W O R L D W I D E
wwPDB
P R O T E I N   D A T A   B A N K

wwPDB X-ray Structure Validation Summary Report (i)

Nov 20, 2023 – 10:19 PM JST

PDB ID	:	7DP8
Title	:	Crystal structure of T2R-TTL-Cevipabulin-eribulin complex
Authors	:	Chen, L.J.; Chen, Q.; Yu, Y.; Yang, J.H.
Deposited on	:	2020-12-18
Resolution	:	2.45 Å(reported)

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

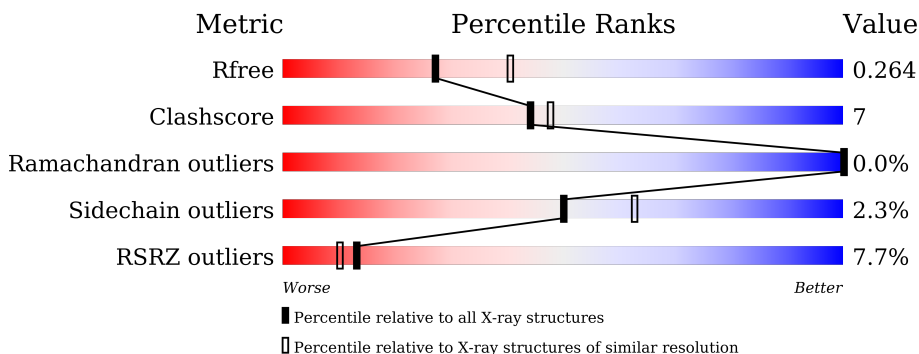|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh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

1   Overall quality at a glance ⓘ

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

The reported resolution of this entry is 2.45 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		0.264
Clashscore		7
Ramachandran outliers		0.0%
Sidechain outliers		2.3%
RSRZ outliers		7.7%

Worse   Better

▌Percentile relative to all X-ray structures

▯Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	1564 (2.46-2.42)
Clashscore	141614	1631 (2.46-2.42)
Ramachandran outliers	138981	1617 (2.46-2.42)
Sidechain outliers	138945	1617 (2.46-2.42)
RSRZ outliers	127900	1547 (2.46-2.42)

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	450	2% / 83% ... 14% ·
1	C	450	2% / 88% ... 9% ·
2	B	445	2% / 79% ... 14% · 6%
2	D	445	9% / 81% ... 14% ·
3	E	143	11% / 69% ... 15% ·· 14%
4	F	384	23% / 67% ... 23% 9%

WORLDWIDE wwPDB PROTEIN DATA BANK

2 Entry composition ⓘ

There are 14 unique types of molecules in this entry. The entry contains 35012 atoms, of which 17101 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 Tubulin alpha-1B chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	438	Total 6802	C 2182	H 3351	N 588	O 657	S 24	0	4	0
1	C	440	Total 6844	C 2201	H 3369	N 589	O 662	S 23	0	8	0

- Molecule 2 is a protein called Tubulin beta chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	B	418	Total 6498	C 2080	H 3185	N 565	O 639	S 29	0	4	0
2	D	426	Total 6563	C 2100	H 3217	N 570	O 649	S 27	0	1	0

- Molecule 3 is a protein called Stathmin-4.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
3	E	123	Total 2069	C 635	H 1037	N 188	O 204	S 5	0	2	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	3	MET	-	expression tag	UNP P63043
E	4	ALA	-	expression tag	UNP P63043

- Molecule 4 is a protein called Tubulin tyrosine ligase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
4	F	351	Total 5696	C 1838	H 2824	N 491	O 528	S 15	0	1	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	379	HIS	-	expression tag	UNP E1BQ43
F	380	HIS	-	expression tag	UNP E1BQ43
F	381	HIS	-	expression tag	UNP E1BQ43
F	382	HIS	-	expression tag	UNP E1BQ43
F	383	HIS	-	expression tag	UNP E1BQ43
F	384	HIS	-	expression tag	UNP E1BQ43

- Molecule 5 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).
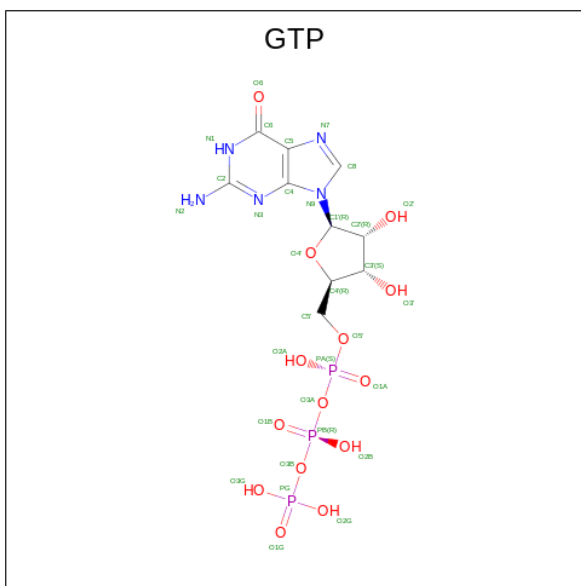
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
5	A	1	Total	C	H	N	O	P	0	0
			42	10	10	5	14	3		
5	C	1	Total	C	H	N	O	P	0	0
			42	10	10	5	14	3		
5	D	1	Total	C	H	N	O	P	0	0
			42	10	10	5	14	3		

- Molecule 6 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

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

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	D	1	Total 1	Mg 1	0	0
6	F	1	Total 1	Mg 1	0	0

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	2	Total 2	Ca 2	0	0
7	B	2	Total 2	Ca 2	0	0
7	C	2	Total 2	Ca 2	0	0

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).
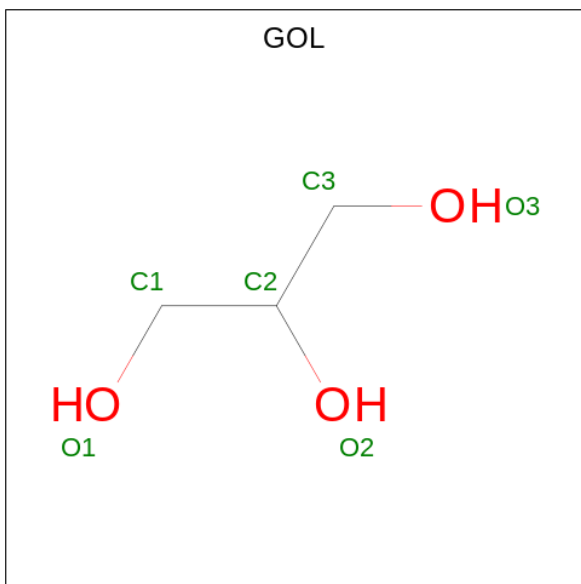
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	A	1	Total 14	C 3	H 8	O 3	0	0
8	A	1	Total 14	C 3	H 8	O 3	0	0

- Molecule 9 is GUANOSINE-5'-DIPHOSPHATE (three-letter code: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).

GDP
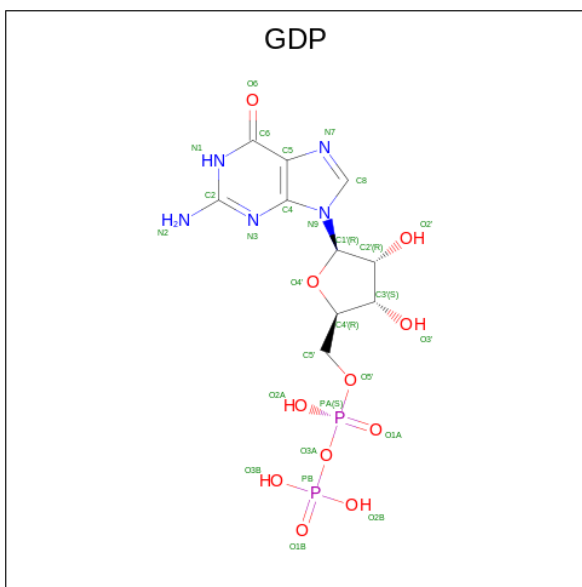
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
9	B	1	Total	C	H	N	O	P	0	0
			38	10	10	5	11	2		

- Molecule 10 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula: $C_6H_{13}NO_4S$).

MES
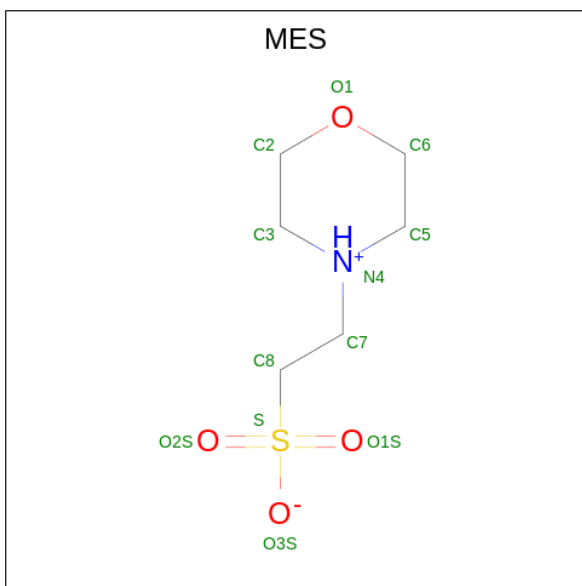
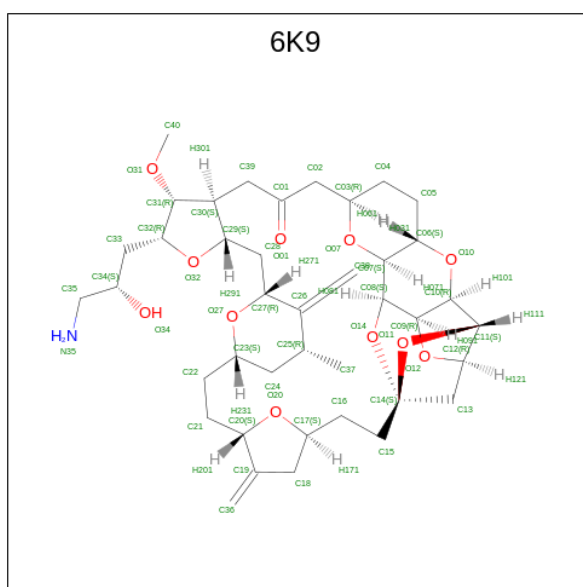| Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
10	B	1	Total	C	H	N	O	S	0	0
			24	6	12	1	4	1		

- Molecule 11 is 6-[2,6-bis(fluoranyl)-4-[3-(methylamino)propoxy]phenyl]-5-chloranyl-N-[(2S)-1,1,1-tris(fluoranyl)propan-2-yl]-[1,2,4]triazolo[1,5-a]pyrimidin-7-amine (three-letter code:

G2X) (formula: $C_{18}H_{18}ClF_5N_6O$) (labeled as "Ligand of Interest" by depositor).
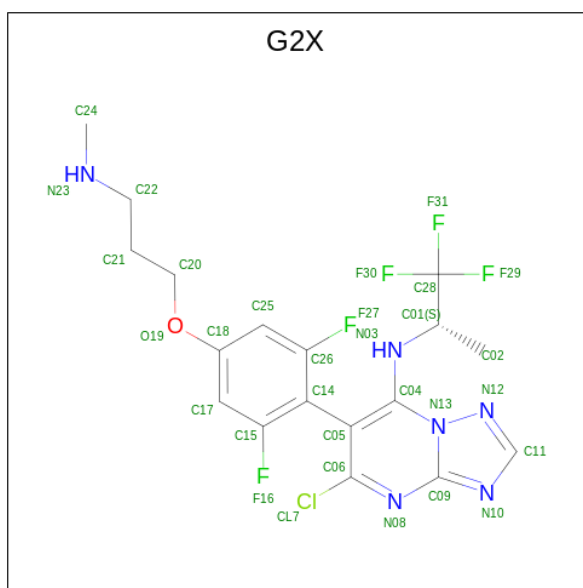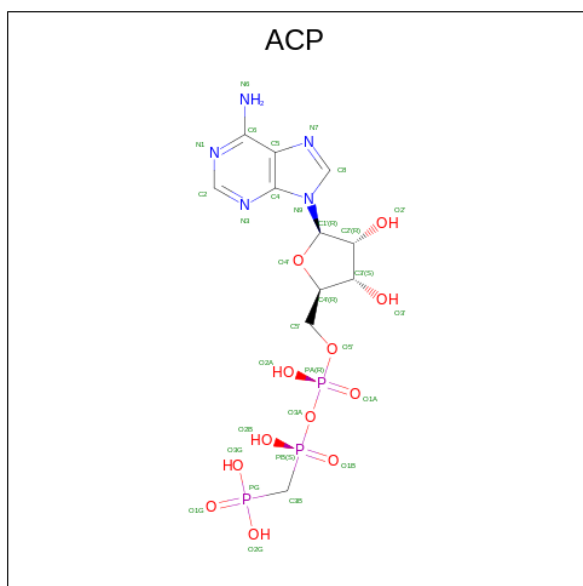

Mol	Chain	Residues	Atoms							ZeroOcc	AltConf
11	C	1	Total	C	Cl	F	H	N	O	0	0
			49	18	1	5	18	6	1		
11	C	1	Total	C	Cl	F	H	N	O	0	0
			49	18	1	5	18	6	1		

- Molecule 12 is (1S,3S,6S,9S,12S,14R,16R,18S,20R,21R,22S,26R,29S,31R,32S,33R,35R,36S)-20-[(2S)-3-amino-2-hydroxypropyl]-21-methoxy-14-methyl-8,15-dimethylidene-2,19,30,34,37,39,40,41-octaoxanonacyclo[24.9.2.1 3,32 .1 3,33 .1 6,9 .1 12,16 .0 18,22 .0 29,36 .0 31,35]hen tetracontan-24-one (non-preferred name) (three-letter code: 6K9) (formula: $C_{40}H_{59}NO_{11}$).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
12	D	1	Total 52	C 40	N 1	O 11	0	0

- Molecule 13 is PHOSPHOMETHYLPHOSPHONIC ACID ADENYLATE ESTER (three-letter code: ACP) (formula: $C_{11}H_{18}N_5O_{12}P_3$).

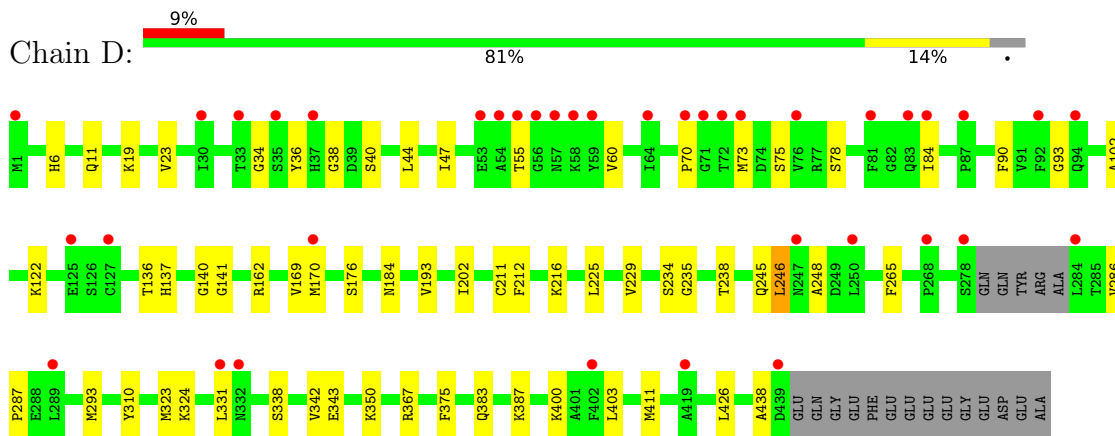| Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
13	F	1	Total 45	C 11	H 14	N 5	O 12	P 3	0	0

- Molecule 14 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
14	A	18	Total 18	O 18	0	0
14	B	29	Total 29	O 29	0	0
14	C	57	Total 57	O 57	0	0
14	D	7	Total 7	O 7	0	0
14	E	4	Total 4	O 4	0	0
14	F	3	Total 3	O 3	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: Tubulin alpha-1B chain

- Molecule 1: Tubulin alpha-1B chain

- Molecule 2: Tubulin beta chain

• Molecule 2: Tubulin beta chain

Chain D:

• Molecule 3: Stathmin-4

Chain E:

• Molecule 4: Tubulin tyrosine ligase

Chain F:
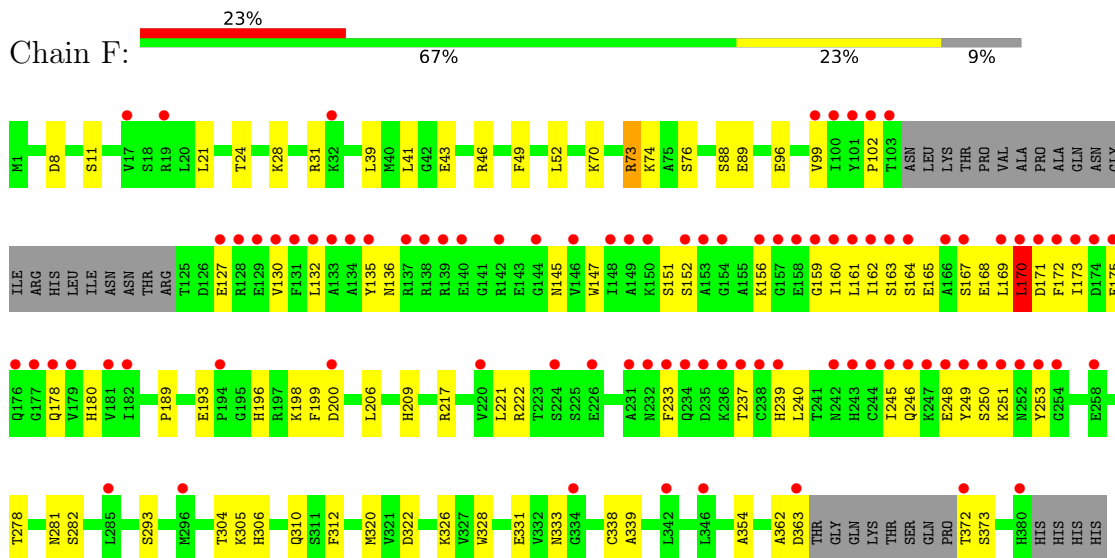
4   Data and refinement statistics   ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	103.94Å 159.07Å 176.24Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	59.46 – 2.45 59.46 – 2.45	Depositor EDS
% Data completeness (in resolution range)	95.0 (59.46-2.45) 95.0 (59.46-2.45)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.18 (at 2.45Å)	Xtriage
Refinement program	PHENIX 1.15.2_3472	Depositor
R, R_{free}	0.227 , 0.264 0.227 , 0.264	Depositor DCC
R_{free} test set	5151 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å^2)	53.9	Xtriage
Anisotropy	0.345	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.40 , 47.6	EDS
L-test for twinning[2]	$< |L| > = 0.50, < L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	35012	wwPDB-VP
Average B, all atoms (Å^2)	68.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.47% 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: CA, MG, GDP, 6K9, MES, GTP, ACP, GOL, G2X

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	0.36	1/3532 (0.0%)	0.51	2/4794 (0.0%)
1	C	0.34	1/3577 (0.0%)	0.56	3/4859 (0.1%)
2	B	0.30	0/3389	0.48	0/4588
2	D	0.29	0/3422	0.48	0/4634
3	E	0.32	0/1041	0.56	2/1382 (0.1%)
4	F	0.29	0/2937	0.51	1/3967 (0.0%)
All	All	0.32	2/17898 (0.0%)	0.51	8/24224 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	C	0	1
2	D	0	1
3	E	0	1
4	F	0	1
All	All	0	5

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	340	SER	CB-OG	8.83	1.53	1.42
1	A	285	GLN	CB-CG	-7.39	1.32	1.52

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	340	SER	CA-CB-OG	14.11	149.30	111.20
3	E	116	LEU	CA-CB-CG	9.04	136.10	115.30
1	C	340	SER	CB-CA-C	-7.62	95.61	110.10
3	E	116	LEU	CB-CG-CD1	-7.41	98.41	111.00
1	C	340	SER	N-CA-CB	6.93	120.90	110.50

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	285	GLN	Sidechain
1	C	340	SER	Mainchain
2	D	55	THR	Peptide
3	E	116	LEU	Peptide
4	F	170	LEU	Peptide

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	3451	3351	3362	43	1
1	C	3475	3369	3384	26	1
2	B	3313	3185	3192	47	0
2	D	3346	3217	3227	37	0
3	E	1032	1037	1040	23	0
4	F	2872	2824	2835	62	0
5	A	32	10	12	0	0
5	C	32	10	12	0	0
5	D	32	10	12	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
6	F	1	0	0	0	0
7	A	2	0	0	0	0
7	B	2	0	0	0	0
7	C	2	0	0	0	0
8	A	12	16	16	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
9	B	28	10	12	2	0
10	B	12	12	12	0	0
11	C	62	36	0	0	0
12	D	52	0	0	2	0
13	F	31	14	14	1	0
14	A	18	0	0	1	0
14	B	29	0	0	4	0
14	C	57	0	0	3	0
14	D	7	0	0	0	0
14	E	4	0	0	2	0
14	F	3	0	0	0	0
All	All	17911	17101	17130	232	1

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 7.

The worst 5 of 232 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)
2:B:162:ARG:NH1	14:B:601:HOH:O	1.93	1.00
3:E:116:LEU:HA	3:E:119:MET:H	1.47	0.80
2:D:75:SER:O	2:D:78:SER:OG	1.99	0.79
1:A:276:ILE:HG21	1:A:283:HIS:CE1	2.19	0.77
4:F:168:GLU:HA	4:F:171:ASP:HB3	1.68	0.76

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:245:ASP:OD1	1:C:57:GLY:H[2_565]	1.50	0.10

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	440/450 (98%)	426 (97%)	14 (3%)	0	100	100
1	C	446/450 (99%)	431 (97%)	15 (3%)	0	100	100
2	B	418/445 (94%)	402 (96%)	16 (4%)	0	100	100
2	D	423/445 (95%)	409 (97%)	14 (3%)	0	100	100
3	E	121/143 (85%)	118 (98%)	3 (2%)	0	100	100
4	F	346/384 (90%)	329 (95%)	16 (5%)	1 (0%)	41	49
All	All	2194/2317 (95%)	2115 (96%)	78 (4%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	F	88	SER

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	373/378 (99%)	370 (99%)	3 (1%)	81	88
1	C	379/378 (100%)	372 (98%)	7 (2%)	59	71
2	B	365/383 (95%)	359 (98%)	6 (2%)	62	74
2	D	369/383 (96%)	358 (97%)	11 (3%)	41	53
3	E	112/127 (88%)	105 (94%)	7 (6%)	18	23
4	F	314/342 (92%)	304 (97%)	10 (3%)	39	50
All	All	1912/1991 (96%)	1868 (98%)	44 (2%)	50	63

5 of 44 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	E	47	LEU
4	F	28	LYS
3	E	51	GLN

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Mol	Chain	Res	Type
3	E	126	LYS
4	F	73	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 20 such sidechains are listed below:

Mol	Chain	Res	Type
3	E	18	GLN
4	F	180	HIS
4	F	243	HIS
4	F	242	ASN
1	C	18	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 22 ligands modelled in this entry, 11 are monoatomic - leaving 11 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
10	MES	B	503	-	12,12,12	2.03	1 (8%)	14,16,16	1.82	5 (35%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z|$ > 2	Counts	RMSZ	#$|Z|$ > 2
11	G2X	C	601	-	28,33,33	2.76	10 (35%)	30,48,48	1.34	5 (16%)
13	ACP	F	402	6	27,33,33	2.56	8 (29%)	32,52,52	1.92	8 (25%)
5	GTP	A	501	6	26,34,34	1.12	2 (7%)	32,54,54	1.40	6 (18%)
8	GOL	A	505	-	5,5,5	0.53	0	5,5,5	0.74	0
9	GDP	B	501	-	24,30,30	1.02	2 (8%)	30,47,47	1.26	6 (20%)
11	G2X	C	605	-	28,33,33	2.91	12 (42%)	30,48,48	1.61	5 (16%)
12	6K9	D	503	-	58,60,60	2.20	15 (25%)	60,92,92	1.74	15 (25%)
5	GTP	C	602	6	26,34,34	1.15	2 (7%)	32,54,54	1.52	6 (18%)
8	GOL	A	504	-	5,5,5	0.80	0	5,5,5	0.76	0
5	GTP	D	502	6	26,34,34	1.13	2 (7%)	32,54,54	1.59	6 (18%)

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
10	MES	B	503	-	-	0/6/14/14	0/1/1/1
11	G2X	C	601	-	-	3/20/20/20	0/3/3/3
13	ACP	F	402	6	-	2/15/38/38	0/3/3/3
5	GTP	A	501	6	-	6/18/38/38	0/3/3/3
8	GOL	A	505	-	-	4/4/4/4	-
9	GDP	B	501	-	-	3/12/32/32	0/3/3/3
11	G2X	C	605	-	-	6/20/20/20	0/3/3/3
12	6K9	D	503	-	-	3/31/131/131	-
5	GTP	C	602	6	-	7/18/38/38	0/3/3/3
8	GOL	A	504	-	-	2/4/4/4	-
5	GTP	D	502	6	-	5/18/38/38	0/3/3/3

The worst 5 of 54 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
11	C	601	G2X	C28-C01	9.07	1.62	1.51
11	C	605	G2X	C28-C01	8.61	1.61	1.51
13	F	402	ACP	O4'-C1'	7.80	1.52	1.41
12	D	503	6K9	C02-C01	-7.23	1.41	1.51
12	D	503	6K9	C18-C19	-6.79	1.40	1.51

The worst 5 of 62 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
11	C	605	G2X	C14-C05-C04	4.92	128.45	121.41
13	F	402	ACP	C3'-C2'-C1'	4.57	107.85	100.98
13	F	402	ACP	N3-C2-N1	-4.54	121.59	128.68
13	F	402	ACP	C4-C5-N7	-3.98	105.25	109.40
12	D	503	6K9	C16-C15-C14	-3.94	108.98	114.43

There are no chirality outliers.

5 of 41 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	501	GTP	PB-O3B-PG-O2G
5	A	501	GTP	C5'-O5'-PA-O1A
5	A	501	GTP	C5'-O5'-PA-O2A
5	C	602	GTP	PB-O3B-PG-O2G
5	C	602	GTP	C5'-O5'-PA-O1A

There are no ring outliers.

4 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
13	F	402	ACP	1	0
9	B	501	GDP	2	0
12	D	503	6K9	2	0
8	A	504	GOL	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 G2X C 601

Bond lengths

Bond angles

Torsions

Rings

Ligand ACP F 402

Bond lengths

Bond angles

Torsions

Rings

Ligand GTP A 501

Bond lengths

Bond angles

Torsions

Rings

Ligand GDP B 501

Bond lengths

Bond angles

Torsions

Rings

Ligand G2X C 605

Bond lengths

Bond angles

Torsions

Rings

Ligand 6K9 D 503

Bond lengths

Bond angles

Torsions

Rings

Ligand GTP C 602

Bond lengths

Bond angles

Torsions

Rings

Ligand GTP D 502

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(Å²)	Q<0.9
1	A	438/450 (97%)	0.44	9 (2%)	63	60	41, 60, 79, 107	0
1	C	440/450 (97%)	0.35	7 (1%)	72	69	35, 50, 65, 108	0
2	B	418/445 (93%)	0.48	10 (2%)	59	54	37, 56, 77, 91	0
2	D	426/445 (95%)	0.80	38 (8%)	9	7	46, 64, 82, 100	0
3	E	123/143 (86%)	0.85	16 (13%)	3	2	46, 66, 91, 96	0
4	F	351/384 (91%)	1.38	90 (25%)	0	0	53, 74, 109, 113	0
All	All	2196/2317 (94%)	0.67	170 (7%)	13	10	35, 60, 91, 113	0

The worst 5 of 170 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	F	169	LEU	8.9
4	F	245	ILE	8.1
4	F	249	TYR	7.9
4	F	166	ALA	7.7
1	A	281	ALA	7.5

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($Å^2$)	Q<0.9
7	CA	B	505	1/1	0.68	0.17	94,94,94,94	0
7	CA	A	503	1/1	0.80	0.08	82,82,82,82	0
7	CA	B	504	1/1	0.84	0.15	101,101,101,101	0
12	6K9	D	503	52/52	0.84	0.26	63,84,94,96	0
7	CA	A	506	1/1	0.85	0.05	96,96,96,96	0
6	MG	D	501	1/1	0.86	0.14	63,63,63,63	0
8	GOL	A	504	6/6	0.88	0.26	65,78,85,90	0
13	ACP	F	402	31/31	0.88	0.16	80,88,105,112	0
11	G2X	C	605	31/31	0.89	0.22	43,58,74,77	0
8	GOL	A	505	6/6	0.91	0.20	77,92,101,110	0
11	G2X	C	601	31/31	0.93	0.21	51,58,76,80	0
6	MG	B	502	1/1	0.93	0.14	65,65,65,65	0
5	GTP	D	502	32/32	0.95	0.14	55,64,81,87	0
6	MG	F	401	1/1	0.95	0.09	79,79,79,79	0
6	MG	C	603	1/1	0.96	0.17	40,40,40,40	0
7	CA	C	604	1/1	0.96	0.34	75,75,75,75	0
5	GTP	A	501	32/32	0.97	0.21	43,51,67,82	0
5	GTP	C	602	32/32	0.97	0.19	31,49,64,78	0
9	GDP	B	501	28/28	0.97	0.18	31,55,77,92	0
10	MES	B	503	12/12	0.97	0.16	48,59,71,73	0
6	MG	A	502	1/1	0.98	0.20	47,47,47,47	0
7	CA	C	606	1/1	0.99	0.11	47,47,47,47	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 6K9 D 503:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
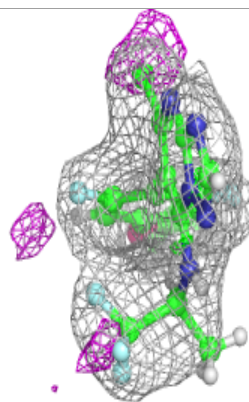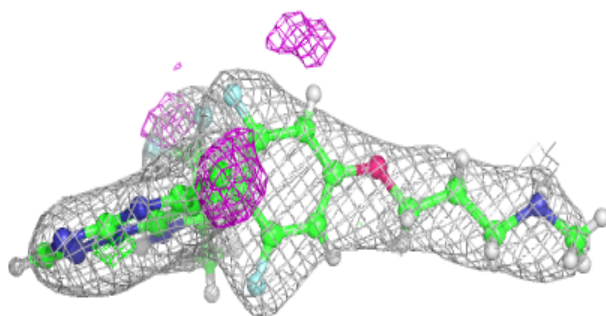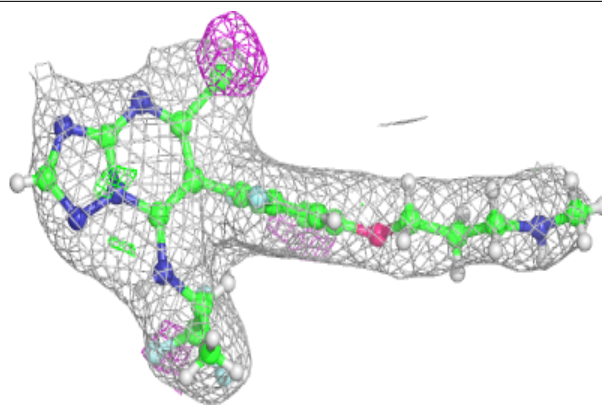and green (positive)
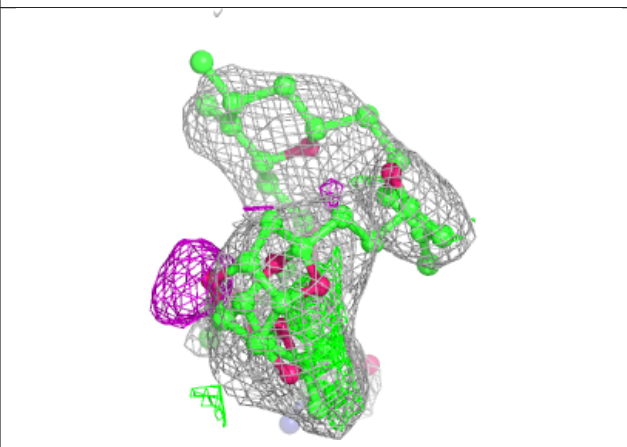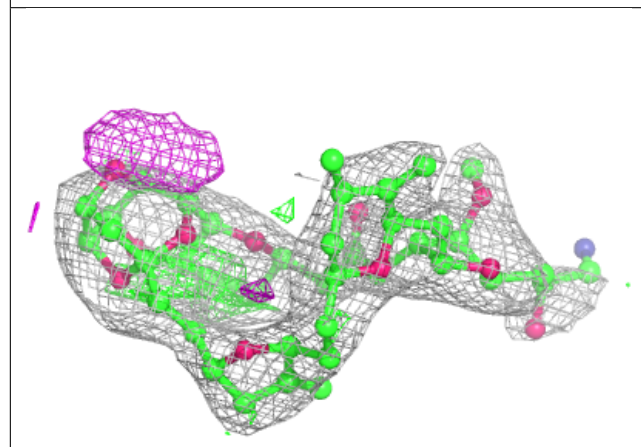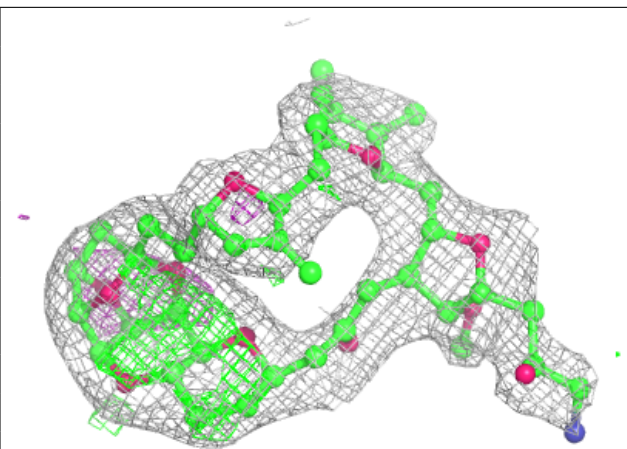
Electron density around ACP F 402:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
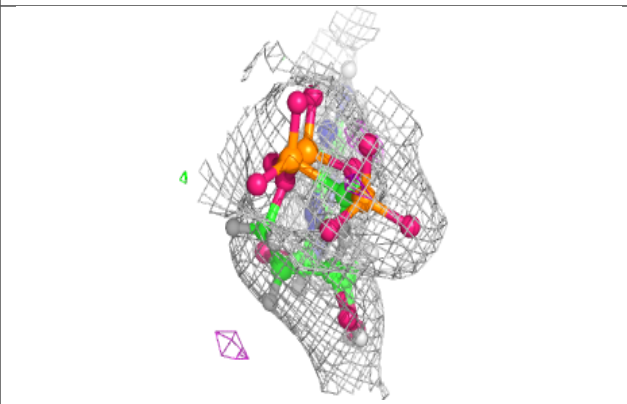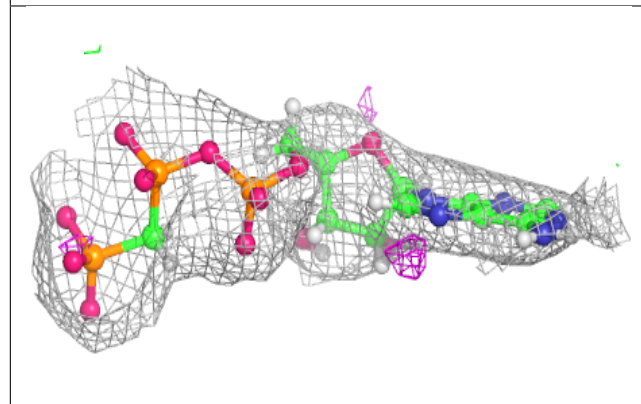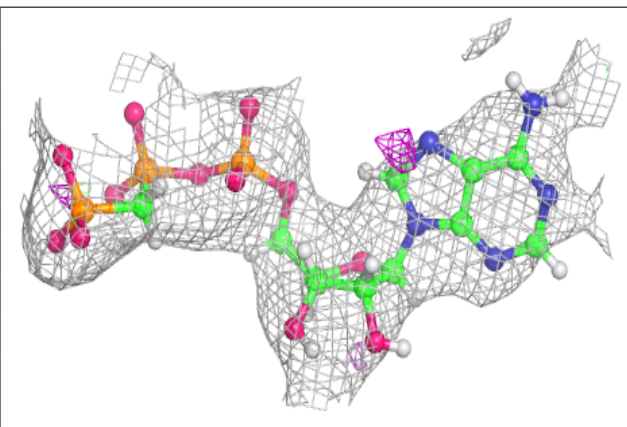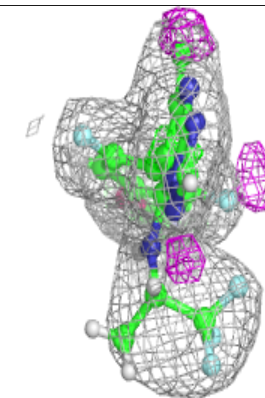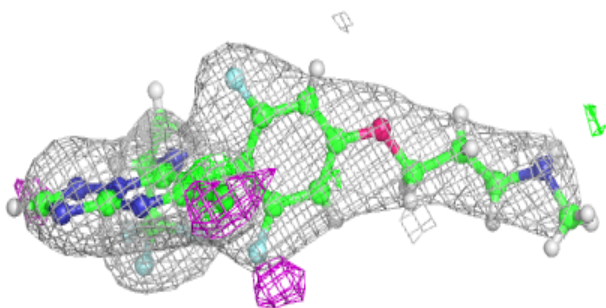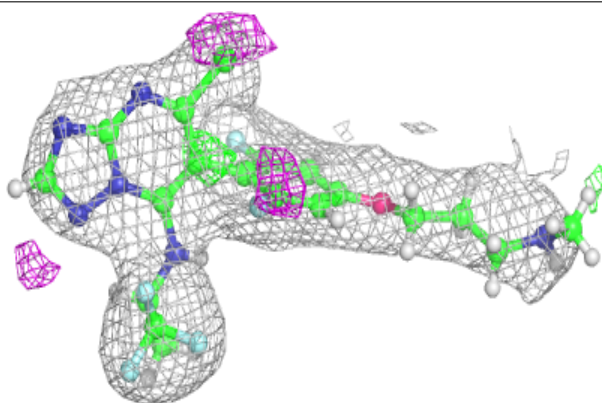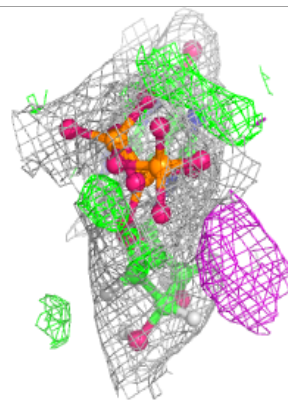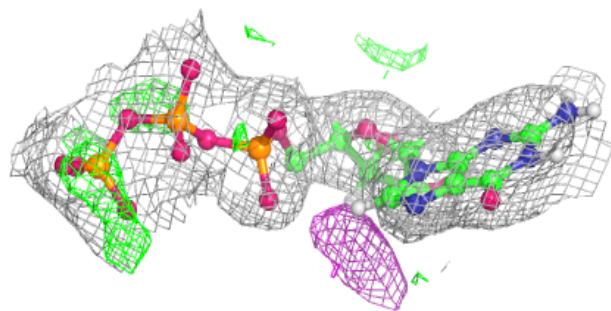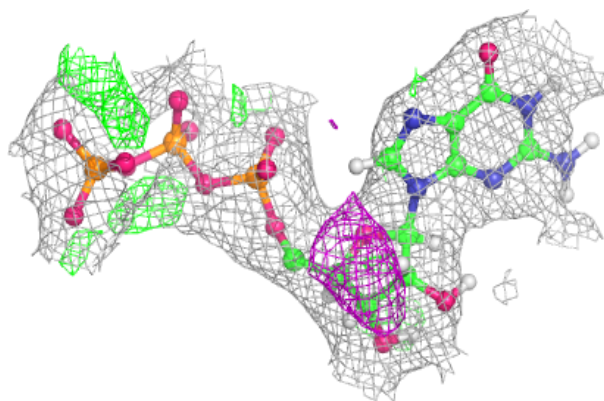
Electron density around G2X C 605:

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 G2X C 601:

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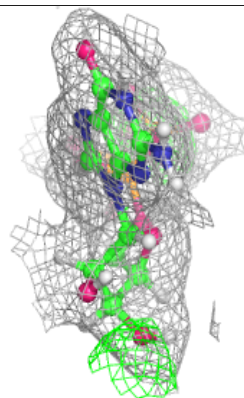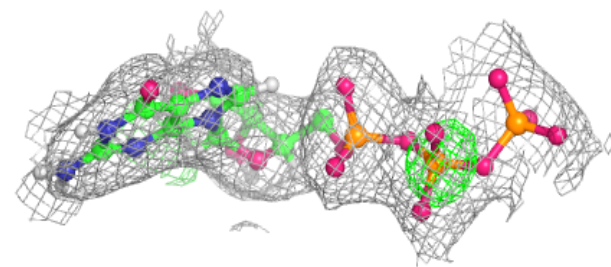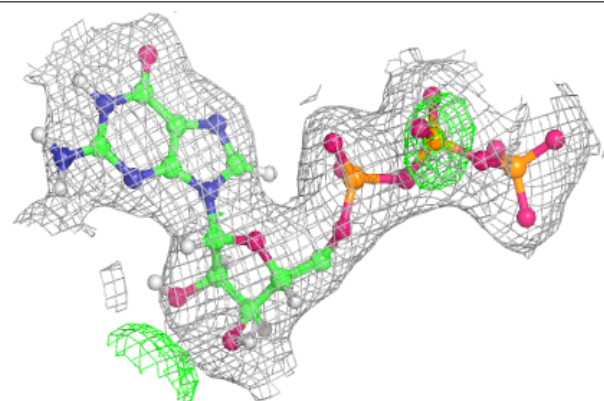mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around GTP D 502:

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

Electron density around GTP A 501:

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

Electron density around GTP C 602:

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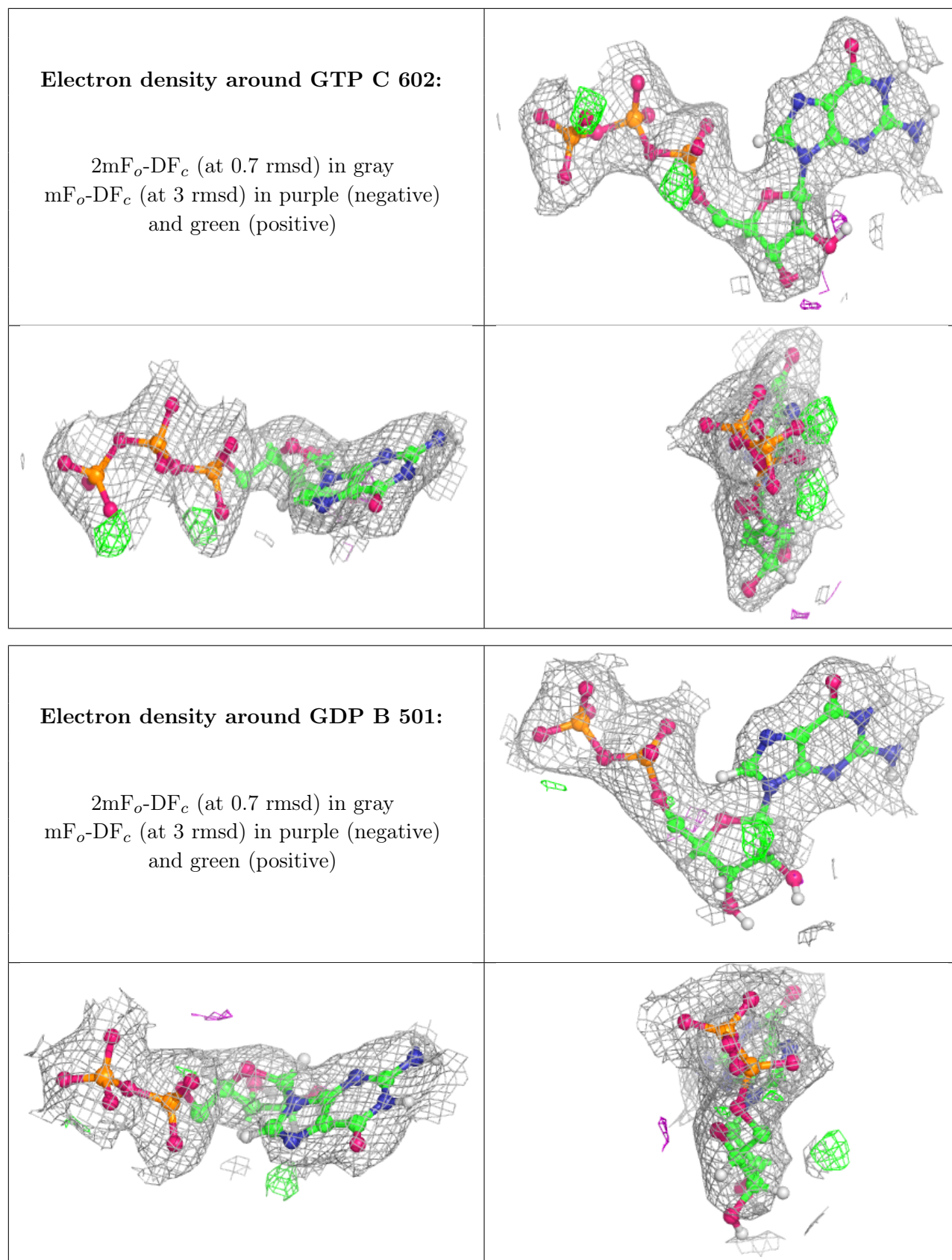mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around GDP B 501:

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

6.5 Other polymers (i)

There are no such residues in this entry.