



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 03:08 PM UTC

PDB ID : 4XZ2 / pdb_00004xz2
Title : Human platelet phosphofructokinase in an R-state in complex with ADP and F6P, crystal form I
Authors : Kloos, M.; Strater, N.
Deposited on : 2015-02-03
Resolution : 2.67 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

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 : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

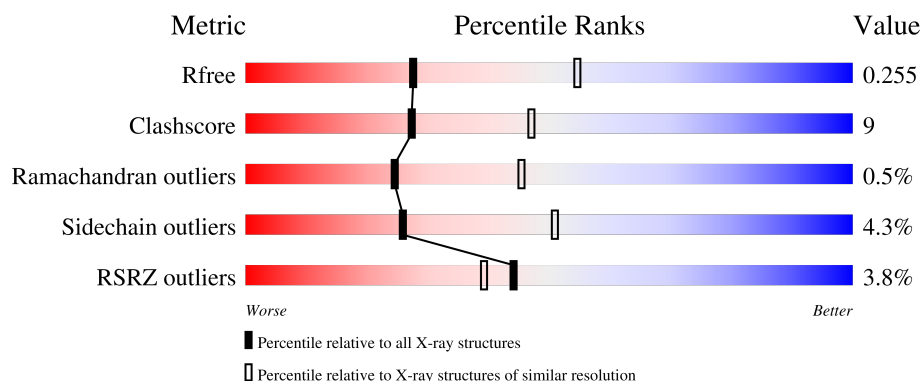
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.67 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}	180053	5070 (2.70-2.66)
Clashscore	190562	5409 (2.70-2.66)
Ramachandran outliers	187476	5324 (2.70-2.66)
Sidechain outliers	187428	5324 (2.70-2.66)
RSRZ outliers	180081	5070 (2.70-2.66)

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 $\leq 5\%$. 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	761	 4% 77% 15% • 7%
1	B	761	 4% 79% 15% • •
1	C	761	 3% 76% 15% • 7%
1	D	761	 4% 76% 17% • 5%

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 criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	PO4	C	802	-	-	X	-
5	F6P	B	803	-	-	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 22132 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 ATP-dependent 6-phosphofructokinase, platelet type.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	708	Total	C	N	O	S	0	0	0
			5426	3410	961	1018	37			
1	B	728	Total	C	N	O	S	0	0	0
			5568	3496	986	1048	38			
1	C	704	Total	C	N	O	S	0	0	0
			5396	3389	957	1013	37			
1	D	725	Total	C	N	O	S	0	0	0
			5546	3481	983	1044	38			

There are 96 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	2	MET	-	initiating methionine	UNP Q01813
A	3	ALA	-	expression tag	UNP Q01813
A	4	SER	-	expression tag	UNP Q01813
A	5	TRP	-	expression tag	UNP Q01813
A	6	SER	-	expression tag	UNP Q01813
A	7	HIS	-	expression tag	UNP Q01813
A	8	PRO	-	expression tag	UNP Q01813
A	9	GLN	-	expression tag	UNP Q01813
A	10	PHE	-	expression tag	UNP Q01813
A	11	GLU	-	expression tag	UNP Q01813
A	12	LYS	-	expression tag	UNP Q01813
A	13	GLY	-	expression tag	UNP Q01813
A	14	ALA	-	expression tag	UNP Q01813
A	15	ASP	-	expression tag	UNP Q01813
A	16	ASP	-	expression tag	UNP Q01813
A	17	ASP	-	expression tag	UNP Q01813
A	18	ASP	-	expression tag	UNP Q01813
A	19	LYS	-	expression tag	UNP Q01813
A	20	VAL	-	expression tag	UNP Q01813
A	21	PRO	-	expression tag	UNP Q01813
A	22	ASP	-	expression tag	UNP Q01813

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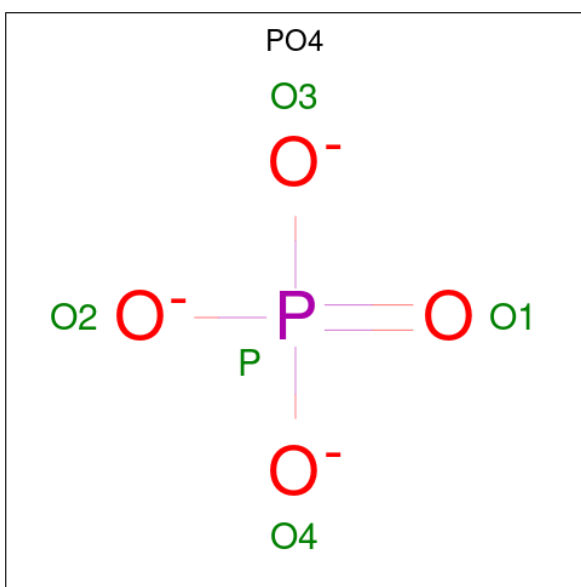
Chain	Residue	Modelled	Actual	Comment	Reference
A	23	PRO	-	expression tag	UNP Q01813
A	24	THR	-	expression tag	UNP Q01813
A	25	SER	-	expression tag	UNP Q01813
B	2	MET	-	initiating methionine	UNP Q01813
B	3	ALA	-	expression tag	UNP Q01813
B	4	SER	-	expression tag	UNP Q01813
B	5	TRP	-	expression tag	UNP Q01813
B	6	SER	-	expression tag	UNP Q01813
B	7	HIS	-	expression tag	UNP Q01813
B	8	PRO	-	expression tag	UNP Q01813
B	9	GLN	-	expression tag	UNP Q01813
B	10	PHE	-	expression tag	UNP Q01813
B	11	GLU	-	expression tag	UNP Q01813
B	12	LYS	-	expression tag	UNP Q01813
B	13	GLY	-	expression tag	UNP Q01813
B	14	ALA	-	expression tag	UNP Q01813
B	15	ASP	-	expression tag	UNP Q01813
B	16	ASP	-	expression tag	UNP Q01813
B	17	ASP	-	expression tag	UNP Q01813
B	18	ASP	-	expression tag	UNP Q01813
B	19	LYS	-	expression tag	UNP Q01813
B	20	VAL	-	expression tag	UNP Q01813
B	21	PRO	-	expression tag	UNP Q01813
B	22	ASP	-	expression tag	UNP Q01813
B	23	PRO	-	expression tag	UNP Q01813
B	24	THR	-	expression tag	UNP Q01813
B	25	SER	-	expression tag	UNP Q01813
C	2	MET	-	initiating methionine	UNP Q01813
C	3	ALA	-	expression tag	UNP Q01813
C	4	SER	-	expression tag	UNP Q01813
C	5	TRP	-	expression tag	UNP Q01813
C	6	SER	-	expression tag	UNP Q01813
C	7	HIS	-	expression tag	UNP Q01813
C	8	PRO	-	expression tag	UNP Q01813
C	9	GLN	-	expression tag	UNP Q01813
C	10	PHE	-	expression tag	UNP Q01813
C	11	GLU	-	expression tag	UNP Q01813
C	12	LYS	-	expression tag	UNP Q01813
C	13	GLY	-	expression tag	UNP Q01813
C	14	ALA	-	expression tag	UNP Q01813
C	15	ASP	-	expression tag	UNP Q01813
C	16	ASP	-	expression tag	UNP Q01813

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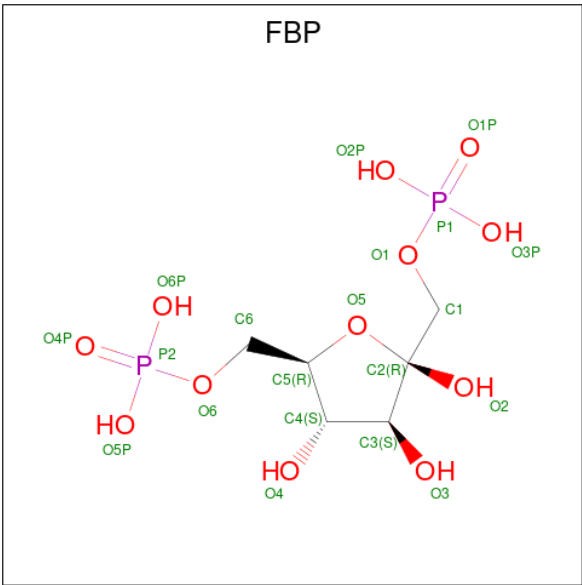
Chain	Residue	Modelled	Actual	Comment	Reference
C	17	ASP	-	expression tag	UNP Q01813
C	18	ASP	-	expression tag	UNP Q01813
C	19	LYS	-	expression tag	UNP Q01813
C	20	VAL	-	expression tag	UNP Q01813
C	21	PRO	-	expression tag	UNP Q01813
C	22	ASP	-	expression tag	UNP Q01813
C	23	PRO	-	expression tag	UNP Q01813
C	24	THR	-	expression tag	UNP Q01813
C	25	SER	-	expression tag	UNP Q01813
D	2	MET	-	initiating methionine	UNP Q01813
D	3	ALA	-	expression tag	UNP Q01813
D	4	SER	-	expression tag	UNP Q01813
D	5	TRP	-	expression tag	UNP Q01813
D	6	SER	-	expression tag	UNP Q01813
D	7	HIS	-	expression tag	UNP Q01813
D	8	PRO	-	expression tag	UNP Q01813
D	9	GLN	-	expression tag	UNP Q01813
D	10	PHE	-	expression tag	UNP Q01813
D	11	GLU	-	expression tag	UNP Q01813
D	12	LYS	-	expression tag	UNP Q01813
D	13	GLY	-	expression tag	UNP Q01813
D	14	ALA	-	expression tag	UNP Q01813
D	15	ASP	-	expression tag	UNP Q01813
D	16	ASP	-	expression tag	UNP Q01813
D	17	ASP	-	expression tag	UNP Q01813
D	18	ASP	-	expression tag	UNP Q01813
D	19	LYS	-	expression tag	UNP Q01813
D	20	VAL	-	expression tag	UNP Q01813
D	21	PRO	-	expression tag	UNP Q01813
D	22	ASP	-	expression tag	UNP Q01813
D	23	PRO	-	expression tag	UNP Q01813
D	24	THR	-	expression tag	UNP Q01813
D	25	SER	-	expression tag	UNP Q01813

- Molecule 2 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).



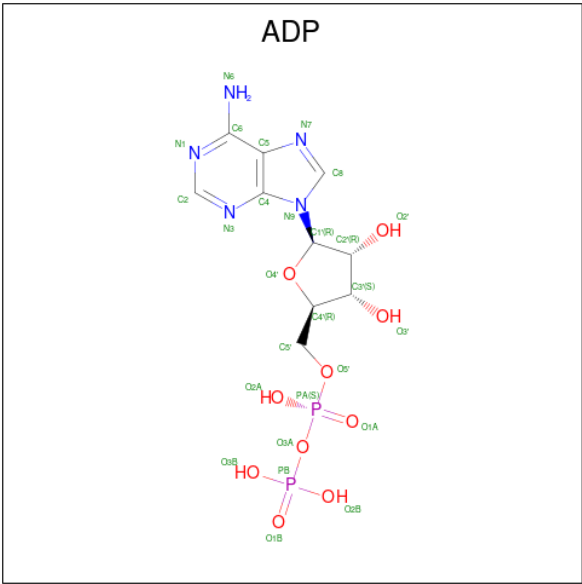
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	P	0	0
			5	4	1		
2	B	1	Total	O	P	0	0
			5	4	1		
2	B	1	Total	O	P	0	0
			5	4	1		
2	C	1	Total	O	P	0	0
			5	4	1		
2	D	1	Total	O	P	0	0
			5	4	1		
2	D	1	Total	O	P	0	0
			5	4	1		

- Molecule 3 is 1,6-di-O-phosphono-beta-D-fructofuranose (CCD ID: FBP) (formula: $C_6H_{14}O_{12}P_2$).



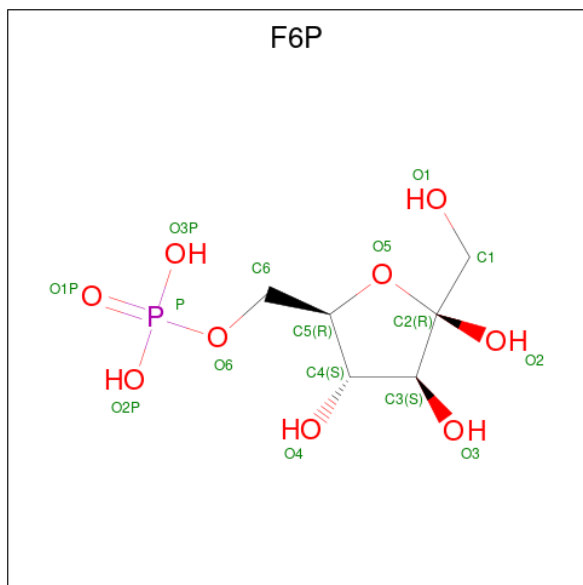
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	O	P	0	0
			20	6	12	2		
3	B	1	Total	C	O	P	0	0
			20	6	12	2		
3	C	1	Total	C	O	P	0	0
			20	6	12	2		
3	D	1	Total	C	O	P	0	0
			20	6	12	2		

- Molecule 4 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: C₁₀H₁₅N₅O₁₀P₂).

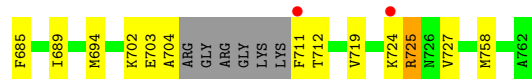


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	B	1	Total	C	N	O	P	0	0
			27	10	5	10	2		
4	D	1	Total	C	N	O	P	0	0
			27	10	5	10	2		

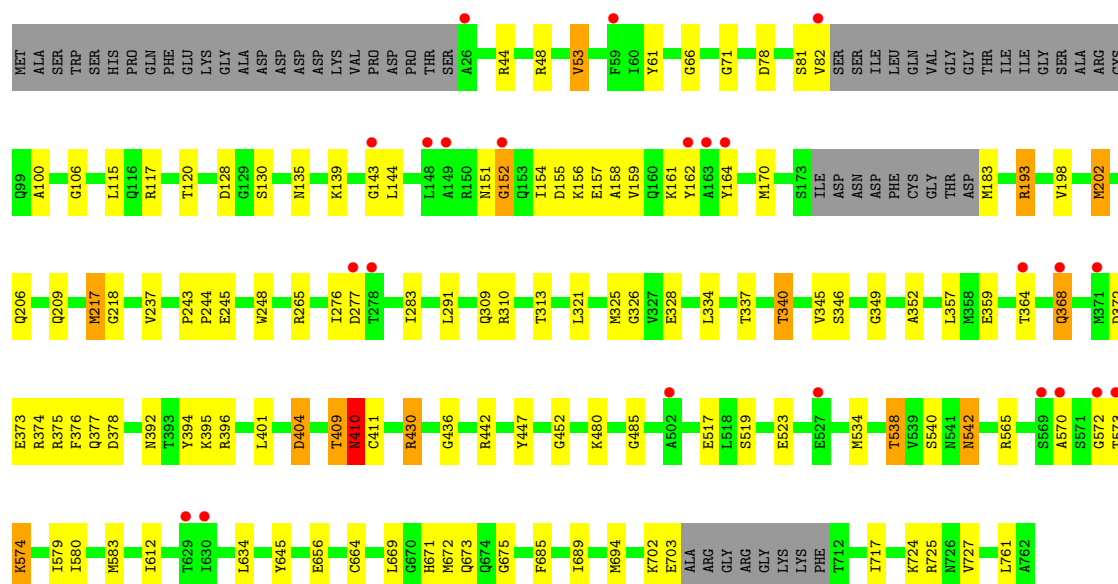
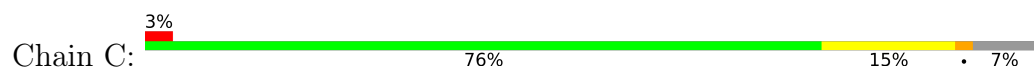
- Molecule 5 is 6-O-phosphono-beta-D-fructofuranose (CCD ID: F6P) (formula: C₆H₁₃O₉P).



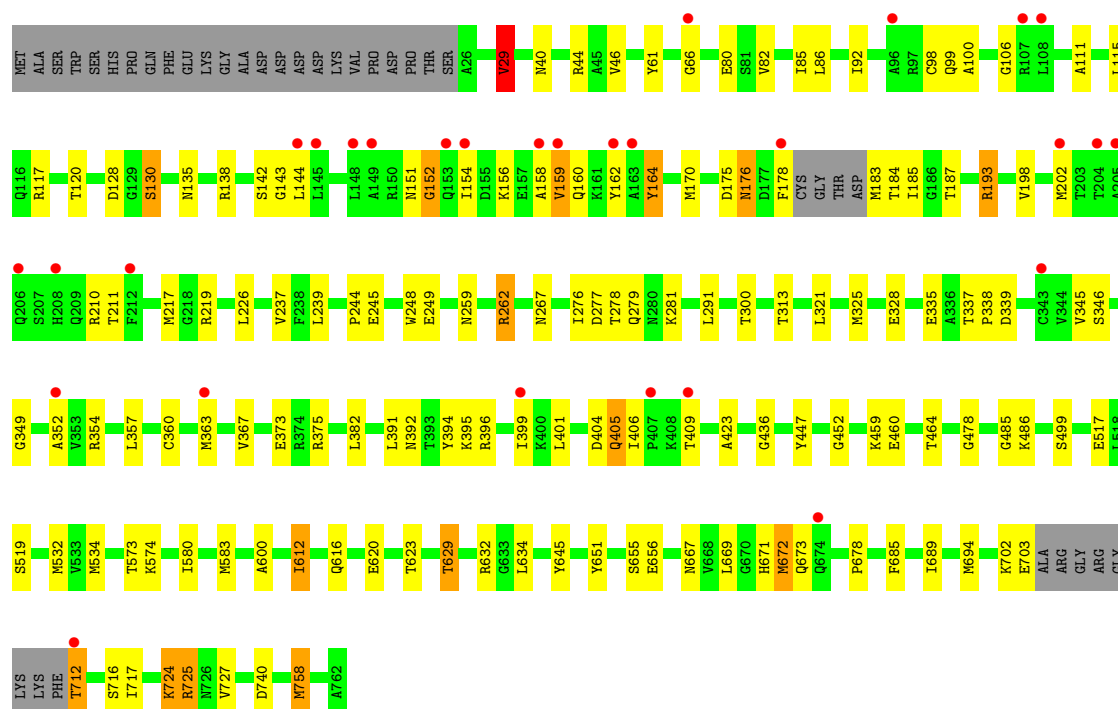
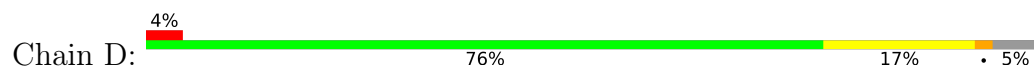
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	B	1	Total	C	O	P	0	0
			16	6	9	1		
5	D	1	Total	C	O	P	0	0
			16	6	9	1		



- Molecule 1: ATP-dependent 6-phosphofructokinase, platelet type



- Molecule 1: ATP-dependent 6-phosphofructokinase, platelet type



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	76.65Å 164.52Å 133.20Å 90.00° 102.96° 90.00°	Depositor
Resolution (Å)	46.03 – 2.67 46.03 – 2.67	Depositor EDS
% Data completeness (in resolution range)	99.1 (46.03-2.67) 99.1 (46.03-2.67)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.82 (at 2.69Å)	Xtriage
Refinement program	REFMAC 5.8.0073	Depositor
R, R_{free}	0.216 , 0.255 0.219 , 0.255	Depositor DCC
R_{free} test set	4500 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	52.4	Xtriage
Anisotropy	0.297	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 46.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	22132	wwPDB-VP
Average B, all atoms (Å ²)	63.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.99% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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: F6P, PO4, ADP, FBP

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	0.83	0/5513	0.95	3/7444 (0.0%)
1	B	0.81	0/5657	0.95	6/7640 (0.1%)
1	C	0.76	0/5482	0.94	5/7402 (0.1%)
1	D	0.75	0/5634	0.95	10/7609 (0.1%)
All	All	0.79	0/22286	0.95	24/30095 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	1

There are no bond length outliers.

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	409	THR	N-CA-C	-11.36	95.53	110.53
1	D	406	ILE	CA-C-N	9.54	129.16	119.24
1	D	406	ILE	C-N-CA	9.54	129.16	119.24
1	B	409	THR	N-CA-C	-9.46	98.78	110.41
1	C	375	ARG	N-CA-C	-7.92	99.67	110.68

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	143	GLY	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	5426	0	5453	104	1
1	B	5568	0	5595	107	0
1	C	5396	0	5426	95	1
1	D	5546	0	5576	120	0
2	A	5	0	0	0	0
2	B	10	0	0	2	0
2	C	5	0	0	2	0
2	D	10	0	0	1	0
3	A	20	0	10	1	0
3	B	20	0	10	0	0
3	C	20	0	10	1	0
3	D	20	0	10	3	0
4	B	27	0	12	6	0
4	D	27	0	12	3	0
5	B	16	0	11	9	0
5	D	16	0	11	5	0
All	All	22132	0	22136	404	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 9.

The worst 5 of 404 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:575:ARG:NH1	1:A:631:GLN:NE2	1.62	1.45
1:D:111:ALA:O	1:D:115:LEU:HD12	1.54	1.06
1:A:529:CYS:O	1:A:711:PHE:N	1.88	1.06
1:B:373:GLU:HB3	1:B:375:ARG:HG3	1.34	1.05
1:B:534:MET:HE3	1:B:719:VAL:HG22	1.38	1.04

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:372:ASP:OD2	1:C:139:LYS:NZ[1_554]	2.17	0.03

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	700/761 (92%)	686 (98%)	11 (2%)	3 (0%)	30 51
1	B	722/761 (95%)	698 (97%)	20 (3%)	4 (1%)	21 41
1	C	696/761 (92%)	682 (98%)	11 (2%)	3 (0%)	30 51
1	D	719/761 (94%)	695 (97%)	20 (3%)	4 (1%)	21 41
All	All	2837/3044 (93%)	2761 (97%)	62 (2%)	14 (0%)	24 45

5 of 14 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	152	GLY
1	A	152	GLY
1	B	152	GLY
1	C	574	LYS
1	D	152	GLY

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	571/614 (93%)	549 (96%)	22 (4%)	28 54

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	587/614 (96%)	567 (97%)	20 (3%)	32	59
1	C	568/614 (92%)	542 (95%)	26 (5%)	24	48
1	D	585/614 (95%)	554 (95%)	31 (5%)	20	43
All	All	2311/2456 (94%)	2212 (96%)	99 (4%)	26	51

5 of 99 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	378	ASP
1	D	117	ARG
1	C	401	LEU
1	C	534	MET
1	D	159	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 72 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	176	ASN
1	D	738	GLN
1	D	259	ASN
1	D	501	ASN
1	B	267	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 oligosaccharides in this entry.

5.6 Ligand geometry

14 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	PO4	B	805	-	4,4,4	1.17	0	6,6,6	0.79	0
2	PO4	D	804	-	4,4,4	0.86	0	6,6,6	0.89	0
2	PO4	C	802	-	4,4,4	1.40	0	6,6,6	0.72	0
3	FBP	B	802	-	18,20,20	1.19	1 (5%)	21,32,32	1.11	1 (4%)
3	FBP	A	802	-	18,20,20	1.30	1 (5%)	21,32,32	1.56	1 (4%)
5	F6P	B	803	-	15,16,16	0.78	1 (6%)	16,25,25	1.36	1 (6%)
4	ADP	D	801	-	28,29,29	1.41	4 (14%)	43,45,45	2.02	13 (30%)
2	PO4	D	805	-	4,4,4	0.99	0	6,6,6	0.69	0
3	FBP	C	801	-	18,20,20	1.12	1 (5%)	21,32,32	1.42	2 (9%)
2	PO4	A	801	-	4,4,4	1.16	0	6,6,6	0.79	0
4	ADP	B	801	-	28,29,29	1.64	5 (17%)	43,45,45	2.07	12 (27%)
2	PO4	B	804	-	4,4,4	1.22	0	6,6,6	0.71	0
5	F6P	D	803	-	15,16,16	0.81	1 (6%)	16,25,25	1.18	1 (6%)
3	FBP	D	802	-	18,20,20	0.97	1 (5%)	21,32,32	0.97	1 (4%)

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
3	FBP	B	802	-	-	6/13/32/32	0/1/1/1
3	FBP	A	802	-	-	5/13/32/32	0/1/1/1
5	F6P	B	803	-	-	3/9/28/28	0/1/1/1
4	ADP	D	801	-	-	4/16/32/32	0/3/3/3
3	FBP	C	801	-	-	3/13/32/32	0/1/1/1
4	ADP	B	801	-	-	0/16/32/32	0/3/3/3
5	F6P	D	803	-	-	4/9/28/28	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	FBP	D	802	-	-	4/13/32/32	0/1/1/1

The worst 5 of 15 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	801	ADP	PA-O3A	4.84	1.64	1.59
4	D	801	ADP	C5-C4	4.69	1.47	1.39
4	B	801	ADP	C5-C4	4.20	1.46	1.39
3	A	802	FBP	O2-C2	3.95	1.47	1.40
3	B	802	FBP	O2-C2	3.01	1.45	1.40

The worst 5 of 32 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	801	ADP	C5-C4-N3	-5.90	118.59	126.72
4	D	801	ADP	C5-C4-N3	-5.86	118.65	126.72
3	A	802	FBP	O2-C2-O5	5.32	119.55	109.33
4	D	801	ADP	N3-C4-N9	5.16	135.94	127.17
4	B	801	ADP	N3-C4-N9	4.98	135.65	127.17

There are no chirality outliers.

5 of 29 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	802	FBP	O1-C1-C2-O2
3	A	802	FBP	O1-C1-C2-C3
3	A	802	FBP	O1-C1-C2-O5
3	B	802	FBP	O1-C1-C2-O2
3	B	802	FBP	O1-C1-C2-O5

There are no ring outliers.

11 monomers are involved in 33 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	805	PO4	1	0
2	C	802	PO4	2	0
3	A	802	FBP	1	0
5	B	803	F6P	9	0
4	D	801	ADP	3	0
2	D	805	PO4	1	0
3	C	801	FBP	1	0

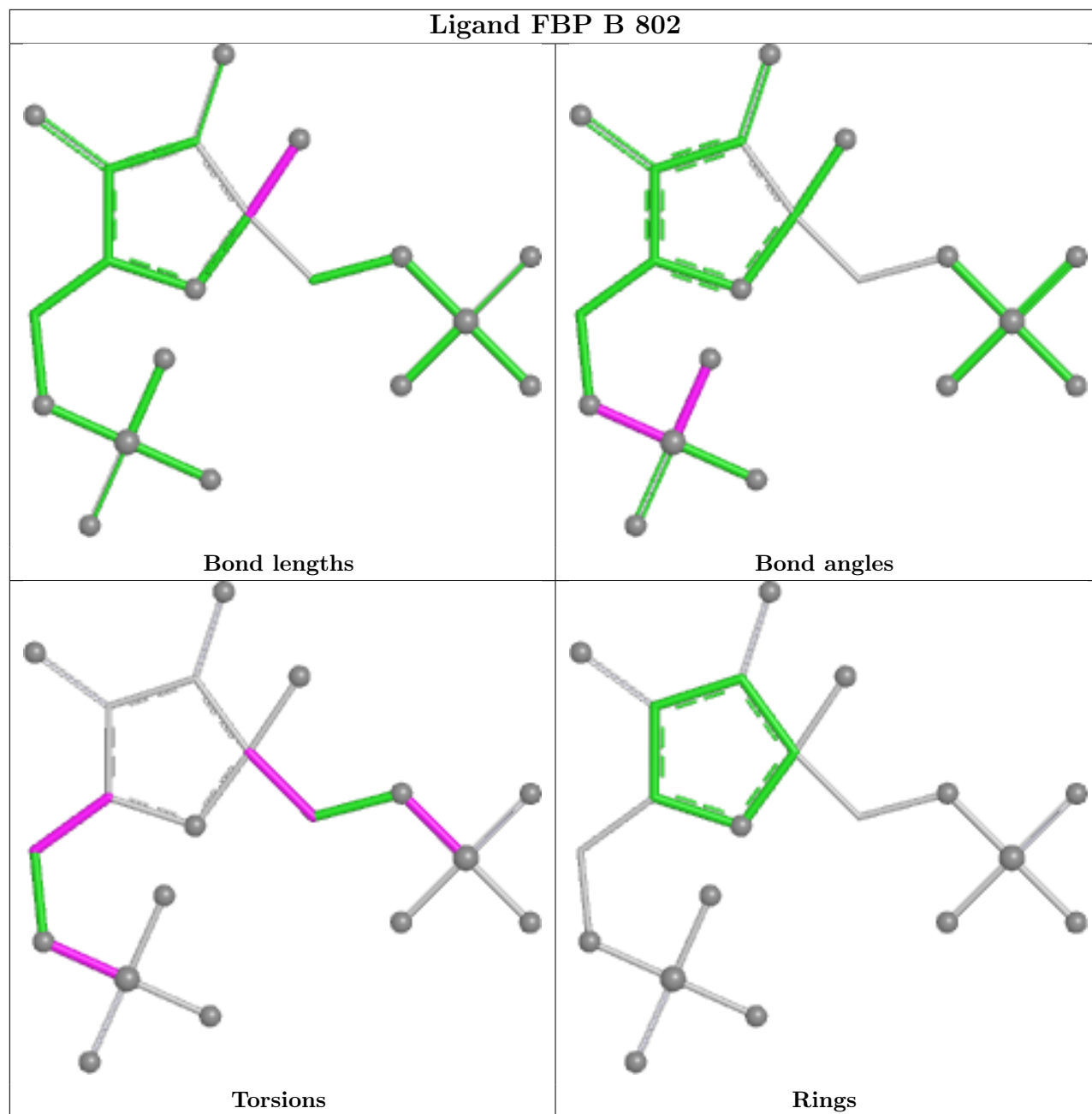
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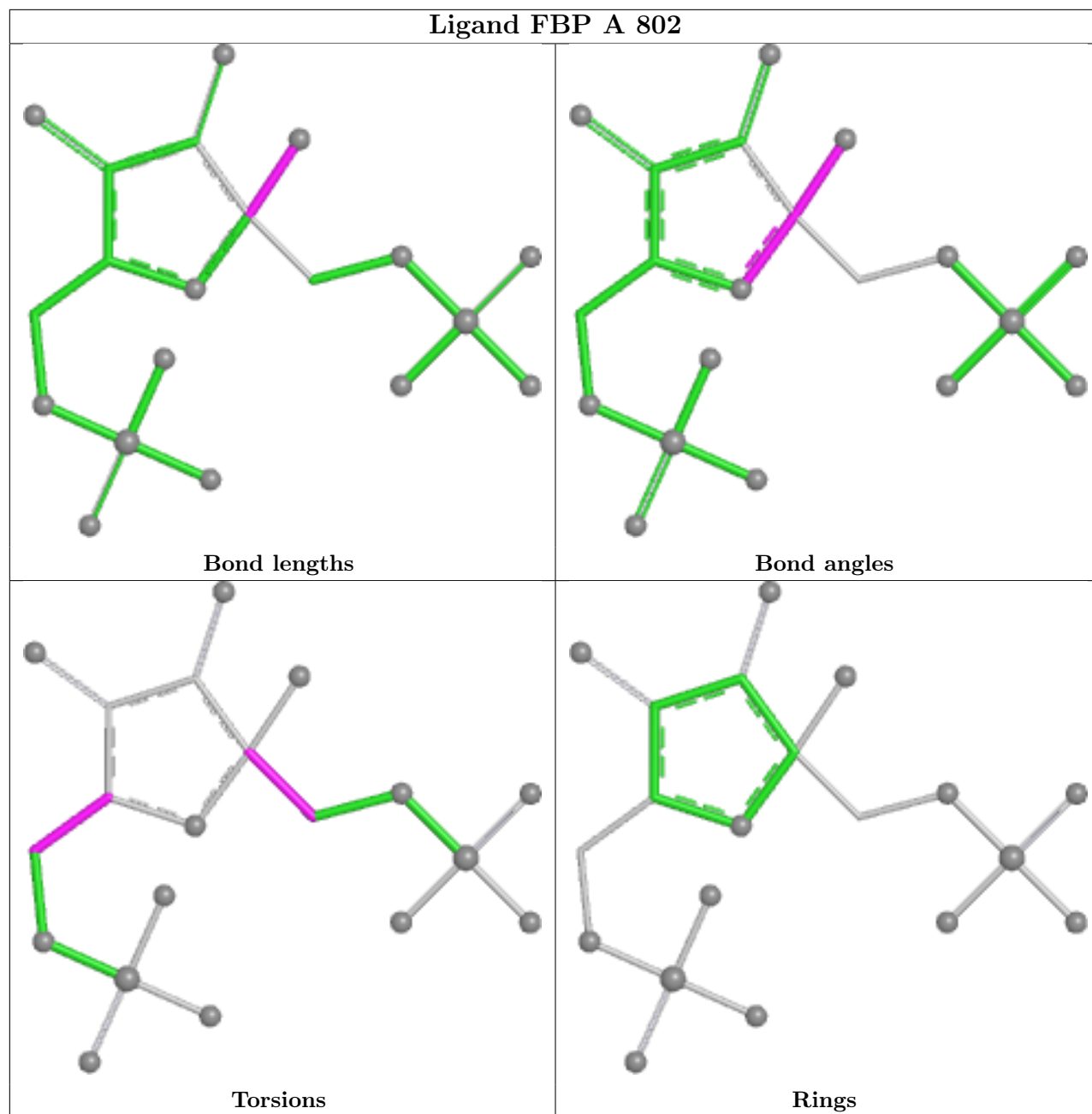
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	801	ADP	6	0
2	B	804	PO4	1	0
5	D	803	F6P	5	0
3	D	802	FBP	3	0

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.

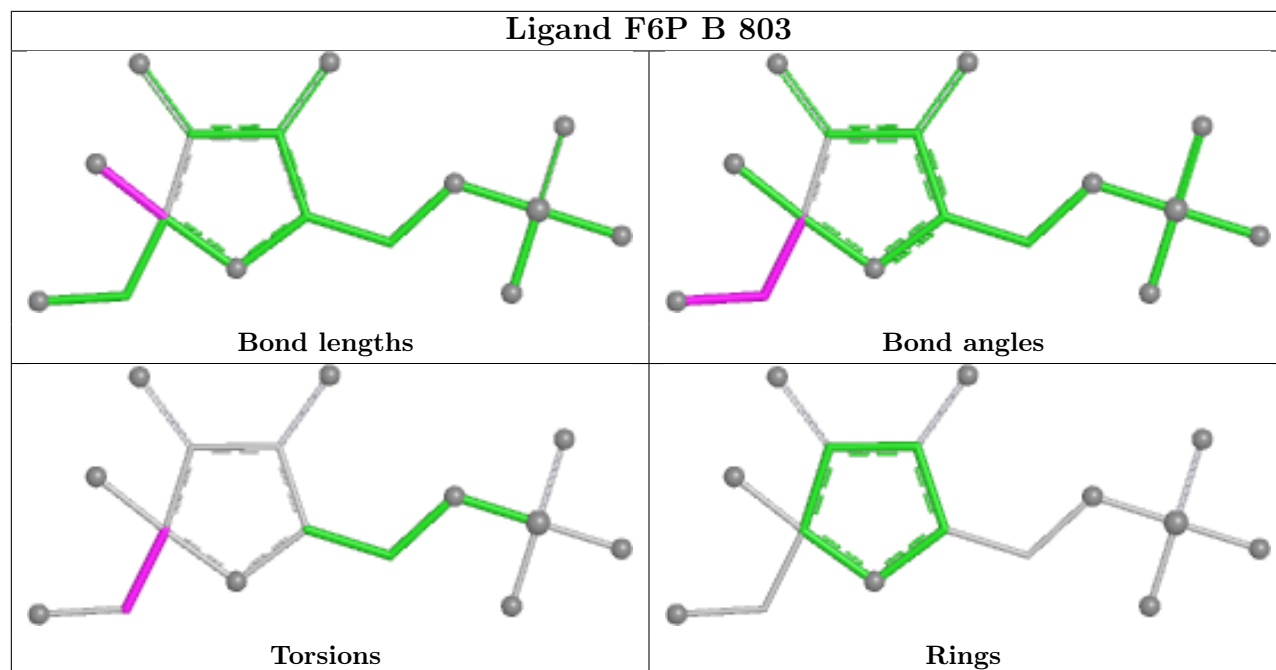
Ligand FBP B 802



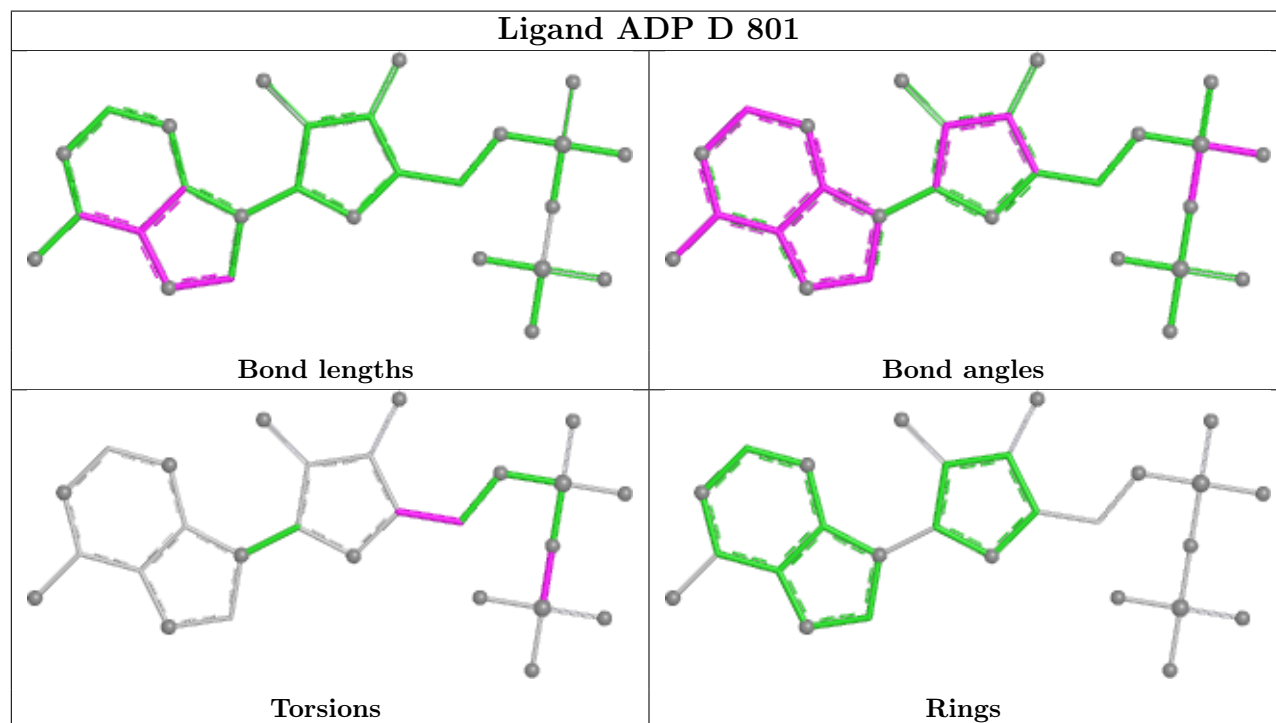
Ligand FBP A 802

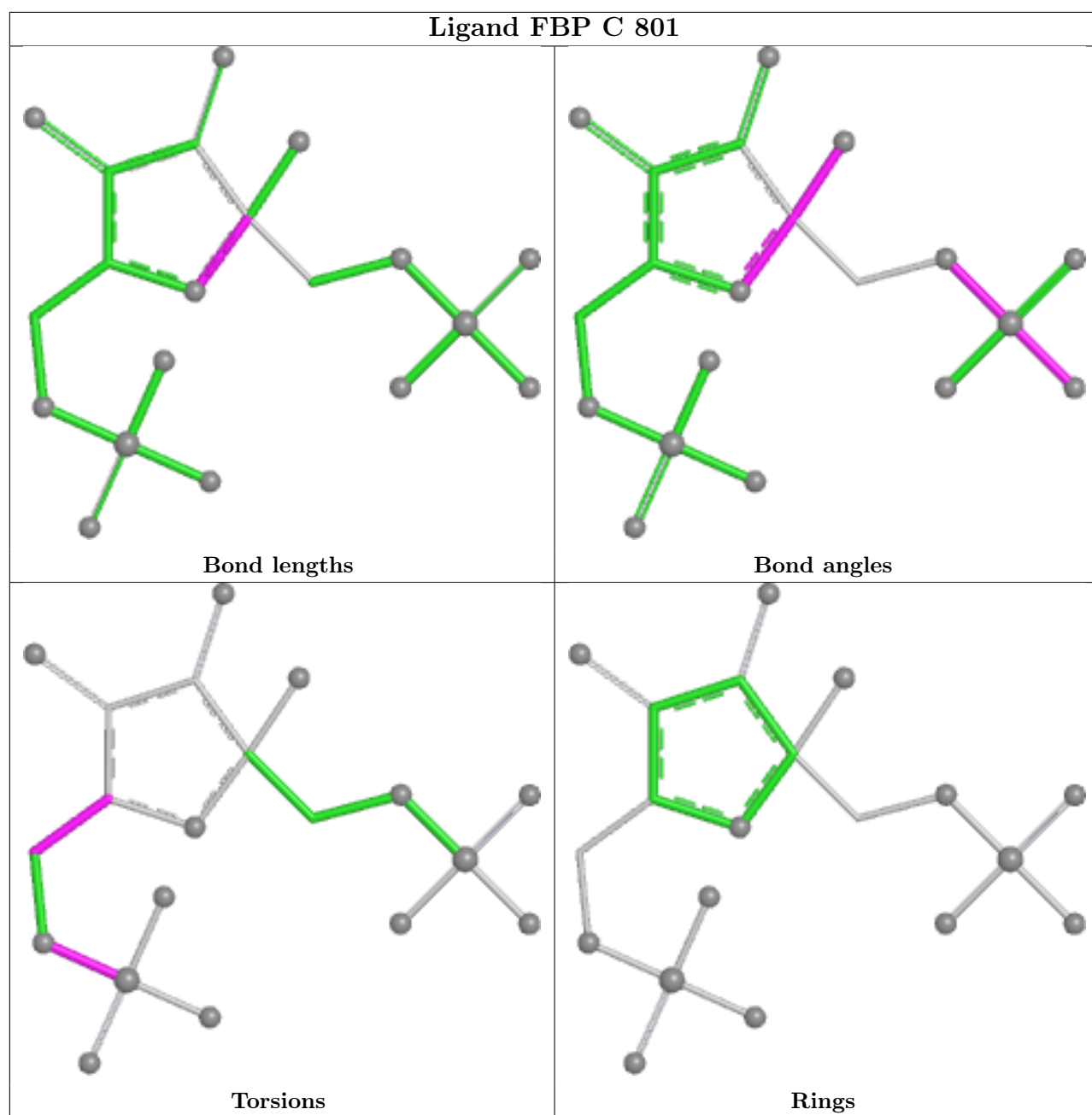


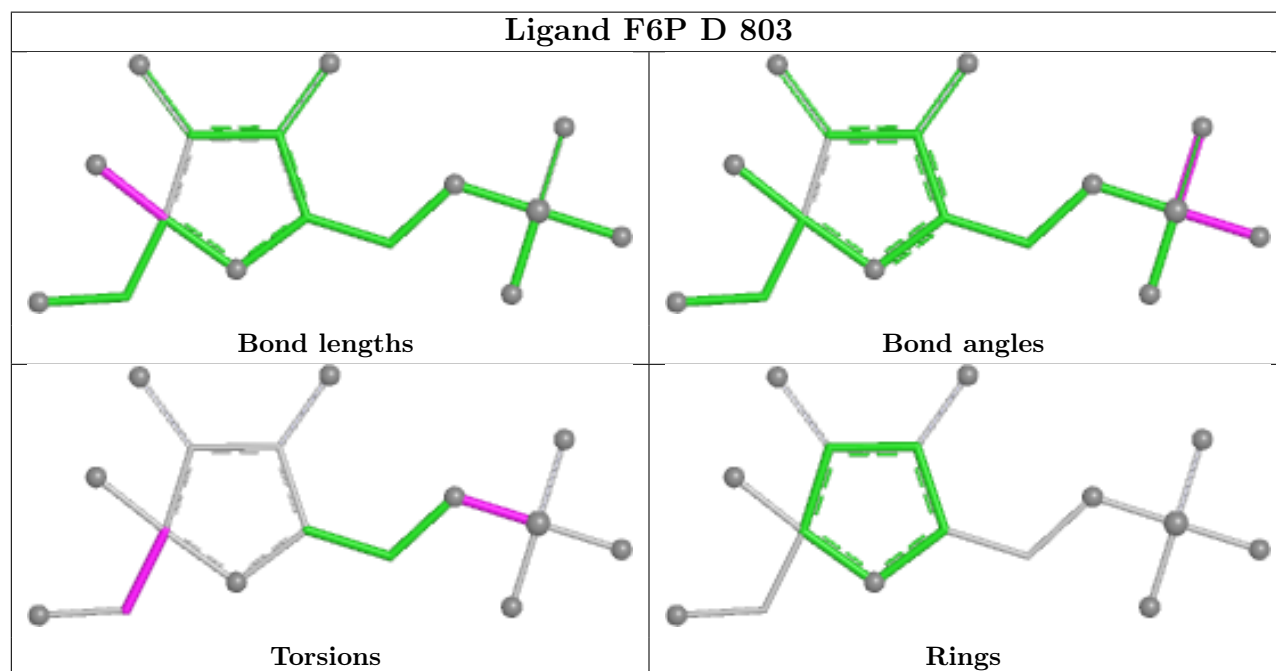
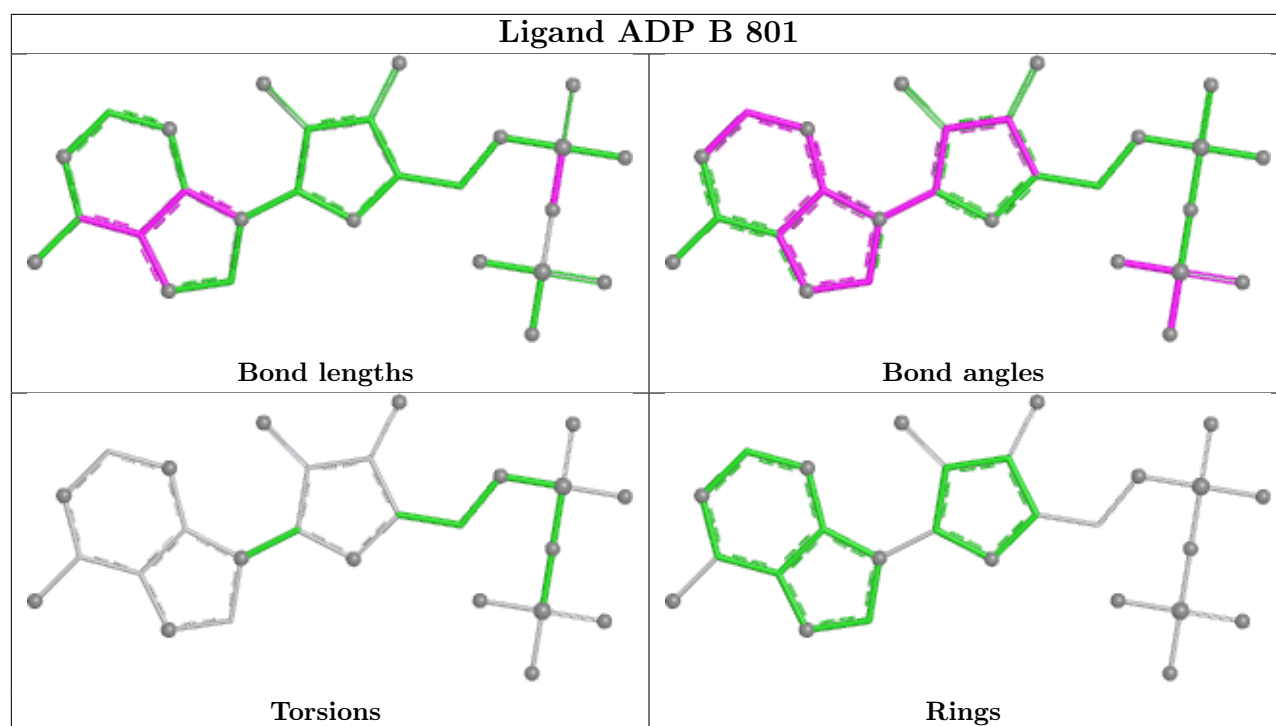
Ligand F6P B 803

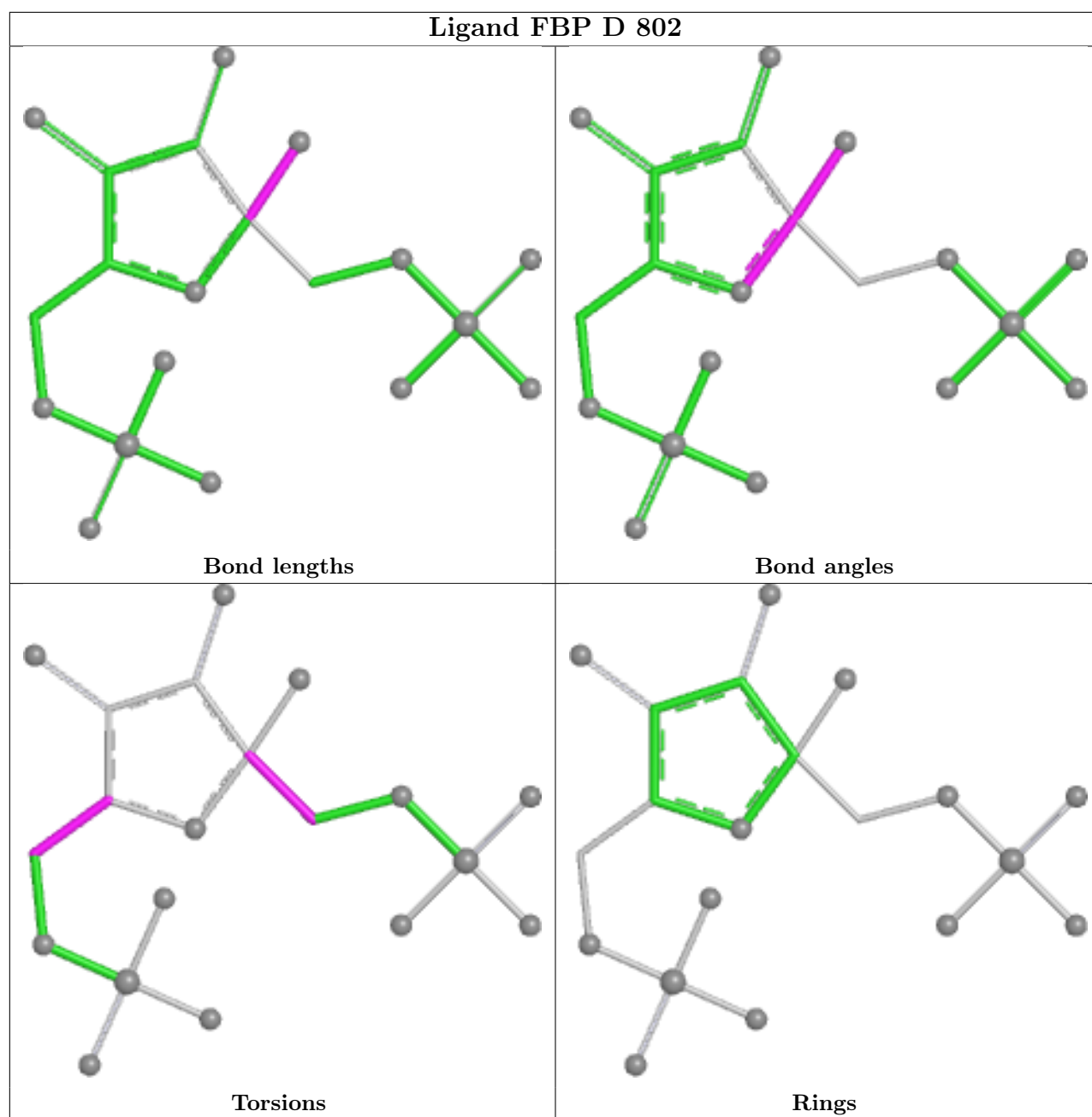


Ligand ADP D 801









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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å ²)	Q<0.9
1	A	708/761 (93%)	0.05	29 (4%)	41	36	27, 48, 94, 158	0
1	B	728/761 (95%)	0.11	28 (3%)	44	39	30, 51, 100, 194	0
1	C	704/761 (92%)	0.36	23 (3%)	49	44	35, 66, 108, 138	0
1	D	725/761 (95%)	0.34	29 (4%)	42	37	35, 66, 115, 174	0
All	All	2865/3044 (94%)	0.21	109 (3%)	44	39	27, 57, 108, 194	0

The worst 5 of 109 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	205	ALA	6.6
1	A	162	TYR	5.5
1	B	162	TYR	5.2
1	B	163	ALA	5.0
1	C	570	ALA	4.7

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 oligosaccharides in this entry.

6.4 Ligands [i](#)

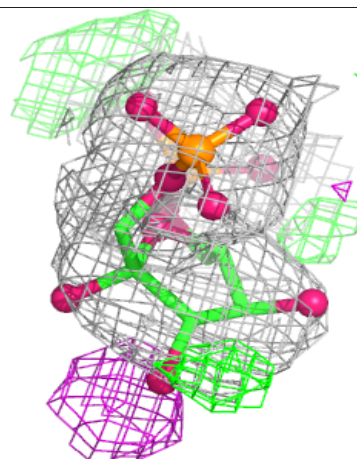
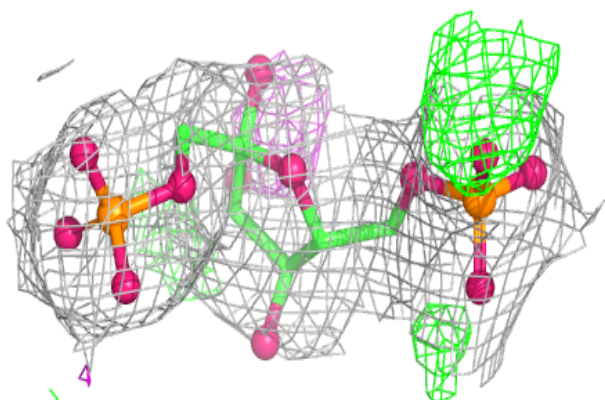
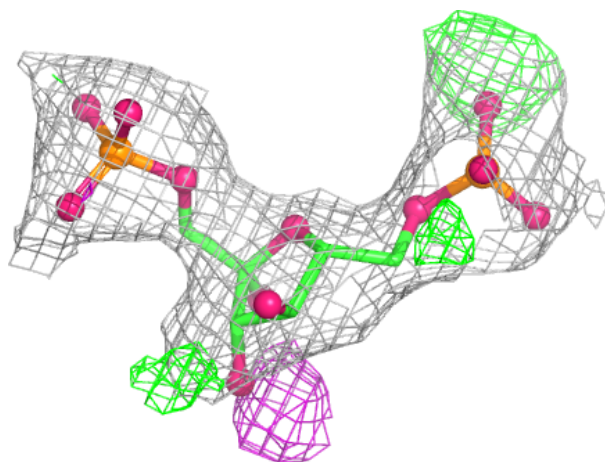
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q < 0.9’ lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	FBP	B	802	20/20	0.78	0.14	70,89,99,100	0
2	PO4	D	804	5/5	0.87	0.09	62,72,76,76	0
4	ADP	B	801	27/27	0.87	0.10	59,69,78,81	0
3	FBP	D	802	20/20	0.88	0.11	65,84,105,119	0
4	ADP	D	801	27/27	0.88	0.09	84,89,96,102	0
5	F6P	D	803	16/16	0.90	0.09	65,72,77,77	0
3	FBP	C	801	20/20	0.92	0.10	38,54,61,70	0
5	F6P	B	803	16/16	0.94	0.08	43,54,61,69	0
2	PO4	B	804	5/5	0.95	0.06	49,49,51,54	0
3	FBP	A	802	20/20	0.96	0.07	36,43,44,46	0
2	PO4	C	802	5/5	0.96	0.05	54,55,59,61	0
2	PO4	D	805	5/5	0.97	0.06	48,54,57,59	0
2	PO4	B	805	5/5	0.98	0.04	39,39,40,42	0
2	PO4	A	801	5/5	0.99	0.04	33,33,34,36	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.

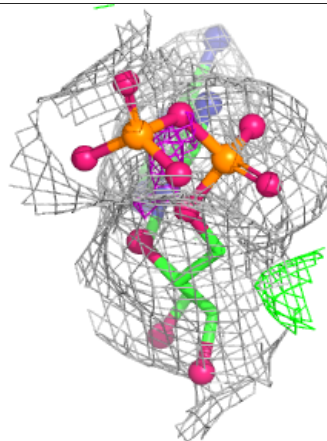
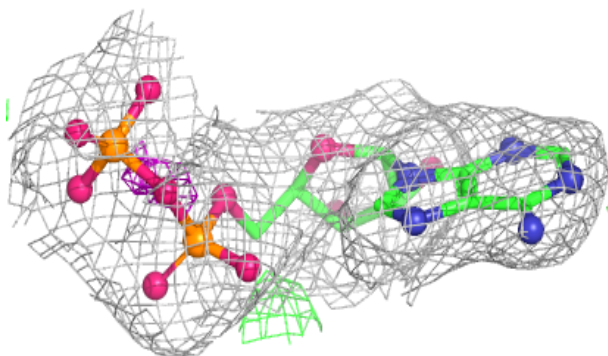
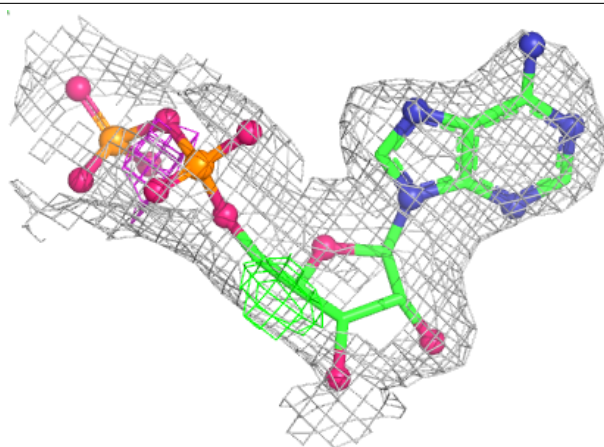
Electron density around FBP B 802:

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



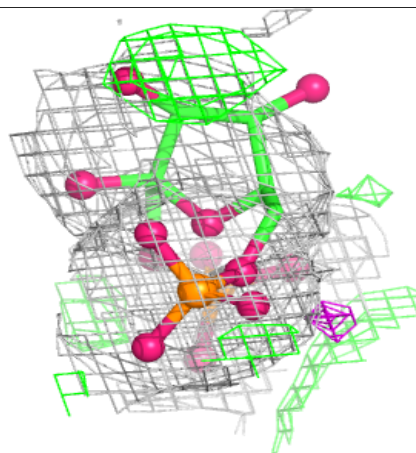
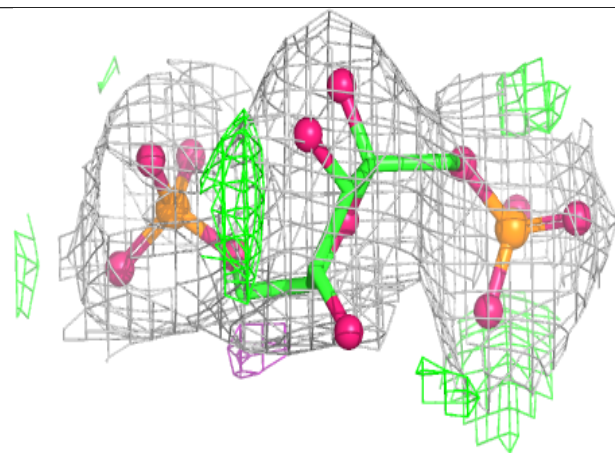
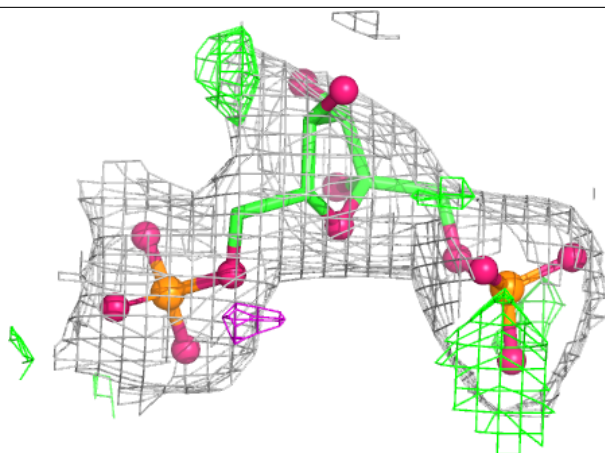
Electron density around ADP B 801:

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and green (positive)



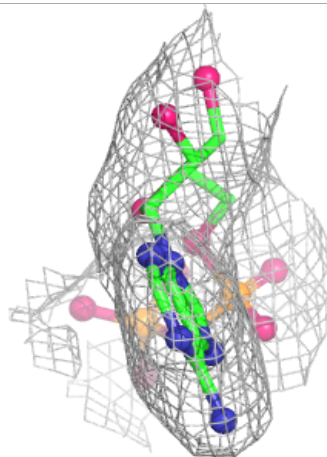
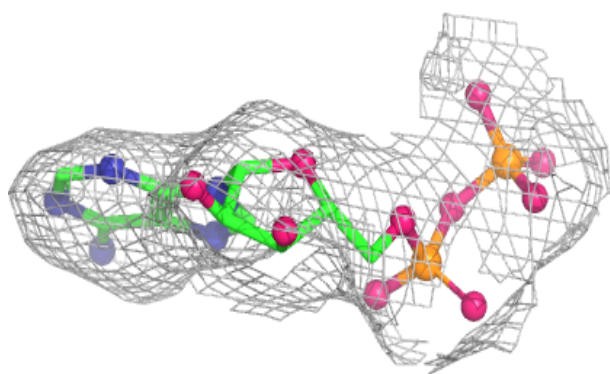
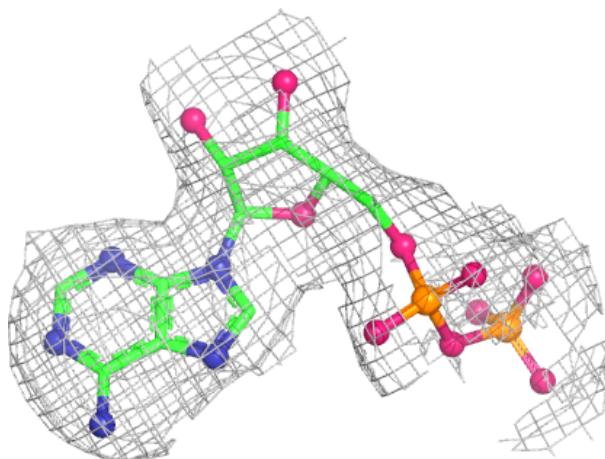
Electron density around FBP D 802:

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



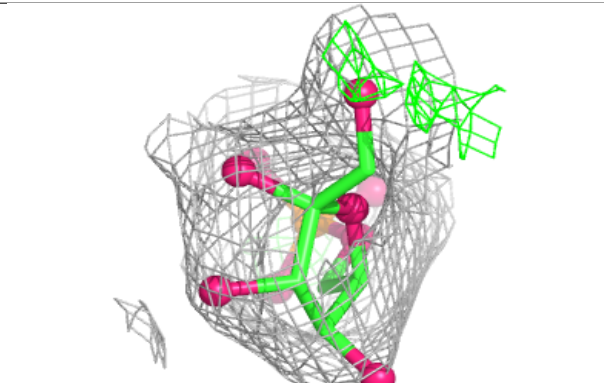
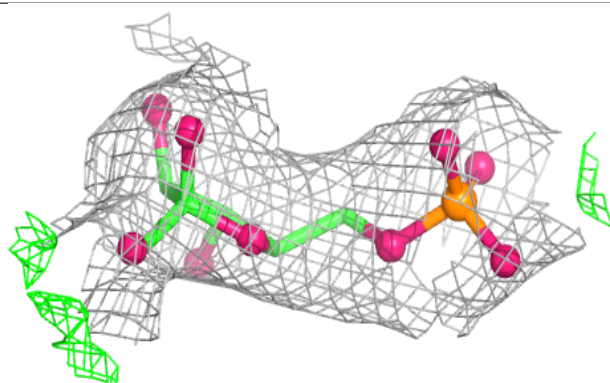
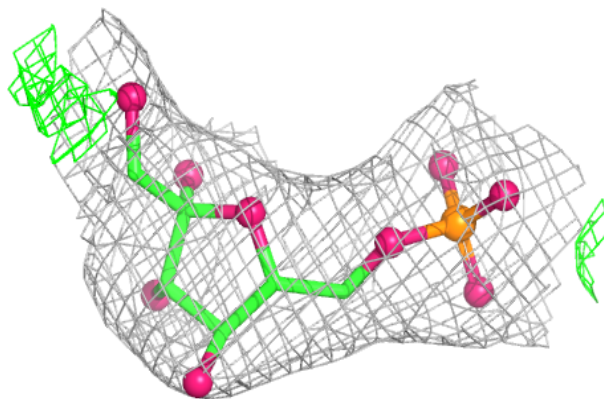
Electron density around ADP D 801:

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

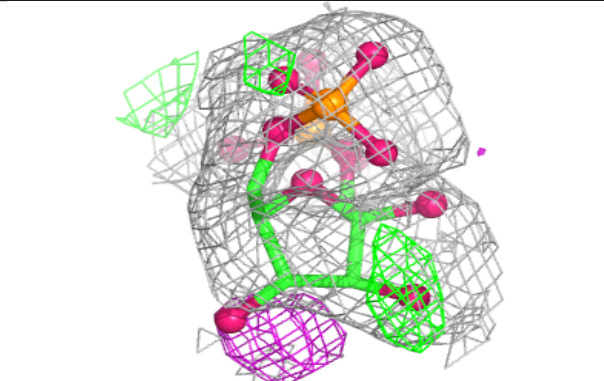
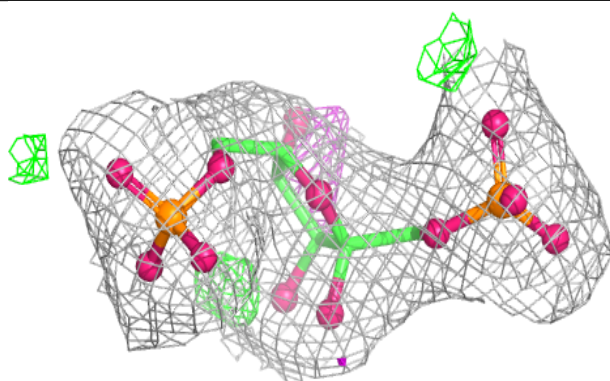
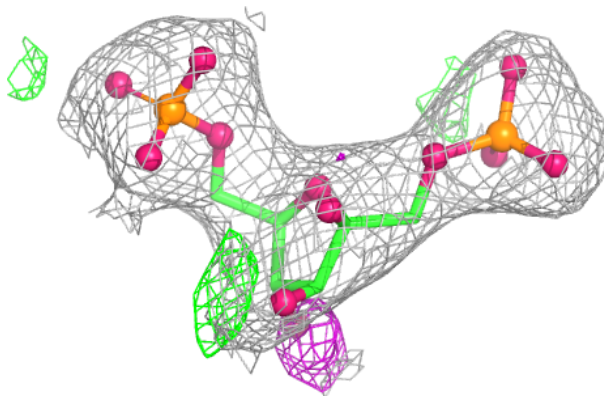


Electron density around F6P D 803:

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

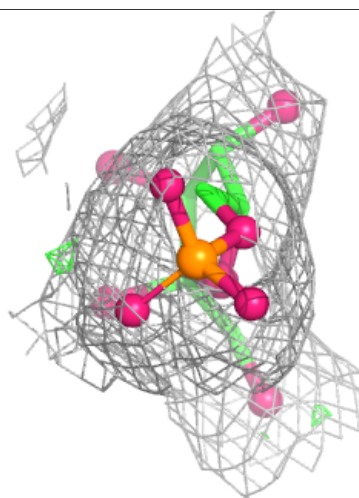
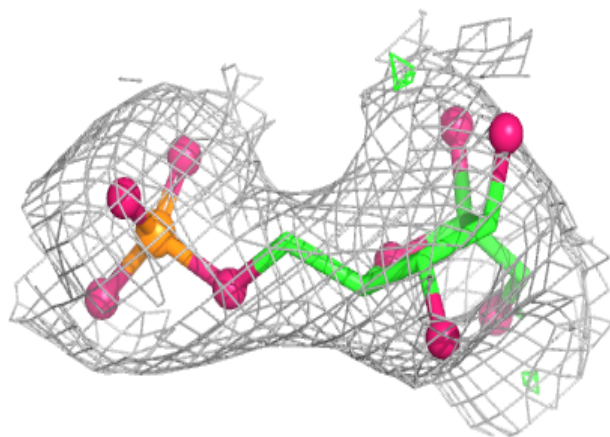
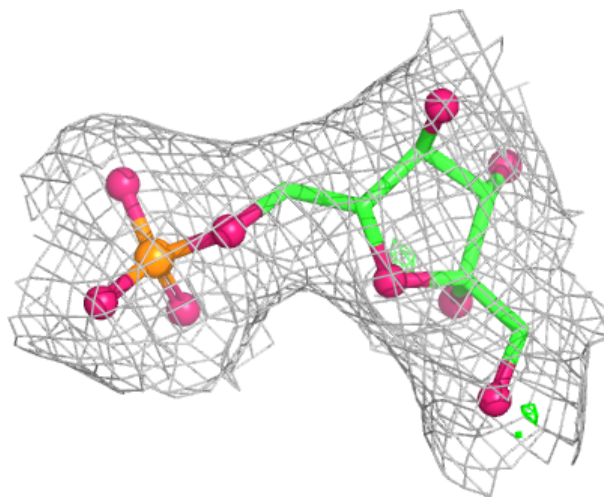
**Electron density around FBP C 801:**

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



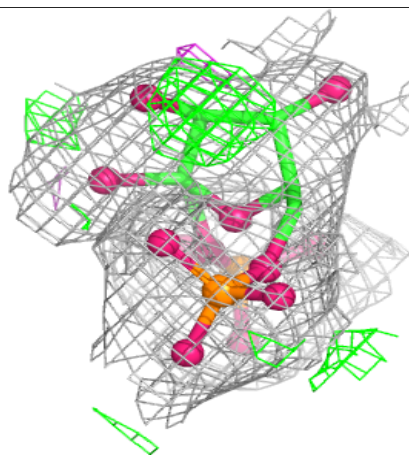
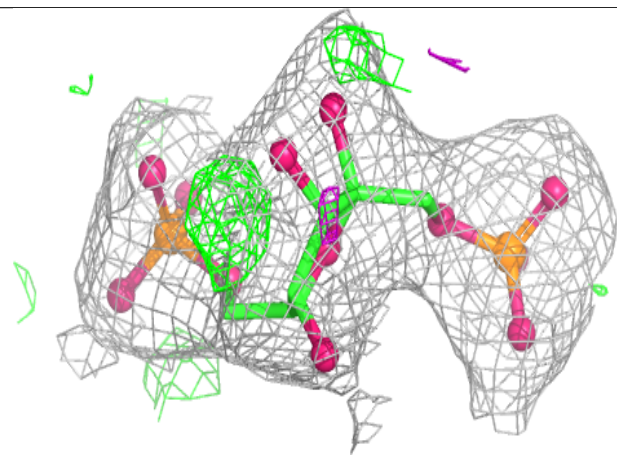
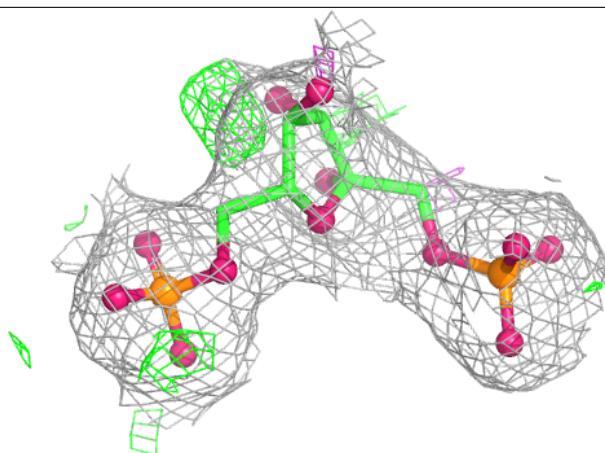
Electron density around F6P B 803:

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



Electron density around FBP A 802:

$2mF_o-DF_c$ (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.