



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 20, 2023 – 09:02 AM EDT

PDB ID : 5JV4  
Title : Structure of F420 binding protein, MSMEG\_6526, from Mycobacterium smegmatis with F420 bound  
Authors : Lee, B.M.; Carr, P.D.; Jackson, C.J.  
Deposited on : 2016-05-10  
Resolution : 1.70 Å(reported)

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

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

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

---

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.35.1  
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) : 2.35.1

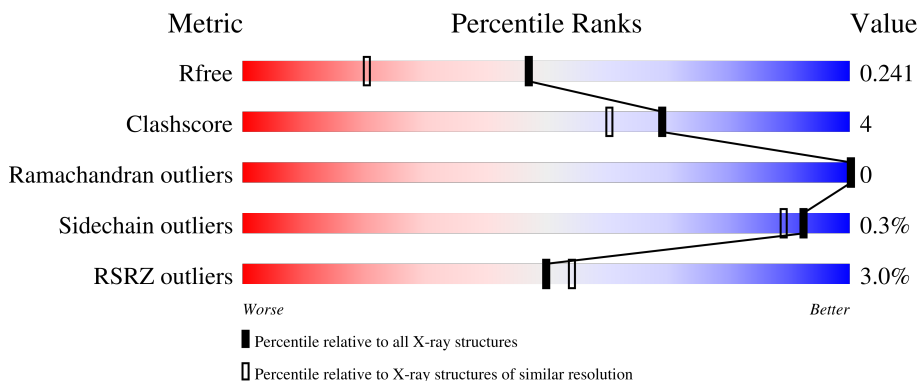
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.70 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.



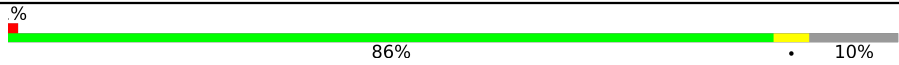
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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  $\geq 3$ , 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	154	 5% 84% 8% 8%
1	B	154	 2% 86% 10%
1	C	154	 3% 82% 8% 10%
1	D	154	 % 83% 6% 10%
1	E	154	 4% 85% 5% 10%

Continued on next page...

*Continued from previous page...*

Mol	Chain	Length	Quality of chain
1	F	154	 <p>A horizontal bar chart representing the quality of the chain. The bar is divided into three segments: a red segment on the left (4%), a large green segment in the middle (86%), and a yellow segment on the right (10%). A small black dot is located at the end of the yellow segment. The percentage values are printed below the bar.</p>

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 7362 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 Pyridoxamine 5'-phosphate oxidase-like FMN-binding protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	142	1113	702	203	207	1	109	0	0
1	B	139	1095	692	201	202		0	0	0
1	C	138	1084	683	200	201		81	0	0
1	D	138	1084	683	200	201		0	0	0
1	E	138	1084	683	200	201		113	0	0
1	F	138	1084	683	200	201		92	0	0

There are 72 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-11	HIS	-	expression tag	UNP A0A0D6J2M1
A	-10	HIS	-	expression tag	UNP A0A0D6J2M1
A	-9	HIS	-	expression tag	UNP A0A0D6J2M1
A	-8	HIS	-	expression tag	UNP A0A0D6J2M1
A	-7	HIS	-	expression tag	UNP A0A0D6J2M1
A	-6	HIS	-	expression tag	UNP A0A0D6J2M1
A	-5	GLU	-	expression tag	UNP A0A0D6J2M1
A	-4	ASN	-	expression tag	UNP A0A0D6J2M1
A	-3	LEU	-	expression tag	UNP A0A0D6J2M1
A	-2	TYR	-	expression tag	UNP A0A0D6J2M1
A	-1	PHE	-	expression tag	UNP A0A0D6J2M1
A	0	GLY	-	expression tag	UNP A0A0D6J2M1
B	-11	HIS	-	expression tag	UNP A0A0D6J2M1
B	-10	HIS	-	expression tag	UNP A0A0D6J2M1
B	-9	HIS	-	expression tag	UNP A0A0D6J2M1
B	-8	HIS	-	expression tag	UNP A0A0D6J2M1
B	-7	HIS	-	expression tag	UNP A0A0D6J2M1

*Continued on next page...*

*Continued from previous page...*

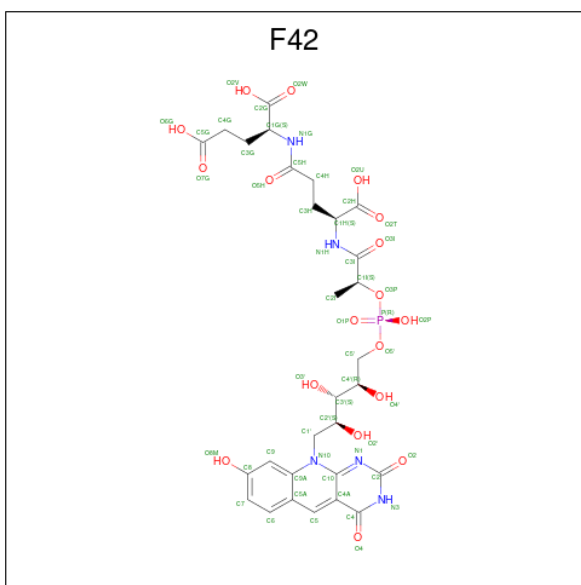
Chain	Residue	Modelled	Actual	Comment	Reference
B	-6	HIS	-	expression tag	UNP A0A0D6J2M1
B	-5	GLU	-	expression tag	UNP A0A0D6J2M1
B	-4	ASN	-	expression tag	UNP A0A0D6J2M1
B	-3	LEU	-	expression tag	UNP A0A0D6J2M1
B	-2	TYR	-	expression tag	UNP A0A0D6J2M1
B	-1	PHE	-	expression tag	UNP A0A0D6J2M1
B	0	GLY	-	expression tag	UNP A0A0D6J2M1
C	-11	HIS	-	expression tag	UNP A0A0D6J2M1
C	-10	HIS	-	expression tag	UNP A0A0D6J2M1
C	-9	HIS	-	expression tag	UNP A0A0D6J2M1
C	-8	HIS	-	expression tag	UNP A0A0D6J2M1
C	-7	HIS	-	expression tag	UNP A0A0D6J2M1
C	-6	HIS	-	expression tag	UNP A0A0D6J2M1
C	-5	GLU	-	expression tag	UNP A0A0D6J2M1
C	-4	ASN	-	expression tag	UNP A0A0D6J2M1
C	-3	LEU	-	expression tag	UNP A0A0D6J2M1
C	-2	TYR	-	expression tag	UNP A0A0D6J2M1
C	-1	PHE	-	expression tag	UNP A0A0D6J2M1
C	0	GLY	-	expression tag	UNP A0A0D6J2M1
D	-11	HIS	-	expression tag	UNP A0A0D6J2M1
D	-10	HIS	-	expression tag	UNP A0A0D6J2M1
D	-9	HIS	-	expression tag	UNP A0A0D6J2M1
D	-8	HIS	-	expression tag	UNP A0A0D6J2M1
D	-7	HIS	-	expression tag	UNP A0A0D6J2M1
D	-6	HIS	-	expression tag	UNP A0A0D6J2M1
D	-5	GLU	-	expression tag	UNP A0A0D6J2M1
D	-4	ASN	-	expression tag	UNP A0A0D6J2M1
D	-3	LEU	-	expression tag	UNP A0A0D6J2M1
D	-2	TYR	-	expression tag	UNP A0A0D6J2M1
D	-1	PHE	-	expression tag	UNP A0A0D6J2M1
D	0	GLY	-	expression tag	UNP A0A0D6J2M1
E	-11	HIS	-	expression tag	UNP A0A0D6J2M1
E	-10	HIS	-	expression tag	UNP A0A0D6J2M1
E	-9	HIS	-	expression tag	UNP A0A0D6J2M1
E	-8	HIS	-	expression tag	UNP A0A0D6J2M1
E	-7	HIS	-	expression tag	UNP A0A0D6J2M1
E	-6	HIS	-	expression tag	UNP A0A0D6J2M1
E	-5	GLU	-	expression tag	UNP A0A0D6J2M1
E	-4	ASN	-	expression tag	UNP A0A0D6J2M1
E	-3	LEU	-	expression tag	UNP A0A0D6J2M1
E	-2	TYR	-	expression tag	UNP A0A0D6J2M1
E	-1	PHE	-	expression tag	UNP A0A0D6J2M1

*Continued on next page...*

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
E	0	GLY	-	expression tag	UNP A0A0D6J2M1
F	-11	HIS	-	expression tag	UNP A0A0D6J2M1
F	-10	HIS	-	expression tag	UNP A0A0D6J2M1
F	-9	HIS	-	expression tag	UNP A0A0D6J2M1
F	-8	HIS	-	expression tag	UNP A0A0D6J2M1
F	-7	HIS	-	expression tag	UNP A0A0D6J2M1
F	-6	HIS	-	expression tag	UNP A0A0D6J2M1
F	-5	GLU	-	expression tag	UNP A0A0D6J2M1
F	-4	ASN	-	expression tag	UNP A0A0D6J2M1
F	-3	LEU	-	expression tag	UNP A0A0D6J2M1
F	-2	TYR	-	expression tag	UNP A0A0D6J2M1
F	-1	PHE	-	expression tag	UNP A0A0D6J2M1
F	0	GLY	-	expression tag	UNP A0A0D6J2M1

- Molecule 2 is COENZYME F420 (three-letter code: F42) (formula: C<sub>29</sub>H<sub>36</sub>N<sub>5</sub>O<sub>18</sub>P).



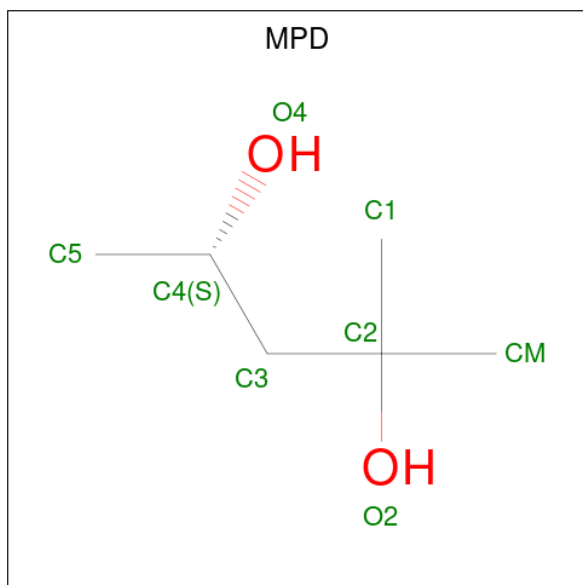
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	P		
2	A	1	Total	C	N	O	P	0	0
			30	16	3	10	1		
2	B	1	Total	C	N	O	P	0	0
			30	16	3	10	1		
2	B	1	Total	C	N	O	P	0	0
			30	16	3	10	1		
2	C	1	Total	C	N	O	P	0	0
			30	16	3	10	1		
2	D	1	Total	C	N	O	P	0	0
			53	29	5	18	1		

Continued on next page...

Continued from previous page...

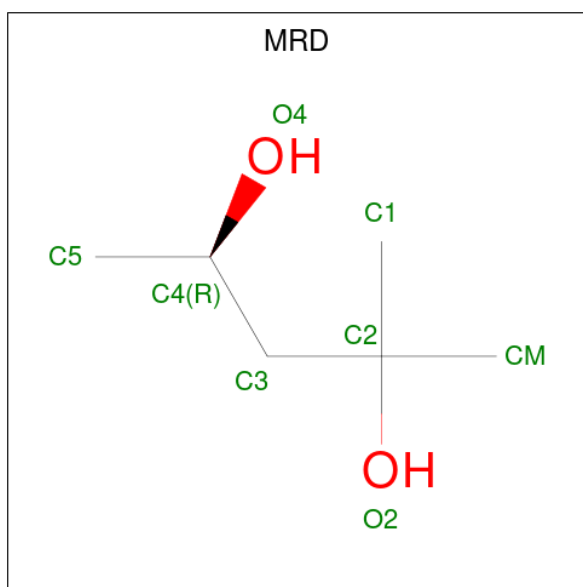
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
2	F	1	30	16	3	10	1	0	0

- Molecule 3 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
3	A	1	8	6	2	0	0
3	B	1	8	6	2	0	0
3	B	1	8	6	2	0	0
3	C	1	8	6	2	0	0
3	E	1	8	6	2	0	0
3	F	1	8	6	2	0	0
3	F	1	8	6	2	0	0

- Molecule 4 is (4R)-2-METHYLPENTANE-2,4-DIOL (three-letter code: MRD) (formula: C<sub>6</sub>H<sub>14</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total C O 8 6 2	0	0
4	C	1	Total C O 8 6 2	0	0

- Molecule 5 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	D	1	Total Na 1 1	0	0

- Molecule 6 is water.

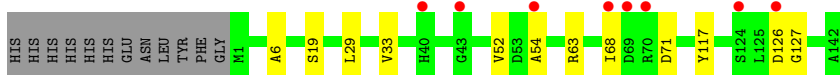
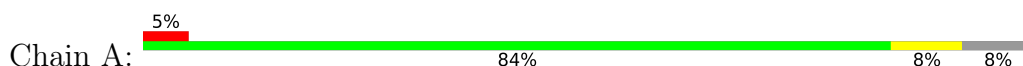
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	103	Total O 103 103	0	0
6	B	111	Total O 111 111	0	0
6	C	72	Total O 72 72	0	0
6	D	105	Total O 105 105	0	0
6	E	77	Total O 77 77	0	0
6	F	74	Total O 74 74	0	0



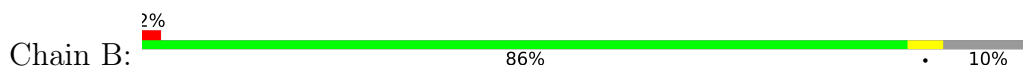
### 3 Residue-property plots [i](#)

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

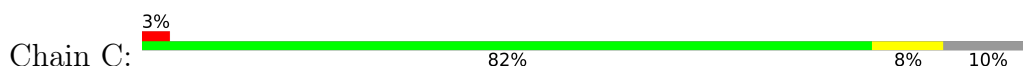
- Molecule 1: Pyridoxamine 5'-phosphate oxidase-like FMN-binding protein



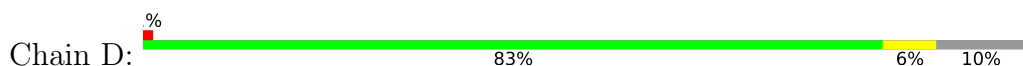
- Molecule 1: Pyridoxamine 5'-phosphate oxidase-like FMN-binding protein



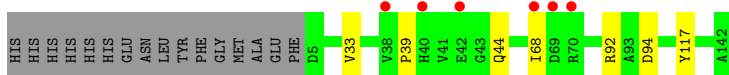
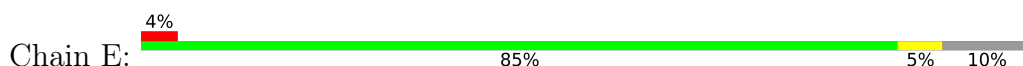
- Molecule 1: Pyridoxamine 5'-phosphate oxidase-like FMN-binding protein




- Molecule 1: Pyridoxamine 5'-phosphate oxidase-like FMN-binding protein

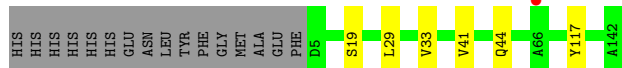


- Molecule 1: Pyridoxamine 5'-phosphate oxidase-like FMN-binding protein



- Molecule 1: Pyridoxamine 5'-phosphate oxidase-like FMN-binding protein

Chain F:  %



## 4 Data and refinement statistics i

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	139.95Å 84.24Å 75.98Å 90.00° 90.85° 90.00°	Depositor
Resolution (Å)	75.97 – 1.70 40.81 – 1.70	Depositor EDS
% Data completeness (in resolution range)	99.9 (75.97-1.70) 99.9 (40.81-1.70)	Depositor EDS
$R_{merge}$	0.12	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.93 (at 1.70Å)	Xtrriage
Refinement program	REFMAC 5.8.0049	Depositor
R, $R_{free}$	0.189 , 0.231 0.198 , 0.241	Depositor DCC
$R_{free}$ test set	4905 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	17.3	Xtrriage
Anisotropy	0.017	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 50.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	0.025 for -1/2*h+3/2*k,1/2*h+1/2*k,-l 0.024 for -1/2*h-3/2*k,-1/2*h+1/2*k,-l 0.064 for 1/2*h+3/2*k,1/2*h-1/2*k,-l 0.055 for 1/2*h-3/2*k,-1/2*h-1/2*k,-l 0.034 for -h,-k,l	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	7362	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	26.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.45% 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 [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: F42, NA, MPD, MRD

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	0.86	0/1143	0.89	0/1566
1	B	0.95	0/1125	0.89	0/1541
1	C	0.86	0/1113	0.89	0/1525
1	D	0.89	0/1113	0.90	0/1525
1	E	0.85	0/1113	0.86	0/1525
1	F	0.88	0/1113	0.82	0/1525
All	All	0.88	0/6720	0.87	0/9207

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 [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	1113	0	1070	8	1
1	B	1095	0	1058	4	4
1	C	1084	0	1049	11	1
1	D	1084	0	1049	8	0
1	E	1084	0	1049	5	0
1	F	1084	0	1049	13	0
2	A	30	0	16	0	0

*Continued on next page...*

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	60	0	30	0	0
2	C	30	0	15	0	0
2	D	53	0	32	0	0
2	F	30	0	15	0	0
3	A	8	0	14	0	0
3	B	16	0	28	0	0
3	C	8	0	14	2	0
3	E	8	0	14	0	0
3	F	16	0	28	0	0
4	B	8	0	14	0	0
4	C	8	0	14	0	0
5	D	1	0	0	0	0
6	A	103	0	0	1	0
6	B	111	0	0	2	0
6	C	72	0	0	0	0
6	D	105	0	0	3	0
6	E	77	0	0	0	0
6	F	74	0	0	0	0
All	All	7362	0	6558	46	5

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.

All (46) 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)
3:C:202:MPD:O2	3:C:202:MPD:H52	1.73	0.88
1:F:41:VAL:HG23	1:F:44:GLN:CG	2.17	0.74
1:C:30:VAL:HG22	1:C:31:PRO:HD2	1.71	0.72
1:F:41:VAL:HG23	1:F:44:GLN:HG2	1.71	0.71
1:A:54:ALA:O	1:A:126:ASP:OD2	2.08	0.70
1:F:41:VAL:CG2	1:F:44:GLN:CG	2.70	0.69
1:C:30:VAL:CG2	1:C:31:PRO:HD2	2.23	0.68
1:B:70:ARG:HD3	6:B:327:HOH:O	1.96	0.66
3:C:202:MPD:O2	3:C:202:MPD:C5	2.45	0.64
1:F:41:VAL:HG23	1:F:44:GLN:HB2	1.80	0.64
1:F:41:VAL:CG2	1:F:44:GLN:HG2	2.29	0.61
1:C:29:LEU:HD21	1:F:19:SER:HB2	1.83	0.60
1:D:63:ARG:NH1	6:D:302:HOH:O	2.38	0.57
1:F:41:VAL:HG23	1:F:44:GLN:CB	2.36	0.55
1:F:41:VAL:HG21	1:F:44:GLN:HG3	1.89	0.54

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:92:ARG:HD3	1:E:94:ASP:OD1	2.09	0.53
1:F:33:VAL:HB	1:F:117:TYR:CZ	2.45	0.52
1:E:33:VAL:HB	1:E:117:TYR:CZ	2.46	0.51
1:C:30:VAL:HG22	1:C:31:PRO:CD	2.40	0.50
1:A:52:VAL:O	1:A:127:GLY:HA3	2.12	0.50
1:D:114:ARG:HD2	6:D:384:HOH:O	2.11	0.49
1:E:39:PRO:CB	1:E:44:GLN:HB2	2.42	0.49
1:C:33:VAL:HB	1:C:117:TYR:CZ	2.47	0.49
1:B:33:VAL:O	1:B:50:THR:HG23	2.12	0.48
1:C:52:VAL:O	1:C:127:GLY:HA3	2.12	0.48
1:F:41:VAL:HG21	1:F:44:GLN:CG	2.40	0.48
1:B:101:HIS:HE1	6:B:387:HOH:O	1.96	0.48
1:F:41:VAL:CG2	1:F:44:GLN:HG3	2.44	0.48
1:A:6:ALA:HB2	6:A:317:HOH:O	2.14	0.47
1:A:33:VAL:HB	1:A:117:TYR:CZ	2.50	0.47
1:B:33:VAL:HB	1:B:117:TYR:CZ	2.50	0.46
1:E:92:ARG:CD	1:E:94:ASP:OD1	2.64	0.46
1:A:68:ILE:HA	1:A:71:ASP:O	2.15	0.46
1:C:17:VAL:O	1:C:76:LEU:HA	2.16	0.46
1:C:19:SER:HB2	1:F:29:LEU:HD21	1.96	0.46
1:C:30:VAL:CG2	1:C:31:PRO:CD	2.95	0.45
1:A:29:LEU:HD21	1:D:19:SER:HB2	1.99	0.44
1:A:126:ASP:N	1:A:126:ASP:OD1	2.50	0.44
1:A:19:SER:HB2	1:D:29:LEU:HD21	2.00	0.44
1:C:30:VAL:HG23	1:C:31:PRO:HD2	2.00	0.43
1:D:92:ARG:HH12	1:D:136:ARG:NH2	2.16	0.43
1:D:136:ARG:NH1	6:D:301:HOH:O	2.51	0.43
1:D:33:VAL:HB	1:D:117:TYR:CZ	2.53	0.43
1:D:114:ARG:NH1	1:D:120:TYR:O	2.51	0.42
1:E:68:ILE:O	1:E:68:ILE:HG22	2.20	0.41
1:C:29:LEU:HD21	1:F:29:LEU:HD21	2.03	0.41

All (5) 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:B:87:GLN:OE1	1:B:87:GLN:OE1[2_555]	1.05	1.15
1:B:87:GLN:CD	1:B:87:GLN:OE1[2_555]	1.17	1.03
1:B:87:GLN:OE1	1:B:87:GLN:NE2[2_555]	1.61	0.59
1:B:87:GLN:CD	1:B:87:GLN:CD[2_555]	1.99	0.21
1:A:63:ARG:NH2	1:C:5:ASP:OD1[3_445]	2.00	0.20

## 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	140/154 (91%)	136 (97%)	4 (3%)	0	100	100
1	B	137/154 (89%)	136 (99%)	1 (1%)	0	100	100
1	C	136/154 (88%)	134 (98%)	2 (2%)	0	100	100
1	D	136/154 (88%)	134 (98%)	2 (2%)	0	100	100
1	E	136/154 (88%)	131 (96%)	5 (4%)	0	100	100
1	F	136/154 (88%)	134 (98%)	2 (2%)	0	100	100
All	All	821/924 (89%)	805 (98%)	16 (2%)	0	100	100

There are no Ramachandran outliers to report.

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

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	114/126 (90%)	114 (100%)	0	100	100
1	B	113/126 (90%)	113 (100%)	0	100	100
1	C	112/126 (89%)	111 (99%)	1 (1%)	78	70
1	D	112/126 (89%)	111 (99%)	1 (1%)	78	70
1	E	112/126 (89%)	112 (100%)	0	100	100
1	F	112/126 (89%)	112 (100%)	0	100	100
All	All	675/756 (89%)	673 (100%)	2 (0%)	92	89

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

Mol	Chain	Res	Type
1	C	55	LYS
1	D	64	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	101	HIS
1	E	118	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 16 ligands modelled in this entry, 1 is monoatomic - leaving 15 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	F42	B	201	-	29,32,55	1.56	5 (17%)	36,48,79	2.99	12 (33%)
2	F42	F	201	-	29,32,55	1.84	4 (13%)	36,48,79	2.87	8 (22%)
3	MPD	B	204	-	7,7,7	0.35	0	9,10,10	1.16	1 (11%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
3	MPD	B	203	-	7,7,7	0.52	0	9,10,10	0.94	0
4	MRD	B	205	-	7,7,7	0.26	0	9,10,10	1.26	2 (22%)
3	MPD	E	201	-	7,7,7	0.56	0	9,10,10	0.59	0
3	MPD	F	203	-	7,7,7	0.36	0	9,10,10	0.87	0
2	F42	C	201	-	29,32,55	1.73	5 (17%)	36,48,79	3.29	11 (30%)
2	F42	D	202	-	51,55,55	1.15	3 (5%)	64,79,79	2.57	13 (20%)
3	MPD	C	202	-	7,7,7	0.38	0	9,10,10	1.02	0
3	MPD	F	202	-	7,7,7	0.31	0	9,10,10	0.67	0
4	MRD	C	203	-	7,7,7	0.16	0	9,10,10	1.02	0
2	F42	A	201	-	29,32,55	2.00	4 (13%)	36,48,79	3.31	13 (36%)
3	MPD	A	202	-	7,7,7	0.31	0	9,10,10	0.67	0
2	F42	B	202	-	29,32,55	2.03	6 (20%)	36,48,79	2.18	12 (33%)

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	F42	B	201	-	-	3/18/18/53	0/3/3/3
2	F42	F	201	-	-	4/18/18/53	0/3/3/3
3	MPD	B	204	-	-	2/5/5/5	-
3	MPD	B	203	-	-	0/5/5/5	-
4	MRD	B	205	-	-	0/5/5/5	-
3	MPD	E	201	-	-	1/5/5/5	-
3	MPD	F	203	-	-	2/5/5/5	-
2	F42	C	201	-	-	0/18/18/53	0/3/3/3
2	F42	D	202	-	-	7/53/53/53	0/3/3/3
3	MPD	C	202	-	-	3/5/5/5	-
3	MPD	F	202	-	-	0/5/5/5	-
4	MRD	C	203	-	-	0/5/5/5	-
2	F42	A	201	-	-	4/18/18/53	0/3/3/3
3	MPD	A	202	-	-	0/5/5/5	-
2	F42	B	202	-	-	13/18/18/53	0/3/3/3

All (27) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	201	F42	C4A-C10	8.38	1.49	1.41

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	201	F42	C4A-C10	7.56	1.48	1.41
2	B	202	F42	C4A-C10	6.76	1.48	1.41
2	C	201	F42	C4A-C10	6.08	1.47	1.41
2	B	201	F42	C4A-C10	5.95	1.47	1.41
2	B	202	F42	C5A-C9A	3.93	1.48	1.42
2	A	201	F42	C5A-C9A	3.51	1.48	1.42
2	D	202	F42	C4A-C10	3.42	1.44	1.41
2	B	202	F42	P-O1P	3.41	1.61	1.50
2	B	202	F42	C10-N1	3.28	1.37	1.33
2	D	202	F42	C1'-N10	-3.22	1.44	1.48
2	B	202	F42	C4-N3	3.13	1.38	1.33
2	F	201	F42	C2-N1	-3.05	1.32	1.38
2	D	202	F42	C6-C7	3.04	1.43	1.36
2	B	201	F42	C10-N1	-2.71	1.29	1.33
2	C	201	F42	C5A-C9A	2.51	1.46	1.42
2	C	201	F42	P-O3P	2.49	1.64	1.54
2	C	201	F42	C4'-C3'	-2.47	1.48	1.53
2	C	201	F42	C2-N1	-2.40	1.33	1.38
2	F	201	F42	C5-C4A	-2.37	1.34	1.39
2	B	202	F42	C6-C5A	-2.33	1.36	1.41
2	A	201	F42	P-O3P	2.17	1.63	1.54
2	B	201	F42	C4'-C3'	-2.15	1.49	1.53
2	B	201	F42	P-O3P	2.11	1.63	1.54
2	F	201	F42	P-O3P	2.11	1.63	1.54
2	A	201	F42	C6-C7	2.03	1.40	1.36
2	B	201	F42	C9A-N10	2.02	1.41	1.38

All (72) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	202	F42	C4A-C4-N3	-13.24	115.17	124.40
2	A	201	F42	C2-N3-C4	11.20	124.60	115.14
2	B	201	F42	C4A-C4-N3	-11.18	116.61	124.40
2	C	201	F42	C2-N3-C4	10.94	124.38	115.14
2	C	201	F42	C4A-C4-N3	-10.51	117.07	124.40
2	D	202	F42	C2-N3-C4	10.22	123.77	115.14
2	F	201	F42	C2-N3-C4	9.77	123.39	115.14
2	F	201	F42	C4A-C4-N3	-9.75	117.60	124.40
2	A	201	F42	C4A-C4-N3	-9.48	117.80	124.40
2	B	201	F42	C1'-N10-C9A	7.69	124.34	118.29
2	C	201	F42	C1'-N10-C9A	7.54	124.23	118.29
2	A	201	F42	C1'-N10-C9A	7.02	123.82	118.29

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	201	F42	C2-N3-C4	6.88	120.95	115.14
2	B	202	F42	C4A-C4-N3	-5.57	120.52	124.40
2	C	201	F42	C1'-N10-C10	-5.46	113.52	118.41
2	A	201	F42	C10-C4A-C4	-5.23	114.34	119.99
2	F	201	F42	O3'-C3'-C4'	-5.03	96.66	108.81
2	D	202	F42	C1'-N10-C9A	4.88	122.14	118.29
2	B	202	F42	C2-N3-C4	4.85	119.23	115.14
2	F	201	F42	C1'-N10-C9A	4.38	121.74	118.29
2	C	201	F42	C10-C4A-C4	-4.27	115.38	119.99
2	A	201	F42	C5-C4A-C10	4.24	122.41	117.11
2	B	202	F42	C1'-N10-C9A	4.22	121.61	118.29
2	F	201	F42	C10-C4A-C4	-3.83	115.86	119.99
2	D	202	F42	C1'-N10-C10	-3.68	115.12	118.41
2	B	202	F42	O3P-P-O2P	3.57	121.27	107.64
2	B	202	F42	O3'-C3'-C4'	-3.40	100.59	108.81
2	A	201	F42	O3P-P-O5'	-3.37	97.78	106.73
2	C	201	F42	C5'-C4'-C3'	-3.25	105.92	112.20
2	D	202	F42	O3I-C3I-N1H	3.21	128.87	122.93
2	B	201	F42	C5A-C9A-N10	3.19	121.83	118.71
2	D	202	F42	O3P-C1I-C3I	3.11	117.29	108.99
2	A	201	F42	O4'-C4'-C5'	-3.04	103.09	109.92
2	B	202	F42	C10-C4A-C4	-3.02	116.73	119.99
2	A	201	F42	C4A-C5-C5A	-2.92	117.94	122.27
2	B	201	F42	C5-C4A-C10	2.89	120.72	117.11
2	B	202	F42	C5-C5A-C9A	2.86	121.41	118.72
2	B	201	F42	O3'-C3'-C4'	-2.83	101.99	108.81
2	B	201	F42	C1'-N10-C10	-2.82	115.89	118.41
2	B	202	F42	C5-C4A-C10	2.76	120.56	117.11
2	F	201	F42	O2P-P-O1P	2.67	121.13	110.68
2	D	202	F42	O2W-C2G-C1G	-2.64	113.58	122.26
2	B	202	F42	C9A-N10-C10	-2.60	118.50	121.91
2	B	202	F42	O2'-C2'-C3'	2.59	115.40	109.10
2	B	201	F42	O2P-P-O5'	2.58	113.60	106.73
2	A	201	F42	C5A-C9A-N10	2.56	121.22	118.71
4	B	205	MRD	O2-C2-CM	-2.51	100.04	108.08
2	B	201	F42	O2P-P-O1P	2.46	120.31	110.68
2	D	202	F42	C6-C7-C8	-2.45	117.33	120.15
2	A	201	F42	C6-C7-C8	-2.43	117.35	120.15
2	B	202	F42	O2'-C2'-C1'	2.42	115.42	109.59
2	B	202	F42	C4A-C5-C5A	-2.41	118.69	122.27
2	A	201	F42	C9-C9A-C5A	-2.41	116.56	119.66
2	B	201	F42	C9-C9A-C5A	-2.41	116.56	119.66

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	202	F42	C8-C9-C9A	2.40	122.96	118.14
2	C	201	F42	O3P-P-O5'	-2.39	100.38	106.73
4	B	205	MRD	CM-C2-C1	2.36	115.49	110.57
2	C	201	F42	C5-C5A-C9A	2.35	120.93	118.72
2	F	201	F42	O2'-C2'-C1'	-2.31	104.02	109.59
2	D	202	F42	C9-C9A-C5A	-2.26	116.75	119.66
2	D	202	F42	C2I-C1I-C3I	2.25	116.67	111.11
2	B	201	F42	O5'-C5'-C4'	-2.21	103.47	109.36
2	C	201	F42	O2P-P-O1P	2.19	119.27	110.68
2	D	202	F42	O7G-C5G-C4G	-2.16	116.13	123.08
2	C	201	F42	C5-C4A-C10	2.13	119.77	117.11
2	D	202	F42	O2V-C2G-C1G	2.13	120.47	113.40
2	A	201	F42	C7-C8-C9	2.12	123.10	120.39
3	B	204	MPD	O4-C4-C5	2.10	118.46	109.38
2	F	201	F42	C8-C9-C9A	2.09	122.32	118.14
2	C	201	F42	O3P-P-O2P	2.07	115.54	107.64
2	B	201	F42	C10-C4A-C4	-2.04	117.79	119.99
2	A	201	F42	C9A-N10-C10	-2.02	119.27	121.91

There are no chirality outliers.

All (39) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	201	F42	C3'-C4'-C5'-O5'
2	B	201	F42	O4'-C4'-C5'-O5'
2	B	202	F42	C1'-C2'-C3'-O3'
2	B	202	F42	C1'-C2'-C3'-C4'
2	B	202	F42	O2'-C2'-C3'-O3'
2	B	202	F42	O2'-C2'-C3'-C4'
2	B	202	F42	C2'-C3'-C4'-O4'
2	B	202	F42	O3'-C3'-C4'-O4'
2	B	202	F42	O4'-C4'-C5'-O5'
2	B	202	F42	C5'-O5'-P-O2P
2	B	202	F42	C5'-O5'-P-O3P
2	D	202	F42	C5'-O5'-P-O2P
2	F	201	F42	C3'-C4'-C5'-O5'
2	F	201	F42	O4'-C4'-C5'-O5'
3	B	204	MPD	C2-C3-C4-C5
3	E	201	MPD	C2-C3-C4-O4
3	F	203	MPD	C2-C3-C4-O4
2	B	202	F42	O3'-C3'-C4'-C5'
2	B	202	F42	C2'-C3'-C4'-C5'

*Continued on next page...*

*Continued from previous page...*

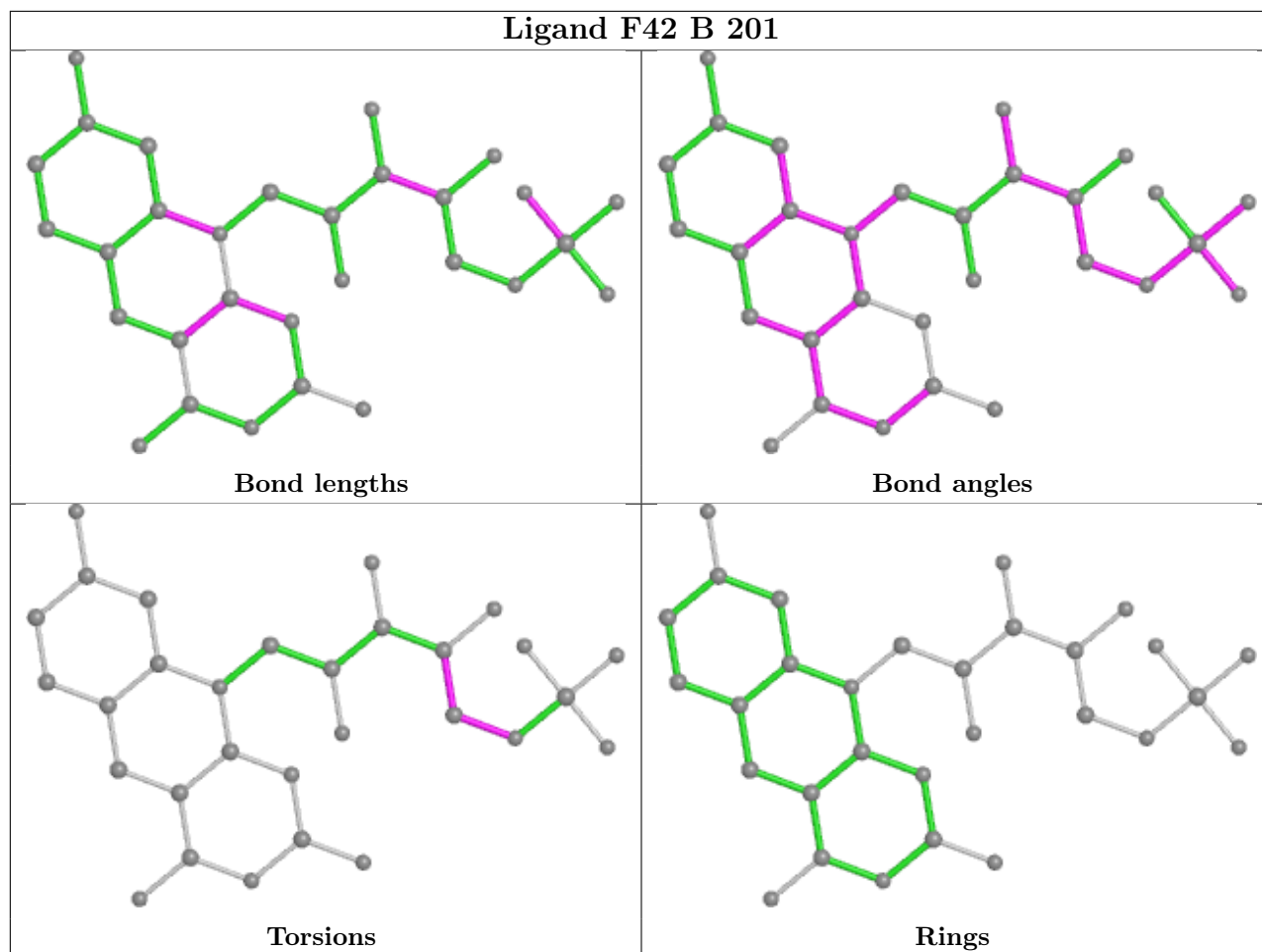
Mol	Chain	Res	Type	Atoms
2	D	202	F42	C5'-O5'-P-O3P
2	B	202	F42	C5'-O5'-P-O1P
2	A	201	F42	C2'-C3'-C4'-C5'
2	A	201	F42	C2'-C3'-C4'-O4'
3	F	203	MPD	C2-C3-C4-C5
2	B	201	F42	C4'-C5'-O5'-P
3	C	202	MPD	C1-C2-C3-C4
2	F	201	F42	C4'-C5'-O5'-P
2	D	202	F42	C3G-C4G-C5G-O6G
2	D	202	F42	N1H-C1H-C2H-O2T
2	D	202	F42	C3G-C4G-C5G-O7G
2	B	202	F42	C3'-C4'-C5'-O5'
2	D	202	F42	C1G-C3G-C4G-C5G
3	C	202	MPD	O2-C2-C3-C4
2	A	201	F42	C5'-O5'-P-O3P
2	A	201	F42	O4'-C4'-C5'-O5'
2	F	201	F42	O2'-C2'-C3'-C4'
3	C	202	MPD	C2-C3-C4-C5
3	B	204	MPD	C2-C3-C4-O4
2	D	202	F42	C2I-C1I-C3I-O3I

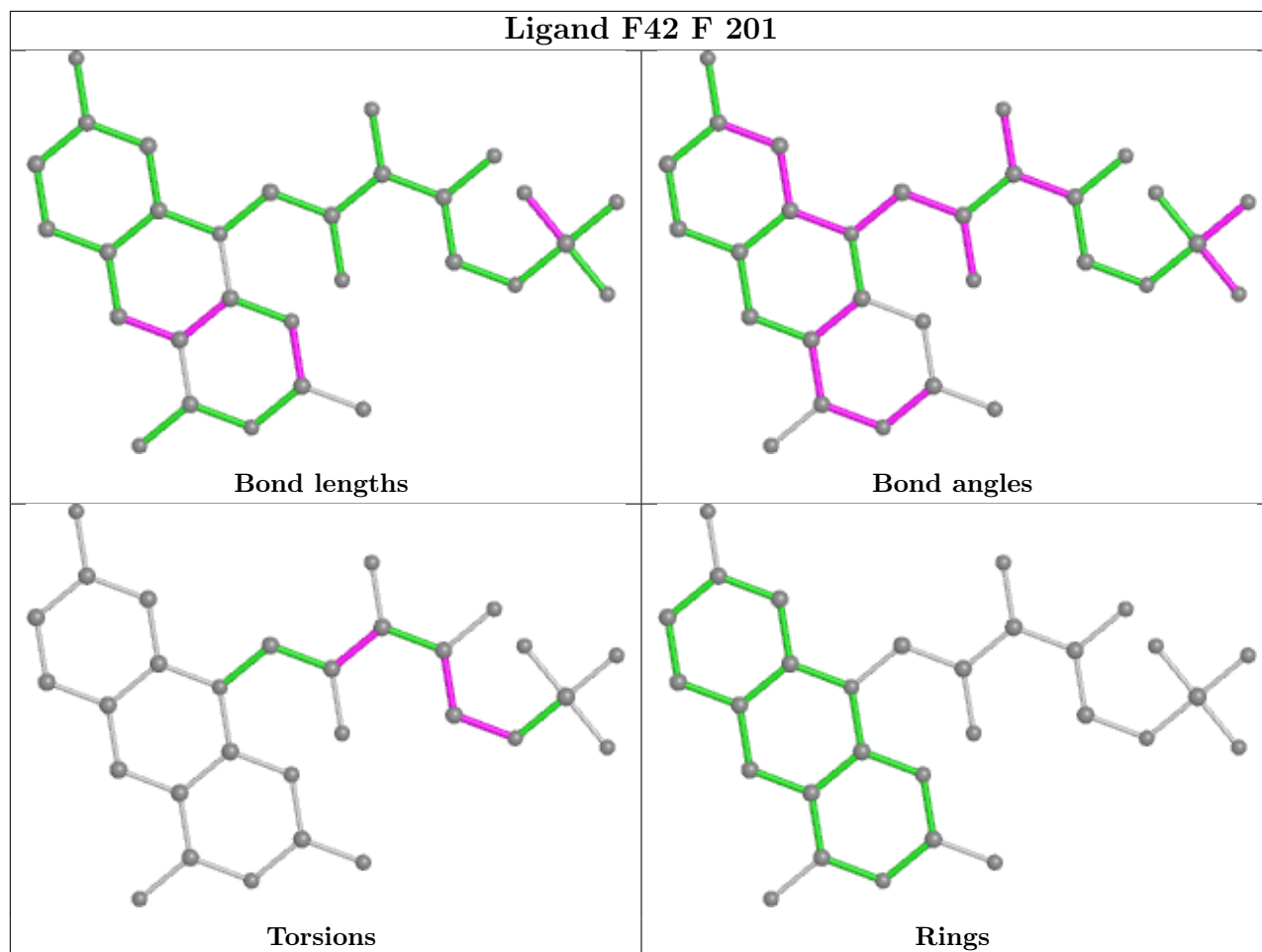
There are no ring outliers.

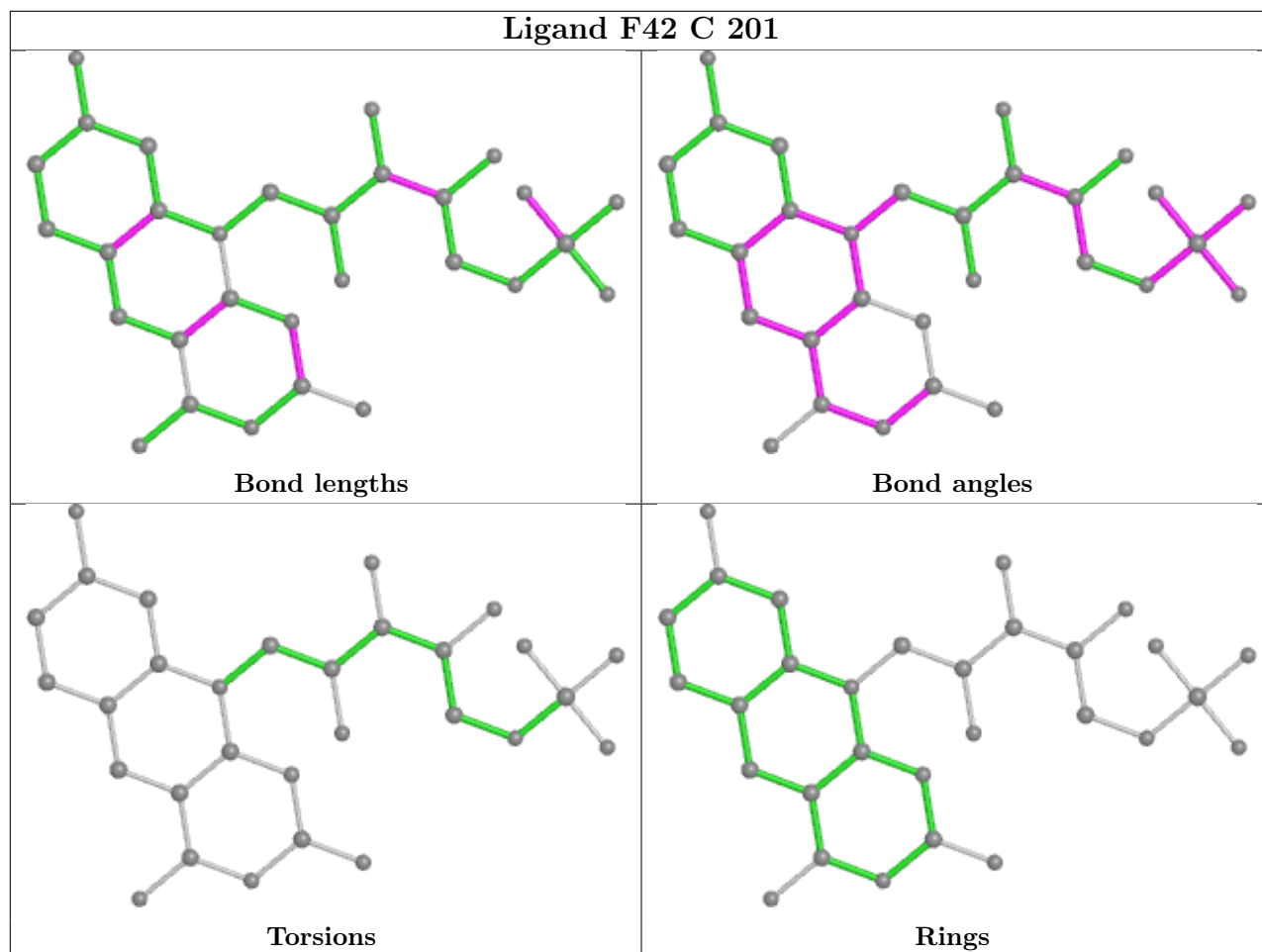
1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	202	MPD	2	0

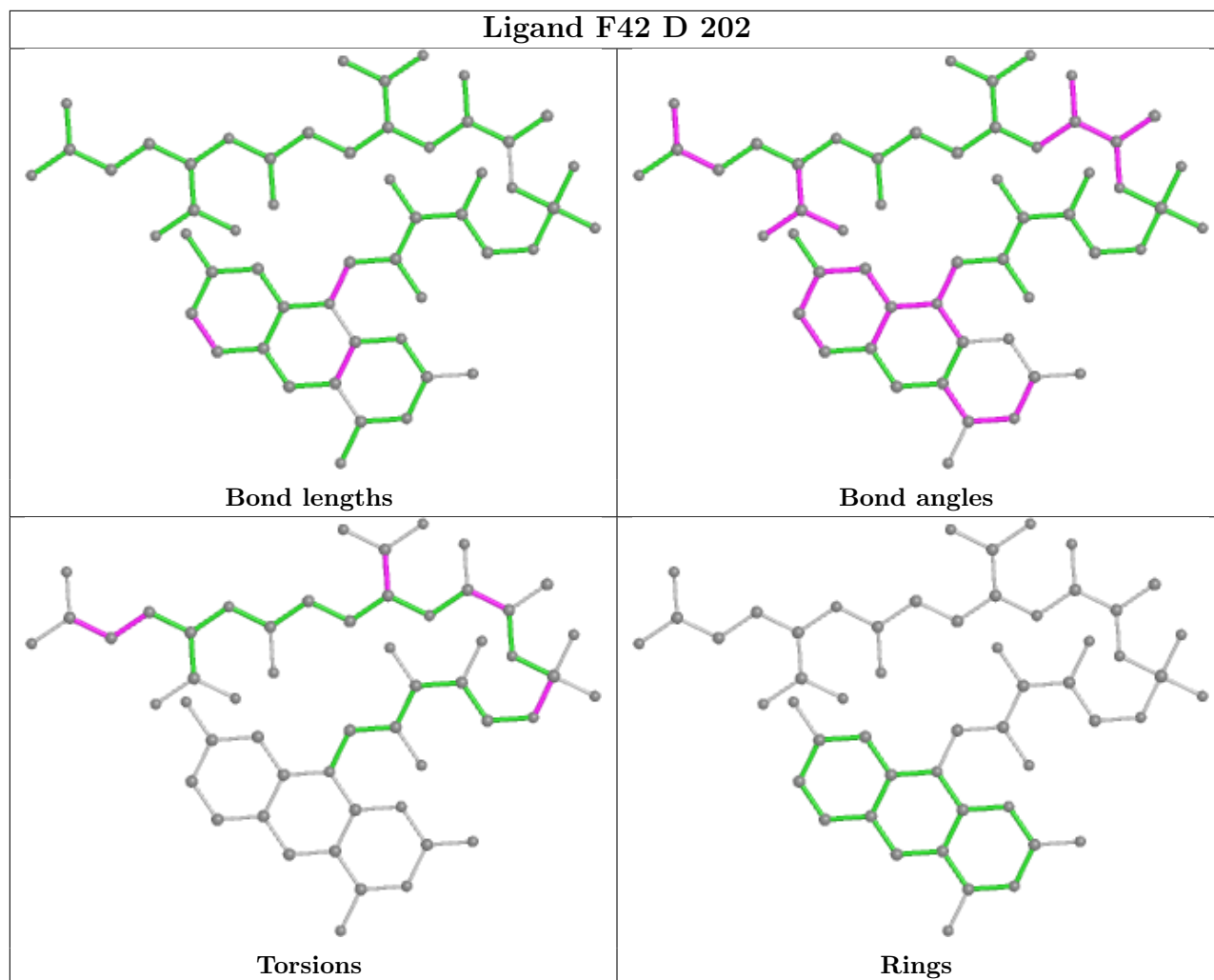
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

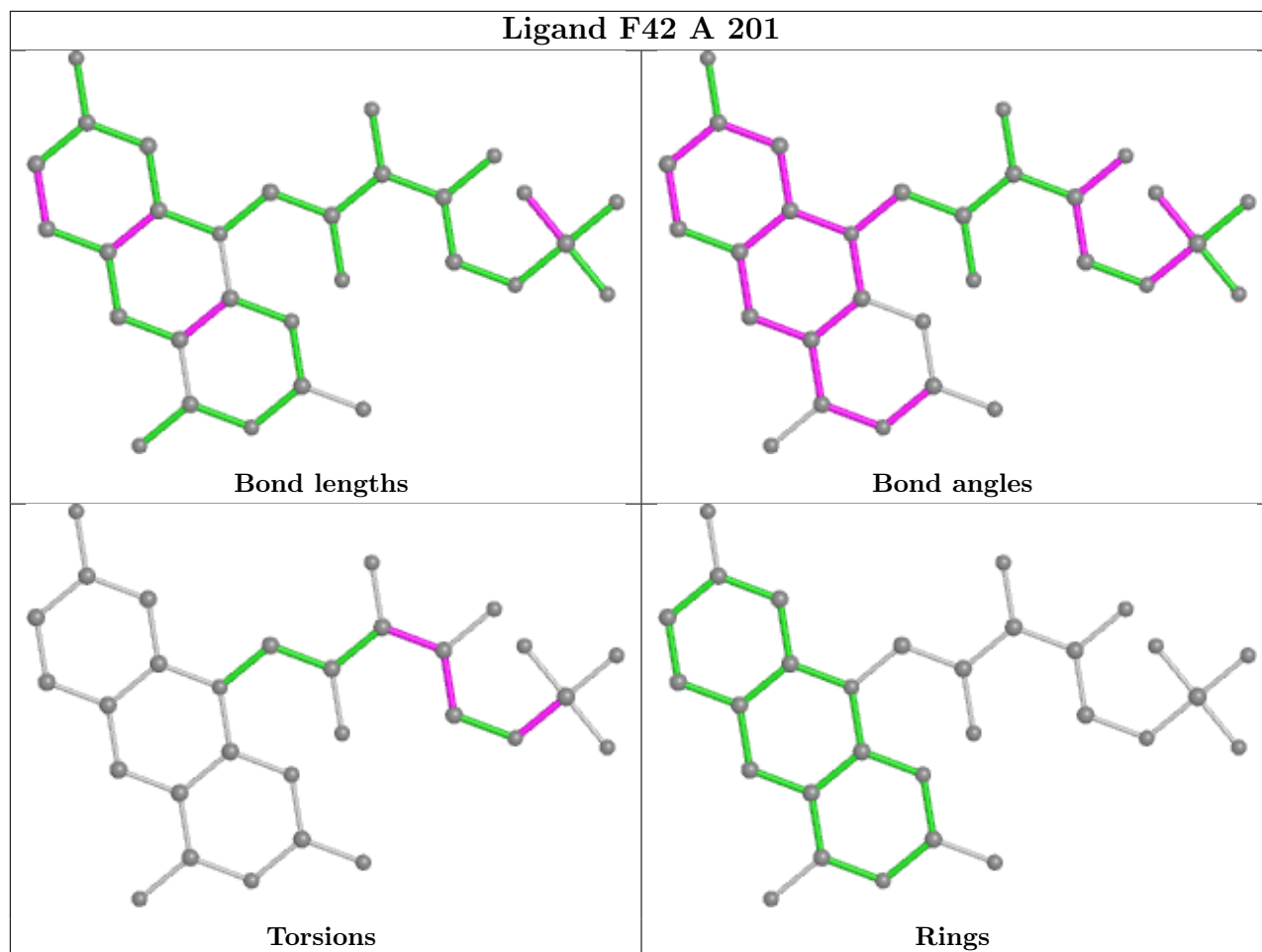


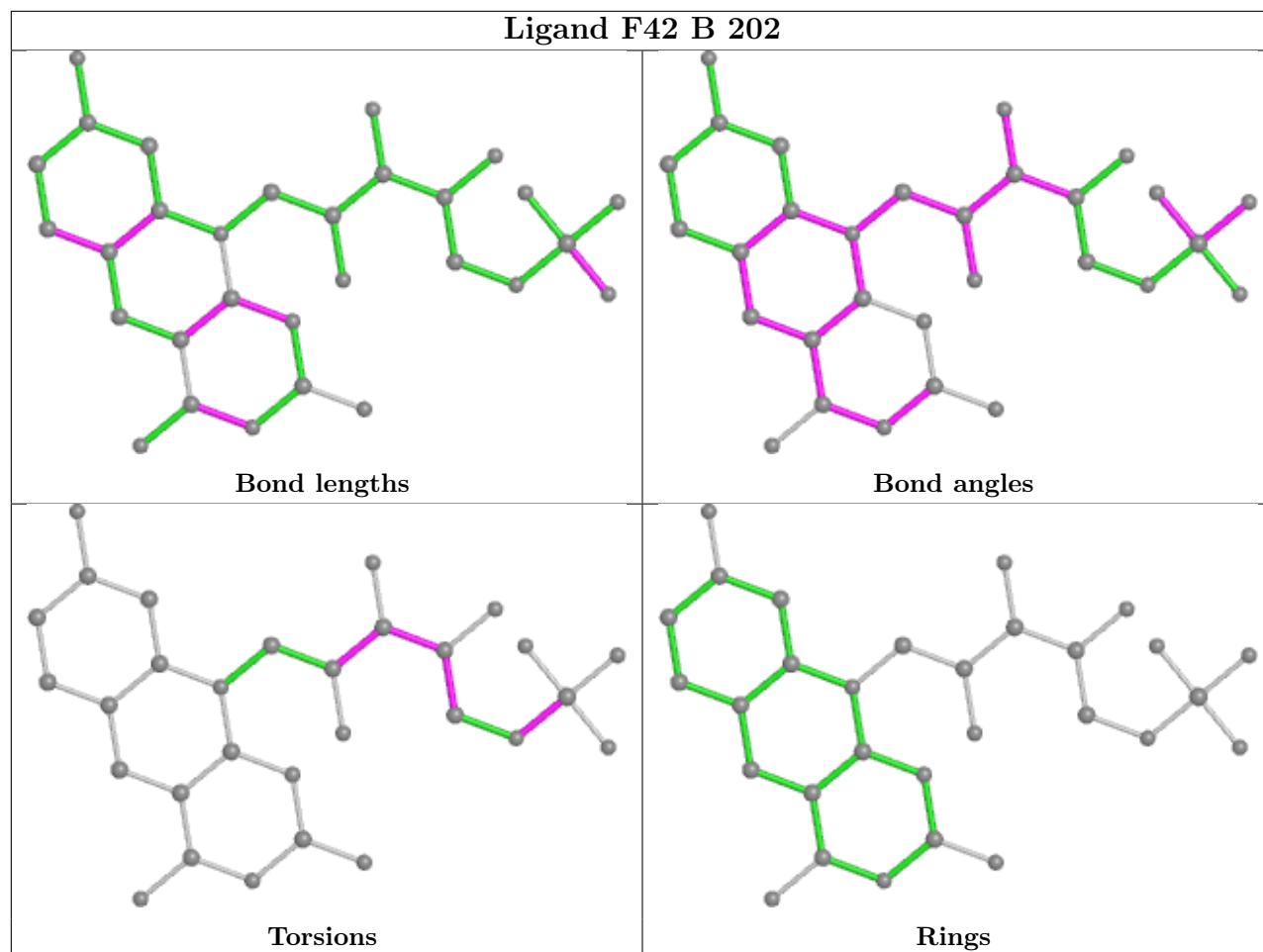












## 5.7 Other polymers [i](#)

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

### 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, 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	129/154 (83%)	0.04	8 (6%) 20 23	10, 17, 45, 58	0
1	B	139/154 (90%)	0.08	3 (2%) 62 66	11, 18, 36, 61	0
1	C	129/154 (83%)	-0.11	5 (3%) 39 44	12, 19, 38, 60	0
1	D	138/154 (89%)	-0.29	1 (0%) 87 90	10, 17, 31, 45	0
1	E	125/154 (81%)	0.09	6 (4%) 30 34	10, 19, 53, 92	0
1	F	128/154 (83%)	-0.14	1 (0%) 86 88	11, 19, 37, 59	0
All	All	788/924 (85%)	-0.06	24 (3%) 50 54	10, 18, 40, 92	0

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	70	ARG	7.3
1	E	69	ASP	7.1
1	E	40	HIS	5.8
1	B	4	PHE	4.6
1	A	69	ASP	4.6
1	A	70	ARG	4.4
1	A	54	ALA	4.2
1	B	40	HIS	4.0
1	C	54	ALA	3.9
1	A	43	GLY	3.5
1	F	66	ALA	2.9
1	A	68	ILE	2.9
1	C	40	HIS	2.9
1	E	38	VAL	2.7
1	E	42	GLU	2.6
1	A	126	ASP	2.6
1	E	68	ILE	2.6
1	A	40	HIS	2.6
1	A	124	SER	2.5

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	C	64	ARG	2.4
1	C	66	ALA	2.2
1	C	118	HIS	2.2
1	D	40	HIS	2.1
1	B	61	ASN	2.1

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

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

## 6.3 Carbohydrates [\(i\)](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [\(i\)](#)

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

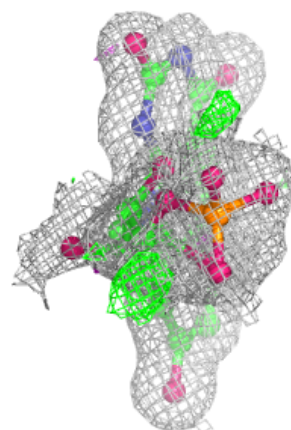
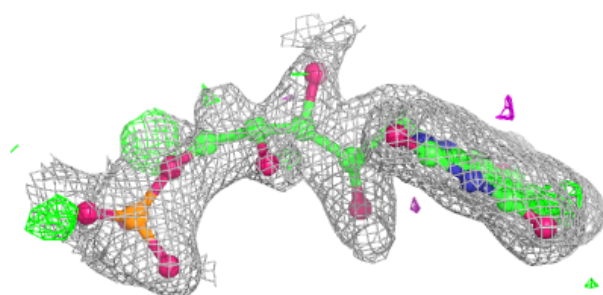
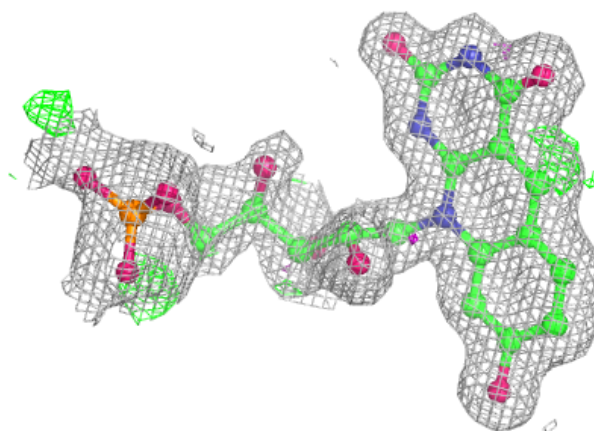
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	MPD	B	204	8/8	0.86	0.15	30,32,35,37	0
3	MPD	A	202	8/8	0.89	0.14	32,35,39,40	0
3	MPD	E	201	8/8	0.90	0.23	52,54,56,58	0
4	MRD	C	203	8/8	0.90	0.15	31,33,36,37	0
3	MPD	F	203	8/8	0.91	0.14	32,39,42,42	0
4	MRD	B	205	8/8	0.91	0.12	24,26,29,32	0
2	F42	B	202	30/53	0.91	0.12	15,20,61,64	0
3	MPD	B	203	8/8	0.92	0.12	23,25,29,30	0
2	F42	B	201	30/53	0.92	0.10	12,15,49,56	0
2	F42	C	201	30/53	0.93	0.10	15,18,54,57	0
3	MPD	F	202	8/8	0.94	0.12	32,34,36,37	0
2	F42	F	201	30/53	0.94	0.10	13,18,78,81	0
2	F42	A	201	30/53	0.95	0.08	14,18,54,60	0
3	MPD	C	202	8/8	0.96	0.09	21,23,24,24	8
2	F42	D	202	53/53	0.97	0.09	10,13,39,60	0
5	NA	D	201	1/1	0.97	0.27	5,5,5,5	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.

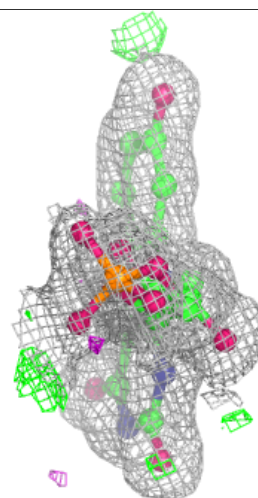
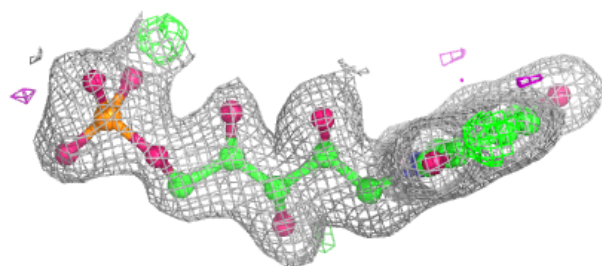
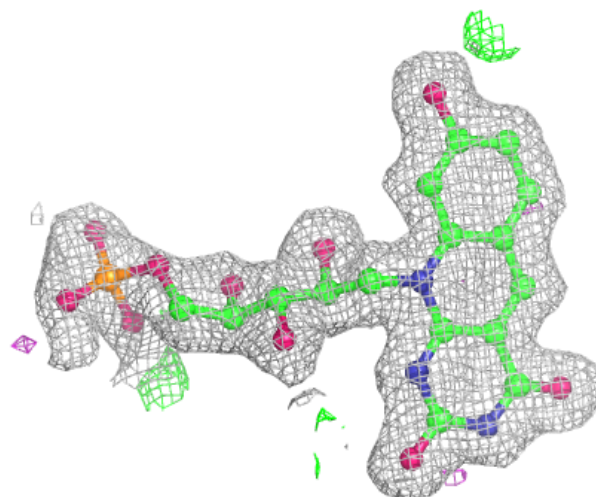
**Electron density around F42 B 202:**

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



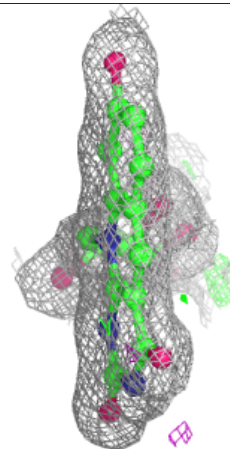
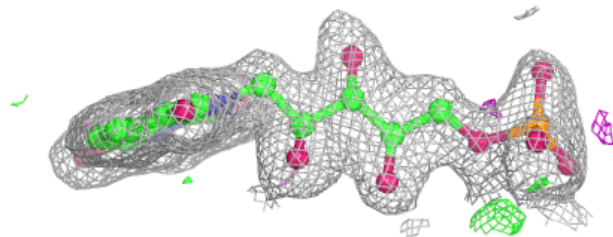
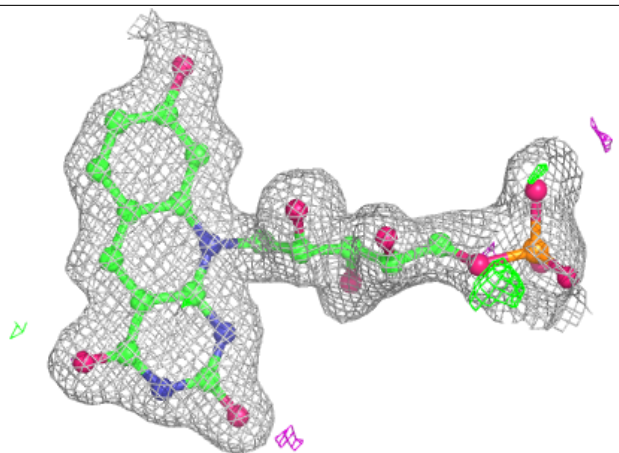
**Electron density around F42 B 201:**

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



**Electron density around F42 C 201:**

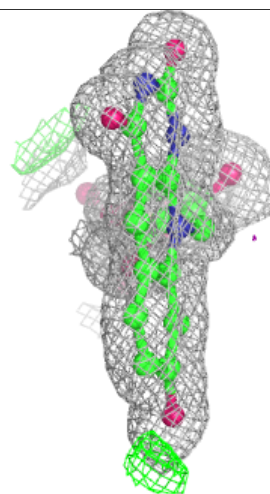
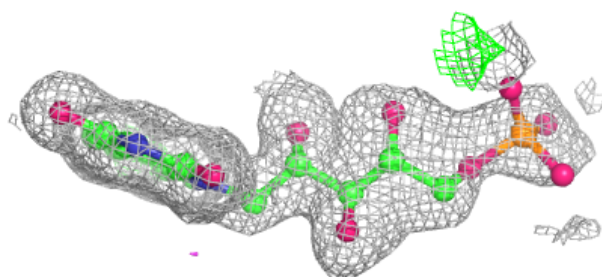
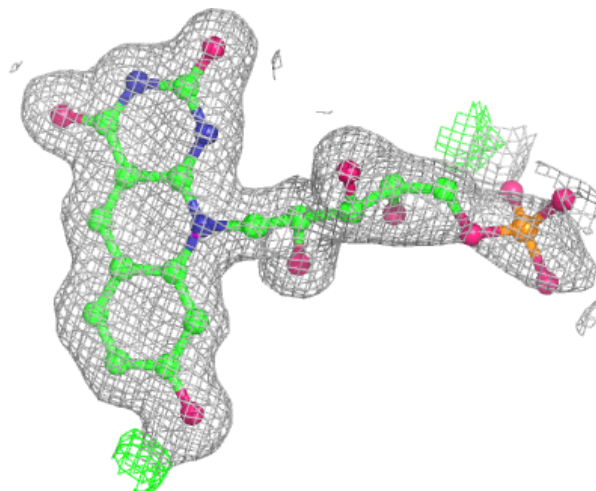
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)





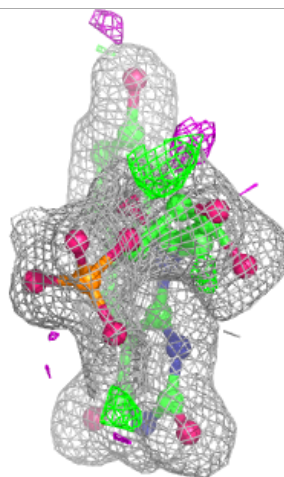
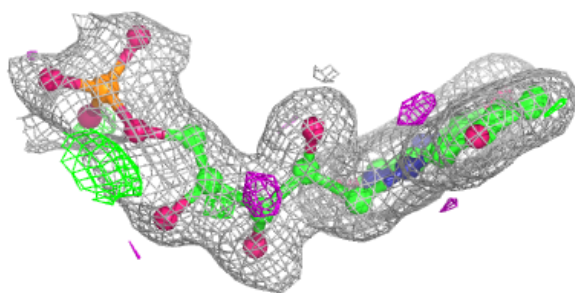
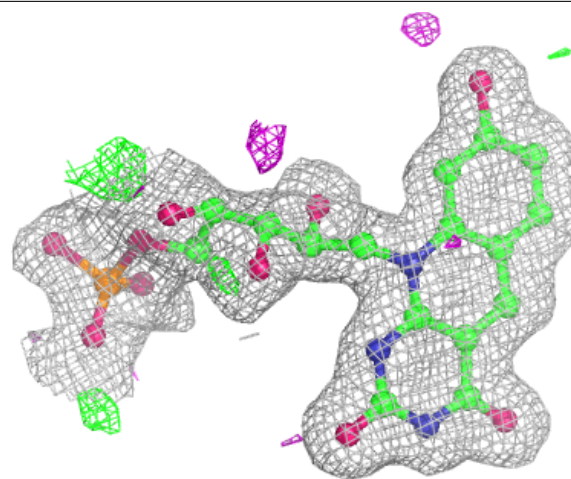
**Electron density around F42 F 201:**

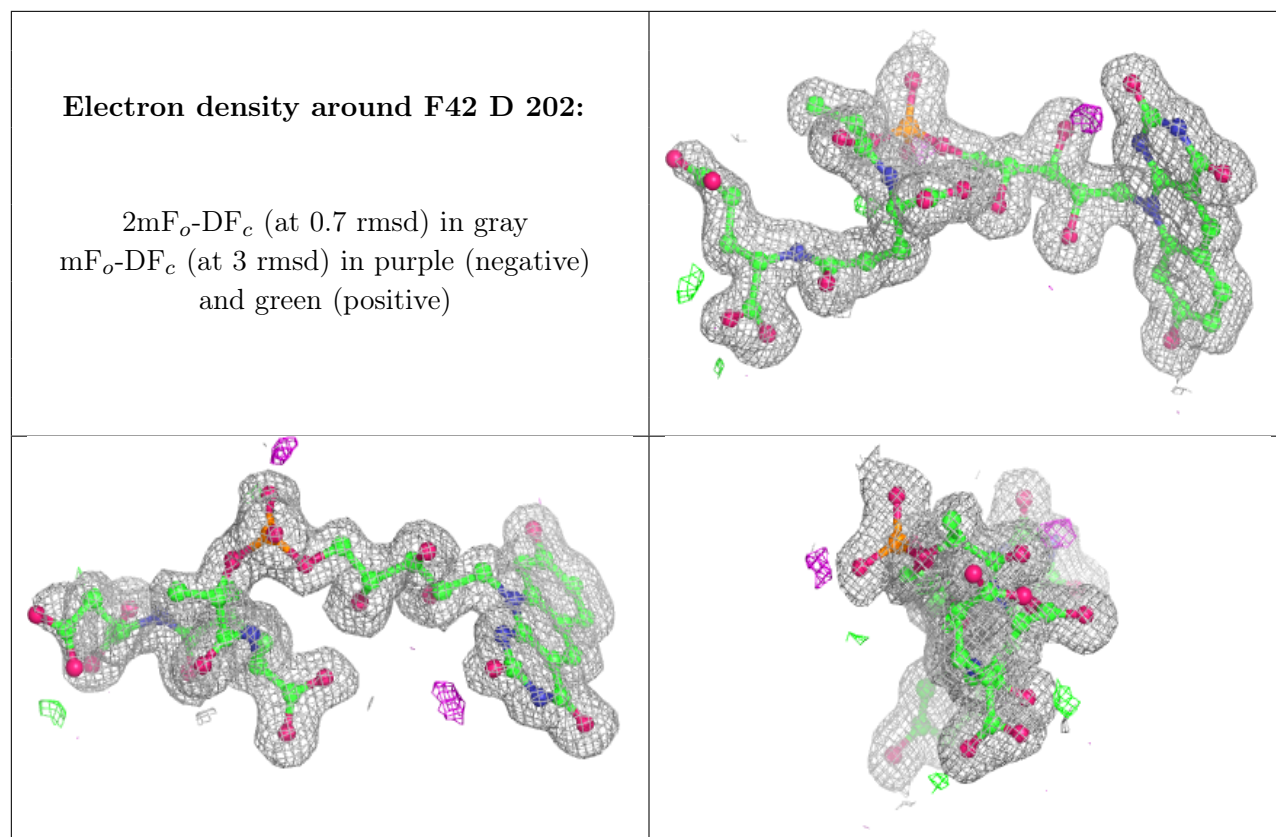
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



**Electron density around F42 A 201:**

$2mF_o-DF_c$  (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.