Full wwPDB X-ray Structure Validation Report (i)

Dec 15, 2025 – 12:35 pm GMT

PDB ID	:	9HMR / pdb_00009hmr
Title	:	KRAS-G12V-D92C covalently bound to BI-1830
Authors	:	van Tienen, L.M.; Zak, K.M.; Kessler, D.; Sellers, W.R.
Deposited on	:	2024-12-09
Resolution	:	1.50 Å(reported)

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

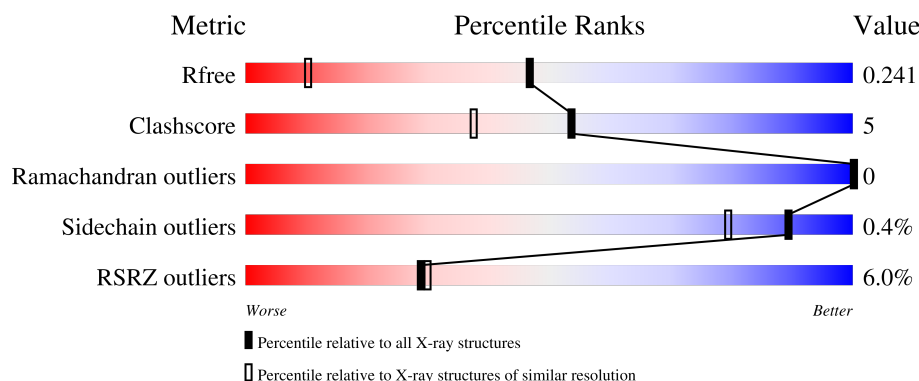|		
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.47

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 1.50 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	Percentile Ranks	Value
Rfree		0.241
Clashscore		5
Ramachandran outliers		0
Sidechain outliers		0.4%
RSRZ outliers		6.0%

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$_{free}$	164625	3717 (1.50-1.50)
Clashscore	180529	4048 (1.50-1.50)
Ramachandran outliers	177936	3970 (1.50-1.50)
Sidechain outliers	177891	3967 (1.50-1.50)
RSRZ outliers	164620	3718 (1.50-1.50)

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	170	6% 83% 8% · 8%
1	B	170	5% 83% 6% · 9%
1	C	170	6% 78% 12% · 9%
1	D	170	4% 82% 8% 10%

WORLDWIDE PDB
PROTEIN DATA BANK

2   Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 5578 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 Isoform 2B of GTPase KRas.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	156	Total	C	N	O	S	0	1	0
			1250	788	217	240	5			
1	B	154	Total	C	N	O	S	0	3	0
			1242	787	215	235	5			
1	C	155	Total	C	N	O	S	0	4	0
			1248	792	213	238	5			
1	D	153	Total	C	N	O	S	0	4	0
			1246	788	215	238	5			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	0	GLY	-	expression tag	UNP P01116
A	12	VAL	GLY	engineered mutation	UNP P01116
A	51	SER	CYS	engineered mutation	UNP P01116
A	80	LEU	CYS	engineered mutation	UNP P01116
A	92	CYS	ASP	engineered mutation	UNP P01116
A	118	SER	CYS	engineered mutation	UNP P01116
B	0	GLY	-	expression tag	UNP P01116
B	12	VAL	GLY	engineered mutation	UNP P01116
B	51	SER	CYS	engineered mutation	UNP P01116
B	80	LEU	CYS	engineered mutation	UNP P01116
B	92	CYS	ASP	engineered mutation	UNP P01116
B	118	SER	CYS	engineered mutation	UNP P01116
C	0	GLY	-	expression tag	UNP P01116
C	12	VAL	GLY	engineered mutation	UNP P01116
C	51	SER	CYS	engineered mutation	UNP P01116
C	80	LEU	CYS	engineered mutation	UNP P01116
C	92	CYS	ASP	engineered mutation	UNP P01116
C	118	SER	CYS	engineered mutation	UNP P01116
D	0	GLY	-	expression tag	UNP P01116
D	12	VAL	GLY	engineered mutation	UNP P01116
D	51	SER	CYS	engineered mutation	UNP P01116

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
D	80	LEU	CYS	engineered mutation	UNP P01116
D	92	CYS	ASP	engineered mutation	UNP P01116
D	118	SER	CYS	engineered mutation	UNP P01116

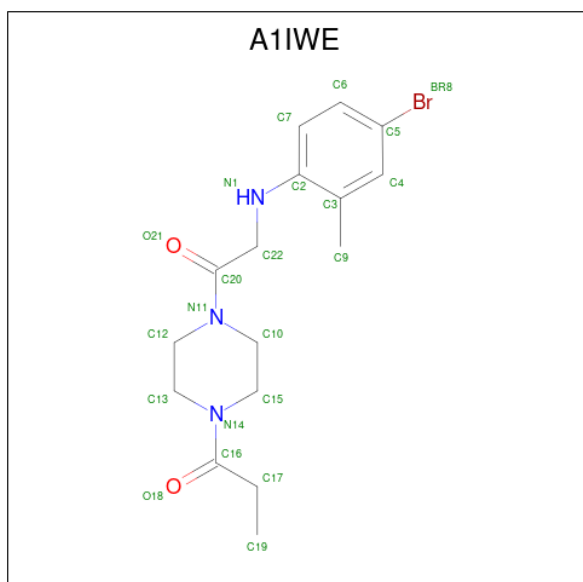- Molecule 2 is GUANOSINE-5'-DIPHOSPHATE (CCD ID: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).
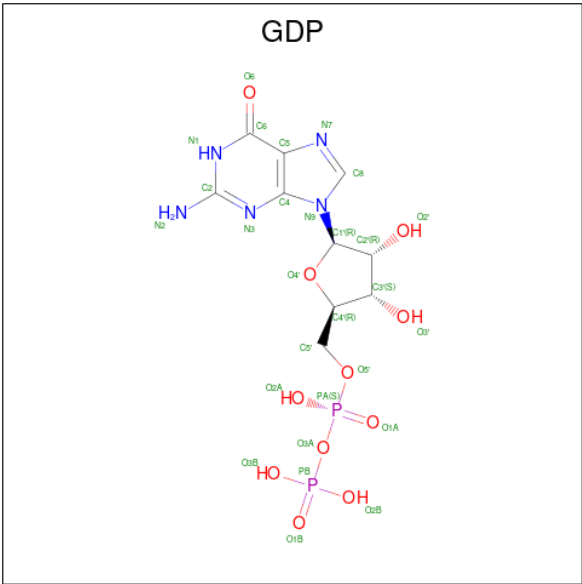
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			28	10	5	11	2		
2	B	1	Total	C	N	O	P	0	0
			28	10	5	11	2		
2	C	1	Total	C	N	O	P	0	0
			28	10	5	11	2		
2	D	1	Total	C	N	O	P	0	0
			28	10	5	11	2		

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).

EDO

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 4	C 2	O 2	0	0
3	B	1	Total 4	C 2	O 2	0	0
3	C	1	Total 4	C 2	O 2	0	0
3	D	1	Total 4	C 2	O 2	0	0

- Molecule 4 is 1-[4-[2-[(4-bromanyl-2-methyl-phenyl)amino]ethanoyl]piperazin-1-yl]prop an-1-one (CCD ID: A1IWE) (formula: $C_{16}H_{22}BrN_3O_2$) (labeled as "Ligand of Interest" by depositor).

A1IWE

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total 22	Br 1	C 16	N 3	O 2	0	0
4	B	1	Total 22	Br 1	C 16	N 3	O 2	0	0
4	C	1	Total 22	Br 1	C 16	N 3	O 2	0	0
4	D	1	Total 22	Br 1	C 16	N 3	O 2	0	0

• Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	104	Total 105	O 105	0	1
5	B	92	Total 92	O 92	0	0
5	C	91	Total 91	O 91	0	0
5	D	87	Total 88	O 88	0	1

# 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.
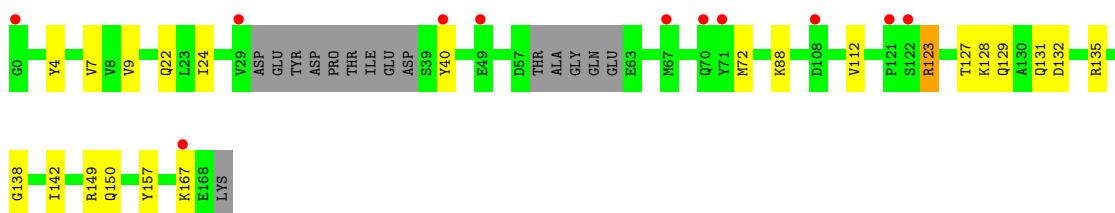
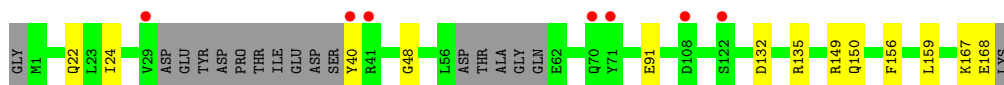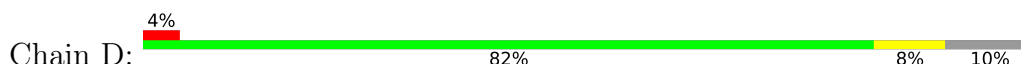- Molecule 1: Isoform 2B of GTPase KRas
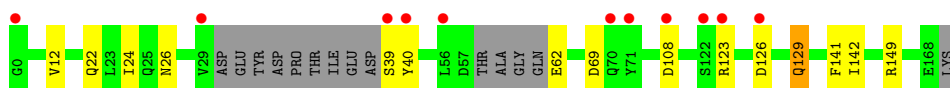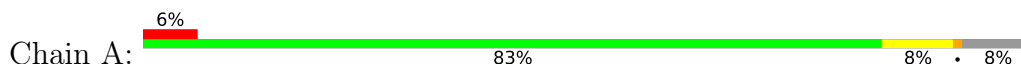
Chain A:

- Molecule 1: Isoform 2B of GTPase KRas

Chain B:

- Molecule 1: Isoform 2B of GTPase KRas

Chain C:

- Molecule 1: Isoform 2B of GTPase KRas

Chain D:
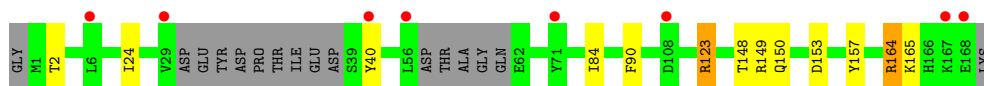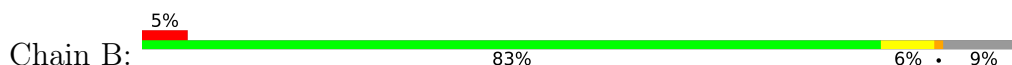
4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	43.87Å 116.56Å 68.64Å 90.00° 108.64° 90.00°	Depositor
Resolution (Å)	39.16 – 1.50 39.16 – 1.50	Depositor EDS
% Data completeness (in resolution range)	99.4 (39.16-1.50) 99.9 (39.16-1.50)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.29 (at 1.50Å)	Xtriage
Refinement program	REFMAC 5.8.0430	Depositor
R, R_{free}	0.205 , 0.239 0.209 , 0.241	Depositor DCC
R_{free} test set	5085 reflections (4.88%)	wwPDB-VP
Wilson B-factor (Å^2)	10.7	Xtriage
Anisotropy	1.470	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 48.6	EDS
L-test for twinning[2]	$< |L| > = 0.52, < L^2 > = 0.35$	Xtriage
Estimated twinning fraction	0.068 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	5578	wwPDB-VP
Average B, all atoms (Å^2)	28.0	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 39.70 % 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 3.0544e-04. 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: EDO, GDP, A1IWE

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	0.84	0/1270	1.32	3/1707 (0.2%)
1	B	0.76	0/1268	1.23	1/1705 (0.1%)
1	C	0.91	2/1277 (0.2%)	1.34	2/1719 (0.1%)
1	D	0.93	1/1275 (0.1%)	1.32	2/1714 (0.1%)
All	All	0.86	3/5090 (0.1%)	1.30	8/6845 (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	A	0	1
1	B	0	2
1	C	0	1
All	All	0	4

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	131	GLN	C-O	6.23	1.31	1.24
1	C	167	LYS	CE-NZ	5.72	1.66	1.49
1	D	156	PHE	C-O	5.29	1.30	1.24

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	123	ARG	NE-CZ-NH1	-6.65	114.85	121.50
1	B	164	ARG	CA-CB-CG	-6.53	101.03	114.10
1	A	129	GLN	CB-CA-C	-6.31	100.32	110.79

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	159	LEU	O-C-N	5.93	128.17	122.07
1	A	129	GLN	N-CA-CB	5.85	118.72	110.12
1	D	91	GLU	CB-CG-CD	5.67	122.23	112.60
1	A	69	ASP	CA-CB-CG	5.41	118.01	112.60
1	C	88	LYS	N-CA-C	-5.04	105.79	111.28

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	123	ARG	Sidechain
1	B	123	ARG	Sidechain
1	B	164	ARG	Sidechain
1	C	123	ARG	Sidechain

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	1250	0	1258	9	0
1	B	1242	0	1263	8	0
1	C	1248	0	1268	21	0
1	D	1246	0	1263	6	0
2	A	28	0	12	1	0
2	B	28	0	12	1	0
2	C	28	0	12	0	0
2	D	28	0	12	2	0
3	A	4	0	6	0	0
3	B	4	0	6	1	0
3	C	4	0	5	0	0
3	D	4	0	6	0	0
4	A	22	0	0	0	0
4	B	22	0	0	1	0
4	C	22	0	0	0	0
4	D	22	0	0	0	0
5	A	105	0	0	4	0
5	B	92	0	0	3	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	C	91	0	0	9	0
5	D	88	0	0	4	0
All	All	5578	0	5123	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:C:127:THR:HB	5:C:301:HOH:O	1.61	1.00
2:D:303:GDP:O3B	5:D:401[A]:HOH:O	1.82	0.97
1:C:127:THR:N	5:C:301:HOH:O	2.02	0.92
1:C:112[A]:VAL:HG11	1:C:142:ILE:CD1	2.10	0.81
1:C:127:THR:CA	5:C:301:HOH:O	2.30	0.79
1:C:112[A]:VAL:CG1	1:C:142:ILE:CD1	2.60	0.78
2:D:303:GDP:O3B	5:D:401[B]:HOH:O	2.01	0.78
1:C:138:GLY:O	5:C:302:HOH:O	2.02	0.76
1:C:127:THR:CB	5:C:301:HOH:O	2.28	0.73
1:C:112[A]:VAL:CG1	1:C:142:ILE:HD12	2.18	0.73
2:B:303:GDP:O2B	5:B:401:HOH:O	2.07	0.71
1:C:128:LYS:N	5:C:301:HOH:O	2.20	0.70
1:C:129:GLN:OE1	5:C:304:HOH:O	2.11	0.68
4:B:302:A1IWE:C22	4:B:302:A1IWE:C9	2.75	0.65
1:C:112[A]:VAL:HG11	1:C:142:ILE:HD13	1.81	0.61
1:B:148:THR:O	1:B:149:ARG:HB3	2.01	0.61
1:C:9:VAL:HG11	1:C:72:MET:HE1	1.83	0.60
2:A:201:GDP:O1B	5:A:302:HOH:O	2.15	0.60
1:D:167:LYS:O	1:D:168:GLU:C	2.44	0.60
1:C:7:VAL:HG12	1:C:9:VAL:HG13	1.86	0.58
1:B:150:GLN:HG2	5:B:415:HOH:O	2.04	0.58
1:D:150:GLN:HG2	5:D:467:HOH:O	2.05	0.56
1:A:126:ASP:H	1:A:129:GLN:NE2	2.05	0.54
1:B:84[A]:ILE:HD12	1:B:123:ARG:HE	1.73	0.53
1:D:48:GLY:HA2	5:D:469:HOH:O	2.10	0.51
1:A:12:VAL:HG21	1:A:62:GLU:HB2	1.93	0.49
1:B:90:PHE:CE2	3:B:301:EDO:H22	2.49	0.48
1:D:132:ASP:OD1	1:D:135:ARG:NH2	2.39	0.47
1:A:26:ASN:ND2	5:A:311:HOH:O	2.44	0.46
1:C:4:TYR:OH	5:C:303:HOH:O	2.05	0.46
1:A:24:ILE:CD1	1:A:40:TYR:HB3	2.47	0.45

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:141:PHE:C	1:A:142:ILE:HG13	2.41	0.45
1:B:148:THR:O	1:B:149:ARG:CB	2.64	0.45
1:A:126:ASP:H	1:A:129:GLN:HE21	1.63	0.45
1:B:24:ILE:CD1	1:B:40:TYR:HB3	2.47	0.45
1:C:22:GLN:O	1:C:149:ARG:NH1	2.46	0.44
1:C:24:ILE:CD1	1:C:40:TYR:HB3	2.48	0.44
1:D:24:ILE:CD1	1:D:40:TYR:HB3	2.48	0.43
1:A:22:GLN:O	1:A:149:ARG:NH1	2.48	0.43
1:A:108:ASP:O	5:A:303:HOH:O	2.21	0.43
1:B:2:THR:HA	5:B:455:HOH:O	2.17	0.43
1:C:112[A]:VAL:HG13	1:C:142:ILE:HD12	2.00	0.43
1:C:157:TYR:OH	5:C:305:HOH:O	2.21	0.42
1:A:39:SER:N	5:A:313:HOH:O	2.52	0.42
1:C:132:ASP:OD1	1:C:135:ARG:NH2	2.50	0.41
1:C:149:ARG:HG2	1:C:149:ARG:O	2.20	0.41
1:D:22:GLN:HG3	1:D:149:ARG:HG3	2.03	0.41
1:B:153:ASP:HB3	1:B:157:TYR:CE2	2.56	0.41

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	151/170 (89%)	148 (98%)	3 (2%)	0	100	100
1	B	151/170 (89%)	148 (98%)	3 (2%)	0	100	100
1	C	153/170 (90%)	148 (97%)	5 (3%)	0	100	100
1	D	151/170 (89%)	148 (98%)	3 (2%)	0	100	100
All	All	606/680 (89%)	592 (98%)	14 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	139/150 (93%)	139 (100%)	0	100	100
1	B	139/150 (93%)	138 (99%)	1 (1%)	81	66
1	C	140/150 (93%)	139 (99%)	1 (1%)	81	66
1	D	140/150 (93%)	140 (100%)	0	100	100
All	All	558/600 (93%)	556 (100%)	2 (0%)	89	79

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	165	LYS
1	C	150	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	129	GLN
1	B	25	GLN
1	B	150	GLN
1	C	25	GLN
1	C	27	HIS
1	C	99	GLN
1	C	129	GLN
1	D	25	GLN
1	D	150	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

12 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	GDP	B	303	-	24,30,30	1.03	3 (12%)	30,47,47	0.88	1 (3%)
3	EDO	C	203	-	3,3,3	1.02	0	2,2,2	0.10	0
3	EDO	D	301	-	3,3,3	0.41	0	2,2,2	0.44	0
3	EDO	A	202	-	3,3,3	0.57	0	2,2,2	0.10	0
4	A1IWE	C	202	1	23,23,23	0.78	1 (4%)	31,31,31	1.06	2 (6%)
4	A1IWE	D	302	1	23,23,23	0.65	0	31,31,31	0.94	2 (6%)
2	GDP	D	303	-	24,30,30	1.08	2 (8%)	30,47,47	1.04	1 (3%)
2	GDP	A	201	-	24,30,30	1.18	3 (12%)	30,47,47	0.87	1 (3%)
4	A1IWE	A	203	1	23,23,23	0.43	0	31,31,31	0.84	1 (3%)
4	A1IWE	B	302	1	23,23,23	0.55	0	31,31,31	0.64	1 (3%)
2	GDP	C	201	-	24,30,30	1.20	4 (16%)	30,47,47	1.02	2 (6%)
3	EDO	B	301	-	3,3,3	0.24	0	2,2,2	0.82	0

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	GDP	B	303	-	-	0/12/32/32	0/3/3/3

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	C	203	-	-	1/1/1/1	-
3	EDO	D	301	-	-	1/1/1/1	-
3	EDO	A	202	-	-	1/1/1/1	-
4	A1IWE	C	202	1	-	5/15/25/25	0/2/2/2
4	A1IWE	D	302	1	-	4/15/25/25	0/2/2/2
2	GDP	D	303	-	-	0/12/32/32	0/3/3/3
2	GDP	A	201	-	-	0/12/32/32	0/3/3/3
4	A1IWE	A	203	1	-	2/15/25/25	0/2/2/2
4	A1IWE	B	302	1	-	3/15/25/25	0/2/2/2
2	GDP	C	201	-	-	0/12/32/32	0/3/3/3
3	EDO	B	301	-	-	1/1/1/1	-

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	201	GDP	C5-C6	-3.06	1.41	1.47
2	C	201	GDP	C5-C6	-3.02	1.41	1.47
4	C	202	A1IWE	C19-C17	2.87	1.64	1.51
2	D	303	GDP	C8-N7	-2.78	1.30	1.35
2	A	201	GDP	C8-N7	-2.75	1.30	1.35
2	C	201	GDP	C5-C4	-2.66	1.36	1.43
2	B	303	GDP	C5-C6	-2.63	1.42	1.47
2	C	201	GDP	C8-N7	-2.52	1.30	1.35
2	B	303	GDP	C8-N7	-2.33	1.31	1.35
2	D	303	GDP	C5-C6	-2.26	1.42	1.47
2	C	201	GDP	C6-N1	2.11	1.41	1.37
2	A	201	GDP	C5-C4	-2.10	1.37	1.43
2	B	303	GDP	C5-C4	-2.01	1.38	1.43

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	303	GDP	O6-C6-C5	3.15	130.53	124.37
4	C	202	A1IWE	C19-C17-C16	2.87	118.02	112.72
2	C	201	GDP	O6-C6-C5	2.85	129.95	124.37
2	A	201	GDP	O6-C6-C5	2.85	129.94	124.37
2	B	303	GDP	O6-C6-C5	2.60	129.45	124.37
4	A	203	A1IWE	C20-C22-N1	2.54	117.18	110.91
4	D	302	A1IWE	C20-C22-N1	2.48	117.03	110.91
4	D	302	A1IWE	C19-C17-C16	2.36	117.08	112.72
4	C	202	A1IWE	C12-N11-C20	2.34	130.47	122.81

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	302	A1IWE	C15-N14-C13	2.13	116.73	112.62
2	C	201	GDP	O6-C6-N1	-2.05	118.22	120.65

There are no chirality outliers.

All (18) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	302	A1IWE	C7-C2-N1-C22
4	B	302	A1IWE	C3-C2-N1-C22
4	C	202	A1IWE	C3-C2-N1-C22
4	D	302	A1IWE	C3-C2-N1-C22
4	C	202	A1IWE	C7-C2-N1-C22
4	D	302	A1IWE	C7-C2-N1-C22
3	B	301	EDO	O1-C1-C2-O2
3	D	301	EDO	O1-C1-C2-O2
4	A	203	A1IWE	O21-C20-C22-N1
4	C	202	A1IWE	O21-C20-C22-N1
4	A	203	A1IWE	N11-C20-C22-N1
4	C	202	A1IWE	N11-C20-C22-N1
4	C	202	A1IWE	C20-C22-N1-C2
4	D	302	A1IWE	C20-C22-N1-C2
3	A	202	EDO	O1-C1-C2-O2
3	C	203	EDO	O1-C1-C2-O2
4	D	302	A1IWE	O21-C20-C22-N1
4	B	302	A1IWE	C20-C22-N1-C2

There are no ring outliers.

5 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	303	GDP	1	0
2	D	303	GDP	2	0
2	A	201	GDP	1	0
4	B	302	A1IWE	1	0
3	B	301	EDO	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 B 303

Bond lengths

Bond angles

Torsions

Rings

Ligand A1IWE C 202

Bond lengths

Bond angles

Torsions

Rings

Ligand A1IWE D 302

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP D 303

Bond lengths

Bond angles

Torsions

Rings

Full wwPDB X-ray Structure Validation Report

Ligand GDP A 201

Bond lengths

Bond angles

Torsions

Rings

Ligand A1IWE A 203

Bond lengths

Bond angles

Torsions

Rings

Ligand A1IWE B 302

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP C 201

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	156/170 (91%)	0.33	11 (7%)	23	24	12, 23, 47, 58	3 (1%)
1	B	154/170 (90%)	0.51	8 (5%)	34	35	13, 25, 46, 81	3 (1%)
1	C	155/170 (91%)	0.44	11 (7%)	23	24	11, 23, 45, 68	5 (3%)
1	D	153/170 (90%)	0.40	7 (4%)	38	40	12, 22, 43, 57	4 (2%)
All	All	618/680 (90%)	0.42	37 (5%)	29	30	11, 23, 46, 81	15 (2%)

All (37) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	56	LEU	5.3
1	A	126	ASP	4.9
1	C	71	TYR	4.4
1	B	40	TYR	3.7
1	D	108	ASP	3.5
1	B	29	VAL	3.4
1	C	0	GLY	3.4
1	D	29	VAL	3.3
1	C	49	GLU	3.2
1	A	71	TYR	3.2
1	D	40	TYR	3.2
1	A	123	ARG	3.1
1	B	108	ASP	3.1
1	C	121	PRO	3.0
1	C	67	MET	3.0
1	B	71	TYR	2.9
1	C	108	ASP	2.9
1	B	168	GLU	2.9
1	A	108	ASP	2.6
1	C	167	LYS	2.5
1	A	122	SER	2.5

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	A	56	LEU	2.5
1	C	70	GLN	2.4
1	D	70	GLN	2.4
1	A	29	VAL	2.3
1	A	40	TYR	2.3
1	C	29	VAL	2.3
1	D	122	SER	2.2
1	D	71	TYR	2.2
1	A	39	SER	2.2
1	D	41	ARG	2.2
1	B	167	LYS	2.2
1	A	0	GLY	2.2
1	A	70	GLN	2.2
1	C	122	SER	2.2
1	B	6	LEU	2.0
1	C	40	TYR	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 oligosaccharides 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
4	A1IWE	C	202	22/22	0.69	0.24	30,49,74,107	22
4	A1IWE	A	203	22/22	0.72	0.23	27,46,86,125	22
4	A1IWE	B	302	22/22	0.79	0.18	21,36,71,109	22
4	A1IWE	D	302	22/22	0.83	0.17	24,39,71,89	22
2	GDP	D	303	28/28	0.96	0.06	18,22,29,30	0
3	EDO	C	203	4/4	0.96	0.08	19,20,20,20	0
2	GDP	C	201	28/28	0.97	0.05	17,21,24,28	0

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	EDO	D	301	4/4	0.97	0.07	18,20,22,22	0
2	GDP	B	303	28/28	0.97	0.06	20,24,29,31	0
2	GDP	A	201	28/28	0.98	0.05	17,21,25,26	0
3	EDO	A	202	4/4	0.99	0.04	20,21,21,22	0
3	EDO	B	301	4/4	0.99	0.04	22,24,24,25	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.
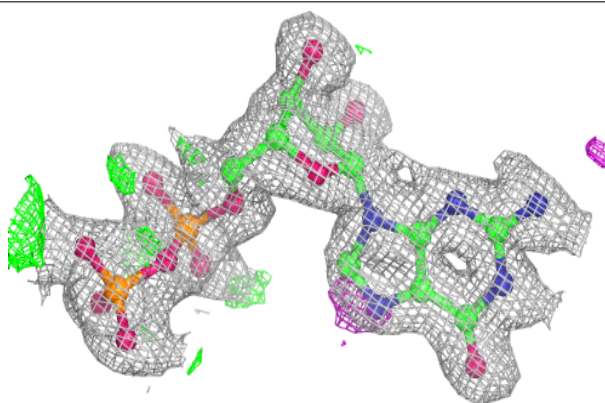
Electron density around A1IWE C 202:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
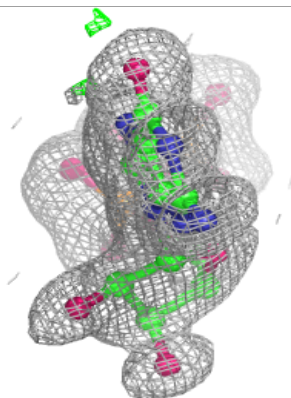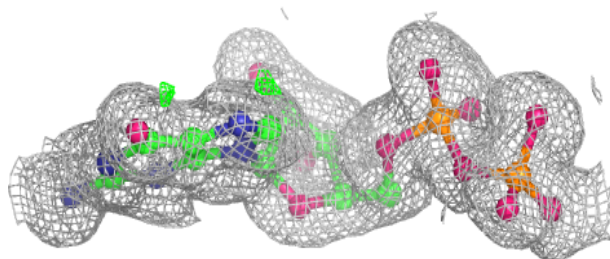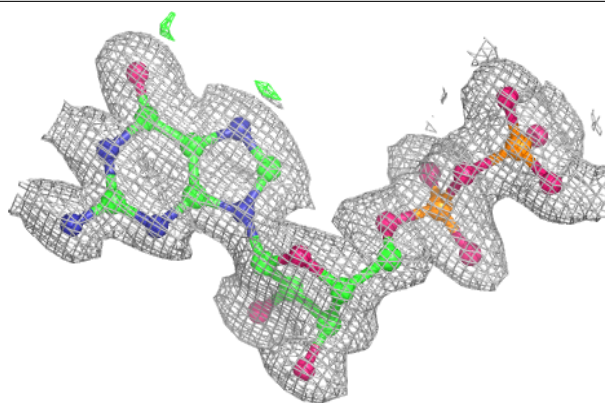mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative) and green (positive)
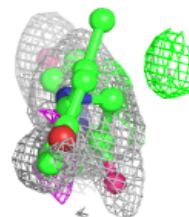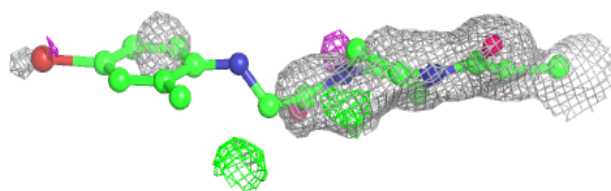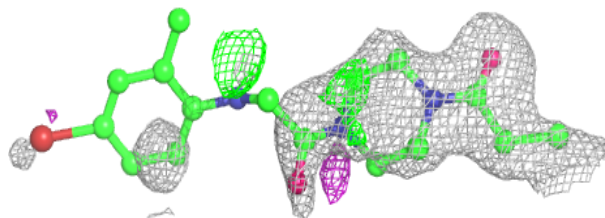
Electron density around A1IWE A 203:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
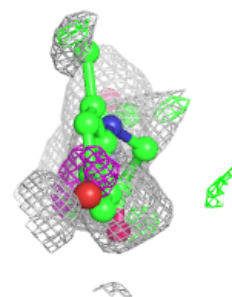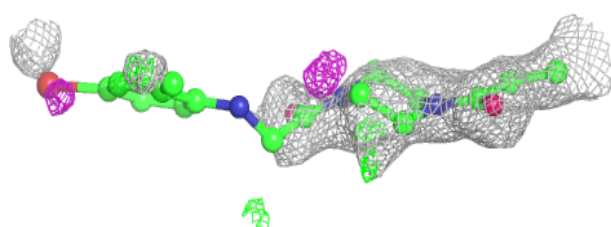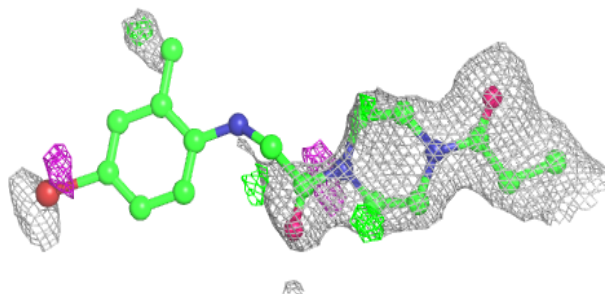
Electron density around A1IWE B 302:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
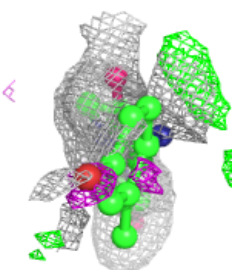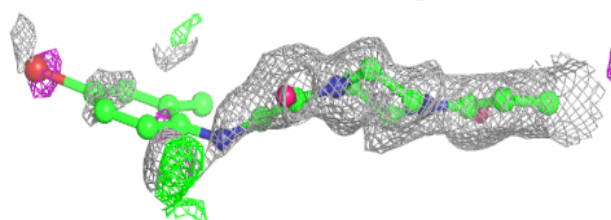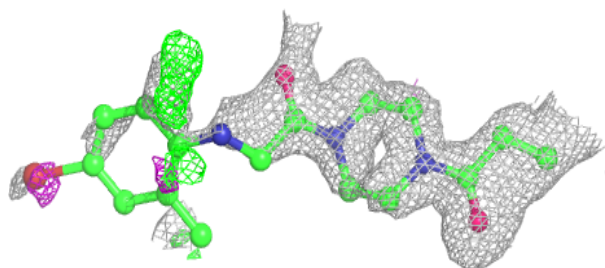
Electron density around A1IWE D 302:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
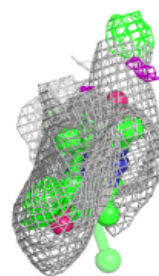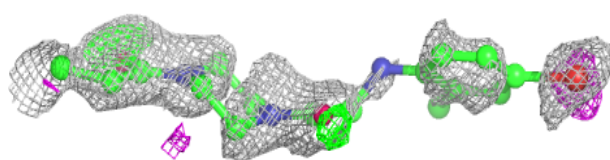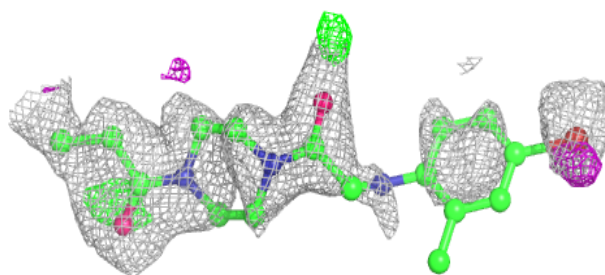
Electron density around GDP D 303:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
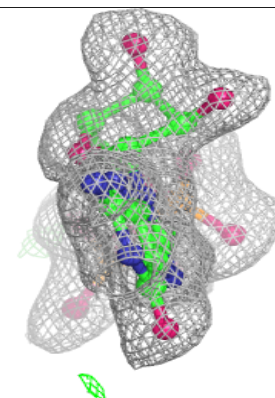mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
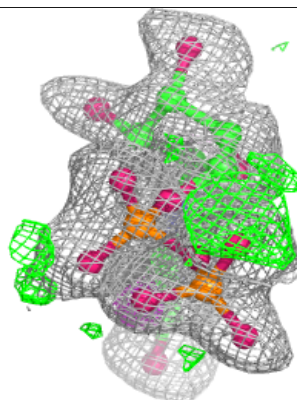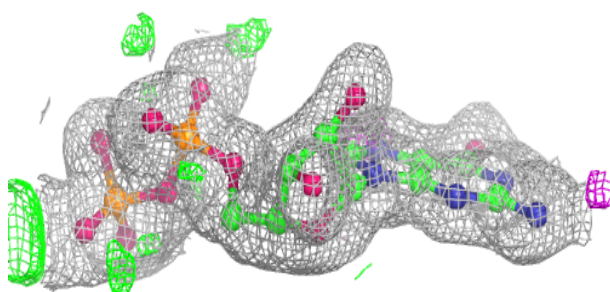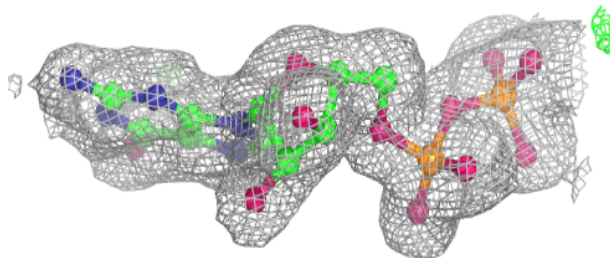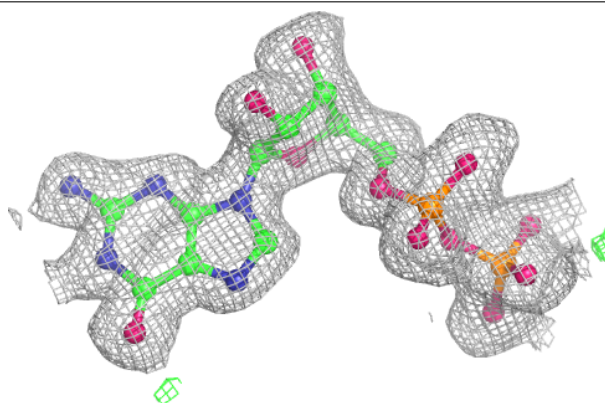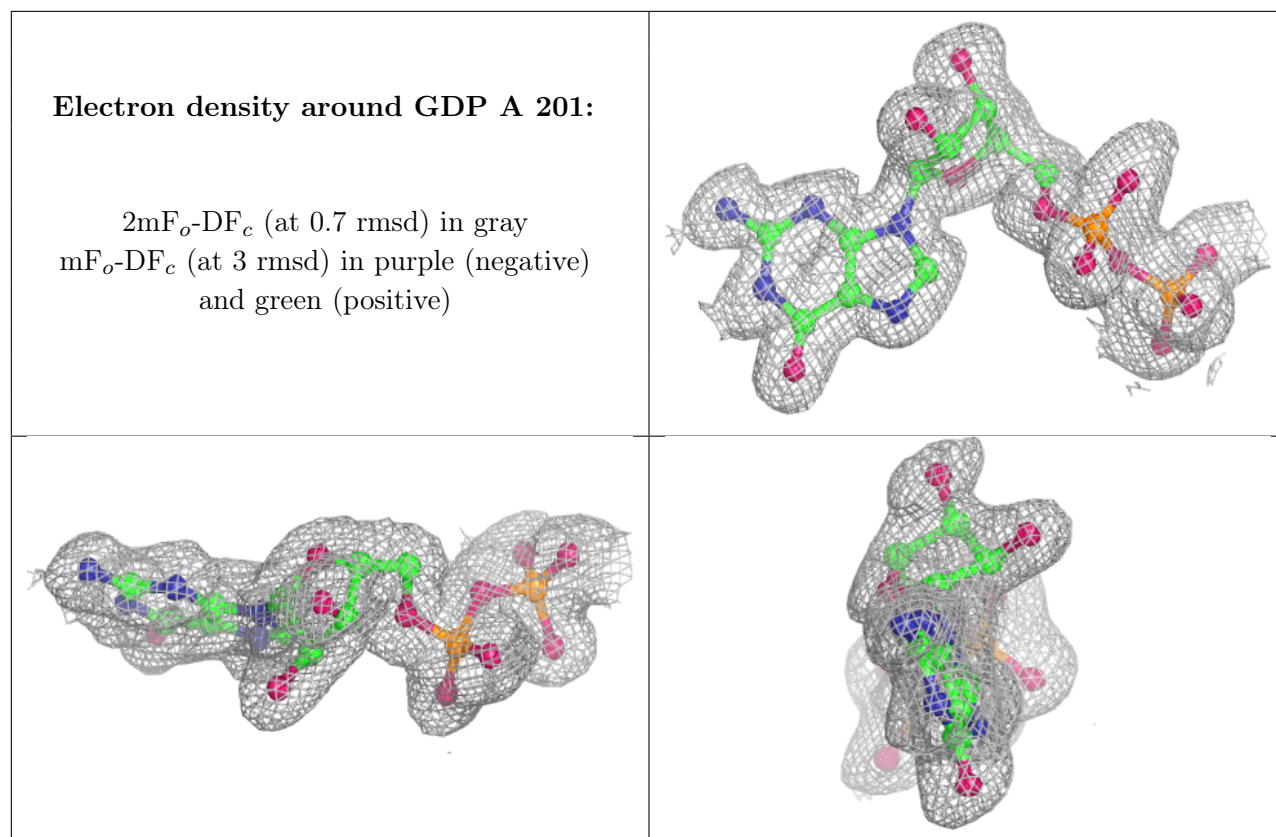
Electron density around GDP C 201:

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 B 303:

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 201:

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

6.5　Other polymers ⓘ

There are no such residues in this entry.