Full wwPDB X-ray Structure Validation Report ⓘ

May 7, 2025 – 12:29 AM JST

PDB ID	:	8X28 / pdb_00008x28
Title	:	Crystal structure of H5 hemagglutinin from human-infecting H5N8 influenza virus
Authors	:	Jin, X.Y.; Han, P.; Song, H.; Qi, J.X.
Deposited on	:	2023-11-09
Resolution	:	3.19 Å(reported)

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

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

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

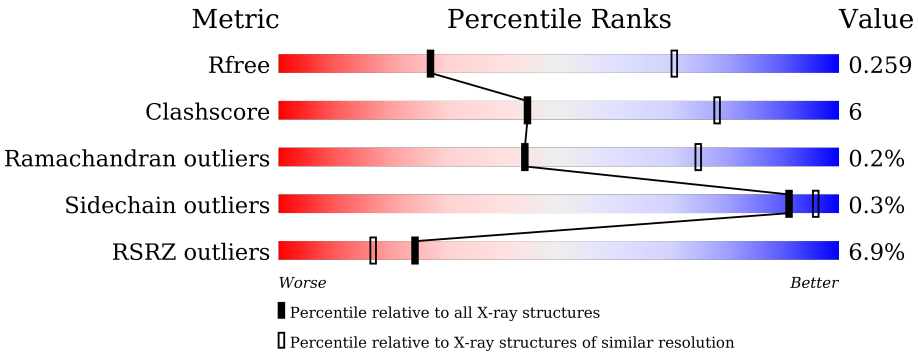
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.19 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	1370 (3.20-3.20)
Clashscore	180529	1497 (3.20-3.20)
Ramachandran outliers	177936	1479 (3.20-3.20)
Sidechain outliers	177891	1478 (3.20-3.20)
RSRZ outliers	164620	1371 (3.20-3.20)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=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	506	8% 80% 15% .
1	B	506	7% 78% 19% .
1	C	506	4% 80% 16% .
1	D	506	6% 80% 15% .
1	E	506	6% 86% 10% .
1	F	506	9% 82% 14% .

2 Entry composition

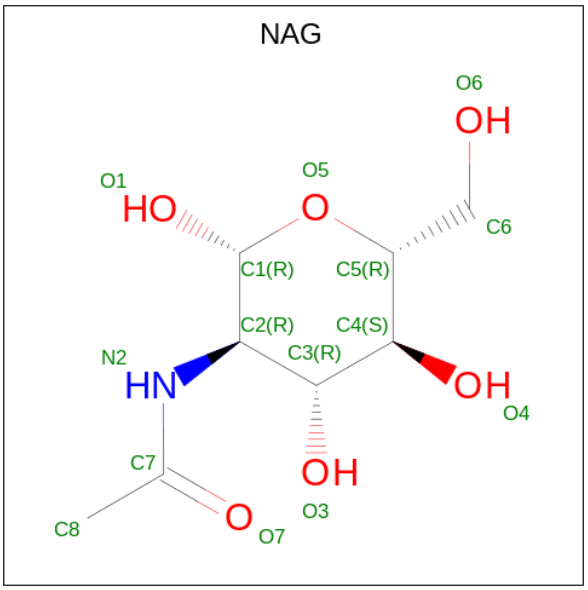
There are 2 unique types of molecules in this entry. The entry contains 23525 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Hemagglutinin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	485	Total	C	N	O	S	0	0	0
			3883	2441	676	744	22			
1	C	484	Total	C	N	O	S	0	0	0
			3878	2438	675	743	22			
1	D	484	Total	C	N	O	S	0	0	0
			3878	2438	675	743	22			
1	B	491	Total	C	N	O	S	0	0	0
			3923	2469	682	750	22			
1	E	485	Total	C	N	O	S	0	0	0
			3883	2441	676	744	22			
1	F	485	Total	C	N	O	S	0	0	0
			3884	2442	676	744	22			

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

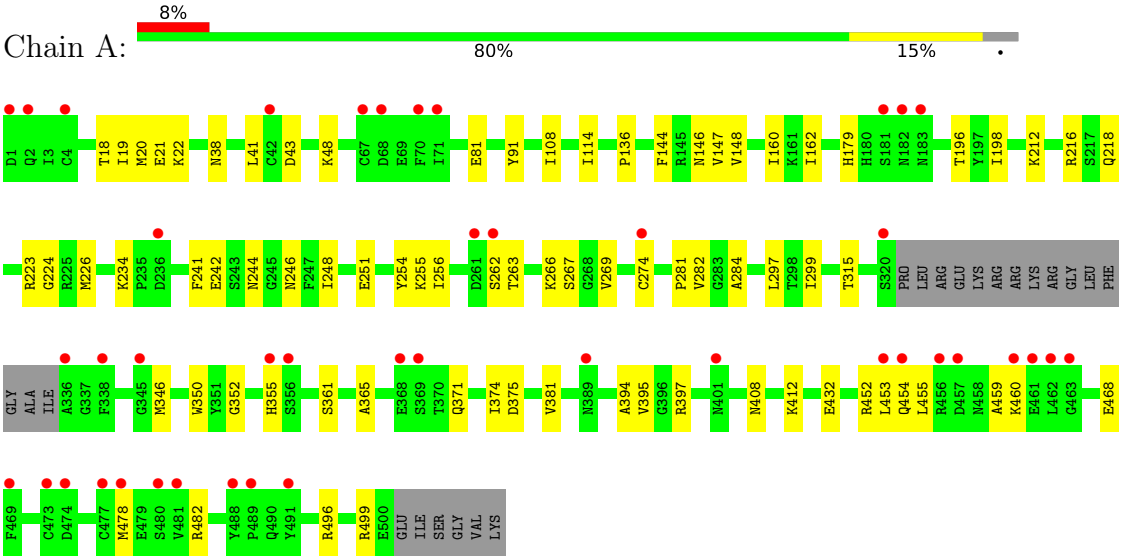


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	C	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	D	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	E	1	Total	C	N	O	0	0
			14	8	1	5		
2	E	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		
2	F	1	Total	C	N	O	0	0
			14	8	1	5		

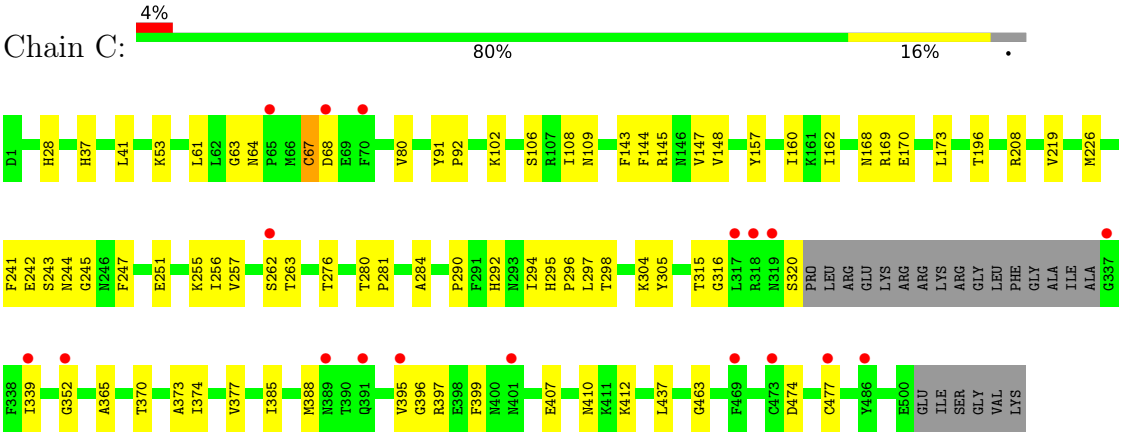
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

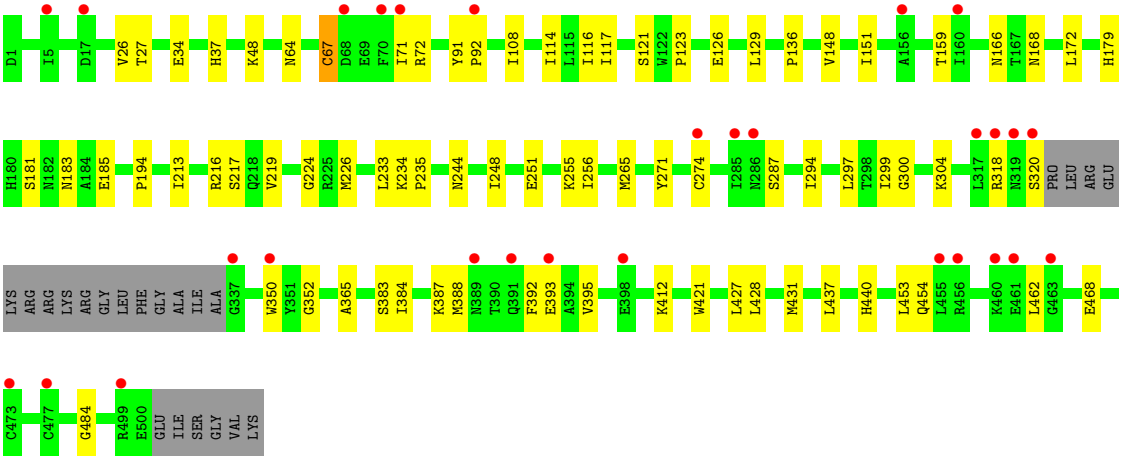
• Molecule 1: Hemagglutinin



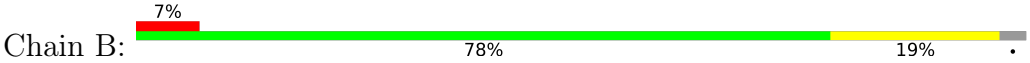
• Molecule 1: Hemagglutinin

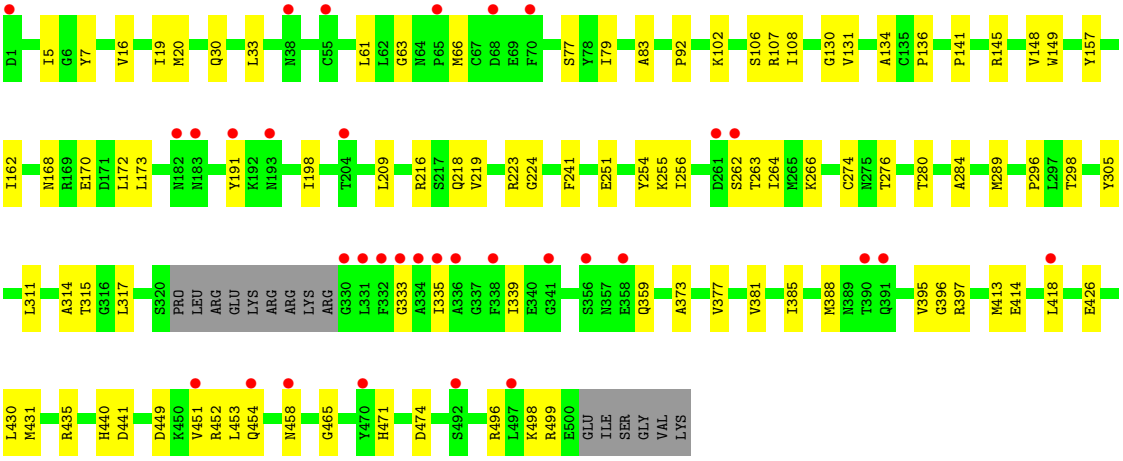


• Molecule 1: Hemagglutinin

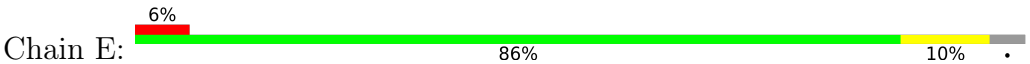


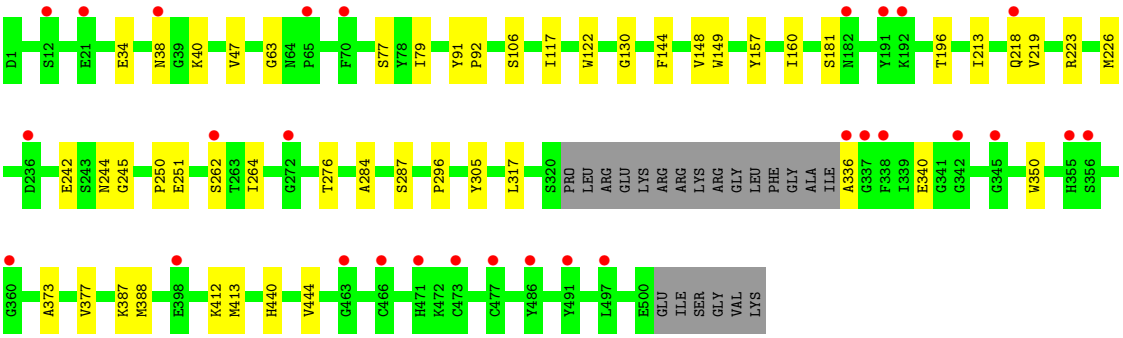
• Molecule 1: Hemagglutinin



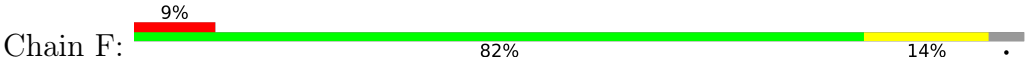


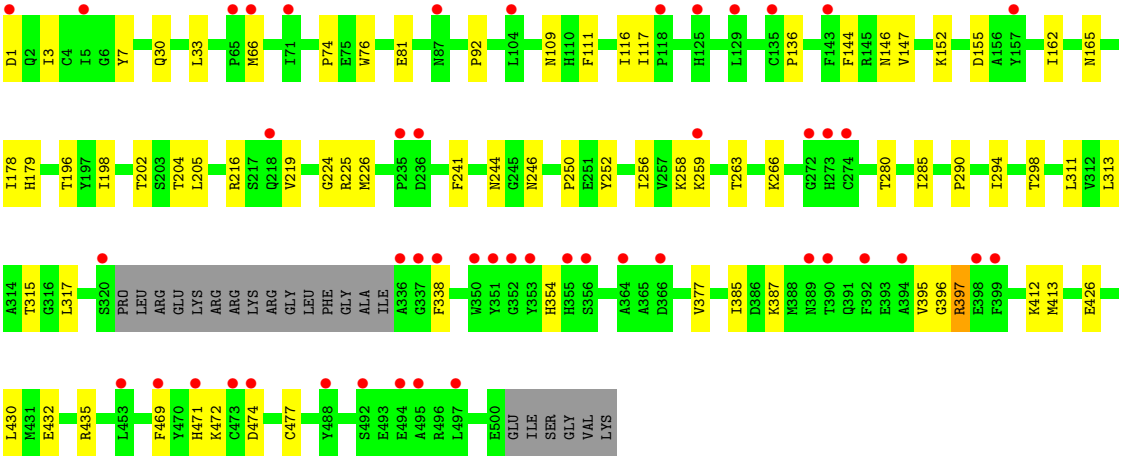
• Molecule 1: Hemagglutinin





• Molecule 1: Hemagglutinin




D1 Q2 I3 C4 I5 G6 Y7 Q30 L33 P65 M66 I71 P74 E75 W76 E81 N87 P92 L104 N109 H110 F111 I116 I117 P118 H125 L129 C135 P136 F143 F144 R145 N146 V147 K152 D155 A156 Y157 I162 N165
I178 H179 T196 Y197 I198 T202 S203 T204 L205 R216 S217 Q218 V219 G224 R225 M226 P235 D236 F241 N244 G245 N246 P250 E251 Y252 I256 V257 K258 K259 T263 K266 G272 H273 C274 T280 I285 P290 I294 T298 L311 V312 L313
A314 T315 G316 L317 S320 PRO LEU ARG GLU LYS ARG ARG LYS ARG GLY LEU PHE GLY ALA ILE A336 G337 F338 W350 Y351 G352 Y353 H354 H355 S356 A364 A365 D366 V377 I385 D386 K387 N388 N389 T390 Q391 F392 E393 A394 V395 G396 R397 E398 F399 K412 M413 E426
L430 M431 E432 R435 L453 F469 Y470 H471 K472 C473 D474 C477 Y488 S492 E493 E494 A495 R496 L497 E500 GLU ILE SER GLY VAL LYS

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	72.93Å 267.38Å 131.19Å 90.00° 99.46° 90.00°	Depositor
Resolution (Å)	32.04 – 3.19 32.04 – 3.19	Depositor EDS
% Data completeness (in resolution range)	99.6 (32.04-3.19) 88.0 (32.04-3.19)	Depositor EDS
R_{merge}	0.35	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.79 (at 3.19Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.242 , 0.259 0.242 , 0.259	Depositor DCC
R_{free} test set	80027 reflections (2.42%)	wwPDB-VP
Wilson B-factor (Å^2)	48.2	Xtriage
Anisotropy	0.107	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 59.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.46$, $< L^2 > = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.84	EDS
Total number of atoms	23525	wwPDB-VP
Average B, all atoms (Å^2)	77.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.51% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 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	0.17	0/3972	0.41	0/5379
1	B	0.12	0/4013	0.34	0/5434
1	C	0.16	0/3967	0.40	0/5372
1	D	0.14	0/3967	0.35	0/5372
1	E	0.12	0/3972	0.32	0/5379
1	F	0.17	0/3973	0.39	0/5381
All	All	0.15	0/23864	0.37	0/32317

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	3883	0	3738	50	0
1	B	3923	0	3779	61	0
1	C	3878	0	3732	51	0
1	D	3878	0	3733	50	0
1	E	3883	0	3738	31	0
1	F	3884	0	3742	50	0
2	A	28	0	26	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	42	0	39	0	0
2	C	42	0	39	0	0
2	D	28	0	26	0	0
2	E	28	0	26	0	0
2	F	28	0	26	0	0
All	All	23525	0	22644	273	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.

All (273) 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:E:47:VAL:HG23	1:E:77:SER:HB3	1.62	0.81
1:B:397:ARG:HH22	1:F:412:LYS:HB2	1.47	0.78
1:A:41:LEU:HG	1:A:269:VAL:HG23	1.68	0.75
1:A:412:LYS:HG3	1:C:397:ARG:HH21	1.52	0.74
1:B:263:THR:HG21	1:B:396:GLY:H	1.54	0.73
1:B:7:TYR:HB2	1:B:317:LEU:HD13	1.71	0.72
1:C:64:ASN:HB3	1:C:67:CYS:HB2	1.71	0.72
1:E:276:THR:HG21	1:E:284:ALA:HB1	1.74	0.70
1:F:263:THR:HG21	1:F:396:GLY:H	1.56	0.69
1:B:276:THR:HG21	1:B:284:ALA:HB1	1.75	0.69
1:B:333:GLY:HA3	1:B:441:ASP:HB3	1.75	0.68
1:B:216:ARG:HH21	1:B:224:GLY:HA2	1.58	0.68
1:C:61:LEU:HD21	1:C:173:LEU:HD21	1.76	0.67
1:D:320:SER:HB3	1:D:437:LEU:HD13	1.77	0.67
1:F:469:PHE:HB3	1:F:471:HIS:O	1.94	0.67
1:A:452:ARG:HG2	1:A:453:LEU:H	1.60	0.66
1:B:395:VAL:HG22	1:F:412:LYS:HE2	1.77	0.66
1:A:216:ARG:HH21	1:A:224:GLY:HA2	1.60	0.65
1:E:79:ILE:HB	1:E:264:ILE:HD13	1.79	0.64
1:C:280:THR:HG22	1:C:298:THR:HG22	1.79	0.64
1:F:109:ASN:HB2	1:F:258:LYS:HB2	1.81	0.62
1:A:148:VAL:HG13	1:A:251:GLU:HB2	1.81	0.62
1:C:263:THR:HG21	1:C:396:GLY:H	1.63	0.62
1:D:71:ILE:HG22	1:D:72:ARG:HG2	1.80	0.62
1:F:432:GLU:HA	1:F:435:ARG:HD2	1.82	0.61
1:F:216:ARG:HH21	1:F:224:GLY:HA2	1.65	0.61
1:E:218:GLN:HE21	1:E:223:ARG:HH11	1.49	0.61
1:E:148:VAL:HG23	1:E:251:GLU:HB2	1.83	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:460:LYS:HB3	1:A:468:GLU:HB3	1.82	0.60
1:A:397:ARG:NH2	1:D:412:LYS:HG3	2.17	0.60
1:C:315:THR:HA	1:C:377:VAL:HG11	1.83	0.59
1:D:64:ASN:HB3	1:D:67:CYS:HB2	1.84	0.59
1:B:92:PRO:HB3	1:B:219:VAL:HG13	1.83	0.59
1:D:26:VAL:HA	1:D:318:ARG:HB3	1.83	0.59
1:C:276:THR:HG21	1:C:284:ALA:HB1	1.84	0.58
1:D:159:THR:HG22	1:D:244:ASN:HB3	1.86	0.58
1:B:5:ILE:HD11	1:B:451:VAL:HG21	1.86	0.58
1:C:162:ILE:HG22	1:C:241:PHE:HB2	1.86	0.57
1:A:397:ARG:HH22	1:D:412:LYS:HG3	1.69	0.57
1:B:280:THR:HG22	1:B:298:THR:HG22	1.86	0.57
1:F:33:LEU:HB2	1:F:311:LEU:HB2	1.86	0.57
1:C:196:THR:HG22	1:C:244:ASN:HB3	1.86	0.56
1:F:315:THR:HA	1:F:377:VAL:HG11	1.87	0.56
1:D:114:ILE:HG21	1:D:255:LYS:HE3	1.88	0.56
1:A:408:ASN:OD1	1:C:395:VAL:HG21	2.06	0.56
1:C:320:SER:HA	1:C:437:LEU:HD13	1.87	0.56
1:B:452:ARG:C	1:B:454:GLN:H	2.14	0.56
1:B:16:VAL:HG21	1:B:314:ALA:HB2	1.87	0.55
1:F:7:TYR:HB2	1:F:317:LEU:HD13	1.88	0.55
1:D:108:ILE:HD12	1:D:256:ILE:HG23	1.88	0.55
1:C:68:ASP:OD2	1:C:145:ARG:HG3	2.06	0.55
1:A:218:GLN:HB3	1:A:223:ARG:HG2	1.88	0.55
1:A:394:ALA:HA	1:D:412:LYS:HE3	1.88	0.55
1:D:166:ASN:HB2	1:D:233:LEU:HD23	1.89	0.54
1:D:216:ARG:HH21	1:D:224:GLY:HA2	1.71	0.54
1:A:108:ILE:HD12	1:A:256:ILE:HG23	1.89	0.54
1:A:299:ILE:HG23	1:A:395:VAL:HG12	1.90	0.54
1:D:234:LYS:HD3	1:D:235:PRO:HD3	1.90	0.54
1:F:162:ILE:HG22	1:F:241:PHE:HB2	1.89	0.54
1:A:263:THR:HB	1:A:395:VAL:HB	1.90	0.54
1:C:109:ASN:HB3	1:C:257:VAL:HG23	1.90	0.54
1:A:19:ILE:HG23	1:A:20:MET:HG3	1.90	0.54
1:E:336:ALA:HB3	1:E:340:GLU:HG3	1.90	0.54
1:D:462:LEU:HD21	1:D:468:GLU:HB2	1.90	0.53
1:A:371:GLN:HA	1:A:374:ILE:HG12	1.90	0.53
1:B:162:ILE:HG23	1:B:241:PHE:HB2	1.91	0.53
1:E:63:GLY:O	1:E:144:PHE:HD1	1.92	0.53
1:A:160:ILE:O	1:A:242:GLU:HA	2.08	0.53
1:F:1:ASP:HB2	1:F:472:LYS:HG2	1.91	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:148:VAL:HG23	1:C:251:GLU:HB2	1.91	0.53
1:D:37:HIS:HB3	1:D:294:ILE:HD13	1.89	0.53
1:F:280:THR:HG22	1:F:298:THR:HG22	1.91	0.53
1:A:81:GLU:O	1:A:266:LYS:HA	2.09	0.52
1:B:61:LEU:HD21	1:B:173:LEU:HD21	1.92	0.52
1:A:455:LEU:HD13	1:A:459:ALA:HB3	1.91	0.52
1:C:168:ASN:HB3	1:C:255:LYS:HE2	1.90	0.52
1:D:27:THR:HG23	1:D:318:ARG:HB2	1.92	0.52
1:C:91:TYR:CD1	1:C:226:MET:HG3	2.45	0.52
1:D:454:GLN:HE22	1:D:484:GLY:HA2	1.74	0.52
1:B:452:ARG:HG2	1:B:453:LEU:H	1.74	0.52
1:C:399:PHE:HB2	1:C:407:GLU:HG3	1.92	0.51
1:B:106:SER:HB2	1:B:262:SER:O	2.10	0.51
1:D:92:PRO:HB3	1:D:219:VAL:HG13	1.91	0.51
1:C:28:HIS:H	1:C:316:GLY:HA3	1.76	0.51
1:C:463:GLY:HA2	1:D:453:LEU:HD13	1.93	0.51
1:F:81:GLU:O	1:F:266:LYS:HA	2.10	0.51
1:F:290:PRO:HG3	1:F:385:ILE:HA	1.92	0.50
1:C:160:ILE:O	1:C:242:GLU:HA	2.10	0.50
1:B:414:GLU:O	1:B:418:LEU:HG	2.10	0.50
1:B:102:LYS:HE2	1:B:264:ILE:HG13	1.94	0.50
1:B:77:SER:HA	1:B:107:ARG:HD3	1.92	0.50
1:D:48:LYS:HE2	1:D:271:TYR:CE2	2.46	0.50
1:B:296:PRO:HG3	1:B:305:TYR:CE2	2.47	0.50
1:A:355:HIS:O	1:A:361:SER:HA	2.12	0.50
1:F:202:THR:HG23	1:F:204:THR:H	1.76	0.50
1:F:3:ILE:HB	1:F:469:PHE:CZ	2.47	0.49
1:C:397:ARG:HH11	1:C:410:ASN:HD21	1.58	0.49
1:D:181:SER:HB2	1:D:213:ILE:HG12	1.93	0.49
1:D:383:SER:O	1:D:387:LYS:HB2	2.12	0.49
1:B:311:LEU:HD21	1:B:426:GLU:HG2	1.93	0.49
1:A:38:ASN:ND2	1:A:284:ALA:HB3	2.28	0.49
1:D:183:ASN:ND2	1:D:185:GLU:HB3	2.28	0.49
1:A:38:ASN:HD21	1:A:284:ALA:HB3	1.76	0.49
1:A:91:TYR:CD1	1:A:226:MET:HG3	2.48	0.49
1:D:91:TYR:CD1	1:D:226:MET:HG3	2.48	0.49
1:A:452:ARG:C	1:A:454:GLN:H	2.21	0.48
1:D:265:MET:HE3	1:D:299:ILE:HD12	1.94	0.48
1:C:169:ARG:O	1:C:169:ARG:HG2	2.13	0.48
1:B:458:ASN:HB3	1:B:471:HIS:CD2	2.48	0.48
1:F:258:LYS:HG3	1:F:259:LYS:H	1.79	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:114:ILE:HG21	1:A:255:LYS:HE3	1.94	0.48
1:A:212:LYS:HD3	1:C:208:ARG:HB2	1.96	0.48
1:D:148:VAL:HG23	1:D:251:GLU:HB2	1.95	0.48
1:E:440:HIS:O	1:E:444:VAL:HG23	2.14	0.48
1:D:121:SER:C	1:D:123:PRO:HD3	2.38	0.48
1:C:144:PHE:HB2	1:C:147:VAL:HG12	1.95	0.47
1:D:388:MET:HE1	1:D:421:TRP:CH2	2.49	0.47
1:B:198:ILE:HB	1:B:209:LEU:HB2	1.96	0.47
1:A:315:THR:HG22	1:A:381:VAL:HG21	1.96	0.47
1:D:34:GLU:HG2	1:D:287:SER:HB2	1.95	0.47
1:B:435:ARG:HE	1:F:435:ARG:NH2	2.13	0.47
1:E:157:TYR:CZ	1:E:245:GLY:HA2	2.50	0.47
1:B:30:GLN:HE21	1:B:289:MET:HE1	1.80	0.47
1:F:395:VAL:HG23	1:F:396:GLY:O	2.14	0.47
1:E:317:LEU:HD11	1:E:350:TRP:CG	2.50	0.47
1:F:111:PHE:HE1	1:F:256:ILE:HG12	1.79	0.47
1:C:281:PRO:HD3	1:C:297:LEU:O	2.15	0.47
1:C:373:ALA:O	1:C:377:VAL:HG23	2.14	0.47
1:C:292:HIS:ND1	1:C:294:ILE:HG22	2.30	0.46
1:D:352:GLY:HA3	1:D:365:ALA:HA	1.97	0.46
1:B:317:LEU:HD23	1:B:440:HIS:CG	2.51	0.46
1:F:3:ILE:HB	1:F:469:PHE:CE2	2.50	0.46
1:C:37:HIS:HB3	1:C:294:ILE:CD1	2.45	0.46
1:C:63:GLY:O	1:C:144:PHE:HA	2.16	0.46
1:A:352:GLY:HA3	1:A:365:ALA:HA	1.97	0.46
1:D:126:GLU:HB3	1:D:151:ILE:HG13	1.98	0.46
1:A:281:PRO:HD3	1:A:297:LEU:O	2.15	0.46
1:E:38:ASN:CG	1:E:284:ALA:HB3	2.41	0.46
1:B:131:VAL:CG1	1:B:141:PRO:HB2	2.45	0.46
1:F:196:THR:HA	1:F:244:ASN:OD1	2.16	0.46
1:E:106:SER:HB2	1:E:262:SER:O	2.16	0.46
1:B:108:ILE:HD12	1:B:256:ILE:HG23	1.98	0.46
1:B:381:VAL:O	1:B:385:ILE:HG13	2.16	0.46
1:F:144:PHE:HB2	1:F:147:VAL:HG12	1.98	0.46
1:A:412:LYS:CG	1:C:397:ARG:HH21	2.27	0.45
1:B:449:ASP:HB3	1:F:338:PHE:CZ	2.50	0.45
1:F:387:LYS:HD3	1:F:387:LYS:HA	1.77	0.45
1:D:72:ARG:HA	1:D:72:ARG:HD3	1.59	0.45
1:D:395:VAL:HG12	1:D:395:VAL:O	2.17	0.45
1:E:34:GLU:HG2	1:E:287:SER:HB2	1.98	0.45
1:F:397:ARG:HA	1:F:397:ARG:HD3	1.67	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:285:ILE:HG12	1:F:294:ILE:HD12	1.99	0.45
1:A:452:ARG:HG2	1:A:453:LEU:N	2.28	0.45
1:F:92:PRO:HB3	1:F:219:VAL:HB	1.98	0.45
1:A:198:ILE:HD11	1:A:246:ASN:O	2.17	0.45
1:C:68:ASP:CG	1:C:145:ARG:HG3	2.42	0.45
1:C:102:LYS:O	1:C:106:SER:HB3	2.16	0.45
1:D:304:LYS:HG2	1:D:421:TRP:CE2	2.52	0.45
1:A:43:ASP:OD1	1:A:48:LYS:HA	2.17	0.45
1:B:458:ASN:HB3	1:B:471:HIS:HD2	1.81	0.45
1:A:196:THR:HA	1:A:244:ASN:ND2	2.32	0.45
1:C:294:ILE:HG23	1:C:295:HIS:H	1.82	0.44
1:E:160:ILE:O	1:E:242:GLU:HA	2.16	0.44
1:B:339:ILE:HG12	1:B:465:GLY:HA3	1.99	0.44
1:E:181:SER:HB2	1:E:213:ILE:HG12	1.99	0.44
1:F:196:THR:HG21	1:F:246:ASN:HB2	2.00	0.44
1:A:374:ILE:HG13	1:A:375:ASP:N	2.33	0.44
2:A:601:NAG:O7	1:D:217:SER:HB2	2.17	0.44
1:B:148:VAL:HG23	1:B:251:GLU:HB2	1.98	0.44
1:B:496:ARG:HA	1:B:499:ARG:HD3	1.99	0.44
1:C:474:ASP:N	1:C:477:CYS:HB3	2.32	0.44
1:B:218:GLN:HB3	1:B:223:ARG:HG2	1.98	0.44
1:F:116:ILE:HD11	1:F:250:PRO:HB2	1.98	0.44
1:F:426:GLU:O	1:F:430:LEU:HG	2.18	0.44
1:C:92:PRO:HB3	1:C:219:VAL:HB	2.00	0.44
1:B:131:VAL:HG12	1:B:141:PRO:HB2	1.99	0.44
1:B:19:ILE:HG23	1:B:20:MET:HG3	2.00	0.44
1:A:179:HIS:HB2	1:A:248:ILE:HD11	2.00	0.44
1:C:412:LYS:HD3	1:D:393:GLU:HB3	2.00	0.44
1:F:117:ILE:HD12	1:F:250:PRO:HG2	2.00	0.44
1:A:262:SER:HA	1:A:395:VAL:HG11	1.99	0.43
1:C:106:SER:HB2	1:C:262:SER:O	2.18	0.43
1:B:430:LEU:HD11	1:E:387:LYS:HE3	2.00	0.43
1:E:412:LYS:HE3	1:F:413:MET:HE1	2.00	0.43
1:B:413:MET:HB2	1:E:413:MET:HE2	1.99	0.43
1:E:388:MET:HE3	1:E:388:MET:HB3	1.84	0.43
1:A:350:TRP:CH2	1:A:374:ILE:HG22	2.54	0.43
1:C:168:ASN:C	1:C:170:GLU:H	2.24	0.43
1:D:427:LEU:O	1:D:431:MET:HG3	2.19	0.43
1:E:296:PRO:HG3	1:E:305:TYR:CE2	2.54	0.43
1:F:202:THR:H	1:F:205:LEU:HB3	1.83	0.43
1:B:296:PRO:HG3	1:B:305:TYR:CZ	2.53	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:61:LEU:O	1:B:254:TYR:OH	2.32	0.43
1:B:359:GLN:HE21	1:B:474:ASP:HB2	1.84	0.43
1:B:388:MET:HE2	1:B:388:MET:HB2	1.89	0.43
1:C:53:LYS:HE3	1:C:53:LYS:HB2	1.94	0.43
1:E:196:THR:HA	1:E:244:ASN:ND2	2.34	0.43
1:A:267:SER:OG	1:A:269:VAL:HG22	2.19	0.43
1:C:370:THR:O	1:C:374:ILE:HG23	2.19	0.43
1:B:168:ASN:C	1:B:170:GLU:H	2.26	0.43
1:E:412:LYS:HD3	1:F:395:VAL:HG22	2.01	0.43
1:F:474:ASP:O	1:F:477:CYS:HB2	2.19	0.43
1:D:114:ILE:HD11	1:D:172:LEU:HD21	2.01	0.42
1:B:172:LEU:HD23	1:B:255:LYS:HA	2.01	0.42
1:C:304:LYS:HE3	1:C:388:MET:HE2	2.01	0.42
1:D:183:ASN:HD22	1:D:185:GLU:HB3	1.83	0.42
1:E:122:TRP:HZ3	1:E:160:ILE:HG21	1.84	0.42
1:A:18:THR:OG1	1:A:21:GLU:HB2	2.19	0.42
1:B:157:TYR:CE2	1:B:191:TYR:HD2	2.37	0.42
1:E:40:LYS:HE3	1:E:40:LYS:HB2	1.85	0.42
1:F:179:HIS:CD2	1:F:226:MET:HE2	2.54	0.42
1:D:126:GLU:HG2	1:D:129:LEU:HD13	2.02	0.42
1:D:300:GLY:HA2	1:D:392:PHE:CD1	2.54	0.42
1:B:315:THR:HA	1:B:377:VAL:HG11	2.02	0.42
1:D:168:ASN:HB3	1:D:255:LYS:HE2	2.01	0.42
1:D:384:ILE:HG12	1:D:428:LEU:HD21	2.00	0.42
1:F:92:PRO:HB2	1:F:225:ARG:HE	1.83	0.42
1:F:202:THR:HG22	1:F:205:LEU:HB2	2.02	0.42
1:A:21:GLU:O	1:A:22:LYS:HD3	2.20	0.42
1:A:144:PHE:HB2	1:A:147:VAL:HG12	2.02	0.42
1:C:243:SER:OG	1:C:247:PHE:HB2	2.20	0.42
1:B:63:GLY:HA3	1:B:145:ARG:H	1.84	0.42
1:B:498:LYS:HD2	1:B:498:LYS:HA	1.64	0.42
1:F:146:ASN:HB3	1:F:252:TYR:HB2	2.00	0.42
1:F:152:LYS:HD2	1:F:155:ASP:HA	2.02	0.42
1:B:335:ILE:HG23	1:B:441:ASP:HA	2.02	0.42
1:B:431:MET:O	1:B:435:ARG:HD2	2.20	0.42
1:E:91:TYR:CD1	1:E:226:MET:HG3	2.54	0.42
1:F:66:MET:HE2	1:F:66:MET:HB3	1.97	0.42
1:C:296:PRO:HG3	1:C:305:TYR:CE2	2.55	0.42
1:C:339:ILE:O	1:C:339:ILE:HG22	2.20	0.42
1:F:178:ILE:HB	1:F:198:ILE:HD12	2.00	0.42
1:A:346:MET:SD	1:A:352:GLY:HA3	2.60	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:432:GLU:OE2	1:D:431:MET:HG2	2.20	0.41
1:D:304:LYS:HE3	1:D:388:MET:HE2	2.02	0.41
1:B:33:LEU:HB2	1:B:311:LEU:HB2	2.01	0.41
1:E:92:PRO:HB3	1:E:219:VAL:HB	2.02	0.41
1:E:373:ALA:O	1:E:377:VAL:HG23	2.19	0.41
1:A:496:ARG:HA	1:A:499:ARG:HB2	2.01	0.41
1:F:30:GLN:O	1:F:313:LEU:N	2.53	0.41
1:A:162:ILE:HG22	1:A:241:PHE:HB2	2.03	0.41
1:C:290:PRO:HG3	1:C:385:ILE:HA	2.02	0.41
1:B:83:ALA:HA	1:B:266:LYS:HD2	2.02	0.41
1:B:134:ALA:O	1:B:136:PRO:HD3	2.19	0.41
1:A:478:MET:O	1:A:482:ARG:HG3	2.20	0.41
1:C:157:TYR:CZ	1:C:245:GLY:HA2	2.56	0.41
1:D:116:ILE:HG13	1:D:117:ILE:N	2.35	0.41
1:B:66:MET:HE2	1:B:66:MET:HB3	1.89	0.41
1:E:412:LYS:HE2	1:F:397:ARG:NH2	2.36	0.41
1:D:350:TRP:CZ3	1:D:440:HIS:HE1	2.39	0.41
1:B:130:GLY:HA3	1:B:149:TRP:O	2.20	0.41
1:B:311:LEU:HD23	1:B:311:LEU:HA	1.89	0.41
1:E:196:THR:HA	1:E:244:ASN:HD21	1.85	0.41
1:F:3:ILE:HD12	1:F:354:HIS:O	2.20	0.41
1:F:315:THR:HG22	1:F:315:THR:O	2.21	0.41
1:B:373:ALA:O	1:B:377:VAL:HG23	2.21	0.41
1:A:234:LYS:HE3	1:A:234:LYS:HB3	1.83	0.40
1:C:41:LEU:HD13	1:C:80:VAL:HG11	2.03	0.40
1:C:108:ILE:HD12	1:C:256:ILE:HG23	2.03	0.40
1:C:352:GLY:HA3	1:C:365:ALA:HA	2.03	0.40
1:D:297:LEU:HD22	1:D:395:VAL:O	2.20	0.40
1:B:397:ARG:HH22	1:F:412:LYS:CB	2.27	0.40
1:E:130:GLY:HA3	1:E:149:TRP:HB3	2.03	0.40
1:A:146:ASN:ND2	1:A:254:TYR:OH	2.55	0.40
1:C:108:ILE:HD13	1:C:108:ILE:HA	1.92	0.40
1:C:143:PHE:CG	1:C:144:PHE:N	2.88	0.40
1:D:148:VAL:CG2	1:D:251:GLU:HB2	2.50	0.40
1:D:179:HIS:HB2	1:D:248:ILE:HD11	2.03	0.40
1:B:79:ILE:HB	1:B:264:ILE:HD13	2.03	0.40
1:B:452:ARG:O	1:B:453:LEU:HB2	2.20	0.40
1:F:76:TRP:HH2	1:F:111:PHE:CD2	2.40	0.40
1:E:117:ILE:HD12	1:E:250:PRO:HG2	2.03	0.40
1:A:267:SER:OG	1:A:281:PRO:O	2.30	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	481/506 (95%)	459 (95%)	21 (4%)	1 (0%)	44 75
1	B	487/506 (96%)	462 (95%)	25 (5%)	0	100 100
1	C	480/506 (95%)	455 (95%)	25 (5%)	0	100 100
1	D	480/506 (95%)	463 (96%)	15 (3%)	2 (0%)	30 64
1	E	481/506 (95%)	459 (95%)	22 (5%)	0	100 100
1	F	481/506 (95%)	452 (94%)	27 (6%)	2 (0%)	30 64
All	All	2890/3036 (95%)	2750 (95%)	135 (5%)	5 (0%)	44 75

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	136	PRO
1	A	136	PRO
1	F	136	PRO
1	F	74	PRO
1	D	194	PRO

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	428/445 (96%)	426 (100%)	2 (0%)	86 93
1	B	431/445 (97%)	430 (100%)	1 (0%)	92 97
1	C	428/445 (96%)	427 (100%)	1 (0%)	92 97

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	D	428/445 (96%)	426 (100%)	2 (0%)	86 93
1	E	427/445 (96%)	427 (100%)	0	100 100
1	F	428/445 (96%)	426 (100%)	2 (0%)	86 93
All	All	2570/2670 (96%)	2562 (100%)	8 (0%)	91 96

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	274	CYS
1	A	282	VAL
1	C	67	CYS
1	D	67	CYS
1	D	274	CYS
1	B	274	CYS
1	F	165	ASN
1	F	397	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (32) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	28	HIS
1	A	64	ASN
1	A	125	HIS
1	A	146	ASN
1	A	168	ASN
1	A	193	ASN
1	A	240	HIS
1	A	273	HIS
1	C	125	HIS
1	C	146	ASN
1	C	193	ASN
1	C	240	HIS
1	C	389	ASN
1	C	408	ASN
1	C	458	ASN
1	D	110	HIS
1	D	183	ASN
1	D	454	GLN
1	B	182	ASN
1	B	275	ASN

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Mol	Chain	Res	Type
1	B	355	HIS
1	B	410	ASN
1	E	28	HIS
1	E	125	HIS
1	E	193	ASN
1	E	240	HIS
1	E	424	ASN
1	F	15	GLN
1	F	37	HIS
1	F	125	HIS
1	F	424	ASN
1	F	446	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

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

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

14 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	NAG	C	601	1	14,14,15	1.99	3 (21%)	17,19,21	0.97	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
2	NAG	F	602	1	14,14,15	2.02	5 (35%)	17,19,21	1.90	3 (17%)
2	NAG	E	601	1	14,14,15	2.04	4 (28%)	17,19,21	1.10	2 (11%)
2	NAG	A	601	1	14,14,15	2.04	4 (28%)	17,19,21	2.54	4 (23%)
2	NAG	B	602	1	14,14,15	2.06	4 (28%)	17,19,21	1.10	2 (11%)
2	NAG	E	602	1	14,14,15	2.04	4 (28%)	17,19,21	1.08	2 (11%)
2	NAG	F	601	1	14,14,15	1.89	3 (21%)	17,19,21	2.42	3 (17%)
2	NAG	B	603	1	14,14,15	2.00	4 (28%)	17,19,21	1.12	1 (5%)
2	NAG	D	602	1	14,14,15	2.08	4 (28%)	17,19,21	1.21	3 (17%)
2	NAG	B	601	1	14,14,15	2.03	4 (28%)	17,19,21	1.14	2 (11%)
2	NAG	C	603	1	14,14,15	2.00	4 (28%)	17,19,21	1.15	1 (5%)
2	NAG	D	601	1	14,14,15	2.04	4 (28%)	17,19,21	1.22	3 (17%)
2	NAG	A	602	1	14,14,15	2.01	4 (28%)	17,19,21	1.12	1 (5%)
2	NAG	C	602	1	14,14,15	2.05	4 (28%)	17,19,21	1.09	1 (5%)

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	NAG	C	601	1	-	0/6/23/26	0/1/1/1
2	NAG	F	602	1	-	0/6/23/26	0/1/1/1
2	NAG	E	601	1	-	0/6/23/26	0/1/1/1
2	NAG	A	601	1	-	3/6/23/26	0/1/1/1
2	NAG	B	602	1	-	2/6/23/26	0/1/1/1
2	NAG	E	602	1	-	0/6/23/26	0/1/1/1
2	NAG	F	601	1	-	1/6/23/26	0/1/1/1
2	NAG	B	603	1	-	0/6/23/26	0/1/1/1
2	NAG	D	602	1	-	0/6/23/26	0/1/1/1
2	NAG	B	601	1	-	0/6/23/26	0/1/1/1
2	NAG	C	603	1	-	0/6/23/26	0/1/1/1
2	NAG	D	601	1	-	1/6/23/26	0/1/1/1
2	NAG	A	602	1	-	0/6/23/26	0/1/1/1
2	NAG	C	602	1	-	0/6/23/26	0/1/1/1

All (55) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	602	NAG	O5-C1	4.97	1.51	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	602	NAG	O5-C1	4.92	1.51	1.43
2	B	602	NAG	O5-C1	4.92	1.51	1.43
2	A	601	NAG	O5-C1	4.89	1.51	1.43
2	D	601	NAG	O5-C1	4.84	1.51	1.43
2	E	601	NAG	O5-C1	4.81	1.51	1.43
2	E	602	NAG	O5-C1	4.79	1.51	1.43
2	F	602	NAG	O5-C1	4.75	1.51	1.43
2	A	602	NAG	O5-C1	4.71	1.51	1.43
2	B	601	NAG	O5-C1	4.65	1.51	1.43
2	C	603	NAG	O5-C1	4.63	1.51	1.43
2	C	601	NAG	O5-C1	4.62	1.51	1.43
2	B	603	NAG	O5-C1	4.56	1.51	1.43
2	F	601	NAG	O5-C1	4.00	1.50	1.43
2	F	601	NAG	C7-N2	3.67	1.47	1.34
2	D	601	NAG	C7-N2	3.66	1.46	1.34
2	B	603	NAG	C7-N2	3.65	1.46	1.34
2	B	601	NAG	C7-N2	3.64	1.46	1.34
2	E	602	NAG	C7-N2	3.61	1.46	1.34
2	C	601	NAG	C7-N2	3.61	1.46	1.34
2	A	602	NAG	C7-N2	3.61	1.46	1.34
2	C	603	NAG	C7-N2	3.60	1.46	1.34
2	E	601	NAG	C7-N2	3.59	1.46	1.34
2	B	602	NAG	C7-N2	3.57	1.46	1.34
2	D	602	NAG	C7-N2	3.57	1.46	1.34
2	C	602	NAG	C7-N2	3.55	1.46	1.34
2	A	601	NAG	C7-N2	3.47	1.46	1.34
2	F	602	NAG	C7-N2	3.37	1.45	1.34
2	F	601	NAG	C2-N2	2.68	1.50	1.46
2	E	601	NAG	C2-N2	2.48	1.50	1.46
2	B	603	NAG	C2-N2	2.45	1.50	1.46
2	B	601	NAG	C2-N2	2.43	1.50	1.46
2	A	602	NAG	C2-N2	2.42	1.50	1.46
2	C	603	NAG	C2-N2	2.42	1.50	1.46
2	C	601	NAG	C2-N2	2.40	1.50	1.46
2	F	602	NAG	C2-N2	2.38	1.50	1.46
2	E	602	NAG	C2-N2	2.38	1.50	1.46
2	D	602	NAG	C2-N2	2.37	1.50	1.46
2	D	601	NAG	C2-N2	2.35	1.50	1.46
2	B	602	NAG	C2-N2	2.34	1.50	1.46
2	C	602	NAG	C2-N2	2.34	1.50	1.46
2	B	601	NAG	O5-C5	2.30	1.48	1.43
2	F	602	NAG	O5-C5	2.28	1.48	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	602	NAG	O5-C5	2.26	1.48	1.43
2	C	602	NAG	O5-C5	2.24	1.48	1.43
2	D	602	NAG	O5-C5	2.24	1.48	1.43
2	B	602	NAG	O5-C5	2.22	1.47	1.43
2	A	602	NAG	O5-C5	2.20	1.47	1.43
2	B	603	NAG	O5-C5	2.19	1.47	1.43
2	C	603	NAG	O5-C5	2.13	1.47	1.43
2	A	601	NAG	O7-C7	-2.11	1.18	1.23
2	D	601	NAG	O5-C5	2.10	1.47	1.43
2	E	601	NAG	O5-C5	2.08	1.47	1.43
2	A	601	NAG	C8-C7	2.02	1.54	1.50
2	F	602	NAG	O7-C7	-2.00	1.18	1.23

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	F	601	NAG	C1-O5-C5	-7.28	102.33	112.19
2	A	601	NAG	C8-C7-N2	5.54	125.48	116.10
2	F	602	NAG	C1-C2-N2	-5.45	101.18	110.49
2	A	601	NAG	C4-C3-C2	5.25	118.71	111.02
2	A	601	NAG	O7-C7-N2	-4.96	112.83	121.95
2	F	601	NAG	C1-C2-N2	-4.92	102.09	110.49
2	F	602	NAG	C2-N2-C7	4.13	128.79	122.90
2	F	601	NAG	C2-N2-C7	3.50	127.89	122.90
2	A	601	NAG	C2-N2-C7	3.12	127.35	122.90
2	C	602	NAG	C1-O5-C5	2.73	115.89	112.19
2	B	602	NAG	C1-O5-C5	2.68	115.82	112.19
2	F	602	NAG	C3-C4-C5	2.41	114.54	110.24
2	D	601	NAG	C1-O5-C5	2.37	115.40	112.19
2	D	602	NAG	C8-C7-N2	2.35	120.08	116.10
2	E	602	NAG	C8-C7-N2	2.35	120.07	116.10
2	B	601	NAG	C8-C7-N2	2.33	120.04	116.10
2	C	601	NAG	C8-C7-N2	2.31	120.00	116.10
2	B	603	NAG	C8-C7-N2	2.30	120.00	116.10
2	A	602	NAG	C8-C7-N2	2.28	119.95	116.10
2	C	603	NAG	C8-C7-N2	2.25	119.91	116.10
2	E	602	NAG	C2-N2-C7	-2.22	119.75	122.90
2	E	601	NAG	C8-C7-N2	2.19	119.81	116.10
2	D	602	NAG	C2-N2-C7	-2.19	119.78	122.90
2	B	601	NAG	C2-N2-C7	-2.18	119.80	122.90
2	D	601	NAG	C8-C7-N2	2.16	119.76	116.10
2	B	602	NAG	C8-C7-N2	2.07	119.60	116.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	E	601	NAG	C1-O5-C5	2.04	114.95	112.19
2	D	602	NAG	C1-O5-C5	2.03	114.94	112.19
2	D	601	NAG	C6-C5-C4	-2.01	108.29	113.00

There are no chirality outliers.

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	F	601	NAG	C3-C2-N2-C7
2	A	601	NAG	C8-C7-N2-C2
2	A	601	NAG	O7-C7-N2-C2
2	B	602	NAG	C4-C5-C6-O6
2	D	601	NAG	O5-C5-C6-O6
2	A	601	NAG	O5-C5-C6-O6
2	B	602	NAG	O5-C5-C6-O6

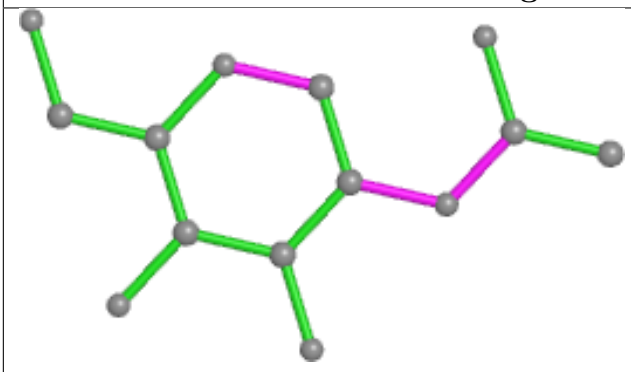
There are no ring outliers.

1 monomer is involved in 1 short contact:

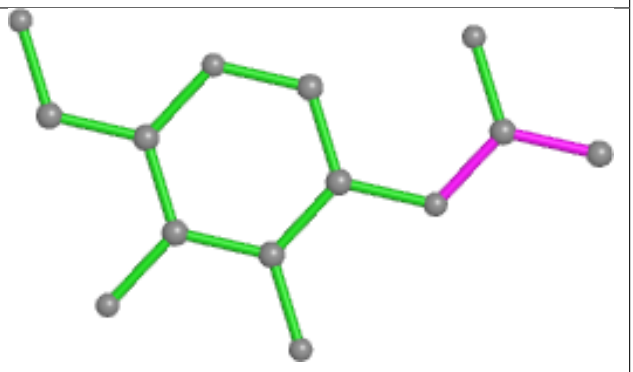
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	601	NAG	1	0

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

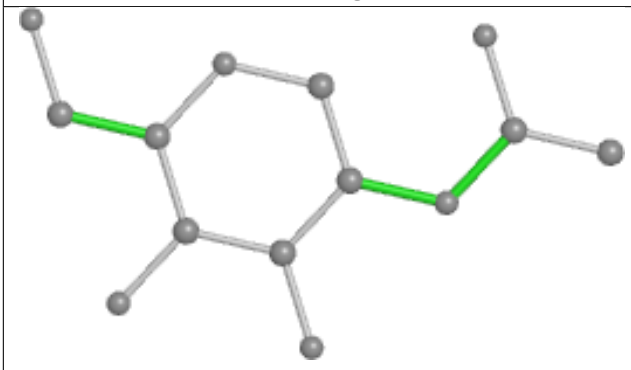
Ligand NAG C 601



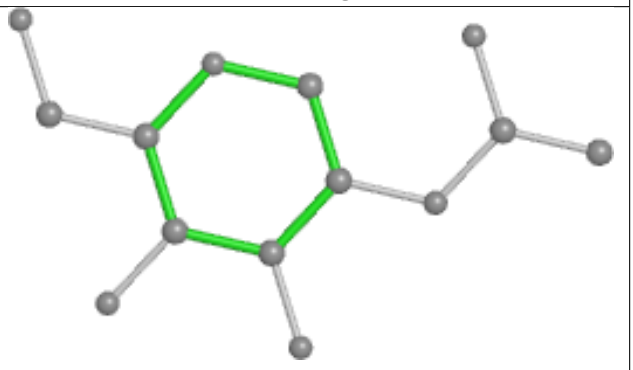
Bond lengths



Bond angles

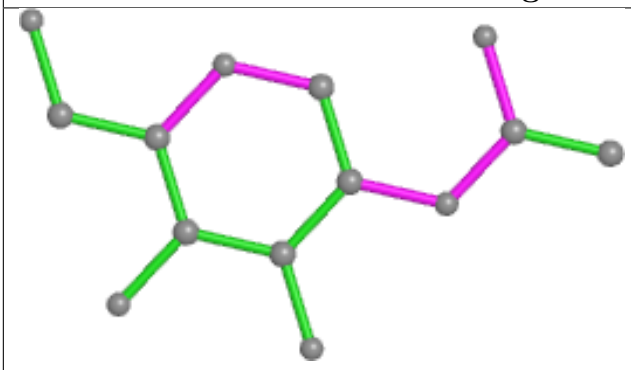


Torsions



Rings

Ligand NAG F 602



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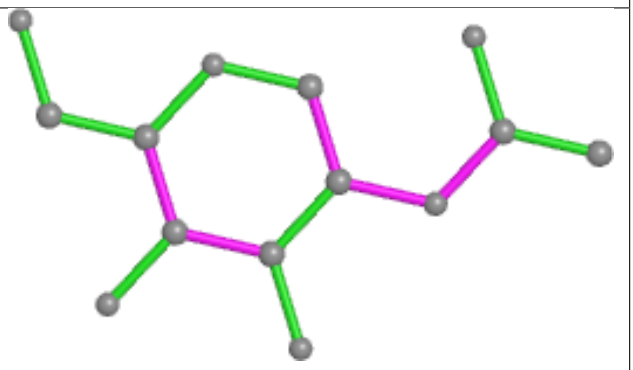

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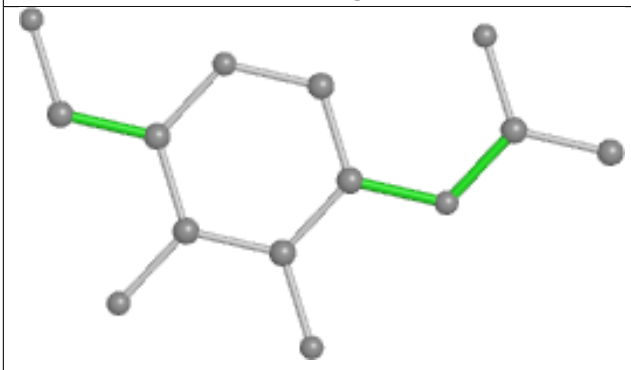

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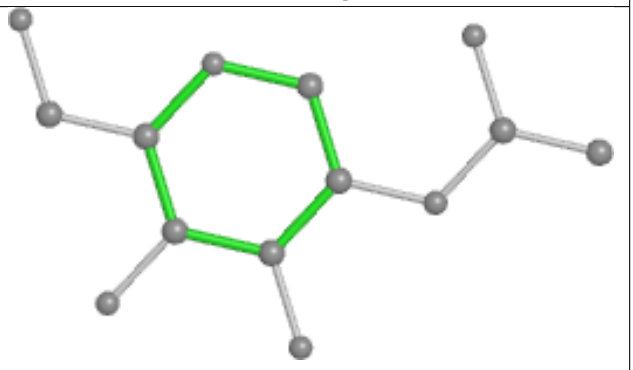
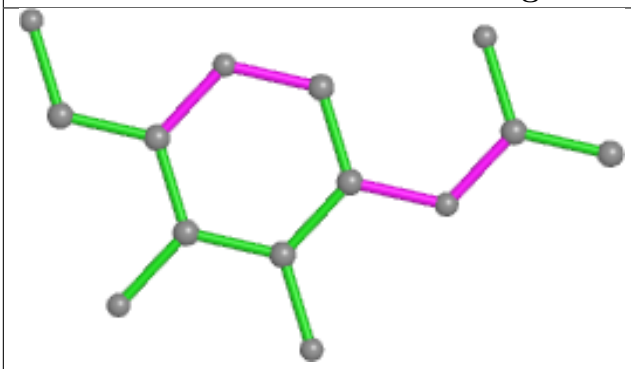


Rings

Ligand NAG E 601



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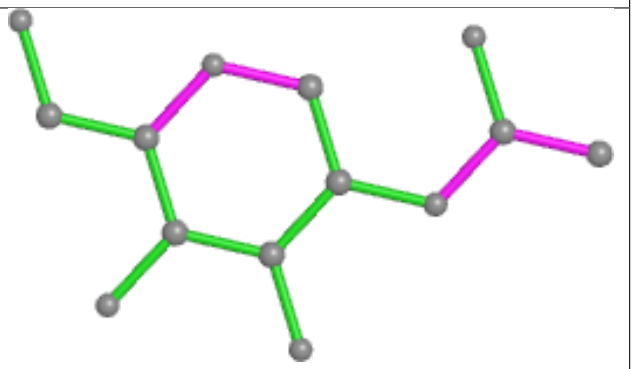

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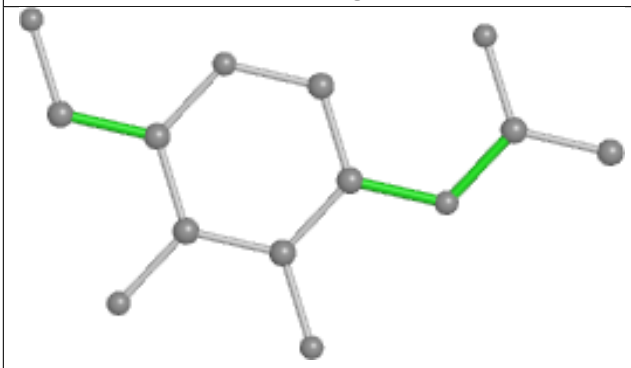

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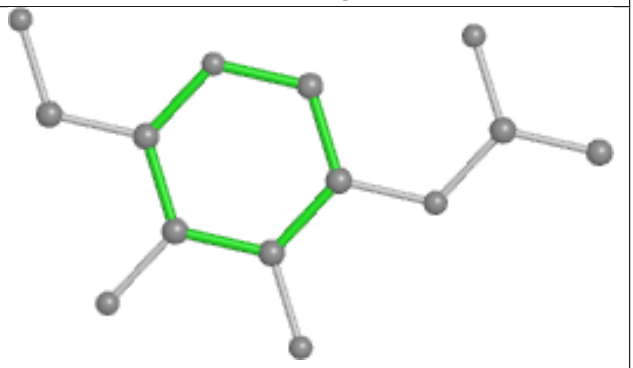
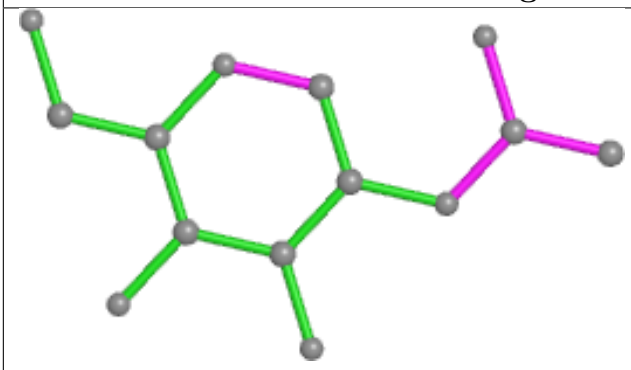


Rings

Ligand NAG A 601



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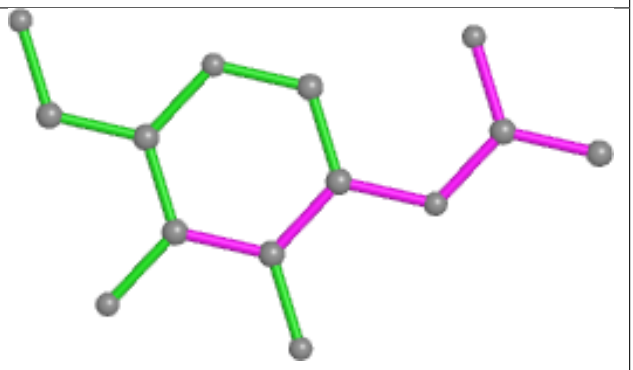
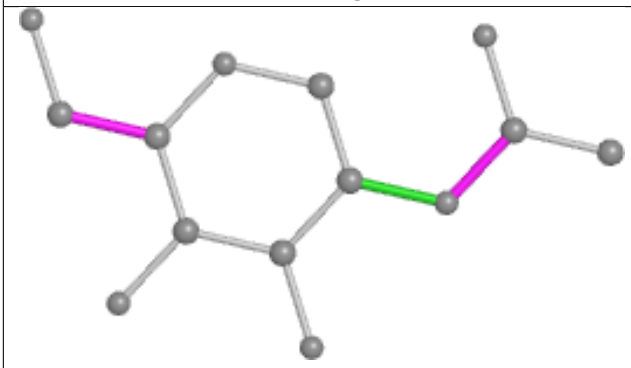


Bond angles



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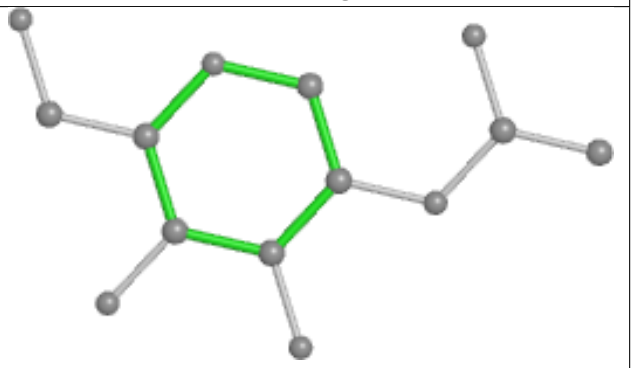
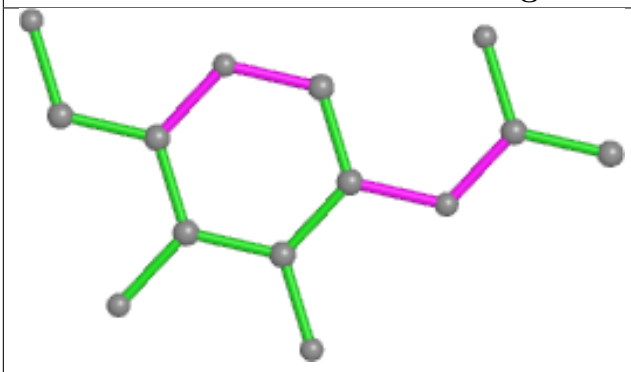


Rings

Ligand NAG B 602



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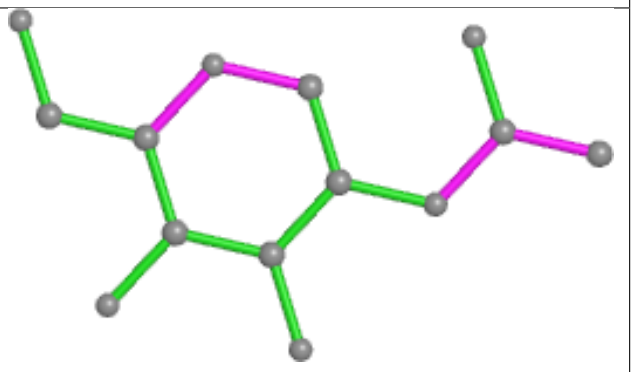

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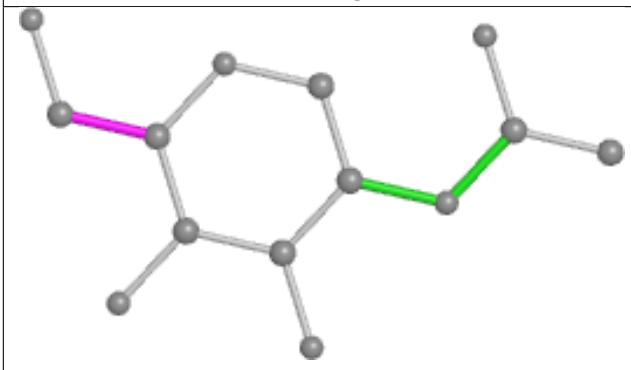

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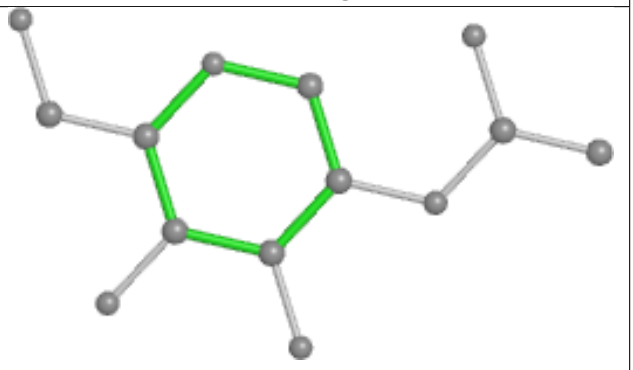
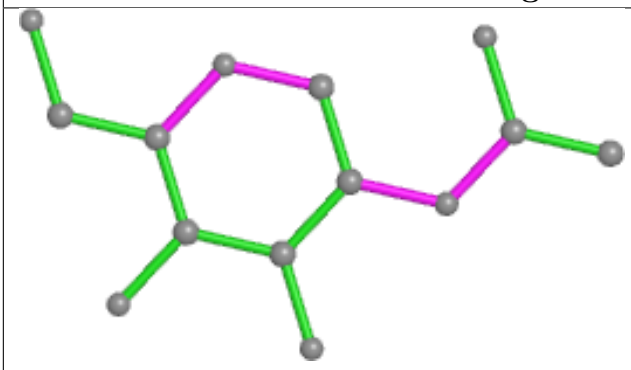


Rings

Ligand NAG E 602



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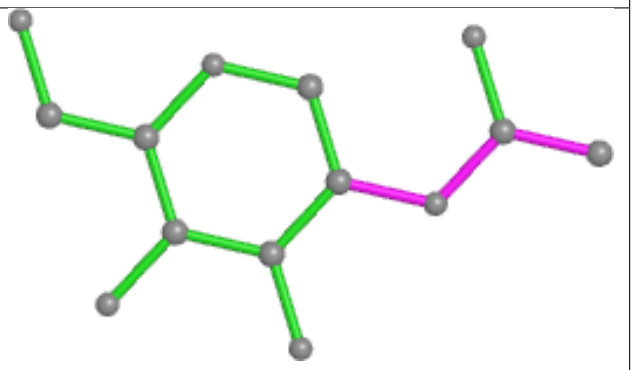

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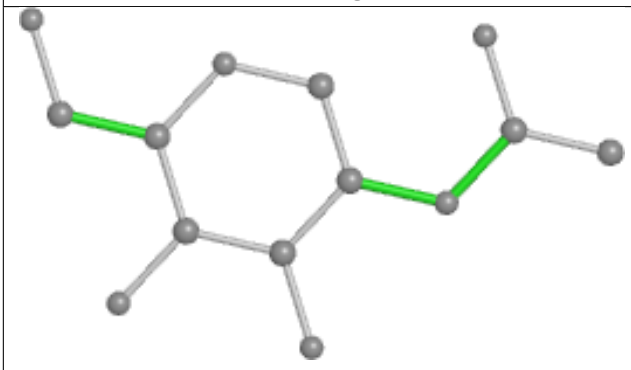

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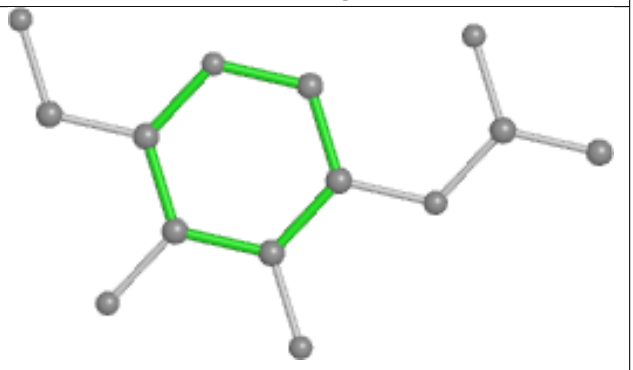

Rings

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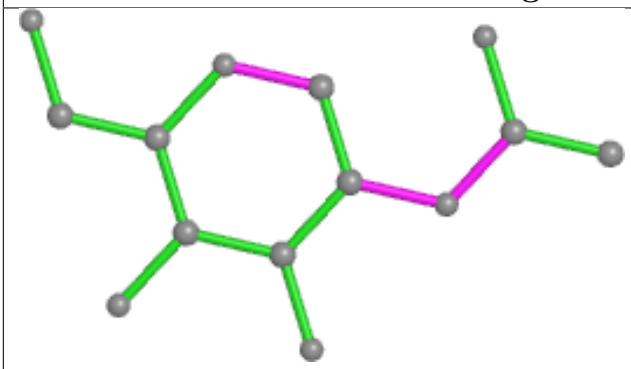
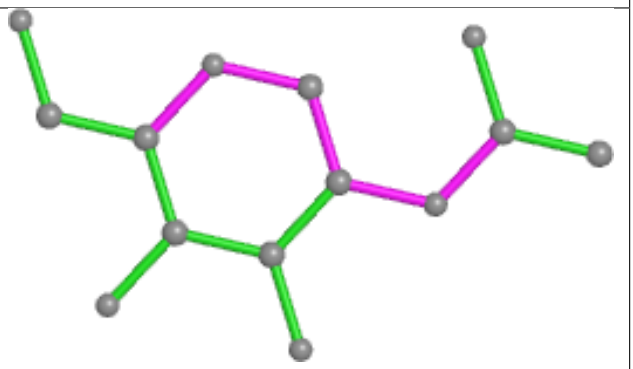


Bond lengths



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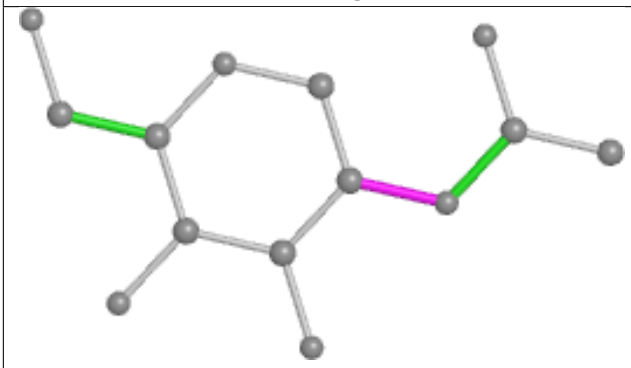

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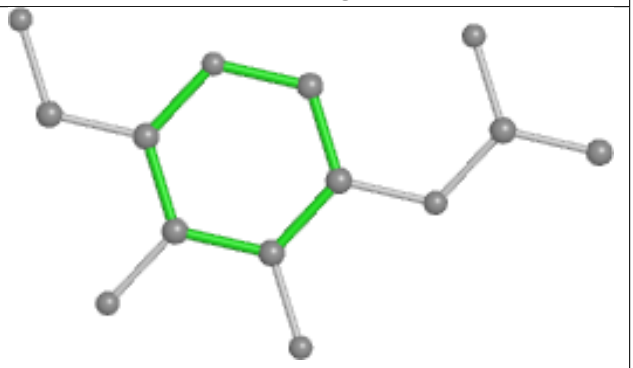
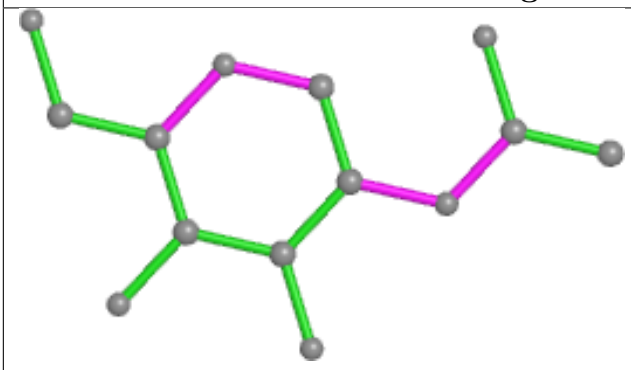
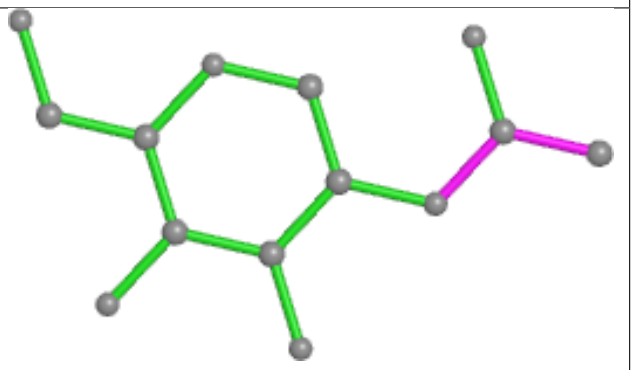


Rings

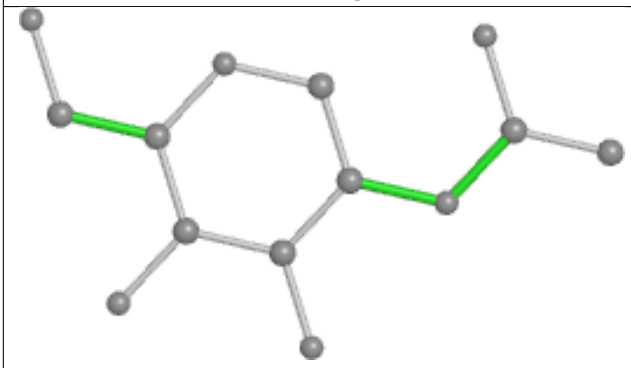
Ligand NAG B 603



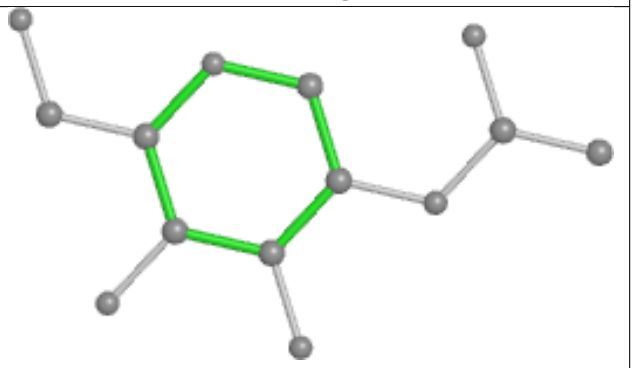
Bond lengths



Bond angles

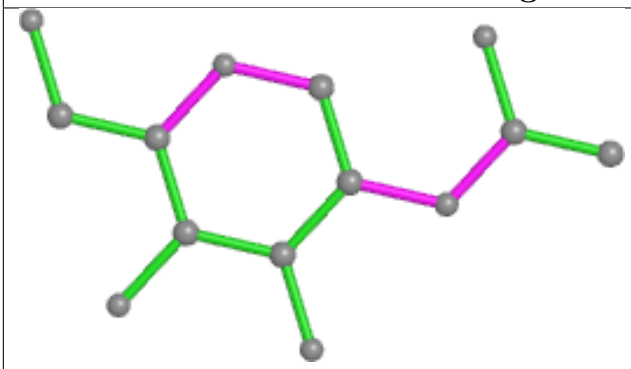


Torsions

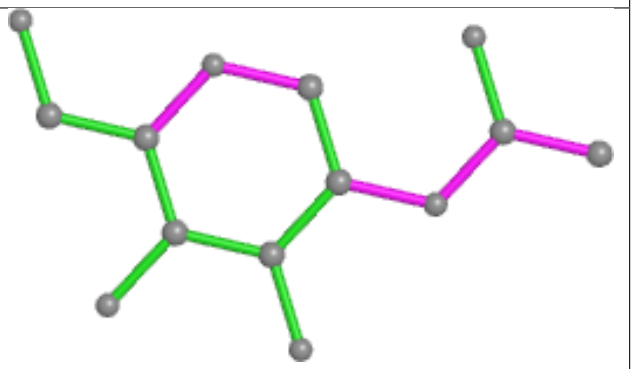


Rings

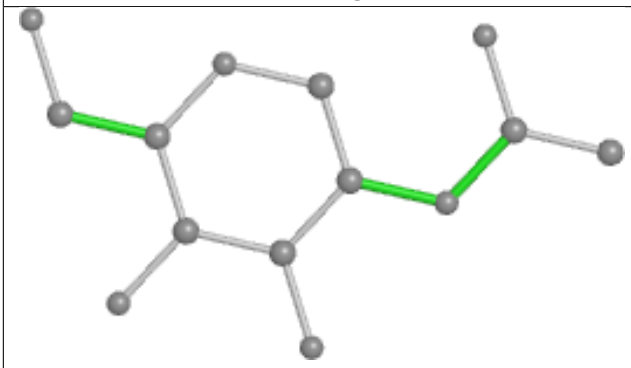
Ligand NAG D 602



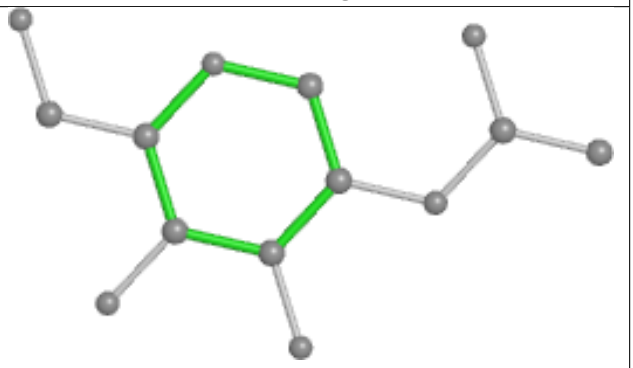
Bond lengths



Bond angles

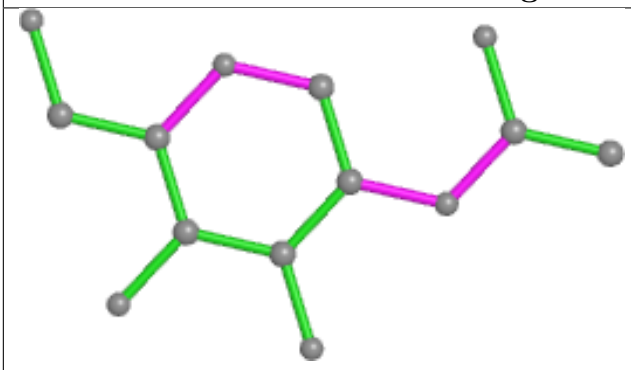


Torsions

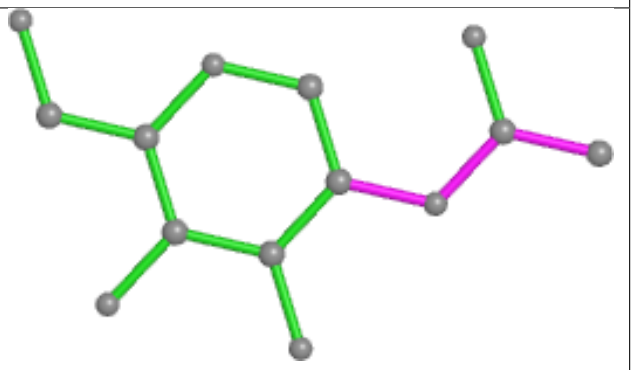


Rings

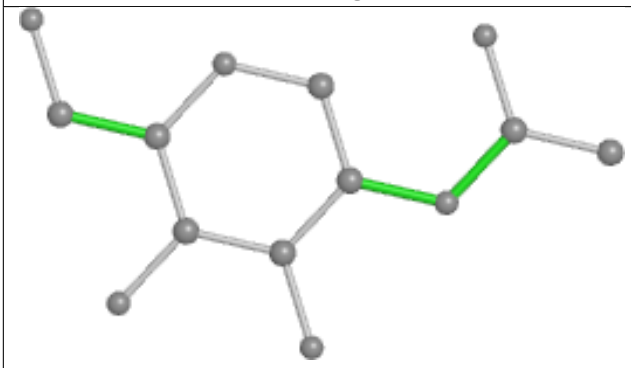
Ligand NAG B 601



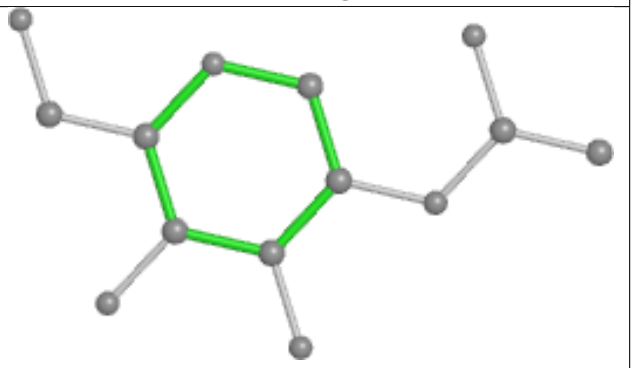
Bond lengths



Bond angles

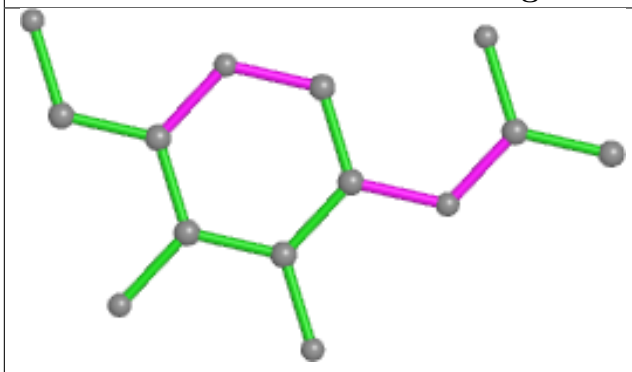


Torsions

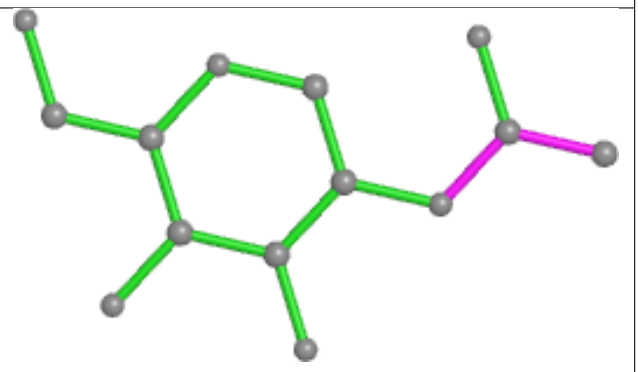


Rings

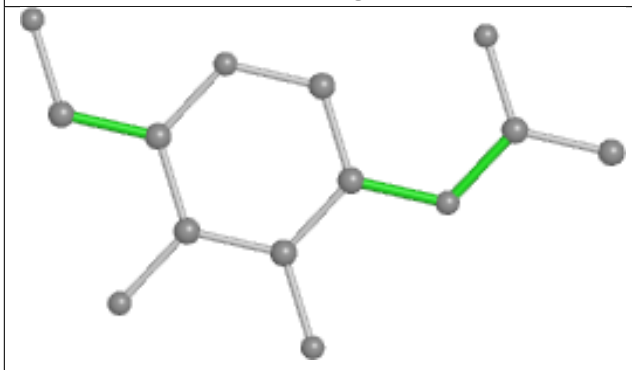
Ligand NAG C 603



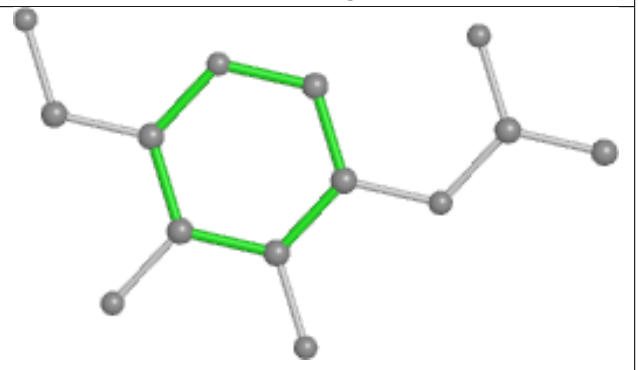
Bond lengths



Bond angles

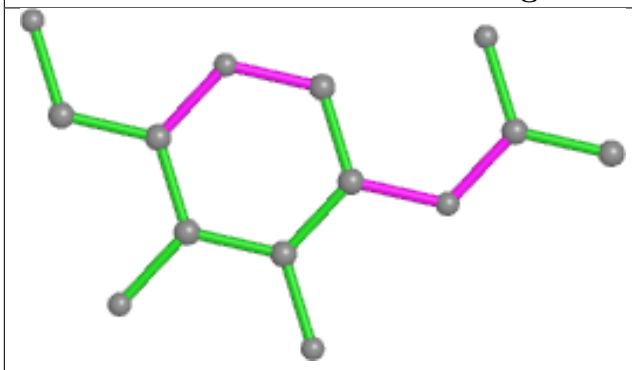


Torsions

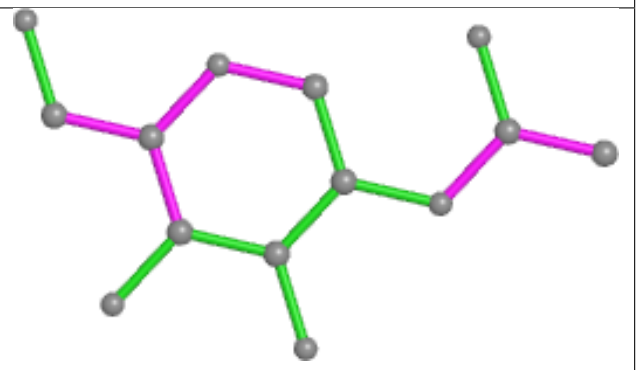


Rings

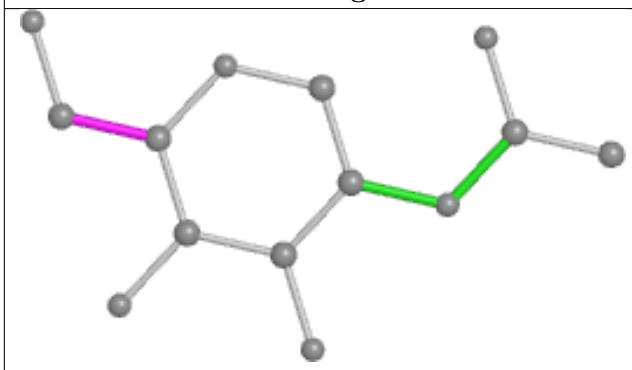
Ligand NAG D 601



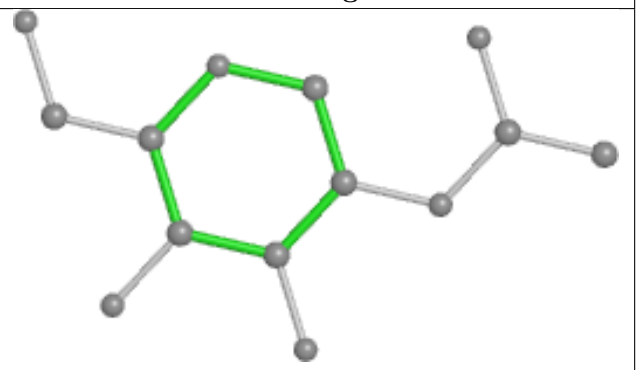
Bond lengths



Bond angles

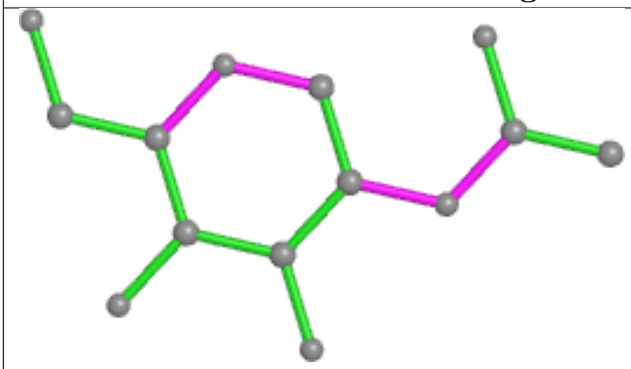


Torsions

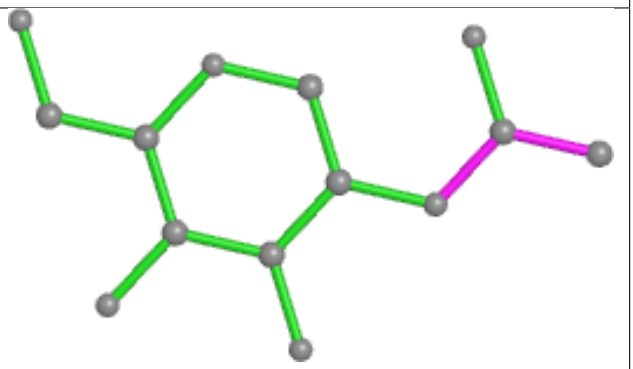


Rings

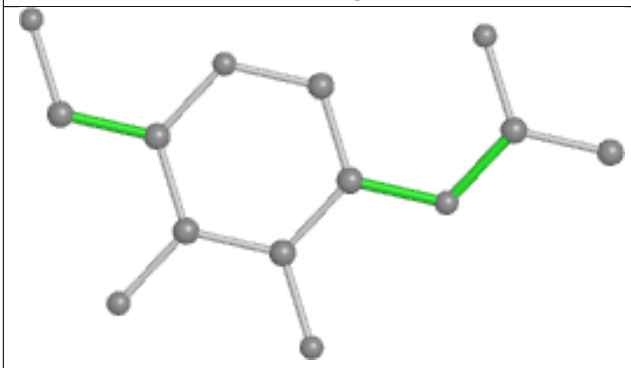
Ligand NAG A 602



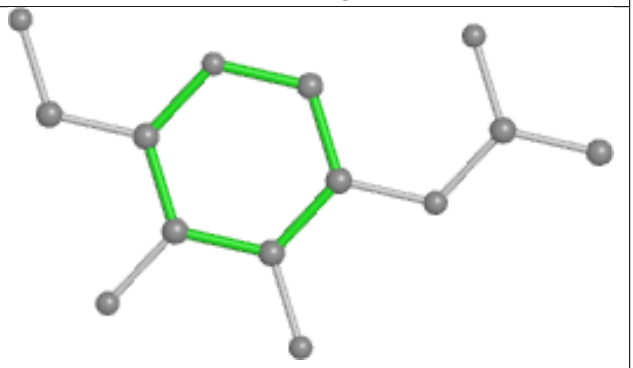
Bond lengths



Bond angles

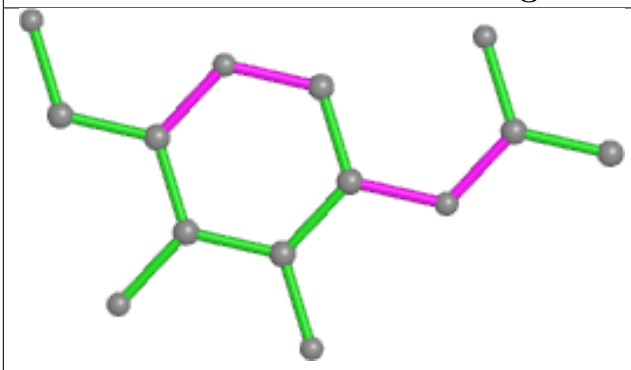


Torsions

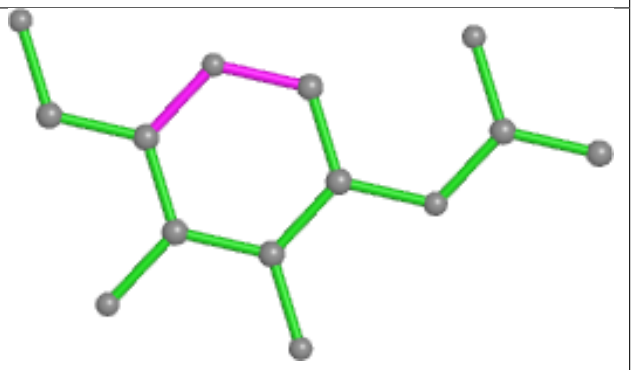


Rings

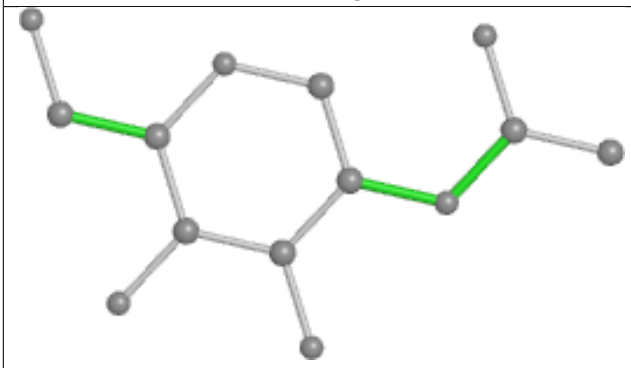
Ligand NAG C 602



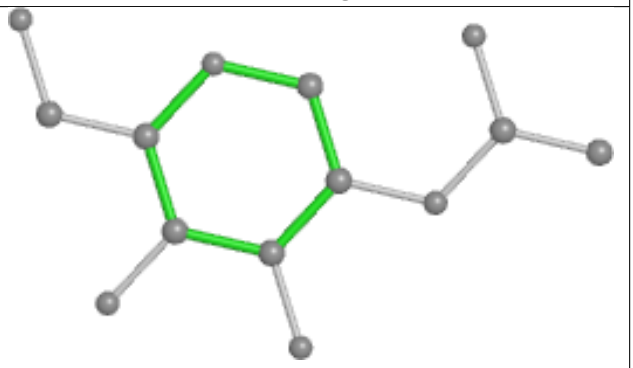
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	485/506 (95%)	0.63	43 (8%)	17	12	33, 63, 161, 195	0
1	B	491/506 (97%)	0.68	33 (6%)	25	17	39, 77, 131, 168	0
1	C	484/506 (95%)	0.34	18 (3%)	45	31	24, 50, 132, 148	0
1	D	484/506 (95%)	0.51	29 (5%)	29	19	32, 58, 142, 166	0
1	E	485/506 (95%)	0.55	29 (5%)	29	19	31, 62, 147, 164	0
1	F	485/506 (95%)	0.86	48 (9%)	14	10	43, 86, 164, 185	0
All	All	2914/3036 (95%)	0.59	200 (6%)	24	17	24, 68, 147, 195	0

All (200) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	352	GLY	4.9
1	B	335	ILE	4.8
1	A	477	CYS	4.7
1	B	331	LEU	4.6
1	E	338	PHE	4.5
1	F	497	LEU	4.5
1	B	332	PHE	4.5
1	F	473	CYS	4.5
1	B	336	ALA	4.4
1	F	66	MET	4.3
1	B	333	GLY	4.0
1	A	473	CYS	3.9
1	D	477	CYS	3.8
1	D	350	TRP	3.7
1	B	334	ALA	3.6
1	F	337	GLY	3.6
1	E	182	ASN	3.6
1	A	469	PHE	3.6
1	E	486	TYR	3.5

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Mol	Chain	Res	Type	RSRZ
1	A	460	LYS	3.5
1	E	38	ASN	3.5
1	B	70	PHE	3.5
1	F	338	PHE	3.4
1	E	473	CYS	3.4
1	F	492	SER	3.3
1	F	392	PHE	3.3
1	B	38	ASN	3.3
1	A	71	ILE	3.3
1	D	71	ILE	3.2
1	D	320	SER	3.2
1	A	182	ASN	3.2
1	B	262	SER	3.1
1	A	461	GLU	3.1
1	C	486	TYR	3.1
1	B	356	SER	3.1
1	B	182	ASN	3.1
1	A	338	PHE	3.1
1	A	4	CYS	3.0
1	A	462	LEU	3.0
1	B	1	ASP	3.0
1	C	469	PHE	3.0
1	F	353	TYR	3.0
1	F	218	GLN	3.0
1	E	463	GLY	2.9
1	F	135	CYS	2.9
1	E	491	TYR	2.9
1	F	1	ASP	2.9
1	B	55	CYS	2.9
1	A	181	SER	2.9
1	C	317	LEU	2.9
1	E	477	CYS	2.9
1	D	68	ASP	2.9
1	F	471	HIS	2.9
1	E	337	GLY	2.9
1	E	218	GLN	2.8
1	B	330	GLY	2.8
1	D	92	PRO	2.8
1	A	355	HIS	2.8
1	B	68	ASP	2.8
1	E	70	PHE	2.8
1	A	336	ALA	2.7

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Mol	Chain	Res	Type	RSRZ
1	F	5	ILE	2.7
1	E	336	ALA	2.7
1	F	236	ASP	2.7
1	C	70	PHE	2.7
1	F	399	PHE	2.7
1	A	480	SER	2.7
1	F	356	SER	2.7
1	D	70	PHE	2.7
1	F	351	TYR	2.7
1	D	473	CYS	2.7
1	A	456	ARG	2.7
1	D	318	ARG	2.7
1	B	261	ASP	2.7
1	F	350	TRP	2.6
1	E	272	GLY	2.6
1	D	389	ASN	2.6
1	B	204	THR	2.6
1	D	317	LEU	2.6
1	B	418	LEU	2.6
1	A	2	GLN	2.6
1	B	470	TYR	2.6
1	E	398	GLU	2.6
1	D	456	ARG	2.5
1	E	356	SER	2.5
1	F	104	LEU	2.5
1	F	157	TYR	2.5
1	A	356	SER	2.5
1	D	286	ASN	2.5
1	B	338	PHE	2.5
1	B	497	LEU	2.5
1	A	320	SER	2.5
1	C	262	SER	2.5
1	F	320	SER	2.5
1	A	1	ASP	2.5
1	D	156	ALA	2.5
1	F	336	ALA	2.5
1	B	358	GLU	2.5
1	D	285	ILE	2.5
1	A	345	GLY	2.5
1	B	183	ASN	2.5
1	D	455	LEU	2.4
1	B	390	THR	2.4

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Mol	Chain	Res	Type	RSRZ
1	C	352	GLY	2.4
1	A	183	ASN	2.4
1	C	319	ASN	2.4
1	B	191	TYR	2.4
1	E	191	TYR	2.4
1	F	398	GLU	2.4
1	A	68	ASP	2.4
1	D	319	ASN	2.4
1	B	193	ASN	2.4
1	F	453	LEU	2.4
1	E	345	GLY	2.4
1	A	478	MET	2.4
1	B	391	GLN	2.4
1	C	68	ASP	2.4
1	C	389	ASN	2.4
1	D	274	CYS	2.4
1	F	274	CYS	2.4
1	A	481	VAL	2.4
1	C	318	ARG	2.4
1	E	471	HIS	2.4
1	B	341	GLY	2.4
1	A	70	PHE	2.3
1	A	368	GLU	2.3
1	A	488	TYR	2.3
1	E	342	GLY	2.3
1	F	364	ALA	2.3
1	F	71	ILE	2.3
1	B	454	GLN	2.3
1	E	65	PRO	2.3
1	D	499	ARG	2.3
1	A	42	CYS	2.3
1	E	497	LEU	2.3
1	E	262	SER	2.3
1	D	463	GLY	2.3
1	D	398	GLU	2.3
1	E	236	ASP	2.2
1	F	494	GLU	2.2
1	B	492	SER	2.2
1	A	389	ASN	2.2
1	C	473	CYS	2.2
1	C	339	ILE	2.2
1	A	369	SER	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	17	ASP	2.2
1	F	235	PRO	2.2
1	F	366	ASP	2.2
1	F	474	ASP	2.2
1	B	451	VAL	2.2
1	E	21	GLU	2.2
1	E	355	HIS	2.2
1	C	65	PRO	2.2
1	A	401	ASN	2.2
1	A	454	GLN	2.2
1	F	488	TYR	2.2
1	F	495	ALA	2.2
1	F	143	PHE	2.2
1	F	259	LYS	2.2
1	A	489	PRO	2.2
1	A	453	LEU	2.2
1	C	395	VAL	2.2
1	C	391	GLN	2.2
1	D	5	ILE	2.1
1	D	460	LYS	2.1
1	D	461	GLU	2.1
1	F	469	PHE	2.1
1	A	261	ASP	2.1
1	F	394	ALA	2.1
1	F	273	HIS	2.1
1	F	65	PRO	2.1
1	E	12	SER	2.1
1	F	389	ASN	2.1
1	A	67	CYS	2.1
1	A	274	CYS	2.1
1	A	262	SER	2.1
1	A	463	GLY	2.1
1	A	491	TYR	2.1
1	C	337	GLY	2.1
1	C	401	ASN	2.1
1	B	458	ASN	2.1
1	E	192	LYS	2.1
1	A	474	ASP	2.1
1	F	87	ASN	2.1
1	A	236	ASP	2.1
1	A	457	ASP	2.1
1	F	129	LEU	2.1

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Mol	Chain	Res	Type	RSRZ
1	F	355	HIS	2.1
1	C	477	CYS	2.1
1	D	160	ILE	2.0
1	D	337	GLY	2.0
1	F	390	THR	2.0
1	D	391	GLN	2.0
1	B	65	PRO	2.0
1	D	393	GLU	2.0
1	E	360	GLY	2.0
1	F	272	GLY	2.0
1	F	118	PRO	2.0
1	F	125	HIS	2.0
1	E	466	CYS	2.0

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 (i)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	NAG	B	601	14/15	0.63	0.15	73,117,133,136	0
2	NAG	C	601	14/15	0.67	0.19	64,115,135,142	0
2	NAG	A	602	14/15	0.69	0.12	71,116,131,133	0
2	NAG	C	603	14/15	0.70	0.14	88,123,145,146	0
2	NAG	B	603	14/15	0.72	0.14	83,111,121,126	0
2	NAG	F	602	14/15	0.73	0.11	81,121,138,145	0
2	NAG	E	602	14/15	0.74	0.15	95,124,139,140	0
2	NAG	E	601	14/15	0.75	0.15	62,84,111,112	0
2	NAG	B	602	14/15	0.76	0.17	85,105,123,124	0
2	NAG	D	602	14/15	0.79	0.13	105,123,126,127	0

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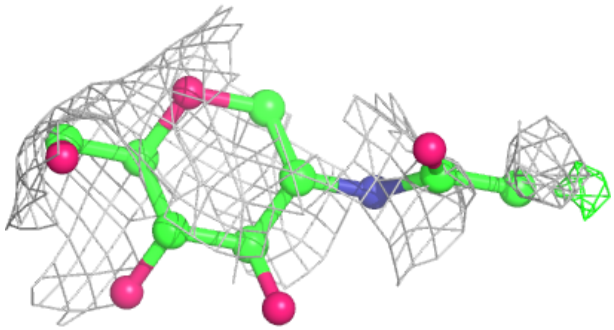
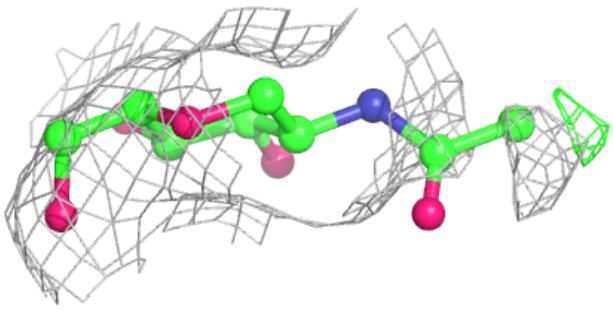
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	NAG	A	601	14/15	0.80	0.22	66,92,105,108	0
2	NAG	D	601	14/15	0.85	0.11	47,60,83,88	0
2	NAG	F	601	14/15	0.86	0.13	66,93,104,104	0
2	NAG	C	602	14/15	0.86	0.13	52,64,85,87	0

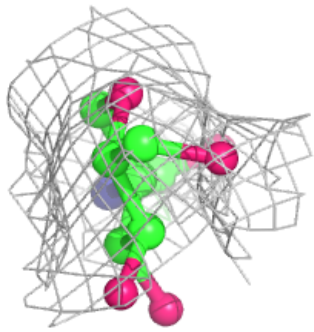
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around NAG B 601:

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

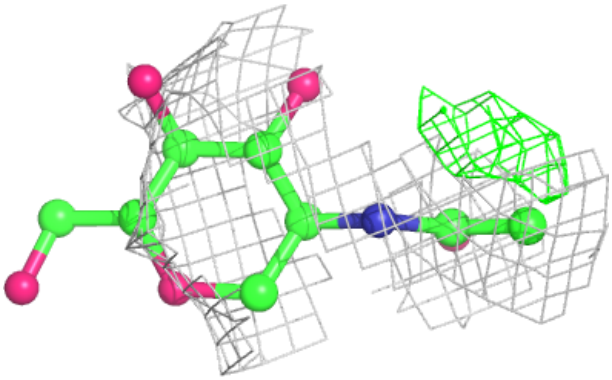


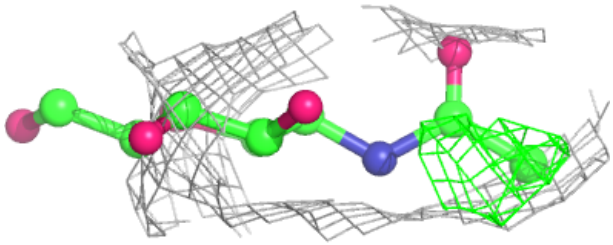


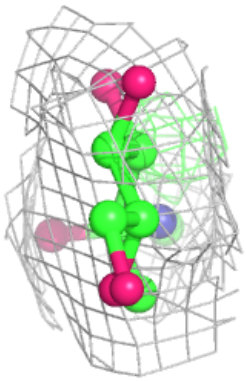


Electron density around NAG C 601:

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

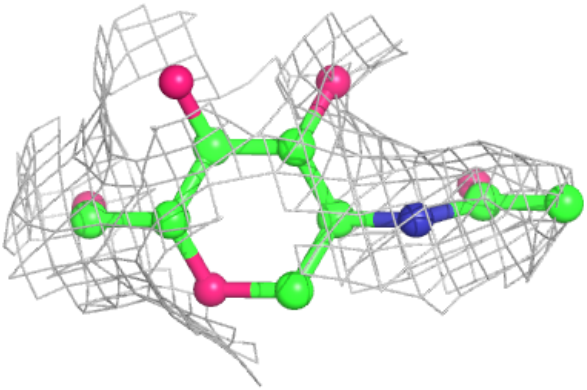


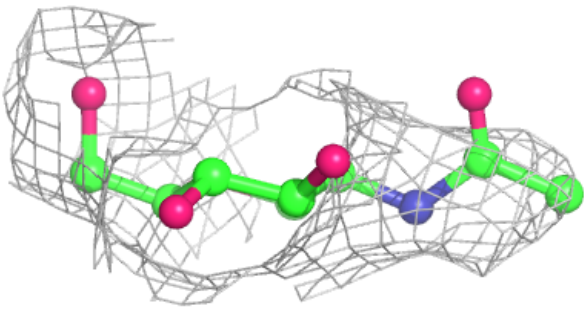




Electron density around NAG A 602:

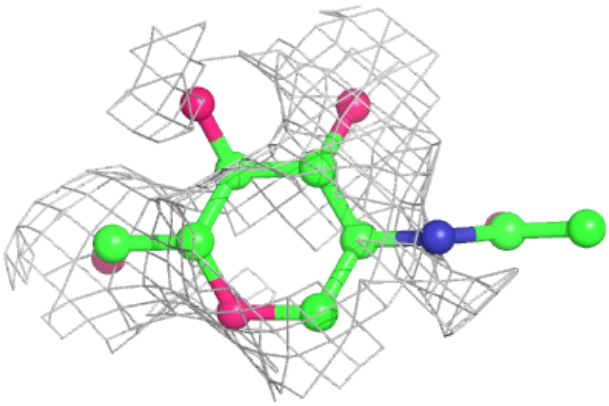
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

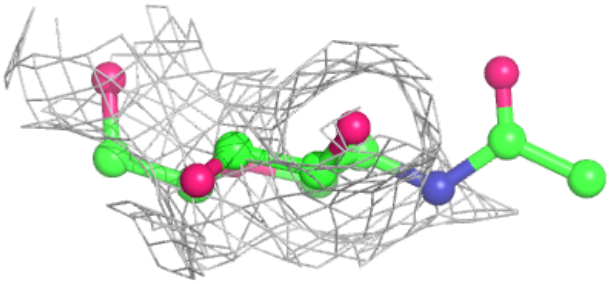


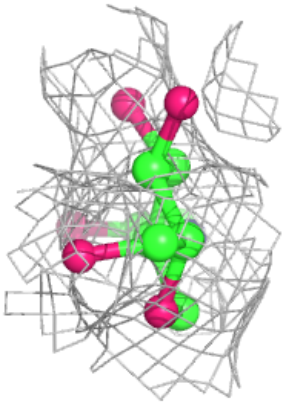


Electron density around NAG C 603:

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

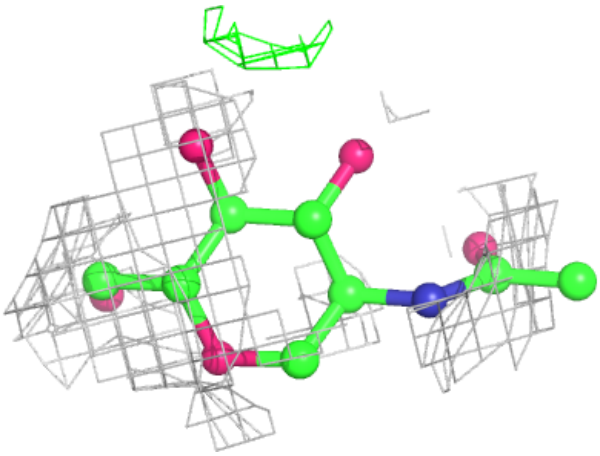


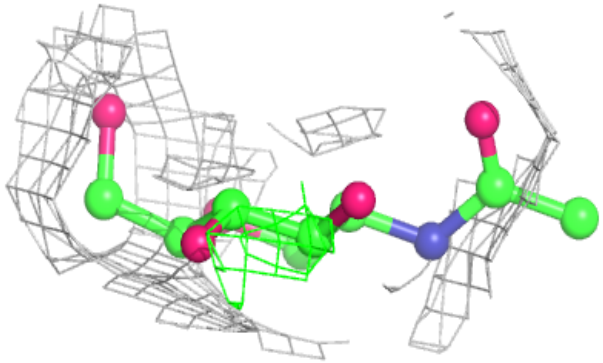


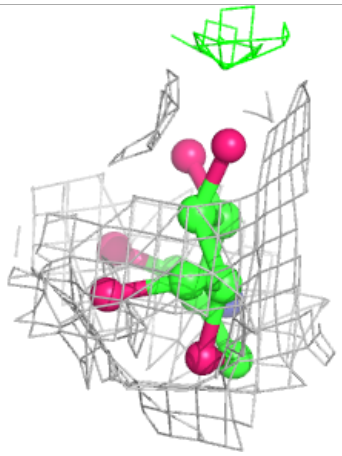


Electron density around NAG B 603:

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

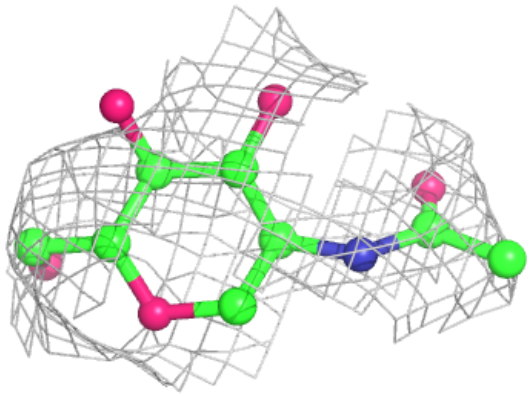


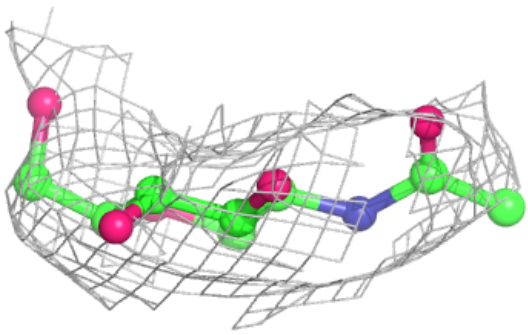


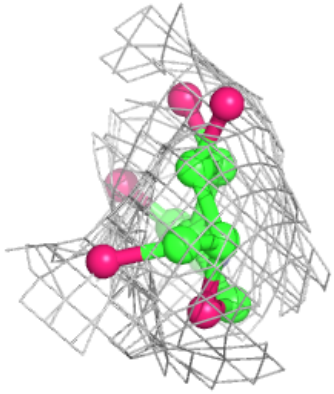


Electron density around NAG F 602:

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

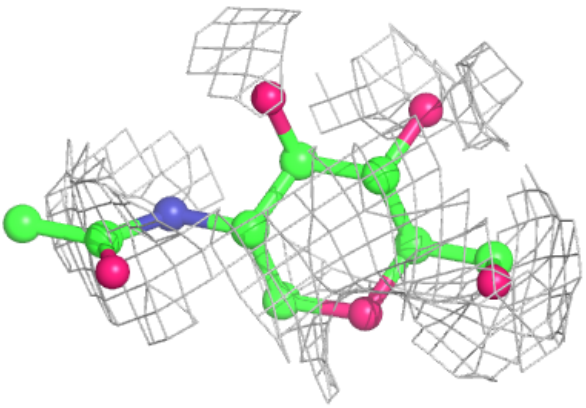


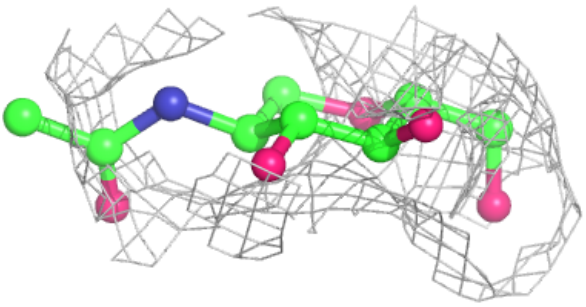


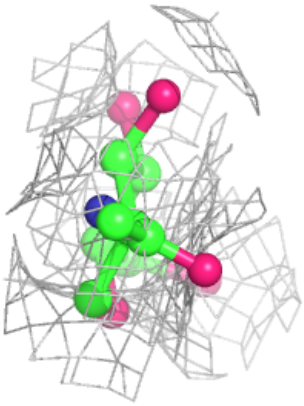


Electron density around NAG E 602:

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

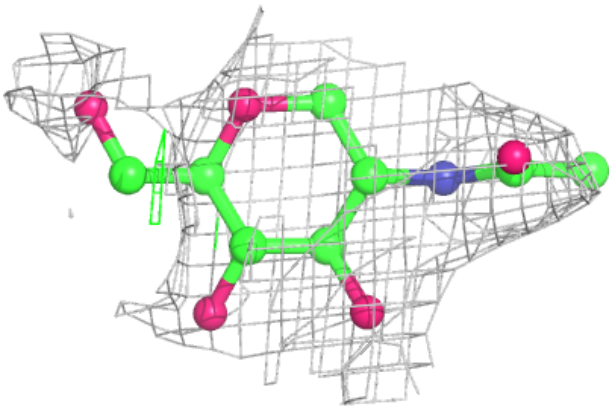


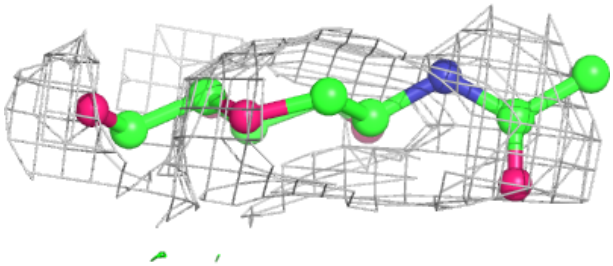


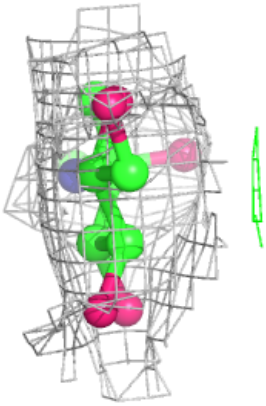


Electron density around NAG E 601:

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

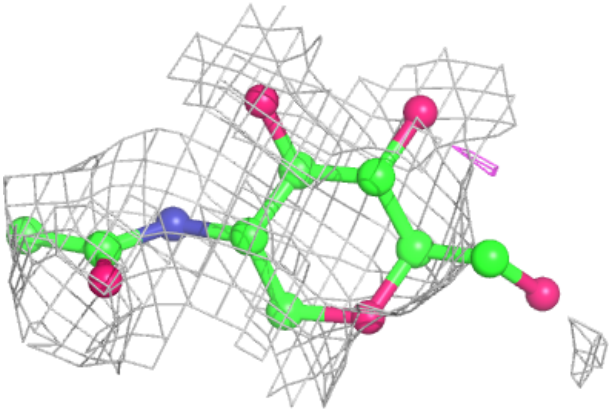


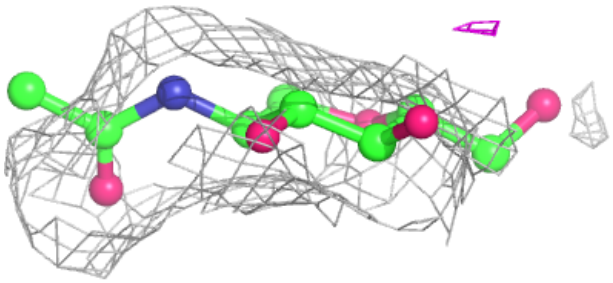


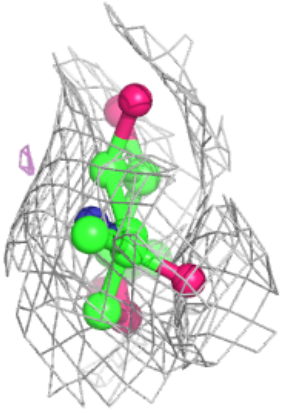


Electron density around NAG B 602:

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

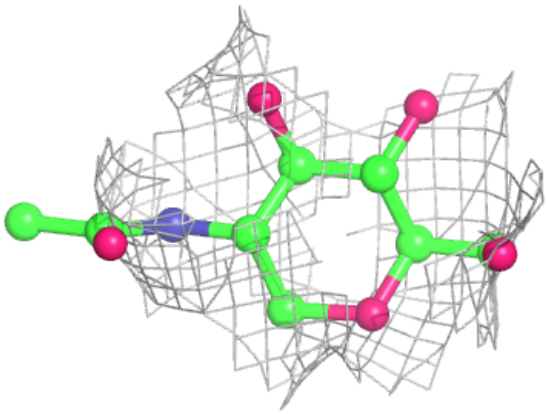


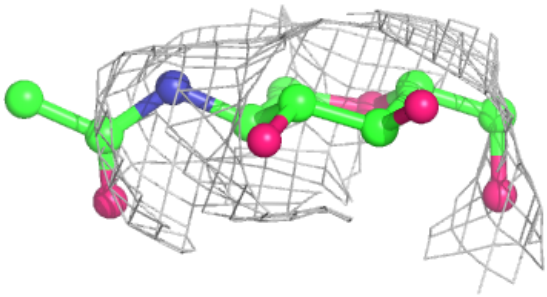


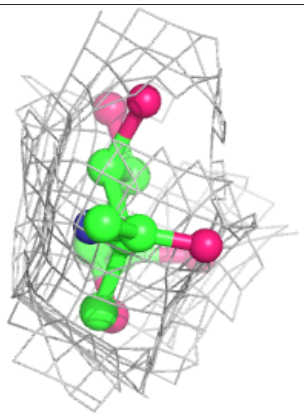


Electron density around NAG D 602:

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

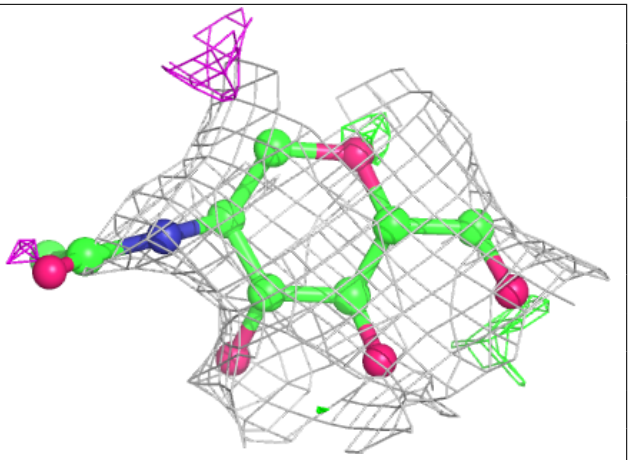


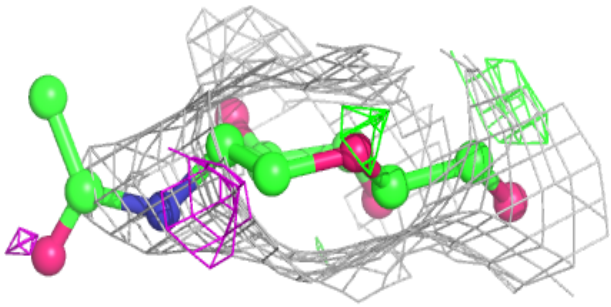


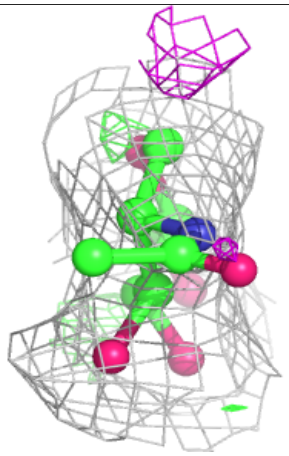


Electron density around NAG A 601:

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

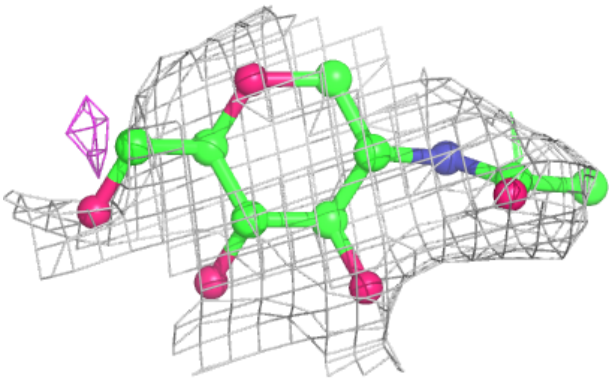


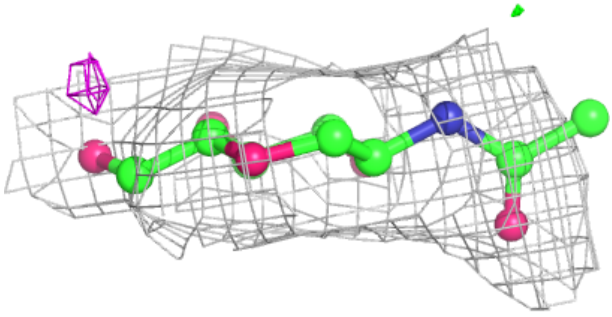


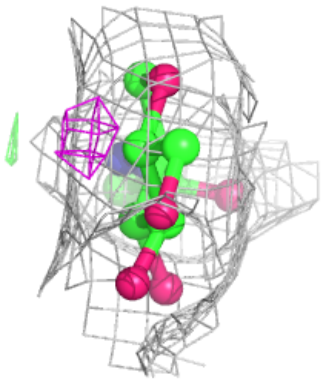


Electron density around NAG D 601:

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

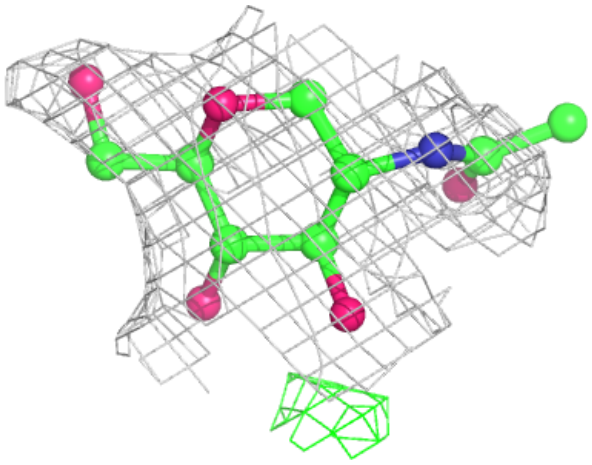


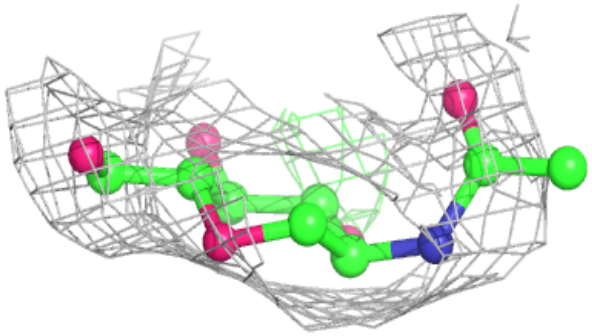


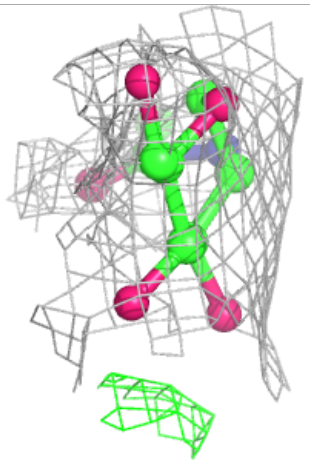


Electron density around NAG F 601:

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

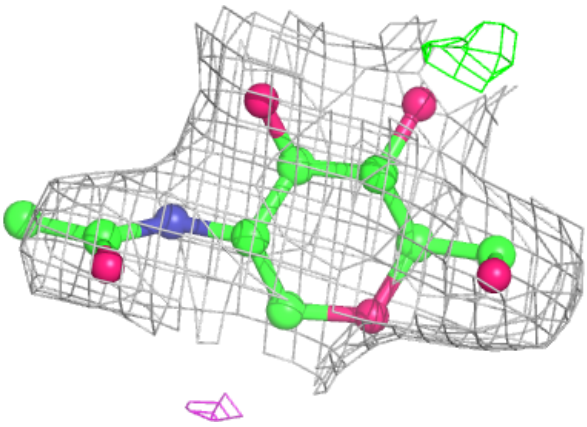


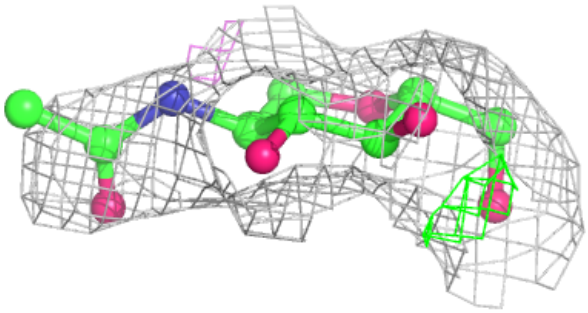


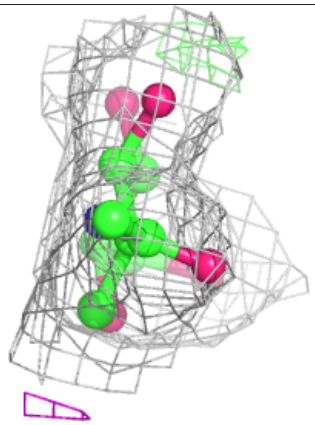


Electron density around NAG C 602:

$2mF_o$-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

There are no such residues in this entry.