Full wwPDB X-ray Structure Validation Report (i)

Aug 20, 2023 – 07:43 PM EDT

PDB ID	:	2NZJ
Title	:	The crystal structure of REM1 in complex with GDP
Authors	:	Turnbull, A.P.; Papagrigoriou, E.; Ugochukwu, E.; Elkins, J.M.; Soundararajan, M.; Yang, X.; Gorrec, F.; Umeano, C.; Salah, E.; Burgess, N.; Johansson, C.; Berridge, G.; Gileadi, O.; Bray, J.; Marsden, B.; Watts, S.; von Delft, F.; Weigelt, J.; Edwards, A.; Arrowsmith, C.H.; Sundstrom, M.; Doyle, D.; Structural Genomics Consortium (SGC)
Deposited on	:	2006-11-23
Resolution	:	2.50 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:

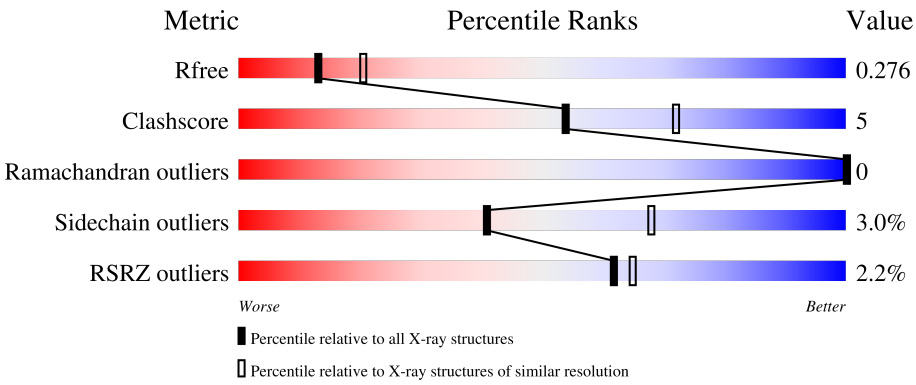
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)

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 2.50 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	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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	175	2%, 77%, 11%, •, 11%
1	B	175	3%, 77%, 14%, 9%
1	C	175	3%, 81%, 9%, •, 9%

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Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.35

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Mol	Chain	Length	Quality of chain
1	D	175	% 73% 14% • 11%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 4785 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 GTP-binding protein REM 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	155	1140	722	196	217	5	0	0	0
1	B	160	1180	744	210	221	5	0	0	0
1	C	159	1185	747	207	226	5	0	0	0
1	D	155	1146	721	200	220	5	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	SER	-	cloning artifact	UNP O75628
A	0	MET	-	cloning artifact	UNP O75628
B	-1	SER	-	cloning artifact	UNP O75628
B	0	MET	-	cloning artifact	UNP O75628
C	-1	SER	-	cloning artifact	UNP O75628
C	0	MET	-	cloning artifact	UNP O75628
D	-1	SER	-	cloning artifact	UNP O75628
D	0	MET	-	cloning artifact	UNP O75628

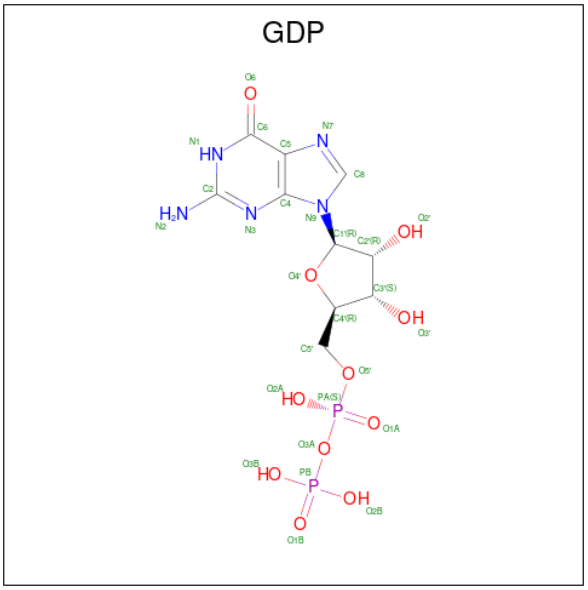
- Molecule 2 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Mg		
2	A	1	1	1	0	0
2	B	1	1	1	0	0
2	C	1	1	1	0	0
2	D	1	1	1	0	0

- Molecule 3 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Cl		
3	A	1	1	1	0	0
3	B	1	1	1	0	0

- Molecule 4 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
4	A	1	28	10	5	11	2	0	0
4	B	1	28	10	5	11	2	0	0
4	C	1	28	10	5	11	2	0	0
4	D	1	28	10	5	11	2	0	0

- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
5	A	4	4	4	0	0
5	B	4	4	4	0	0

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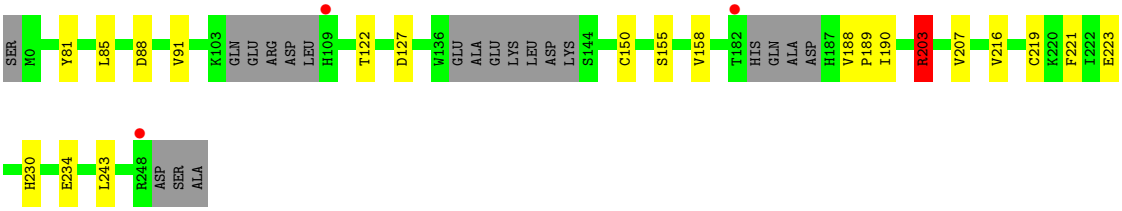
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
5	C	4	4	4	0	0
			Total	O		
5	D	4	4	4	0	0

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.

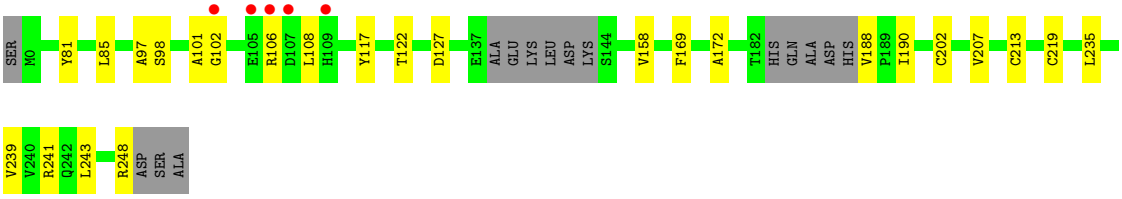
• Molecule 1: GTP-binding protein REM 1

Chain A:



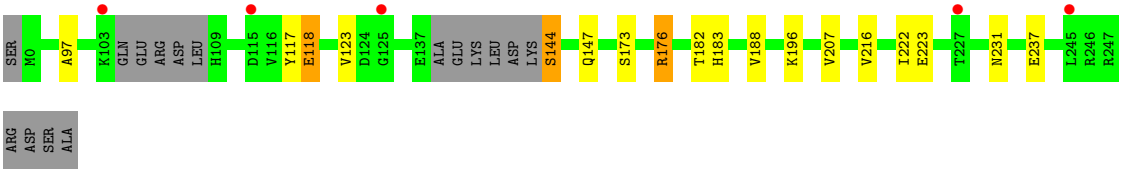
• Molecule 1: GTP-binding protein REM 1

Chain B:



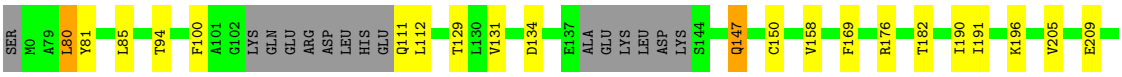
• Molecule 1: GTP-binding protein REM 1

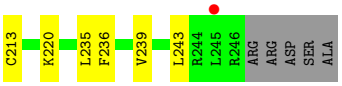
Chain C:



• Molecule 1: GTP-binding protein REM 1

Chain D:




C213
K220
L235
F236
V239
L243
R244
L245
R246
ARG
ARG
ASP
SER
ALA

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	43.64Å 102.28Å 165.56Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.00 – 2.50 30.03 – 2.51	Depositor EDS
% Data completeness (in resolution range)	97.7 (29.00-2.50) 97.7 (30.03-2.51)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.58 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.225 , 0.280 0.224 , 0.276	Depositor DCC
R_{free} test set	1284 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	47.6	Xtriage
Anisotropy	0.347	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 24.7	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	4785	wwPDB-VP
Average B, all atoms (Å^2)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 60.23 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.5684e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

[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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: MG, GDP, CL

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	0.69	1/1152 (0.1%)	0.71	1/1563 (0.1%)
1	B	0.64	1/1193 (0.1%)	0.70	1/1617 (0.1%)
1	C	0.60	0/1200	0.67	0/1627
1	D	0.57	0/1160	0.67	0/1573
All	All	0.63	2/4705 (0.0%)	0.69	2/6380 (0.0%)

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	B	0	1
1	D	0	1
All	All	0	2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	202	CYS	CB-SG	-5.69	1.72	1.81
1	A	234	GLU	CG-CD	5.26	1.59	1.51

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	203	ARG	NE-CZ-NH1	-6.56	117.02	120.30
1	B	241	ARG	NE-CZ-NH1	5.91	123.26	120.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	101	ALA	Peptide
1	D	112	LEU	Peptide

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	1140	0	1102	12	0
1	B	1180	0	1148	13	0
1	C	1185	0	1147	11	0
1	D	1146	0	1098	17	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	28	0	12	0	0
4	B	28	0	12	0	0
4	C	28	0	12	1	0
4	D	28	0	12	1	0
5	A	4	0	0	0	0
5	B	4	0	0	0	0
5	C	4	0	0	0	0
5	D	4	0	0	0	0
All	All	4785	0	4543	49	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 5.

All (49) 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:D:80:LEU:HD13	1:D:129:THR:HG22	1.69	0.73
1:D:176:ARG:NH2	1:D:213:CYS:O	2.31	0.64
1:D:191:ILE:N	1:D:191:ILE:HD13	2.16	0.61
1:D:147:GLN:HE21	1:D:147:GLN:HA	1.66	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:123:VAL:HG22	1:C:237:GLU:HG2	1.83	0.60
1:B:81:TYR:CG	1:B:243:LEU:HD13	2.37	0.59
1:C:196:LYS:HG2	4:C:1003:GDP:C6	2.38	0.59
1:D:85:LEU:HD23	1:D:158:VAL:HB	1.84	0.59
1:A:81:TYR:CG	1:A:243:LEU:HD13	2.40	0.57
1:D:80:LEU:HD13	1:D:129:THR:CG2	2.34	0.56
1:B:81:TYR:CD1	1:B:243:LEU:HD13	2.40	0.56
1:A:230:HIS:NE2	1:D:131:VAL:HG11	2.22	0.55
1:A:81:TYR:CD1	1:A:243:LEU:HD13	2.43	0.54
1:D:190:ILE:C	1:D:191:ILE:HD13	2.29	0.53
1:A:85:LEU:HD23	1:A:158:VAL:HB	1.91	0.53
1:B:85:LEU:HD23	1:B:158:VAL:HB	1.91	0.52
1:A:203:ARG:NH1	1:A:223:GLU:OE2	2.39	0.49
1:B:106:ARG:CZ	1:B:108:LEU:HD23	2.42	0.49
1:B:169:PHE:O	1:B:172:ALA:HB3	2.12	0.49
1:B:235:LEU:O	1:B:239:VAL:HG23	2.13	0.49
1:A:155:SER:O	1:A:188:VAL:HG23	2.12	0.48
1:C:207:VAL:HG22	1:C:223:GLU:CD	2.34	0.48
1:B:98:SER:O	1:B:102:GLY:HA3	2.14	0.47
1:A:88:ASP:O	1:A:91:VAL:HG22	2.15	0.47
1:C:207:VAL:HG22	1:C:223:GLU:OE1	2.15	0.47
1:D:235:LEU:O	1:D:239:VAL:HG23	2.15	0.47
1:D:196:LYS:HG2	4:D:1004:GDP:C6	2.51	0.46
1:A:190:ILE:O	1:A:219:CYS:HB2	2.16	0.46
1:D:169:PHE:HB2	1:D:205:VAL:HG21	1.98	0.45
1:B:97:ALA:HB1	1:B:117:TYR:CD1	2.51	0.45
1:C:173:SER:O	1:C:176:ARG:HG3	2.17	0.45
1:B:190:ILE:O	1:B:219:CYS:HB2	2.16	0.45
1:B:188:VAL:O	1:B:188:VAL:HG13	2.18	0.44
1:D:191:ILE:HD12	1:D:220:LYS:HB2	1.99	0.44
1:B:122:THR:OG1	1:B:127:ASP:OD1	2.24	0.44
1:D:80:LEU:CD1	1:D:129:THR:HG22	2.43	0.43
1:C:207:VAL:HG22	1:C:223:GLU:OE2	2.19	0.42
1:D:100:PHE:HB2	1:D:236:PHE:CE2	2.54	0.42
1:C:97:ALA:HB1	1:C:117:TYR:CD1	2.55	0.42
1:A:221:PHE:HB3	1:D:111:GLN:HA	2.02	0.41
1:A:122:THR:OG1	1:A:127:ASP:OD2	2.33	0.41
1:C:222:ILE:HD11	1:C:231:ASN:HB3	2.01	0.41
1:D:94:THR:OG1	1:D:134:ASP:OD2	2.38	0.41
1:C:183:HIS:HB3	1:C:188:VAL:HB	2.03	0.41
1:B:207:VAL:HG21	1:C:118:GLU:OE2	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:144:SER:HB3	1:C:147:GLN:OE1	2.21	0.41
1:A:189:PRO:HG2	1:A:243:LEU:HD23	2.03	0.40
1:A:216:VAL:HG21	1:B:213:CYS:HA	2.03	0.40
1:D:81:TYR:CG	1:D:243:LEU:HD13	2.56	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	147/175 (84%)	142 (97%)	5 (3%)	0	100	100
1	B	154/175 (88%)	149 (97%)	5 (3%)	0	100	100
1	C	153/175 (87%)	152 (99%)	1 (1%)	0	100	100
1	D	149/175 (85%)	147 (99%)	2 (1%)	0	100	100
All	All	603/700 (86%)	590 (98%)	13 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	115/148 (78%)	112 (97%)	3 (3%)	46	72
1	B	117/148 (79%)	116 (99%)	1 (1%)	78	92

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	120/148 (81%)	115 (96%)	5 (4%)	30	54
1	D	114/148 (77%)	109 (96%)	5 (4%)	28	52
All	All	466/592 (79%)	452 (97%)	14 (3%)	41	68

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	150	CYS
1	A	203	ARG
1	A	207	VAL
1	B	248	ARG
1	C	118	GLU
1	C	144	SER
1	C	176	ARG
1	C	182	THR
1	C	216	VAL
1	D	80	LEU
1	D	147	GLN
1	D	150	CYS
1	D	182	THR
1	D	209	GLU

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

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains (i)

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

5.5 Carbohydrates (i)

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 10 ligands modelled in this entry, 6 are monoatomic - leaving 4 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
4	GDP	A	1001	2	24,30,30	0.88	0	30,47,47	1.52	7 (23%)
4	GDP	D	1004	2	24,30,30	1.04	2 (8%)	30,47,47	1.17	6 (20%)
4	GDP	C	1003	2	24,30,30	0.82	0	30,47,47	1.24	5 (16%)
4	GDP	B	1002	2	24,30,30	0.80	1 (4%)	30,47,47	1.57	8 (26%)

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
4	GDP	A	1001	2	-	1/12/32/32	0/3/3/3
4	GDP	D	1004	2	-	2/12/32/32	0/3/3/3
4	GDP	C	1003	2	-	4/12/32/32	0/3/3/3
4	GDP	B	1002	2	-	3/12/32/32	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	1004	GDP	C6-N1	-2.13	1.34	1.37
4	B	1002	GDP	C6-N1	-2.11	1.34	1.37
4	D	1004	GDP	O4'-C1'	2.04	1.43	1.41

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	1002	GDP	PA-O3A-PB	-4.08	118.83	132.83
4	A	1001	GDP	PA-O3A-PB	-3.42	121.08	132.83
4	A	1001	GDP	O6-C6-C5	-3.03	118.46	124.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	1002	GDP	O3B-PB-O1B	-2.69	100.14	110.68
4	A	1001	GDP	O6-C6-N1	2.66	123.80	120.65
4	B	1002	GDP	N2-C2-N3	-2.57	114.73	119.74
4	C	1003	GDP	C8-N7-C5	2.57	107.89	102.99
4	B	1002	GDP	O3B-PB-O3A	2.45	112.85	104.64
4	B	1002	GDP	O6-C6-C5	-2.43	119.63	124.37
4	A	1001	GDP	N2-C2-N1	2.42	121.87	116.71
4	C	1003	GDP	O6-C6-C5	-2.39	119.71	124.37
4	B	1002	GDP	C8-N7-C5	2.39	107.54	102.99
4	C	1003	GDP	PA-O3A-PB	-2.32	124.86	132.83
4	D	1004	GDP	O3'-C3'-C2'	-2.30	104.39	111.82
4	A	1001	GDP	C3'-C2'-C1'	2.29	104.43	100.98
4	B	1002	GDP	N2-C2-N1	2.22	121.45	116.71
4	D	1004	GDP	PA-O3A-PB	-2.21	125.25	132.83
4	A	1001	GDP	O2B-PB-O3A	2.20	112.02	104.64
4	B	1002	GDP	C5-C6-N1	2.17	117.78	113.95
4	D	1004	GDP	O6-C6-N1	2.17	123.21	120.65
4	A	1001	GDP	C5-C6-N1	2.14	117.74	113.95
4	D	1004	GDP	O2B-PB-O3A	2.11	111.73	104.64
4	C	1003	GDP	N2-C2-N1	2.10	121.19	116.71
4	C	1003	GDP	C5-C6-N1	2.09	117.63	113.95
4	D	1004	GDP	O6-C6-C5	-2.02	120.42	124.37
4	D	1004	GDP	C8-N7-C5	2.00	106.80	102.99

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	1002	GDP	PA-O3A-PB-O2B
4	C	1003	GDP	PA-O3A-PB-O2B
4	C	1003	GDP	C5'-O5'-PA-O1A
4	D	1004	GDP	PA-O3A-PB-O2B
4	A	1001	GDP	PA-O3A-PB-O1B
4	B	1002	GDP	PA-O3A-PB-O1B
4	D	1004	GDP	PA-O3A-PB-O1B
4	C	1003	GDP	PA-O3A-PB-O1B
4	C	1003	GDP	PA-O3A-PB-O3B
4	B	1002	GDP	C5'-O5'-PA-O1A

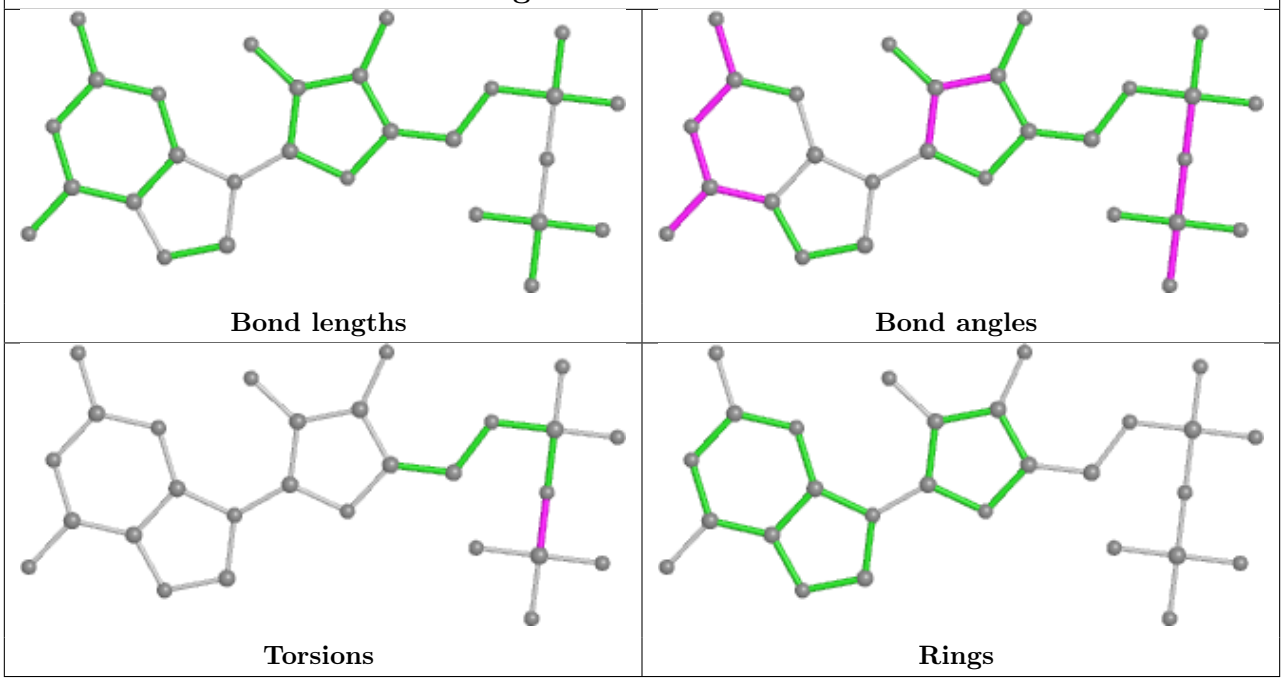
There are no ring outliers.

2 monomers are involved in 2 short contacts:

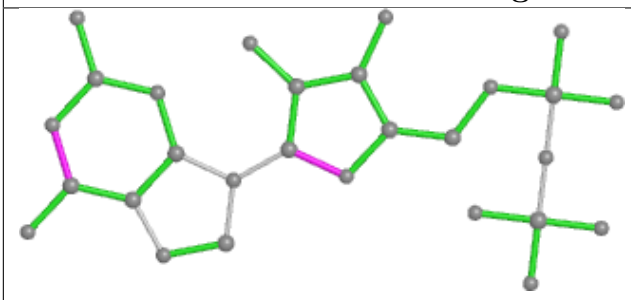
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	1004	GDP	1	0
4	C	1003	GDP	1	0

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.

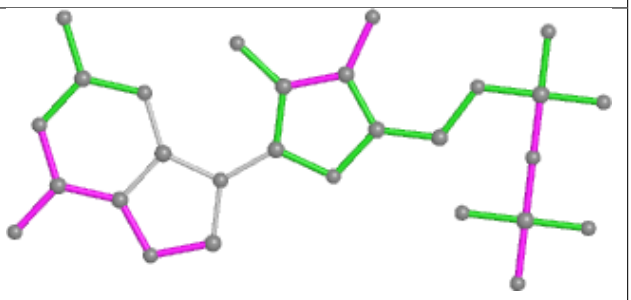
Ligand GDP A 1001



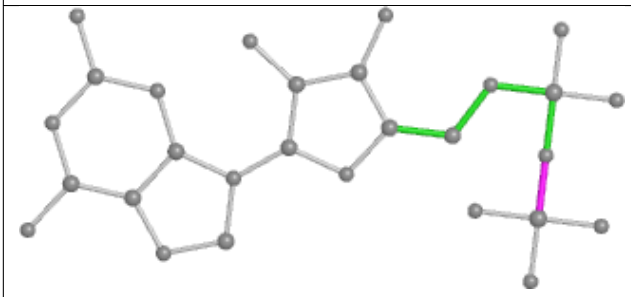
Ligand GDP D 1004



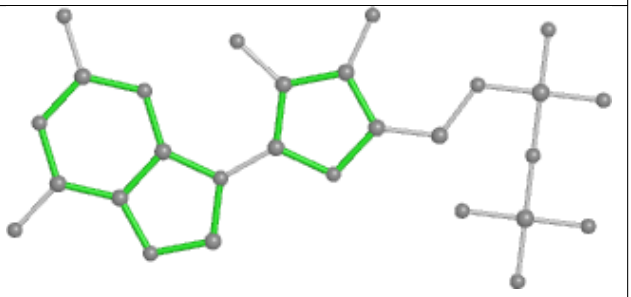
Bond lengths



Bond angles

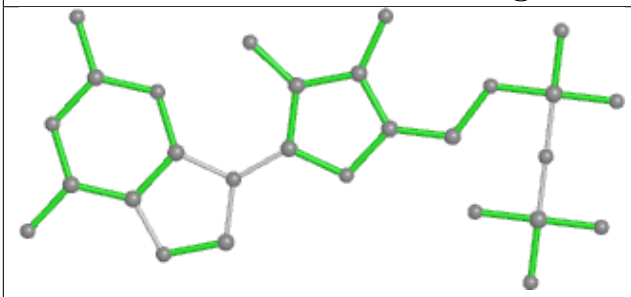


Torsions

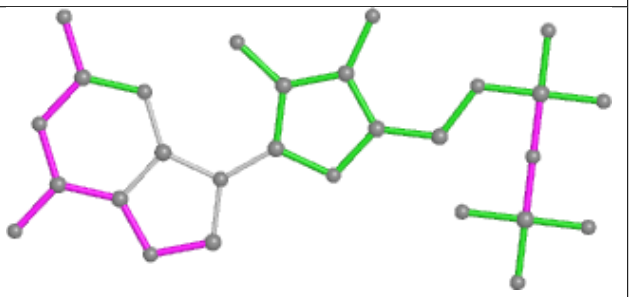


Rings

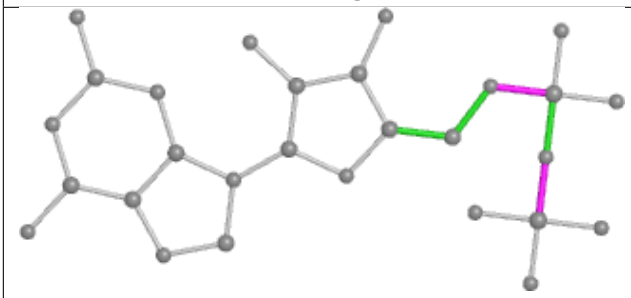
Ligand GDP C 1003



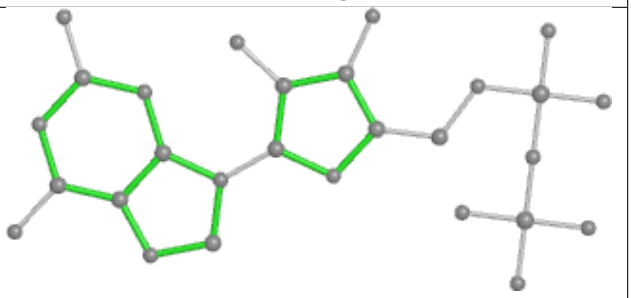
Bond lengths



Bond angles

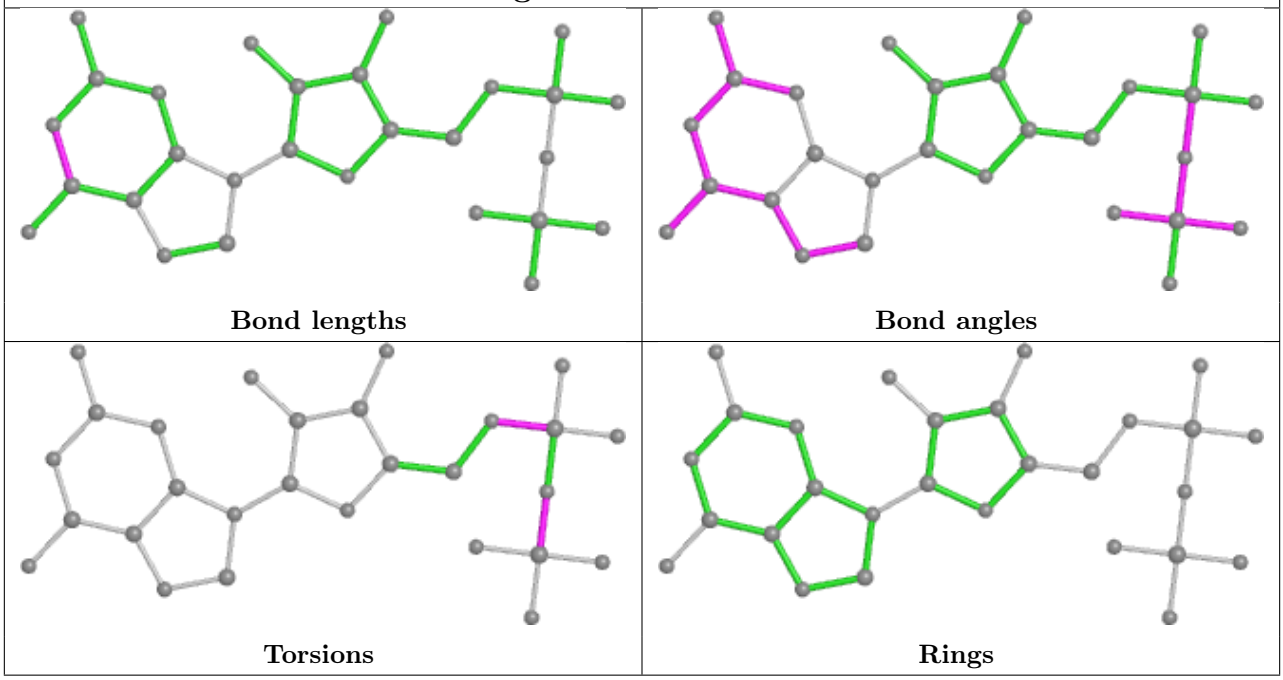


Torsions



Rings

Ligand GDP B 1002



5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

In the following table, the column labelled '#RSRZ> 2' contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	155/175 (88%)	-0.19	3 (1%)	66	69	10, 25, 35, 41	0
1	B	160/175 (91%)	-0.02	5 (3%)	49	52	10, 27, 36, 42	0
1	C	159/175 (90%)	-0.02	5 (3%)	49	52	5, 23, 36, 41	0
1	D	155/175 (88%)	-0.04	1 (0%)	89	90	4, 24, 35, 39	0
All	All	629/700 (89%)	-0.07	14 (2%)	62	65	4, 25, 36, 42	0

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	105	GLU	6.6
1	C	245	LEU	4.9
1	C	115	ASP	3.7
1	B	102	GLY	3.6
1	B	109	HIS	3.6
1	D	245	LEU	3.6
1	C	125	GLY	3.3
1	A	182	THR	2.6
1	C	227	THR	2.6
1	A	248	ARG	2.3
1	B	106	ARG	2.2
1	A	109	HIS	2.2
1	B	107	ASP	2.1
1	C	103	LYS	2.1

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)

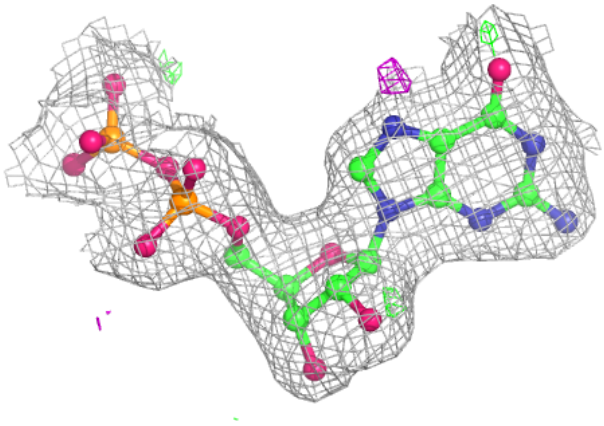
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

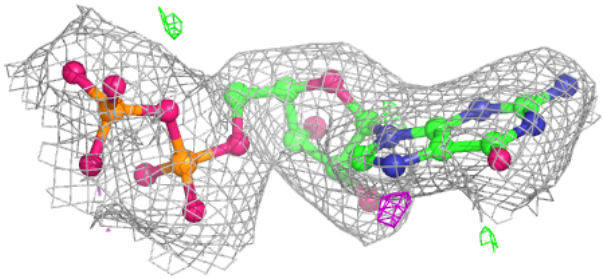
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	MG	D	252	1/1	0.94	0.03	50,50,50,50	0
2	MG	B	252	1/1	0.95	0.04	36,36,36,36	0
2	MG	A	252	1/1	0.95	0.07	37,37,37,37	0
2	MG	C	252	1/1	0.97	0.04	49,49,49,49	0
3	CL	B	253	1/1	0.97	0.06	45,45,45,45	0
4	GDP	B	1002	28/28	0.97	0.09	34,37,38,39	0
4	GDP	C	1003	28/28	0.97	0.08	39,41,43,44	0
4	GDP	D	1004	28/28	0.97	0.08	38,41,45,46	0
4	GDP	A	1001	28/28	0.98	0.09	29,36,37,41	0
3	CL	A	253	1/1	0.99	0.07	50,50,50,50	0

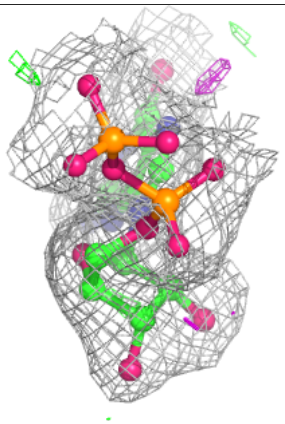
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around GDP B 1002:

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

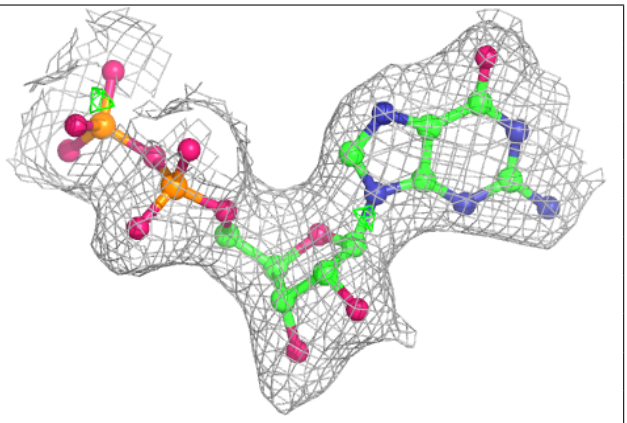


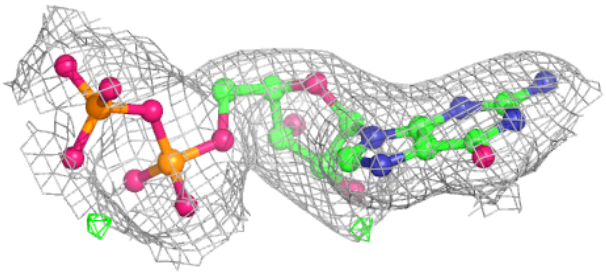


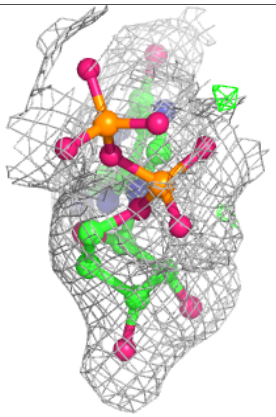


Electron density around GDP C 1003:

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

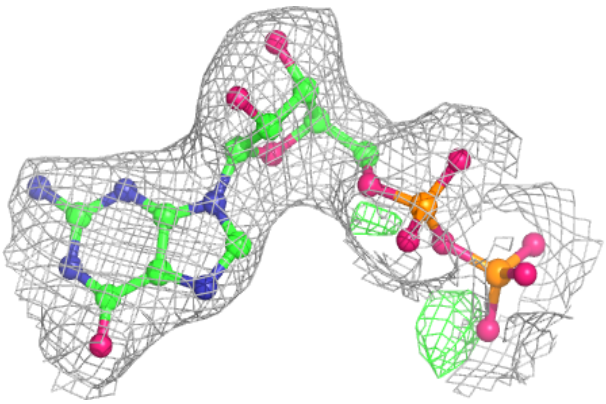


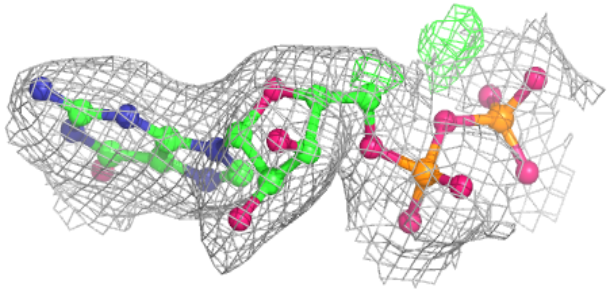


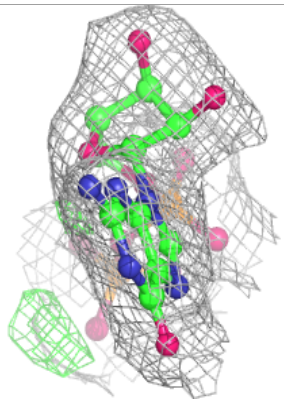


Electron density around GDP D 1004:

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







Electron density around GDP A 1001:

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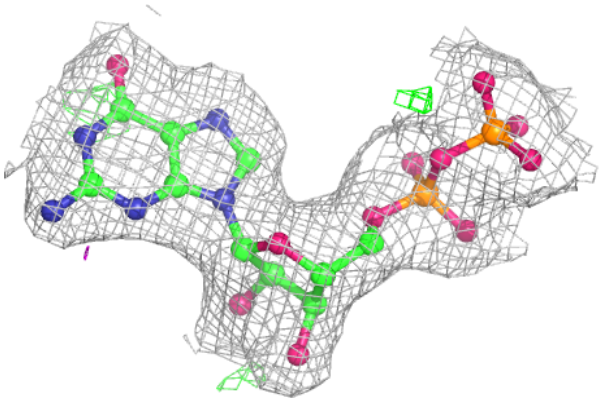
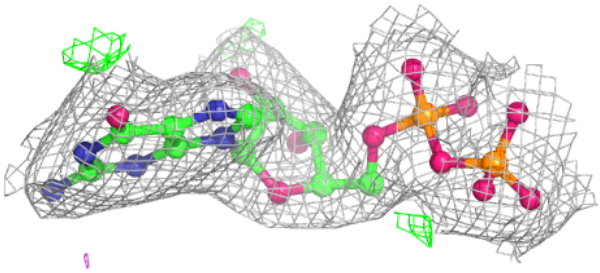
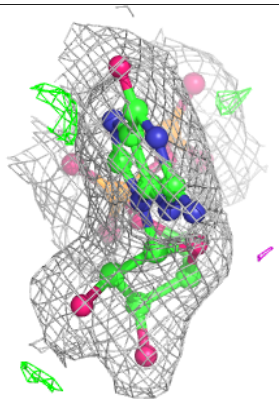
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)







6.5 Other polymers (i)

There are no such residues in this entry.