Full wwPDB X-ray Structure Validation Report (i)

Oct 30, 2023 – 10:04 AM EDT

PDB ID	:	8SWY
Title	:	PARP4 ART domain bound to NADH
Authors	:	Frigon, L.; Pascal, J.M.
Deposited on	:	2023-05-19
Resolution	:	2.55 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 (i) 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 (i)) were used in the production of this report:

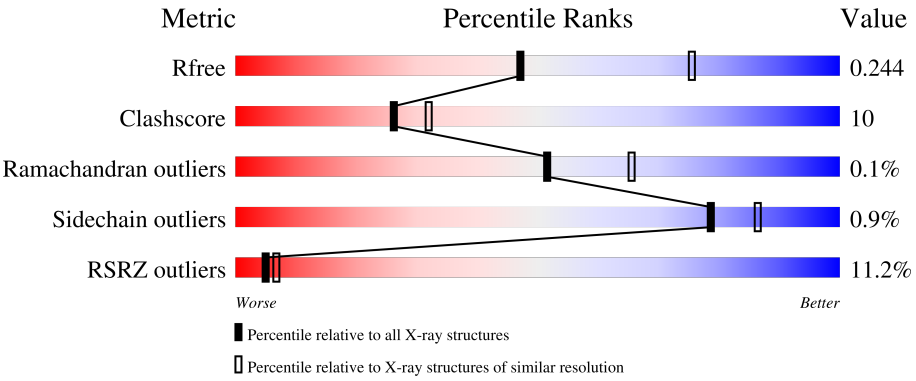
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.55 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1284 (2.56-2.52)
Clashscore	141614	1332 (2.56-2.52)
Ramachandran outliers	138981	1315 (2.56-2.52)
Sidechain outliers	138945	1315 (2.56-2.52)
RSRZ outliers	127900	1272 (2.56-2.52)

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	259	7% 77% 18% ·
1	B	259	9% 75% 17% 9%
1	C	259	15% 74% 16% · 7%

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	GOL	B	601	-	-	-	X

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 5841 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 Protein mono-ADP-ribosyltransferase PARP4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	248	Total	C	N	O	S	0	0	0
			1941	1221	333	377	10			
1	B	236	Total	C	N	O	S	0	1	0
			1857	1172	315	360	10			
1	C	240	Total	C	N	O	S	0	0	0
			1880	1183	320	367	10			

There are 27 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	315	SER	-	expression tag	UNP Q9UKK3
A	357	GLY	-	linker	UNP Q9UKK3
A	358	SER	-	linker	UNP Q9UKK3
A	359	GLY	-	linker	UNP Q9UKK3
A	360	SER	-	linker	UNP Q9UKK3
A	361	GLY	-	linker	UNP Q9UKK3
A	362	SER	-	linker	UNP Q9UKK3
A	363	GLY	-	linker	UNP Q9UKK3
A	364	GLY	-	linker	UNP Q9UKK3
B	315	SER	-	expression tag	UNP Q9UKK3
B	357	GLY	-	linker	UNP Q9UKK3
B	358	SER	-	linker	UNP Q9UKK3
B	359	GLY	-	linker	UNP Q9UKK3
B	360	SER	-	linker	UNP Q9UKK3
B	361	GLY	-	linker	UNP Q9UKK3
B	362	SER	-	linker	UNP Q9UKK3
B	363	GLY	-	linker	UNP Q9UKK3
B	364	GLY	-	linker	UNP Q9UKK3
C	315	SER	-	expression tag	UNP Q9UKK3
C	357	GLY	-	linker	UNP Q9UKK3
C	358	SER	-	linker	UNP Q9UKK3
C	359	GLY	-	linker	UNP Q9UKK3
C	360	SER	-	linker	UNP Q9UKK3

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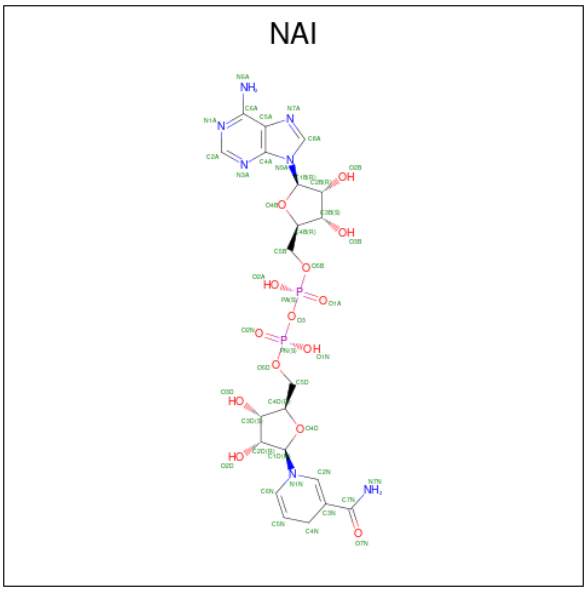
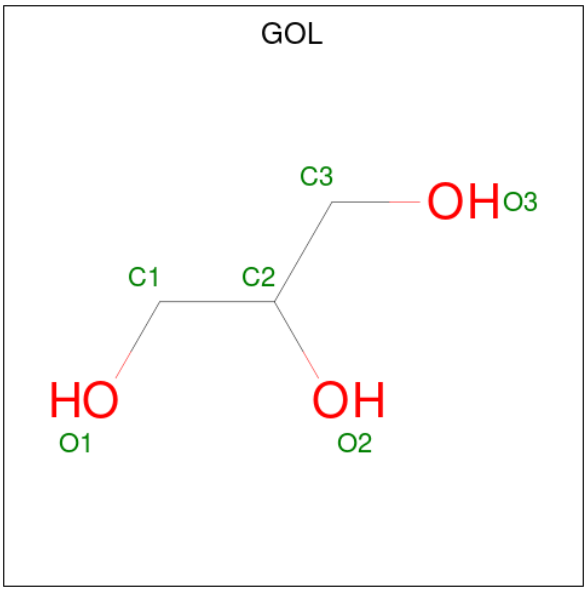
Chain	Residue	Modelled	Actual	Comment	Reference
C	361	GLY	-	linker	UNP Q9UKK3
C	362	SER	-	linker	UNP Q9UKK3
C	363	GLY	-	linker	UNP Q9UKK3
C	364	GLY	-	linker	UNP Q9UKK3

- Molecule 2 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (three-letter code: NAI) (formula: $C_{21}H_{29}N_7O_{14}P_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	B	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total C O 6 3 3	0	0
3	A	1	Total C O 6 3 3	0	0
3	B	1	Total C O 6 3 3	0	0
3	B	1	Total C O 6 3 3	0	0

- Molecule 4 is water.

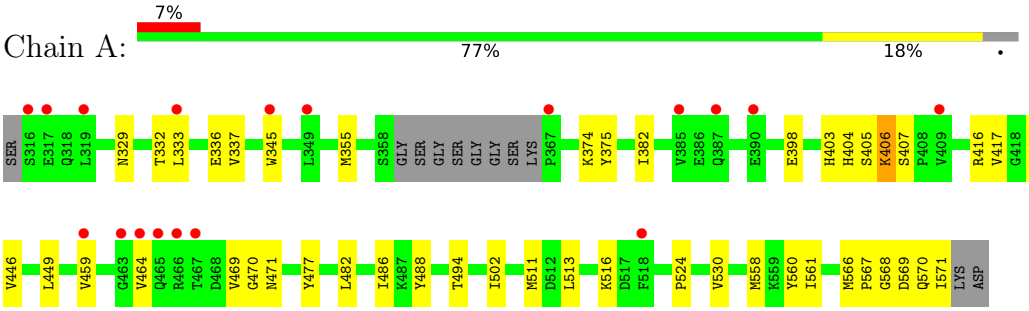
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	22	Total O 22 22	0	0
4	B	22	Total O 22 22	0	0
4	C	7	Total O 7 7	0	0

3 Residue-property plots (i)

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

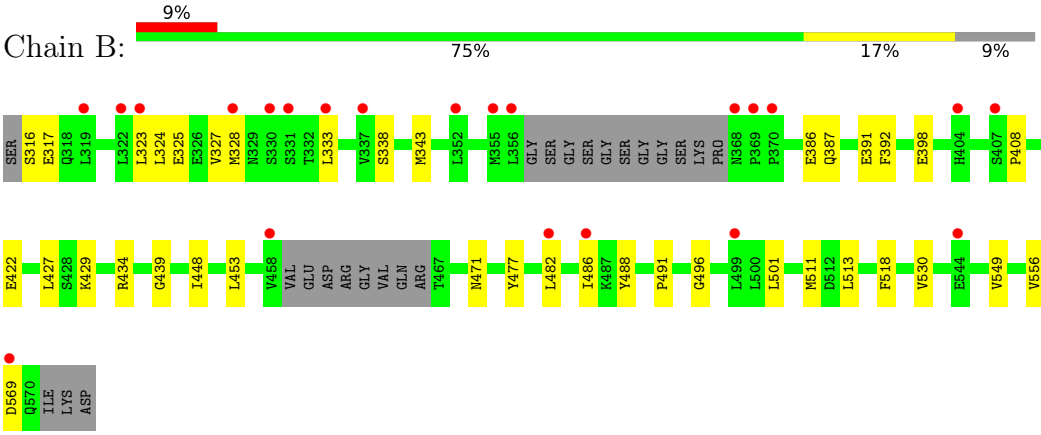
• Molecule 1: Protein mono-ADP-ribosyltransferase PARP4

Chain A:



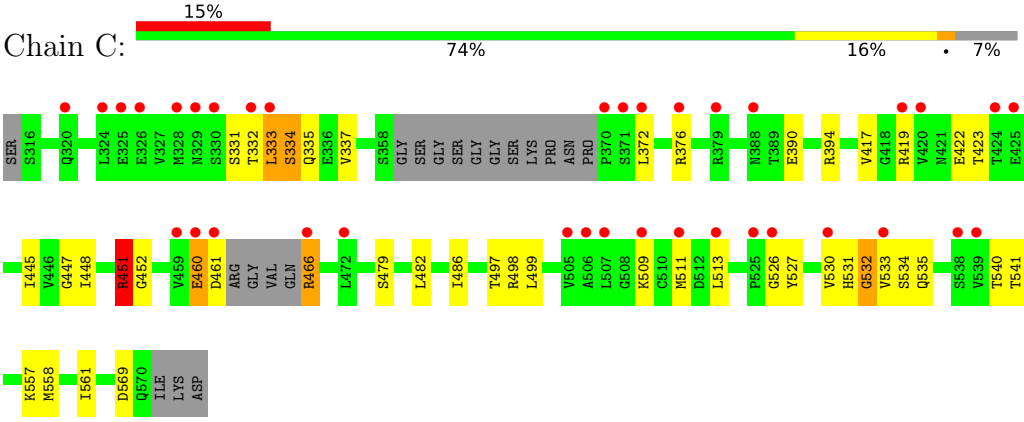
• Molecule 1: Protein mono-ADP-ribosyltransferase PARP4

Chain B:



• Molecule 1: Protein mono-ADP-ribosyltransferase PARP4

Chain C:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	116.90Å 151.70Å 104.60Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.41 – 2.55 46.41 – 2.55	Depositor EDS
% Data completeness (in resolution range)	99.9 (46.41-2.55) 100.0 (46.41-2.55)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.60 (at 2.54Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.211 , 0.254 0.209 , 0.244	Depositor DCC
R_{free} test set	1532 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å^2)	81.3	Xtriage
Anisotropy	0.245	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.32 , 65.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	5841	wwPDB-VP
Average B, all atoms (Å^2)	97.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.25% 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: NAI, GOL

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	0.44	0/1975	0.66	0/2671
1	B	0.47	0/1889	0.67	0/2555
1	C	0.48	0/1911	0.81	6/2581 (0.2%)
All	All	0.46	0/5775	0.71	6/7807 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	2

There are no bond length outliers.

All (6) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	461	ASP	N-CA-CB	16.70	140.65	110.60
1	C	334	SER	N-CA-C	-8.10	89.12	111.00
1	C	334	SER	N-CA-CB	8.05	122.57	110.50
1	C	460	GLU	N-CA-C	7.87	132.24	111.00
1	C	532	GLY	N-CA-C	-7.60	94.11	113.10
1	C	461	ASP	N-CA-C	-7.50	90.74	111.00

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	451	ARG	Sidechain

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Mol	Chain	Res	Type	Group
1	C	466	ARG	Sidechain

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1941	0	1938	42	0
1	B	1857	0	1853	36	0
1	C	1880	0	1873	44	0
2	A	44	0	27	3	0
2	B	44	0	27	5	0
3	A	12	0	16	2	0
3	B	12	0	16	2	0
4	A	22	0	0	12	0
4	B	22	0	0	2	0
4	C	7	0	0	3	0
All	All	5841	0	5750	120	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 10.

All (120) 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:345:TRP:HB3	4:A:1121:HOH:O	1.48	1.11
1:C:534:SER:HB3	1:C:546:ASP:OD1	1.51	1.11
1:C:423:THR:HG22	1:C:557:LYS:HE3	1.40	1.04
1:C:423:THR:HG22	1:C:557:LYS:CE	1.95	0.95
1:C:534:SER:CB	1:C:546:ASP:OD1	2.19	0.91
1:B:439:GLY:H	2:B:602:NAI:H72N	1.22	0.84
1:C:535:GLN:HG3	1:C:541:THR:H	1.46	0.80
1:A:471:ASN:HB2	1:A:516:LYS:HG2	1.66	0.77
1:B:427:LEU:HA	1:C:390:GLU:OE1	1.85	0.77
1:A:329:ASN:O	1:A:332:THR:HG22	1.85	0.76
1:A:423:THR:CG2	4:A:1105:HOH:O	2.33	0.76
1:A:423:THR:HG23	4:A:1105:HOH:O	1.87	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:408:PRO:HD2	4:B:712:HOH:O	1.86	0.74
1:C:486:ILE:HG23	1:C:498:ARG:NH2	2.01	0.74
1:C:423:THR:CG2	1:C:557:LYS:HE3	2.18	0.73
1:A:345:TRP:HE3	4:A:1121:HOH:O	1.70	0.72
1:A:345:TRP:CE3	4:A:1121:HOH:O	2.41	0.72
1:B:513:LEU:HD12	1:B:530[B]:VAL:CG1	2.21	0.71
1:C:372:LEU:HD21	1:C:376:ARG:NH2	2.06	0.71
1:B:566:MET:HB3	1:B:567:PRO:HD2	1.72	0.70
1:A:403:HIS:HE1	1:A:407:SER:O	1.76	0.69
1:A:494:THR:HB	4:A:1108:HOH:O	1.92	0.69
1:C:423:THR:HG22	1:C:557:LYS:NZ	2.08	0.68
1:C:531:HIS:CE1	1:C:533:VAL:HA	2.30	0.67
1:C:513:LEU:HD12	1:C:530:VAL:HG11	1.75	0.67
1:B:324:LEU:HA	1:B:327:VAL:HG22	1.77	0.66
1:B:429:LYS:HG2	1:C:390:GLU:OE2	1.97	0.64
1:A:459:VAL:HB	1:A:464:VAL:HG22	1.78	0.63
1:B:391:GLU:OE1	1:B:416:ARG:NH2	2.32	0.63
1:B:488:TYR:OH	2:B:602:NAI:H1D	1.99	0.62
1:B:448:ILE:HG21	1:B:501:LEU:HD11	1.81	0.62
1:A:513:LEU:HD12	1:A:530:VAL:CG1	2.30	0.62
1:C:429:LYS:HZ3	1:C:429:LYS:H	1.48	0.62
1:C:334:SER:O	1:C:337:VAL:N	2.33	0.62
1:A:417:VAL:HG21	1:A:561:ILE:HG13	1.82	0.61
4:A:1115:HOH:O	1:B:511:MET:CE	2.48	0.61
1:A:403:HIS:NE2	1:A:405:SER:OG	2.34	0.60
1:C:419:ARG:NH1	1:C:422:GLU:OE2	2.34	0.60
1:A:419:ARG:HD3	1:A:422:GLU:OE2	2.01	0.60
1:A:524:PRO:HG3	3:A:1002:GOL:H12	1.84	0.60
1:A:337:VAL:HG22	1:A:382:ILE:HG22	1.84	0.60
1:B:513:LEU:HD12	1:B:530[B]:VAL:HG11	1.84	0.59
1:C:448:ILE:HA	1:C:452:GLY:O	2.02	0.59
1:C:513:LEU:HG	1:C:530:VAL:HG13	1.84	0.59
1:B:325:GLU:HA	1:B:328:MET:HE2	1.85	0.59
1:C:422:GLU:OE1	1:C:558:MET:HG2	2.02	0.59
1:A:488:TYR:OH	2:A:1001:NAI:H1D	2.04	0.58
1:B:453:LEU:HD12	1:B:556:VAL:HG11	1.85	0.58
1:C:447:GLY:O	1:C:451:ARG:HG3	2.04	0.57
1:C:427:LEU:HA	1:C:429:LYS:HE2	1.86	0.57
1:B:530[A]:VAL:CG2	1:B:549:VAL:HB	2.35	0.57
1:B:482:LEU:HG	1:B:486:ILE:HD11	1.85	0.57
1:C:417:VAL:HG21	1:C:561:ILE:HG13	1.87	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:419:ARG:HB2	1:B:422:GLU:HB2	1.87	0.55
1:C:332:THR:O	1:C:333:LEU:HB2	2.07	0.55
1:B:482:LEU:O	1:B:486:ILE:HG13	2.06	0.55
1:B:513:LEU:HD22	3:B:601:GOL:H11	1.89	0.54
1:C:334:SER:O	1:C:335:GLN:C	2.46	0.53
1:A:446:VAL:CG2	4:A:1102:HOH:O	2.56	0.53
1:A:416:ARG:HD2	4:A:1110:HOH:O	2.09	0.53
1:B:333:LEU:HG	1:B:338:SER:HB2	1.90	0.53
1:C:531:HIS:CD2	1:C:532:GLY:O	2.64	0.51
1:A:446:VAL:HG22	4:A:1102:HOH:O	2.11	0.51
1:C:498:ARG:HD2	1:C:569:ASP:OD2	2.11	0.50
1:A:566:MET:O	1:A:569:ASP:HB2	2.11	0.50
1:A:336:GLU:OE1	1:A:336:GLU:N	2.29	0.50
1:A:398:GLU:O	3:A:1003:GOL:H11	2.12	0.49
1:A:419:ARG:HB2	1:A:422:GLU:HB2	1.94	0.49
2:B:602:NAI:N7N	4:B:701:HOH:O	2.32	0.49
1:B:491:PRO:HB3	1:B:496:GLY:O	2.12	0.49
1:B:387:GLN:HA	1:B:392:PHE:CD2	2.48	0.48
1:A:403:HIS:CE1	1:A:407:SER:O	2.63	0.48
1:C:509:LYS:HD2	1:C:526:GLY:O	2.14	0.48
1:C:429:LYS:HZ3	1:C:429:LYS:N	2.11	0.48
1:C:534:SER:HB3	1:C:546:ASP:CG	2.32	0.48
1:C:479:SER:HB2	4:C:605:HOH:O	2.13	0.48
1:C:497:THR:HA	4:C:601:HOH:O	2.14	0.48
1:C:445:ILE:HG13	1:C:499:LEU:HD12	1.95	0.47
1:A:513:LEU:HD12	1:A:530:VAL:HG11	1.95	0.47
1:C:479:SER:CB	4:C:605:HOH:O	2.62	0.47
1:A:511:MET:SD	1:B:511:MET:HE3	2.55	0.46
1:A:423:THR:HG21	4:A:1105:HOH:O	2.11	0.46
1:A:355:MET:HE3	1:A:355:MET:HB3	1.80	0.45
1:A:449:LEU:HD21	1:A:561:ILE:HD11	1.99	0.45
1:C:534:SER:N	1:C:546:ASP:OD1	2.50	0.45
1:C:482:LEU:HG	1:C:486:ILE:HD11	1.99	0.45
1:B:434:ARG:HE	1:B:434:ARG:HB3	1.57	0.45
2:A:1001:NAI:O1N	2:A:1001:NAI:N7N	2.48	0.45
1:A:404:HIS:HA	1:A:406:LYS:HE3	1.99	0.45
1:A:374:LYS:HE2	4:A:1121:HOH:O	2.18	0.44
1:A:477:TYR:CE2	2:A:1001:NAI:H3D	2.53	0.44
1:A:502:ILE:HB	1:A:560:TYR:HB2	1.99	0.44
1:C:419:ARG:O	1:C:423:THR:HG23	2.18	0.44
1:C:513:LEU:CD1	1:C:530:VAL:HG11	2.46	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:316:SER:OG	1:B:317:GLU:N	2.51	0.44
1:A:417:VAL:HG11	1:A:558:MET:HE3	2.00	0.43
1:C:331:SER:C	1:C:333:LEU:H	2.22	0.43
1:A:333:LEU:HD13	1:A:375:TYR:CD2	2.53	0.43
1:B:429:LYS:HA	1:B:429:LYS:HD3	1.83	0.43
1:C:532:GLY:N	1:C:547:GLU:O	2.45	0.43
1:B:398:GLU:O	3:B:603:GOL:H12	2.19	0.42
1:B:477:TYR:CE2	2:B:602:NAI:H3D	2.54	0.42
1:B:323:LEU:O	1:B:327:VAL:HG13	2.19	0.42
1:B:429:LYS:HG3	1:C:394:ARG:HB2	2.02	0.42
1:C:486:ILE:HG23	1:C:498:ARG:HH21	1.83	0.42
1:B:386:GLU:O	1:B:392:PHE:HB2	2.19	0.41
1:A:567:PRO:O	1:A:568:GLY:C	2.58	0.41
1:B:471:ASN:HA	1:B:518:PHE:CE1	2.56	0.41
1:B:568:GLY:O	1:B:569:ASP:C	2.58	0.41
1:A:469:VAL:HG12	1:A:470:GLY:O	2.21	0.41
1:A:482:LEU:O	1:A:486:ILE:HG13	2.20	0.41
1:A:567:PRO:C	1:A:569:ASP:N	2.73	0.41
1:C:531:HIS:NE2	1:C:532:GLY:O	2.54	0.41
1:B:477:TYR:CD2	2:B:602:NAI:H3D	2.56	0.41
1:C:511:MET:HB2	1:C:527:TYR:CD2	2.56	0.41
1:C:535:GLN:HG3	1:C:540:THR:HA	2.02	0.40
1:B:324:LEU:O	1:B:328:MET:N	2.54	0.40
1:A:570:GLN:O	1:A:571:ILE:C	2.59	0.40
1:A:336:GLU:H	1:A:336:GLU:CD	2.20	0.40
1:B:513:LEU:CD1	1:B:530[B]:VAL:CG1	2.95	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	244/259 (94%)	236 (97%)	8 (3%)	0	100	100
1	B	231/259 (89%)	221 (96%)	10 (4%)	0	100	100
1	C	234/259 (90%)	220 (94%)	13 (6%)	1 (0%)	34	46
All	All	709/777 (91%)	677 (96%)	31 (4%)	1 (0%)	51	65

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	333	LEU

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	223/230 (97%)	222 (100%)	1 (0%)	91	95
1	B	214/230 (93%)	213 (100%)	1 (0%)	88	93
1	C	216/230 (94%)	212 (98%)	4 (2%)	57	72
All	All	653/690 (95%)	647 (99%)	6 (1%)	78	86

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	406	LYS
1	B	343	MET
1	C	429	LYS
1	C	451	ARG
1	C	460	GLU
1	C	466	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 monosaccharides in this entry.

5.6 Ligand geometry

6 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	NAI	B	602	-	42,48,48	0.48	0	47,73,73	0.81	2 (4%)
3	GOL	A	1002	-	5,5,5	0.09	0	5,5,5	0.24	0
3	GOL	B	601	-	5,5,5	0.08	0	5,5,5	0.23	0
3	GOL	B	603	-	5,5,5	0.09	0	5,5,5	0.22	0
3	GOL	A	1003	-	5,5,5	0.09	0	5,5,5	0.22	0
2	NAI	A	1001	-	42,48,48	0.45	0	47,73,73	0.80	2 (4%)

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	NAI	B	602	-	-	11/25/72/72	0/5/5/5
3	GOL	A	1002	-	-	0/4/4/4	-
3	GOL	B	601	-	-	4/4/4/4	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GOL	B	603	-	-	0/4/4/4	-
3	GOL	A	1003	-	-	2/4/4/4	-
2	NAI	A	1001	-	-	6/25/72/72	0/5/5/5

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	1001	NAI	C3N-C2N-N1N	-2.58	119.42	123.10
2	B	602	NAI	C5A-C6A-N6A	2.44	124.06	120.35
2	A	1001	NAI	C5A-C6A-N6A	2.28	123.82	120.35
2	B	602	NAI	C3N-C2N-N1N	-2.12	120.08	123.10

There are no chirality outliers.

All (23) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1001	NAI	O4D-C1D-N1N-C6N
2	B	602	NAI	O4B-C4B-C5B-O5B
2	B	602	NAI	PA-O3-PN-O5D
2	B	602	NAI	C5D-O5D-PN-O1N
2	B	602	NAI	O4D-C1D-N1N-C6N
3	B	601	GOL	C1-C2-C3-O3
3	A	1003	GOL	O2-C2-C3-O3
2	B	602	NAI	C3B-C4B-C5B-O5B
3	A	1003	GOL	C1-C2-C3-O3
3	B	601	GOL	O1-C1-C2-C3
3	B	601	GOL	O1-C1-C2-O2
3	B	601	GOL	O2-C2-C3-O3
2	B	602	NAI	C2D-C1D-N1N-C2N
2	A	1001	NAI	C2D-C1D-N1N-C2N
2	A	1001	NAI	O4B-C4B-C5B-O5B
2	B	602	NAI	C5D-O5D-PN-O3
2	B	602	NAI	C5D-O5D-PN-O2N
2	B	602	NAI	C3D-C4D-C5D-O5D
2	B	602	NAI	C2D-C1D-N1N-C6N
2	A	1001	NAI	C2D-C1D-N1N-C6N
2	A	1001	NAI	O4D-C4D-C5D-O5D
2	B	602	NAI	PN-O3-PA-O2A
2	A	1001	NAI	C3D-C4D-C5D-O5D

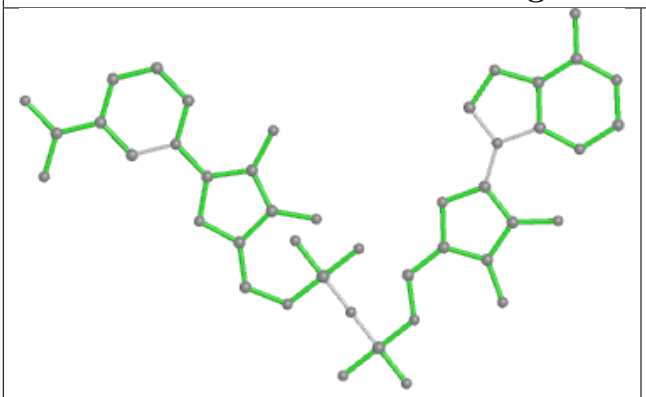
There are no ring outliers.

6 monomers are involved in 12 short contacts:

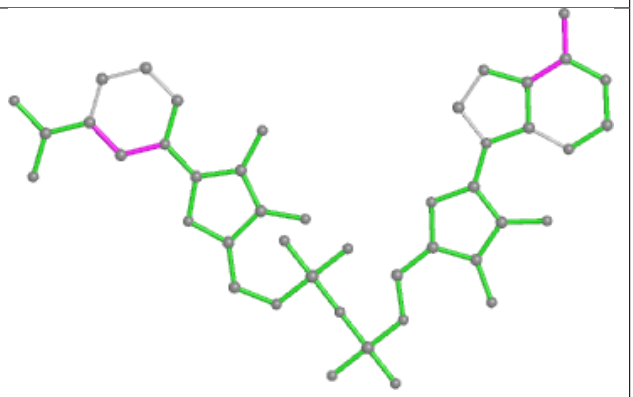
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	602	NAI	5	0
3	A	1002	GOL	1	0
3	B	601	GOL	1	0
3	B	603	GOL	1	0
3	A	1003	GOL	1	0
2	A	1001	NAI	3	0

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

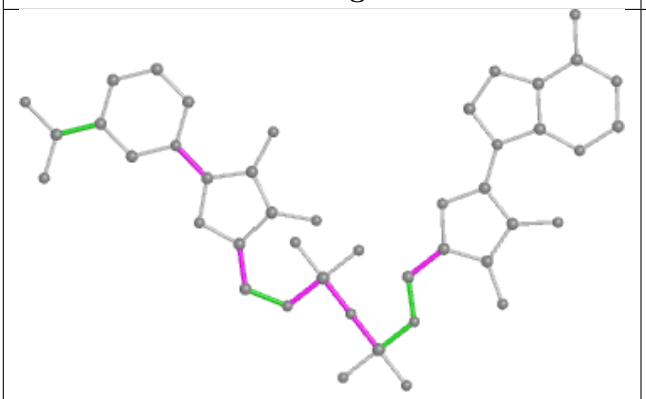
Ligand NAI B 602



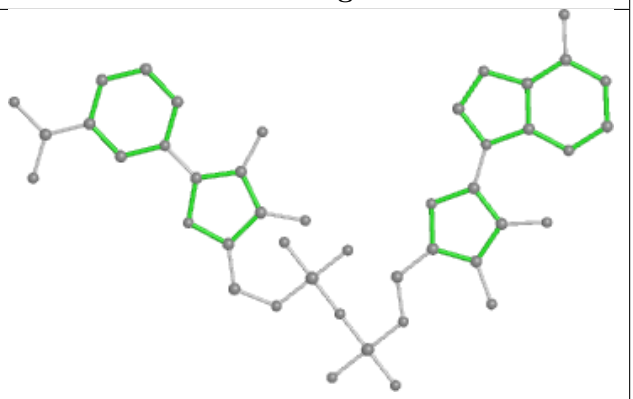
Bond lengths



Bond angles

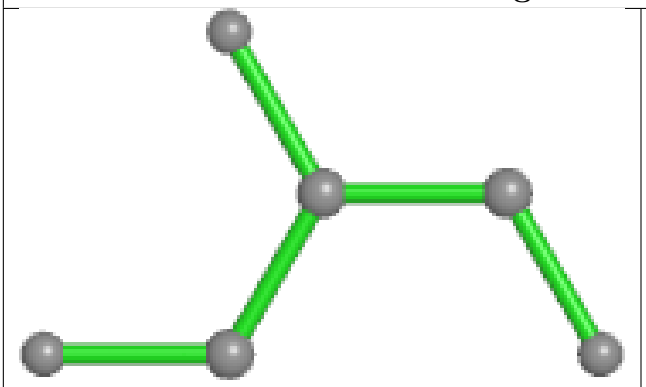


Torsions

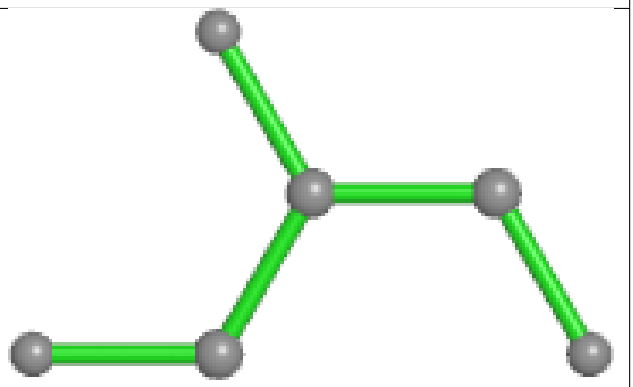


Rings

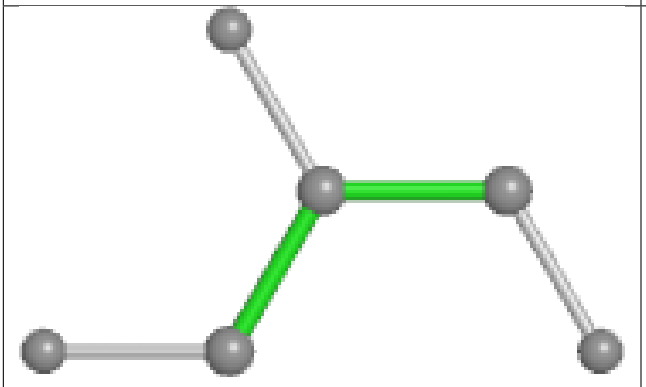
Ligand GOL A 1002



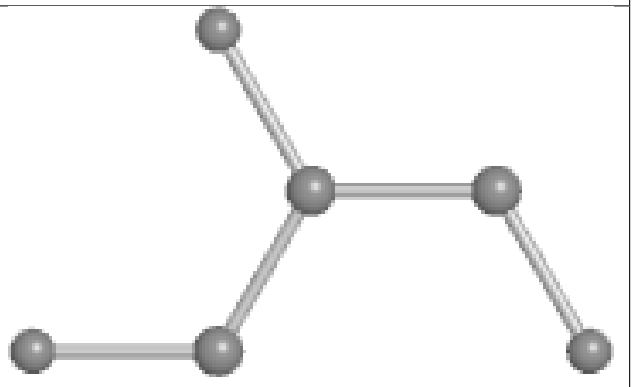
Bond lengths



Bond angles

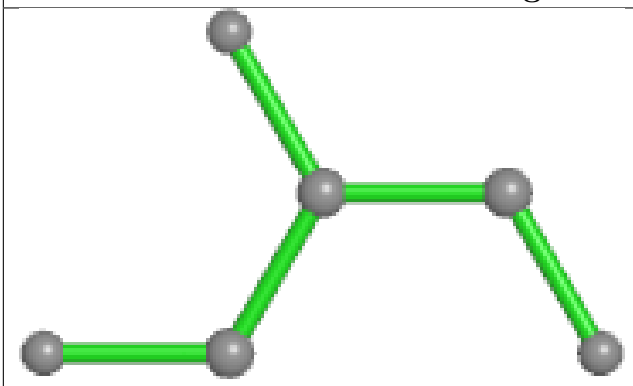


Torsions

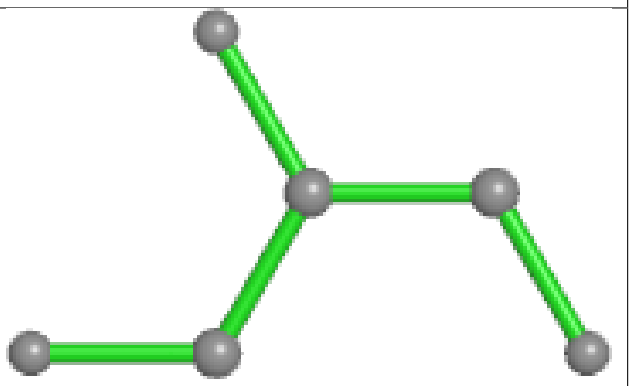


Rings

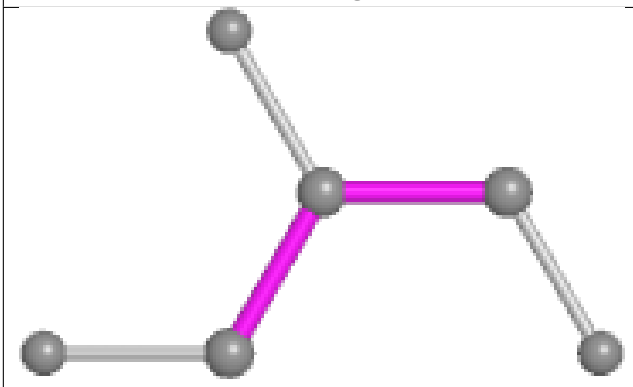
Ligand GOL B 601



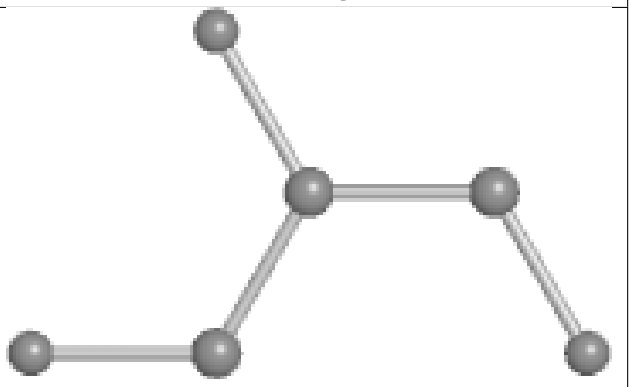
Bond lengths



Bond angles

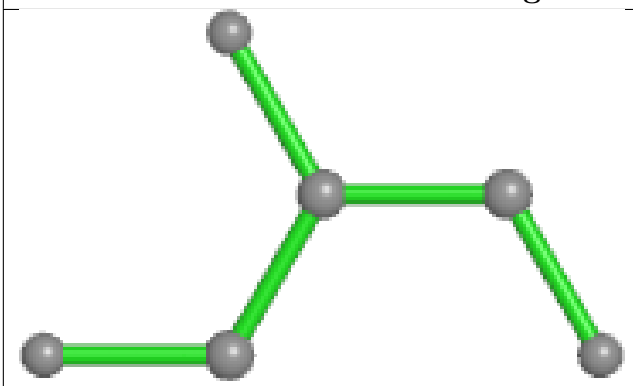


Torsions

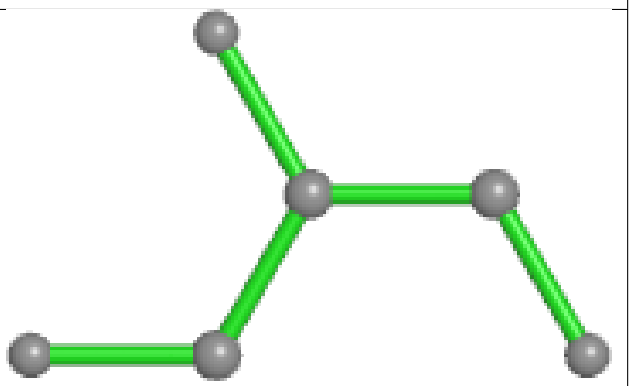


Rings

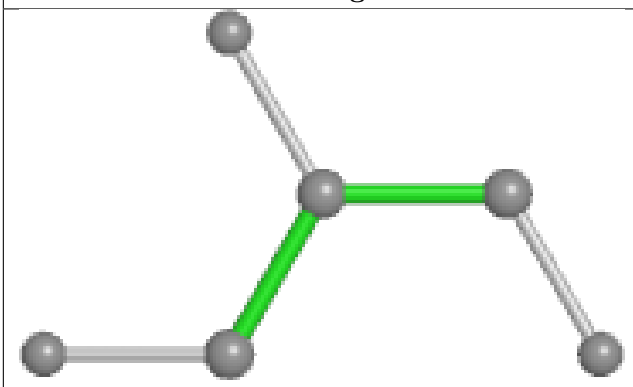
Ligand GOL B 603



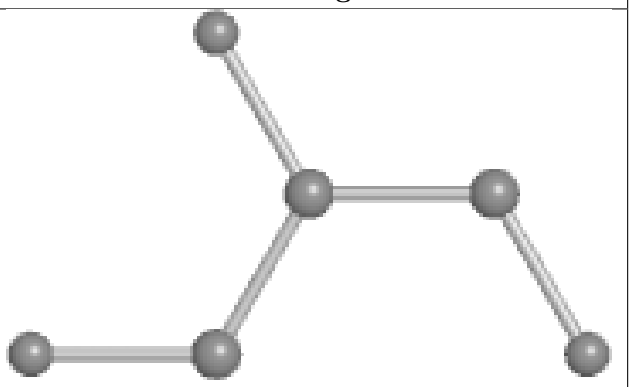
Bond lengths



Bond angles

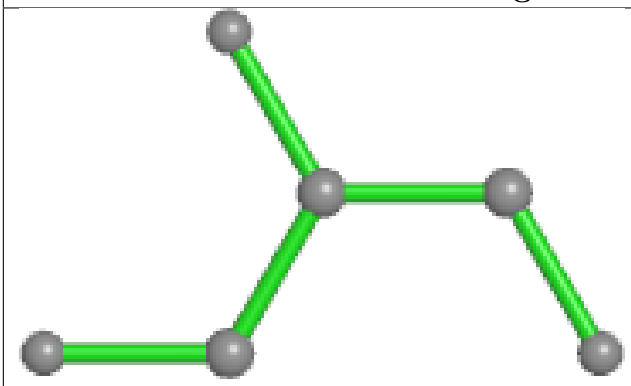


Torsions

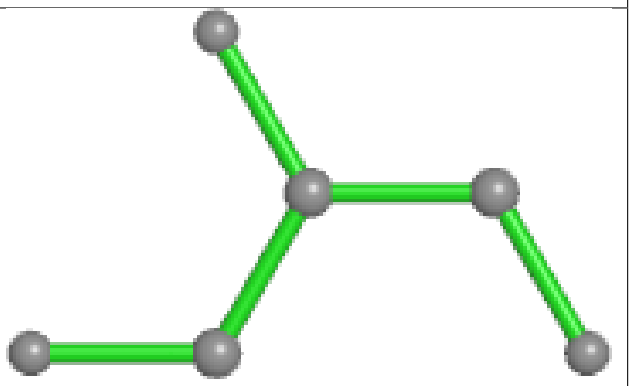


Rings

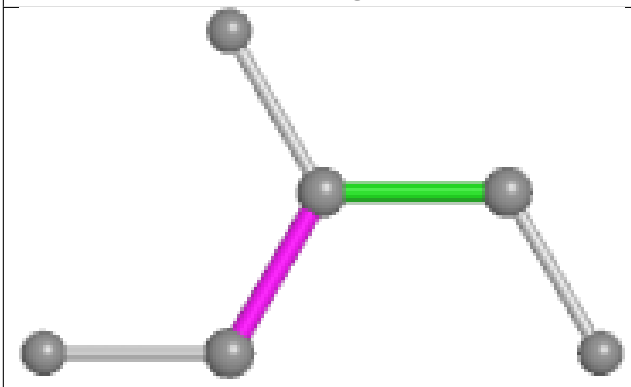
Ligand GOL A 1003



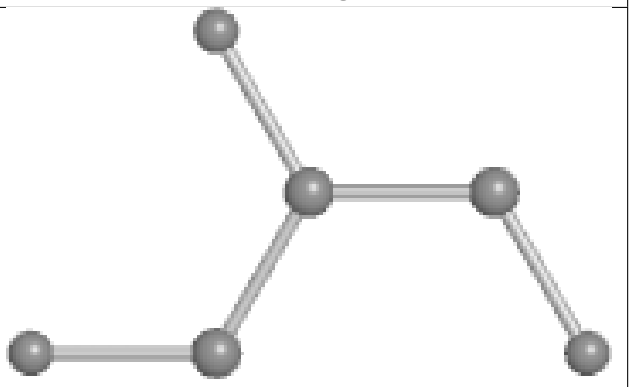
Bond lengths



Bond angles

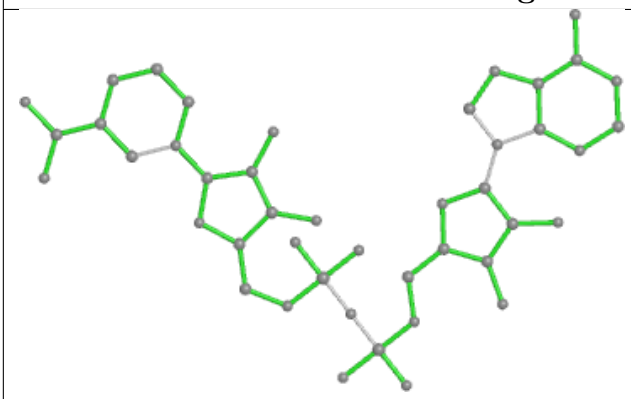


Torsions

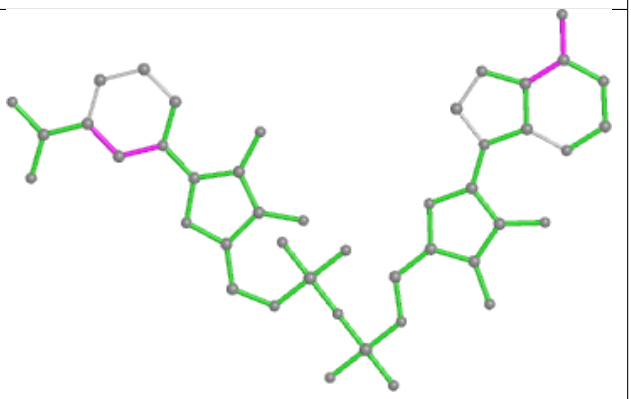


Rings

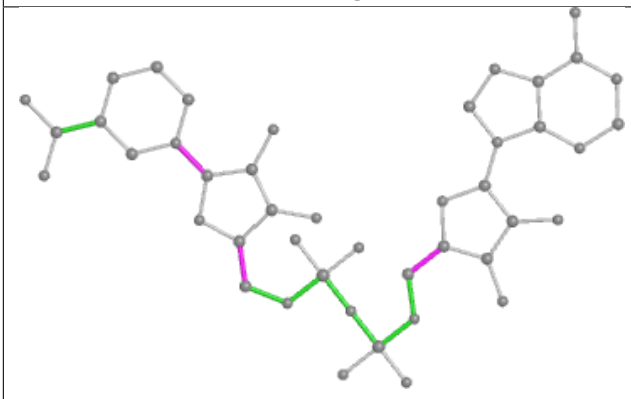
Ligand NAI A 1001



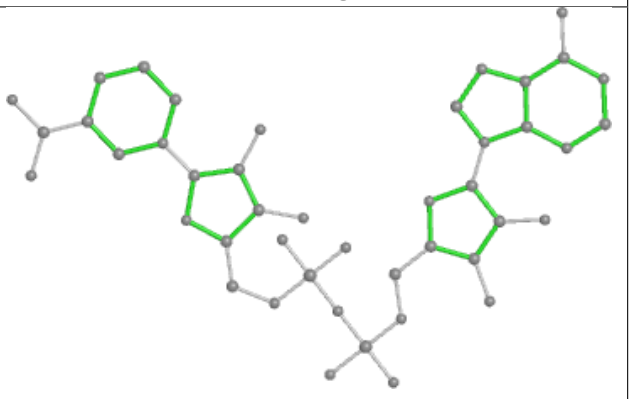
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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	248/259 (95%)	0.63	18 (7%) 15 18	61, 84, 136, 176	0
1	B	236/259 (91%)	0.66	23 (9%) 7 9	55, 87, 174, 210	0
1	C	240/259 (92%)	0.95	40 (16%) 1 1	66, 100, 176, 195	0
All	All	724/777 (93%)	0.75	81 (11%) 5 7	55, 89, 164, 210	0

All (81) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	328	MET	8.2
1	A	466	ARG	7.1
1	A	463	GLY	5.6
1	C	330	SER	5.4
1	C	426	PHE	5.1
1	A	459	VAL	5.1
1	C	513	LEU	4.9
1	C	530	VAL	4.9
1	C	376	ARG	4.8
1	C	329	ASN	4.8
1	C	332	THR	4.6
1	C	326	GLU	4.4
1	C	505	VAL	4.3
1	C	430	LEU	4.3
1	C	506	ALA	4.2
1	A	316	SER	4.1
1	B	330	SER	4.1
1	B	323	LEU	4.0
1	C	333	LEU	3.9
1	A	464	VAL	3.8
1	C	507	LEU	3.8
1	C	324	LEU	3.7
1	B	370	PRO	3.7

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Mol	Chain	Res	Type	RSRZ
1	C	427	LEU	3.6
1	B	458	VAL	3.6
1	C	372	LEU	3.4
1	B	368	ASN	3.4
1	C	460	GLU	3.4
1	C	420	VAL	3.4
1	C	371	SER	3.4
1	B	356	LEU	3.3
1	C	424	THR	3.2
1	C	543	PHE	3.2
1	A	465	GLN	3.1
1	A	349	LEU	3.1
1	B	355	MET	3.0
1	B	352	LEU	3.0
1	C	466	ARG	3.0
1	B	319	LEU	3.0
1	B	331	SER	3.0
1	B	333	LEU	2.9
1	B	566	MET	2.9
1	C	325	GLU	2.9
1	B	482	LEU	2.8
1	C	320	GLN	2.8
1	A	409	VAL	2.7
1	C	370	PRO	2.7
1	C	379	ARG	2.7
1	B	407	SER	2.7
1	B	569	ASP	2.6
1	C	388	ASN	2.6
1	B	404	HIS	2.6
1	B	337	VAL	2.5
1	B	486	ILE	2.5
1	A	467	THR	2.5
1	A	390	GLU	2.5
1	C	509	LYS	2.4
1	A	518	PHE	2.3
1	C	472	LEU	2.3
1	A	345	TRP	2.3
1	A	387	GLN	2.3
1	A	367	PRO	2.2
1	C	461	ASP	2.2
1	C	539	VAL	2.2
1	A	317	GLU	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	385	VAL	2.2
1	A	333	LEU	2.2
1	C	526	GLY	2.2
1	C	511	MET	2.2
1	C	419	ARG	2.1
1	A	319	LEU	2.1
1	B	499	LEU	2.1
1	B	322	LEU	2.1
1	B	369	PRO	2.1
1	C	459	VAL	2.0
1	C	538	SER	2.0
1	B	544	GLU	2.0
1	C	425	GLU	2.0
1	C	533	VAL	2.0
1	B	328	MET	2.0
1	C	525	PRO	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)

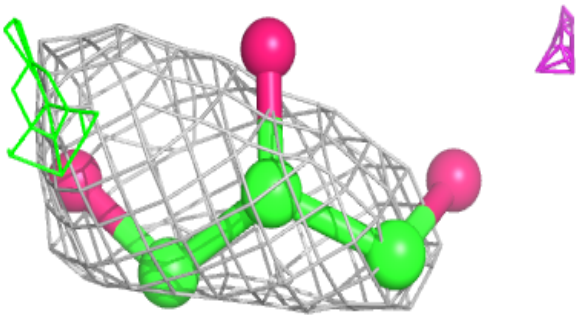
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

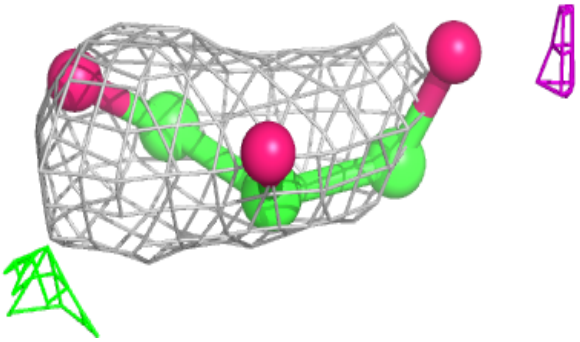
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	GOL	B	601	6/6	0.70	0.64	107,110,112,122	0
3	GOL	A	1003	6/6	0.73	0.35	109,121,127,132	0
3	GOL	B	603	6/6	0.81	0.53	104,117,121,121	0
2	NAI	A	1001	44/44	0.86	0.27	70,83,99,104	44
3	GOL	A	1002	6/6	0.87	0.32	87,91,108,113	0
2	NAI	B	602	44/44	0.87	0.21	68,81,98,103	44

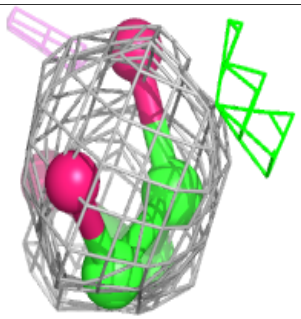
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around GOL 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)

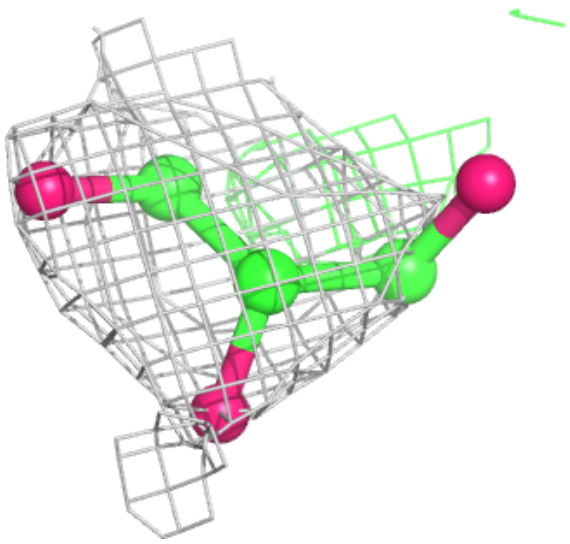


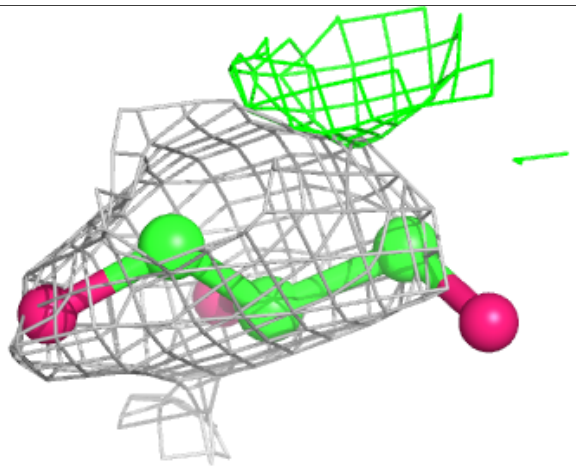


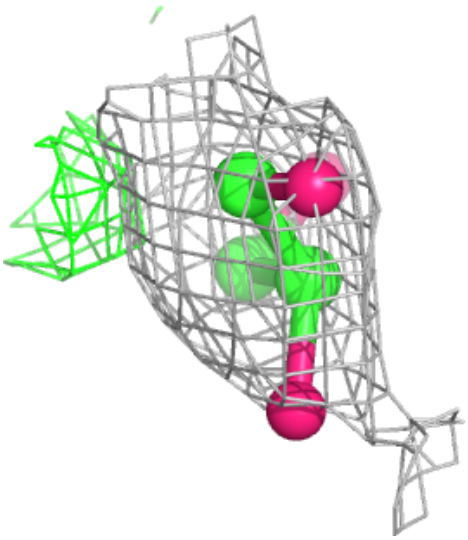


Electron density around GOL A 1003:

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

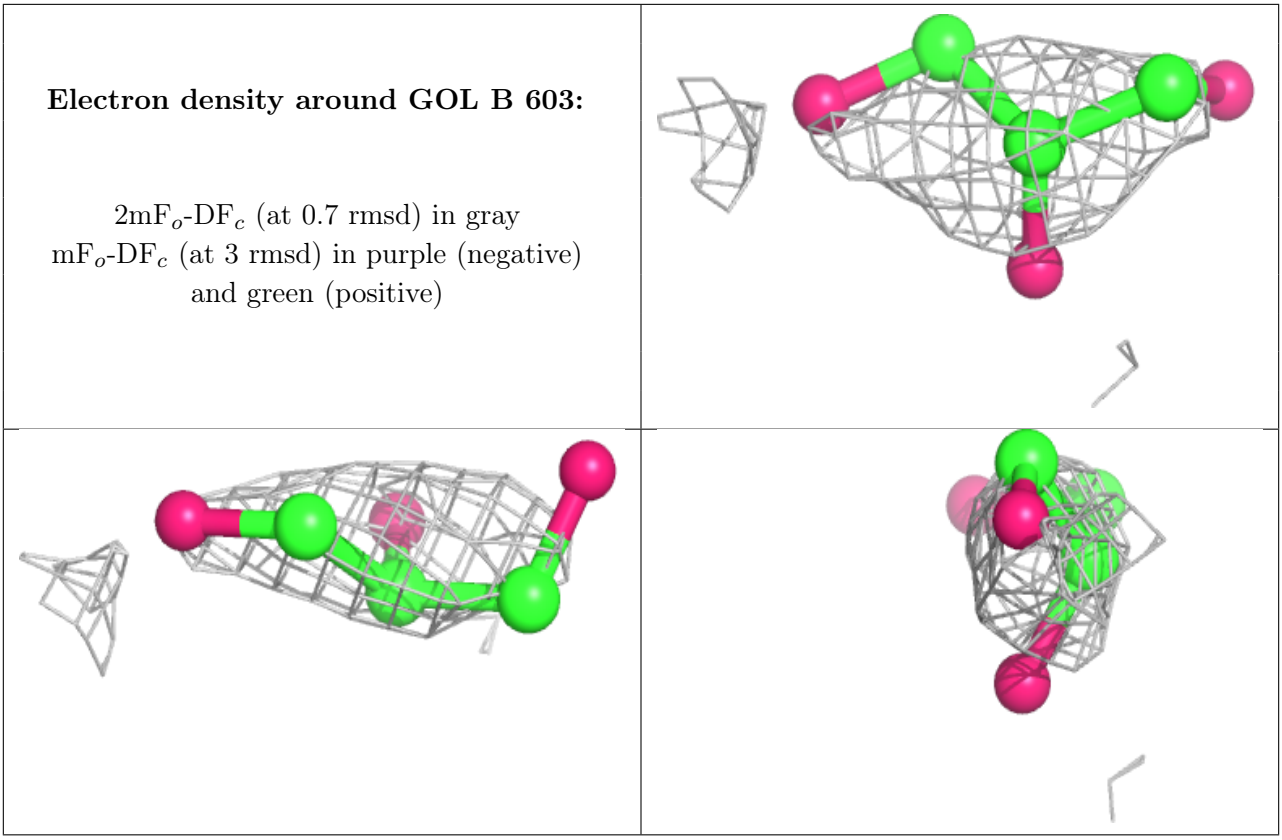






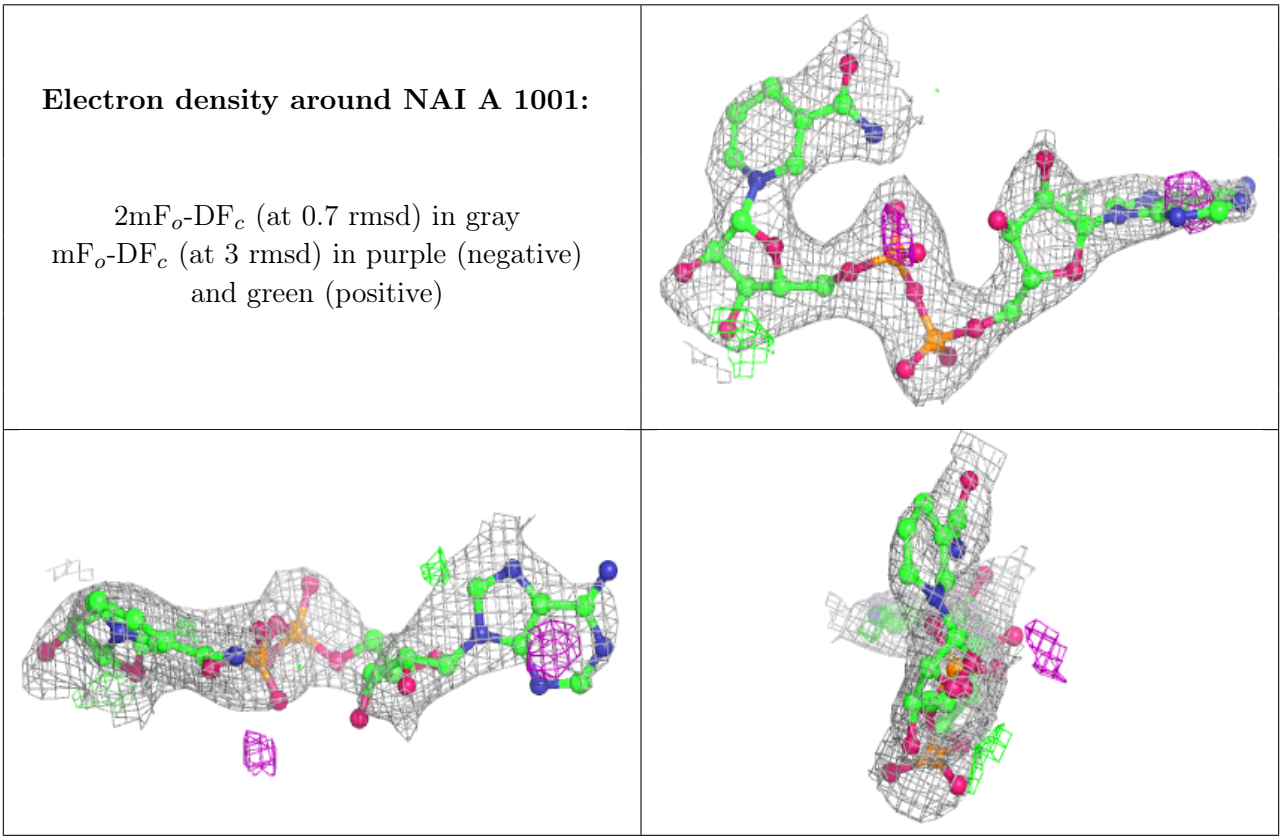
Electron density around GOL B 603:

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



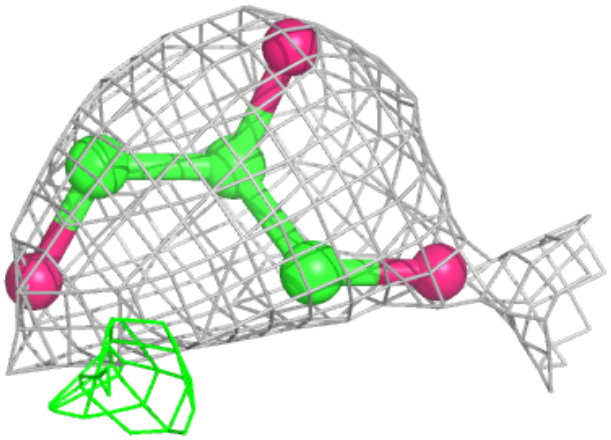
Electron density around NAI A 1001:

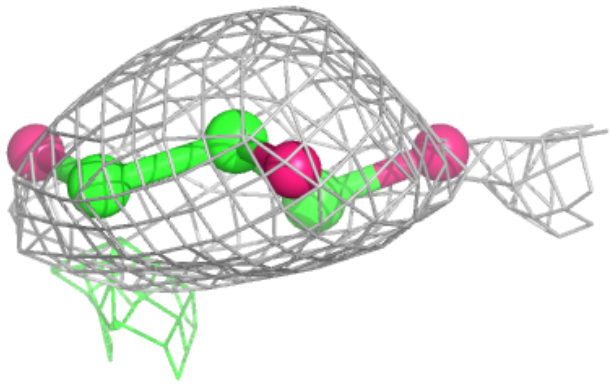
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

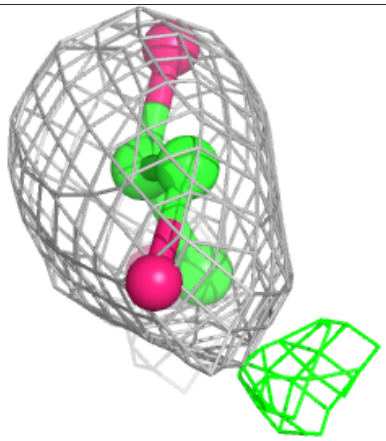


Electron density around GOL A 1002:

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

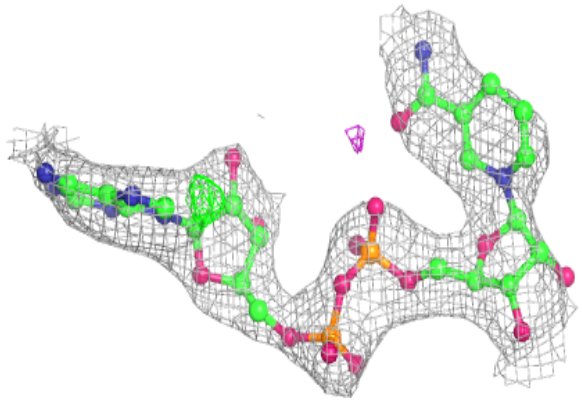


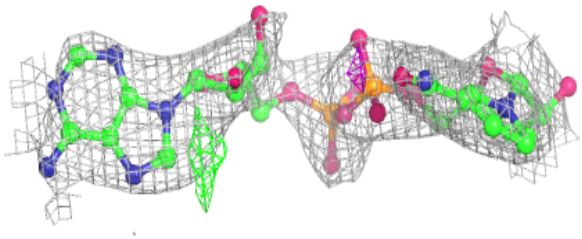


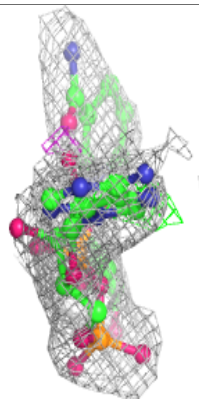


Electron density around NAI B 602:

$2mF_o$-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 (i)

There are no such residues in this entry.