Full wwPDB X-ray Structure Validation Report ⓘ

Nov 22, 2023 – 06:04 PM JST

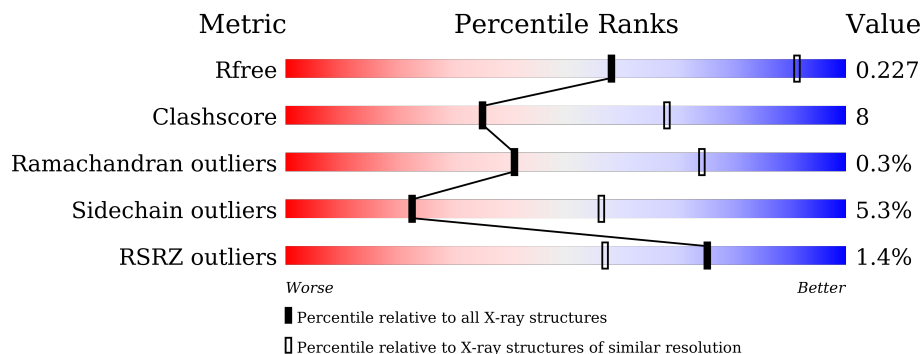|		
PDB ID	:	7W5N
Title	:	The crystal structure of the reduced form of Gluconobacter oxydans WSH-004 SNDH
Authors	:	Li, D.; Hou, X.D.; Rao, Y.J.; Yin, D.J.; Zhou, J.W.; Chen, J.
Deposited on	:	2021-11-30
Resolution	:	2.99 Å(reported)

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 2.99 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	Percentile Ranks	Value
Rfree		0.227
Clashscore		8
Ramachandran outliers		0.3%
Sidechain outliers		5.3%
RSRZ outliers		1.4%

Worse _____ *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2754 (3.00-2.96)
Clashscore	141614	3103 (3.00-2.96)
Ramachandran outliers	138981	2993 (3.00-2.96)
Sidechain outliers	138945	2996 (3.00-2.96)
RSRZ outliers	127900	2644 (3.00-2.96)

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	504	2% · 78% · 18% · ·
1	B	504	% · 79% · 17% · ·
1	C	504	2% · 72% · 24% · ·
1	D	504	% · 77% · 19% ·

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2 Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 15112 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 L-sorbosone dehydrogenase, NAD(P) dependent.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	492	Total	C	N	O	S	0	0	0
			3722	2361	645	698	18			
1	B	491	Total	C	N	O	S	0	0	0
			3715	2357	644	696	18			
1	C	490	Total	C	N	O	S	0	0	0
			3708	2352	643	695	18			
1	D	491	Total	C	N	O	S	0	0	0
			3715	2357	644	696	18			

- Molecule 2 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (three-letter code: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$) (labeled as "Ligand of Interest" by depositor).
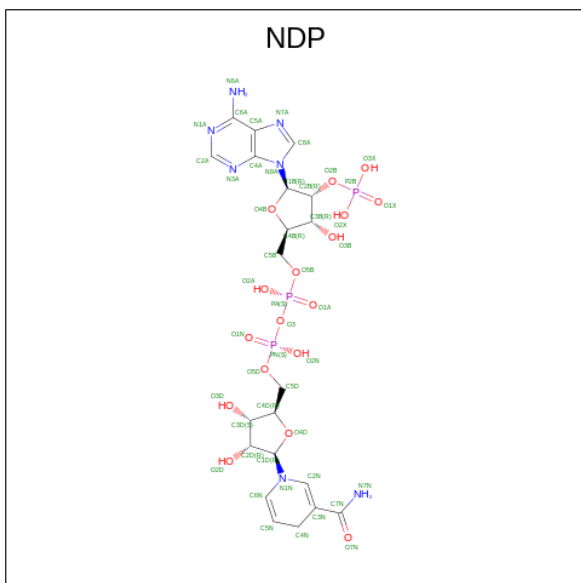
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			48	21	7	17	3		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	B	1	Total 48	C 21	N 7	O 17	P 3	0	0
2	C	1	Total 48	C 21	N 7	O 17	P 3	0	0
2	D	1	Total 48	C 21	N 7	O 17	P 3	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	16	Total 16	O 16	0	0
3	B	10	Total 10	O 10	0	0
3	C	16	Total 16	O 16	0	0
3	D	18	Total 18	O 18	0	0

3 Residue-property plots ⓘ

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

• Molecule 1: L-sorbosone dehydrogenase, NAD(P) dependent
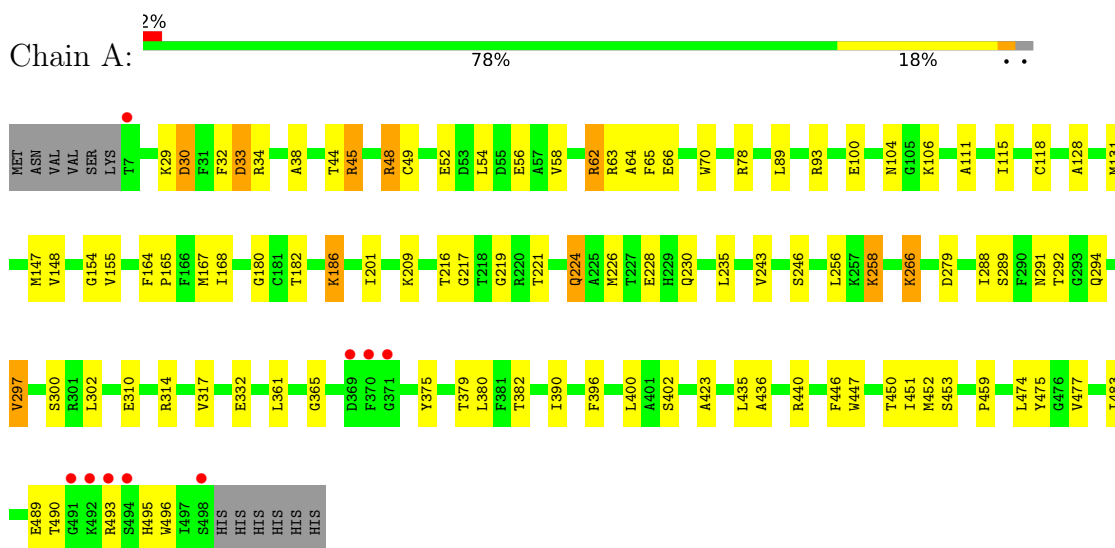
• Molecule 1: L-sorbosone dehydrogenase, NAD(P) dependent

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Chain D:
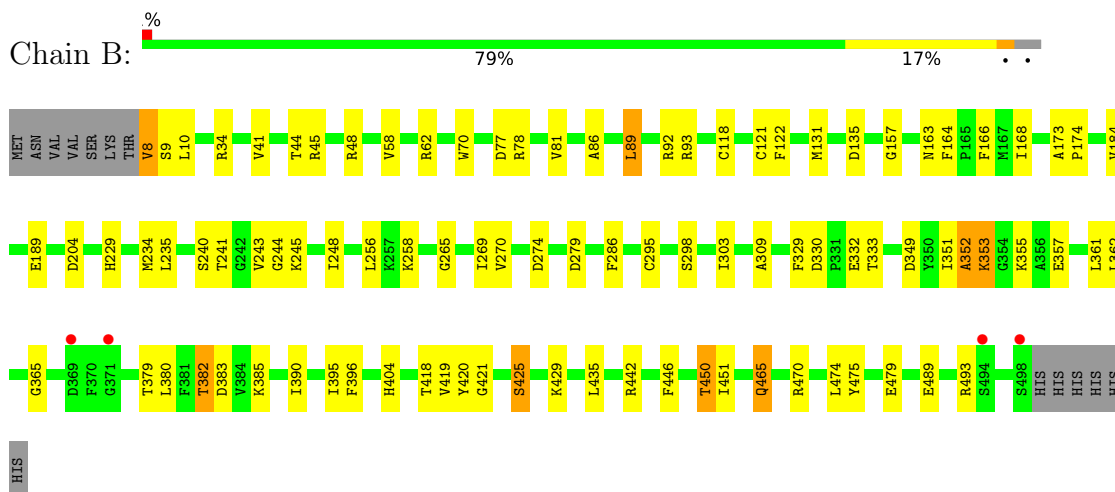
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	80.24Å　　118.82Å　　109.02Å 90.00°　　93.32°　　90.00°	Depositor
Resolution (Å)	23.52　–　2.99 23.50　–　2.99	Depositor EDS
% Data completeness (in resolution range)	99.4 (23.52-2.99) 99.7 (23.50-2.99)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.31	Depositor
$< I/\sigma(I) >$ [1]	2.89 (at 2.99Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.171　,　0.219 0.179　,　0.227	Depositor DCC
R_{free} test set	3990 reflections (9.67%)	wwPDB-VP
Wilson B-factor (Å^2)	23.3	Xtriage
Anisotropy	0.068	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 31.0	EDS
L-test for twinning [2]	$< \lvert L \rvert > = 0.47, < L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	15112	wwPDB-VP
Average B, all atoms (Å^2)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.42% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< \lvert L \rvert >$, $< L^2 >$ 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: NDP

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	0.70	0/3797	0.83	0/5142
1	B	0.70	0/3790	0.83	0/5132
1	C	0.70	0/3783	0.83	0/5122
1	D	0.71	0/3790	0.83	0/5132
All	All	0.70	0/15160	0.83	0/20528

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	3722	0	3711	67	0
1	B	3715	0	3704	58	0
1	C	3708	0	3695	85	0
1	D	3715	0	3704	58	0
2	A	48	0	26	7	0
2	B	48	0	26	3	0
2	C	48	0	26	2	0
2	D	48	0	26	3	0
3	A	16	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	10	0	0	0	0
3	C	16	0	0	1	0
3	D	18	0	0	0	0
All	All	15112	0	14918	246	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 8.

All (246) 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:B:396:PHE:HB2	2:B:601:NDP:H6N	1.34	1.03
1:C:396:PHE:HB2	2:C:601:NDP:H6N	1.41	1.02
1:A:396:PHE:HB2	2:A:601:NDP:H6N	1.54	0.89
1:C:34:ARG:HB3	1:C:44:THR:HG22	1.61	0.80
1:D:297:VAL:HG12	1:D:423:ALA:HB2	1.67	0.76
1:A:297:VAL:HG12	1:A:423:ALA:HB2	1.69	0.74
1:A:396:PHE:CB	2:A:601:NDP:H6N	2.18	0.74
1:B:234:MET:HG3	1:B:258:LYS:HB3	1.68	0.74
1:B:361:LEU:HD11	1:B:379:THR:HG23	1.70	0.73
1:C:39:HIS:HA	1:C:372:LYS:HD2	1.71	0.73
1:A:451:ILE:HG13	1:A:452:MET:HG3	1.71	0.72
1:C:16:GLU:HA	1:C:45:ARG:HB2	1.70	0.71
1:C:295:CYS:HB2	1:C:298:SER:HB3	1.72	0.71
1:B:361:LEU:HD21	1:B:365:GLY:HA3	1.75	0.69
1:D:186:LYS:HD2	1:D:222:VAL:HG23	1.76	0.68
1:B:419:VAL:O	1:B:465:GLN:HB2	1.95	0.66
1:C:341:GLU:HG2	1:C:374:GLN:HE22	1.61	0.66
1:A:474:LEU:HB2	1:C:131:MET:HE1	1.78	0.65
1:B:396:PHE:CB	2:B:601:NDP:H6N	2.19	0.63
1:A:89:LEU:HD12	1:A:201:ILE:HD13	1.81	0.62
1:C:186:LYS:HB2	1:C:226:MET:CE	2.29	0.62
1:C:488:ILE:HG12	1:D:448:VAL:HB	1.81	0.62
1:A:111:ALA:O	1:A:115:ILE:HG12	1.99	0.62
1:C:366:GLY:O	1:C:377:GLN:HG2	2.00	0.62
1:B:470:ARG:O	1:B:479:GLU:HG3	2.00	0.61
1:C:497:ILE:HG22	1:D:322:LYS:HE3	1.83	0.61
1:D:94:ASP:OD1	1:D:112:LYS:NZ	2.29	0.61
1:A:186:LYS:HB2	1:A:226:MET:CE	2.30	0.61
1:C:419:VAL:O	1:C:465:GLN:HB2	2.01	0.61
1:B:361:LEU:HD11	1:B:379:THR:CG2	2.31	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:93:ARG:NH1	1:C:116:ASP:OD1	2.35	0.60
1:B:295:CYS:HB3	1:B:298:SER:HB3	1.84	0.59
1:B:351:ILE:HG22	1:B:355:LYS:HE2	1.84	0.59
1:C:241:THR:HA	1:C:263:LEU:HD13	1.83	0.59
1:D:219:GLY:HA3	2:D:601:NDP:C8A	2.32	0.59
1:D:207:LEU:HD11	1:D:211:VAL:HG11	1.85	0.59
1:A:32:PHE:HE1	1:A:217:GLY:HA2	1.68	0.58
1:B:390:ILE:HG22	1:B:395:ILE:HD11	1.84	0.58
1:D:93:ARG:HG3	1:D:115:ILE:HG21	1.85	0.58
1:D:89:LEU:HD11	1:D:166:PHE:CZ	2.39	0.58
1:B:164:PHE:HB2	1:B:168:ILE:HG13	1.85	0.57
1:A:118:CYS:SG	1:A:167:MET:HA	2.44	0.57
1:D:245:LYS:HA	1:D:248:ILE:HD12	1.87	0.57
1:A:266:LYS:HE2	1:A:300:SER:HB2	1.87	0.56
1:B:265:GLY:HA2	1:B:420:TYR:CG	2.41	0.56
1:D:100:GLU:OE2	1:D:165:PRO:HD2	2.05	0.56
1:D:26:ARG:NH2	1:D:56:GLU:OE1	2.38	0.56
1:B:241:THR:O	1:B:245:LYS:HG3	2.06	0.56
1:D:295:CYS:SG	1:D:297:VAL:HG23	2.46	0.56
1:A:459:PRO:HG3	1:A:475:TYR:CD2	2.39	0.56
1:B:382:THR:HG22	1:B:383:ASP:H	1.71	0.56
1:A:314:ARG:HA	1:A:317:VAL:HG22	1.88	0.55
1:C:362:LEU:HD12	1:C:380:LEU:HD12	1.87	0.55
1:A:396:PHE:HB2	2:A:601:NDP:C6N	2.30	0.55
1:A:489:GLU:OE2	1:B:450:THR:HG23	2.06	0.55
1:C:380:LEU:HD23	1:C:400:LEU:HD23	1.89	0.55
1:C:39:HIS:O	1:C:41:VAL:HG13	2.07	0.55
1:C:450:THR:HB	1:D:489:GLU:HB2	1.89	0.54
1:B:243:VAL:HG21	2:B:601:NDP:O2A	2.07	0.54
1:C:222:VAL:HG12	1:C:226:MET:HE2	1.90	0.54
1:C:237:PHE:CZ	1:C:243:VAL:HB	2.42	0.54
1:D:92:ARG:NH2	1:D:204:ASP:OD2	2.37	0.54
1:A:70:TRP:CD1	1:A:180:GLY:HA2	2.43	0.54
1:A:436:ALA:O	1:A:440:ARG:HG3	2.09	0.53
1:C:273:ALA:C	1:C:275:SER:H	2.12	0.53
1:B:48:ARG:NH1	1:B:189:GLU:OE2	2.42	0.52
1:C:222:VAL:HG12	1:C:226:MET:CE	2.38	0.52
1:D:58:VAL:HG11	1:D:229:HIS:CE1	2.44	0.52
1:C:186:LYS:HB2	1:C:226:MET:HE1	1.91	0.52
1:C:396:PHE:CD1	2:C:601:NDP:H1D	2.45	0.52
1:C:266:LYS:HE3	1:C:393:ASP:O	2.10	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:496:TRP:N	1:D:282:ASP:OD2	2.36	0.52
1:D:419:VAL:HB	1:D:465:GLN:OE1	2.10	0.52
1:B:270:VAL:HA	1:B:303:ILE:O	2.11	0.51
1:A:186:LYS:HB2	1:A:226:MET:HE3	1.92	0.51
1:C:14:PRO:HG3	1:C:42:PRO:HB2	1.92	0.51
1:C:44:THR:HG21	1:C:103:GLU:OE2	2.11	0.51
1:C:186:LYS:HB2	1:C:226:MET:HE3	1.91	0.51
1:D:185:VAL:HG12	1:D:187:PRO:HD3	1.92	0.51
1:A:30:ASP:HB2	1:A:48:ARG:NH2	2.26	0.51
1:A:493:ARG:HH12	1:B:451:ILE:HG22	1.75	0.51
1:B:475:TYR:O	1:B:479:GLU:HG2	2.10	0.51
1:A:38:ALA:HB1	1:A:375:TYR:OH	2.11	0.51
1:C:163:ASN:HB2	1:C:294:GLN:O	2.11	0.51
1:D:267:ASN:ND2	1:D:296:CYS:O	2.40	0.51
1:D:89:LEU:HD11	1:D:166:PHE:HZ	1.75	0.50
1:B:70:TRP:CH2	1:B:78:ARG:HA	2.47	0.50
1:A:34:ARG:HB3	1:A:44:THR:OG1	2.12	0.50
1:A:186:LYS:HB2	1:A:226:MET:HE1	1.94	0.50
1:C:13:LYS:HG2	1:C:14:PRO:HD2	1.94	0.50
1:D:111:ALA:O	1:D:115:ILE:HG12	2.12	0.50
1:C:20:PHE:CZ	1:C:23:GLY:HA2	2.46	0.50
1:A:490:THR:HG23	1:C:432:ASP:HA	1.94	0.49
1:C:431:ILE:O	1:C:435:LEU:HB2	2.11	0.49
1:C:438:THR:HA	1:C:446:PHE:CZ	2.48	0.49
1:B:92:ARG:NH2	1:B:204:ASP:OD2	2.41	0.49
1:C:282:ASP:CG	1:D:496:TRP:H	2.16	0.49
1:C:303:ILE:HD12	1:C:414:ILE:HB	1.94	0.49
1:A:49:CYS:HB2	1:A:216:THR:O	2.13	0.49
1:D:98:TYR:CZ	1:D:102:LEU:HD11	2.47	0.49
1:B:274:ASP:OD1	1:B:274:ASP:C	2.50	0.49
1:A:58:VAL:HG13	1:A:155:VAL:HG11	1.95	0.49
1:A:100:GLU:OE2	1:A:165:PRO:HD2	2.13	0.49
1:A:106:LYS:NZ	1:A:291:ASN:OD1	2.46	0.49
1:B:10:LEU:HD13	1:B:41:VAL:HG21	1.94	0.49
1:C:115:ILE:O	1:C:119:ILE:HG13	2.13	0.48
1:A:361:LEU:HD21	1:A:379:THR:HG23	1.94	0.48
1:C:458:THR:HG21	1:D:487:HIS:CE1	2.48	0.48
1:D:324:ARG:HG3	1:D:334:GLN:OE1	2.14	0.48
1:A:396:PHE:CG	2:A:601:NDP:H1D	2.48	0.48
1:A:496:TRP:CZ3	1:B:286:PHE:HA	2.49	0.48
1:D:150:ARG:NH1	1:D:481:THR:OG1	2.47	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:173:ALA:N	1:D:174:PRO:HD2	2.29	0.48
1:B:70:TRP:CZ3	1:B:78:ARG:HG2	2.48	0.47
1:B:135:ASP:O	1:C:136:THR:HG23	2.14	0.47
1:C:461:GLY:HA3	1:C:470:ARG:HD3	1.96	0.47
1:C:470:ARG:O	1:C:479:GLU:HG3	2.14	0.47
1:C:262:GLU:OE1	1:C:461:GLY:HA2	2.14	0.47
1:B:309:ALA:HB1	1:B:404:HIS:NE2	2.30	0.47
1:A:104:ASN:OD1	1:A:106:LYS:HG3	2.15	0.47
1:A:54:LEU:O	1:A:58:VAL:HG23	2.15	0.47
1:D:326:GLY:HA2	1:D:370:PHE:CE2	2.50	0.47
1:C:103:GLU:OE1	1:C:191:THR:HA	2.13	0.47
1:A:495:HIS:NE2	1:B:279:ASP:OD1	2.44	0.47
1:C:288:ILE:HD13	1:C:300:SER:HA	1.97	0.47
1:B:309:ALA:HB1	1:B:404:HIS:CD2	2.50	0.47
1:C:496:TRP:CD2	1:D:286:PHE:HD1	2.33	0.46
1:D:419:VAL:O	1:D:465:GLN:HB2	2.15	0.46
2:D:601:NDP:H2D	2:D:601:NDP:H2N	1.61	0.46
1:C:319:LYS:NZ	1:D:497:ILE:O	2.49	0.46
1:D:310:GLU:HG2	1:D:314:ARG:NH2	2.31	0.46
1:D:265:GLY:HA2	1:D:420:TYR:CG	2.51	0.46
1:A:219:GLY:HA3	2:A:601:NDP:C8A	2.46	0.46
1:C:21:ILE:HB	1:C:26:ARG:HH21	1.81	0.46
2:D:601:NDP:O2A	2:D:601:NDP:H3D	2.16	0.46
1:C:105:GLY:O	1:C:336:GLY:HA3	2.17	0.45
1:C:296:CYS:HB2	3:C:707:HOH:O	2.16	0.45
1:C:416:ASN:HD21	1:C:441:VAL:HA	1.82	0.45
1:D:65:PHE:HE1	1:D:152:PRO:HB2	1.81	0.45
1:B:353:LYS:HE3	1:B:353:LYS:HB2	1.66	0.45
1:D:330:ASP:HB3	1:D:333:THR:HG23	1.96	0.45
1:A:64:ALA:HB3	1:A:182:THR:HG21	1.98	0.45
1:B:86:ALA:HB2	1:B:122:PHE:HB3	1.97	0.45
1:D:118:CYS:SG	1:D:167:MET:HA	2.55	0.45
1:A:70:TRP:O	1:A:78:ARG:HD3	2.16	0.45
1:A:288:ILE:HG12	1:A:400:LEU:HB2	1.98	0.45
1:C:475:TYR:CE1	1:D:483:ILE:HD12	2.51	0.45
1:C:190:VAL:HG23	1:C:191:THR:HG23	1.99	0.45
1:C:368:VAL:O	1:C:370:PHE:N	2.48	0.45
1:C:14:PRO:HG3	1:C:42:PRO:CB	2.47	0.45
1:A:361:LEU:HD21	1:A:379:THR:CG2	2.46	0.45
1:C:117:HIS:NE2	1:C:171:GLU:OE2	2.48	0.45
1:C:118:CYS:SG	1:C:167:MET:HA	2.57	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:131:MET:HE3	1:D:131:MET:CB	2.47	0.44
1:C:324:ARG:NH2	1:C:332:GLU:O	2.46	0.44
1:D:86:ALA:HB2	1:D:122:PHE:HB3	1.98	0.44
1:C:270:VAL:HA	1:C:303:ILE:O	2.18	0.44
1:A:450:THR:HB	1:B:489:GLU:HB2	1.98	0.44
1:B:77:ASP:O	1:B:81:VAL:HG23	2.16	0.44
1:B:173:ALA:N	1:B:174:PRO:HD2	2.33	0.44
1:A:361:LEU:HA	1:A:361:LEU:HD23	1.75	0.44
1:B:451:ILE:HG23	1:B:451:ILE:O	2.17	0.44
1:A:243:VAL:O	1:A:246:SER:HB2	2.18	0.44
1:C:61:ALA:HA	1:C:210:GLY:O	2.17	0.44
1:A:128:ALA:CB	1:A:477:VAL:HG21	2.48	0.44
1:B:244:GLY:O	1:B:248:ILE:HG13	2.17	0.44
1:D:238:THR:HG23	1:D:262:GLU:HB2	2.00	0.44
1:A:65:PHE:CZ	1:A:154:GLY:HA2	2.53	0.43
1:A:361:LEU:HD11	1:A:365:GLY:HA3	2.00	0.43
1:A:147:MET:HG3	1:D:136:THR:HG21	2.00	0.43
1:A:396:PHE:CD1	2:A:601:NDP:H1D	2.53	0.43
1:B:269:ILE:HG13	1:B:425:SER:HB3	1.99	0.43
1:C:353:LYS:O	1:C:357:GLU:HG3	2.19	0.43
1:C:493:ARG:O	1:C:493:ARG:HG3	2.18	0.43
1:A:164:PHE:HB2	1:A:168:ILE:HG13	2.00	0.43
1:A:289:SER:O	1:A:292:THR:N	2.52	0.43
1:A:447:TRP:HB3	1:A:450:THR:HG23	2.01	0.43
1:C:89:LEU:HD22	1:C:115:ILE:HG23	2.01	0.43
1:A:89:LEU:CD1	1:A:201:ILE:HD13	2.47	0.43
1:C:273:ALA:C	1:C:275:SER:N	2.71	0.43
1:D:106:LYS:NZ	1:D:164:PHE:CD1	2.87	0.43
1:B:58:VAL:HG11	1:B:229:HIS:CE1	2.53	0.43
1:B:362:LEU:HD13	1:B:382:THR:OG1	2.19	0.43
1:B:435:LEU:HD23	1:B:435:LEU:HA	1.90	0.43
1:B:349:ASP:O	1:B:352:ALA:HB3	2.19	0.43
1:C:110:GLN:O	1:C:114:GLU:HG3	2.19	0.43
1:A:224:GLN:O	1:A:228:GLU:HG2	2.19	0.43
1:B:8:VAL:HG11	1:B:329:PHE:CD1	2.54	0.42
1:B:131:MET:HE3	1:D:131:MET:HB2	2.00	0.42
1:D:275:SER:OG	1:D:277:LEU:HD23	2.19	0.42
1:D:351:ILE:HG21	1:D:365:GLY:O	2.19	0.42
1:C:332:GLU:OE1	1:C:332:GLU:HA	2.19	0.42
1:C:353:LYS:HG3	1:C:354:GLY:N	2.33	0.42
1:C:482:GLN:HG2	1:D:463:PHE:CG	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:266:LYS:NZ	1:A:390:ILE:O	2.50	0.42
1:A:435:LEU:HD12	1:A:435:LEU:HA	1.91	0.42
1:C:13:LYS:CG	1:C:14:PRO:HD2	2.49	0.42
1:C:21:ILE:HG23	1:C:57:ALA:HA	2.00	0.42
1:B:89:LEU:HD21	1:B:166:PHE:CZ	2.54	0.42
1:B:118:CYS:O	1:B:121:CYS:HB2	2.20	0.42
1:B:361:LEU:HD12	1:B:361:LEU:HA	1.78	0.42
1:B:418:THR:HG23	1:B:420:TYR:O	2.18	0.42
1:C:291:ASN:O	1:C:294:GLN:HB2	2.19	0.42
1:D:435:LEU:HD23	1:D:435:LEU:HA	1.85	0.42
1:D:10:LEU:HD13	1:D:41:VAL:HG21	2.01	0.42
2:A:601:NDP:H3D	2:A:601:NDP:O1A	2.19	0.42
1:B:353:LYS:HG3	1:B:357:GLU:HG3	2.01	0.42
1:A:258:LYS:HE2	1:A:258:LYS:HB3	1.78	0.42
1:B:240:SER:OG	1:B:243:VAL:HG23	2.20	0.42
1:C:38:ALA:HB1	1:C:375:TYR:OH	2.20	0.41
1:C:489:GLU:HB2	1:D:450:THR:HB	2.01	0.41
1:A:310:GLU:O	1:A:314:ARG:HG2	2.19	0.41
1:B:157:GLY:HA2	1:B:184:VAL:O	2.20	0.41
1:B:474:LEU:HD12	1:B:474:LEU:O	2.20	0.41
1:C:102:LEU:HD23	1:C:102:LEU:HA	1.84	0.41
1:D:380:LEU:HD13	1:D:400:LEU:HD23	2.02	0.41
1:A:62:ARG:O	1:A:66:GLU:HB2	2.21	0.41
1:A:317:VAL:CG1	1:A:380:LEU:HD23	2.50	0.41
1:C:166:PHE:CD1	1:C:194:THR:HB	2.55	0.41
1:D:36:SER:HB3	1:D:39:HIS:HB2	2.02	0.41
1:B:429:LYS:HA	1:B:429:LYS:HE2	2.01	0.41
1:C:324:ARG:HG3	1:C:334:GLN:OE1	2.20	0.41
1:A:131:MET:HE1	1:C:128:ALA:N	2.36	0.41
1:C:489:GLU:OE1	1:D:450:THR:OG1	2.27	0.41
1:A:33:ASP:OD1	1:A:45:ARG:HG3	2.21	0.41
1:A:164:PHE:CD1	1:A:167:MET:HE2	2.55	0.41
1:A:302:LEU:HB3	1:A:402:SER:HA	2.02	0.41
1:C:153:ILE:HD13	1:C:234:MET:HB2	2.02	0.41
1:C:353:LYS:HE3	1:C:353:LYS:HB2	1.88	0.41
1:D:54:LEU:HD11	1:D:226:MET:HG2	2.03	0.41
1:D:362:LEU:HD13	1:D:382:THR:HG22	2.03	0.41
1:A:474:LEU:HD12	1:A:474:LEU:HA	1.92	0.41
1:C:341:GLU:CG	1:C:374:GLN:HE22	2.28	0.41
1:C:465:GLN:HG2	1:D:256:LEU:HB2	2.03	0.41
1:D:239:GLY:O	1:D:263:LEU:HA	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:30:ASP:OD2	1:A:30:ASP:N	2.50	0.40
1:B:157:GLY:O	1:B:235:LEU:HA	2.21	0.40
1:B:330:ASP:HB3	1:B:333:THR:OG1	2.22	0.40
1:A:52:GLU:O	1:A:56:GLU:HG3	2.21	0.40
1:C:405:PHE:CD1	1:C:411:ALA:HB2	2.57	0.40
1:C:421:GLY:HA3	1:C:463:PHE:HB2	2.03	0.40
1:B:34:ARG:HB3	1:B:44:THR:OG1	2.21	0.40
1:A:148:VAL:HG13	1:A:483:ILE:HG23	2.03	0.40
1:A:291:ASN:O	1:A:294:GLN:HB2	2.20	0.40
1:C:150:ARG:NH1	1:C:481:THR:OG1	2.55	0.40
1:D:110:GLN:HG3	1:D:290:PHE:HE1	1.86	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	490/504 (97%)	473 (96%)	17 (4%)	0	100	100
1	B	489/504 (97%)	470 (96%)	17 (4%)	2 (0%)	34	70
1	C	488/504 (97%)	460 (94%)	27 (6%)	1 (0%)	47	80
1	D	489/504 (97%)	468 (96%)	19 (4%)	2 (0%)	34	70
All	All	1956/2016 (97%)	1871 (96%)	80 (4%)	5 (0%)	41	74

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	352	ALA
1	C	369	ASP
1	D	421	GLY
1	B	421	GLY

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Mol	Chain	Res	Type
1	D	297	VAL

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	385/397 (97%)	362 (94%)	23 (6%)	19	51
1	B	384/397 (97%)	365 (95%)	19 (5%)	25	59
1	C	383/397 (96%)	357 (93%)	26 (7%)	16	46
1	D	384/397 (97%)	371 (97%)	13 (3%)	37	70
All	All	1536/1588 (97%)	1455 (95%)	81 (5%)	22	56

All (81) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	29	LYS
1	A	30	ASP
1	A	33	ASP
1	A	45	ARG
1	A	48	ARG
1	A	62	ARG
1	A	63	ARG
1	A	93	ARG
1	A	186	LYS
1	A	209	LYS
1	A	221	THR
1	A	224	GLN
1	A	230	GLN
1	A	235	LEU
1	A	256	LEU
1	A	258	LYS
1	A	266	LYS
1	A	279	ASP
1	A	297	VAL
1	A	332	GLU

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Mol	Chain	Res	Type
1	A	382	THR
1	A	446	PHE
1	A	453	SER
1	B	8	VAL
1	B	9	SER
1	B	45	ARG
1	B	62	ARG
1	B	89	LEU
1	B	93	ARG
1	B	163	ASN
1	B	256	LEU
1	B	332	GLU
1	B	353	LYS
1	B	380	LEU
1	B	382	THR
1	B	385	LYS
1	B	425	SER
1	B	442	ARG
1	B	446	PHE
1	B	450	THR
1	B	465	GLN
1	B	493	ARG
1	C	10	LEU
1	C	33	ASP
1	C	44	THR
1	C	89	LEU
1	C	106	LYS
1	C	108	ILE
1	C	131	MET
1	C	179	SER
1	C	235	LEU
1	C	240	SER
1	C	256	LEU
1	C	276	ASN
1	C	292	THR
1	C	306	ARG
1	C	315	LEU
1	C	346	THR
1	C	353	LYS
1	C	369	ASP
1	C	370	PHE
1	C	396	PHE

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Mol	Chain	Res	Type
1	C	408	VAL
1	C	425	SER
1	C	446	PHE
1	C	452	MET
1	C	453	SER
1	C	493	ARG
1	D	84	LYS
1	D	186	LYS
1	D	221	THR
1	D	256	LEU
1	D	297	VAL
1	D	372	LYS
1	D	396	PHE
1	D	440	ARG
1	D	446	PHE
1	D	453	SER
1	D	490	THR
1	D	493	ARG
1	D	494	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	C	276	ASN
1	C	374	GLN
1	D	117	HIS

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 (i)

4 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	NDP	D	601	-	45,52,52	0.62	0	53,80,80	0.72	2 (3%)
2	NDP	A	601	-	45,52,52	0.64	0	53,80,80	0.78	1 (1%)
2	NDP	B	601	-	45,52,52	0.63	0	53,80,80	0.82	3 (5%)
2	NDP	C	601	-	45,52,52	0.60	0	53,80,80	0.81	3 (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	NDP	D	601	-	-	15/30/77/77	0/5/5/5
2	NDP	A	601	-	-	15/30/77/77	0/5/5/5
2	NDP	B	601	-	-	12/30/77/77	0/5/5/5
2	NDP	C	601	-	-	14/30/77/77	0/5/5/5

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	601	NDP	C3N-C2N-N1N	-2.85	119.04	123.10
2	B	601	NDP	C3N-C2N-N1N	-2.37	119.72	123.10
2	B	601	NDP	O4D-C1D-C2D	-2.34	101.53	106.64
2	B	601	NDP	C5A-C6A-N6A	2.28	123.82	120.35
2	D	601	NDP	C3D-C2D-C1D	2.23	105.66	101.43
2	D	601	NDP	C5A-C6A-N6A	2.21	123.71	120.35
2	A	601	NDP	C5A-C6A-N6A	2.11	123.56	120.35
2	C	601	NDP	C5A-C6A-N6A	2.10	123.55	120.35
2	C	601	NDP	C3D-C2D-C1D	2.03	105.28	101.43

There are no chirality outliers.

All (56) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	NDP	C5B-O5B-PA-O2A
2	A	601	NDP	C5B-O5B-PA-O3
2	A	601	NDP	C5D-O5D-PN-O1N
2	A	601	NDP	C5D-O5D-PN-O2N
2	A	601	NDP	C2D-C1D-N1N-C2N
2	B	601	NDP	C5D-O5D-PN-O3
2	B	601	NDP	C5D-O5D-PN-O1N
2	B	601	NDP	C5D-O5D-PN-O2N
2	B	601	NDP	O4D-C4D-C5D-O5D
2	B	601	NDP	C3D-C4D-C5D-O5D
2	B	601	NDP	C2N-C3N-C7N-N7N
2	C	601	NDP	C5B-O5B-PA-O3
2	C	601	NDP	C5D-O5D-PN-O3
2	C	601	NDP	C5D-O5D-PN-O1N
2	C	601	NDP	C2D-C1D-N1N-C2N
2	C	601	NDP	C2N-C3N-C7N-N7N
2	D	601	NDP	C5B-O5B-PA-O3
2	D	601	NDP	C5D-O5D-PN-O1N
2	D	601	NDP	C5D-O5D-PN-O2N
2	D	601	NDP	C2D-C1D-N1N-C2N
2	D	601	NDP	C2N-C3N-C7N-N7N
2	A	601	NDP	C2D-C1D-N1N-C6N
2	C	601	NDP	C2D-C1D-N1N-C6N
2	D	601	NDP	C2D-C1D-N1N-C6N
2	A	601	NDP	O4B-C4B-C5B-O5B
2	A	601	NDP	C3B-C4B-C5B-O5B
2	B	601	NDP	C2D-C1D-N1N-C2N
2	B	601	NDP	C2D-C1D-N1N-C6N
2	C	601	NDP	C4D-C5D-O5D-PN
2	A	601	NDP	PA-O3-PN-O5D
2	C	601	NDP	PA-O3-PN-O5D
2	B	601	NDP	O4D-C1D-N1N-C6N
2	D	601	NDP	C2B-O2B-P2B-O1X
2	D	601	NDP	C5D-O5D-PN-O3
2	A	601	NDP	PN-O3-PA-O1A
2	B	601	NDP	O4D-C1D-N1N-C2N
2	A	601	NDP	C5B-O5B-PA-O1A
2	A	601	NDP	C2N-C3N-C7N-N7N
2	C	601	NDP	C5B-O5B-PA-O1A
2	D	601	NDP	C5B-O5B-PA-O1A

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Mol	Chain	Res	Type	Atoms
2	C	601	NDP	C2N-C3N-C7N-O7N
2	D	601	NDP	C2N-C3N-C7N-O7N
2	C	601	NDP	O4B-C4B-C5B-O5B
2	A	601	NDP	O4D-C1D-N1N-C2N
2	D	601	NDP	O4D-C1D-N1N-C2N
2	C	601	NDP	O4D-C1D-N1N-C2N
2	D	601	NDP	PA-O3-PN-O5D
2	B	601	NDP	C2B-O2B-P2B-O1X
2	D	601	NDP	O4B-C4B-C5B-O5B
2	A	601	NDP	C5D-O5D-PN-O3
2	C	601	NDP	C3B-C4B-C5B-O5B
2	C	601	NDP	O4D-C4D-C5D-O5D
2	D	601	NDP	C3B-C4B-C5B-O5B
2	A	601	NDP	PN-O3-PA-O2A
2	B	601	NDP	PA-O3-PN-O2N
2	D	601	NDP	PN-O3-PA-O1A

There are no ring outliers.

4 monomers are involved in 15 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	601	NDP	3	0
2	A	601	NDP	7	0
2	B	601	NDP	3	0
2	C	601	NDP	2	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.

Full wwPDB X-ray Structure Validation Report

Ligand NDP D 601

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP A 601

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP B 601

Bond lengths

Bond angles

Torsions

Rings

Ligand NDP C 601

Bond lengths

Bond angles

Torsions

Rings
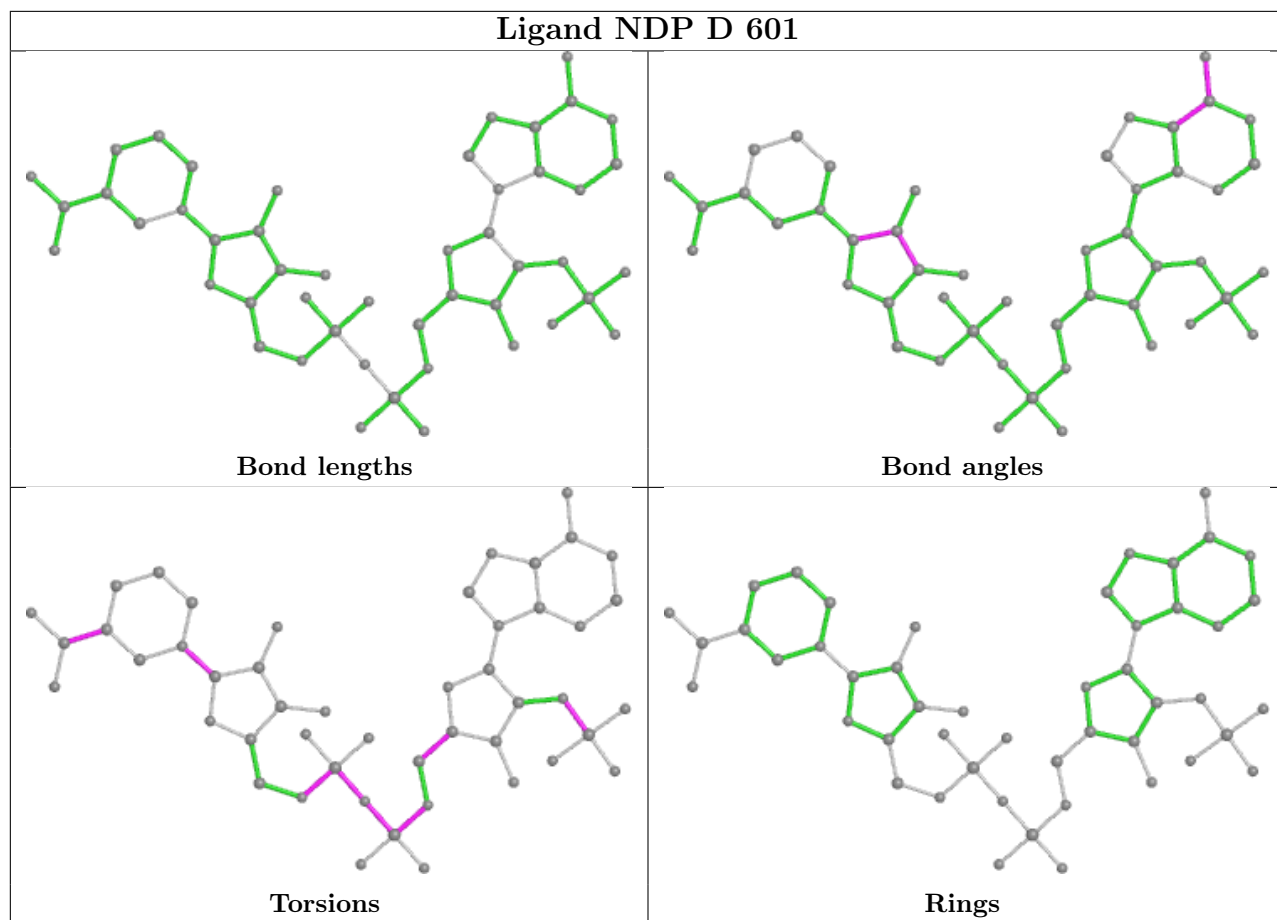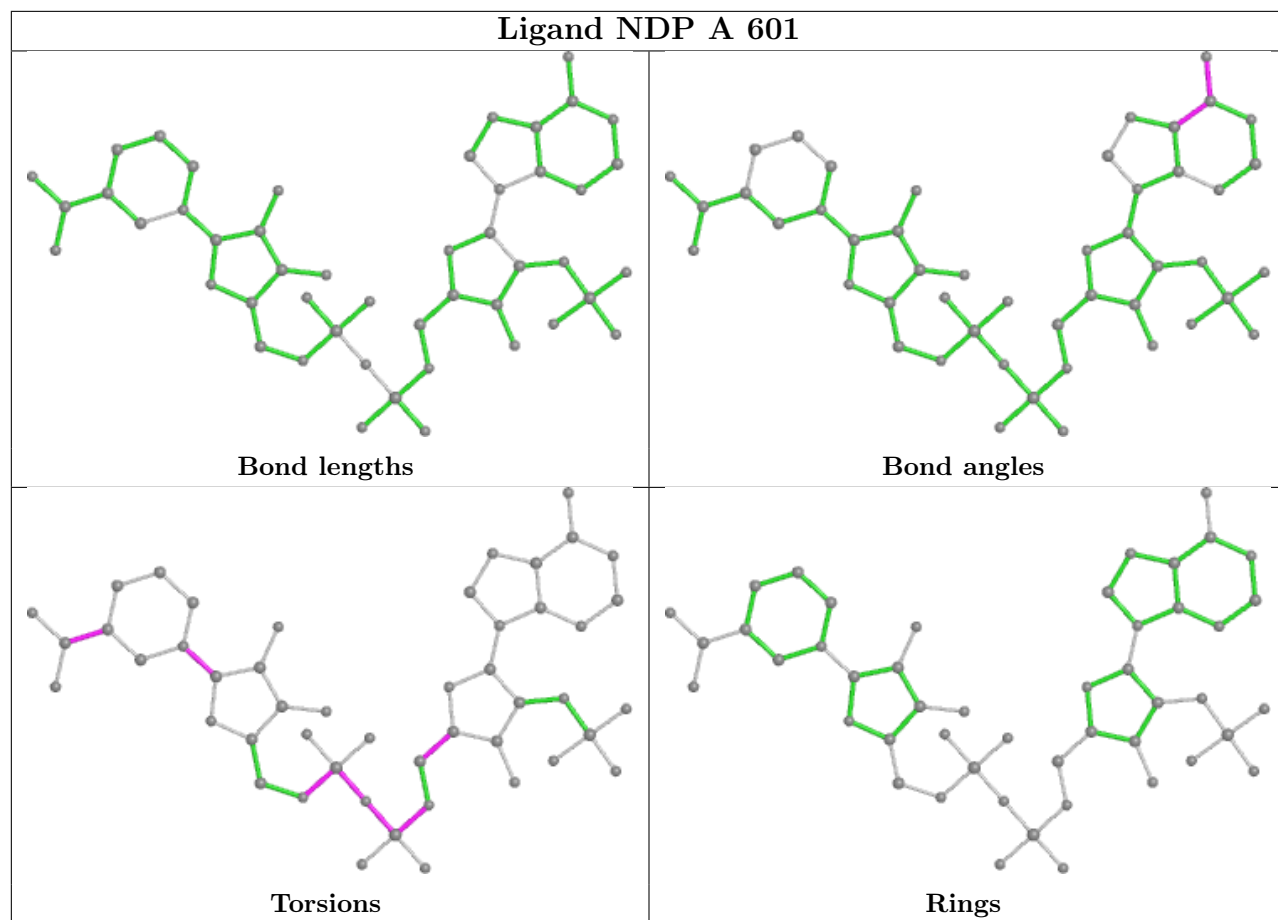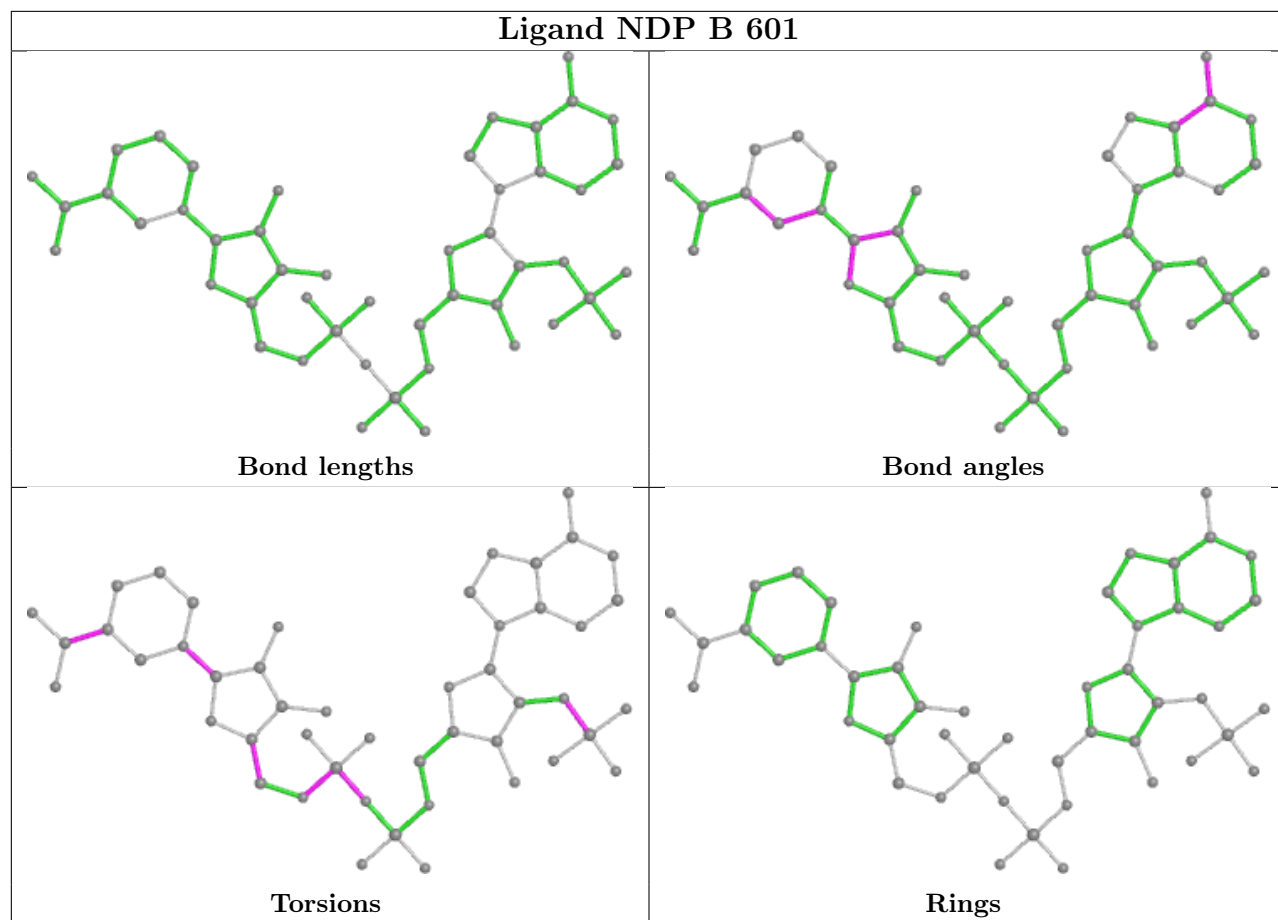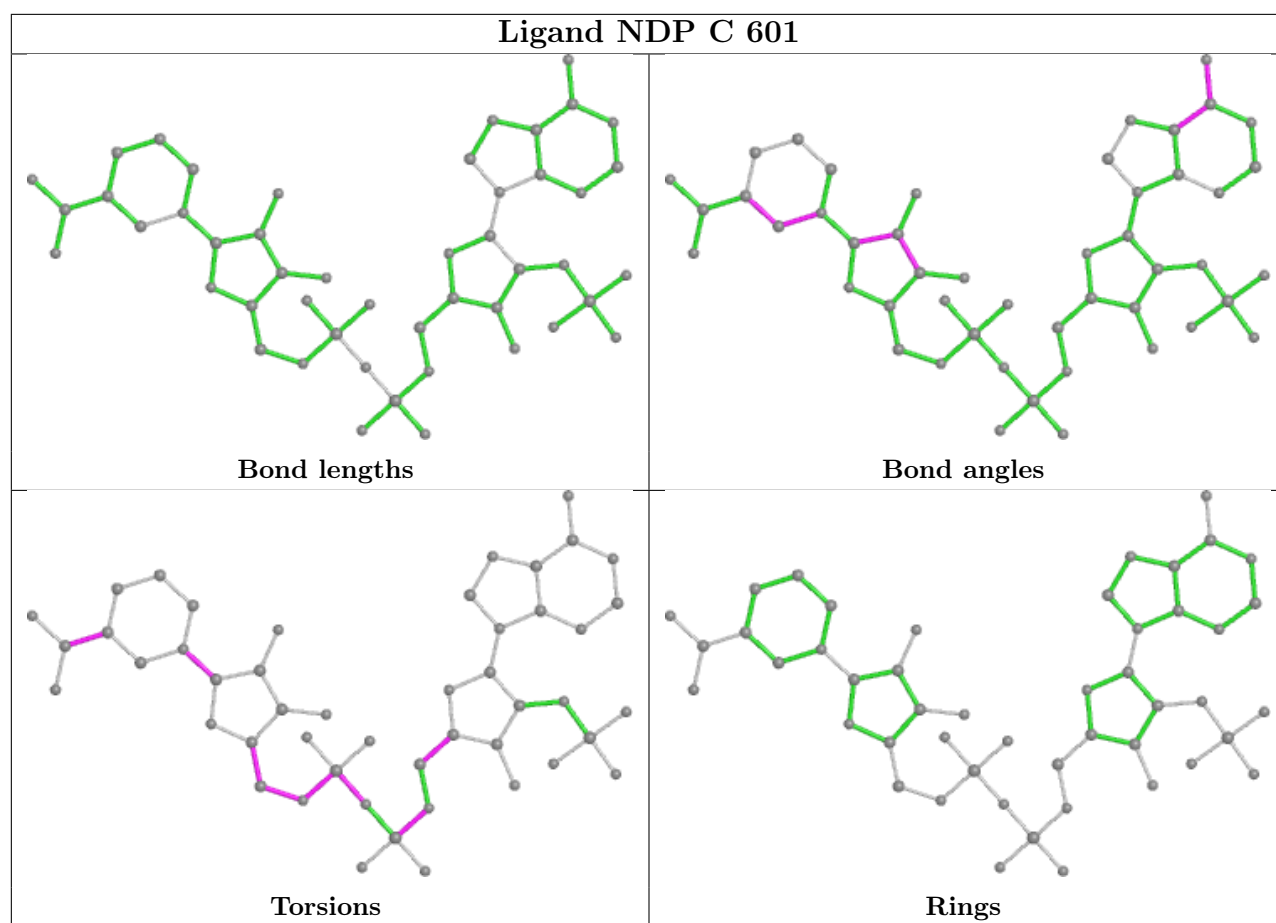
5.7 Other polymers ⓘ

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, 95th 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	492/504 (97%)	-0.37	9 (1%)	68	48	6, 14, 33, 59	0
1	B	491/504 (97%)	-0.37	4 (0%)	86	71	7, 15, 33, 56	0
1	C	490/504 (97%)	-0.20	8 (1%)	72	52	7, 22, 47, 79	0
1	D	491/504 (97%)	-0.39	7 (1%)	75	57	8, 14, 29, 57	0
All	All	1964/2016 (97%)	-0.33	28 (1%)	75	57	6, 16, 38, 79	0

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	10	LEU	4.4
1	A	494	SER	4.1
1	C	369	ASP	3.7
1	C	492	LYS	3.3
1	C	498	SER	3.2
1	D	371	GLY	3.2
1	B	498	SER	3.1
1	A	498	SER	3.1
1	A	7	THR	3.0
1	C	9	SER	3.0
1	B	371	GLY	2.9
1	D	492	LYS	2.9
1	C	370	PHE	2.8
1	B	369	ASP	2.8
1	D	369	ASP	2.7
1	A	369	ASP	2.6
1	D	494	SER	2.5
1	A	491	GLY	2.4
1	D	370	PHE	2.3
1	A	370	PHE	2.2
1	D	491	GLY	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	493	ARG	2.1
1	A	371	GLY	2.1
1	A	492	LYS	2.1
1	C	371	GLY	2.1
1	B	494	SER	2.1
1	C	12	LEU	2.1
1	D	498	SER	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th 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	NDP	C	601	48/48	0.81	0.37	55,68,77,83	0
2	NDP	D	601	48/48	0.85	0.33	36,60,85,90	0
2	NDP	B	601	48/48	0.87	0.33	34,48,76,81	0
2	NDP	A	601	48/48	0.88	0.27	28,52,62,66	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 NDP C 601:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
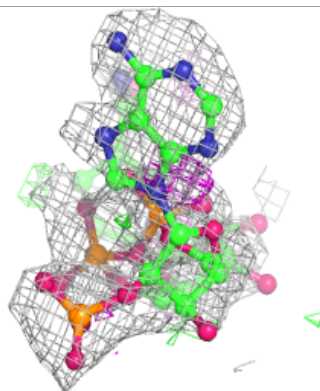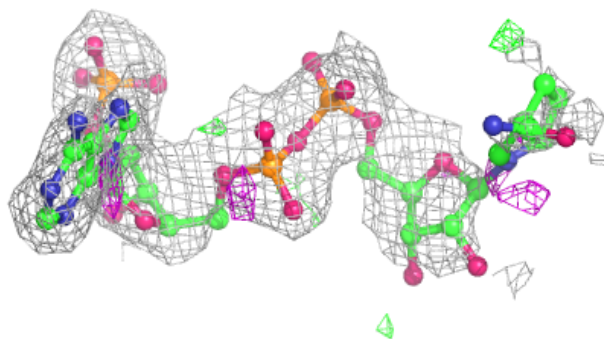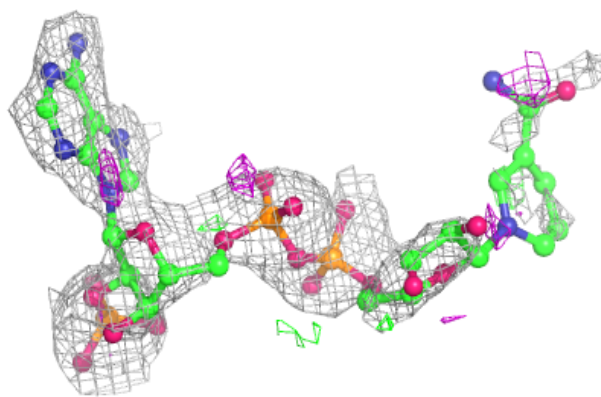mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
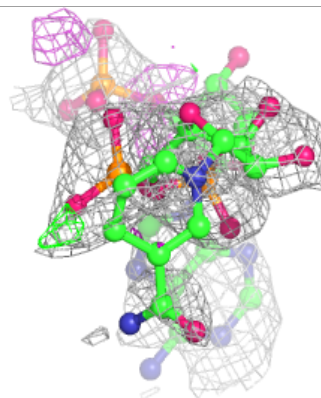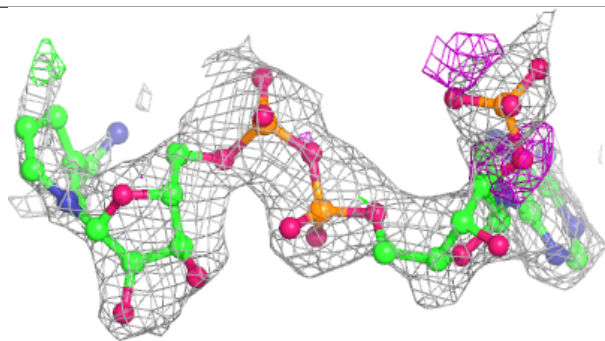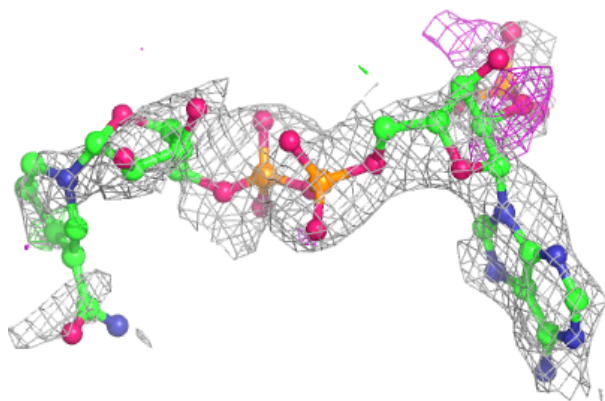
Electron density around NDP D 601:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
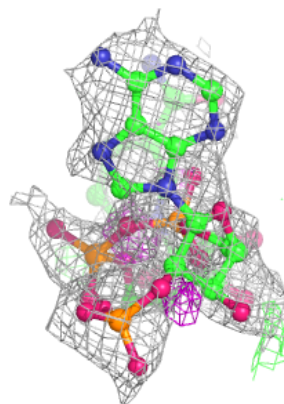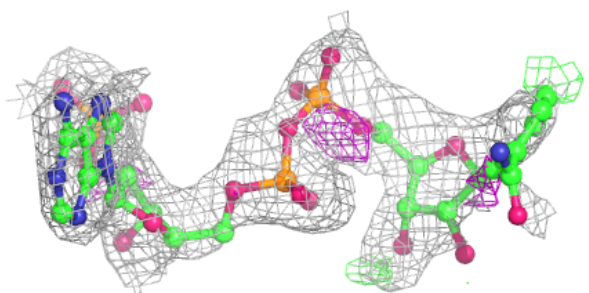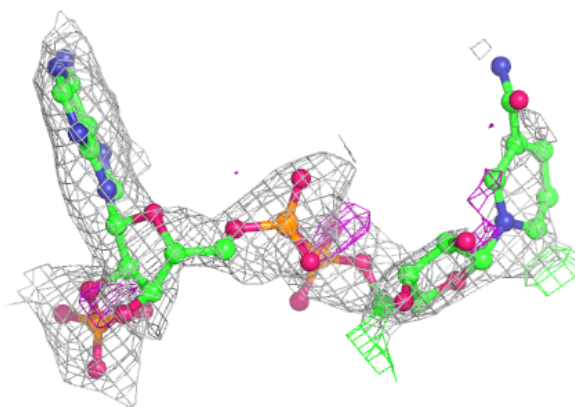
Electron density around NDP B 601:

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

Electron density around NDP 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)
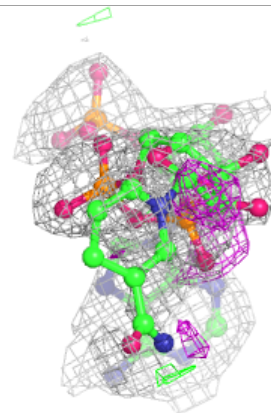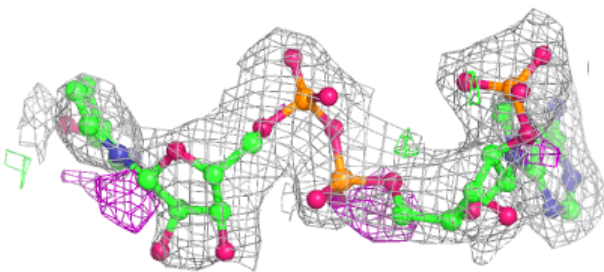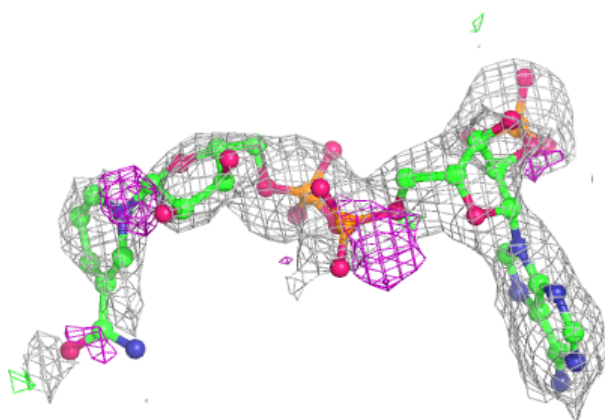
6.5 Other polymers (i)

There are no such residues in this entry.