



# wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 7, 2020 – 10:33 PM BST

PDB ID : 4MOE  
Title : Pyranose 2-oxidase H450G mutant with 3-fluorinated glucose  
Authors : Tan, T.C.; Spadiut, O.; Gandini, R.; Haltrich, D.; Divne, C.  
Deposited on : 2013-09-12  
Resolution : 2.00 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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The following versions of software and data (see [references ⓘ](#)) 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 : 2.13.1  
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) : 2.13.1

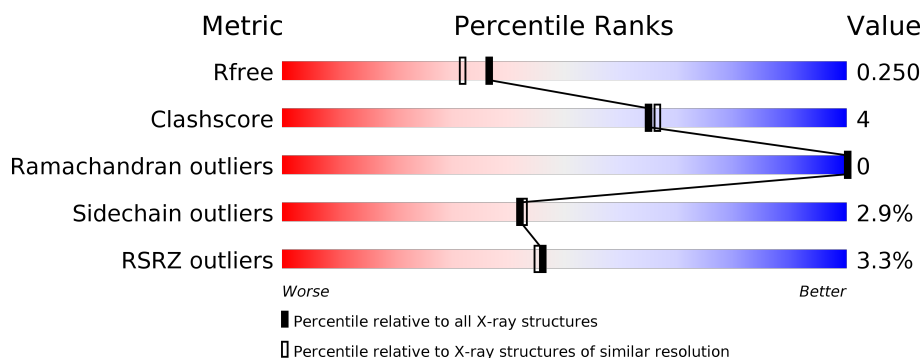
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.00 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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  $\leq 5\%$ . 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	633	<div> <div>3%</div> <div> <div></div> <div>82%</div> <div>8%</div> <div>9%</div> </div> </div>
1	B	633	<div> <div>%</div> <div> <div></div> <div>79%</div> <div>11%</div> <div>9%</div> </div> </div>
1	C	633	<div> <div>4%</div> <div> <div></div> <div>78%</div> <div>12%</div> <div>9%</div> </div> </div>
1	D	633	<div> <div>4%</div> <div> <div></div> <div>80%</div> <div>10%</div> <div>9%</div> </div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	MES	A	804	-	-	X	-

## 2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 19611 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 Pyranose 2-oxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	576	Total	C	N	O	S	0	0	0
			4536	2864	775	872	25			
1	B	576	Total	C	N	O	S	0	0	0
			4536	2864	775	872	25			
1	C	574	Total	C	N	O	S	0	0	0
			4520	2855	773	868	24			
1	D	575	Total	C	N	O	S	0	0	0
			4527	2859	774	870	24			

There are 52 discrepancies between the modelled and reference sequences:

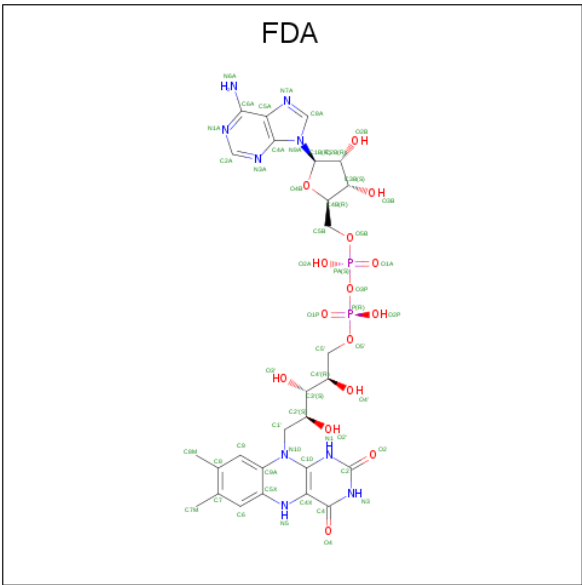
Chain	Residue	Modelled	Actual	Comment	Reference
A	2	ALA	SER	SEE REMARK 999	UNP Q7ZA32
A	450	GLY	HIS	engineered mutation	UNP Q7ZA32
A	623	ALA	-	expression tag	UNP Q7ZA32
A	624	ALA	-	expression tag	UNP Q7ZA32
A	625	ALA	-	expression tag	UNP Q7ZA32
A	626	LEU	-	expression tag	UNP Q7ZA32
A	627	GLU	-	expression tag	UNP Q7ZA32
A	628	HIS	-	expression tag	UNP Q7ZA32
A	629	HIS	-	expression tag	UNP Q7ZA32
A	630	HIS	-	expression tag	UNP Q7ZA32
A	631	HIS	-	expression tag	UNP Q7ZA32
A	632	HIS	-	expression tag	UNP Q7ZA32
A	633	HIS	-	expression tag	UNP Q7ZA32
B	2	ALA	SER	SEE REMARK 999	UNP Q7ZA32
B	450	GLY	HIS	engineered mutation	UNP Q7ZA32
B	623	ALA	-	expression tag	UNP Q7ZA32
B	624	ALA	-	expression tag	UNP Q7ZA32
B	625	ALA	-	expression tag	UNP Q7ZA32
B	626	LEU	-	expression tag	UNP Q7ZA32
B	627	GLU	-	expression tag	UNP Q7ZA32
B	628	HIS	-	expression tag	UNP Q7ZA32

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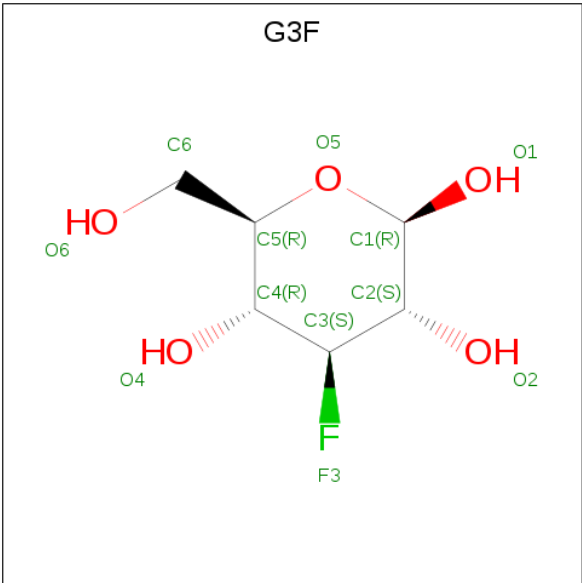
Chain	Residue	Modelled	Actual	Comment	Reference
B	629	HIS	-	expression tag	UNP Q7ZA32
B	630	HIS	-	expression tag	UNP Q7ZA32
B	631	HIS	-	expression tag	UNP Q7ZA32
B	632	HIS	-	expression tag	UNP Q7ZA32
B	633	HIS	-	expression tag	UNP Q7ZA32
C	2	ALA	SER	SEE REMARK 999	UNP Q7ZA32
C	450	GLY	HIS	engineered mutation	UNP Q7ZA32
C	623	ALA	-	expression tag	UNP Q7ZA32
C	624	ALA	-	expression tag	UNP Q7ZA32
C	625	ALA	-	expression tag	UNP Q7ZA32
C	626	LEU	-	expression tag	UNP Q7ZA32
C	627	GLU	-	expression tag	UNP Q7ZA32
C	628	HIS	-	expression tag	UNP Q7ZA32
C	629	HIS	-	expression tag	UNP Q7ZA32
C	630	HIS	-	expression tag	UNP Q7ZA32
C	631	HIS	-	expression tag	UNP Q7ZA32
C	632	HIS	-	expression tag	UNP Q7ZA32
C	633	HIS	-	expression tag	UNP Q7ZA32
D	2	ALA	SER	SEE REMARK 999	UNP Q7ZA32
D	450	GLY	HIS	engineered mutation	UNP Q7ZA32
D	623	ALA	-	expression tag	UNP Q7ZA32
D	624	ALA	-	expression tag	UNP Q7ZA32
D	625	ALA	-	expression tag	UNP Q7ZA32
D	626	LEU	-	expression tag	UNP Q7ZA32
D	627	GLU	-	expression tag	UNP Q7ZA32
D	628	HIS	-	expression tag	UNP Q7ZA32
D	629	HIS	-	expression tag	UNP Q7ZA32
D	630	HIS	-	expression tag	UNP Q7ZA32
D	631	HIS	-	expression tag	UNP Q7ZA32
D	632	HIS	-	expression tag	UNP Q7ZA32
D	633	HIS	-	expression tag	UNP Q7ZA32

- Molecule 2 is DIHYDROFLAVINE-ADENINE DINUCLEOTIDE (three-letter code: FDA) (formula: C<sub>27</sub>H<sub>35</sub>N<sub>9</sub>O<sub>15</sub>P<sub>2</sub>).



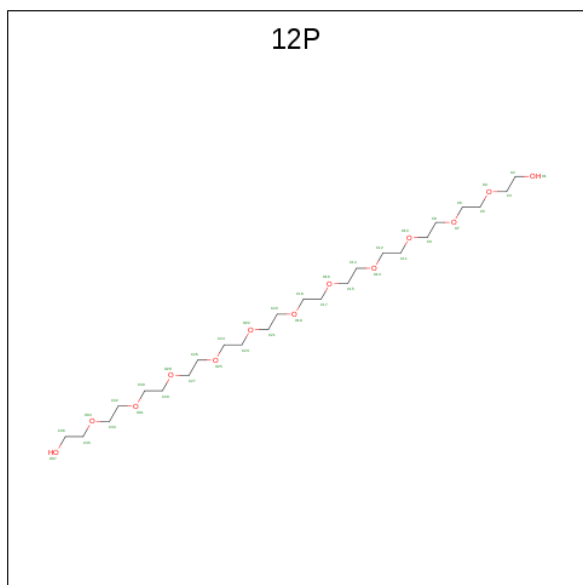
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	D	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is 3-deoxy-3-fluoro-beta-D-glucopyranose (three-letter code: G3F) (formula: C<sub>6</sub>H<sub>11</sub>FO<sub>5</sub>).



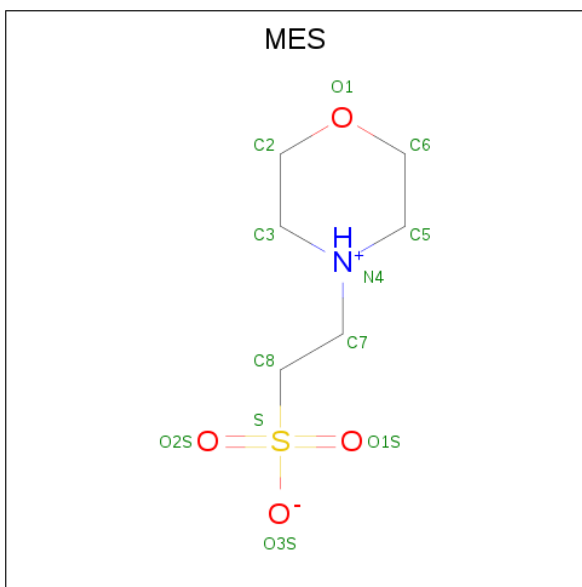
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	F	O	0	0
			12	6	1	5		
3	B	1	Total	C	F	O	0	0
			12	6	1	5		
3	C	1	Total	C	F	O	0	0
			12	6	1	5		
3	D	1	Total	C	F	O	0	0
			12	6	1	5		

- Molecule 4 is DODECAETHYLENE GLYCOL (three-letter code: 12P) (formula:  $C_{24}H_{50}O_{13}$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			15	10	5		
4	A	1	Total	C	O	0	0
			14	9	5		
4	B	1	Total	C	O	0	0
			16	10	6		
4	B	1	Total	C	O	0	0
			11	8	3		

- Molecule 5 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (three-letter code: MES) (formula:  $C_6H_{13}NO_4S$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
5	B	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
5	C	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
5	D	1	Total	C	N	O	S	0	0
			12	6	1	4	1		
5	D	1	Total	C	N	O	S	0	0
			12	6	1	4	1		

- Molecule 6 is water.

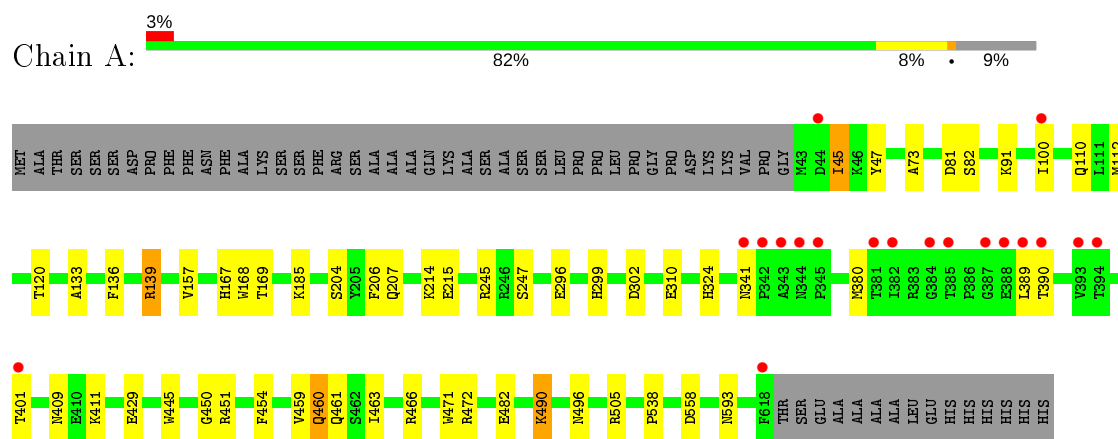
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	294	Total	O	0	0
			294	294		
6	B	369	Total	O	0	0
			369	369		
6	C	183	Total	O	0	0
			183	183		
6	D	270	Total	O	0	0
			270	270		



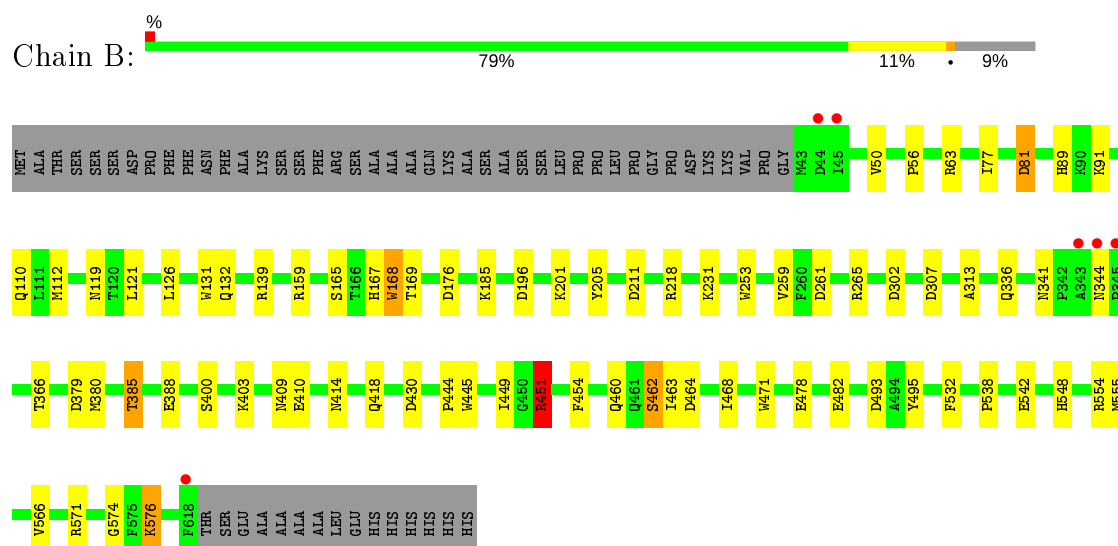
### 3 Residue-property plots [i](#)

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

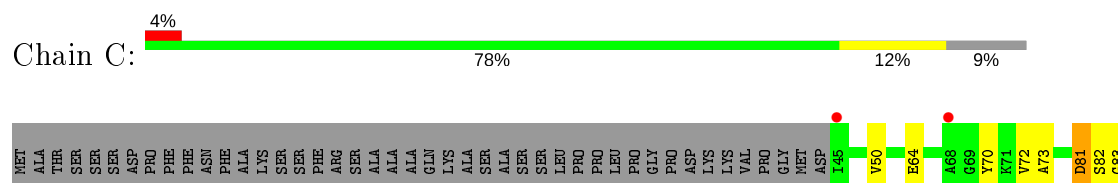
- Molecule 1: Pyranose 2-oxidase

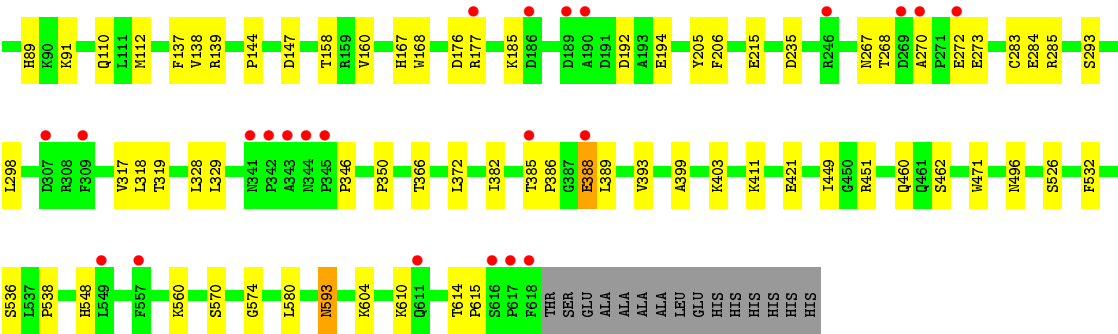


- Molecule 1: Pyranose 2-oxidase

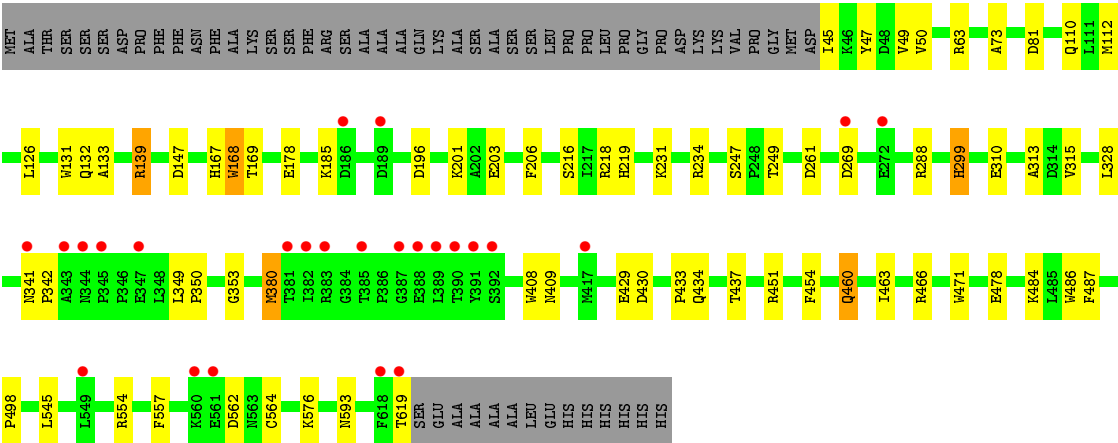
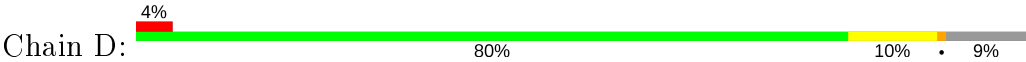


- Molecule 1: Pyranose 2-oxidase





● Molecule 1: Pyranose 2-oxidase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	100.07Å 102.74Å 137.69Å 90.00° 90.80° 90.00°	Depositor
Resolution (Å)	50.00 – 2.00 41.94 – 2.00	Depositor EDS
% Data completeness (in resolution range)	97.7 (50.00-2.00) 97.8 (41.94-2.00)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.32 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, $R_{free}$	0.195 , 0.242 0.202 , 0.250	Depositor DCC
$R_{free}$ test set	3287 reflections (1.79%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	20.3	Xtriage
Anisotropy	0.100	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 49.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.019 for -k,-h,-l 0.022 for k,h,-l 0.028 for h,-k,-l	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	19611	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.69% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup> Intensities estimated from amplitudes.

<sup>2</sup> Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  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: FDA, 12P, MES, G3F

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	1.07	5/4651 (0.1%)	1.02	10/6323 (0.2%)
1	B	1.14	8/4651 (0.2%)	1.07	21/6323 (0.3%)
1	C	0.89	3/4635 (0.1%)	0.89	6/6302 (0.1%)
1	D	1.02	6/4642 (0.1%)	0.98	13/6312 (0.2%)
All	All	1.04	22/18579 (0.1%)	0.99	50/25260 (0.2%)

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

The worst 5 of 22 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	168	TRP	CD2-CE2	7.54	1.50	1.41
1	A	445	TRP	CD2-CE2	7.07	1.49	1.41
1	B	482	GLU	CD-OE1	6.83	1.33	1.25
1	B	478	GLU	CD-OE1	6.54	1.32	1.25
1	A	471	TRP	CD2-CE2	6.11	1.48	1.41

The worst 5 of 50 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	139	ARG	NE-CZ-NH2	-10.73	114.94	120.30
1	B	139	ARG	NE-CZ-NH2	-10.23	115.19	120.30
1	C	147	ASP	CB-CG-OD1	9.98	127.29	118.30
1	D	139	ARG	NE-CZ-NH1	9.84	125.22	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	451	ARG	NE-CZ-NH2	-9.45	115.57	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	81	ASP	Peptide

## 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4536	0	4384	28	0
1	B	4536	0	4384	37	0
1	C	4520	0	4371	47	0
1	D	4527	0	4378	30	0
2	A	53	0	30	2	0
2	B	53	0	30	2	0
2	C	53	0	29	3	0
2	D	53	0	30	3	0
3	A	12	0	11	1	0
3	B	12	0	11	2	0
3	C	12	0	11	3	0
3	D	12	0	11	2	0
4	A	29	0	34	0	0
4	B	27	0	33	0	0
5	A	12	0	13	10	0
5	B	12	0	13	0	0
5	C	12	0	13	1	0
5	D	24	0	26	1	0
6	A	294	0	0	1	0
6	B	369	0	0	3	0
6	C	183	0	0	1	0
6	D	270	0	0	2	0
All	All	19611	0	17812	147	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 4.

The worst 5 of 147 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:A:133:ALA:CB	5:A:804:MES:H71	1.53	1.35
1:A:133:ALA:HB3	5:A:804:MES:H71	1.16	1.14
1:A:133:ALA:HB2	5:A:804:MES:H71	1.40	1.00
1:A:133:ALA:CB	5:A:804:MES:C7	2.46	0.92
1:D:460:GLN:HE22	1:D:463:ILE:H	1.13	0.92

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	574/633 (91%)	560 (98%)	14 (2%)	0	100	100
1	B	574/633 (91%)	558 (97%)	16 (3%)	0	100	100
1	C	572/633 (90%)	551 (96%)	21 (4%)	0	100	100
1	D	573/633 (90%)	556 (97%)	17 (3%)	0	100	100
All	All	2293/2532 (91%)	2225 (97%)	68 (3%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	503/547 (92%)	485 (96%)	18 (4%)	35	34
1	B	503/547 (92%)	490 (97%)	13 (3%)	46	48
1	C	501/547 (92%)	489 (98%)	12 (2%)	49	51
1	D	502/547 (92%)	486 (97%)	16 (3%)	39	38
All	All	2009/2188 (92%)	1950 (97%)	59 (3%)	42	43

5 of 59 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	451	ARG
1	C	168	TRP
1	D	454	PHE
1	B	454	PHE
1	B	462	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 21 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	563	ASN
1	C	105	ASN
1	D	299	HIS
1	B	344	ASN
1	D	341	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

17 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	MES	B	804	-	12,12,12	1.76	1 (8%)	14,16,16	1.76	4 (28%)
5	MES	C	803	-	12,12,12	2.26	1 (8%)	14,16,16	1.62	2 (14%)
4	12P	A	803	-	14,14,36	0.72	0	13,13,35	1.11	1 (7%)
5	MES	D	803	-	12,12,12	1.94	2 (16%)	14,16,16	3.21	3 (21%)
3	G3F	D	802	-	12,12,12	0.90	0	17,17,17	1.44	2 (11%)
3	G3F	C	802	-	12,12,12	1.28	1 (8%)	17,17,17	1.78	6 (35%)
3	G3F	B	802	-	12,12,12	1.07	1 (8%)	17,17,17	3.02	4 (23%)
3	G3F	A	802	-	12,12,12	1.25	2 (16%)	17,17,17	1.66	4 (23%)
4	12P	B	805	-	10,10,36	0.83	0	9,9,35	0.88	0
4	12P	A	805	-	13,13,36	0.68	0	12,12,35	0.48	0
5	MES	D	804	-	12,12,12	2.07	1 (8%)	14,16,16	2.21	5 (35%)
2	FDA	C	801	1	51,58,58	1.60	12 (23%)	60,89,89	2.92	22 (36%)
2	FDA	B	801	1	51,58,58	1.90	14 (27%)	60,89,89	4.61	23 (38%)
2	FDA	A	801	1	51,58,58	1.73	7 (13%)	60,89,89	4.93	24 (40%)
4	12P	B	803	-	15,15,36	0.50	0	14,14,35	0.68	0
5	MES	A	804	-	12,12,12	2.05	2 (16%)	14,16,16	3.07	8 (57%)
2	FDA	D	801	1	51,58,58	1.56	8 (15%)	60,89,89	3.95	18 (30%)

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
5	MES	B	804	-	-	0/6/14/14	0/1/1/1
5	MES	C	803	-	-	4/6/14/14	0/1/1/1
4	12P	A	803	-	-	3/12/12/34	-
5	MES	D	803	-	-	1/6/14/14	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	G3F	D	802	-	-	0/2/22/22	0/1/1/1
3	G3F	C	802	-	-	1/2/22/22	0/1/1/1
3	G3F	B	802	-	-	0/2/22/22	0/1/1/1
3	G3F	A	802	-	-	0/2/22/22	0/1/1/1
4	12P	B	805	-	-	4/8/8/34	-
4	12P	A	805	-	-	3/11/11/34	-
5	MES	D	804	-	-	1/6/14/14	0/1/1/1
2	FDA	C	801	1	-	1/30/50/50	0/6/6/6
2	FDA	B	801	1	-	4/30/50/50	0/6/6/6
2	FDA	A	801	1	-	2/30/50/50	0/6/6/6
4	12P	B	803	-	-	3/13/13/34	-
5	MES	A	804	-	-	1/6/14/14	0/1/1/1
2	FDA	D	801	1	-	2/30/50/50	0/6/6/6

The worst 5 of 52 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	803	MES	C8-S	-7.40	1.67	1.77
2	B	801	FDA	C4X-C10	6.74	1.45	1.38
5	D	804	MES	C8-S	-6.30	1.68	1.77
2	A	801	FDA	C4-C4X	5.96	1.51	1.41
5	A	804	MES	C8-S	-5.84	1.69	1.77

The worst 5 of 126 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	801	FDA	C4-N3-C2	28.98	139.61	115.14
2	B	801	FDA	C4-N3-C2	25.42	136.60	115.14
2	D	801	FDA	C4-N3-C2	23.49	134.97	115.14
2	A	801	FDA	C4X-C4-N3	-16.37	101.04	123.43
2	B	801	FDA	C4X-C4-N3	-14.29	103.89	123.43

There are no chirality outliers.

5 of 30 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	C	803	MES	N4-C7-C8-S
5	C	803	MES	C7-C8-S-O2S
5	D	803	MES	N4-C7-C8-S
5	D	804	MES	C8-C7-N4-C5

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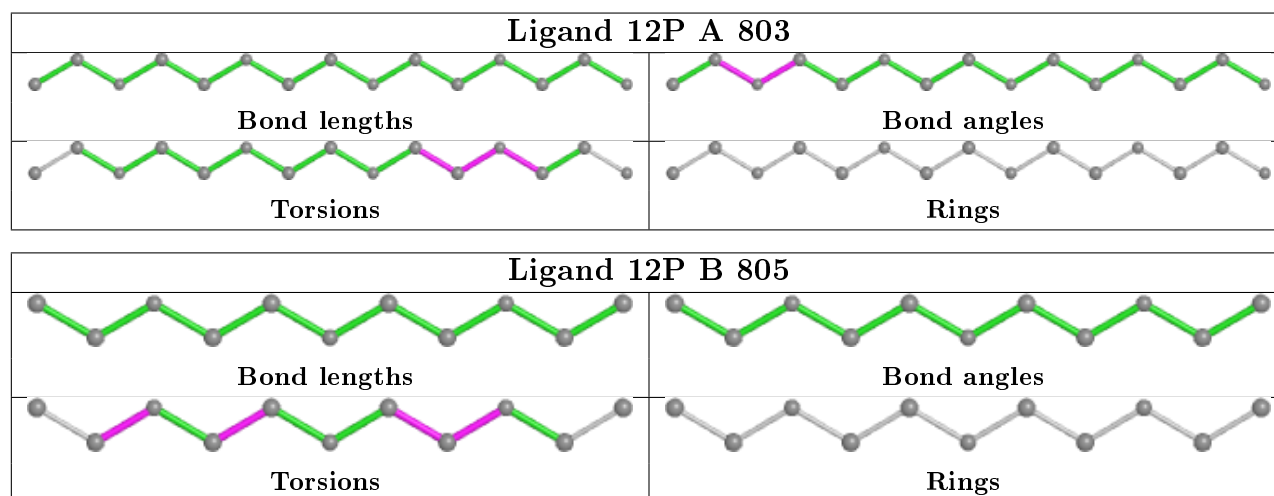
Mol	Chain	Res	Type	Atoms
2	B	801	FDA	PA-O3P-P-O5'

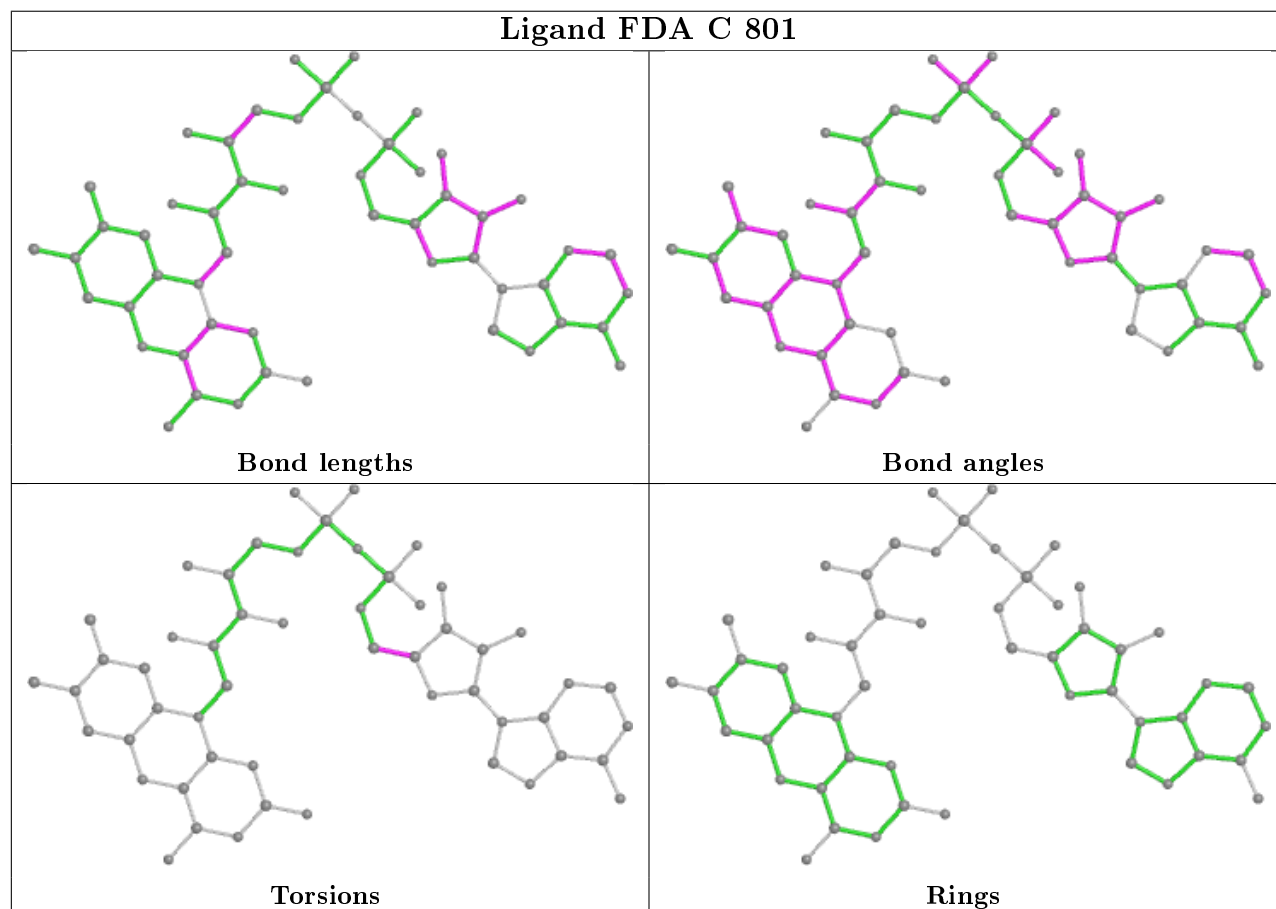
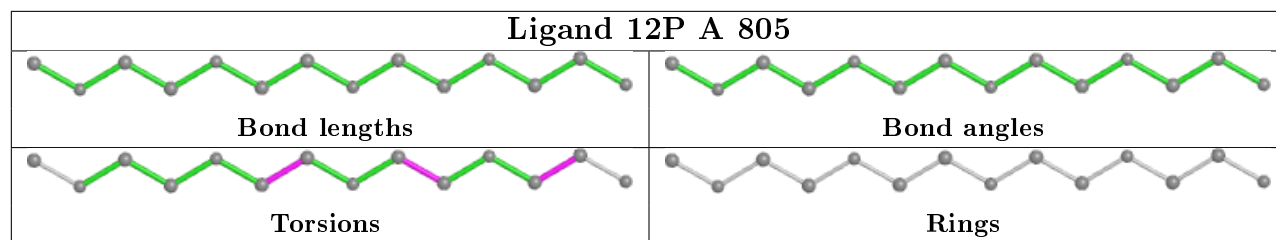
There are no ring outliers.

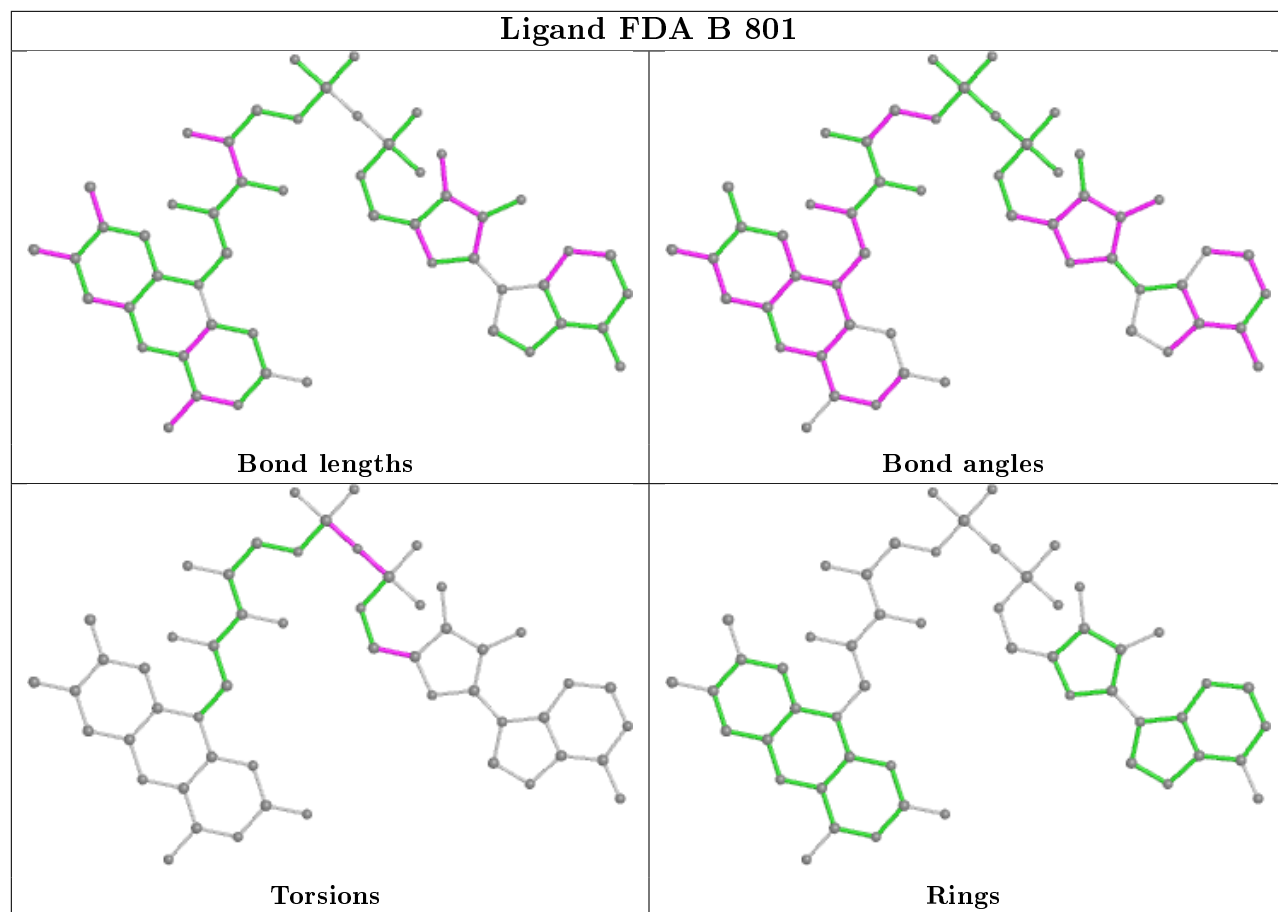
11 monomers are involved in 25 short contacts:

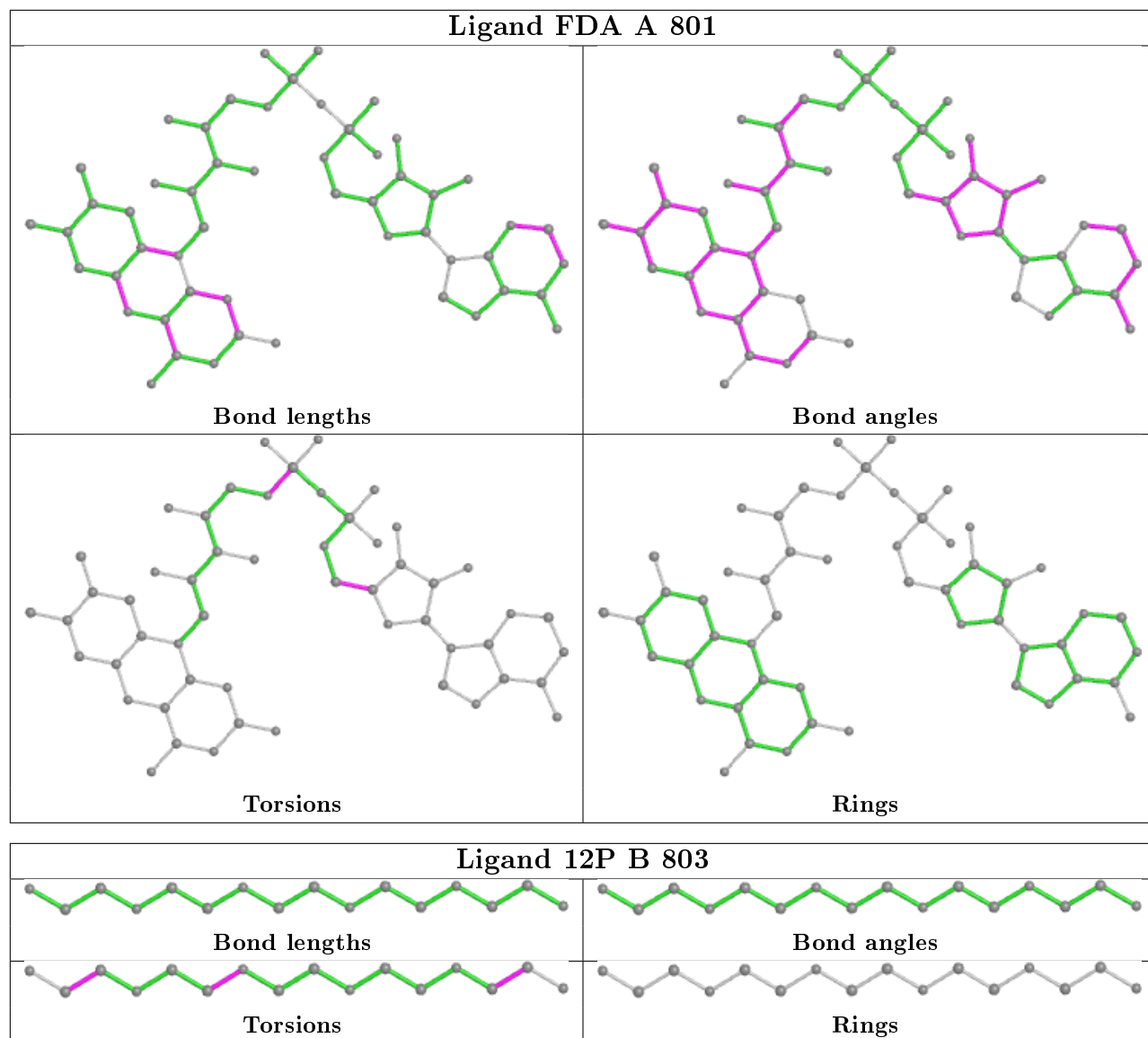
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	C	803	MES	1	0
5	D	803	MES	1	0
3	D	802	G3F	2	0
3	C	802	G3F	3	0
3	B	802	G3F	2	0
3	A	802	G3F	1	0
2	C	801	FDA	3	0
2	B	801	FDA	2	0
2	A	801	FDA	2	0
5	A	804	MES	10	0
2	D	801	FDA	3	0

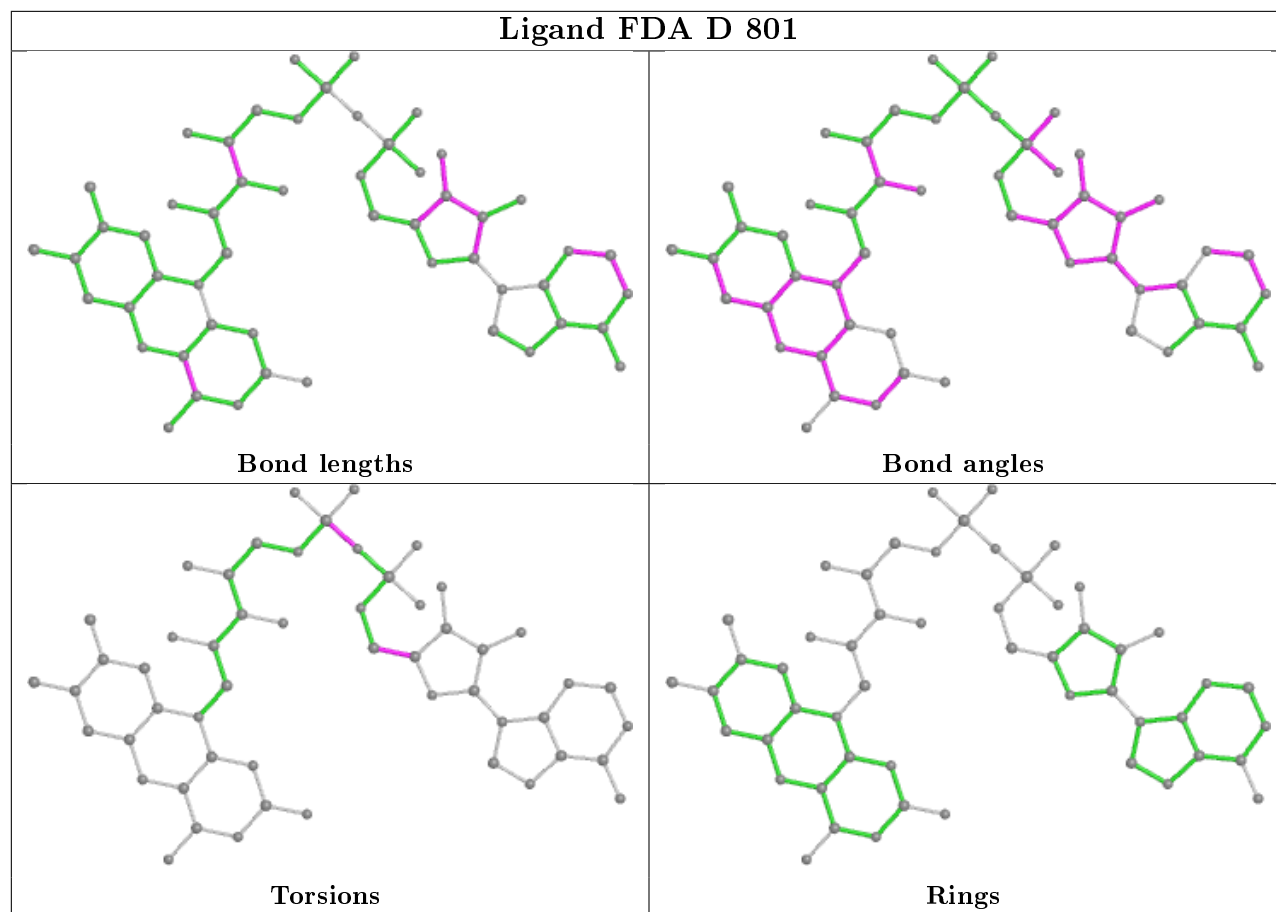
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 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.











## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	576/633 (90%)	-0.11	19 (3%) 46 45	12, 19, 43, 72	0
1	B	576/633 (90%)	-0.26	6 (1%) 82 81	11, 18, 34, 59	0
1	C	574/633 (90%)	0.15	25 (4%) 34 33	15, 33, 56, 81	0
1	D	575/633 (90%)	-0.08	25 (4%) 35 34	13, 23, 44, 71	0
All	All	2301/2532 (90%)	-0.07	75 (3%) 46 45	11, 23, 49, 81	0

The worst 5 of 75 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	389	LEU	6.9
1	A	382	ILE	6.2
1	D	343	ALA	6.0
1	D	385	THR	5.9
1	C	343	ALA	5.8

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> 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.

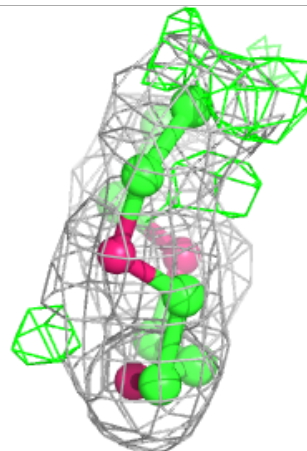
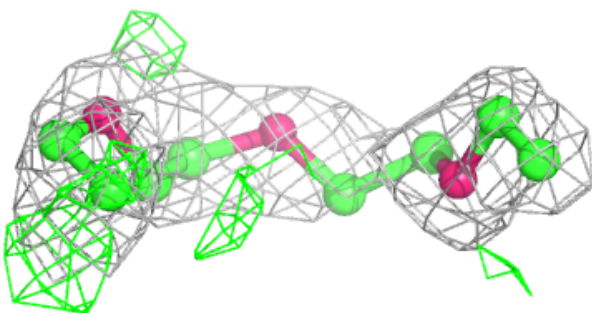
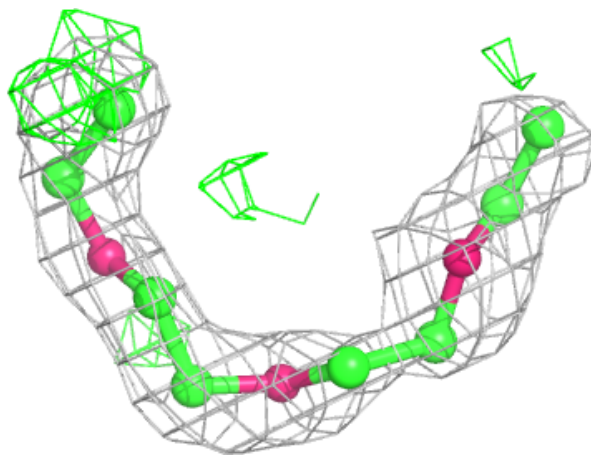
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	MES	C	803	12/12	0.60	0.30	74,83,106,113	0
4	12P	B	805	11/37	0.82	0.18	38,44,46,47	0
4	12P	A	803	15/37	0.88	0.16	27,32,45,47	0
3	G3F	C	802	12/12	0.89	0.14	29,35,37,38	0
4	12P	A	805	14/37	0.91	0.13	27,32,37,39	0
5	MES	A	804	12/12	0.91	0.24	28,41,47,53	0
5	MES	D	804	12/12	0.92	0.20	31,34,40,40	0
4	12P	B	803	16/37	0.93	0.15	31,34,65,69	0
3	G3F	D	802	12/12	0.94	0.12	23,24,28,28	0
3	G3F	A	802	12/12	0.95	0.10	20,22,25,26	0
2	FDA	C	801	53/53	0.96	0.12	16,24,29,33	0
5	MES	D	803	12/12	0.97	0.13	24,30,32,33	0
3	G3F	B	802	12/12	0.97	0.07	22,24,25,25	0
5	MES	B	804	12/12	0.97	0.16	27,29,36,36	0
2	FDA	D	801	53/53	0.97	0.11	10,15,21,31	0
2	FDA	A	801	53/53	0.98	0.12	6,10,14,17	0
2	FDA	B	801	53/53	0.98	0.10	7,10,14,17	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.



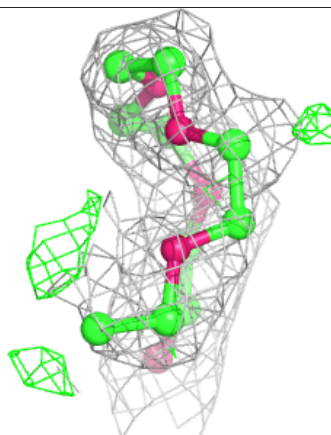
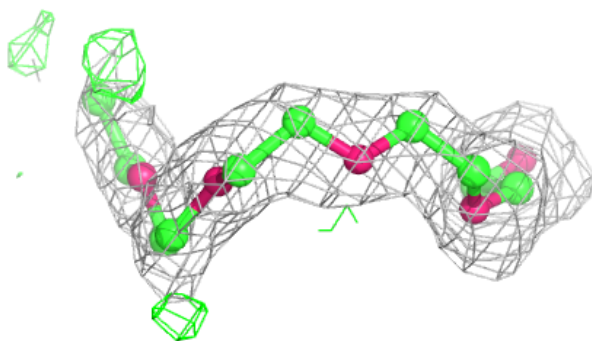
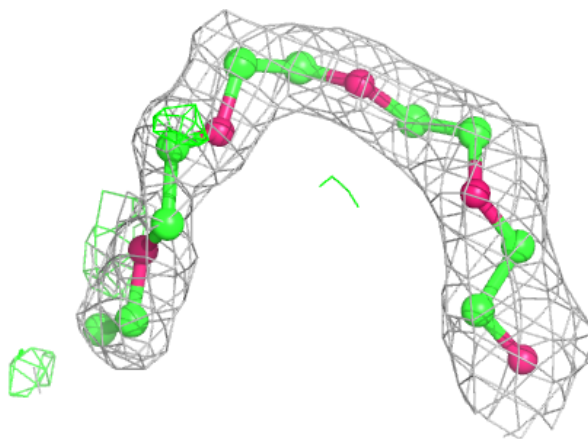
**Electron density around 12P B 805:**

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



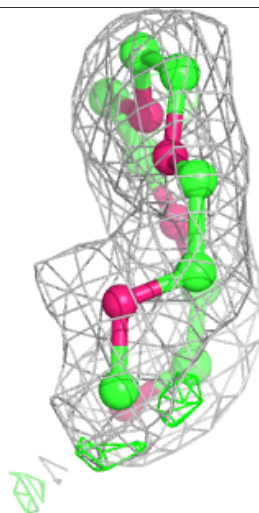
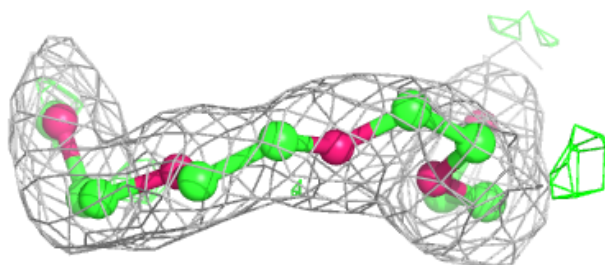
**Electron density around 12P A 803:**

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and green (positive)



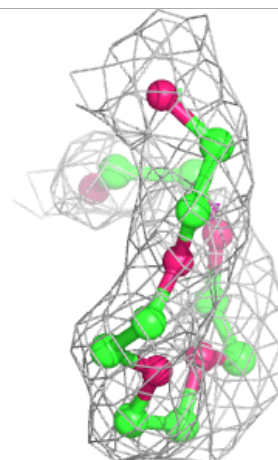
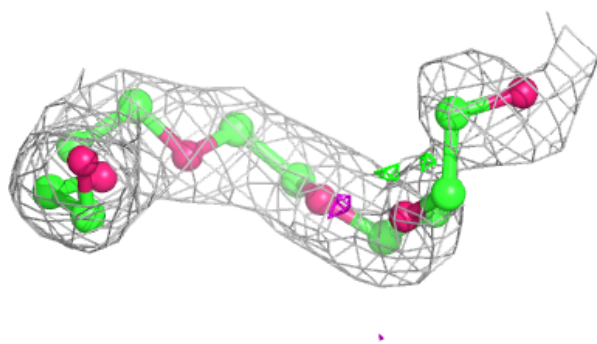
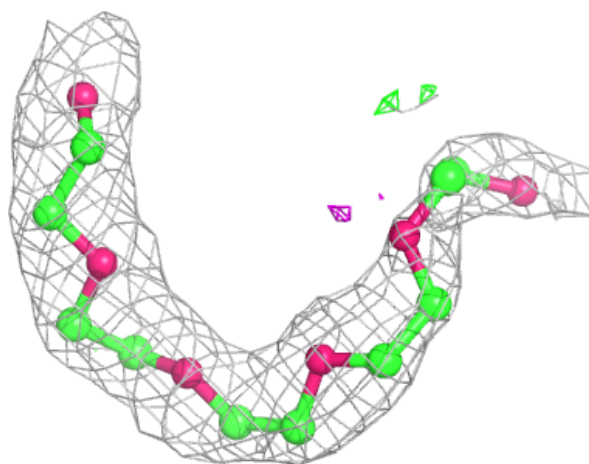
**Electron density around 12P A 805:**

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



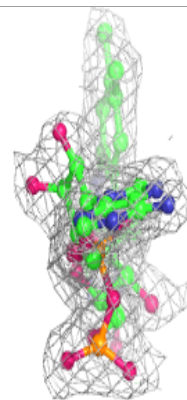
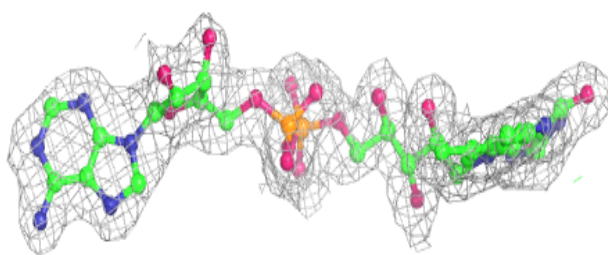
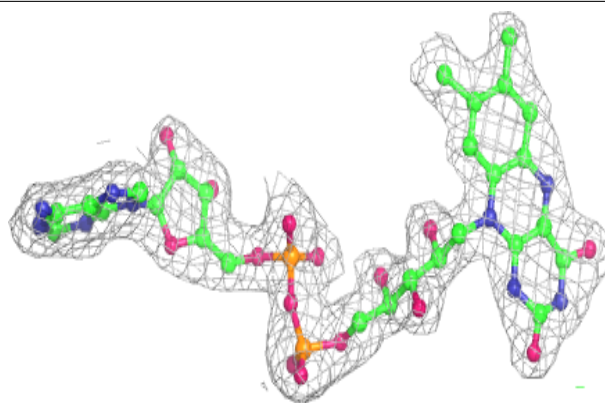
**Electron density around 12P B 803:**

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and green (positive)

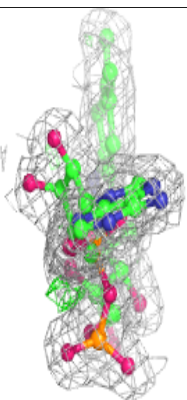
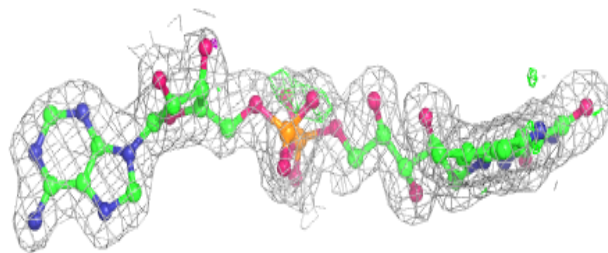
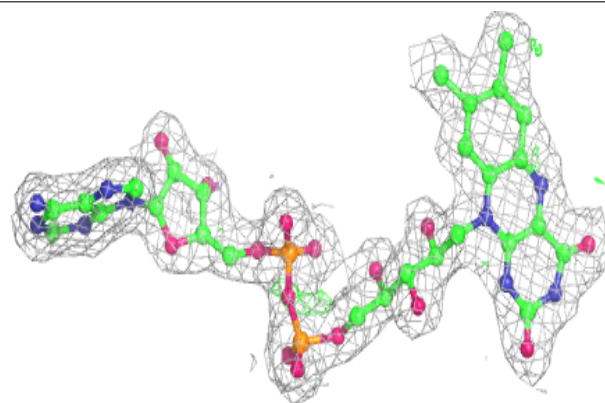


**Electron density around FDA C 801:**

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

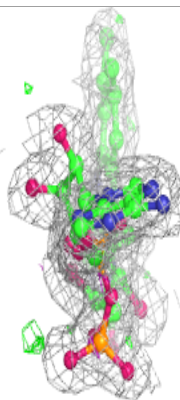
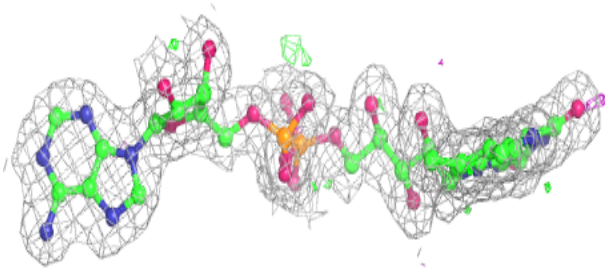
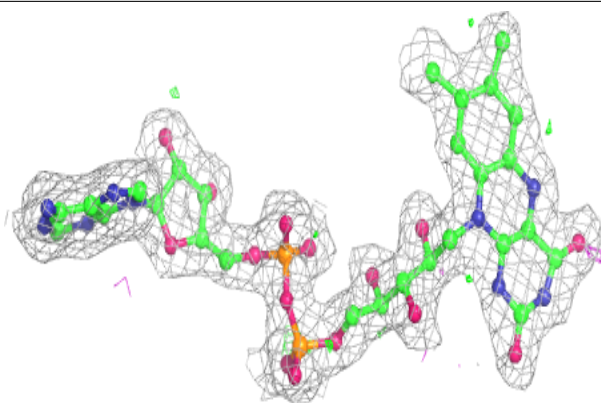
**Electron density around FDA D 801:**

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

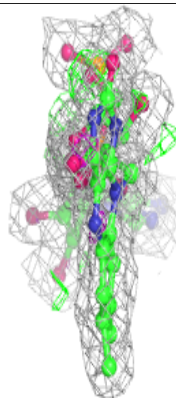
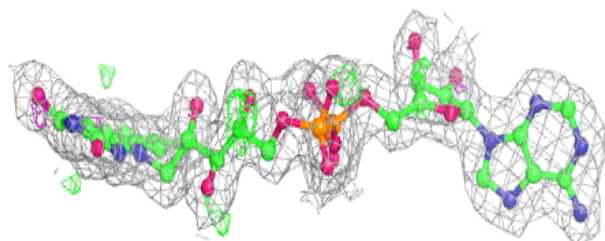
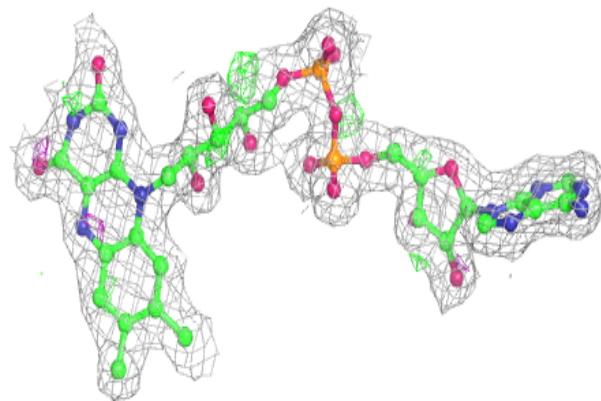


**Electron density around FDA A 801:**

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

**Electron density around FDA B 801:**

$2mF_o-DF_c$  (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.