wwPDB EM Validation Summary Report

Jul 15, 2025 – 10:55 PM JST

PDB ID	:	8ZT2 / pdb_00008zt2
EMDB ID	:	EMD-60445
Title	:	Structure of calcium preference ATP-gated channel Apo-P2X1 in the Desensitized state 1
Authors	:	Zhang, H.; Xu, H.E.
Deposited on	:	2024-06-06
Resolution	:	2.31 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the ⓘ 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:

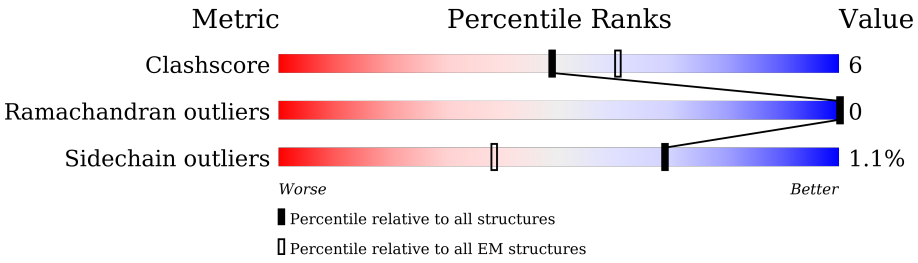
EMDB validation analysis	:	FAILED
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0rc1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.31 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)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Mol	Chain	Length	Quality of chain
1	A	428	65% 12% 23%
1	B	428	65% 12% 23%
1	C	428	64% 13% 23%

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 7994 atoms, of which 0 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 P2X purinoceptor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	330	Total 2588	C 1672	N 445	O 456	S 15	0	0
1	B	330	Total 2588	C 1672	N 445	O 456	S 15	0	0
1	C	330	Total 2588	C 1672	N 445	O 456	S 15	0	0

There are 87 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	MET	-	initiating methionine	UNP P51576
A	400	LYS	-	expression tag	UNP P51576
A	401	LEU	-	expression tag	UNP P51576
A	402	LEU	-	expression tag	UNP P51576
A	403	GLU	-	expression tag	UNP P51576
A	404	VAL	-	expression tag	UNP P51576
A	405	LEU	-	expression tag	UNP P51576
A	406	PHE	-	expression tag	UNP P51576
A	407	GLN	-	expression tag	UNP P51576
A	408	GLY	-	expression tag	UNP P51576
A	409	PRO	-	expression tag	UNP P51576
A	410	HIS	-	expression tag	UNP P51576
A	411	HIS	-	expression tag	UNP P51576
A	412	HIS	-	expression tag	UNP P51576
A	413	HIS	-	expression tag	UNP P51576
A	414	HIS	-	expression tag	UNP P51576
A	415	HIS	-	expression tag	UNP P51576
A	416	HIS	-	expression tag	UNP P51576
A	417	HIS	-	expression tag	UNP P51576
A	418	HIS	-	expression tag	UNP P51576
A	419	HIS	-	expression tag	UNP P51576
A	420	ASP	-	expression tag	UNP P51576
A	421	TYR	-	expression tag	UNP P51576
A	422	LYS	-	expression tag	UNP P51576

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Chain	Residue	Modelled	Actual	Comment	Reference
A	423	ASP	-	expression tag	UNP P51576
A	424	ASP	-	expression tag	UNP P51576
A	425	ASP	-	expression tag	UNP P51576
A	426	ASP	-	expression tag	UNP P51576
A	427	LYS	-	expression tag	UNP P51576
B	0	MET	-	initiating methionine	UNP P51576
B	400	LYS	-	expression tag	UNP P51576
B	401	LEU	-	expression tag	UNP P51576
B	402	LEU	-	expression tag	UNP P51576
B	403	GLU	-	expression tag	UNP P51576
B	404	VAL	-	expression tag	UNP P51576
B	405	LEU	-	expression tag	UNP P51576
B	406	PHE	-	expression tag	UNP P51576
B	407	GLN	-	expression tag	UNP P51576
B	408	GLY	-	expression tag	UNP P51576
B	409	PRO	-	expression tag	UNP P51576
B	410	HIS	-	expression tag	UNP P51576
B	411	HIS	-	expression tag	UNP P51576
B	412	HIS	-	expression tag	UNP P51576
B	413	HIS	-	expression tag	UNP P51576
B	414	HIS	-	expression tag	UNP P51576
B	415	HIS	-	expression tag	UNP P51576
B	416	HIS	-	expression tag	UNP P51576
B	417	HIS	-	expression tag	UNP P51576
B	418	HIS	-	expression tag	UNP P51576
B	419	HIS	-	expression tag	UNP P51576
B	420	ASP	-	expression tag	UNP P51576
B	421	TYR	-	expression tag	UNP P51576
B	422	LYS	-	expression tag	UNP P51576
B	423	ASP	-	expression tag	UNP P51576
B	424	ASP	-	expression tag	UNP P51576
B	425	ASP	-	expression tag	UNP P51576
B	426	ASP	-	expression tag	UNP P51576
B	427	LYS	-	expression tag	UNP P51576
C	0	MET	-	initiating methionine	UNP P51576
C	400	LYS	-	expression tag	UNP P51576
C	401	LEU	-	expression tag	UNP P51576
C	402	LEU	-	expression tag	UNP P51576
C	403	GLU	-	expression tag	UNP P51576
C	404	VAL	-	expression tag	UNP P51576
C	405	LEU	-	expression tag	UNP P51576
C	406	PHE	-	expression tag	UNP P51576

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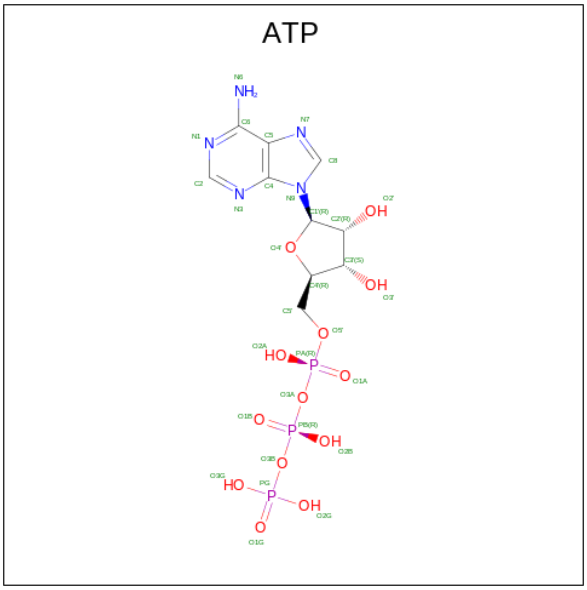
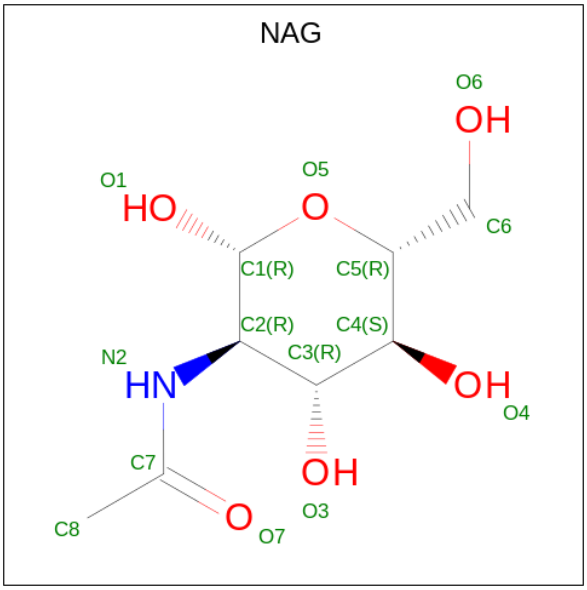
Chain	Residue	Modelled	Actual	Comment	Reference
C	407	GLN	-	expression tag	UNP P51576
C	408	GLY	-	expression tag	UNP P51576
C	409	PRO	-	expression tag	UNP P51576
C	410	HIS	-	expression tag	UNP P51576
C	411	HIS	-	expression tag	UNP P51576
C	412	HIS	-	expression tag	UNP P51576
C	413	HIS	-	expression tag	UNP P51576
C	414	HIS	-	expression tag	UNP P51576
C	415	HIS	-	expression tag	UNP P51576
C	416	HIS	-	expression tag	UNP P51576
C	417	HIS	-	expression tag	UNP P51576
C	418	HIS	-	expression tag	UNP P51576
C	419	HIS	-	expression tag	UNP P51576
C	420	ASP	-	expression tag	UNP P51576
C	421	TYR	-	expression tag	UNP P51576
C	422	LYS	-	expression tag	UNP P51576
C	423	ASP	-	expression tag	UNP P51576
C	424	ASP	-	expression tag	UNP P51576
C	425	ASP	-	expression tag	UNP P51576
C	426	ASP	-	expression tag	UNP P51576
C	427	LYS	-	expression tag	UNP P51576

- Molecule 2 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
2	A	1	Total C N O P 31 10 5 13 3	0
2	B	1	Total C N O P 31 10 5 13 3	0
2	C	1	Total C N O P 31 10 5 13 3	0

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	AltConf
3	A	1	Total C N O 14 8 1 5	0
3	A	1	Total C N O 14 8 1 5	0
3	A	1	Total C N O 14 8 1 5	0
3	B	1	Total C N O 14 8 1 5	0
3	B	1	Total C N O 14 8 1 5	0
3	B	1	Total C N O 14 8 1 5	0
3	C	1	Total C N O 14 8 1 5	0
3	C	1	Total C N O 14 8 1 5	0

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Mol	Chain	Residues	Atoms				AltConf
3	C	1	Total	C	N	O	0
			14	8	1	5	

- Molecule 4 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
4	A	1	Total	Mg	0
			1	1	
4	B	1	Total	Mg	0
			1	1	
4	C	1	Total	Mg	0
			1	1	

- Molecule 5 is CALCIUM ION (CCD ID: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
5	A	1	Total	Ca	0
			1	1	

- Molecule 6 is water.

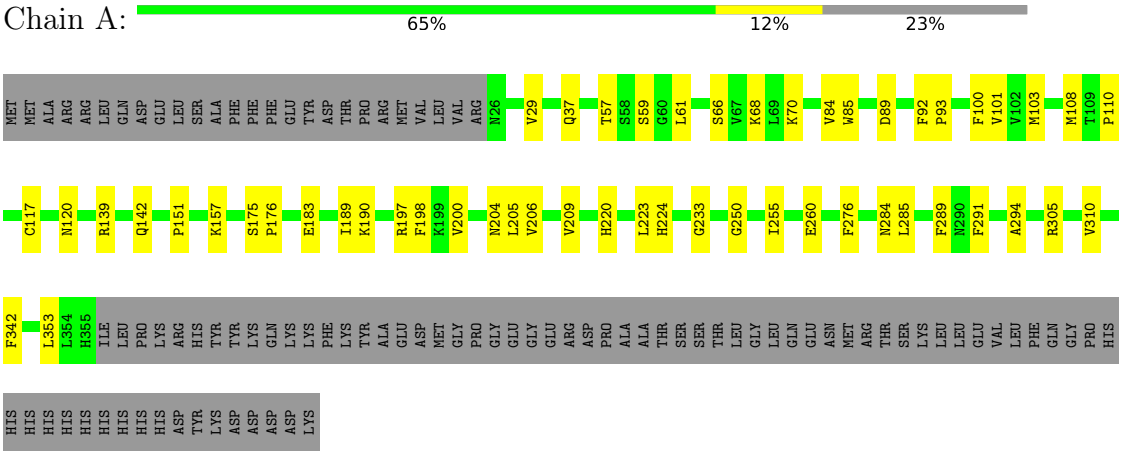
Mol	Chain	Residues	Atoms		AltConf
6	A	2	Total	O	0
			2	2	
6	B	1	Total	O	0
			1	1	
6	C	4	Total	O	0
			4	4	

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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. 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.

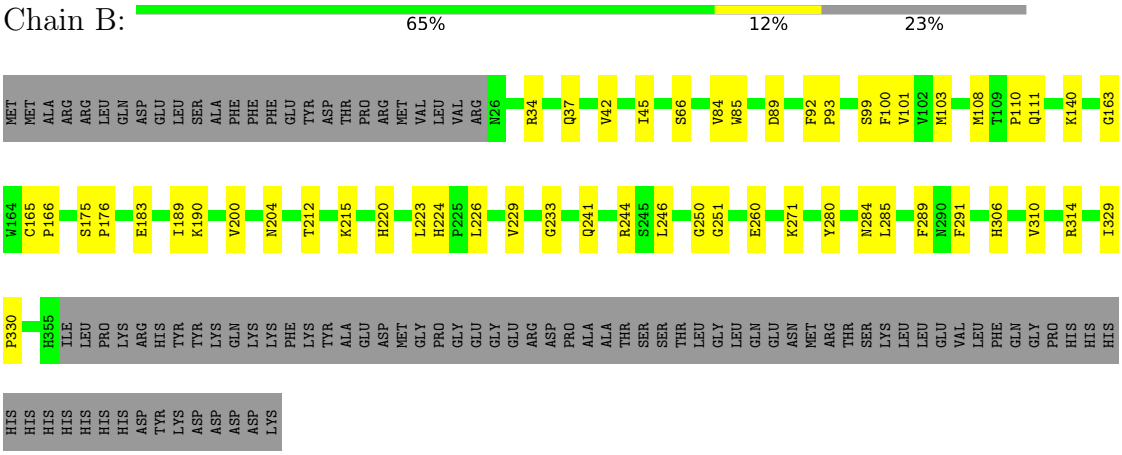
• Molecule 1: P2X purinoceptor 1

Chain A:



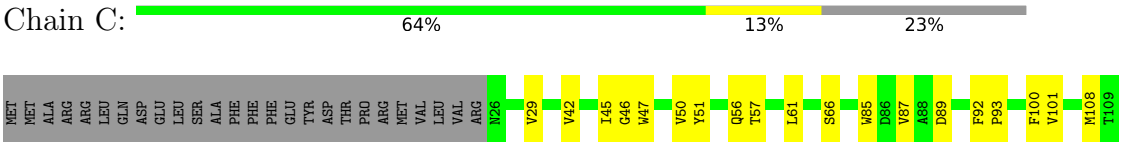
• Molecule 1: P2X purinoceptor 1

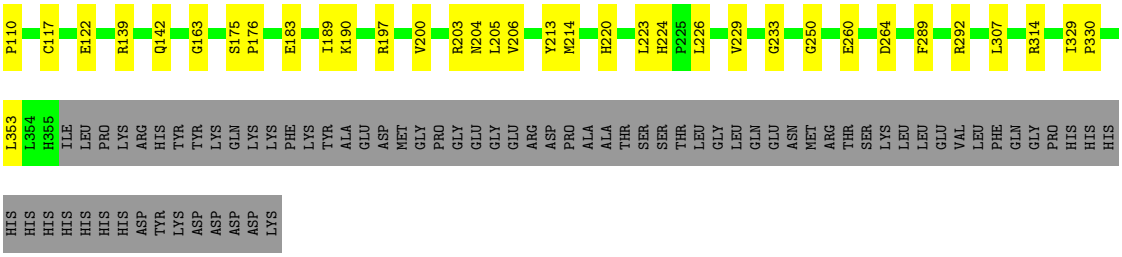
Chain B:



• Molecule 1: P2X purinoceptor 1

Chain C:




P110 C117 E122 R139 Q142 G163 S175 P176 E183 I189 K190 R197 V200 R203 N204 L205 V206 Y213 M214 H220 L223 H224 P225 L226 V229 G233 G250 E260 D264 F289 R292 L307 R314 I329 P330
L353 L354 H355 ILE LEU PRO LYS ARG HIS TYR TYR LYS GLN LYS LYS PHE LYS TYR ALA GLU ASP MET GLY PRO GLY GLU GLY GLU ARG ASP PRO ALA ALA THR SER SER THR LEU GLY LEU GLN GLU ASN MET ARG THR SER LYS LEU LEU GLU VAL LEU PHE GLN GLY PRO HIS HIS HIS
HIS HIS HIS HIS HIS HIS ASP TYR LYS ASP ASP ASP LYS

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	200491	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI POLARA 300	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CA, ATP, MG, NAG

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	0.10	0/2655	0.27	0/3598
1	B	0.11	0/2655	0.28	0/3598
1	C	0.10	0/2655	0.28	0/3598
All	All	0.10	0/7965	0.27	0/10794

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	2588	0	2568	34	0
1	B	2588	0	2568	33	0
1	C	2588	0	2568	32	0
2	A	31	0	12	0	0
2	B	31	0	12	0	0
2	C	31	0	12	0	0
3	A	42	0	39	0	0
3	B	42	0	39	0	0
3	C	42	0	39	0	0
4	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	1	0	0	0	0
4	C	1	0	0	0	0
5	A	1	0	0	0	0
6	A	2	0	0	0	0
6	B	1	0	0	0	0
6	C	4	0	0	0	0
All	All	7994	0	7857	89	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 6.

The worst 5 of 89 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:108:MET:HE2	1:A:110:PRO:HB3	1.78	0.64
1:A:139:ARG:NH2	1:C:214:MET:O	2.32	0.63
1:C:189:ILE:O	1:C:204:ASN:ND2	2.32	0.63
1:B:220:HIS:HD2	1:B:223:LEU:H	1.50	0.59
1:A:189:ILE:O	1:A:204:ASN:ND2	2.35	0.58

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	328/428 (77%)	326 (99%)	2 (1%)	0	100	100
1	B	328/428 (77%)	325 (99%)	3 (1%)	0	100	100
1	C	328/428 (77%)	324 (99%)	4 (1%)	0	100	100
All	All	984/1284 (77%)	975 (99%)	9 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	282/371 (76%)	279 (99%)	3 (1%)	70 83
1	B	282/371 (76%)	281 (100%)	1 (0%)	89 94
1	C	282/371 (76%)	277 (98%)	5 (2%)	54 70
All	All	846/1113 (76%)	837 (99%)	9 (1%)	69 83

5 of 9 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	200	VAL
1	C	260	GLU
1	B	200	VAL
1	C	61	LEU
1	C	87	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 18 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	114	GLN
1	C	277	HIS
1	C	220	HIS
1	B	83	GLN
1	C	83	GLN

5.3.3 RNA

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)

Of 16 ligands modelled in this entry, 4 are monoatomic - leaving 12 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	ATP	C	502	4	26,33,33	0.89	1 (3%)	31,52,52	1.51	6 (19%)
3	NAG	C	505	1	14,14,15	0.32	0	17,19,21	0.42	0
3	NAG	B	504	1	14,14,15	0.21	0	17,19,21	0.43	0
3	NAG	B	503	1	14,14,15	0.22	0	17,19,21	0.43	0
3	NAG	C	504	1	14,14,15	0.20	0	17,19,21	0.43	0
3	NAG	A	503	1	14,14,15	0.22	0	17,19,21	0.42	0
3	NAG	A	502	1	14,14,15	0.22	0	17,19,21	0.45	0
3	NAG	A	504	1	14,14,15	0.32	0	17,19,21	0.40	0
2	ATP	B	502	4	26,33,33	0.89	1 (3%)	31,52,52	1.52	6 (19%)
3	NAG	C	503	1	14,14,15	0.22	0	17,19,21	0.46	0
3	NAG	B	505	1	14,14,15	0.33	0	17,19,21	0.40	0
2	ATP	A	501	4	26,33,33	0.89	1 (3%)	31,52,52	1.52	6 (19%)

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	ATP	C	502	4	-	5/18/38/38	0/3/3/3
3	NAG	C	505	1	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	B	504	1	-	1/6/23/26	0/1/1/1
3	NAG	B	503	1	-	2/6/23/26	0/1/1/1
3	NAG	C	504	1	-	1/6/23/26	0/1/1/1
3	NAG	A	503	1	-	1/6/23/26	0/1/1/1
3	NAG	A	502	1	-	1/6/23/26	0/1/1/1
3	NAG	A	504	1	-	2/6/23/26	0/1/1/1
2	ATP	B	502	4	-	4/18/38/38	0/3/3/3
3	NAG	C	503	1	-	1/6/23/26	0/1/1/1
3	NAG	B	505	1	-	2/6/23/26	0/1/1/1
2	ATP	A	501	4	-	5/18/38/38	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	ATP	C5-C4	2.36	1.47	1.40
2	B	502	ATP	C5-C4	2.36	1.47	1.40
2	C	502	ATP	C5-C4	2.33	1.47	1.40

The worst 5 of 18 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	501	ATP	N3-C2-N1	-3.55	123.13	128.68
2	B	502	ATP	N3-C2-N1	-3.51	123.19	128.68
2	C	502	ATP	N3-C2-N1	-3.50	123.21	128.68
2	B	502	ATP	C3'-C2'-C1'	3.03	105.55	100.98
2	C	502	ATP	PA-O3A-PB	-3.02	122.45	132.83

There are no chirality outliers.

5 of 27 torsion outliers are listed below:

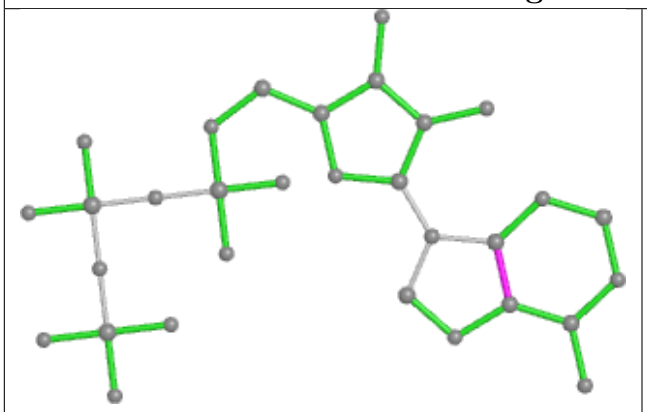
Mol	Chain	Res	Type	Atoms
2	A	501	ATP	C5'-O5'-PA-O2A
2	B	502	ATP	C5'-O5'-PA-O2A
2	C	502	ATP	C5'-O5'-PA-O2A
3	B	503	NAG	C4-C5-C6-O6
3	B	503	NAG	O5-C5-C6-O6

There are no ring outliers.

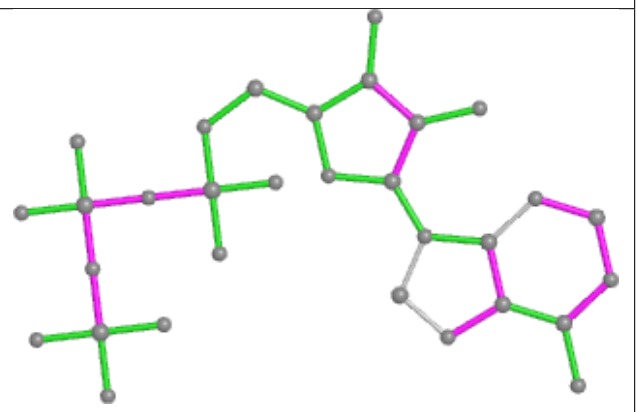
No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

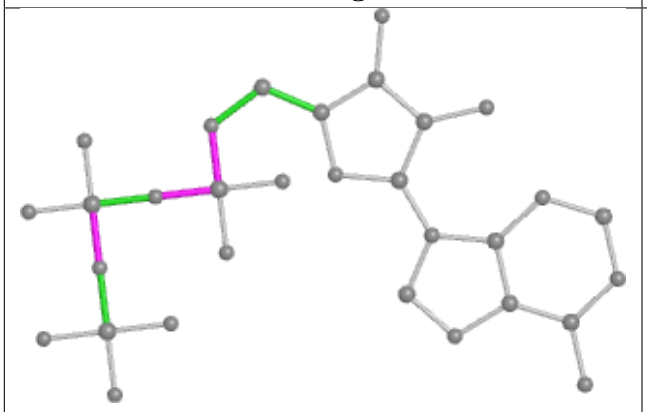
Ligand ATP C 502



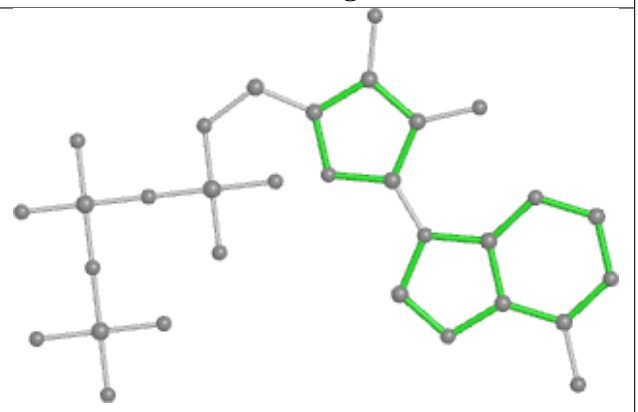
Bond lengths



Bond angles

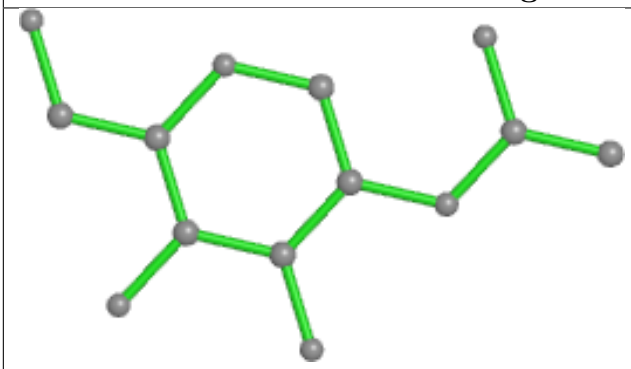


Torsions



Rings

Ligand NAG C 505



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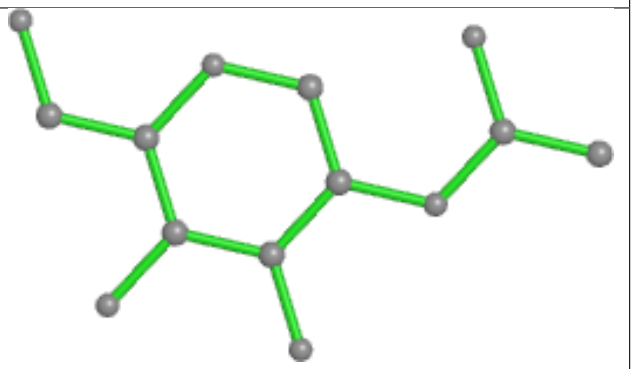
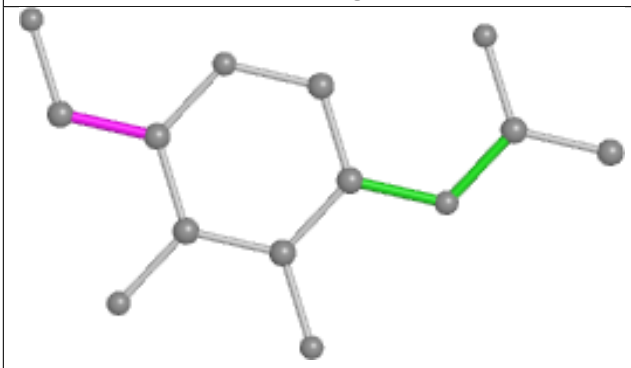


Bond angles



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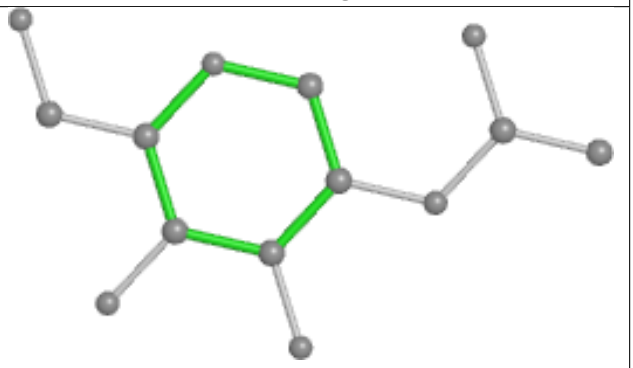
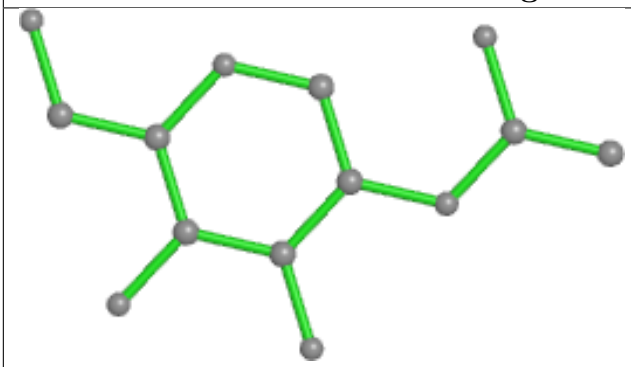


Rings

Ligand NAG B 504



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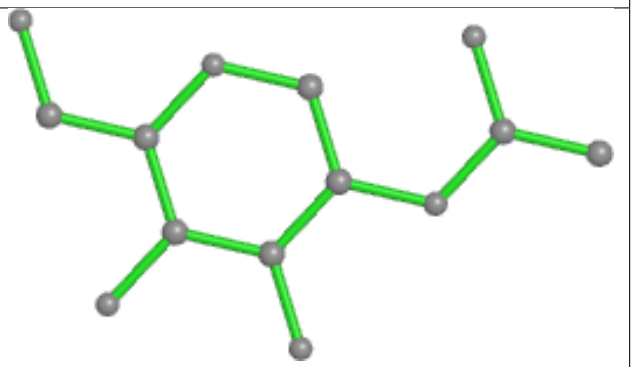
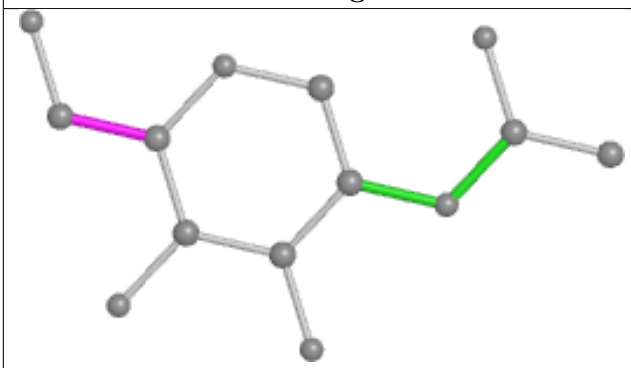
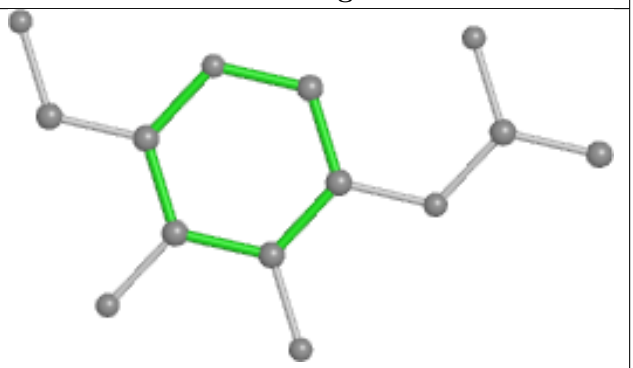


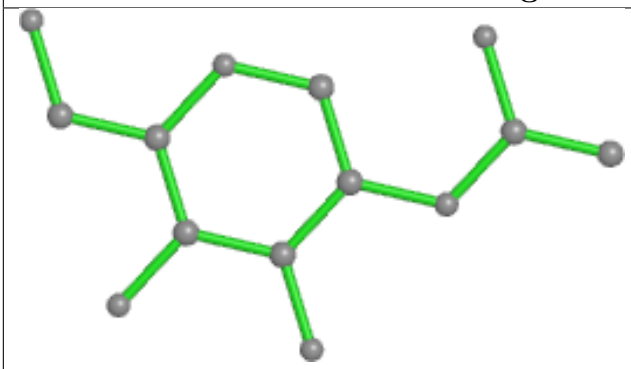
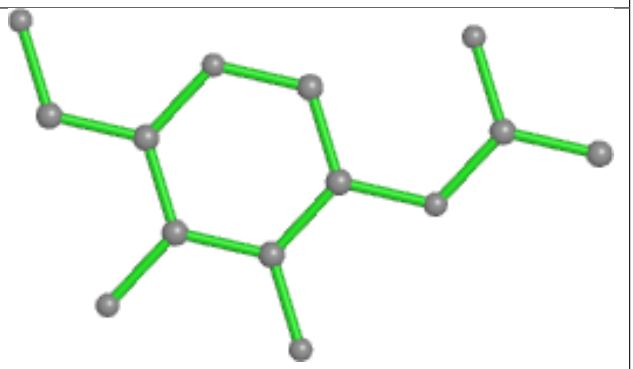
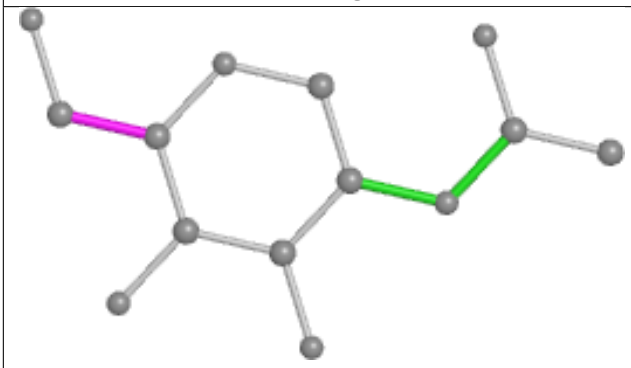
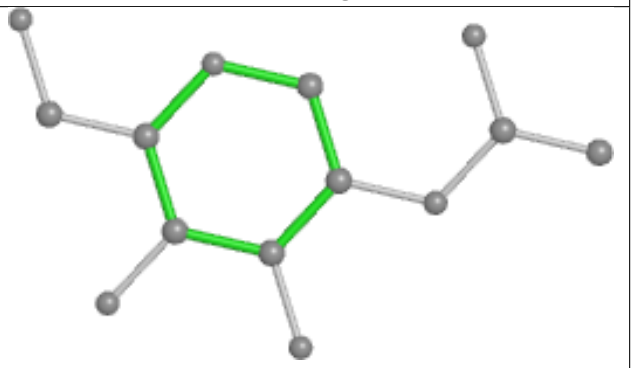
Bond angles

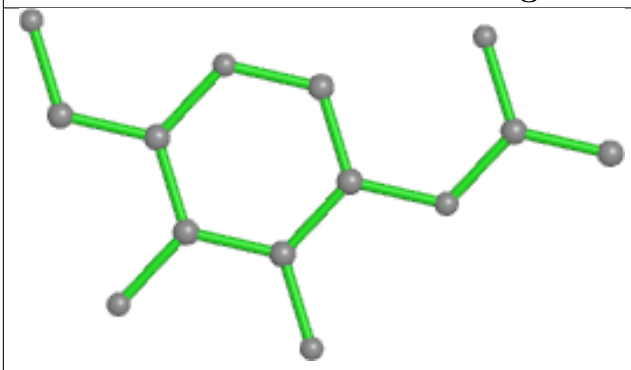
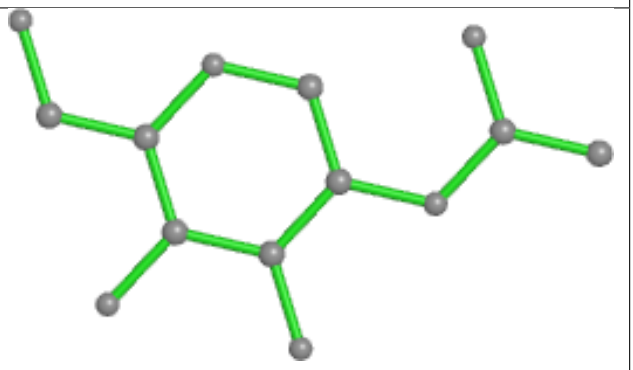
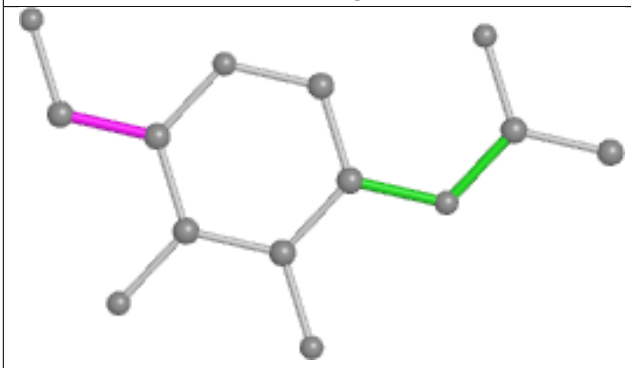
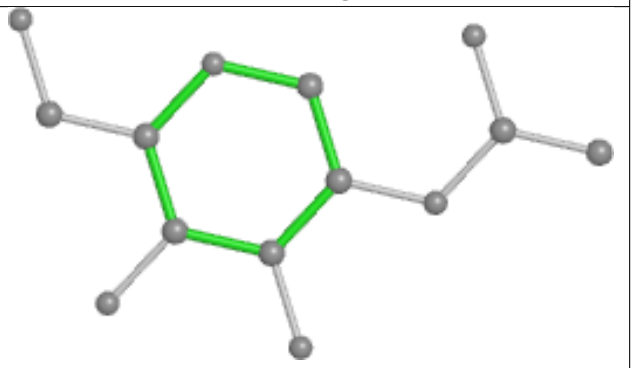


Torsions

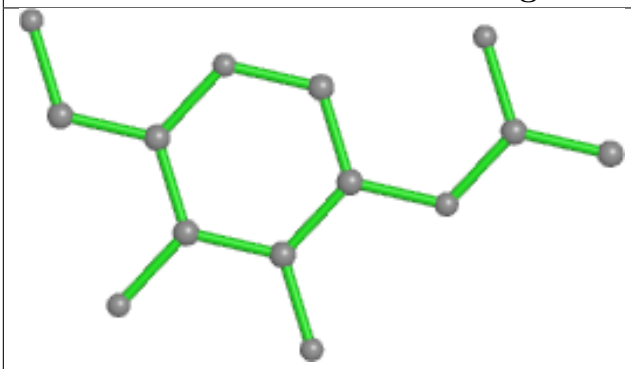


Rings

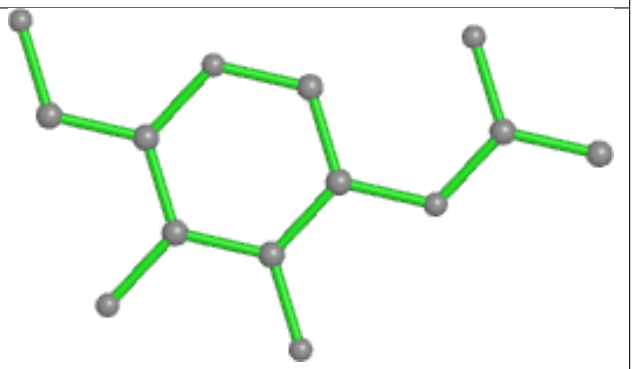
Ligand NAG B 503	
	
Bond lengths	Bond angles
	
Torsions	Rings

Ligand NAG C 504	
	
Bond lengths	Bond angles
	
Torsions	Rings

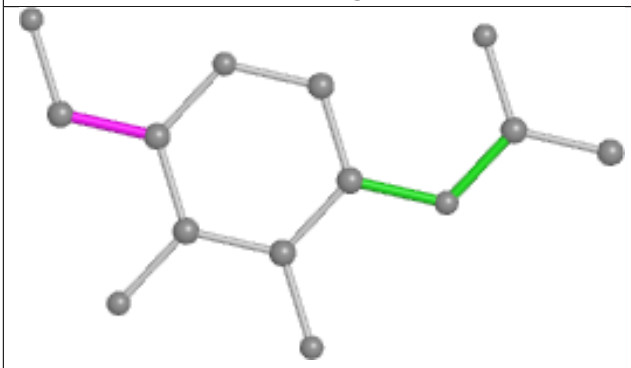
Ligand NAG A 503



Bond lengths



Bond angles



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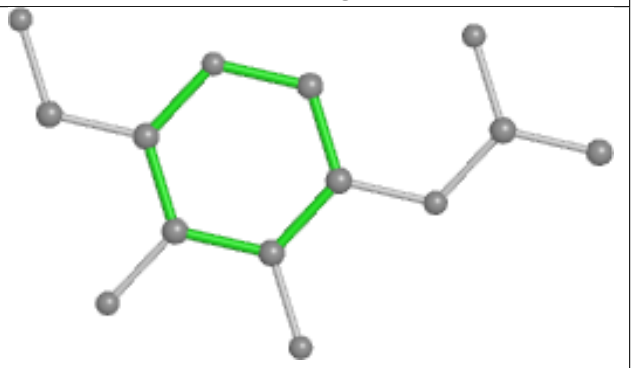

Rings

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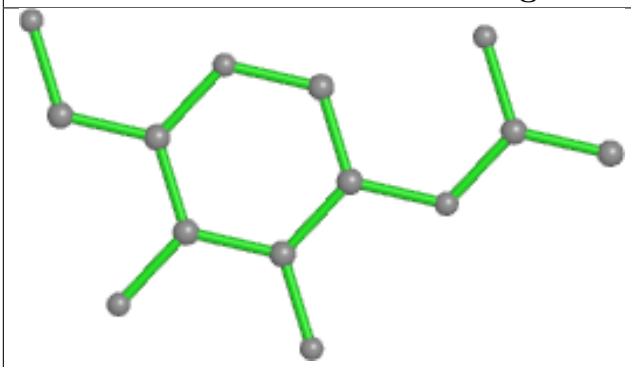

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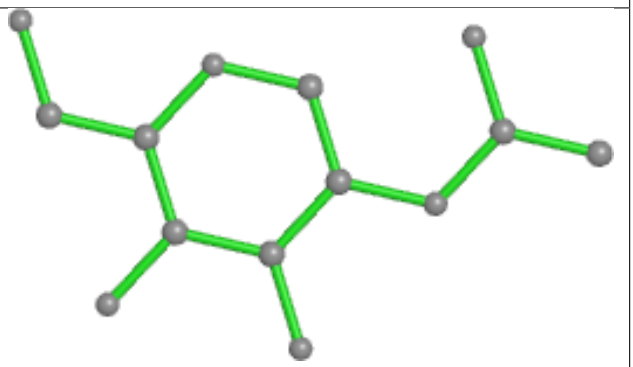

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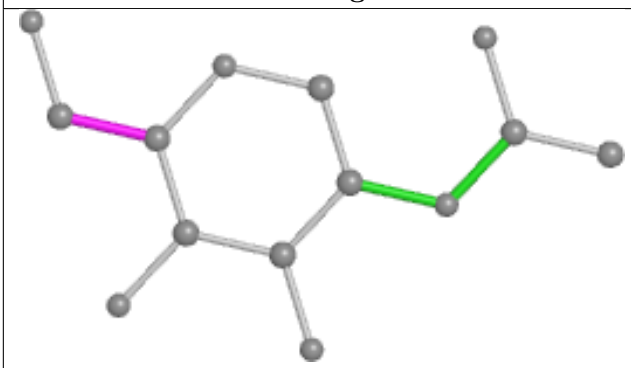

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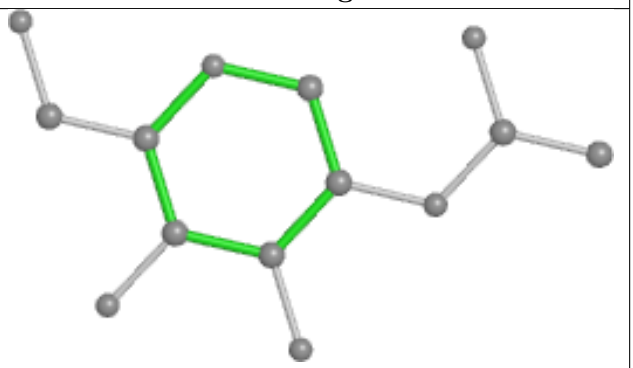

Rings

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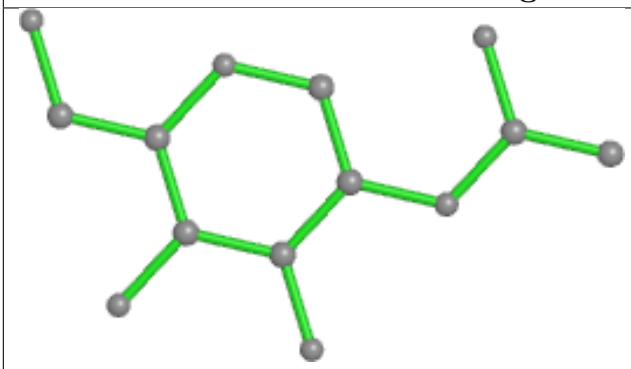

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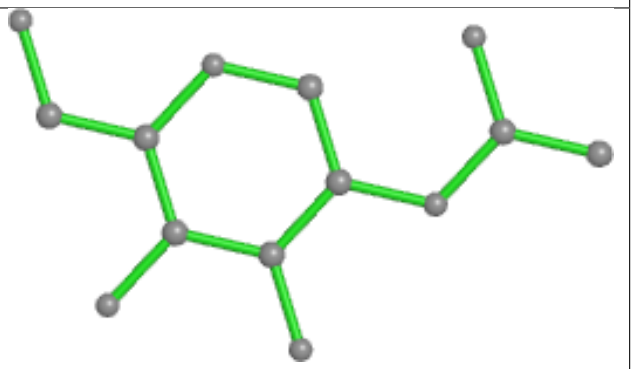

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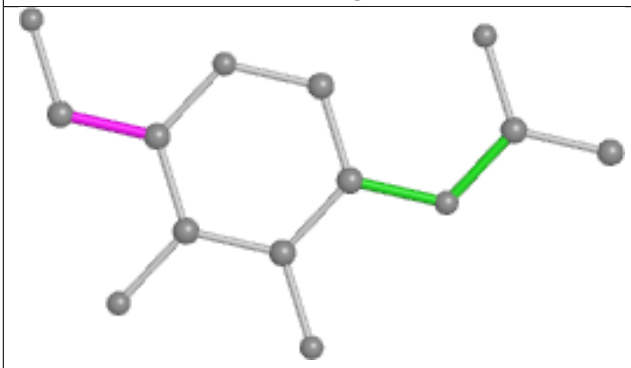
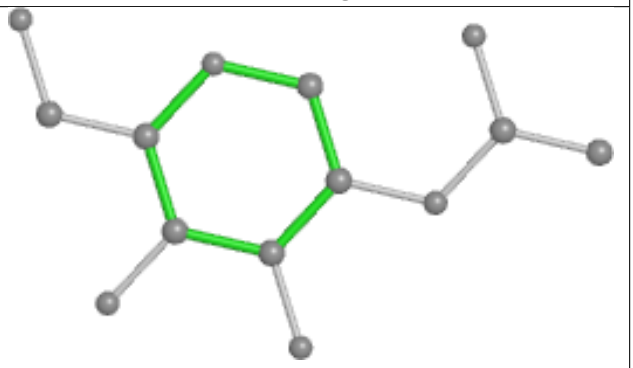
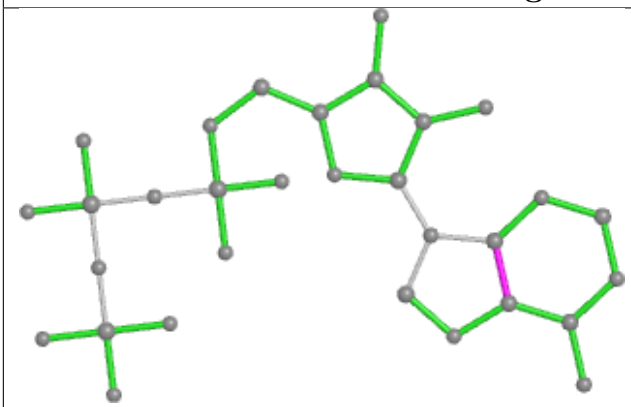


Torsions



Rings

Ligand ATP B 502



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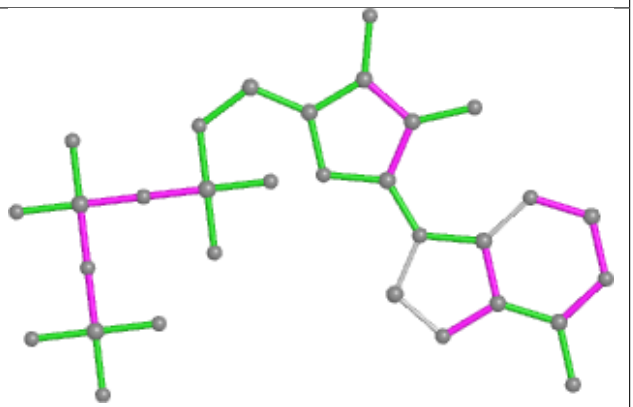
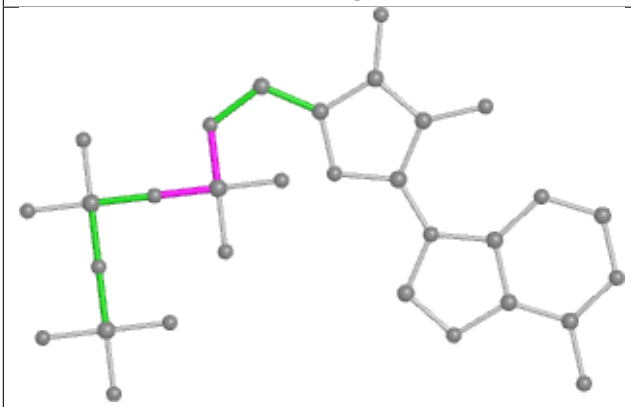


Bond angles



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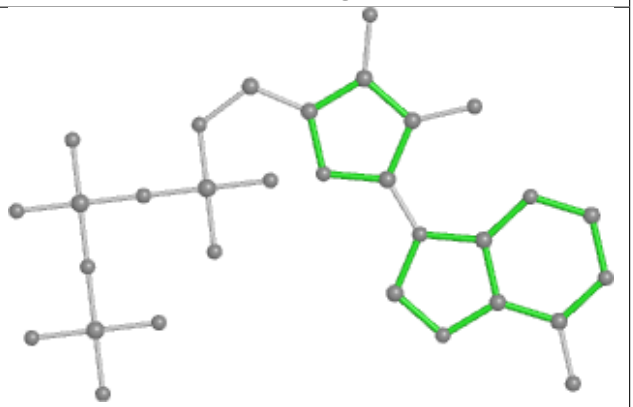
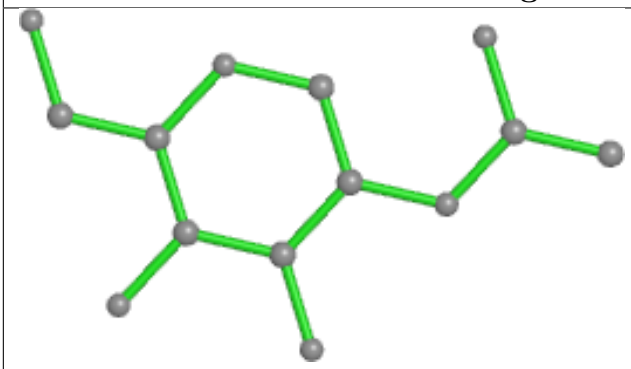


Rings

Ligand NAG C 503



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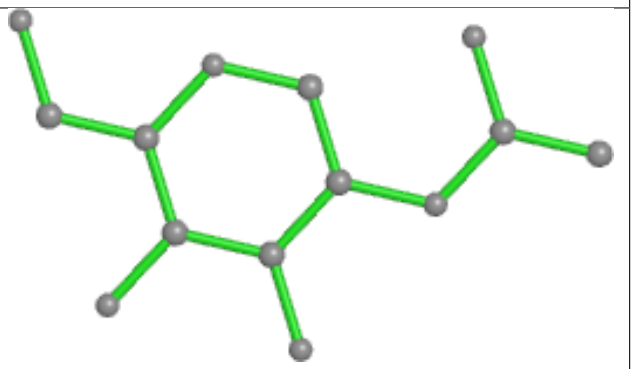
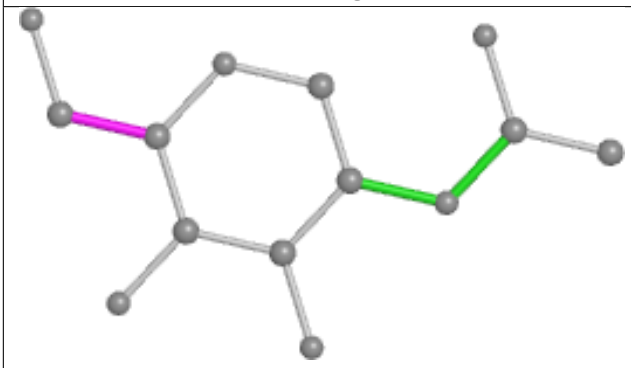


Bond angles



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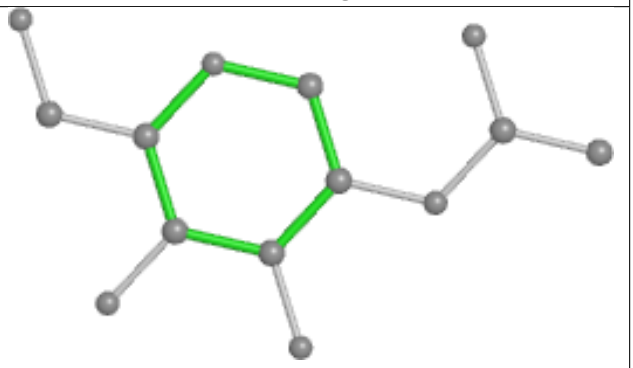
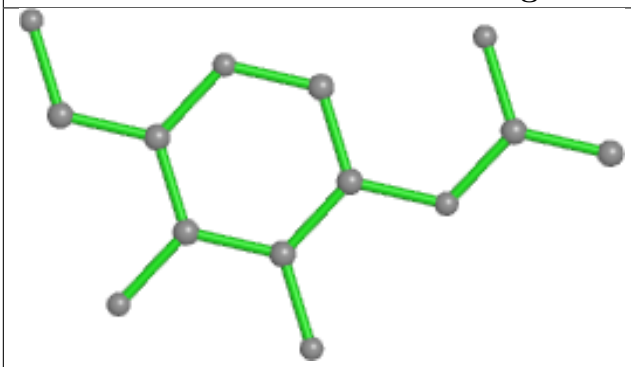


Rings

Ligand NAG B 505



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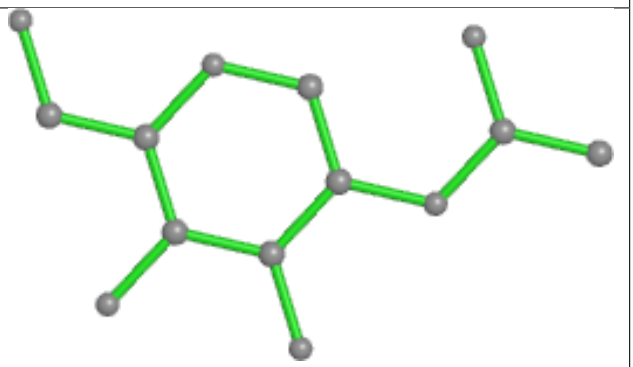
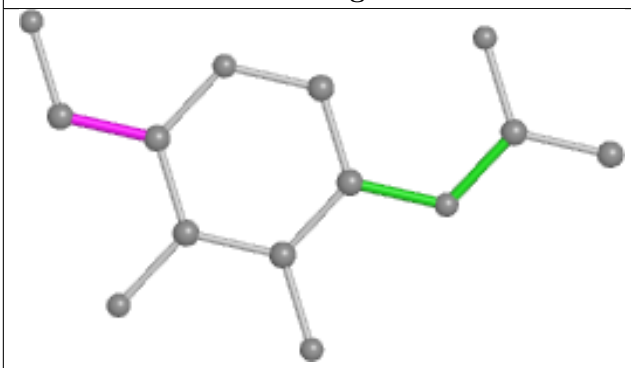


Bond angles



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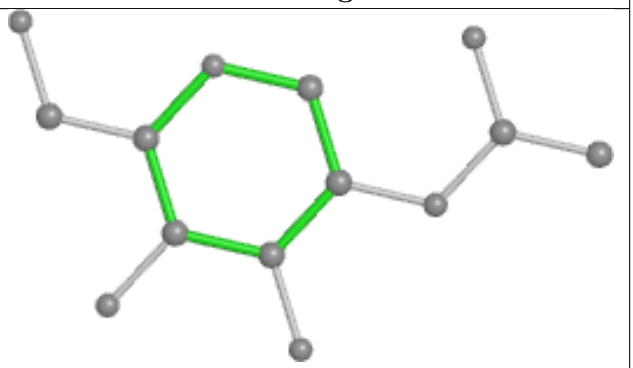
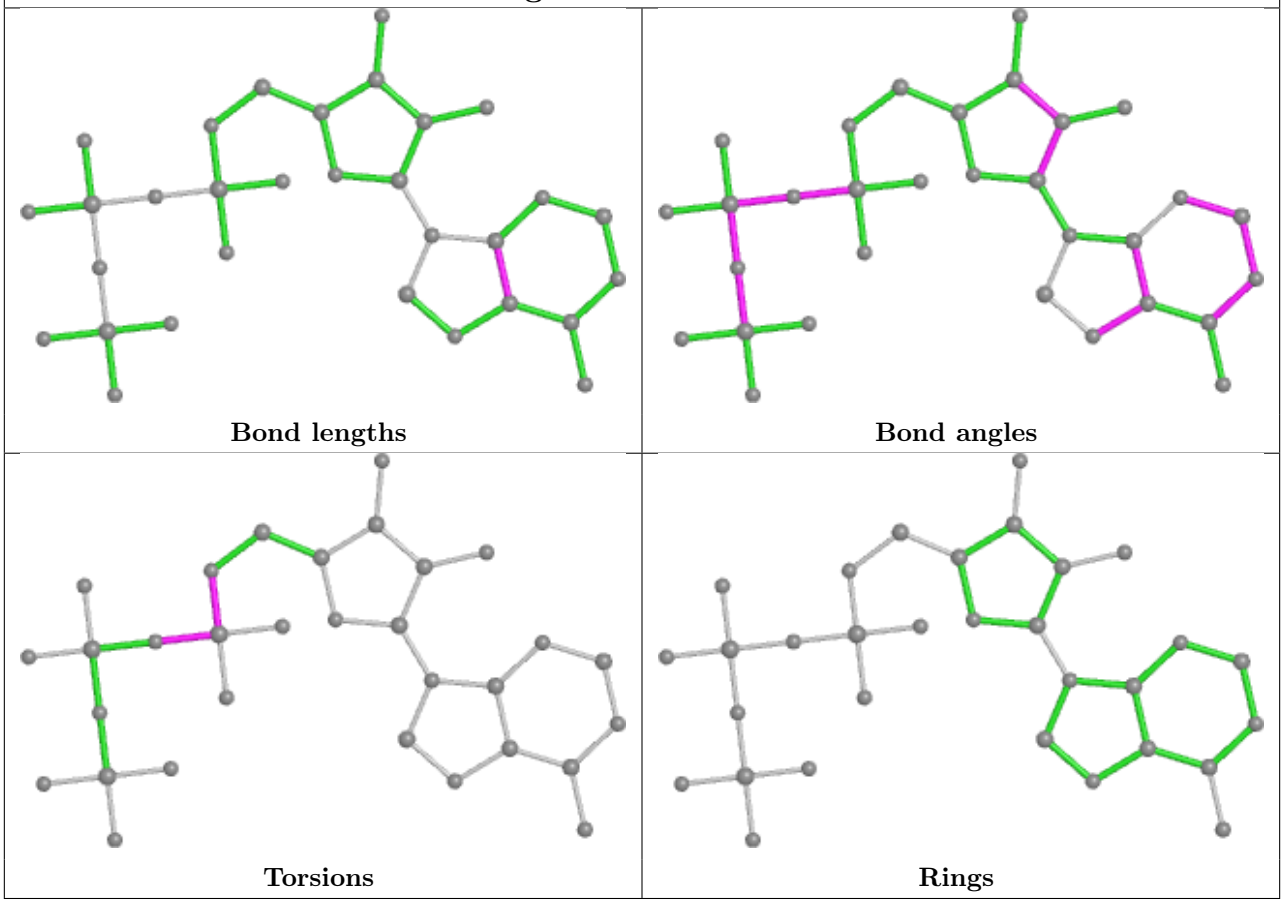


Rings

Ligand ATP A 501



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.