WORLDWIDE PDB

PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Jul 8, 2025 – 02:18 PM JST

PDB ID	:	8YH1 / pdb_00008yh1
Title	:	Crystal structure of Thermus thermophilus UMP kinase complexed with a phosphoryl group acceptor and donor.
Authors	:	Fukui, K.; Nishiwaki, A.; Nakagawa, N.; Kuramitsu, S.; Masui, R.
Deposited on	:	2024-02-27
Resolution	:	2.60 Å(reported)

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

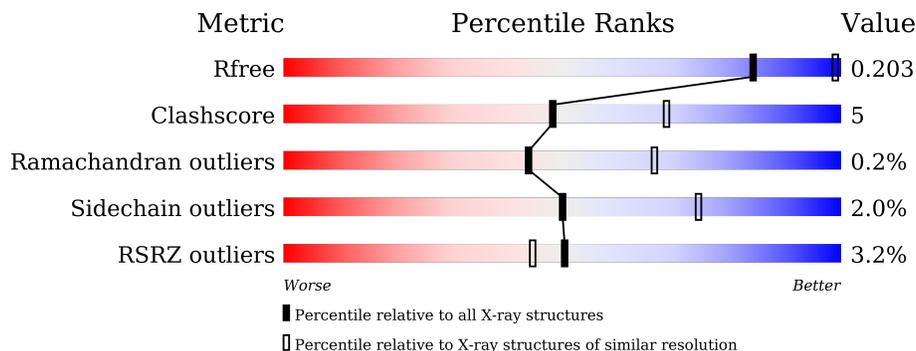|		
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

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 2.60 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.
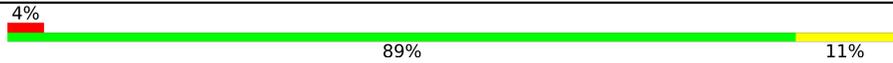
Metric	Percentile Ranks	Value
Rfree		0.203
Clashscore		5
Ramachandran outliers		0.2%
Sidechain outliers		2.0%
RSRZ outliers		3.2%

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	3775 (2.60-2.60)
Clashscore	180529	4181 (2.60-2.60)
Ramachandran outliers	177936	4129 (2.60-2.60)
Sidechain outliers	177891	4129 (2.60-2.60)
RSRZ outliers	164620	3775 (2.60-2.60)

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	233	2% / 87% 12%
1	B	233	3% / 88% 11% ·
1	C	233	2% / 88% 12%
1	D	233	2% / 88% 10% ·
1	E	233	3% / 88% 12%
1	F	233	2% / 85% 15%

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Mol	Chain	Length	Quality of chain
1	G	233	4% · · · 89% · · · 11%
1	H	233	4% · · · 87% · · · 12% ·
1	I	233	9% · · · 83% · · · 16% ·

2 Entry composition ⓘ

There are 7 unique types of molecules in this entry. The entry contains 16733 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 Uridylate kinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	233	Total	C	N	O	S	0	0	0
			1764	1123	305	328	8			
1	B	233	Total	C	N	O	S	0	0	0
			1766	1123	307	328	8			
1	C	233	Total	C	N	O	S	0	0	0
			1764	1123	307	326	8			
1	D	233	Total	C	N	O	S	0	0	0
			1749	1114	299	328	8			
1	E	233	Total	C	N	O	S	0	0	0
			1754	1114	304	328	8			
1	F	233	Total	C	N	O	S	0	0	0
			1754	1114	304	328	8			
1	G	233	Total	C	N	O	S	0	0	0
			1740	1108	299	325	8			
1	H	233	Total	C	N	O	S	0	0	0
			1748	1113	303	324	8			
1	I	231	Total	C	N	O	S	0	0	0
			1705	1082	295	320	8			

- Molecule 2 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).
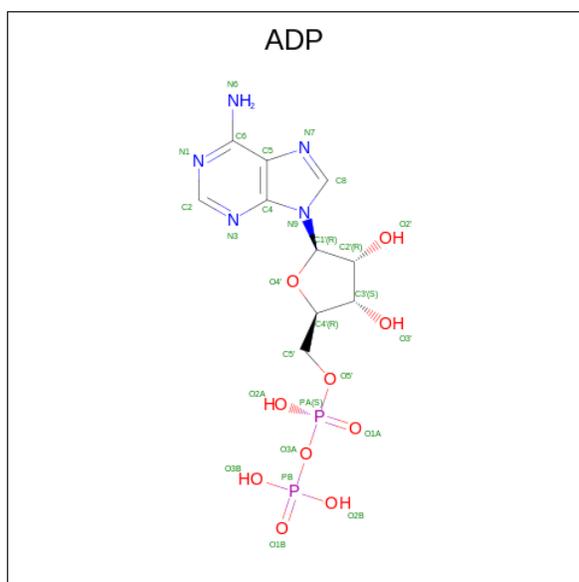
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
2	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
2	C	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
2	D	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
2	E	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
2	F	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
2	G	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
2	H	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

- Molecule 3 is URIDINE-5'-DIPHOSPHATE (CCD ID: UDP) (formula: $C_9H_{14}N_2O_{12}P_2$) (labeled as "Ligand of Interest" by depositor).
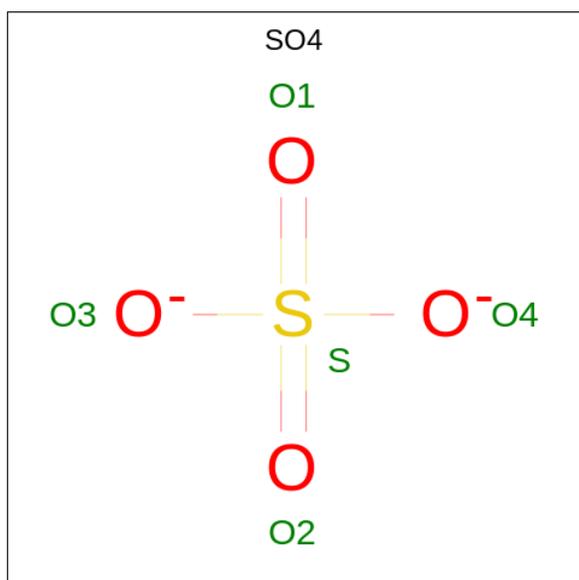
UDP
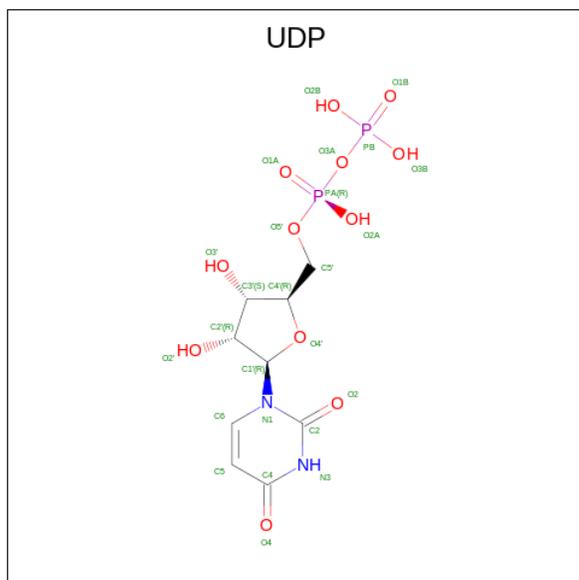
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
3	B	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
3	C	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
3	D	1	Total	C	N	O	P	0	0
			25	9	2	12	2		
3	I	1	Total	C	N	O	P	0	0
			25	9	2	12	2		

- Molecule 4 is SULFATE ION (CCD ID: SO4) (formula: O_4S).

SO4

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total 5	O 4	S 1	0	0
4	A	1	Total 5	O 4	S 1	0	0
4	A	1	Total 5	O 4	S 1	0	0
4	B	1	Total 5	O 4	S 1	0	0
4	B	1	Total 5	O 4	S 1	0	0
4	B	1	Total 5	O 4	S 1	0	0
4	B	1	Total 5	O 4	S 1	0	0
4	B	1	Total 5	O 4	S 1	0	0
4	B	1	Total 5	O 4	S 1	0	0
4	C	1	Total 5	O 4	S 1	0	0
4	C	1	Total 5	O 4	S 1	0	0
4	C	1	Total 5	O 4	S 1	0	0
4	C	1	Total 5	O 4	S 1	0	0
4	D	1	Total 5	O 4	S 1	0	0
4	D	1	Total 5	O 4	S 1	0	0
4	E	1	Total 5	O 4	S 1	0	0
4	E	1	Total 5	O 4	S 1	0	0
4	F	1	Total 5	O 4	S 1	0	0
4	F	1	Total 5	O 4	S 1	0	0
4	G	1	Total 5	O 4	S 1	0	0
4	G	1	Total 5	O 4	S 1	0	0
4	I	1	Total 5	O 4	S 1	0	0

- Molecule 5 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total 1	Mg 1	0	0
5	C	1	Total 1	Mg 1	0	0
5	E	1	Total 1	Mg 1	0	0
5	G	1	Total 1	Mg 1	0	0
5	H	1	Total 1	Mg 1	0	0
5	I	1	Total 1	Mg 1	0	0

- Molecule 6 is URIDINE-5'-MONOPHOSPHATE (CCD ID: U5P) (formula: $C_9H_{13}N_2O_9P$) (labeled as "Ligand of Interest" by depositor).
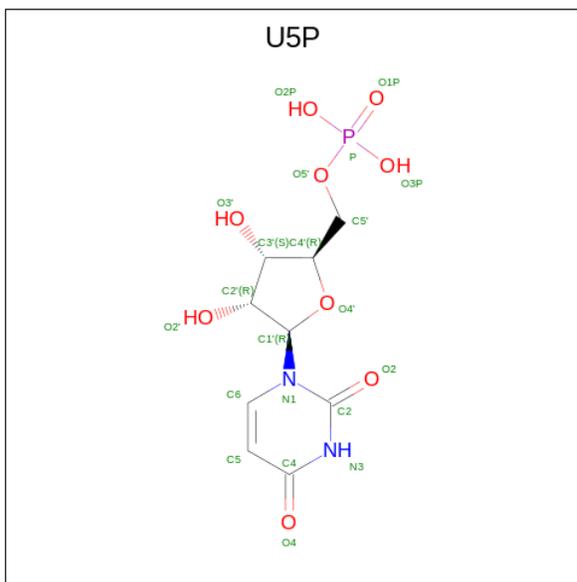
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	E	1	Total 21	C 9	N 2	O 9	P 1	0	0
6	F	1	Total 21	C 9	N 2	O 9	P 1	0	0
6	G	1	Total 21	C 9	N 2	O 9	P 1	0	0
6	H	1	Total 21	C 9	N 2	O 9	P 1	0	0

- Molecule 7 is water.

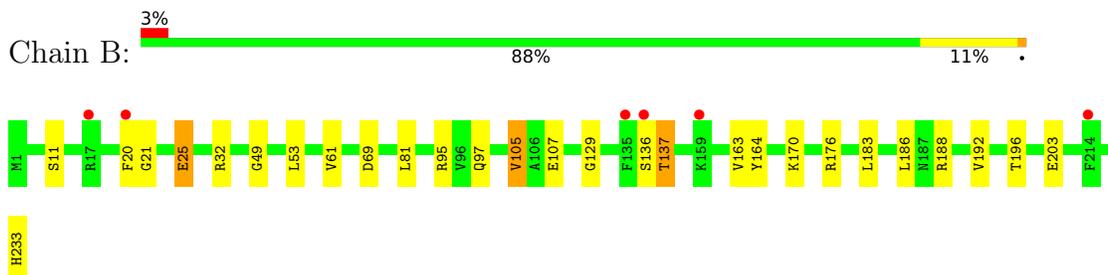| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	91	Total 91	O 91	0	0
7	B	74	Total 74	O 74	0	0
7	C	61	Total 61	O 61	0	0
7	D	48	Total 48	O 48	0	0
7	E	50	Total 50	O 50	0	0
7	F	39	Total 39	O 39	0	0
7	G	31	Total 31	O 31	0	0
7	H	35	Total 35	O 35	0	0
7	I	19	Total 19	O 19	0	0

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.
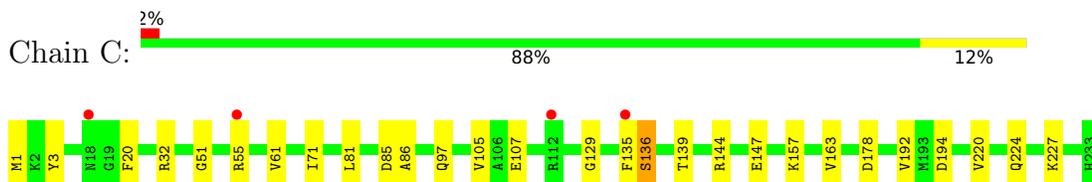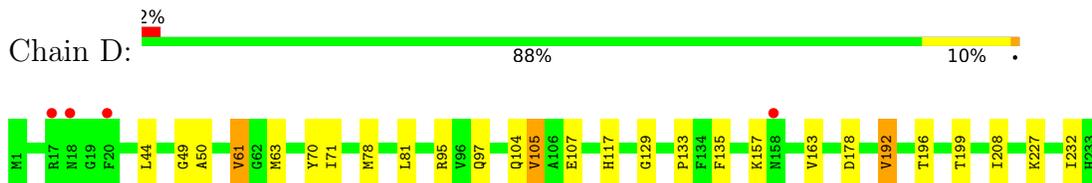
- Molecule 1: Uridylate kinase
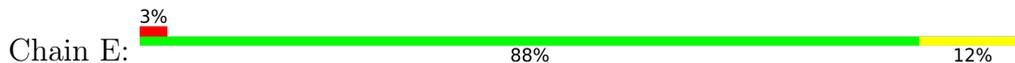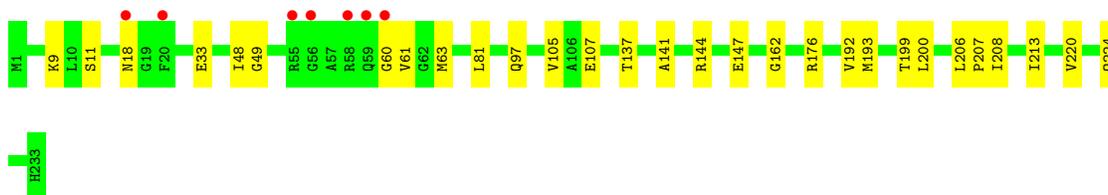
Chain A:

- Molecule 1: Uridylate kinase

Chain B:

- Molecule 1: Uridylate kinase

Chain C:

- Molecule 1: Uridylate kinase

Chain D:

- Molecule 1: Uridylate kinase

Chain E:

M1 K9 L10 S11 N18 G19 F20 E33 I48 G49 R55 G56 A57 R58 Q59 G60 V61 G62 M63 L81 Q97 V105 A106 E107 T137 A141 R144 E147 G162 R176 V192 M193 T199 L200 L206 P207 I208 I213 V220 Q224

H233

• Molecule 1: Uridylate kinase

Chain F:

2%
85%
15%

M1 K2 Y3 K4 K9 L10 S11 N18 E25 V47 A50 V61 Y70 I71 M78 L81 D85 A86 L87 E88 T103 Q104 V105 S136 T137 A141 R144 E147 E151 K157 N158 K159 R169 K170 L180 L183 E184 R188

V192 M193 D194 E203 L206 P207 H233

• Molecule 1: Uridylate kinase

Chain G:

4%
89%
11%

M1 L10 S11 N18 E25 L30 A50 R55 G56 A57 R58 V61 R65 D69 Y70 M73 L81 A86 S89 Q104 V105 F134 F135 S136 K159 Y164 K170 N171 P172 E173 R176 E184 R188 V192 M193 D194 T195

I208 H233

• Molecule 1: Uridylate kinase

Chain H:

4%
87%
12%

M1 S11 R17 N18 G19 F20 A26 K35 D39 R55 R58 Q59 G60 V61 G62 M63 D64 R65 D69 L81 Q104 V105 H117 R122 S136 L143 E147 M155 A156 K157 N158 K159 V160 V163 E173 D178 T181 V192 M193
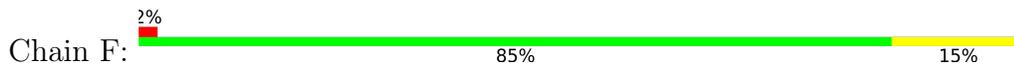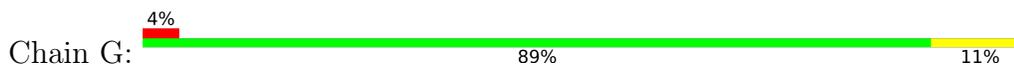
D194 T195 T196 T199 F214 H233

• Molecule 1: Uridylate kinase

Chain I:

9%
83%
16%

M1 K4 R17 N18 G19 F20 E25 I48 G49 A50 R55 V61 R65 D69 L81 V96 Q97 T103 Q104 V105 A106 E107 R113 G129 P133 F134 F135 S136 T137 R144 E147 E151 V152 V153 L154 M155 N158 K159 V160 D161 Y164

S165 D166 D167 P168 R169 K170 N171 PRO GLU A174 V175 R176 T181 Y182 L183 E184 V192 T199 M202 E203 L206 P207 F214 Q224 H233

4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α, β, γ	150.22Å 232.20Å 284.84Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	26.32 – 2.60 26.32 – 2.60	Depositor EDS
% Data completeness (in resolution range)	99.8 (26.32-2.60) 99.8 (26.32-2.60)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	7.15 (at 2.60Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.180 , 0.203 0.180 , 0.203	Depositor DCC
R_{free} test set	150054 reflections (1.31%)	wwPDB-VP
Wilson B-factor (Å^2)	42.7	Xtriage
Anisotropy	0.008	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 40.2	EDS
L-test for twinning[2]	$< |L| > = 0.51, < L^2 > = 0.35$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	16733	wwPDB-VP
Average B, all atoms (Å^2)	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.06% 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 $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: UDP, MG, U5P, SO4, ADP

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	0.40	0/1789	0.57	0/2422
1	B	0.40	0/1791	0.58	0/2425
1	C	0.38	0/1789	0.58	0/2422
1	D	0.32	0/1774	0.49	0/2406
1	E	0.35	0/1778	0.51	0/2409
1	F	0.32	0/1778	0.48	0/2409
1	G	0.31	0/1765	0.49	0/2396
1	H	0.32	0/1773	0.52	0/2404
1	I	0.28	0/1727	0.47	0/2345
All	All	0.35	0/15964	0.52	0/21638

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	1764	0	1817	25	0
1	B	1766	0	1817	24	0
1	C	1764	0	1817	22	0
1	D	1749	0	1779	23	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	1754	0	1799	14	0
1	F	1754	0	1799	26	0
1	G	1740	0	1760	15	0
1	H	1748	0	1787	21	0
1	I	1705	0	1709	22	0
2	A	27	0	12	0	0
2	B	27	0	12	2	0
2	C	27	0	12	1	0
2	D	27	0	12	2	0
2	E	27	0	12	1	0
2	F	27	0	12	2	0
2	G	27	0	12	2	0
2	H	27	0	12	2	0
3	A	25	0	11	1	0
3	B	25	0	11	4	0
3	C	25	0	11	1	0
3	D	25	0	11	3	0
3	I	25	0	11	3	0
4	A	15	0	0	0	0
4	B	30	0	0	1	0
4	C	20	0	0	0	0
4	D	10	0	0	0	0
4	E	10	0	0	0	0
4	F	10	0	0	0	0
4	G	10	0	0	0	0
4	I	5	0	0	0	0
5	A	1	0	0	0	0
5	C	1	0	0	0	0
5	E	1	0	0	0	0
5	G	1	0	0	0	0
5	H	1	0	0	0	0
5	I	1	0	0	0	0
6	E	21	0	11	1	0
6	F	21	0	11	3	0
6	G	21	0	11	2	0
6	H	21	0	11	2	0
7	A	91	0	0	1	0
7	B	74	0	0	4	0
7	C	61	0	0	0	0
7	D	48	0	0	0	0
7	E	50	0	0	0	0
7	F	39	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	G	31	0	0	1	0
7	H	35	0	0	2	0
7	I	19	0	0	2	0
All	All	16733	0	16279	176	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 (176) 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:F:50:ALA:H	6:F:302:U5P:H5'1	1.29	0.94
1:E:60:GLY:HA3	1:E:63:MET:HE3	1.63	0.80
1:H:17:ARG:HG2	1:H:26:ALA:HB2	1.69	0.75
1:H:163:VAL:HG13	1:H:192:VAL:HG21	1.68	0.74
1:B:163:VAL:HG13	1:B:192:VAL:HG21	1.71	0.72
1:F:88:GLU:HG2	7:F:438:HOH:O	1.90	0.70
1:D:163:VAL:HG13	1:D:192:VAL:HG21	1.73	0.70
1:I:181:THR:OG1	1:I:184:GLU:HG3	1.93	0.69
1:F:184:GLU:HG2	1:F:188:ARG:HH21	1.58	0.68
1:B:97:GLN:HG2	1:B:107:GLU:HG3	1.77	0.67
1:A:196:THR:HG23	1:B:196:THR:HG23	1.78	0.64
1:A:155:MET:HE3	1:A:157:LYS:HE3	1.82	0.62
1:C:81:LEU:HD11	1:C:105:VAL:HG13	1.82	0.62
1:B:32:ARG:HD3	7:B:433:HOH:O	1.99	0.62
1:E:97:GLN:HG2	1:E:107:GLU:HG3	1.81	0.61
1:F:9:LYS:NZ	2:F:301:ADP:O2B	2.32	0.61
1:F:137:THR:OG1	6:F:302:U5P:H5'2	2.01	0.61
1:C:163:VAL:HG13	1:C:192:VAL:HG21	1.82	0.61
1:I:50:ALA:HB3	3:I:301:UDP:H4'	1.83	0.60
1:H:155:MET:HE2	1:H:193:MET:SD	2.40	0.60
1:B:20:PHE:CD1	1:B:21:GLY:N	2.70	0.60
1:A:1:MET:HE2	1:A:40:THR:O	2.02	0.59
1:H:60:GLY:HA3	1:H:63:MET:HE3	1.83	0.59
1:D:97:GLN:HG2	1:D:107:GLU:HG3	1.85	0.59
1:C:136:SER:HB3	1:C:194:ASP:OD2	2.03	0.59
1:C:192:VAL:HG22	2:C:301:ADP:C6	2.39	0.58
1:D:157:LYS:HD2	2:D:301:ADP:H5'2	1.85	0.57
1:H:117:HIS:HD2	1:H:122:ARG:HH11	1.50	0.57
1:H:192:VAL:HG22	2:H:301:ADP:C6	2.39	0.57
1:D:81:LEU:HD11	1:D:105:VAL:HG13	1.85	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:135:PHE:O	3:I:301:UDP:N3	2.37	0.57
1:H:65:ARG:NH2	7:H:401:HOH:O	2.36	0.57
1:B:192:VAL:HG22	2:B:301:ADP:C6	2.39	0.57
1:A:17:ARG:NH2	1:A:25:GLU:OE1	2.38	0.57
1:A:63:MET:HA	1:C:85:ASP:OD2	2.05	0.57
1:I:164:TYR:CZ	1:I:176:ARG:HB2	2.40	0.57
1:I:97:GLN:HG2	1:I:107:GLU:HG3	1.87	0.56
1:A:20:PHE:HB2	1:C:20:PHE:CE2	2.41	0.56
1:B:81:LEU:HD11	1:B:105:VAL:HG13	1.87	0.55
1:D:129:GLY:HA3	3:D:302:UDP:C4	2.42	0.55
1:G:193:MET:HE1	1:G:208:ILE:HG21	1.89	0.55
1:H:159:LYS:NZ	7:H:402:HOH:O	2.40	0.54
1:H:17:ARG:HH11	1:H:17:ARG:HG3	1.71	0.54
1:B:20:PHE:CE1	1:B:21:GLY:HA2	2.43	0.54
1:I:161:ASP:OD1	1:I:161:ASP:N	2.39	0.54
1:C:1:MET:HE3	1:C:3:TYR:O	2.07	0.53
1:C:178:ASP:O	1:C:227:LYS:NZ	2.40	0.53
1:I:164:TYR:CE2	1:I:176:ARG:HB2	2.44	0.52
1:B:25:GLU:H	1:B:25:GLU:CD	2.18	0.52
1:I:129:GLY:HA3	3:I:301:UDP:C5	2.44	0.52
1:E:199:THR:HG21	1:I:199:THR:HG21	1.91	0.52
1:B:164:TYR:CE2	1:B:176:ARG:HB2	2.45	0.51
1:F:81:LEU:HD11	1:F:105:VAL:HG13	1.91	0.51
1:C:51:GLY:HA3	1:C:55:ARG:HH21	1.75	0.51
1:E:162:GLY:HA3	1:E:176:ARG:HD2	1.93	0.51
1:F:1:MET:HE3	1:F:3:TYR:O	2.11	0.51
1:D:199:THR:HG21	1:H:199:THR:HG21	1.93	0.50
1:B:20:PHE:CG	1:B:21:GLY:N	2.79	0.50
1:B:20:PHE:HE1	1:B:53:LEU:HD23	1.75	0.50
1:C:97:GLN:HG2	1:C:107:GLU:HG3	1.93	0.50
1:E:33:GLU:HG2	1:E:213:ILE:HG12	1.94	0.50
1:B:129:GLY:HA3	3:B:302:UDP:C5	2.47	0.50
1:E:193:MET:HE1	1:E:208:ILE:HG21	1.94	0.49
1:B:95:ARG:NH1	4:B:305:SO4:O4	2.40	0.49
1:I:203:GLU:OE2	7:I:401:HOH:O	2.20	0.49
1:A:78:MET:HG2	1:C:71:ILE:HG23	1.95	0.49
1:B:49:GLY:HA2	1:B:137:THR:HG21	1.94	0.49
1:F:25:GLU:H	1:F:25:GLU:CD	2.20	0.49
1:F:50:ALA:N	6:F:302:U5P:H5'1	2.11	0.49
1:E:206:LEU:HD12	1:E:207:PRO:HD2	1.95	0.49
1:F:157:LYS:HE2	1:F:192:VAL:O	2.12	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:81:LEU:HD11	1:G:105:VAL:HG13	1.95	0.49
1:G:65:ARG:HG2	1:G:134:PHE:CE1	2.48	0.48
1:A:136:SER:HB3	1:A:194:ASP:OD1	2.13	0.48
1:D:178:ASP:O	1:D:227:LYS:NZ	2.41	0.48
1:F:180:LEU:HD23	1:F:180:LEU:HA	1.70	0.48
1:A:184:GLU:O	1:A:188:ARG:HG3	2.14	0.48
1:A:184:GLU:HG2	1:A:188:ARG:NH2	2.29	0.47
1:H:81:LEU:HD11	1:H:105:VAL:HG13	1.96	0.47
1:G:104:GLN:H	1:G:104:GLN:CD	2.22	0.47
1:G:70:TYR:HA	1:G:73:MET:HE3	1.96	0.47
1:G:184:GLU:O	1:G:188:ARG:HG3	2.15	0.47
1:I:144:ARG:HD3	1:I:147:GLU:OE1	2.14	0.47
1:B:137:THR:OG1	3:B:302:UDP:O2A	2.33	0.47
1:D:63:MET:HG3	1:F:85:ASP:OD2	2.14	0.47
1:C:32:ARG:NH1	1:F:170:LYS:HA	2.29	0.46
6:E:302:U5P:H5'2	6:E:302:U5P:H6	1.96	0.46
1:F:203:GLU:OE2	1:G:195:THR:OG1	2.33	0.46
1:A:61:VAL:HG22	1:C:86:ALA:HA	1.96	0.46
1:D:105:VAL:HG22	1:F:70:TYR:HB3	1.98	0.46
1:H:35:LYS:NZ	1:H:39:ASP:OD2	2.48	0.46
6:H:302:U5P:H6	6:H:302:U5P:H5'2	1.98	0.46
1:I:81:LEU:HD11	1:I:105:VAL:HG13	1.97	0.46
1:I:206:LEU:HD12	1:I:207:PRO:HD2	1.98	0.46
1:D:95:ARG:HG3	1:D:117:HIS:CE1	2.51	0.46
1:H:143:LEU:O	1:H:147:GLU:HG3	2.15	0.46
1:E:81:LEU:HD11	1:E:105:VAL:HG13	1.96	0.46
1:G:11:SER:HB2	2:G:301:ADP:O3B	2.15	0.45
1:F:136:SER:OG	1:F:194:ASP:OD2	2.30	0.45
1:I:4:LYS:N	1:I:151:GLU:OE2	2.43	0.45
1:B:136:SER:HB2	7:B:457:HOH:O	2.16	0.45
1:C:129:GLY:HA3	3:C:302:UDP:C5	2.51	0.45
1:D:196:THR:HG23	1:H:196:THR:HG23	1.98	0.45
1:I:155:MET:HB3	1:I:155:MET:HE3	1.68	0.45
1:A:69:ASP:HB3	3:A:302:UDP:O2	2.17	0.45
7:A:467:HOH:O	1:B:203:GLU:HG3	2.17	0.45
1:I:182:TYR:CG	1:I:202:MET:HB2	2.51	0.45
1:A:70:TYR:HB3	1:C:105:VAL:HG22	2.00	0.44
1:A:184:GLU:HG2	1:A:188:ARG:CZ	2.46	0.44
1:D:49:GLY:HA3	3:D:302:UDP:O3B	2.16	0.44
1:I:65:ARG:NH2	1:I:134:PHE:HA	2.33	0.44
1:B:129:GLY:HA3	3:B:302:UDP:C4	2.52	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:81:LEU:HD11	1:C:105:VAL:CG1	2.48	0.44
1:E:49:GLY:HA2	1:E:137:THR:HG21	1.99	0.44
1:I:104:GLN:CD	1:I:104:GLN:H	2.25	0.44
1:D:157:LYS:HD2	2:D:301:ADP:C5'	2.48	0.44
1:F:184:GLU:HG2	1:F:188:ARG:NH2	2.30	0.44
1:A:224:GLN:NE2	1:A:224:GLN:HA	2.33	0.43
1:E:220:VAL:O	1:E:224:GLN:HG2	2.18	0.43
1:G:164:TYR:CZ	1:G:176:ARG:HB2	2.53	0.43
1:A:155:MET:CE	1:A:157:LYS:HE3	2.46	0.43
1:C:135:PHE:CD1	1:C:139:THR:HG21	2.53	0.43
1:D:61:VAL:HG22	1:F:86:ALA:HA	2.00	0.43
2:G:301:ADP:N3	2:G:301:ADP:H2'	2.33	0.43
1:H:181:THR:HA	1:H:233:HIS:O	2.17	0.43
1:A:203:GLU:HG3	7:B:404:HOH:O	2.18	0.43
1:B:188:ARG:HD3	7:B:403:HOH:O	2.17	0.43
1:D:78:MET:HG2	1:F:71:ILE:HG23	2.00	0.43
1:F:4:LYS:N	1:F:151:GLU:OE2	2.48	0.43
1:G:192:VAL:HG13	1:G:193:MET:HG2	1.99	0.43
1:C:157:LYS:HD3	1:C:157:LYS:HA	1.80	0.43
1:D:97:GLN:HA	1:D:107:GLU:O	2.19	0.43
1:B:183:LEU:HD23	1:B:183:LEU:HA	1.86	0.43
1:D:104:GLN:H	1:D:104:GLN:CD	2.27	0.43
1:G:86:ALA:O	1:G:89:SER:HB2	2.19	0.43
1:A:186:LEU:HD13	1:B:186:LEU:HD13	2.00	0.42
1:D:70:TYR:HB3	1:F:105:VAL:HG22	2.00	0.42
1:D:208:ILE:HB	1:D:232:ILE:HB	2.02	0.42
1:C:220:VAL:O	1:C:224:GLN:HG2	2.18	0.42
1:E:144:ARG:HD3	1:E:147:GLU:OE1	2.19	0.42
1:H:11:SER:HB2	2:H:301:ADP:O3B	2.19	0.42
1:D:157:LYS:HD3	1:D:157:LYS:HA	1.70	0.42
1:A:227:LYS:HA	1:A:227:LYS:HD2	1.92	0.42
1:G:10:LEU:HD13	1:G:30:LEU:HD21	2.02	0.42
1:I:69:ASP:HB2	1:I:133:PRO:HB3	2.01	0.42
1:I:113:ARG:HD2	7:I:418:HOH:O	2.19	0.42
1:A:63:MET:HG3	1:C:85:ASP:OD2	2.19	0.42
1:G:50:ALA:HB3	6:G:302:U5P:H5'2	2.01	0.42
1:H:157:LYS:HD2	1:H:157:LYS:HA	1.68	0.42
1:B:11:SER:HB2	2:B:301:ADP:O3B	2.19	0.42
1:E:11:SER:HB2	2:E:301:ADP:O3B	2.20	0.42
1:G:25:GLU:HB2	7:G:418:HOH:O	2.19	0.42
1:G:69:ASP:HB3	6:G:302:U5P:O2	2.20	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:144:ARG:NH1	1:F:147:GLU:OE1	2.46	0.42
1:H:136:SER:HB3	1:H:194:ASP:OD1	2.20	0.42
1:I:224:GLN:NE2	1:I:224:GLN:HA	2.35	0.42
1:A:2:LYS:HD3	1:A:3:TYR:CZ	2.55	0.41
1:A:155:MET:HE3	1:A:155:MET:HB3	1.76	0.41
1:D:133:PRO:C	1:D:135:PHE:H	2.28	0.41
1:H:104:GLN:OE1	1:H:104:GLN:N	2.29	0.41
1:D:71:ILE:HG23	1:F:78:MET:HG2	2.03	0.41
1:I:96:VAL:O	1:I:107:GLU:HG2	2.20	0.41
1:A:181:THR:HA	1:A:233:HIS:O	2.19	0.41
1:A:159:LYS:HD3	1:A:169:ARG:NH1	2.36	0.41
1:H:117:HIS:CD2	1:H:122:ARG:HH11	2.35	0.41
1:B:69:ASP:HB3	3:B:302:UDP:O2	2.20	0.41
1:C:144:ARG:HD3	1:C:147:GLU:OE1	2.21	0.41
1:D:50:ALA:H	3:D:302:UDP:PA	2.44	0.41
1:F:47:VAL:HG21	1:F:141:ALA:HA	2.02	0.41
1:F:206:LEU:HD12	1:F:207:PRO:HD2	2.03	0.41
1:A:81:LEU:HD11	1:A:105:VAL:CG1	2.50	0.41
1:H:69:ASP:HB3	6:H:302:U5P:O2	2.21	0.41
1:F:11:SER:HB2	2:F:301:ADP:PB	2.61	0.40
1:E:97:GLN:HG2	1:E:107:GLU:CG	2.49	0.40
1:C:227:LYS:HA	1:C:227:LYS:HD2	1.92	0.40
1:E:9:LYS:HG3	1:E:141:ALA:HB2	2.03	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	231/233 (99%)	228 (99%)	3 (1%)	0	100	100
1	B	231/233 (99%)	226 (98%)	4 (2%)	1 (0%)	30	52

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	231/233 (99%)	225 (97%)	6 (3%)	0	100	100
1	D	231/233 (99%)	225 (97%)	6 (3%)	0	100	100
1	E	231/233 (99%)	222 (96%)	8 (4%)	1 (0%)	30	52
1	F	231/233 (99%)	223 (96%)	8 (4%)	0	100	100
1	G	231/233 (99%)	224 (97%)	6 (3%)	1 (0%)	30	52
1	H	231/233 (99%)	224 (97%)	7 (3%)	0	100	100
1	I	227/233 (97%)	217 (96%)	9 (4%)	1 (0%)	30	52
All	All	2075/2097 (99%)	2014 (97%)	57 (3%)	4 (0%)	44	66

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	G	18	ASN
1	B	170	LYS
1	I	137	THR
1	E	18	ASN

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	181/183 (99%)	179 (99%)	2 (1%)	70	86
1	B	181/183 (99%)	176 (97%)	5 (3%)	38	65
1	C	180/183 (98%)	178 (99%)	2 (1%)	70	86
1	D	177/183 (97%)	173 (98%)	4 (2%)	45	71
1	E	179/183 (98%)	175 (98%)	4 (2%)	47	72
1	F	179/183 (98%)	175 (98%)	4 (2%)	47	72
1	G	174/183 (95%)	173 (99%)	1 (1%)	84	94
1	H	177/183 (97%)	173 (98%)	4 (2%)	45	71
1	I	168/183 (92%)	162 (96%)	6 (4%)	30	56

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	1596/1647 (97%)	1564 (98%)	32 (2%)	50 74

All (32) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	7	LEU
1	A	61	VAL
1	B	25	GLU
1	B	61	VAL
1	B	105	VAL
1	B	137	THR
1	B	233	HIS
1	C	61	VAL
1	C	136	SER
1	D	44	LEU
1	D	61	VAL
1	D	105	VAL
1	D	192	VAL
1	E	48	ILE
1	E	61	VAL
1	E	192	VAL
1	E	200	LEU
1	F	61	VAL
1	F	103	THR
1	F	183	LEU
1	F	184	GLU
1	G	136	SER
1	H	61	VAL
1	H	136	SER
1	H	160	VAL
1	H	194	ASP
1	I	48	ILE
1	I	61	VAL
1	I	103	THR
1	I	153	VAL
1	I	160	VAL
1	I	192	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	224	GLN
1	A	233	HIS
1	B	28	GLN
1	C	191	GLN
1	D	28	GLN
1	E	28	GLN
1	F	18	ASN
1	F	28	GLN
1	F	84	GLN
1	H	117	HIS
1	H	132	ASN
1	H	233	HIS
1	I	84	GLN
1	I	224	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 ⓘ

Of 45 ligands modelled in this entry, 6 are monoatomic - leaving 39 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	#$|Z| > 2$
2	ADP	G	301	5	24,29,29	0.95	1 (4%)	29,45,45	1.72	4 (13%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
2	ADP	F	301	-	24,29,29	0.88	1 (4%)	29,45,45	1.43	4 (13%)
3	UDP	B	302	-	24,26,26	0.49	0	37,40,40	0.46	0
4	SO4	F	303	-	4,4,4	0.14	0	6,6,6	0.16	0
4	SO4	C	306	-	4,4,4	0.13	0	6,6,6	0.24	0
3	UDP	C	302	5	24,26,26	0.48	0	37,40,40	0.45	0
2	ADP	C	301	5	24,29,29	0.95	2 (8%)	29,45,45	1.68	8 (27%)
6	U5P	H	302	5	22,22,22	0.55	0	33,33,33	0.92	2 (6%)
4	SO4	E	304	-	4,4,4	0.11	0	6,6,6	0.34	0
6	U5P	E	302	5	22,22,22	0.56	0	33,33,33	0.87	1 (3%)
4	SO4	B	305	-	4,4,4	0.17	0	6,6,6	0.27	0
4	SO4	A	304	-	4,4,4	0.13	0	6,6,6	0.23	0
4	SO4	B	306	-	4,4,4	0.16	0	6,6,6	0.19	0
4	SO4	C	303	-	4,4,4	0.13	0	6,6,6	0.12	0
2	ADP	A	301	5	24,29,29	0.96	1 (4%)	29,45,45	1.64	6 (20%)
4	SO4	A	303	-	4,4,4	0.10	0	6,6,6	0.37	0
3	UDP	D	302	-	24,26,26	0.52	0	37,40,40	0.64	0
4	SO4	I	302	-	4,4,4	0.14	0	6,6,6	0.09	0
4	SO4	B	307	-	4,4,4	0.15	0	6,6,6	0.12	0
4	SO4	B	304	-	4,4,4	0.11	0	6,6,6	0.12	0
4	SO4	D	304	-	4,4,4	0.12	0	6,6,6	0.10	0
2	ADP	B	301	-	24,29,29	0.91	1 (4%)	29,45,45	1.65	5 (17%)
4	SO4	G	303	-	4,4,4	0.13	0	6,6,6	0.13	0
4	SO4	B	303	-	4,4,4	0.15	0	6,6,6	0.17	0
4	SO4	B	308	-	4,4,4	0.13	0	6,6,6	0.21	0
4	SO4	A	305	-	4,4,4	0.16	0	6,6,6	0.09	0
3	UDP	I	301	-	24,26,26	0.38	0	37,40,40	0.78	2 (5%)
2	ADP	H	301	5	24,29,29	0.99	2 (8%)	29,45,45	1.57	4 (13%)
4	SO4	E	303	-	4,4,4	0.15	0	6,6,6	0.16	0
4	SO4	C	305	-	4,4,4	0.12	0	6,6,6	0.28	0
3	UDP	A	302	5	24,26,26	0.43	0	37,40,40	0.72	1 (2%)
6	U5P	F	302	-	22,22,22	0.51	0	33,33,33	0.95	1 (3%)
6	U5P	G	302	5	22,22,22	0.49	0	33,33,33	0.96	1 (3%)
2	ADP	D	301	-	24,29,29	1.04	2 (8%)	29,45,45	1.54	5 (17%)
2	ADP	E	301	5	24,29,29	0.97	1 (4%)	29,45,45	1.55	6 (20%)
4	SO4	C	304	-	4,4,4	0.16	0	6,6,6	0.08	0
4	SO4	D	303	-	4,4,4	0.12	0	6,6,6	0.20	0
4	SO4	G	304	-	4,4,4	0.13	0	6,6,6	0.17	0
4	SO4	F	304	-	4,4,4	0.13	0	6,6,6	0.14	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	ADP	G	301	5	-	5/12/32/32	0/3/3/3
2	ADP	F	301	-	-	3/12/32/32	0/3/3/3
3	UDP	B	302	-	-	7/16/32/32	0/2/2/2
2	ADP	B	301	-	-	4/12/32/32	0/3/3/3
6	U5P	E	302	5	-	5/10/26/26	0/2/2/2
3	UDP	A	302	5	-	6/16/32/32	0/2/2/2
2	ADP	A	301	5	-	3/12/32/32	0/3/3/3
3	UDP	I	301	-	-	4/16/32/32	0/2/2/2
6	U5P	F	302	-	-	4/10/26/26	0/2/2/2
2	ADP	D	301	-	-	5/12/32/32	0/3/3/3
3	UDP	C	302	5	-	5/16/32/32	0/2/2/2
3	UDP	D	302	-	-	8/16/32/32	0/2/2/2
2	ADP	H	301	5	-	5/12/32/32	0/3/3/3
2	ADP	E	301	5	-	4/12/32/32	0/3/3/3
2	ADP	C	301	5	-	4/12/32/32	0/3/3/3
6	U5P	H	302	5	-	5/10/26/26	0/2/2/2
6	U5P	G	302	5	-	1/10/26/26	0/2/2/2

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	301	ADP	C5-C4	2.76	1.48	1.40
2	A	301	ADP	C5-C4	2.73	1.48	1.40
2	C	301	ADP	C5-C4	2.67	1.48	1.40
2	B	301	ADP	C5-C4	2.64	1.47	1.40
2	G	301	ADP	C5-C4	2.62	1.47	1.40
2	D	301	ADP	O4'-C1'	2.57	1.44	1.41
2	E	301	ADP	C5-C4	2.44	1.47	1.40
2	F	301	ADP	C5-C4	2.37	1.47	1.40
2	D	301	ADP	C5-C4	2.36	1.47	1.40
2	C	301	ADP	C2-N3	2.03	1.35	1.32
2	H	301	ADP	C2-N3	2.03	1.35	1.32

All (50) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	301	ADP	PA-O3A-PB	-5.15	115.15	132.83
2	C	301	ADP	PA-O3A-PB	-4.91	115.98	132.83
2	G	301	ADP	PA-O3A-PB	-4.54	117.25	132.83
2	A	301	ADP	PA-O3A-PB	-4.44	117.58	132.83
2	H	301	ADP	PA-O3A-PB	-4.12	118.68	132.83
2	E	301	ADP	N3-C2-N1	-3.87	122.63	128.68
2	D	301	ADP	PA-O3A-PB	-3.77	119.90	132.83
6	G	302	U5P	O3P-P-O5'	-3.68	96.93	106.73
2	D	301	ADP	N3-C2-N1	-3.65	122.98	128.68
2	G	301	ADP	N3-C2-N1	-3.59	123.07	128.68
2	B	301	ADP	N3-C2-N1	-3.44	123.30	128.68
2	E	301	ADP	PA-O3A-PB	-3.43	121.06	132.83
2	G	301	ADP	C3'-C2'-C1'	3.41	106.11	100.98
2	F	301	ADP	PA-O3A-PB	-3.32	121.43	132.83
2	H	301	ADP	N3-C2-N1	-3.28	123.56	128.68
2	H	301	ADP	C3'-C2'-C1'	3.10	105.64	100.98
2	C	301	ADP	N3-C2-N1	-3.05	123.91	128.68
2	A	301	ADP	N6-C6-N1	2.99	124.78	118.57
2	F	301	ADP	N3-C2-N1	-2.96	124.05	128.68
2	B	301	ADP	C3'-C2'-C1'	2.93	105.39	100.98
2	A	301	ADP	N3-C2-N1	-2.87	124.20	128.68
6	H	302	U5P	O3P-P-O5'	-2.87	99.11	106.73
2	C	301	ADP	C3'-C2'-C1'	2.80	105.19	100.98
3	I	301	UDP	PA-O3A-PB	-2.75	123.40	132.83
6	F	302	U5P	O3P-P-O5'	-2.74	99.44	106.73
2	F	301	ADP	C3'-C2'-C1'	2.73	105.08	100.98
2	D	301	ADP	C3'-C2'-C1'	2.64	104.95	100.98
2	A	301	ADP	C3'-C2'-C1'	2.53	104.78	100.98
2	E	301	ADP	C3'-C2'-C1'	2.39	104.57	100.98
2	F	301	ADP	C4-C5-N7	-2.37	106.92	109.40
2	E	301	ADP	O3A-PB-O1B	-2.37	98.02	111.19
3	A	302	UDP	O3B-PB-O3A	2.35	112.53	104.64
2	E	301	ADP	C2-N1-C6	2.33	122.74	118.75
2	D	301	ADP	O3B-PB-O2B	2.29	116.38	107.64
2	D	301	ADP	C4-C5-N7	-2.26	107.05	109.40
3	I	301	UDP	O3B-PB-O3A	2.25	112.17	104.64
2	G	301	ADP	C2-N1-C6	2.22	122.56	118.75
6	E	302	U5P	O2P-P-O1P	2.20	119.31	110.68
2	B	301	ADP	O3A-PB-O1B	-2.20	98.97	111.19
2	H	301	ADP	C4-C5-N7	-2.17	107.14	109.40
6	H	302	U5P	O2P-P-O1P	2.16	119.12	110.68
2	C	301	ADP	O3B-PB-O2B	2.16	115.87	107.64
2	C	301	ADP	N6-C6-N1	2.15	123.04	118.57

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	301	ADP	O3A-PB-O1B	-2.14	99.34	111.19
2	C	301	ADP	O5'-C5'-C4'	-2.11	101.74	108.99
2	C	301	ADP	C4-C5-N7	-2.10	107.21	109.40
2	B	301	ADP	C2-N1-C6	2.06	122.28	118.75
2	A	301	ADP	C2-N1-C6	2.04	122.25	118.75
2	A	301	ADP	O3A-PB-O1B	-2.01	100.02	111.19
2	E	301	ADP	C4-C5-N7	-2.01	107.31	109.40

There are no chirality outliers.

All (78) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	301	ADP	C5'-O5'-PA-O1A
2	C	301	ADP	C5'-O5'-PA-O3A
2	D	301	ADP	C5'-O5'-PA-O3A
2	D	301	ADP	C3'-C4'-C5'-O5'
2	E	301	ADP	PA-O3A-PB-O2B
2	F	301	ADP	C5'-O5'-PA-O2A
2	F	301	ADP	C5'-O5'-PA-O3A
2	G	301	ADP	C5'-O5'-PA-O1A
2	G	301	ADP	C5'-O5'-PA-O3A
2	G	301	ADP	C3'-C4'-C5'-O5'
2	H	301	ADP	C5'-O5'-PA-O3A
3	A	302	UDP	C5'-O5'-PA-O1A
3	A	302	UDP	C5'-O5'-PA-O2A
3	B	302	UDP	C5'-O5'-PA-O1A
3	B	302	UDP	C5'-O5'-PA-O2A
3	C	302	UDP	C5'-O5'-PA-O1A
3	C	302	UDP	C5'-O5'-PA-O2A
3	D	302	UDP	C4'-C5'-O5'-PA
3	I	301	UDP	O4'-C4'-C5'-O5'
3	I	301	UDP	C5'-O5'-PA-O2A
3	I	301	UDP	C5'-O5'-PA-O3A
6	E	302	U5P	C5'-O5'-P-O2P
6	E	302	U5P	C5'-O5'-P-O3P
6	F	302	U5P	C5'-O5'-P-O2P
6	F	302	U5P	C5'-O5'-P-O3P
6	H	302	U5P	C5'-O5'-P-O1P
6	H	302	U5P	C5'-O5'-P-O2P
6	H	302	U5P	C5'-O5'-P-O3P
2	D	301	ADP	O4'-C4'-C5'-O5'
2	G	301	ADP	O4'-C4'-C5'-O5'

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Mol	Chain	Res	Type	Atoms
3	B	302	UDP	O4'-C4'-C5'-O5'
3	D	302	UDP	C3'-C4'-C5'-O5'
3	I	301	UDP	C3'-C4'-C5'-O5'
3	B	302	UDP	C3'-C4'-C5'-O5'
2	H	301	ADP	C3'-C4'-C5'-O5'
6	E	302	U5P	C5'-O5'-P-O1P
6	F	302	U5P	C5'-O5'-P-O1P
3	D	302	UDP	O4'-C4'-C5'-O5'
2	E	301	ADP	C4'-C5'-O5'-PA
6	E	302	U5P	C4'-C5'-O5'-P
2	D	301	ADP	PB-O3A-PA-O5'
3	D	302	UDP	PB-O3A-PA-O5'
2	B	301	ADP	C4'-C5'-O5'-PA
3	B	302	UDP	C4'-C5'-O5'-PA
6	G	302	U5P	C4'-C5'-O5'-P
2	E	301	ADP	PA-O3A-PB-O3B
2	A	301	ADP	PB-O3A-PA-O2A
2	B	301	ADP	PB-O3A-PA-O2A
2	H	301	ADP	PB-O3A-PA-O2A
2	C	301	ADP	C5'-O5'-PA-O2A
2	D	301	ADP	C5'-O5'-PA-O1A
2	F	301	ADP	C5'-O5'-PA-O1A
2	G	301	ADP	C5'-O5'-PA-O2A
2	H	301	ADP	C5'-O5'-PA-O1A
2	H	301	ADP	C5'-O5'-PA-O2A
3	D	302	UDP	C5'-O5'-PA-O2A
2	A	301	ADP	C4'-C5'-O5'-PA
6	H	302	U5P	C4'-C5'-O5'-P
3	A	302	UDP	C4'-C5'-O5'-PA
3	C	302	UDP	C4'-C5'-O5'-PA
3	D	302	UDP	C2'-C1'-N1-C6
3	C	302	UDP	O4'-C4'-C5'-O5'
2	B	301	ADP	PB-O3A-PA-O1A
2	B	301	ADP	C3'-C4'-C5'-O5'
2	E	301	ADP	PA-O3A-PB-O1B
3	A	302	UDP	PA-O3A-PB-O1B
3	B	302	UDP	PA-O3A-PB-O2B
3	A	302	UDP	C5'-O5'-PA-O3A
3	B	302	UDP	C5'-O5'-PA-O3A
3	C	302	UDP	C5'-O5'-PA-O3A
3	D	302	UDP	C5'-O5'-PA-O3A
3	D	302	UDP	C2'-C1'-N1-C2

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Mol	Chain	Res	Type	Atoms
3	A	302	UDP	O4'-C4'-C5'-O5'
6	H	302	U5P	O4'-C4'-C5'-O5'
2	C	301	ADP	PB-O3A-PA-O1A
2	A	301	ADP	C5'-O5'-PA-O1A
6	E	302	U5P	O4'-C4'-C5'-O5'
6	F	302	U5P	O4'-C4'-C5'-O5'

There are no ring outliers.

17 monomers are involved in 33 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	G	301	ADP	2	0
2	F	301	ADP	2	0
3	B	302	UDP	4	0
3	C	302	UDP	1	0
2	C	301	ADP	1	0
6	H	302	U5P	2	0
6	E	302	U5P	1	0
4	B	305	SO4	1	0
3	D	302	UDP	3	0
2	B	301	ADP	2	0
3	I	301	UDP	3	0
2	H	301	ADP	2	0
3	A	302	UDP	1	0
6	F	302	U5P	3	0
6	G	302	U5P	2	0
2	D	301	ADP	2	0
2	E	301	ADP	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 ADP G 301

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP F 301

Bond lengths

Bond angles

Torsions

Rings

Ligand UDP B 302

Bond lengths

Bond angles

Torsions

Rings

Ligand UDP C 302

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP C 301

Bond lengths

Bond angles

Torsions

Rings

Ligand U5P H 302

Bond lengths

Bond angles

Torsions

Rings

Ligand U5P E 302

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP A 301

Bond lengths

Bond angles

Torsions

Rings

Ligand UDP D 302

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP B 301

Bond lengths

Bond angles

Torsions

Rings

Ligand UDP I 301

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP H 301

Bond lengths

Bond angles

Torsions

Rings

Ligand UDP A 302

Bond lengths

Bond angles

Torsions

Rings

Ligand U5P F 302

Bond lengths

Bond angles

Torsions

Rings

Ligand U5P G 302

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP D 301

Bond lengths

Bond angles

Torsions

Rings

Ligand ADP E 301

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	233/233 (100%)	-0.72	4 (1%)	69	64	24, 34, 53, 69	0
1	B	233/233 (100%)	-0.51	6 (2%)	57	51	24, 37, 64, 82	0
1	C	233/233 (100%)	-0.58	4 (1%)	69	64	24, 38, 61, 84	0
1	D	233/233 (100%)	-0.54	4 (1%)	69	64	29, 42, 59, 74	0
1	E	233/233 (100%)	-0.35	7 (3%)	52	46	31, 44, 64, 105	0
1	F	233/233 (100%)	-0.40	4 (1%)	69	64	32, 48, 66, 89	0
1	G	233/233 (100%)	-0.29	9 (3%)	44	38	33, 48, 74, 89	0
1	H	233/233 (100%)	-0.17	9 (3%)	44	38	35, 51, 74, 95	0
1	I	231/233 (99%)	0.27	21 (9%)	16	13	37, 58, 94, 120	0
All	All	2095/2097 (99%)	-0.37	68 (3%)	50	45	24, 44, 72, 120	0

All (68) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	20	PHE	5.7
1	I	20	PHE	5.6
1	I	158	ASN	5.3
1	I	159	LYS	5.2
1	I	175	VAL	4.9
1	F	159	LYS	4.5
1	I	174	ALA	4.4
1	G	58	ARG	4.2
1	E	55	ARG	4.0
1	H	55	ARG	4.0
1	G	55	ARG	3.9
1	G	173	GLU	3.7
1	E	58	ARG	3.7
1	I	160	VAL	3.6
1	I	214	PHE	3.4

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Mol	Chain	Res	Type	RSRZ
1	I	166	ASP	3.3
1	I	170	LYS	3.3
1	C	112	ARG	3.3
1	I	169	ARG	3.2
1	I	19	GLY	3.2
1	I	161	ASP	3.2
1	I	167	ASP	3.2
1	B	159	LYS	3.1
1	I	165	SER	3.1
1	I	55	ARG	3.0
1	G	171	ASN	3.0
1	B	214	PHE	3.0
1	I	168	PRO	3.0
1	A	55	ARG	2.9
1	C	135	PHE	2.9
1	H	64	ASP	2.8
1	G	18	ASN	2.8
1	G	159	LYS	2.8
1	G	170	LYS	2.8
1	H	173	GLU	2.8
1	B	136	SER	2.8
1	H	214	PHE	2.8
1	E	59	GLN	2.7
1	A	20	PHE	2.6
1	D	18	ASN	2.5
1	E	60	GLY	2.5
1	I	25	GLU	2.5
1	D	158	ASN	2.5
1	G	61	VAL	2.4
1	B	135	PHE	2.4
1	I	136	SER	2.4
1	D	17	ARG	2.3
1	I	1	MET	2.3
1	C	55	ARG	2.3
1	I	171	ASN	2.3
1	E	56	GLY	2.3
1	H	20	PHE	2.2
1	I	17	ARG	2.2
1	E	18	ASN	2.2
1	H	159	LYS	2.2
1	H	178	ASP	2.2
1	H	58	ARG	2.2

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Mol	Chain	Res	Type	RSRZ
1	F	158	ASN	2.1
1	D	20	PHE	2.1
1	A	58	ARG	2.1
1	C	18	ASN	2.1
1	F	18	ASN	2.1
1	G	56	GLY	2.1
1	H	18	ASN	2.1
1	E	20	PHE	2.1
1	B	17	ARG	2.1
1	A	17	ARG	2.0
1	F	169	ARG	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	SO4	B	308	5/5	0.66	0.15	106,109,124,128	0
4	SO4	G	304	5/5	0.66	0.14	104,110,125,134	0
4	SO4	I	302	5/5	0.70	0.14	106,108,129,130	0
4	SO4	E	304	5/5	0.72	0.19	86,97,118,126	0
4	SO4	A	303	5/5	0.74	0.22	92,101,115,134	0
4	SO4	B	305	5/5	0.74	0.18	101,108,130,141	0
4	SO4	A	305	5/5	0.78	0.13	111,111,116,125	0
6	U5P	F	302	21/21	0.78	0.27	78,94,100,111	0
4	SO4	G	303	5/5	0.79	0.20	87,107,114,121	0
3	UDP	D	302	25/25	0.79	0.33	72,80,93,95	25
5	MG	H	303	1/1	0.80	0.28	76,76,76,76	0
4	SO4	C	303	5/5	0.80	0.14	103,104,126,135	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	MG	A	306	1/1	0.81	0.21	72,72,72,72	0
4	SO4	A	304	5/5	0.82	0.23	88,90,113,122	0
4	SO4	D	303	5/5	0.84	0.20	85,88,95,101	0
4	SO4	D	304	5/5	0.84	0.11	105,109,121,132	0
4	SO4	B	306	5/5	0.84	0.21	99,108,115,133	0
4	SO4	B	303	5/5	0.85	0.19	79,84,93,103	0
5	MG	G	305	1/1	0.85	0.20	56,56,56,56	0
2	ADP	D	301	27/27	0.85	0.14	50,61,92,115	0
4	SO4	F	303	5/5	0.85	0.20	89,97,102,109	0
4	SO4	F	304	5/5	0.86	0.21	91,97,117,124	0
4	SO4	C	304	5/5	0.86	0.22	101,104,108,118	0
4	SO4	C	305	5/5	0.87	0.24	82,85,100,107	0
4	SO4	E	303	5/5	0.87	0.16	79,83,95,99	0
4	SO4	C	306	5/5	0.87	0.21	89,91,110,112	0
3	UDP	B	302	25/25	0.87	0.21	44,54,63,75	25
3	UDP	C	302	25/25	0.88	0.18	42,49,58,71	25
4	SO4	B	307	5/5	0.88	0.13	98,108,125,132	0
2	ADP	F	301	27/27	0.89	0.13	53,65,93,112	0
2	ADP	G	301	27/27	0.89	0.12	61,69,76,84	0
2	ADP	C	301	27/27	0.89	0.12	53,62,86,93	0
5	MG	I	303	1/1	0.90	0.58	80,80,80,80	0
5	MG	E	305	1/1	0.90	0.20	57,57,57,57	0
3	UDP	I	301	25/25	0.91	0.15	62,73,86,91	25
2	ADP	B	301	27/27	0.91	0.11	46,56,79,80	0
4	SO4	B	304	5/5	0.92	0.21	89,90,99,104	0
2	ADP	H	301	27/27	0.92	0.10	52,63,82,84	0
3	UDP	A	302	25/25	0.94	0.10	42,47,54,72	0
5	MG	C	307	1/1	0.95	0.08	73,73,73,73	0
2	ADP	E	301	27/27	0.95	0.09	37,45,55,59	0
2	ADP	A	301	27/27	0.95	0.09	36,42,57,62	0
6	U5P	H	302	21/21	0.95	0.08	45,50,57,60	0
6	U5P	G	302	21/21	0.96	0.07	49,55,61,65	0
6	U5P	E	302	21/21	0.96	0.08	46,49,53,56	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.
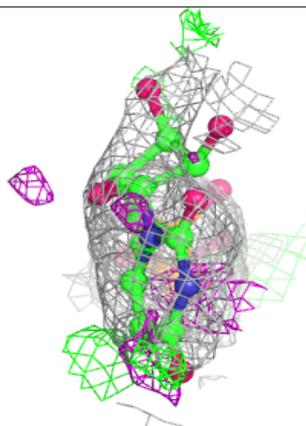
Electron density around U5P F 302:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
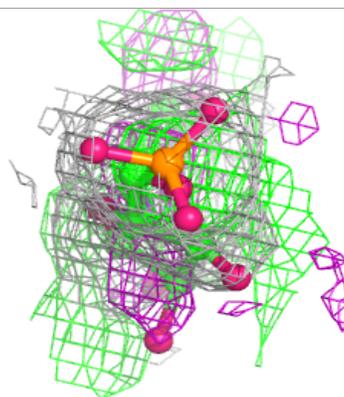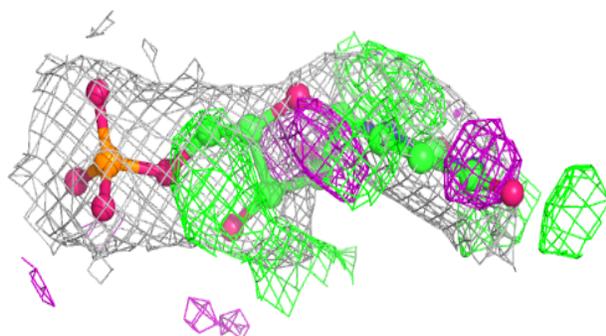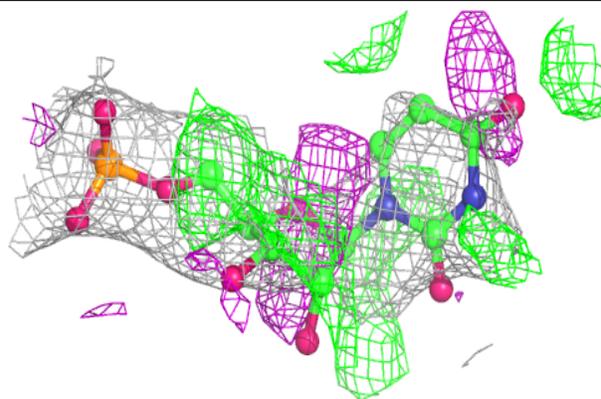
Electron density around UDP D 302:

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mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
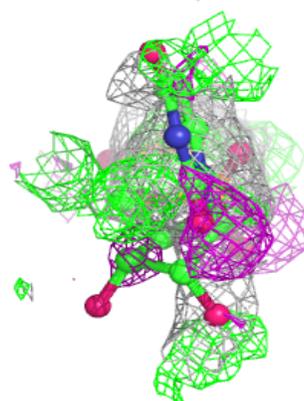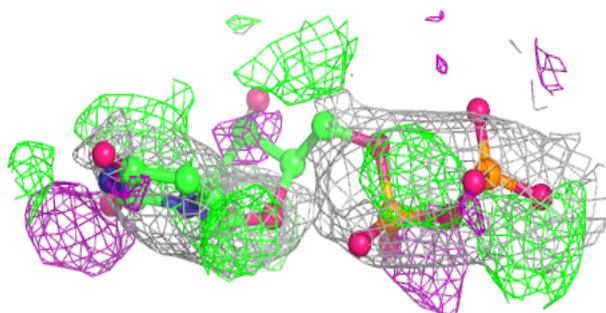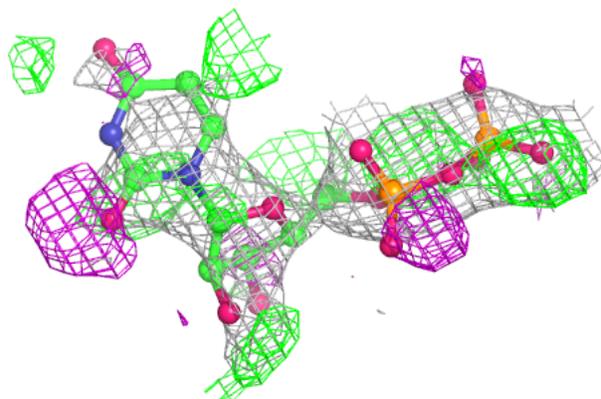
Electron density around MG H 303:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
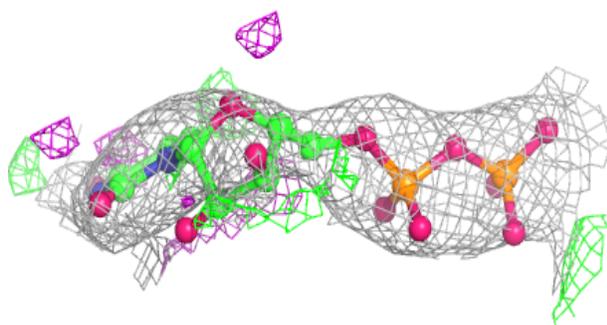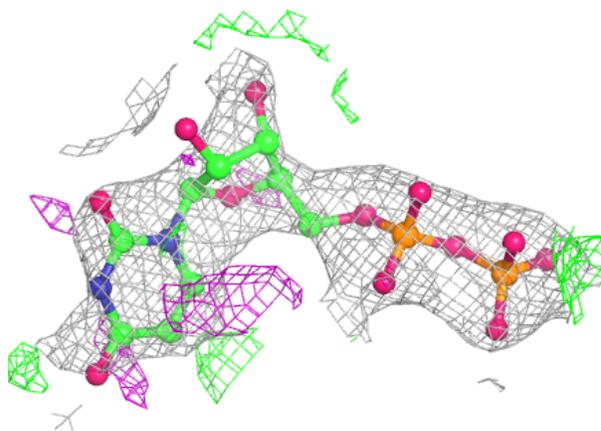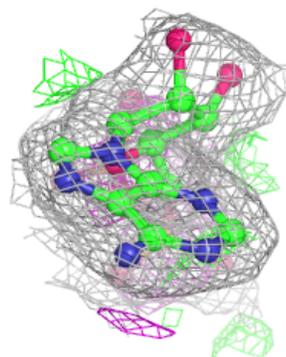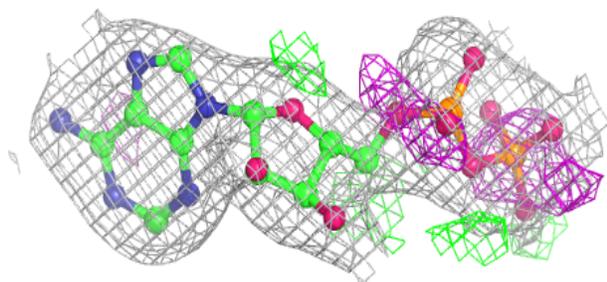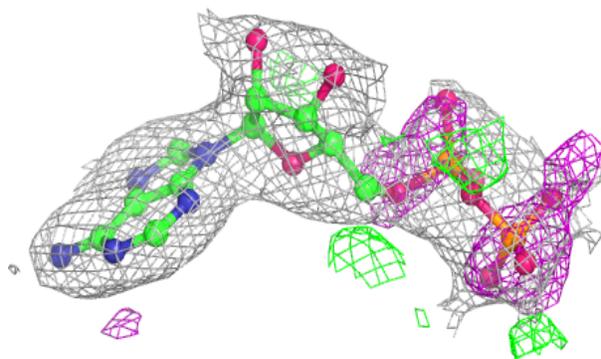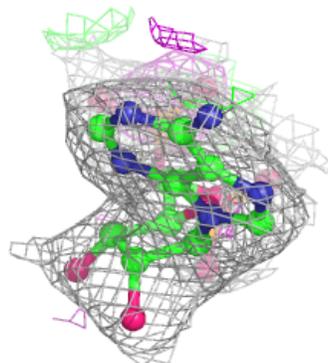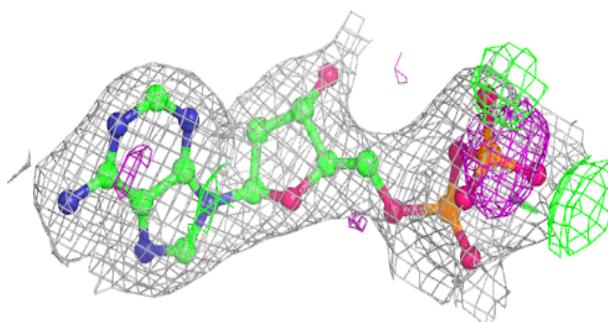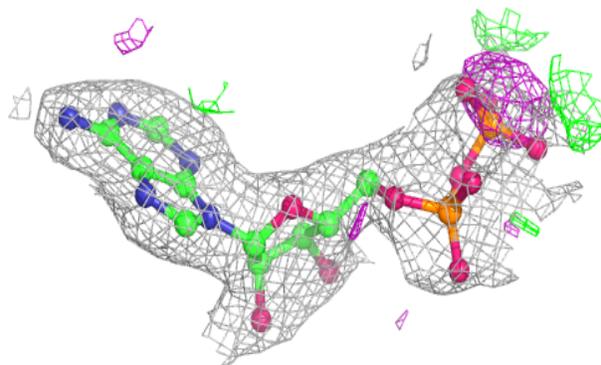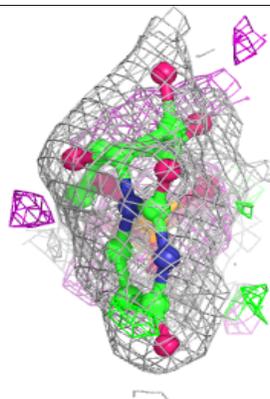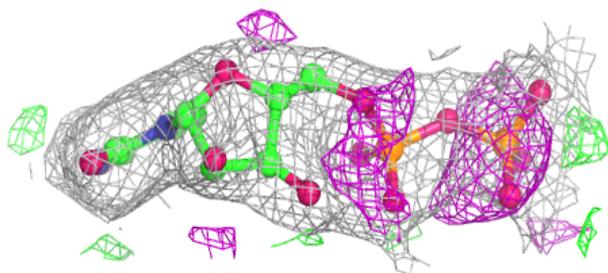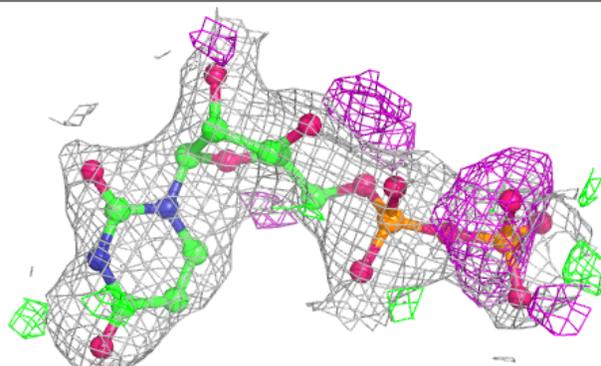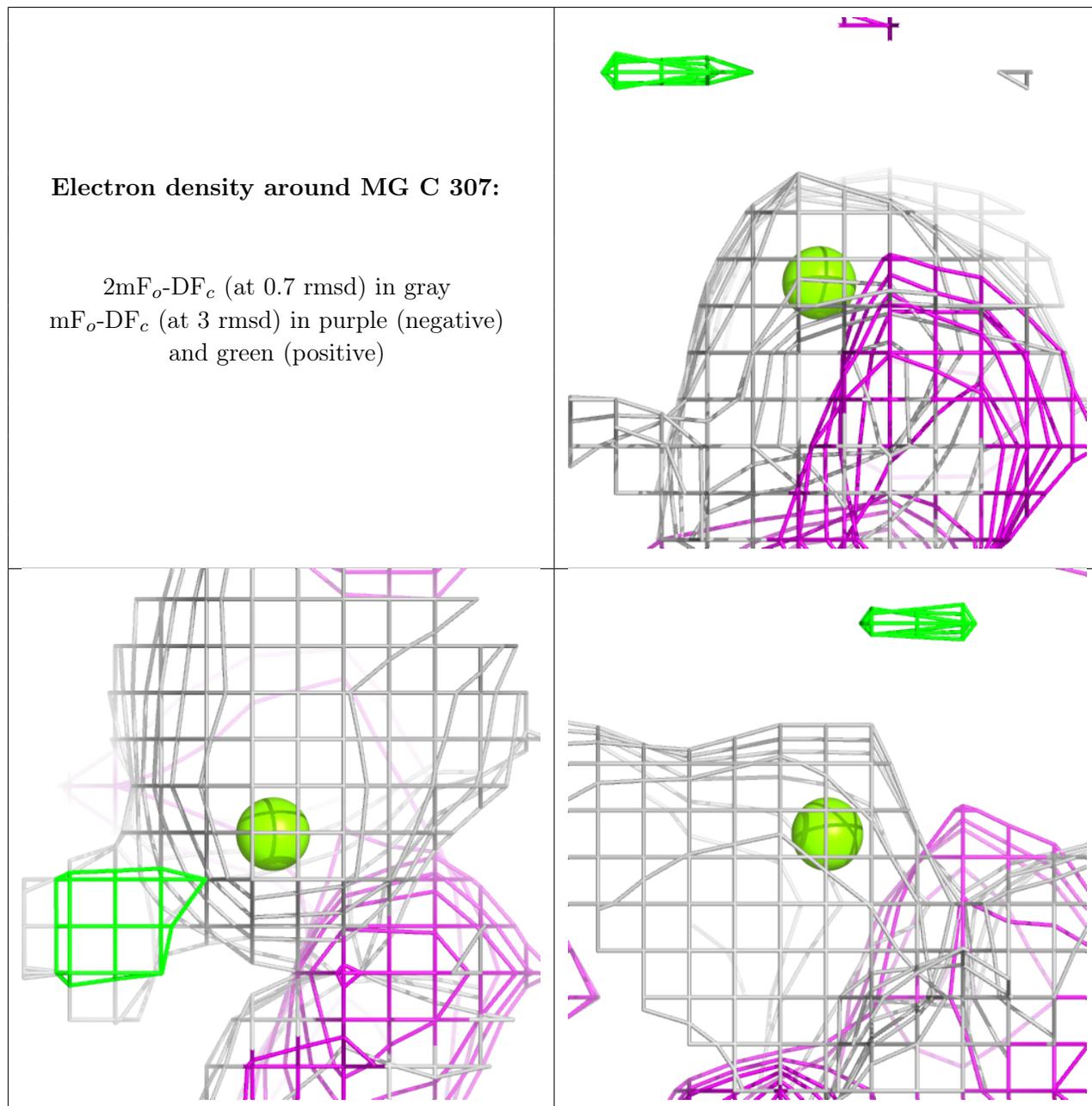mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
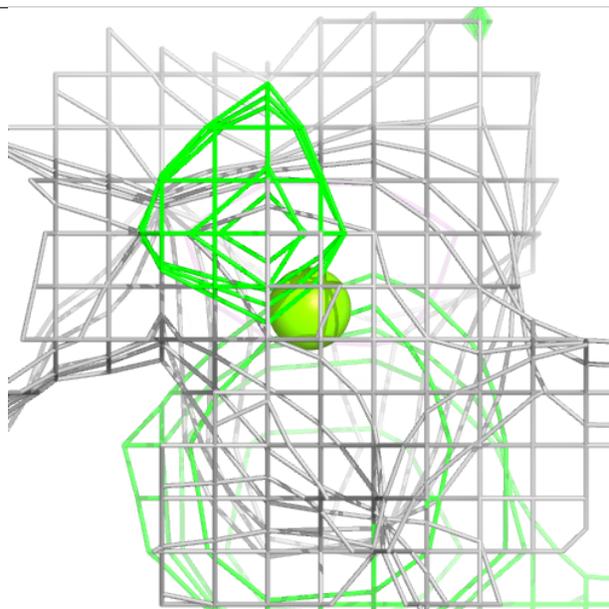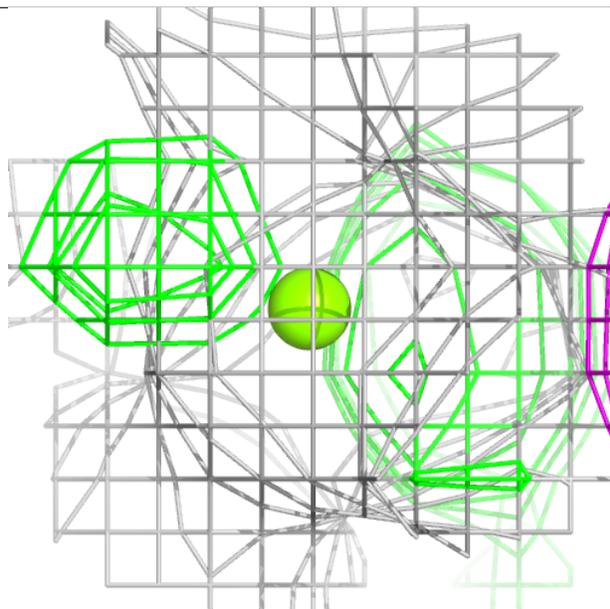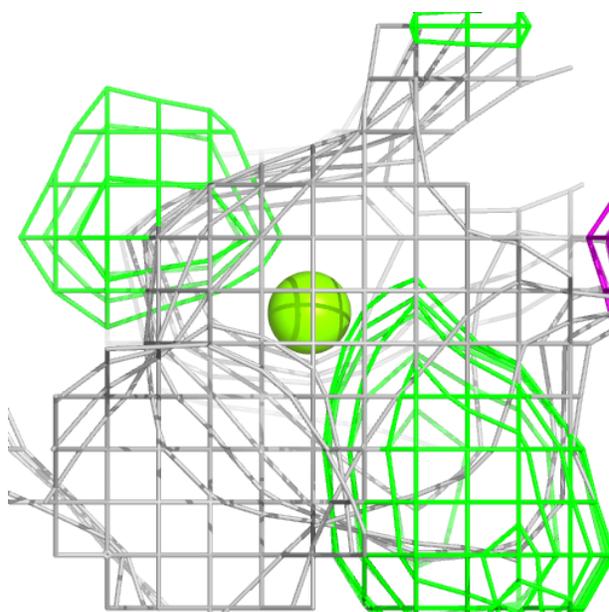
Electron density around MG A 306:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
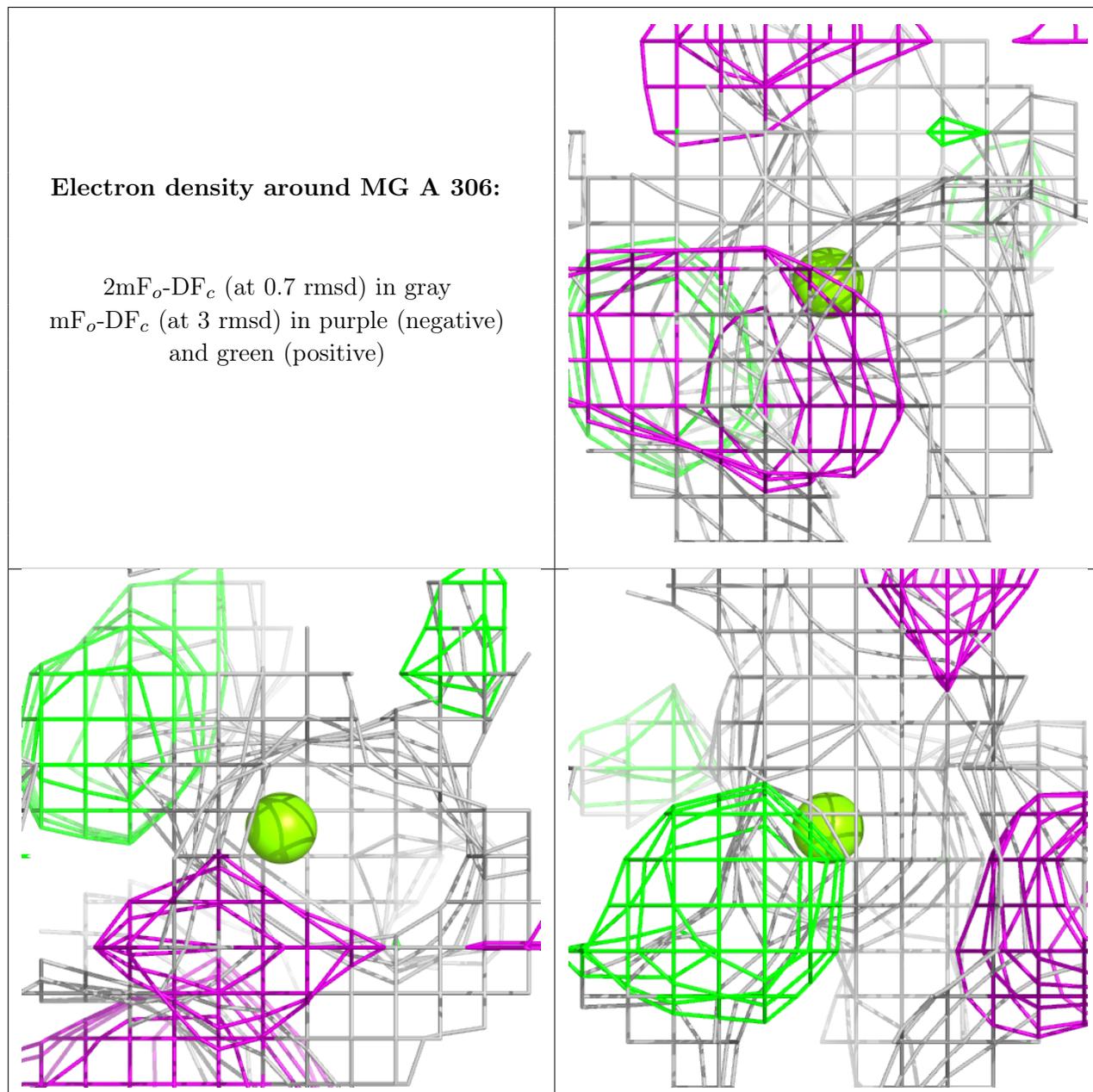
Electron density around MG G 305:

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mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
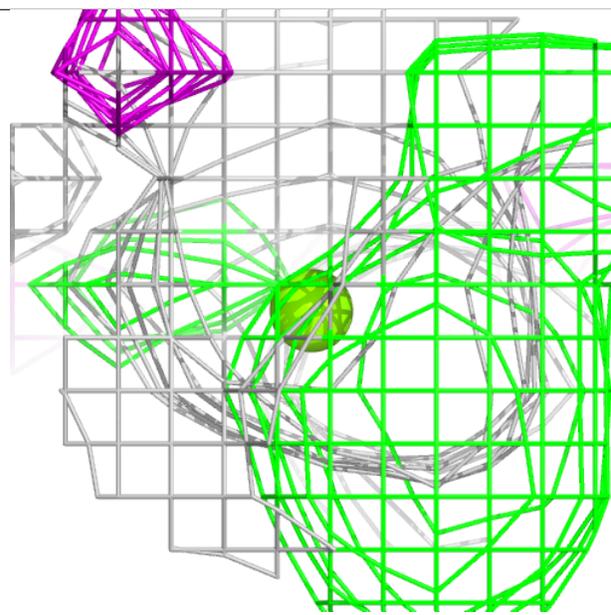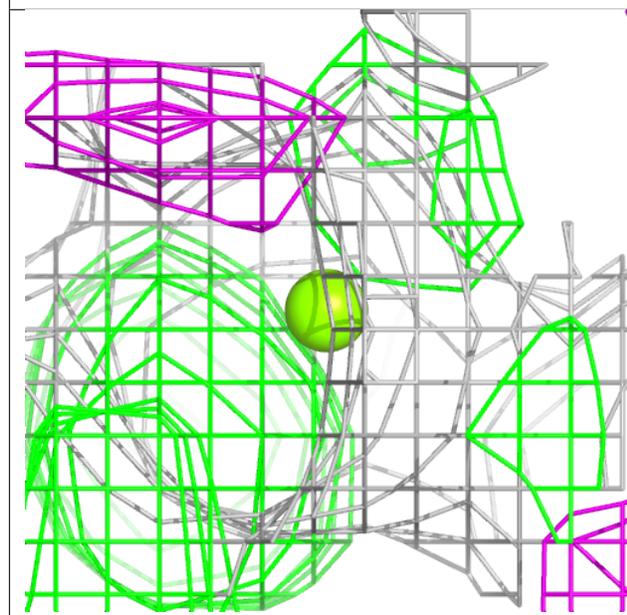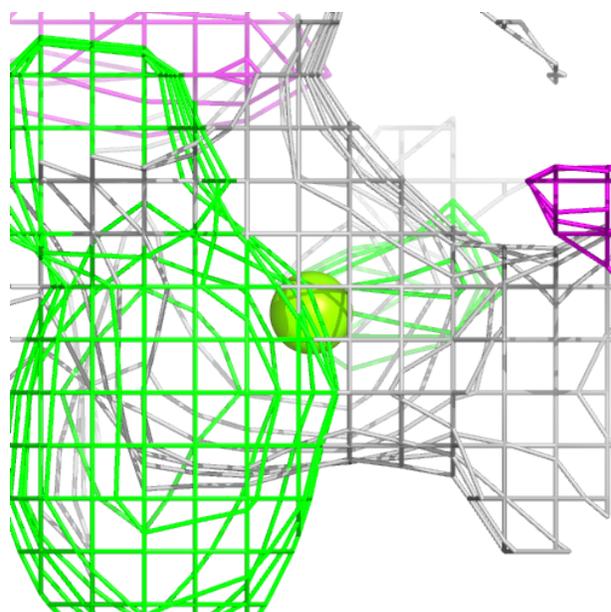
Electron density around ADP D 301:

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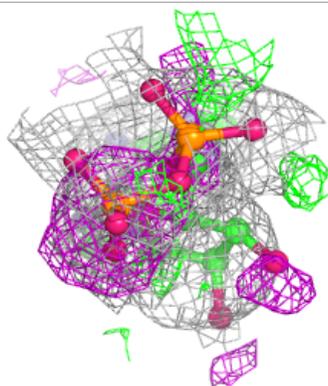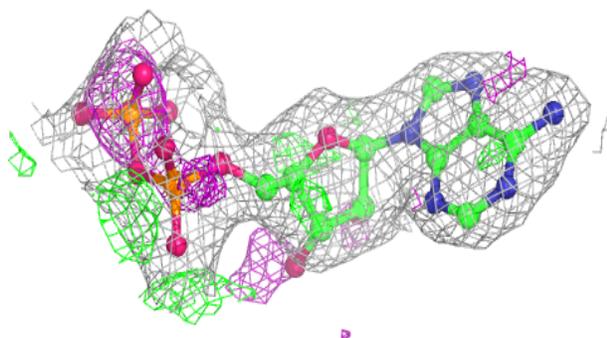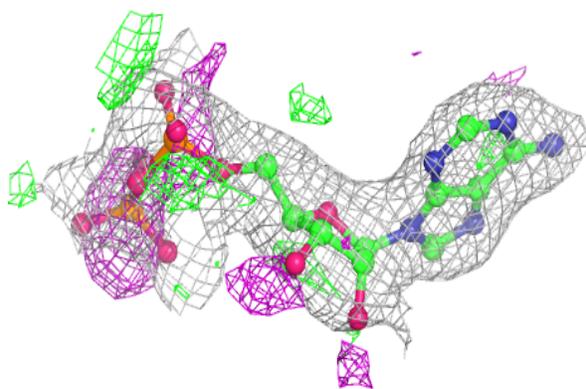
Electron density around UDP B 302:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
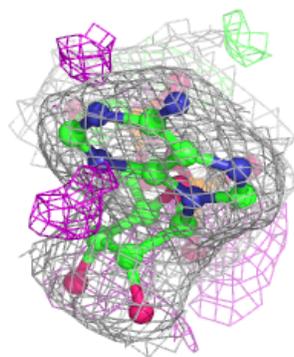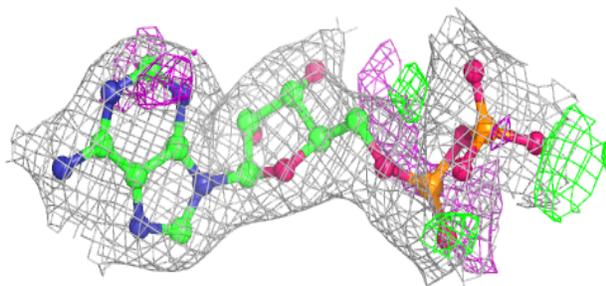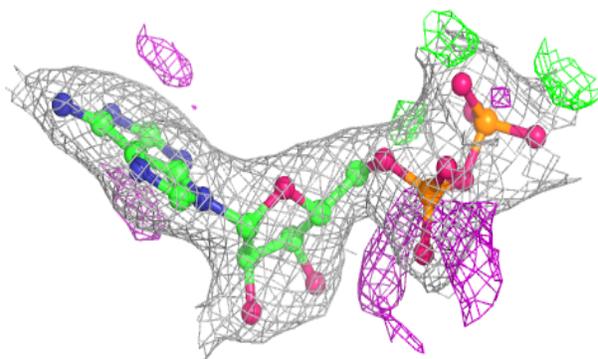mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
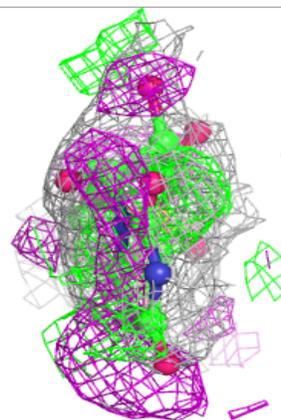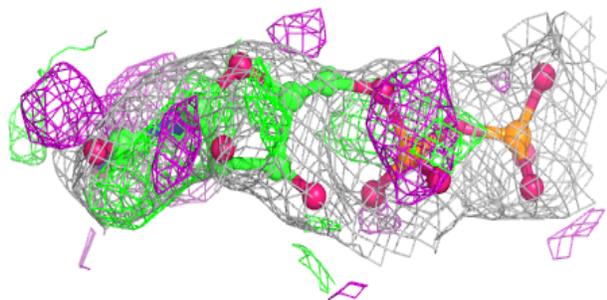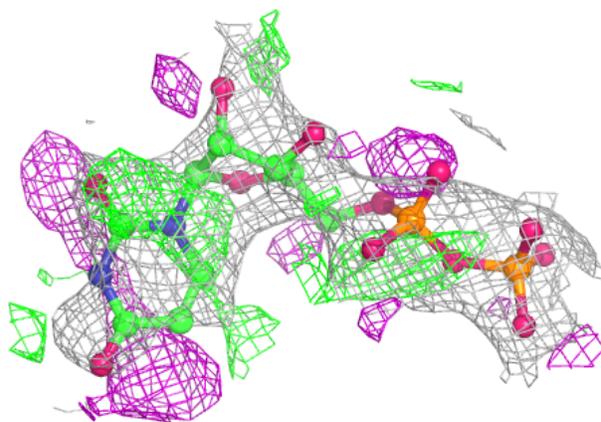
Electron density around UDP C 302:

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and green (positive)
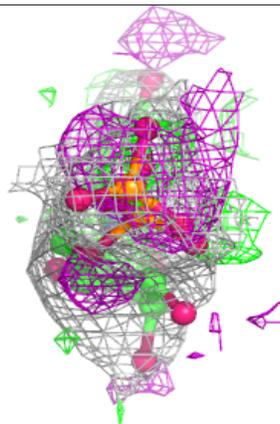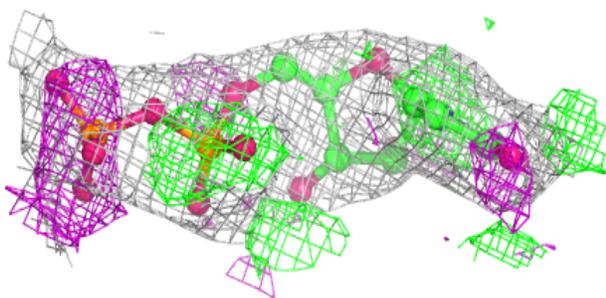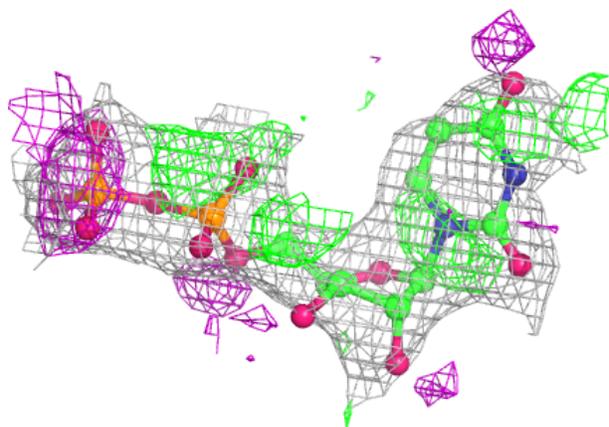
Electron density around ADP F 301:

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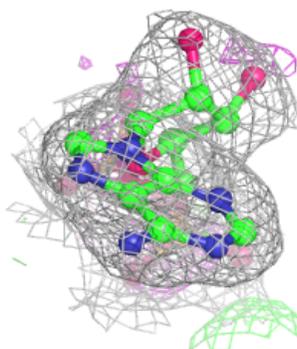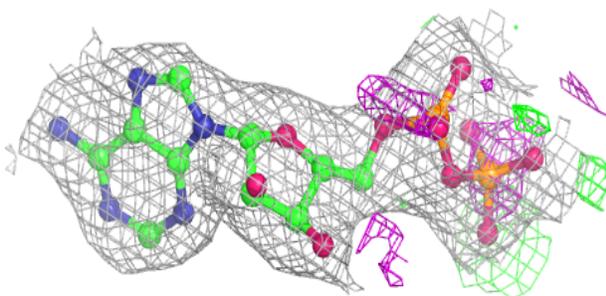$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
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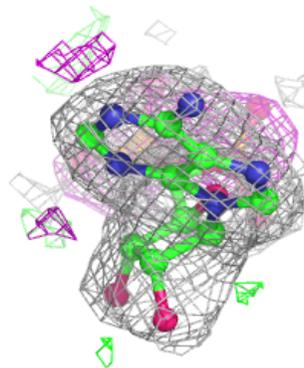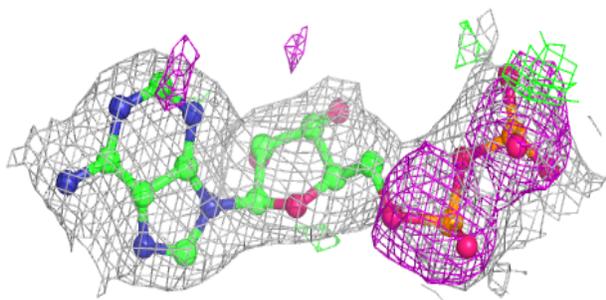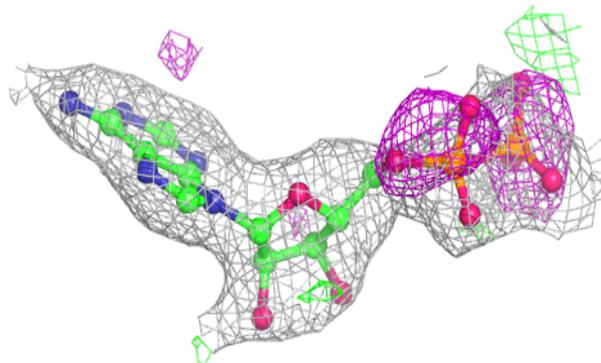
Electron density around ADP G 301:

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mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
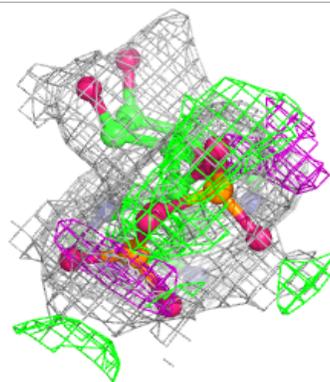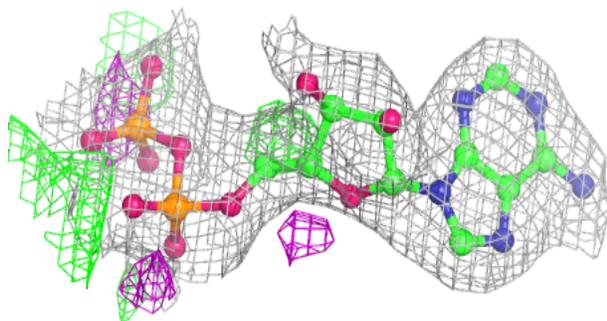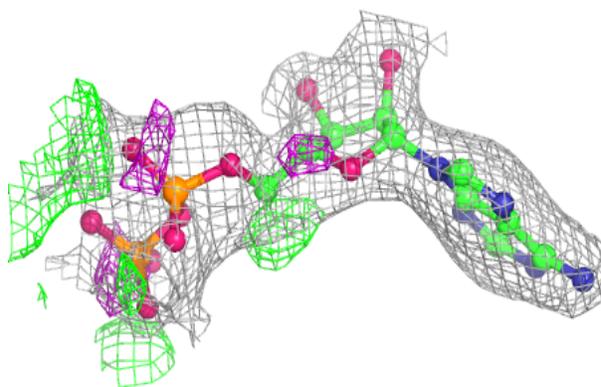
Electron density around ADP C 301:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
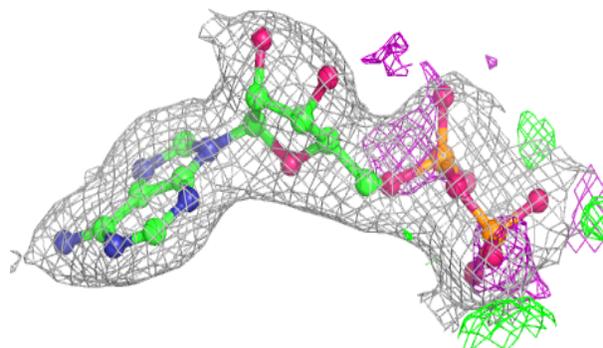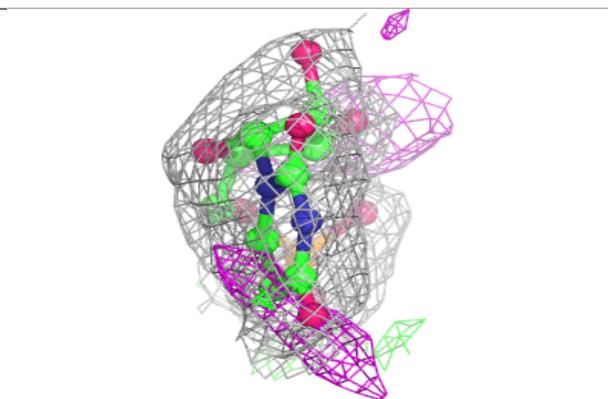mF_o-DF_c (at 3 rmsd) in purple (negative)
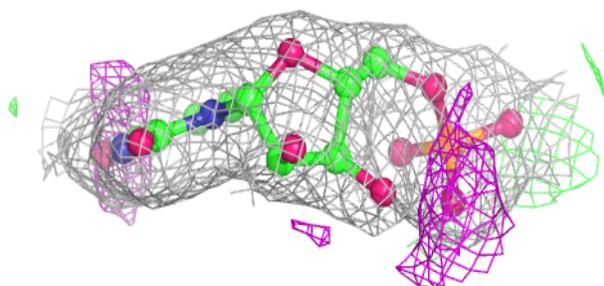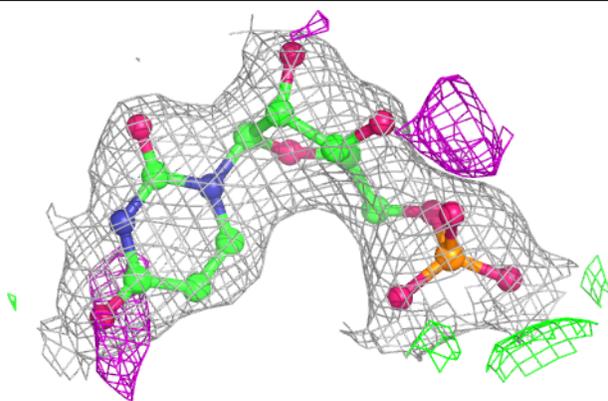and green (positive)
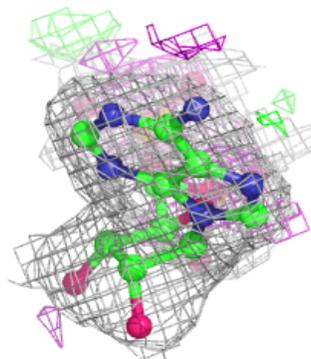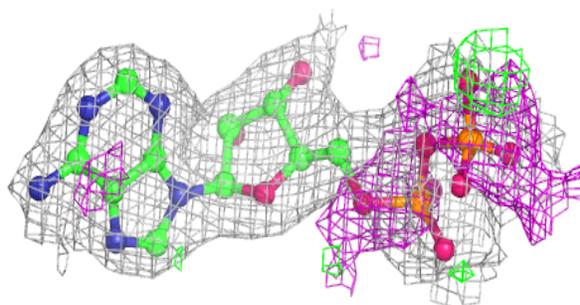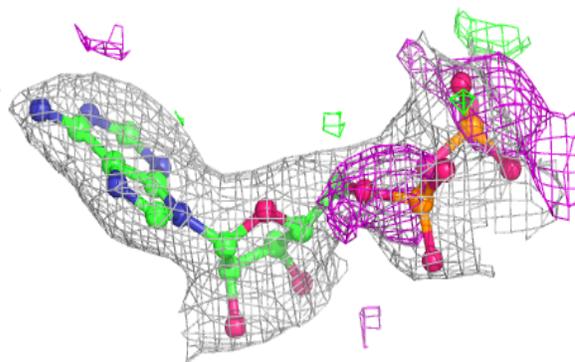
Electron density around MG I 303:

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mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
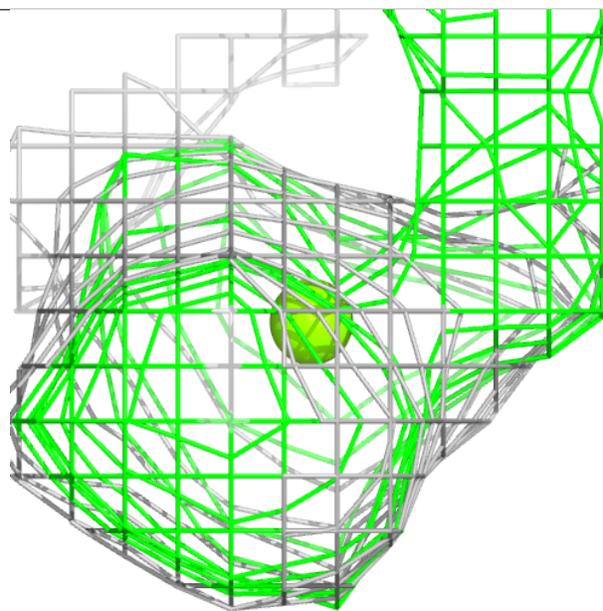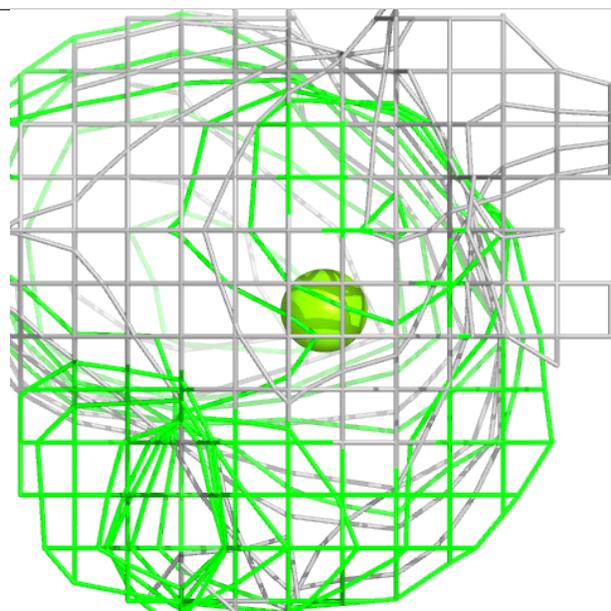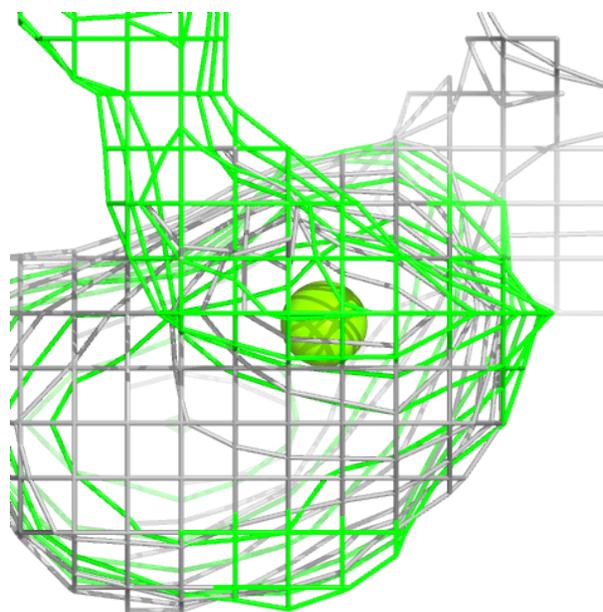
Electron density around MG E 305:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
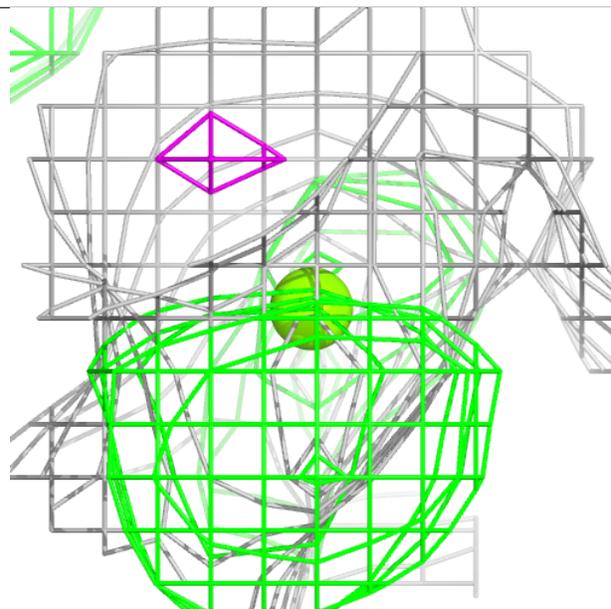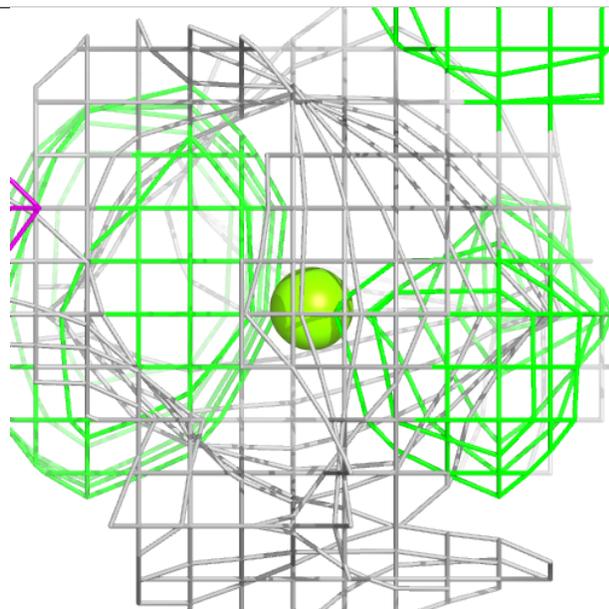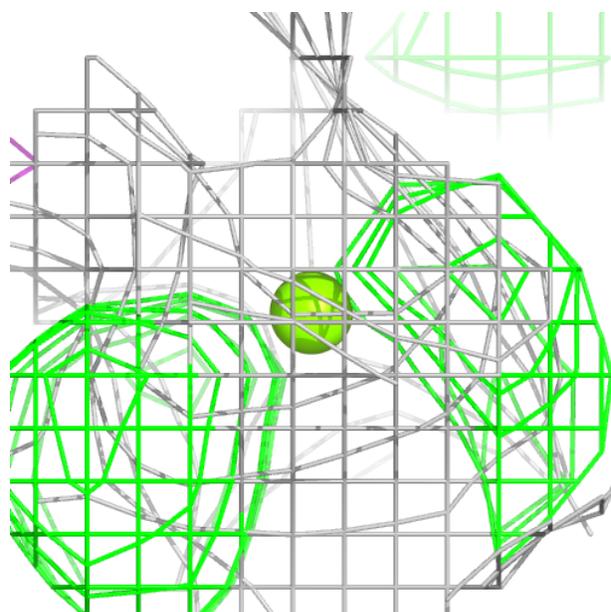
Electron density around UDP I 301:

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

Electron density around ADP B 301:

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

Electron density around ADP H 301:

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

Electron density around UDP A 302:

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

Electron density around MG C 307:

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

Electron density around ADP E 301:

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

Electron density around ADP A 301:

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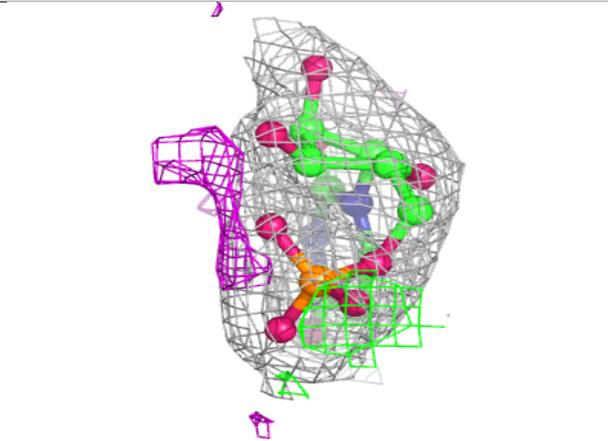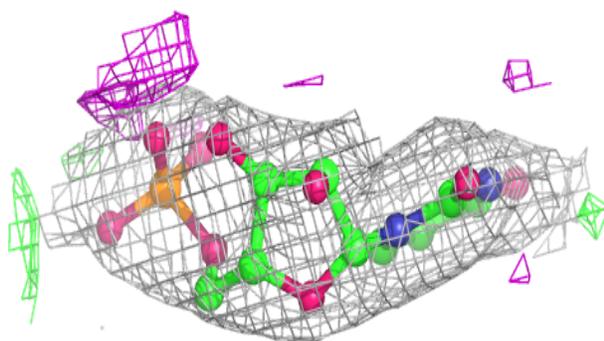mF_o-DF_c (at 3 rmsd) in purple (negative)
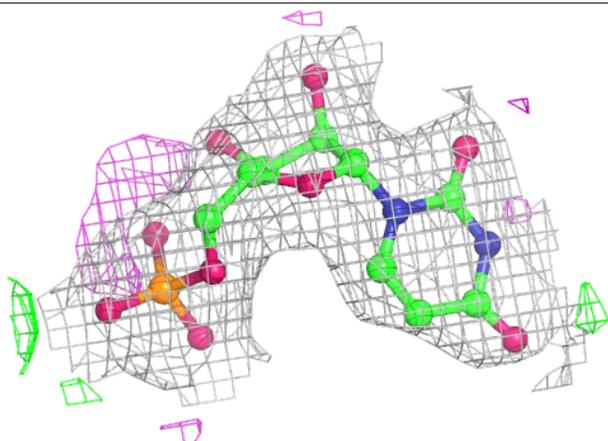and green (positive)

Electron density around U5P H 302:

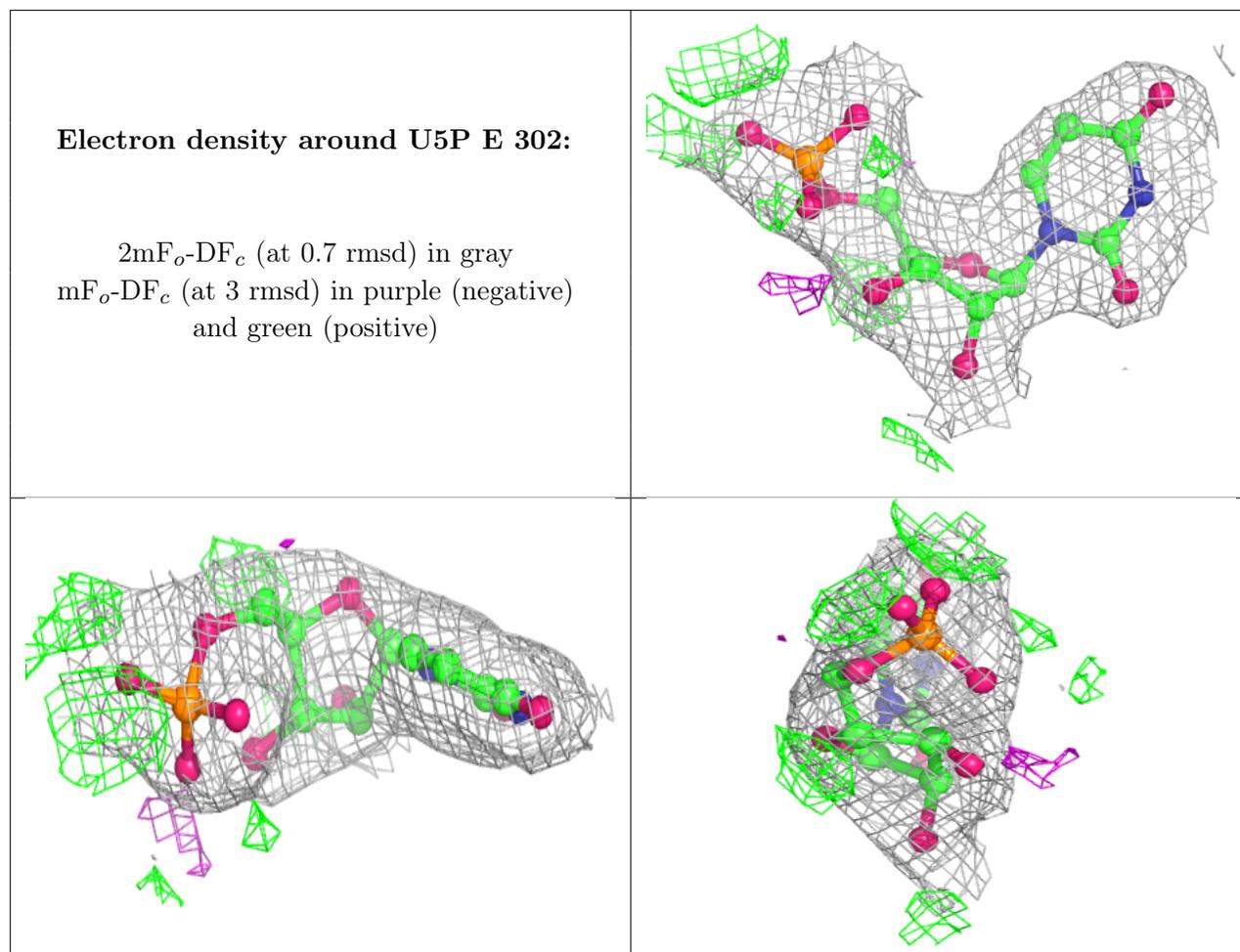2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around U5P G 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 U5P E 302:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.