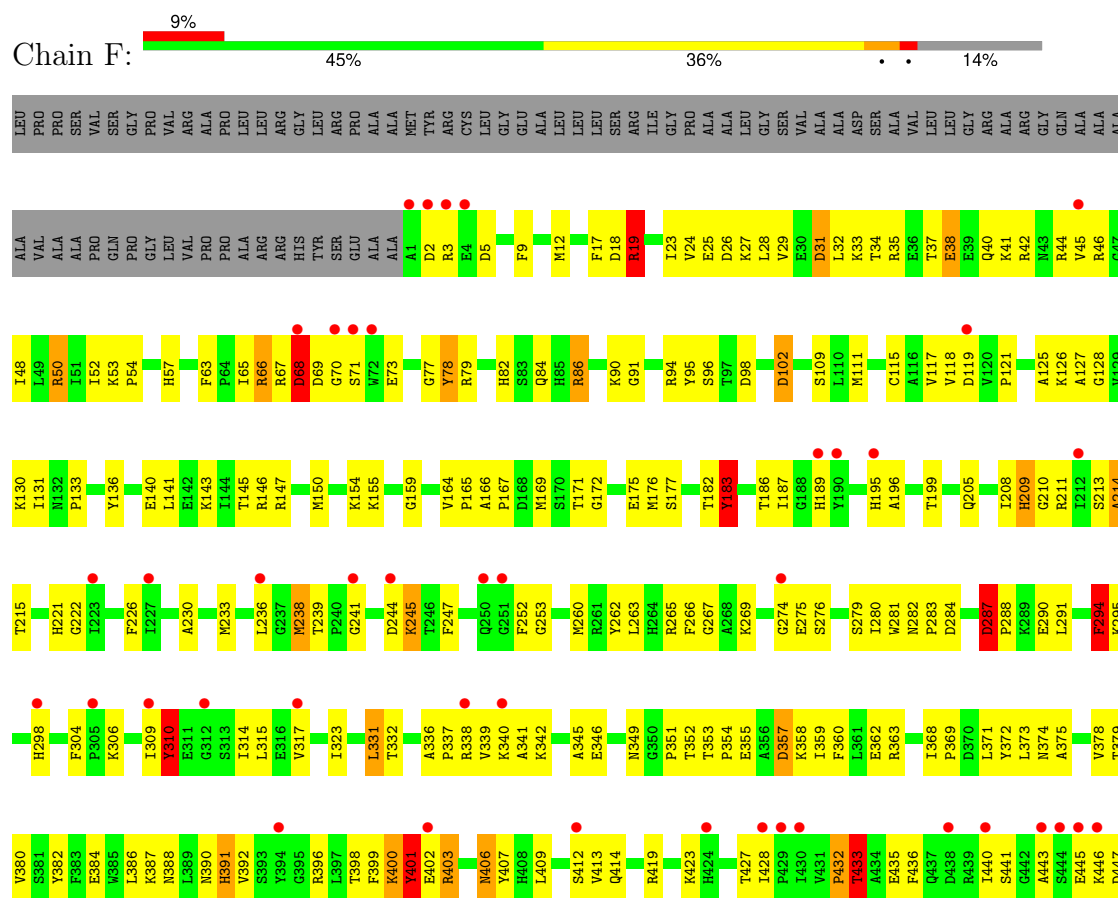
• Molecule 1: Glutamate dehydrogenase 1, mitochondrial

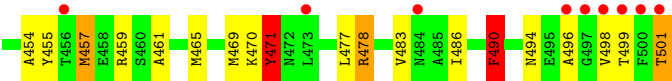






• Molecule 1: Glutamate dehydrogenase 1, mitochondrial





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	121.11Å 98.76Å 165.64Å 90.00° 101.55° 90.00°	Depositor
Resolution (Å)	43.89 – 3.30 43.89 – 3.30	Depositor EDS
% Data completeness (in resolution range)	92.3 (43.89-3.30) 92.3 (43.89-3.30)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.69 (at 3.25Å)	Xtriage
Refinement program	PHENIX (1.12_2829: ???)	Depositor
R, $R_{free}$	0.260 , 0.301 0.260 , 0.300	Depositor DCC
$R_{free}$ test set	7143 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	36.0	Xtriage
Anisotropy	0.236	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 17.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.43$ , $\langle L^2 \rangle = 0.26$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.78	EDS
Total number of atoms	24276	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.24% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: NAI, GTP

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	0.46	0/3999	1.06	26/5396 (0.5%)
1	B	0.48	3/3999 (0.1%)	1.01	21/5396 (0.4%)
1	C	0.46	2/3999 (0.1%)	0.89	16/5396 (0.3%)
1	D	0.57	3/3999 (0.1%)	1.45	32/5396 (0.6%)
1	E	0.55	6/3999 (0.2%)	1.08	31/5396 (0.6%)
1	F	0.60	6/3999 (0.2%)	2.03	52/5396 (1.0%)
All	All	0.52	20/23994 (0.1%)	1.31	178/32376 (0.5%)

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	15
1	B	0	8
1	C	0	12
1	D	0	14
1	E	0	14
1	F	2	18
All	All	2	81

The worst 5 of 20 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	73	GLU	CD-OE1	-15.37	1.08	1.25
1	E	247	PHE	CG-CD1	-10.53	1.23	1.38
1	F	31	ASP	CG-OD1	-10.08	1.02	1.25
1	D	247	PHE	CG-CD1	-9.71	1.24	1.38
1	F	447	ASP	CG-OD1	-9.37	1.03	1.25

The worst 5 of 178 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	F	63	PHE	CB-CG-CD1	77.11	174.77	120.80
1	F	63	PHE	CB-CG-CD2	-59.42	79.20	120.80
1	F	447	ASP	CB-CG-OD1	-47.16	75.86	118.30
1	D	73	GLU	OE1-CD-OE2	-45.39	68.84	123.30
1	D	31	ASP	CB-CG-OD1	44.55	158.39	118.30

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
1	F	433	THR	CB
1	F	501	THR	CB

5 of 81 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	183	TYR	Sidechain
1	A	195	HIS	Sidechain
1	A	31	ASP	Sidechain
1	A	38	GLU	Peptide
1	A	78	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	3916	0	3879	210	0
1	B	3916	0	3880	223	0
1	C	3916	0	3879	214	0
1	D	3916	0	3878	209	0
1	E	3916	0	3879	238	0
1	F	3916	0	3880	224	0
2	A	10	0	5	7	0
2	B	10	0	5	7	0
2	C	10	0	5	4	0
2	D	10	0	5	4	0
2	E	10	0	5	6	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	F	10	0	5	5	0
3	A	32	0	12	13	0
3	B	32	0	12	2	0
3	C	32	0	12	0	0
3	D	32	0	12	1	0
3	E	32	0	12	1	0
3	F	32	0	12	2	0
4	A	88	0	51	11	0
4	B	88	0	51	15	0
4	C	88	0	50	10	0
4	D	88	0	50	9	0
4	E	44	0	25	10	0
4	F	132	0	75	23	0
All	All	24276	0	23679	1210	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 25.

The worst 5 of 1210 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)
4:C:604:NAI:O4B	4:C:604:NAI:C1B	1.63	1.23
1:B:458:GLU:OE2	1:B:462:ARG:NH1	1.80	1.12
1:A:463:GLN:HG2	1:A:466:ARG:HH12	1.18	1.09
1:F:38:GLU:HB2	1:F:40:GLN:H	1.19	1.07
1:C:303:GLY:H	1:C:309:ILE:HD11	1.21	1.04

There are no symmetry-related clashes.

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

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	499/582 (86%)	448 (90%)	42 (8%)	9 (2%)	7	30
1	B	499/582 (86%)	444 (89%)	41 (8%)	14 (3%)	4	22
1	C	499/582 (86%)	448 (90%)	43 (9%)	8 (2%)	8	32
1	D	499/582 (86%)	447 (90%)	40 (8%)	12 (2%)	5	25
1	E	499/582 (86%)	444 (89%)	43 (9%)	12 (2%)	5	25
1	F	499/582 (86%)	446 (89%)	38 (8%)	15 (3%)	3	21
All	All	2994/3492 (86%)	2677 (89%)	247 (8%)	70 (2%)	5	26

5 of 70 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	195	HIS
1	A	214	ALA
1	A	340	LYS
1	B	33	LYS
1	B	214	ALA

### 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 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	417/471 (88%)	409 (98%)	8 (2%)	52	72
1	B	417/471 (88%)	410 (98%)	7 (2%)	56	74
1	C	417/471 (88%)	409 (98%)	8 (2%)	52	72
1	D	417/471 (88%)	407 (98%)	10 (2%)	44	68
1	E	417/471 (88%)	407 (98%)	10 (2%)	44	68
1	F	417/471 (88%)	408 (98%)	9 (2%)	47	69
All	All	2502/2826 (88%)	2450 (98%)	52 (2%)	48	70

5 of 52 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	294	PHE

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Mol	Chain	Res	Type
1	E	79	ARG
1	F	357	ASP
1	D	357	ASP
1	D	491	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	391	HIS
1	F	209	HIS
1	E	195	HIS
1	D	391	HIS
1	F	195	HIS

### 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](#)

24 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
3	GTP	C	602	-	29,34,34	1.45	5 (17%)	35,54,54	1.34	3 (8%)
4	NAI	E	603	-	43,48,48	4.19	20 (46%)	50,73,73	1.90	8 (16%)
4	NAI	A	604	-	43,48,48	4.30	20 (46%)	50,73,73	2.23	11 (22%)
3	GTP	A	602	-	29,34,34	1.39	3 (10%)	35,54,54	1.74	11 (31%)
3	GTP	F	604	-	29,34,34	1.25	3 (10%)	35,54,54	1.37	5 (14%)
3	GTP	B	602	-	29,34,34	1.29	4 (13%)	35,54,54	1.64	6 (17%)
3	GTP	E	602	-	29,34,34	1.34	5 (17%)	35,54,54	1.34	5 (14%)
4	NAI	F	603	-	43,48,48	4.19	21 (48%)	50,73,73	1.90	9 (18%)
4	NAI	C	603	-	43,48,48	4.23	19 (44%)	50,73,73	1.92	4 (8%)
2	GLU	D	601	-	8,9,9	1.13	1 (12%)	8,11,11	1.11	1 (12%)
2	GLU	A	601	-	8,9,9	1.16	1 (12%)	8,11,11	1.11	1 (12%)
4	NAI	C	604	-	43,48,48	4.22	22 (51%)	50,73,73	1.81	8 (16%)
4	NAI	D	603	-	43,48,48	4.12	20 (46%)	50,73,73	1.81	5 (10%)
4	NAI	D	604	-	43,48,48	4.24	20 (46%)	50,73,73	1.91	9 (18%)
2	GLU	B	601	-	8,9,9	1.07	1 (12%)	8,11,11	1.34	1 (12%)
2	GLU	F	602	-	8,9,9	1.09	1 (12%)	8,11,11	1.31	1 (12%)
4	NAI	F	605	-	43,48,48	4.18	21 (48%)	50,73,73	1.93	9 (18%)
2	GLU	E	601	-	8,9,9	1.14	1 (12%)	8,11,11	1.17	1 (12%)
2	GLU	C	601	-	8,9,9	1.07	1 (12%)	8,11,11	1.22	1 (12%)
4	NAI	B	603	-	43,48,48	4.18	20 (46%)	50,73,73	2.03	8 (16%)
4	NAI	F	601	-	43,48,48	4.26	19 (44%)	50,73,73	2.10	10 (20%)
3	GTP	D	602	-	29,34,34	1.28	3 (10%)	35,54,54	1.35	5 (14%)
4	NAI	A	603	-	43,48,48	4.13	19 (44%)	50,73,73	2.16	9 (18%)
4	NAI	B	604	-	43,48,48	4.16	18 (41%)	50,73,73	1.87	8 (16%)

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
3	GTP	C	602	-	-	5/18/38/38	0/3/3/3
4	NAI	E	603	-	-	9/25/72/72	0/5/5/5
4	NAI	A	604	-	-	13/25/72/72	0/5/5/5
3	GTP	A	602	-	-	5/18/38/38	0/3/3/3
3	GTP	F	604	-	-	2/18/38/38	0/3/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GTP	B	602	-	-	3/18/38/38	0/3/3/3
3	GTP	E	602	-	-	2/18/38/38	0/3/3/3
4	NAI	F	603	-	-	10/25/72/72	0/5/5/5
4	NAI	C	603	-	-	12/25/72/72	0/5/5/5
2	GLU	D	601	-	-	1/9/9/9	-
2	GLU	A	601	-	-	3/9/9/9	-
4	NAI	C	604	-	-	15/25/72/72	0/5/5/5
4	NAI	D	603	-	-	12/25/72/72	0/5/5/5
4	NAI	D	604	-	-	11/25/72/72	0/5/5/5
2	GLU	B	601	-	-	0/9/9/9	-
2	GLU	F	602	-	-	0/9/9/9	-
4	NAI	F	605	-	-	14/25/72/72	0/5/5/5
2	GLU	E	601	-	-	0/9/9/9	-
2	GLU	C	601	-	-	1/9/9/9	-
4	NAI	B	603	-	-	9/25/72/72	0/5/5/5
4	NAI	F	601	-	-	8/25/72/72	0/5/5/5
3	GTP	D	602	-	-	3/18/38/38	0/3/3/3
4	NAI	A	603	-	-	8/25/72/72	0/5/5/5
4	NAI	B	604	-	-	11/25/72/72	0/5/5/5

The worst 5 of 268 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	604	NAI	O4B-C1B	17.31	1.63	1.40
4	F	605	NAI	O4B-C1B	16.97	1.63	1.40
4	A	603	NAI	O4B-C1B	16.86	1.63	1.40
4	A	604	NAI	O4B-C1B	16.76	1.62	1.40
4	B	604	NAI	O4B-C1B	16.72	1.62	1.40

The worst 5 of 139 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	F	601	NAI	C3N-C2N-N1N	-9.23	109.65	123.20
4	B	604	NAI	C5A-C6A-N6A	7.44	131.64	120.31
4	C	603	NAI	C5A-C6A-N6A	7.37	131.54	120.31
4	B	603	NAI	C5A-C6A-N6A	7.29	131.41	120.31
4	E	603	NAI	C5A-C6A-N6A	7.23	131.32	120.31

There are no chirality outliers.

5 of 157 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	602	GTP	PB-O3A-PA-O5'
3	B	602	GTP	C5'-O5'-PA-O3A
3	B	602	GTP	C5'-O5'-PA-O1A
3	C	602	GTP	O4'-C4'-C5'-O5'
3	C	602	GTP	C3'-C4'-C5'-O5'

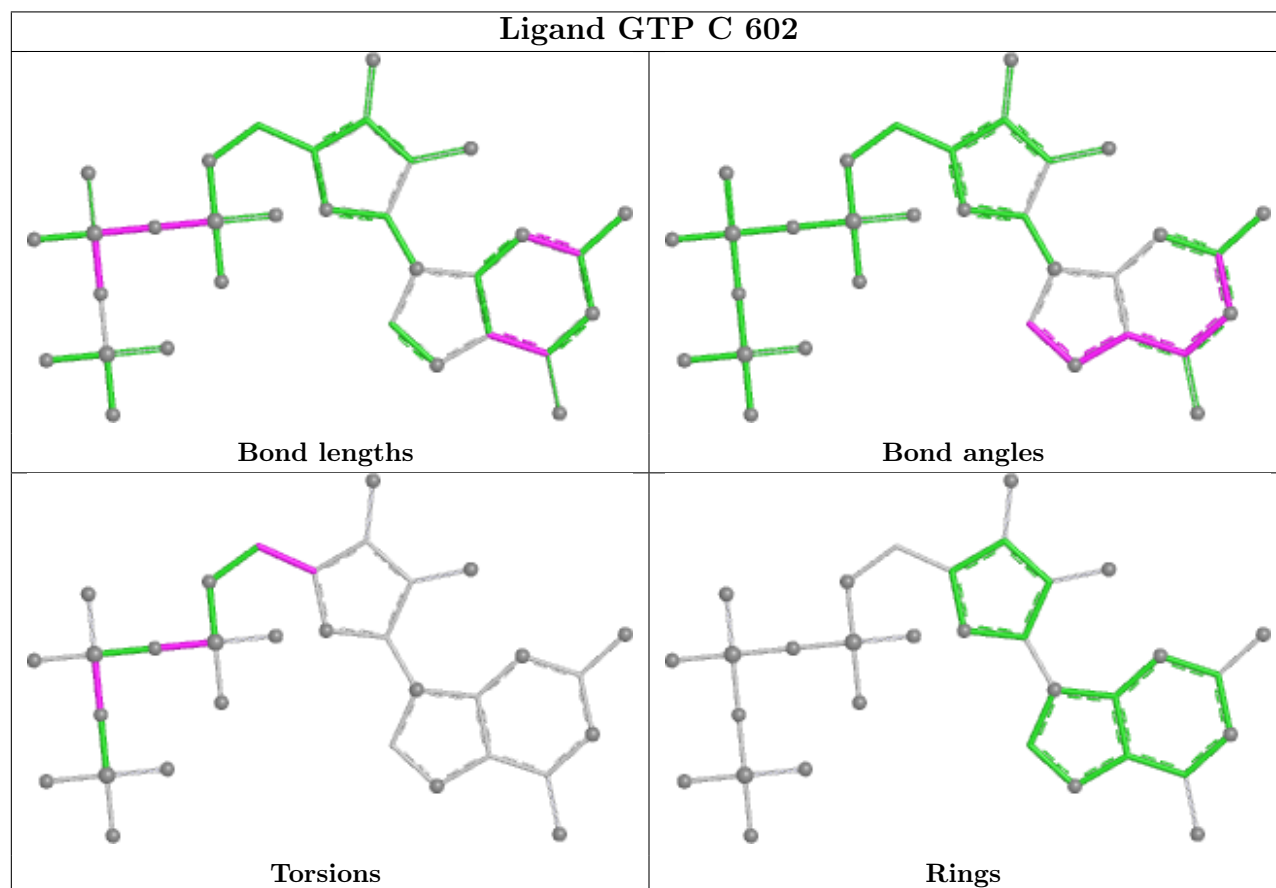
There are no ring outliers.

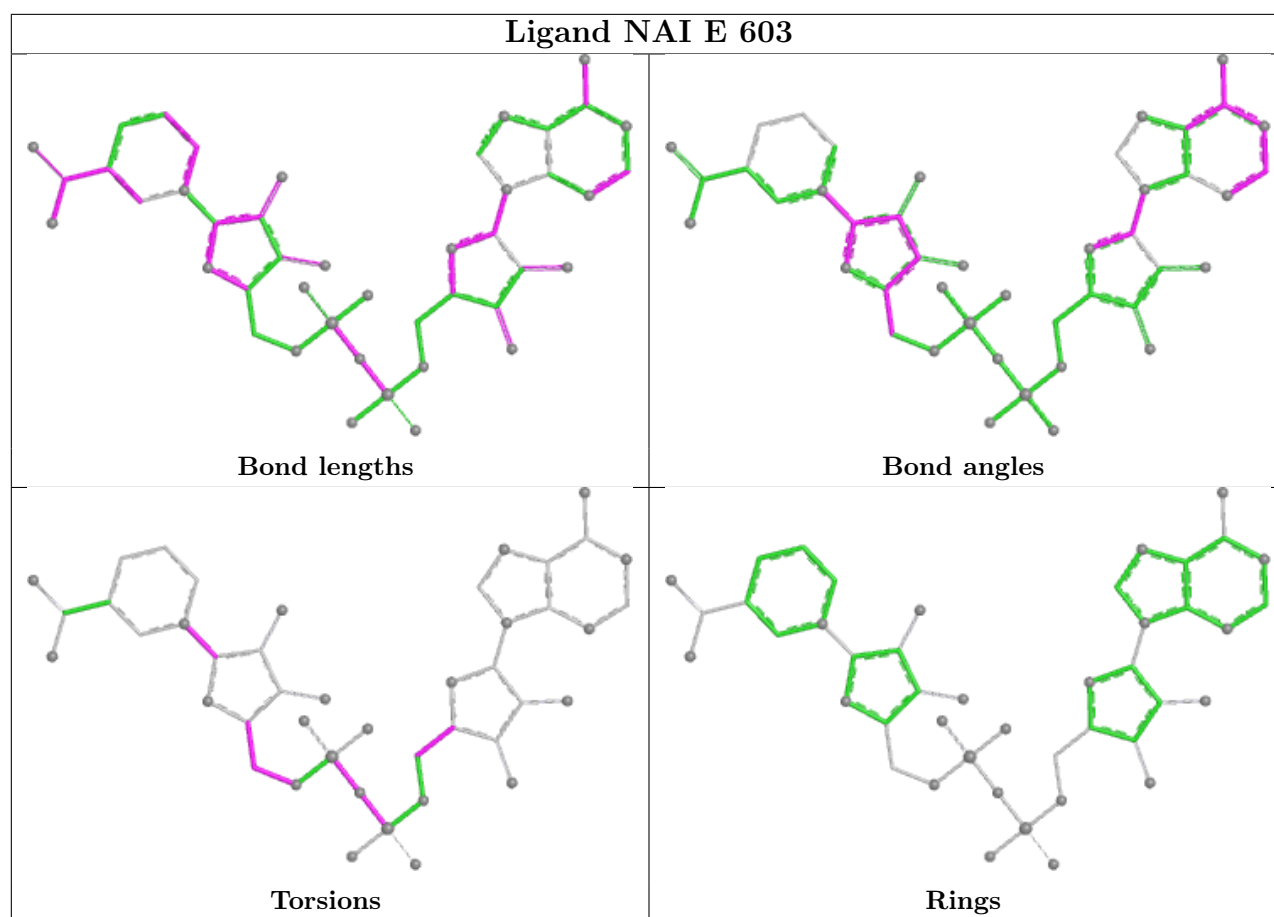
23 monomers are involved in 119 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	E	603	NAI	10	0
4	A	604	NAI	7	0
3	A	602	GTP	13	0
3	F	604	GTP	2	0
3	B	602	GTP	2	0
3	E	602	GTP	1	0
4	F	603	NAI	3	0
4	C	603	NAI	4	0
2	D	601	GLU	4	0
2	A	601	GLU	7	0
4	C	604	NAI	6	0
4	D	603	NAI	5	0
4	D	604	NAI	4	0
2	B	601	GLU	7	0
2	F	602	GLU	5	0
4	F	605	NAI	9	0
2	E	601	GLU	6	0
2	C	601	GLU	4	0
4	B	603	NAI	12	0
4	F	601	NAI	11	0
3	D	602	GTP	1	0
4	A	603	NAI	4	0
4	B	604	NAI	3	0

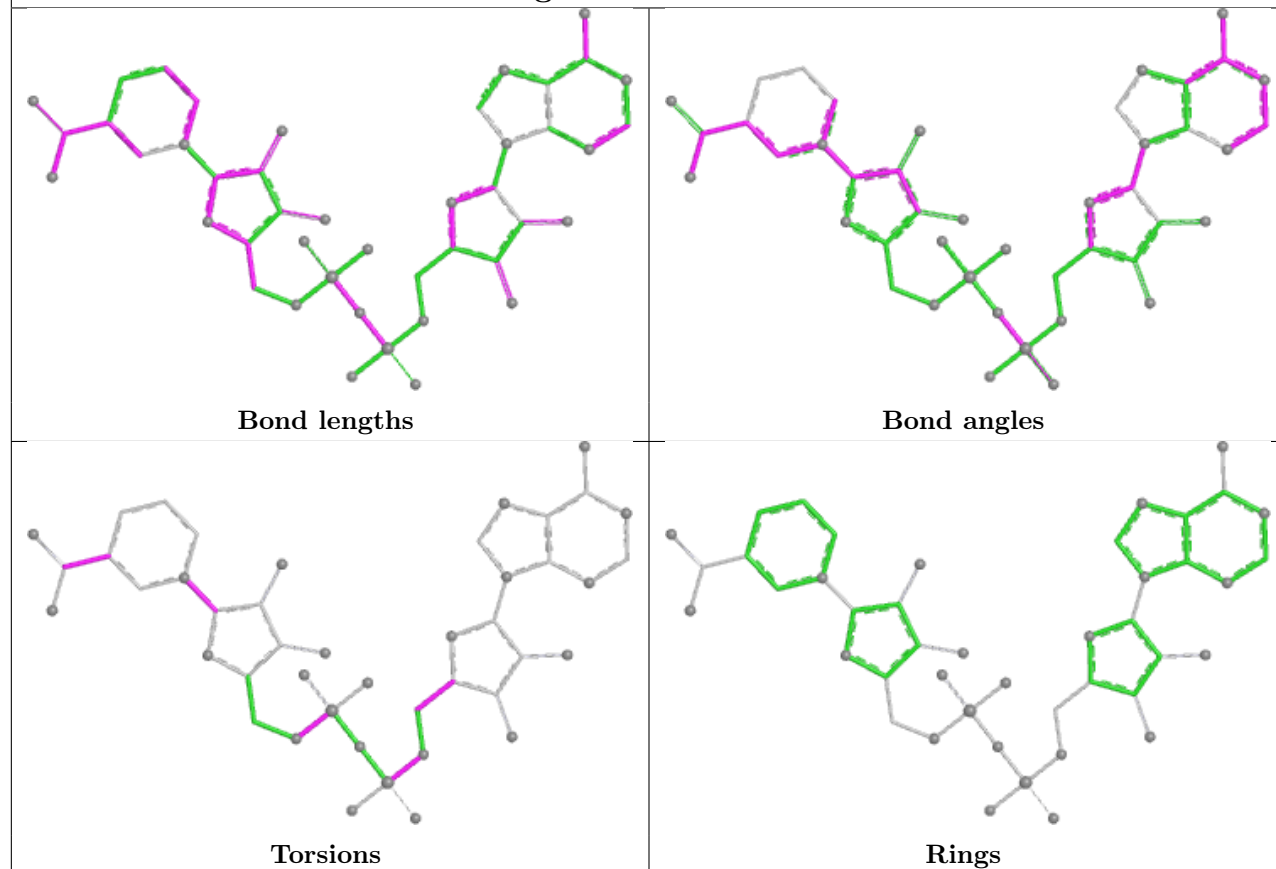
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

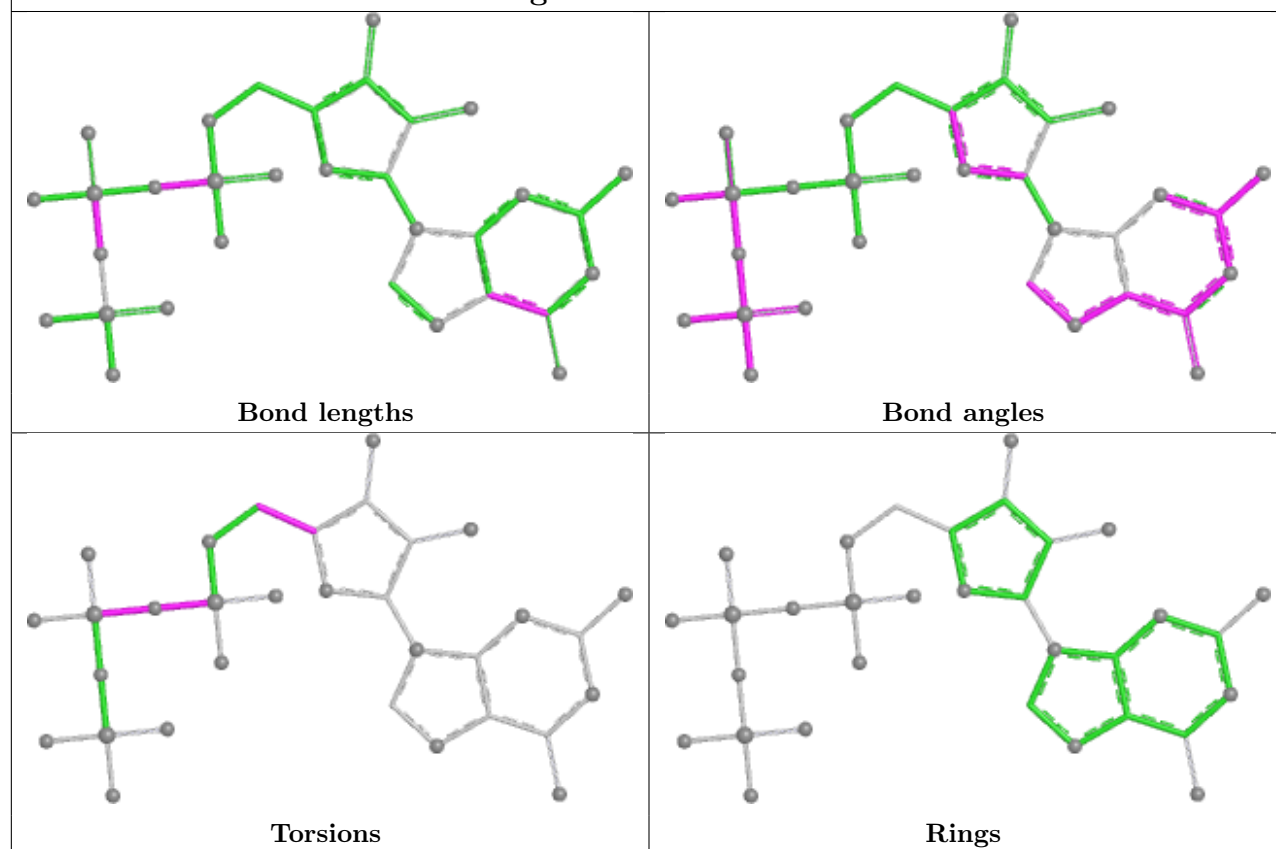




## Ligand NAI A 604

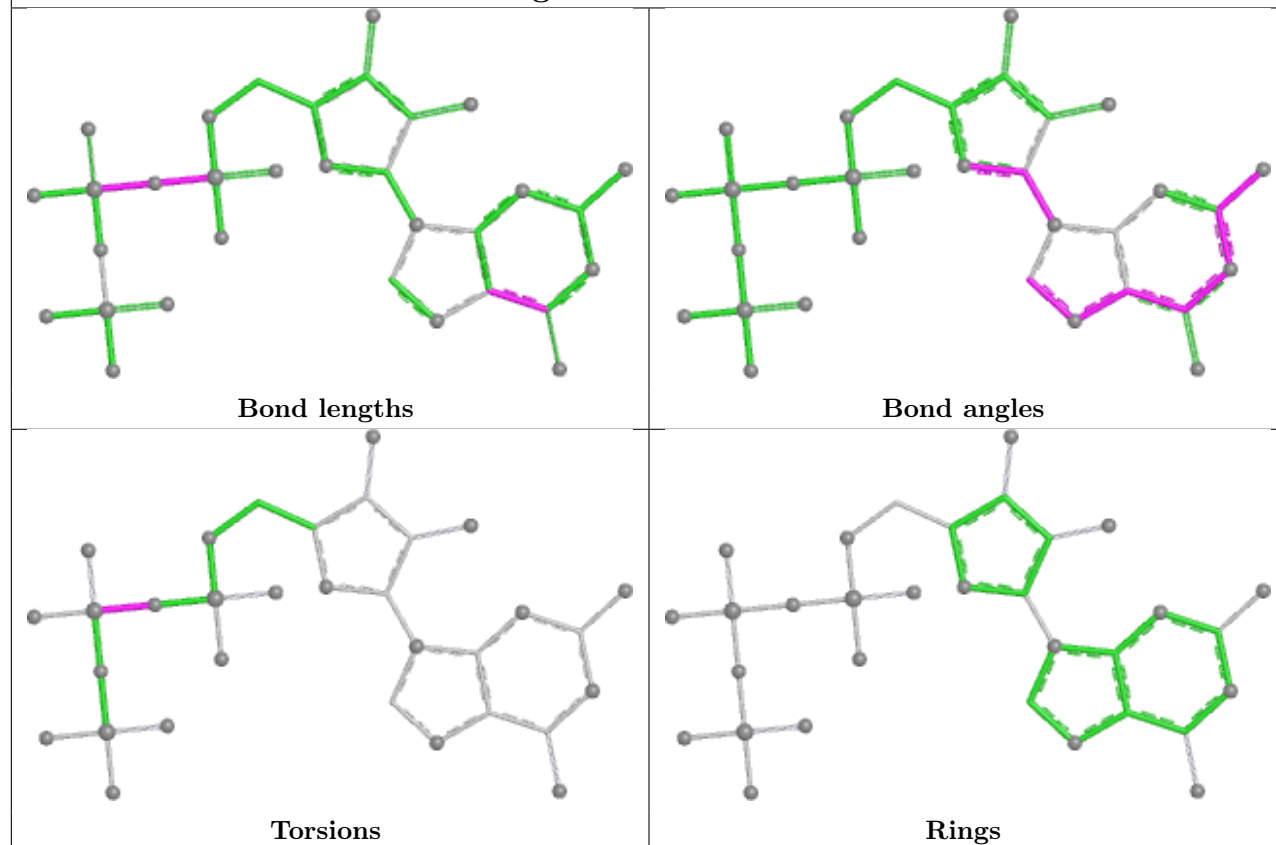


## Ligand GTP A 602

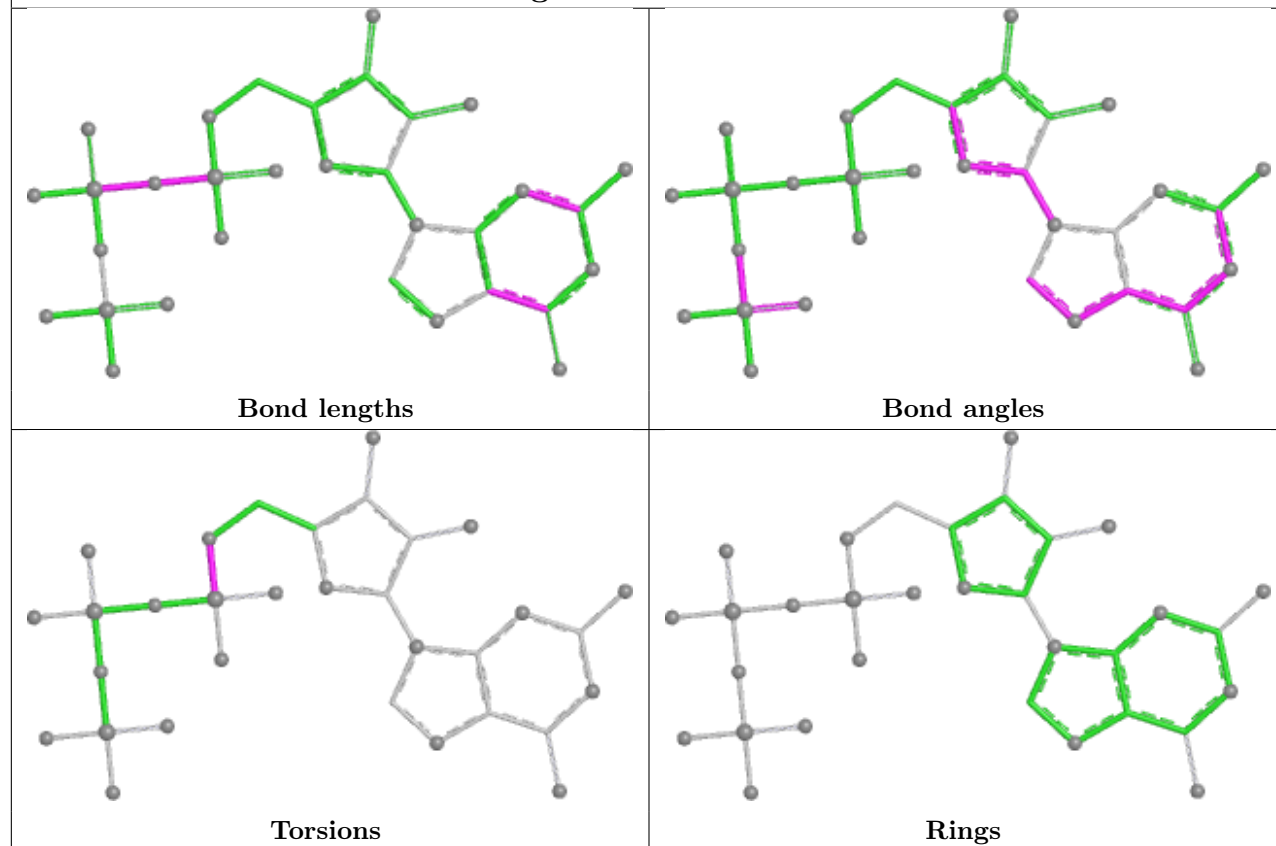


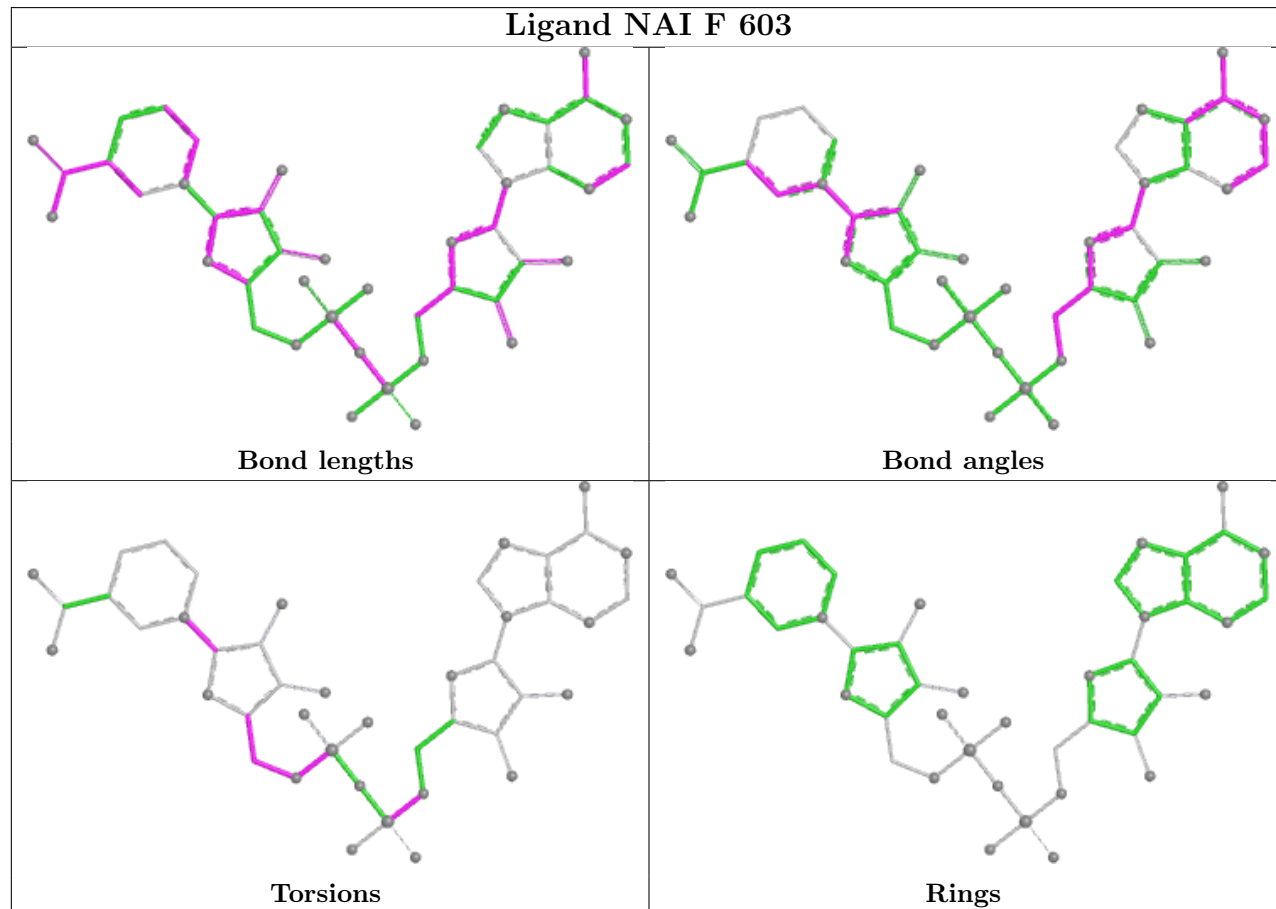
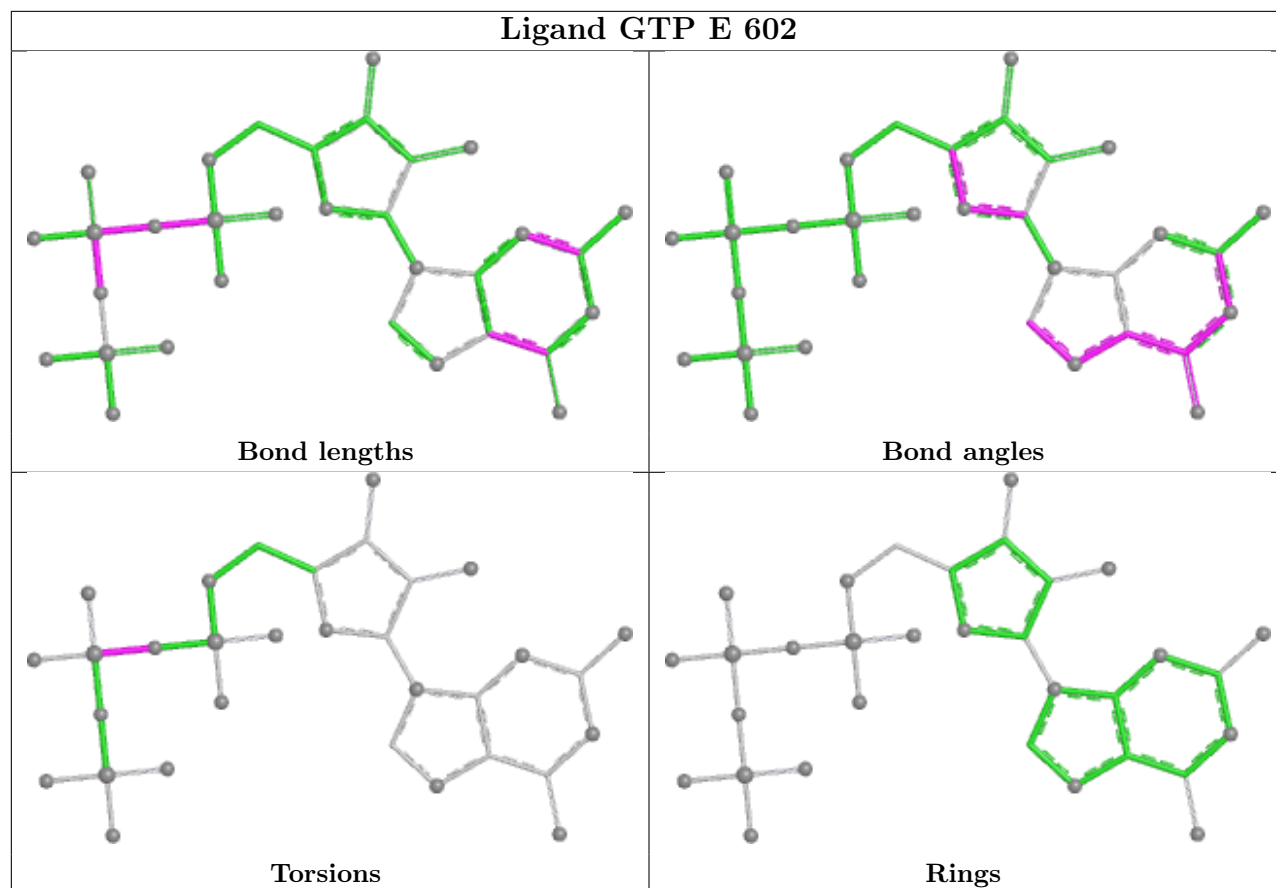


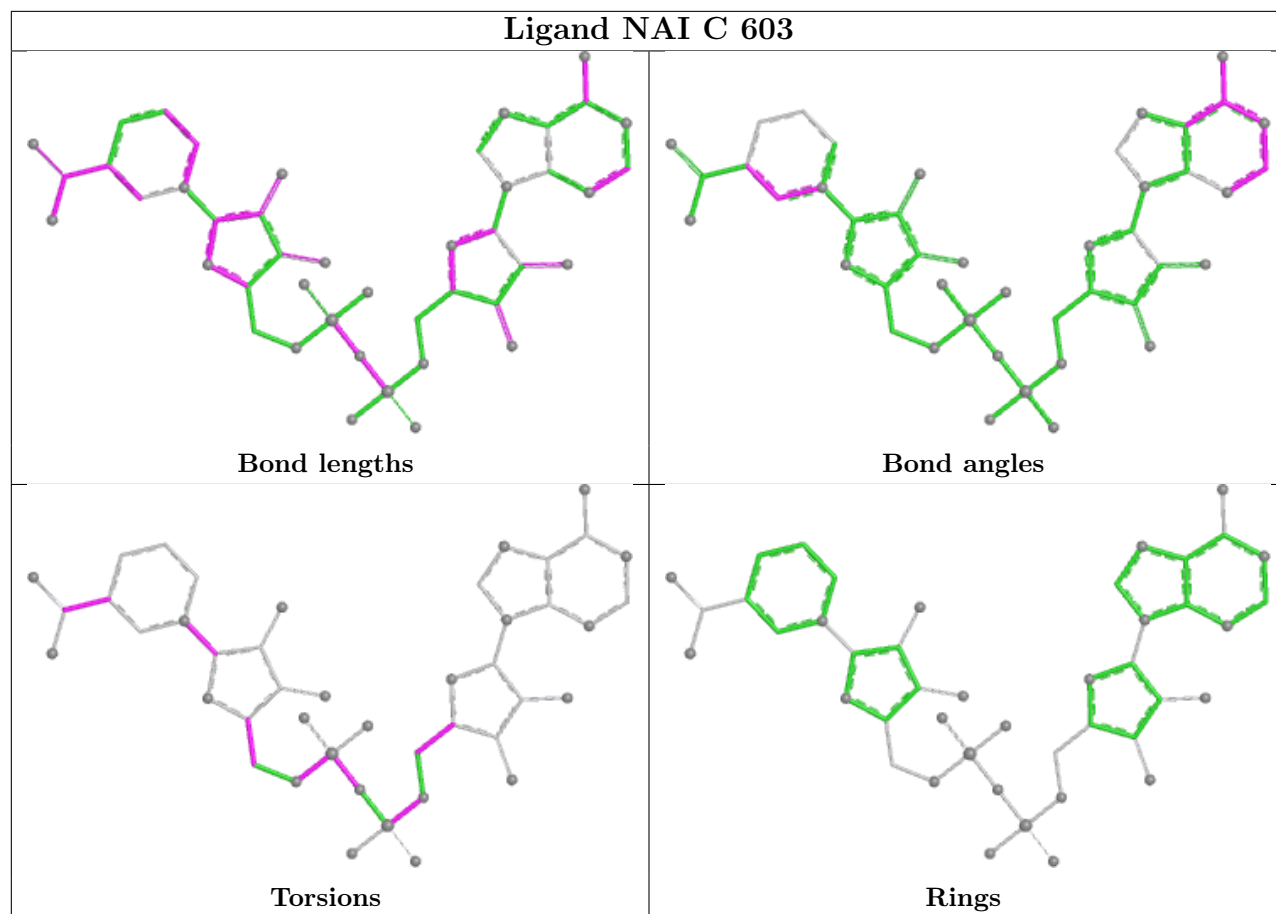
## Ligand GTP F 604

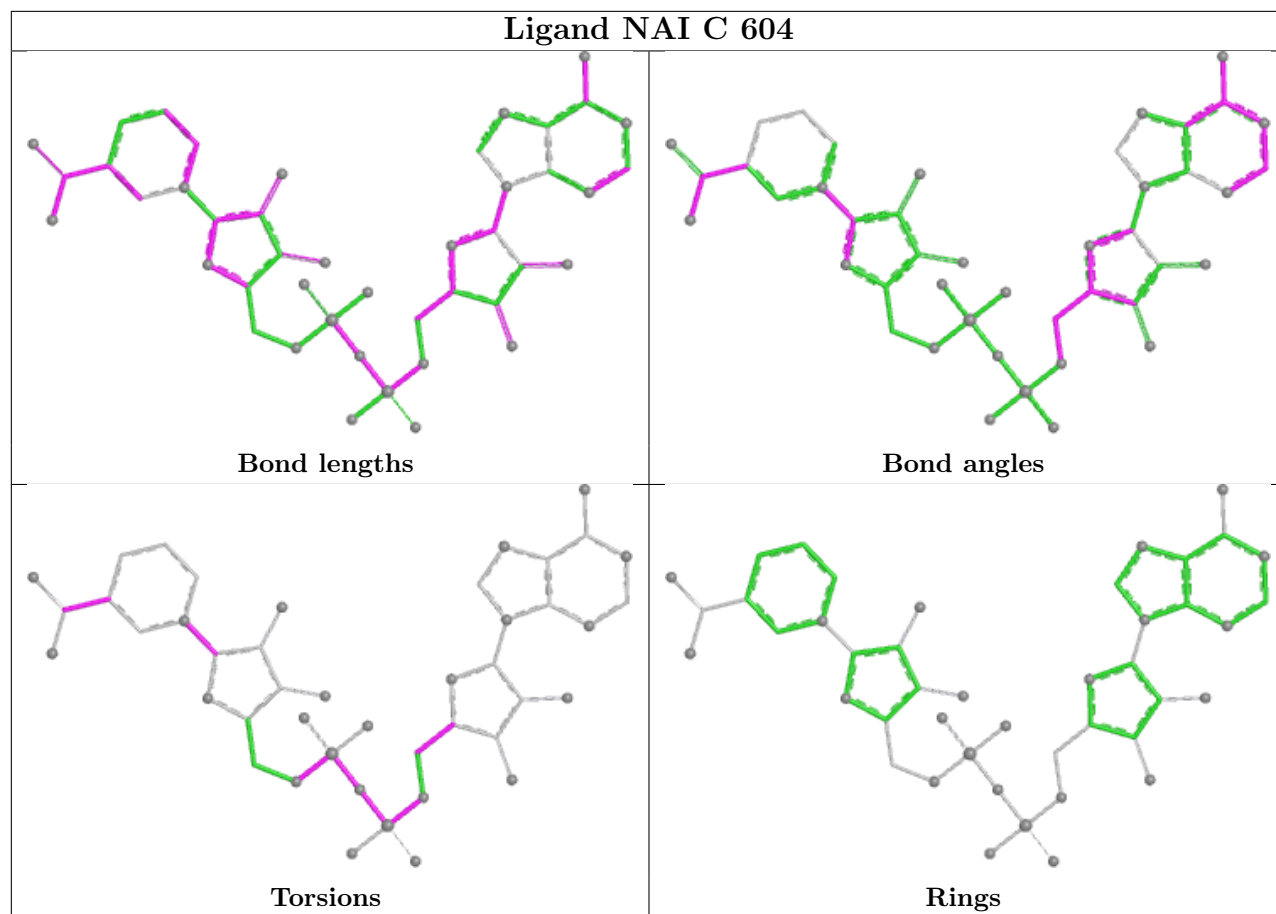


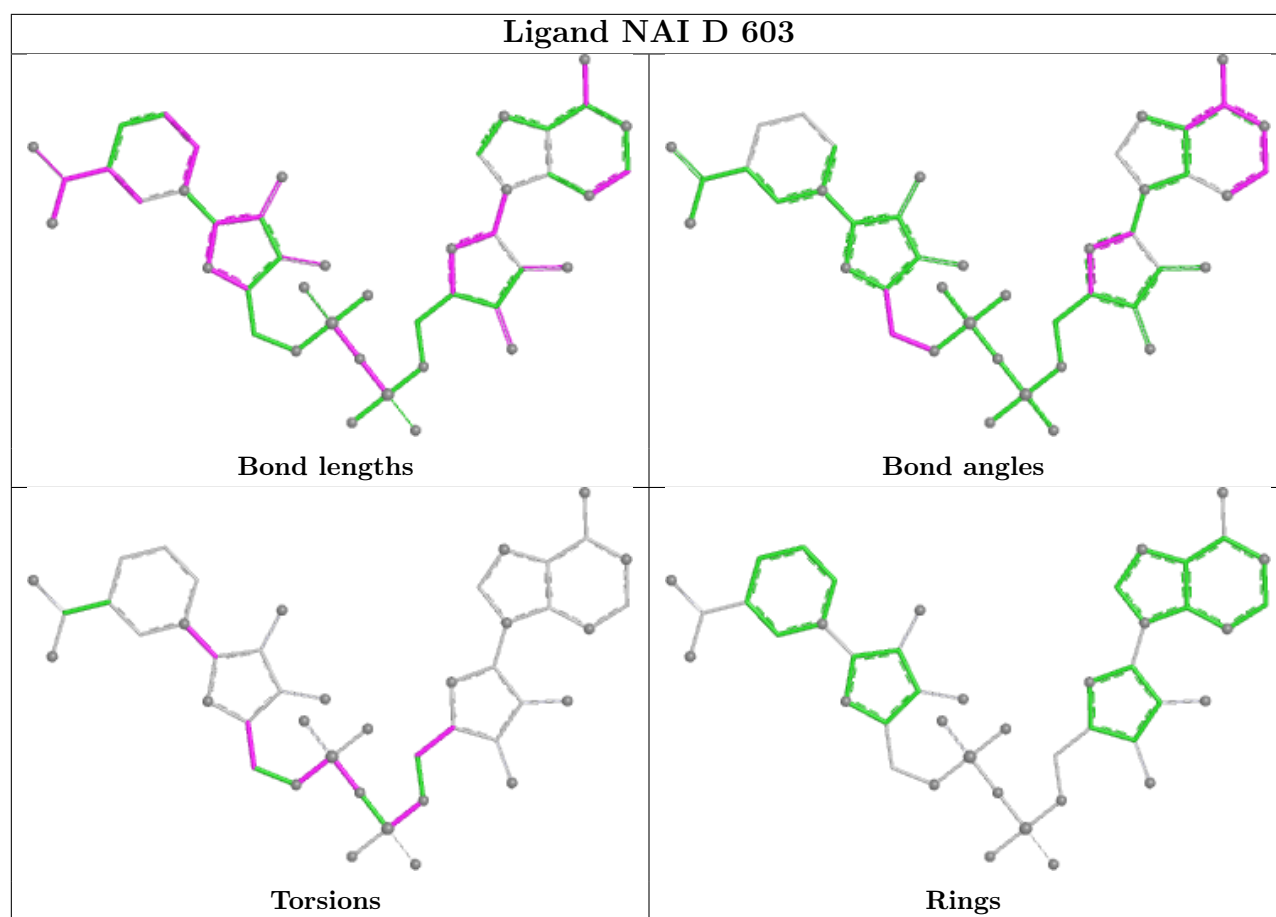
## Ligand GTP B 602

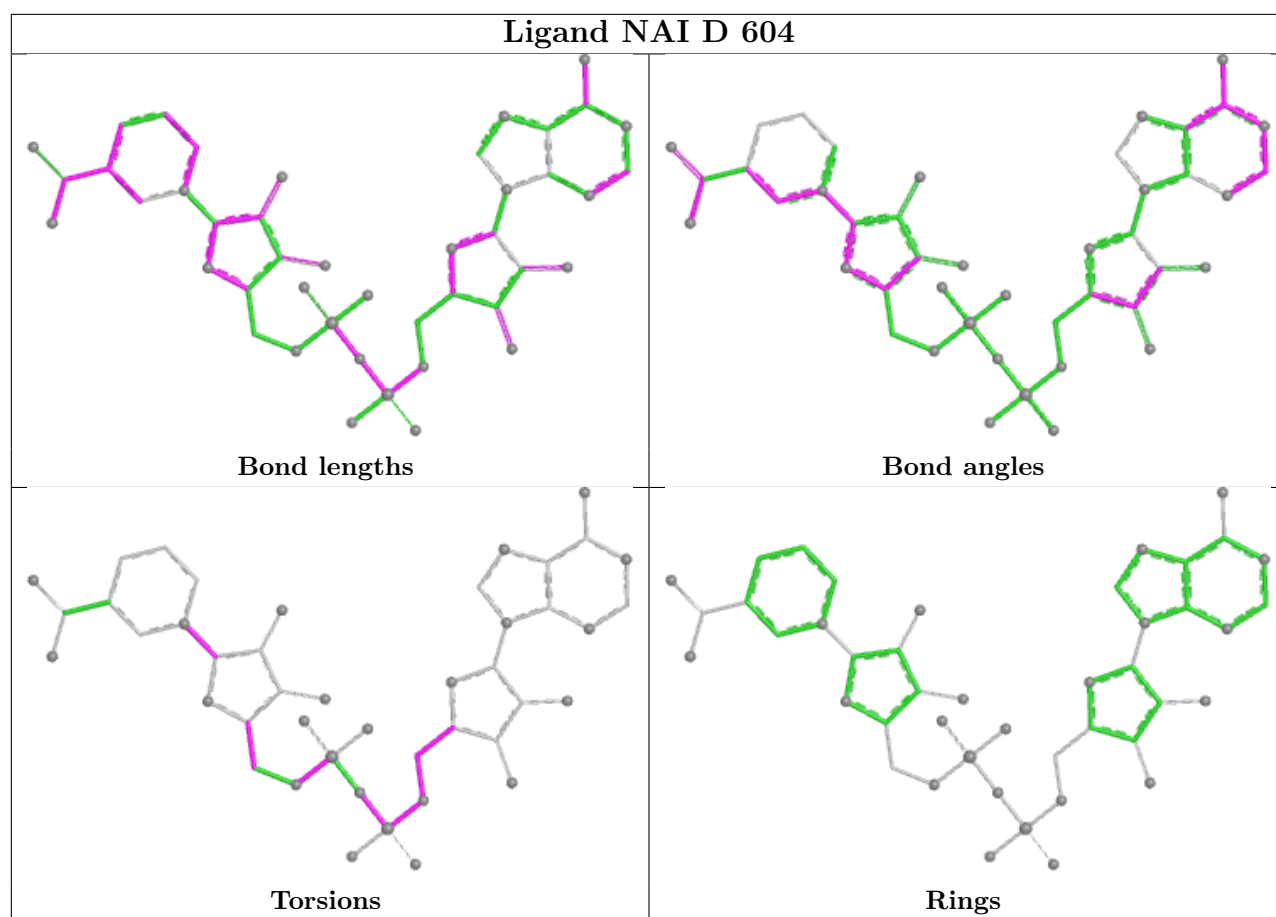


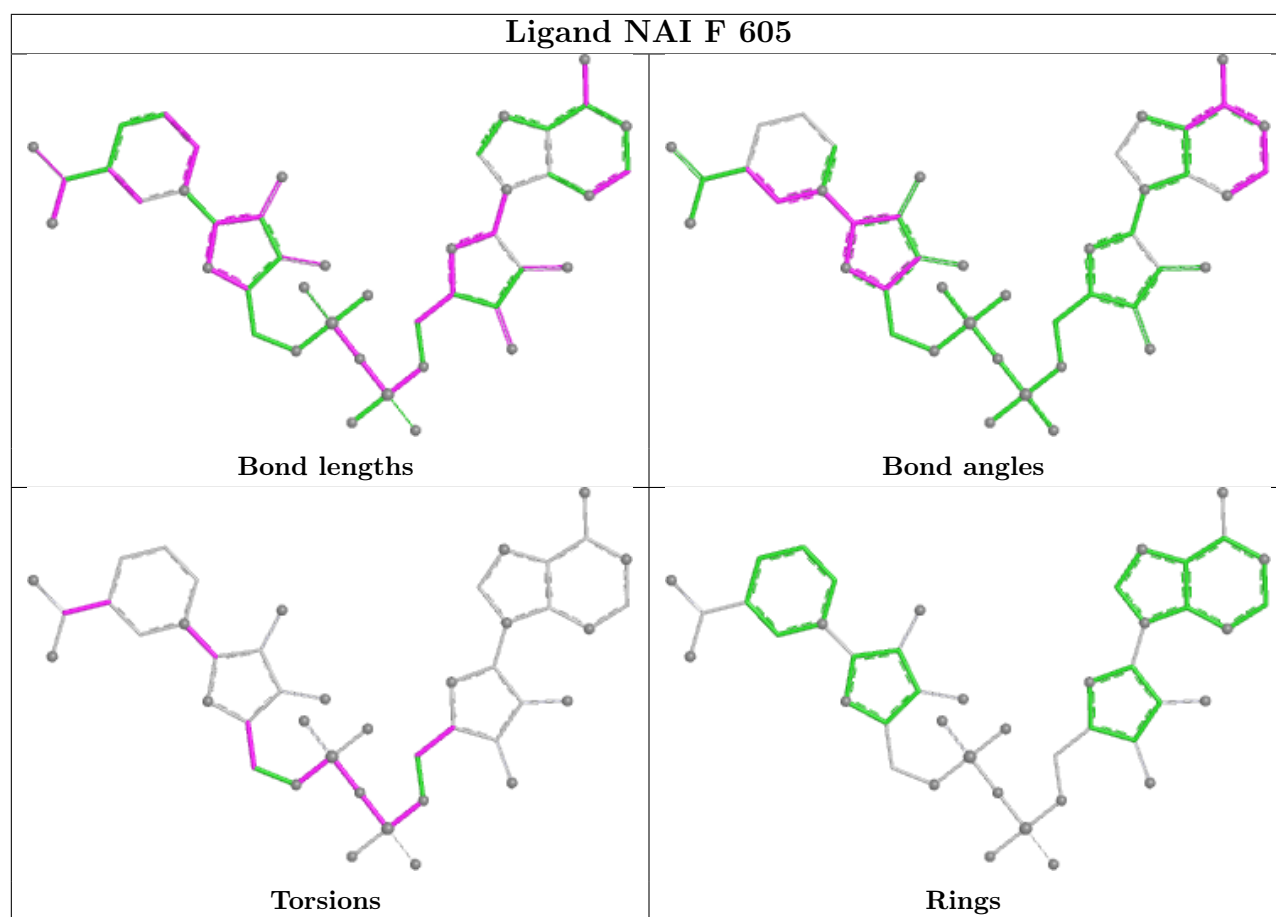




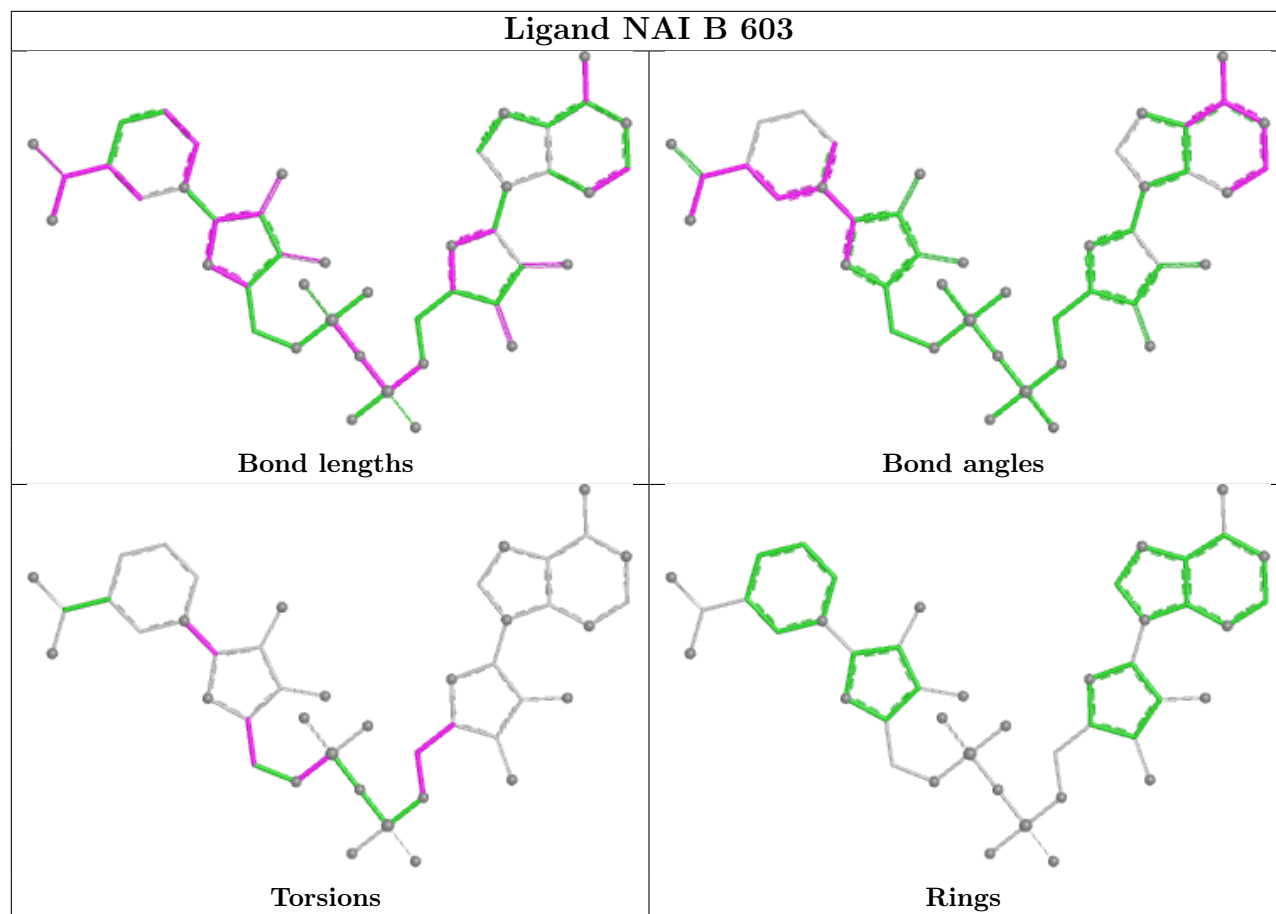






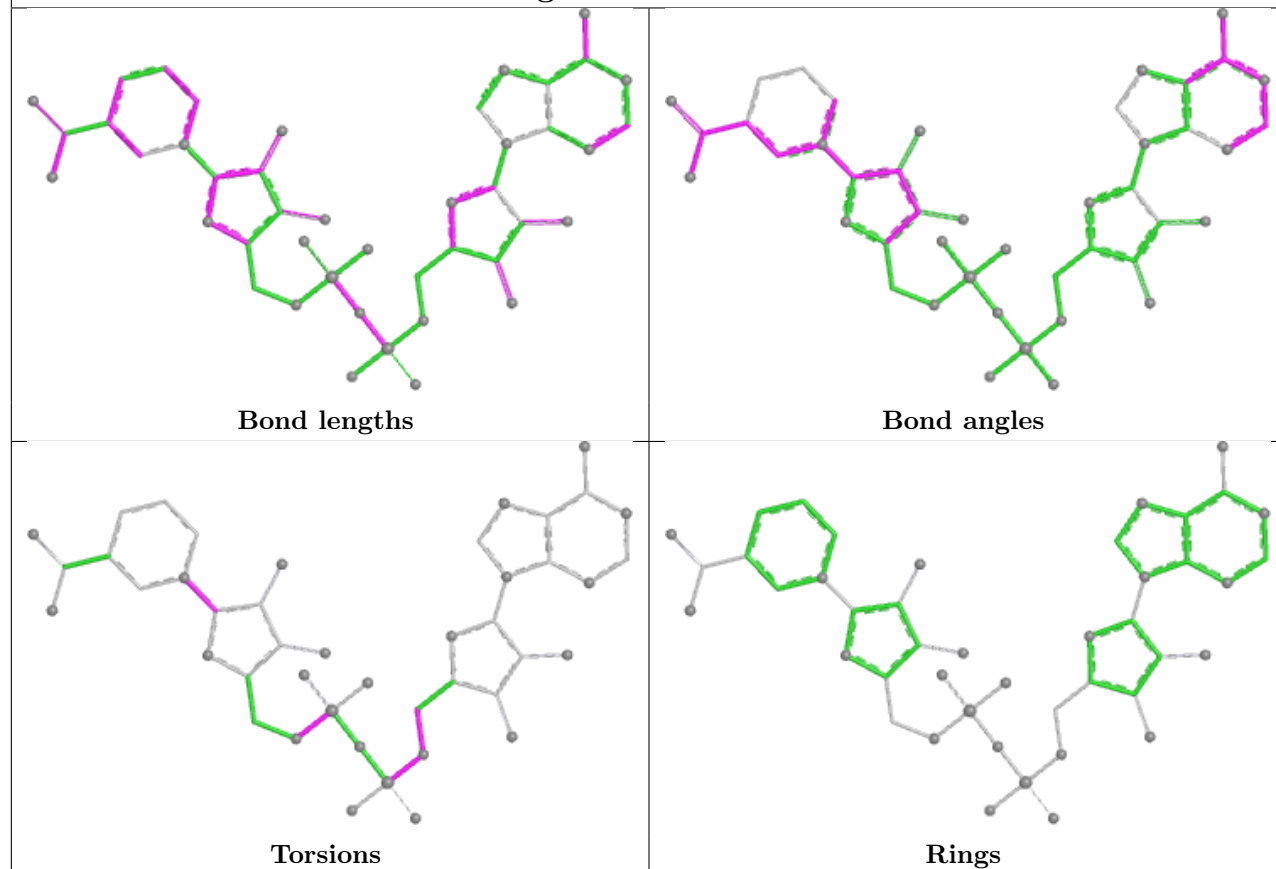


## Ligand NAI B 603

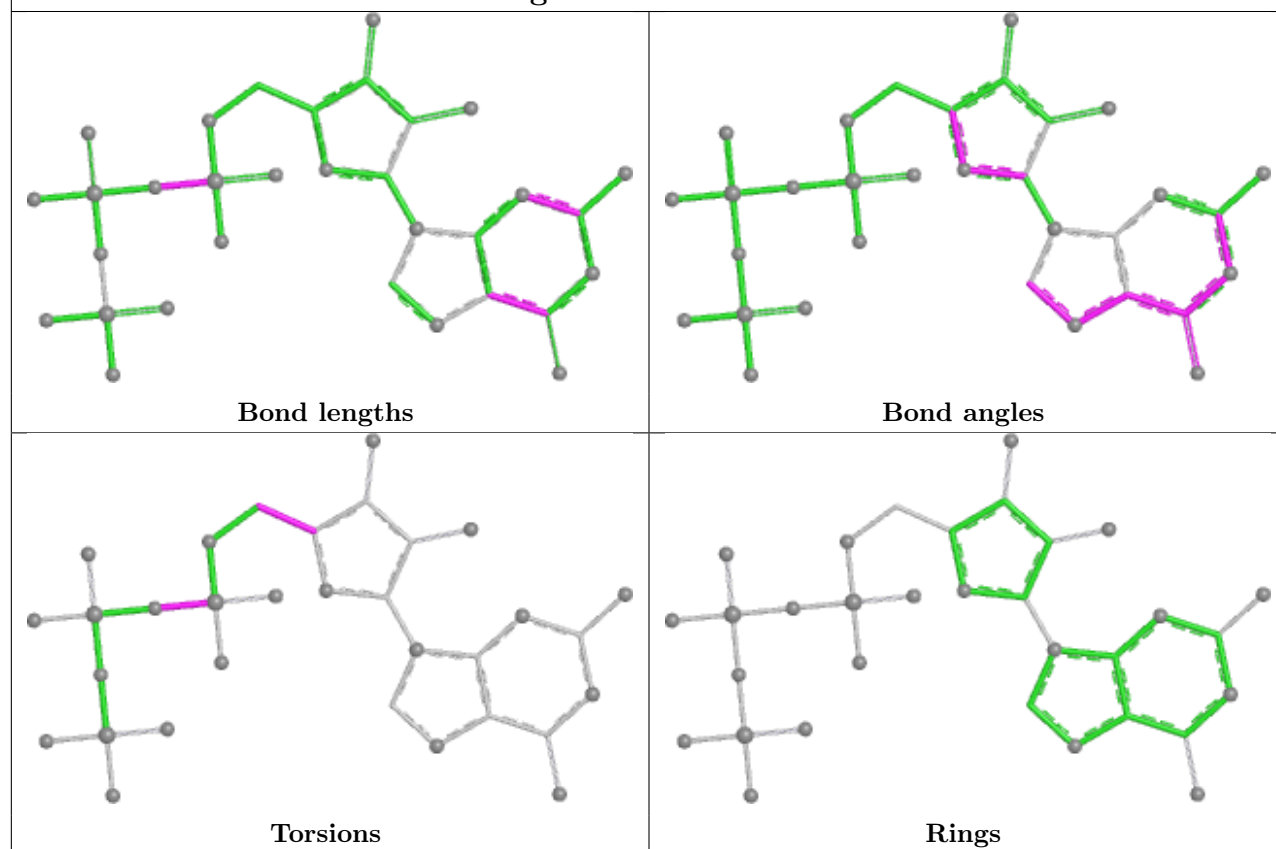


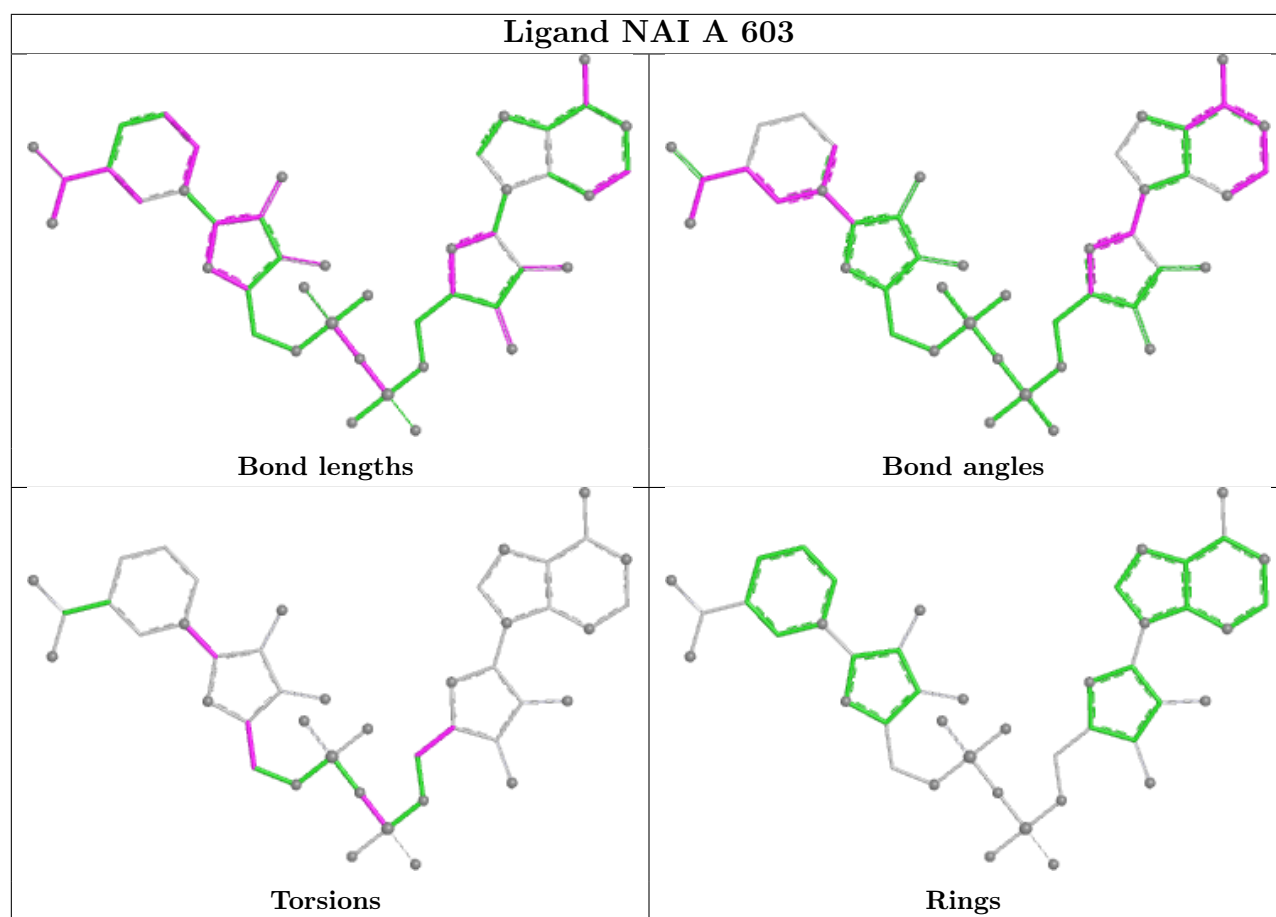


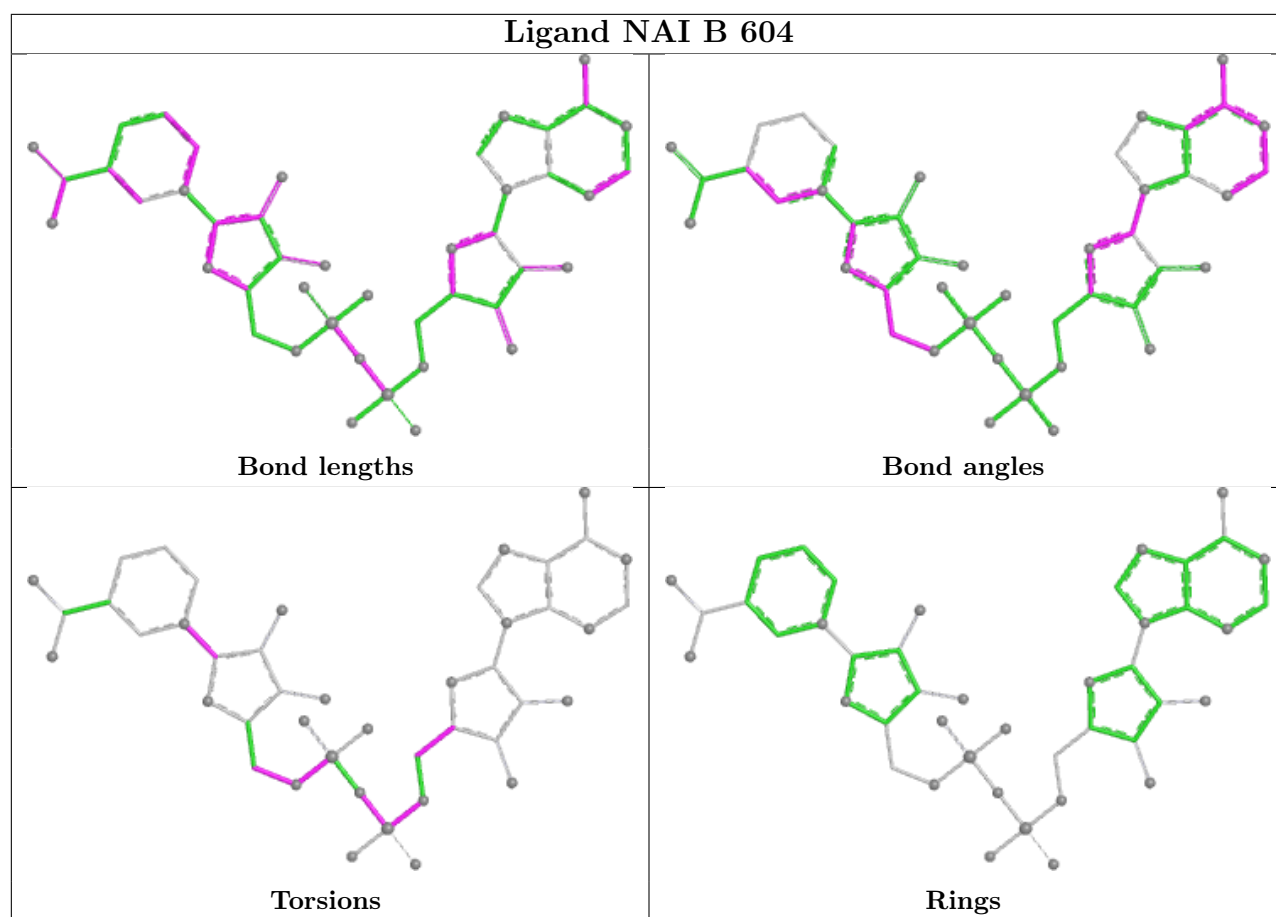
## Ligand NAI F 601



## Ligand GTP D 602







## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	501/582 (86%)	0.86	50 (9%)	14 13	8, 34, 69, 101	0
1	B	501/582 (86%)	0.78	34 (6%)	25 20	7, 29, 65, 94	0
1	C	501/582 (86%)	0.99	60 (11%)	10 10	12, 37, 72, 99	0
1	D	501/582 (86%)	0.81	36 (7%)	23 19	8, 30, 62, 89	0
1	E	501/582 (86%)	1.06	70 (13%)	7 8	7, 41, 78, 95	0
1	F	501/582 (86%)	0.92	51 (10%)	13 13	9, 34, 66, 95	0
All	All	3006/3492 (86%)	0.90	301 (10%)	14 13	7, 34, 73, 101	0

The worst 5 of 301 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	37	THR	6.0
1	D	500	PHE	5.2
1	B	499	THR	5.0
1	F	223	ILE	5.0
1	B	498	VAL	4.9

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands ⓘ

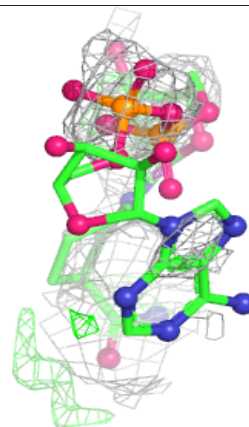
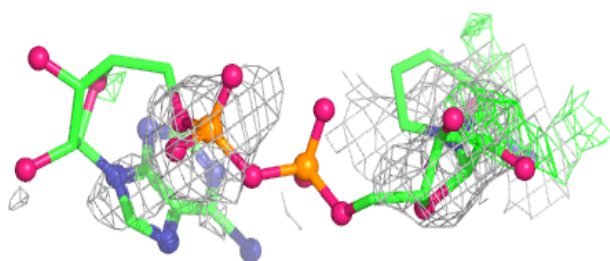
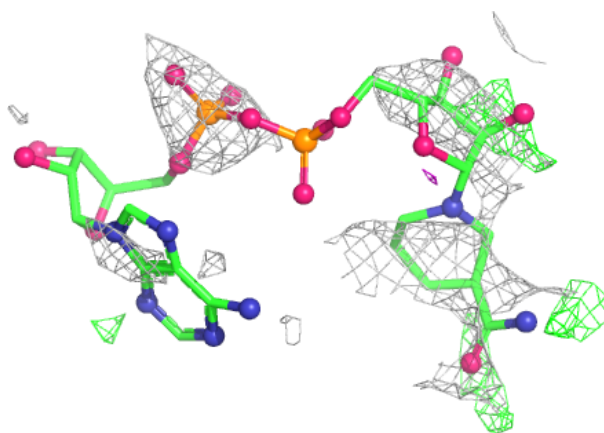
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	NAI	F	603	44/44	0.61	0.27	16,43,66,71	17
3	GTP	E	602	32/32	0.62	0.17	56,83,98,104	0
4	NAI	D	604	44/44	0.63	0.21	10,32,61,93	11
4	NAI	B	604	44/44	0.67	0.20	19,37,52,71	14
4	NAI	C	603	44/44	0.68	0.23	7,46,62,83	18
3	GTP	D	602	32/32	0.69	0.15	34,65,87,94	0
3	GTP	C	602	32/32	0.69	0.16	41,73,95,108	0
4	NAI	A	604	44/44	0.70	0.21	12,33,59,76	13
4	NAI	F	601	44/44	0.71	0.20	11,31,69,97	14
3	GTP	A	602	32/32	0.75	0.14	30,51,81,91	0
3	GTP	F	604	32/32	0.75	0.13	34,50,77,85	0
2	GLU	E	601	10/10	0.81	0.18	21,22,26,36	0
3	GTP	B	602	32/32	0.83	0.10	23,37,48,50	0
4	NAI	B	603	44/44	0.85	0.15	9,17,36,44	0
2	GLU	B	601	10/10	0.85	0.16	9,15,19,21	0
2	GLU	C	601	10/10	0.85	0.14	15,19,25,25	0
4	NAI	F	605	44/44	0.86	0.16	12,27,44,47	0
4	NAI	A	603	44/44	0.87	0.15	10,23,37,44	0
4	NAI	C	604	44/44	0.87	0.13	18,31,53,66	0
4	NAI	E	603	44/44	0.88	0.12	25,41,72,75	0
2	GLU	A	601	10/10	0.88	0.18	16,20,25,30	0
4	NAI	D	603	44/44	0.89	0.12	15,24,45,55	0
2	GLU	D	601	10/10	0.92	0.15	10,15,21,27	0
2	GLU	F	602	10/10	0.92	0.11	11,14,18,24	0

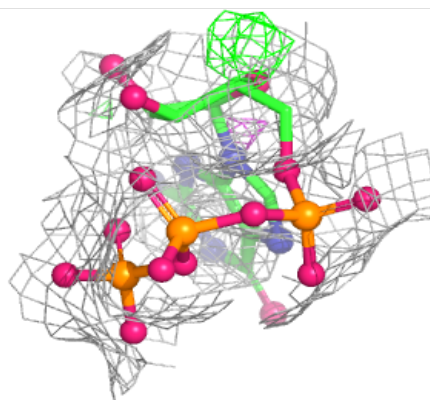
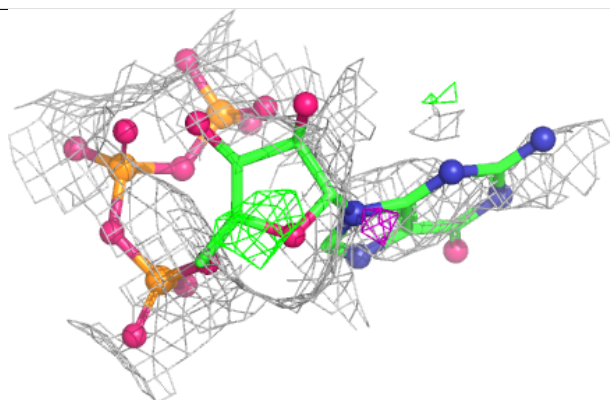
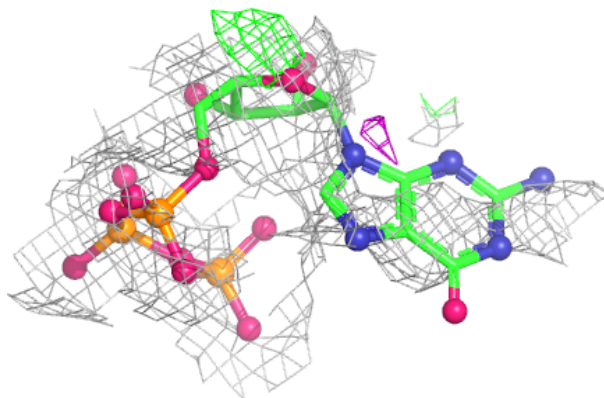
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

**Electron density around NAI F 603:**

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

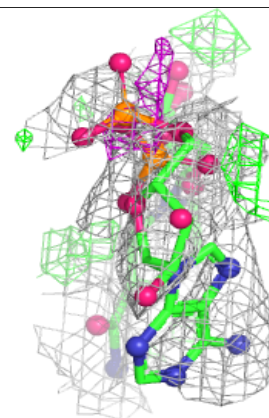
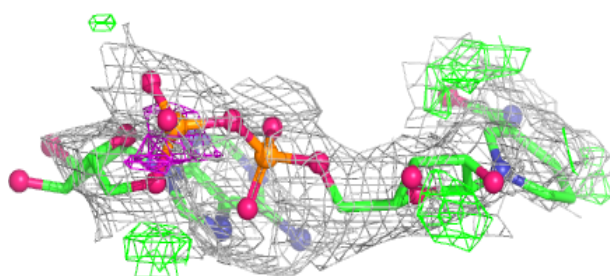
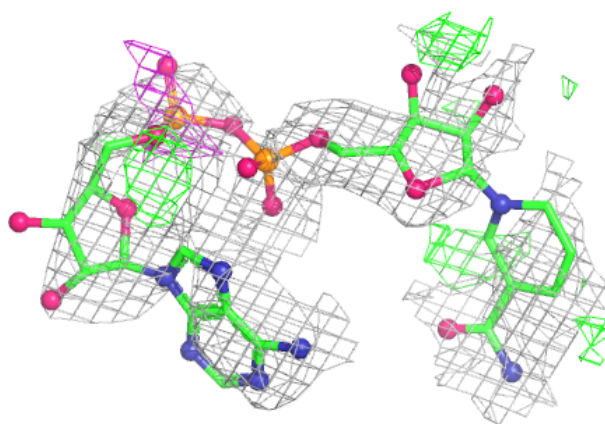
**Electron density around GTP E 602:**

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



**Electron density around NAI D 604:**

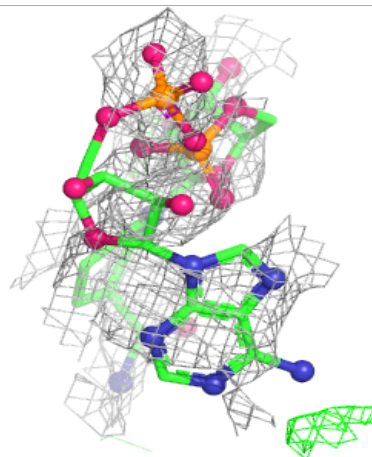
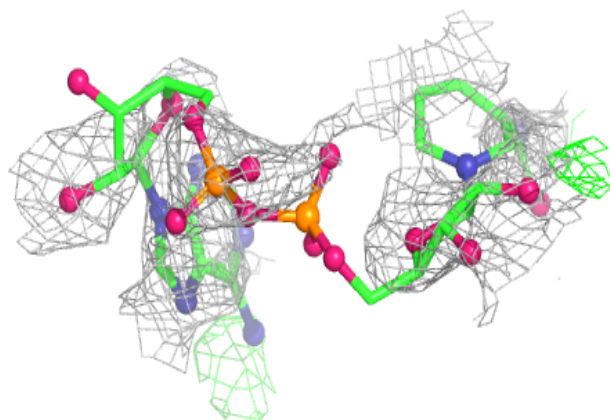
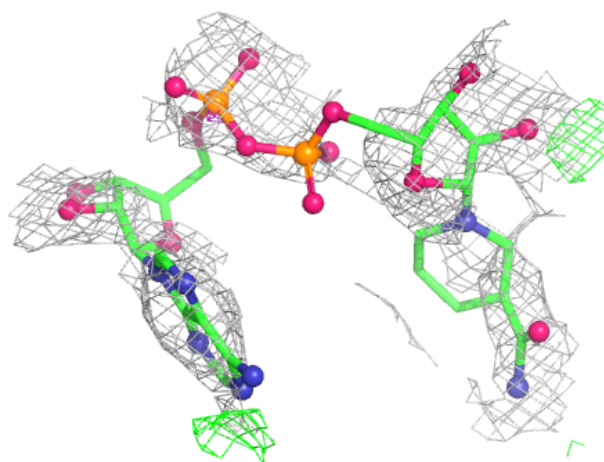
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





**Electron density around NAI B 604:**

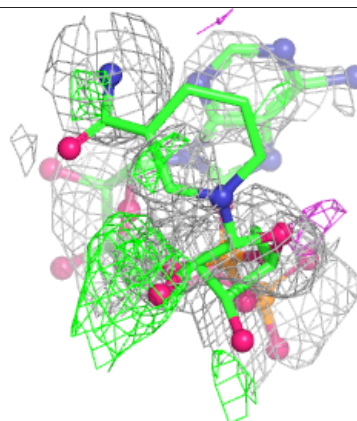
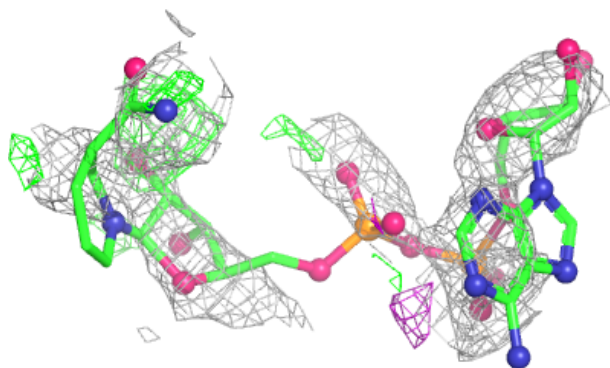
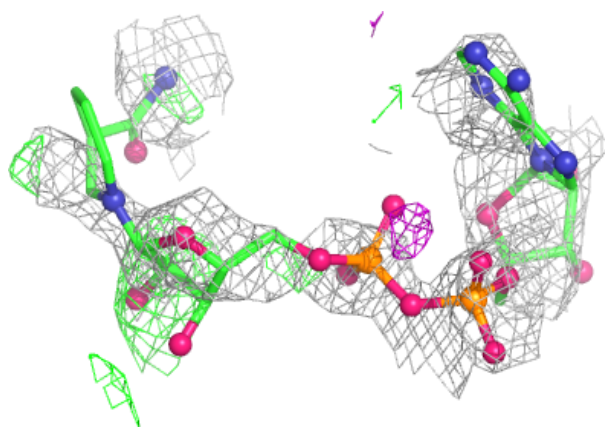
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



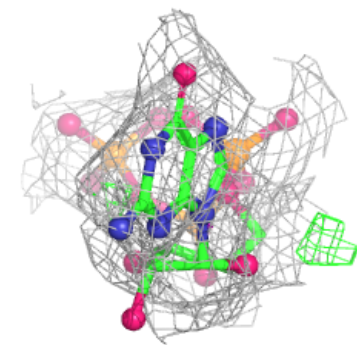
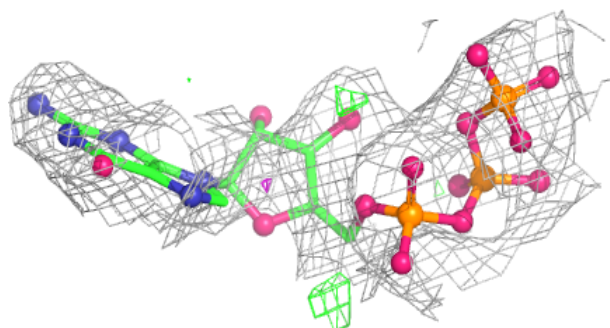
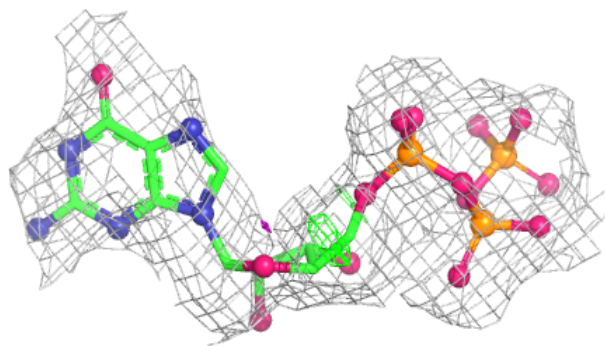


**Electron density around NAI C 603:**

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and green (positive)

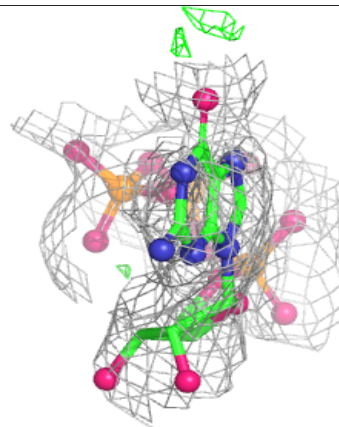
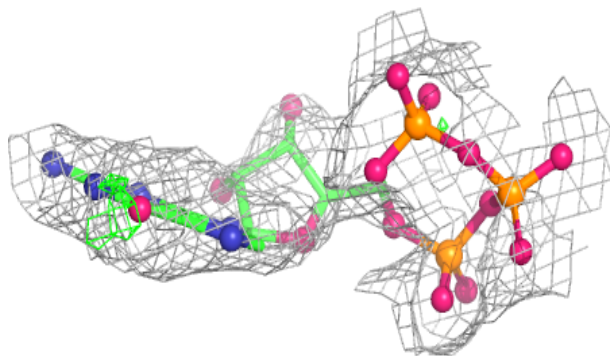
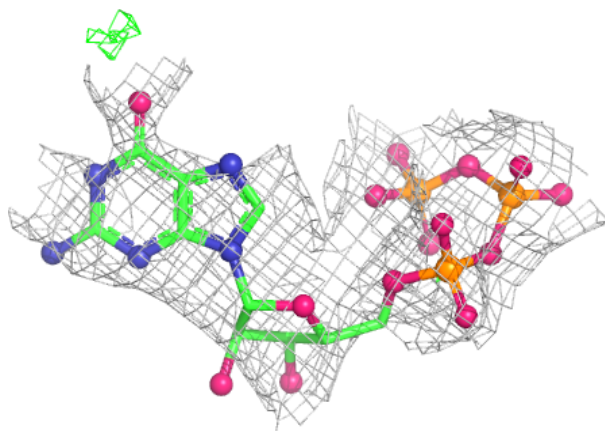
**Electron density around GTP D 602:**

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and green (positive)



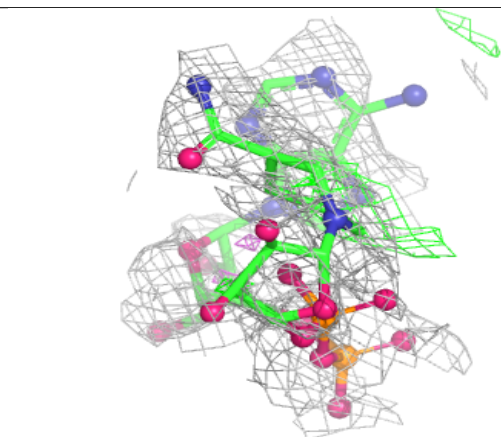
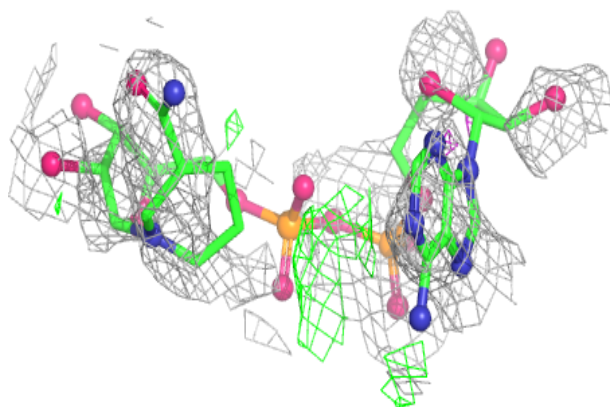
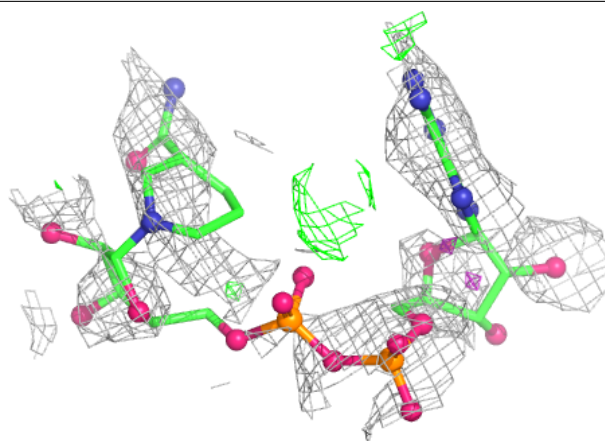
**Electron density around GTP C 602:**

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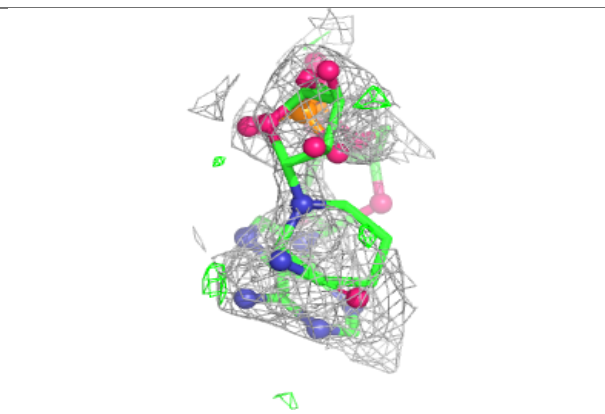
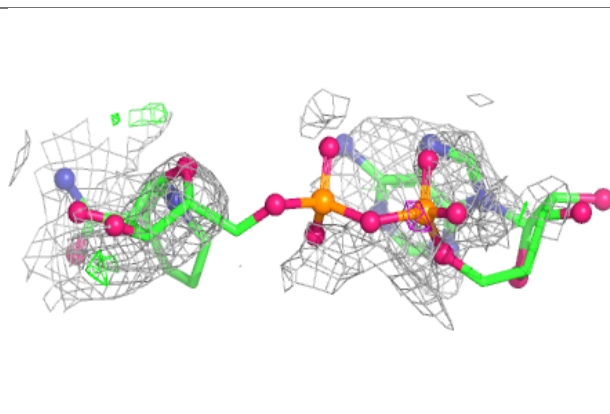
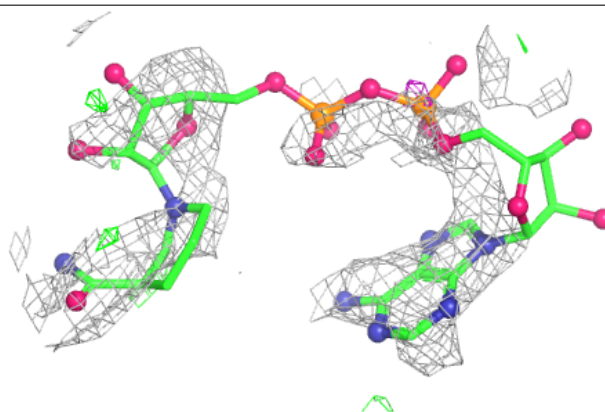


**Electron density around NAI A 604:**

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

**Electron density around NAI F 601:**

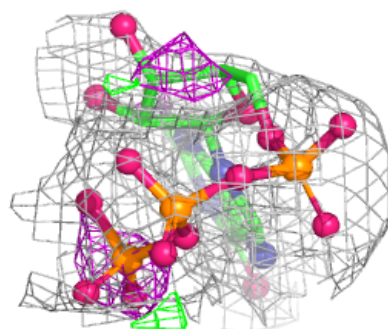
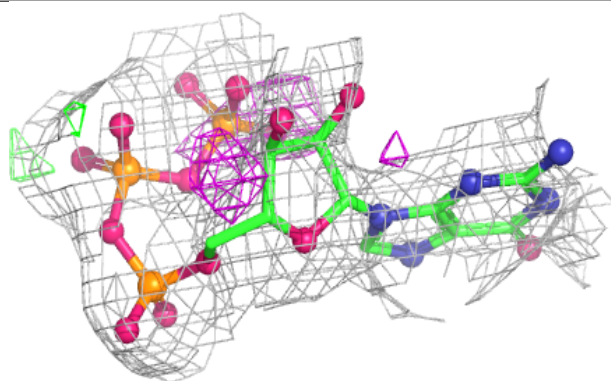
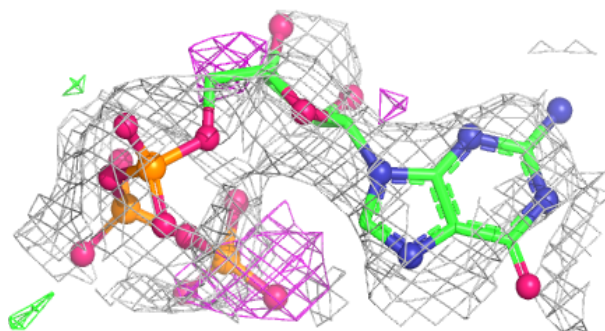
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



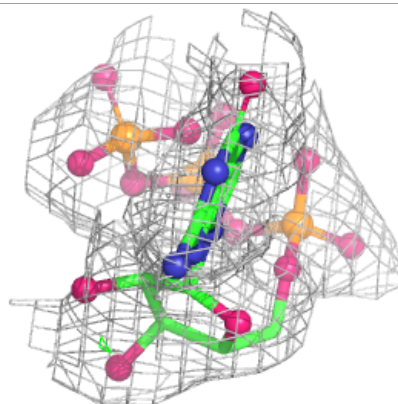
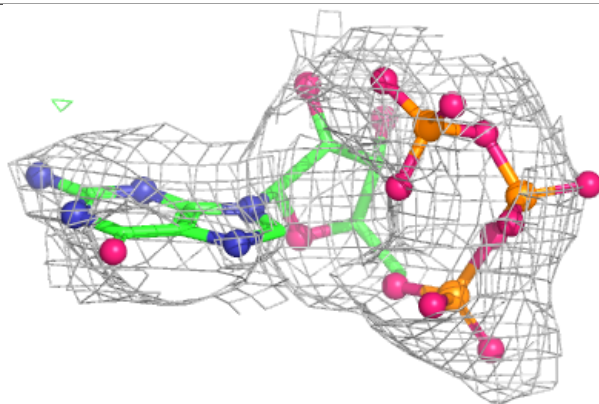
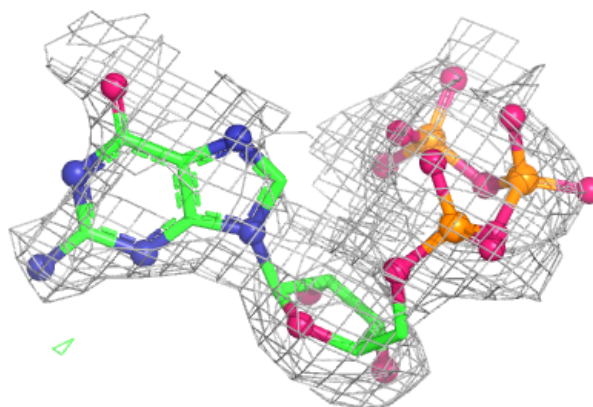


**Electron density around GTP A 602:**

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

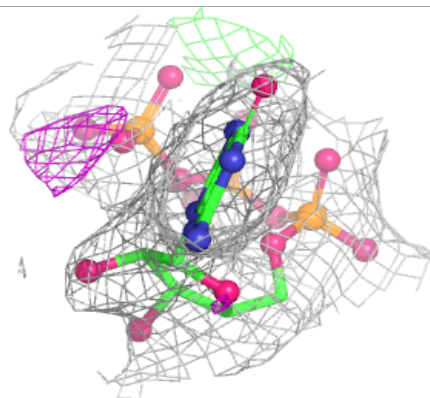
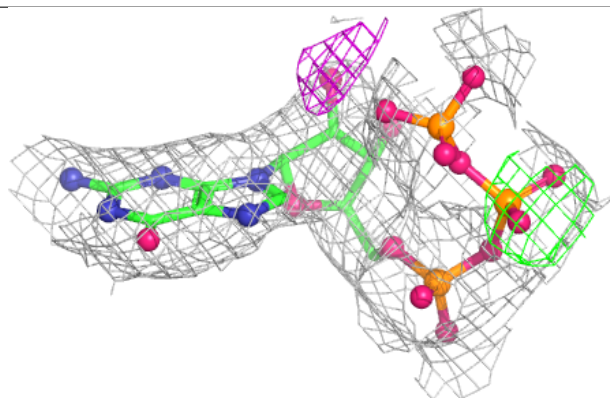
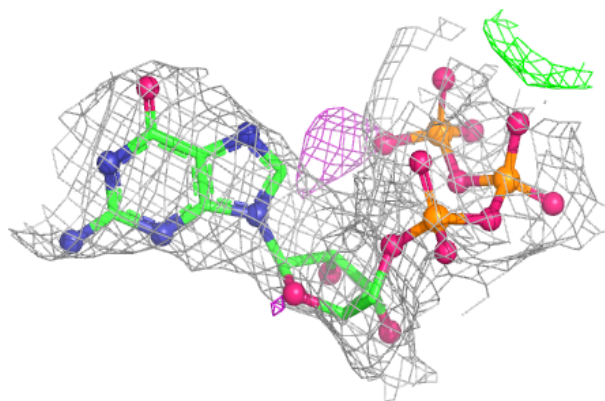
**Electron density around GTP F 604:**

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

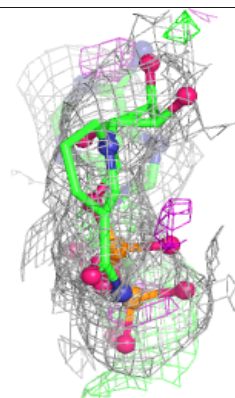
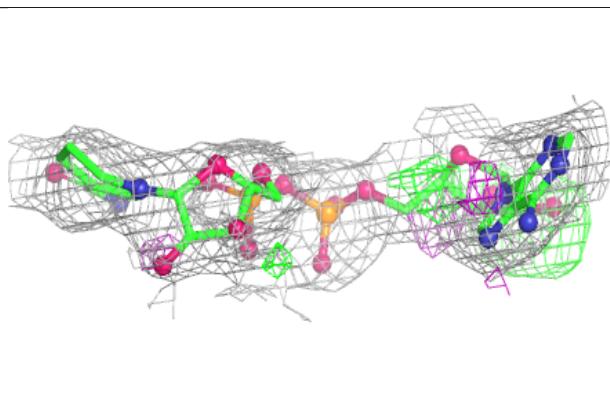
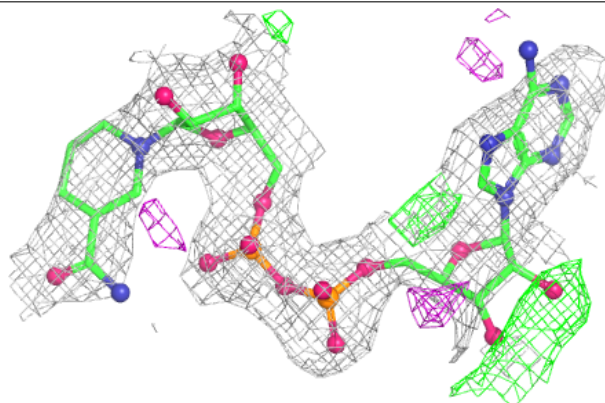


**Electron density around GTP B 602:**

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

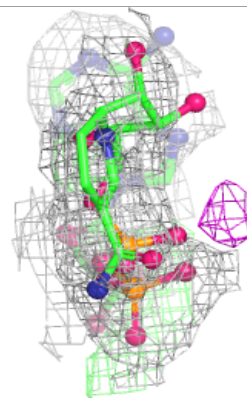
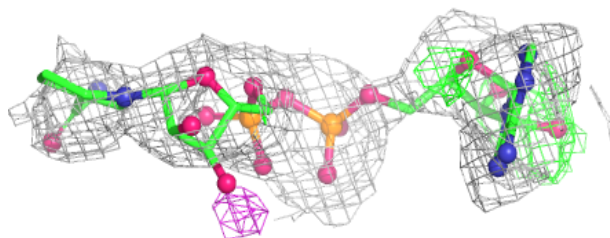
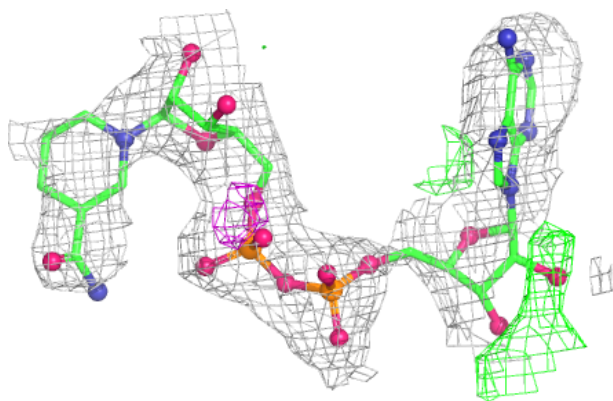
**Electron density around NAI B 603:**

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

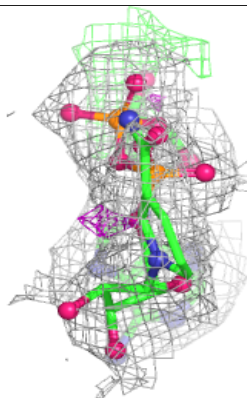
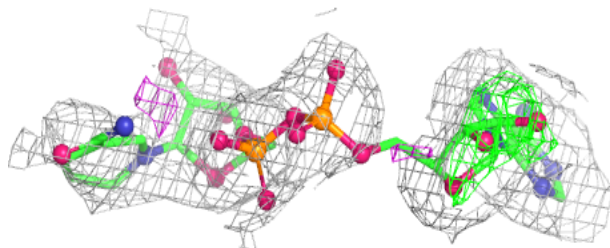
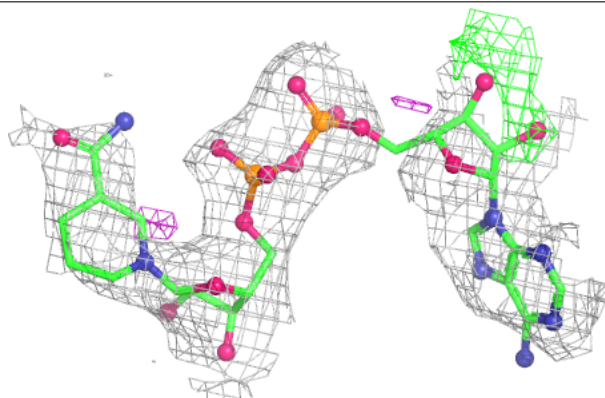


**Electron density around NAI F 605:**

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

**Electron density around NAI A 603:**

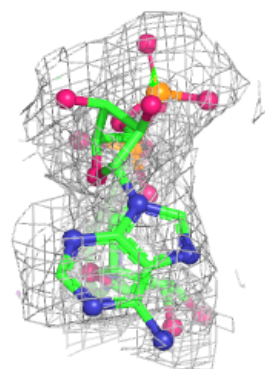
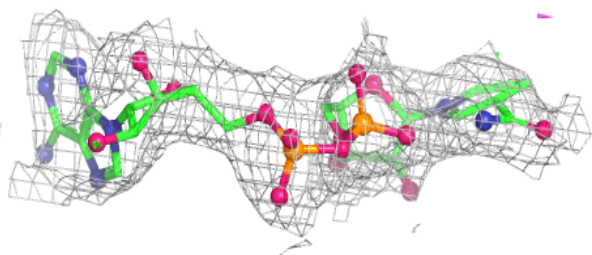
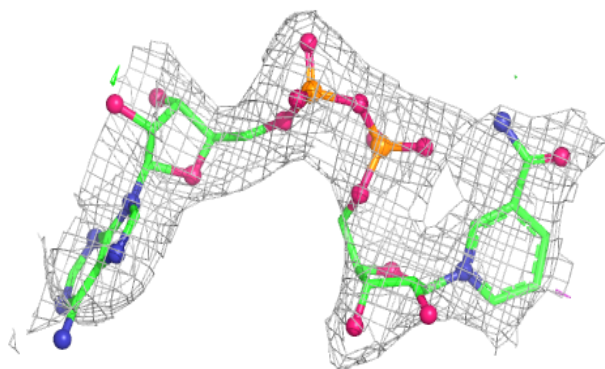
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



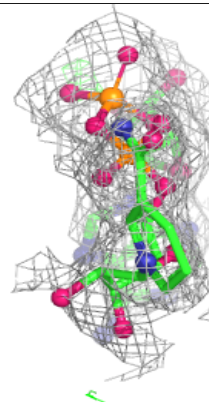
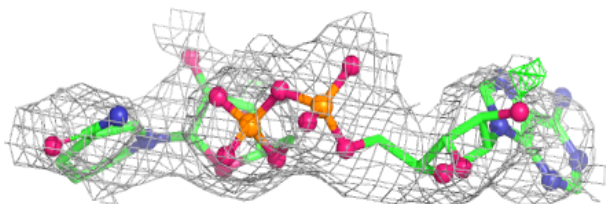
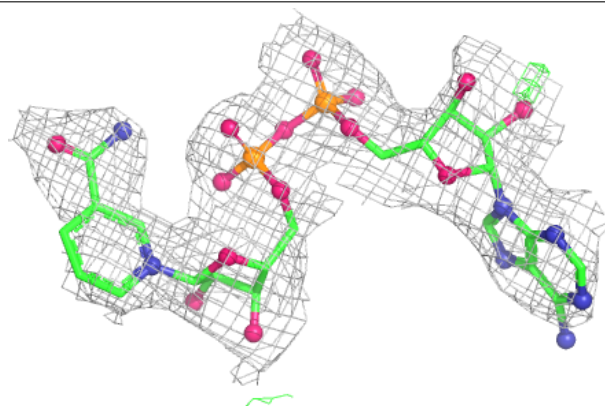


**Electron density around NAI C 604:**

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

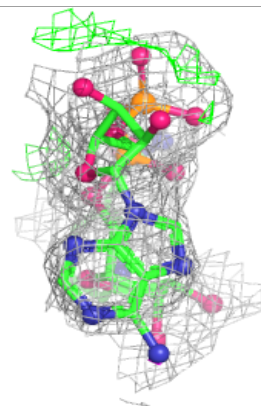
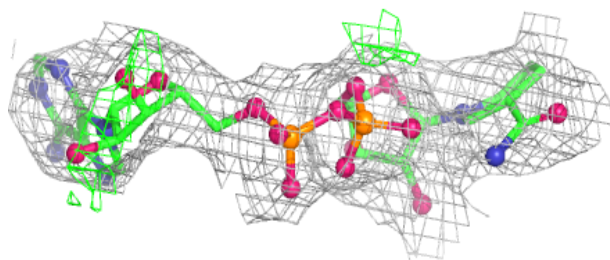
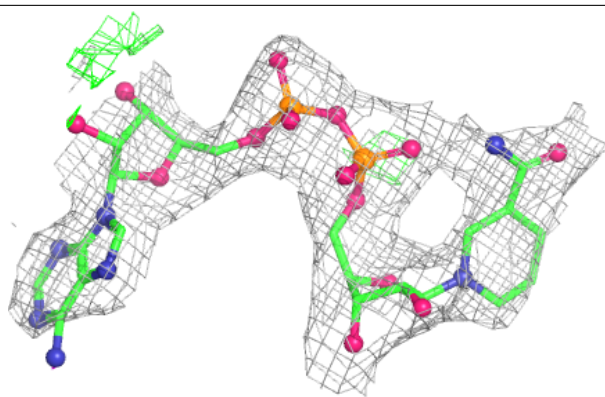
**Electron density around NAI E 603:**

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



**Electron density around NAI D 603:**

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



## 6.5 Other polymers [i](#)

There are no such residues in this entry.