W O R L D W I D E

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P R O T E I N   D A T A   B A N K

wwPDB X-ray Structure Validation Summary Report (i)

Dec 3, 2023 – 03:10 pm GMT

PDB ID	:	1W8S
Title	:	The mechanism of the Schiff Base Forming Fructose-1,6-bisphosphate Aldolase: Structural analysis of reaction intermediates
Authors	:	Lorentzen, E.; Hensel, R.; Siebers, B.; Pohl, E.
Deposited on	:	2004-09-27
Resolution	:	1.85 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 (i) 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 (i)) were used in the production of this report:

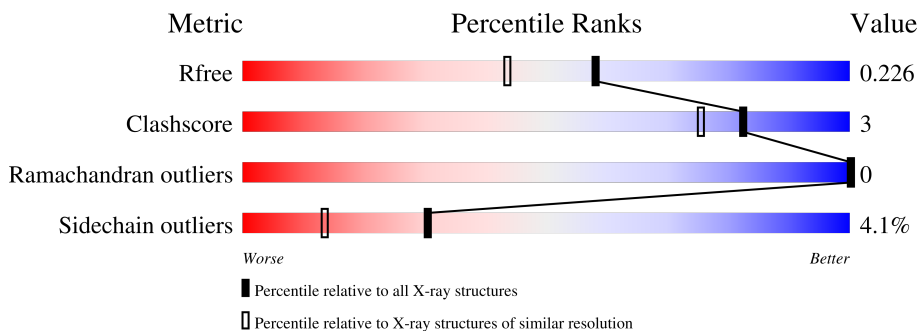|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 1.85 Å.

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

Metric	Percentile Ranks	Value
Rfree		0.226
Clashscore		3
Ramachandran outliers		0
Sidechain outliers		4.1%

Worse   *Better*

■ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	2469 (1.86-1.86)
Clashscore	141614	2625 (1.86-1.86)
Ramachandran outliers	138981	2592 (1.86-1.86)
Sidechain outliers	138945	2592 (1.86-1.86)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Mol	Chain	Length	Quality of chain
1	A	263	86% 9% 5%
1	B	263	87% 6% · 5%
1	C	263	86% 9% 5%
1	D	263	86% 8% · 5%
1	E	263	86% 9% ·
1	F	263	87% 7% · 5%
1	G	263	87% 8% 5%

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Mol	Chain	Length	Quality of chain
1	H	263	83% 11% 5%
1	I	263	89% 6% 5%
1	J	263	87% 8% 5%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 20960 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 FRUCTOSE-BISPHOSPHATE ALDOLASE CLASS I.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	250	Total	C	N	O	S	0	3	0
			1940	1248	327	359	6			
1	B	250	Total	C	N	O	S	0	1	0
			1931	1242	327	357	5			
1	C	250	Total	C	N	O	S	0	2	0
			1936	1246	328	357	5			
1	D	250	Total	C	N	O	S	0	1	0
			1936	1245	330	356	5			
1	E	252	Total	C	N	O	S	0	2	0
			1942	1248	329	359	6			
1	F	250	Total	C	N	O	S	0	2	0
			1937	1245	330	356	6			
1	G	250	Total	C	N	O	S	0	4	0
			1949	1253	330	360	6			
1	H	250	Total	C	N	O	S	0	4	0
			1947	1252	331	359	5			
1	I	250	Total	C	N	O	S	0	2	0
			1935	1245	327	357	6			
1	J	250	Total	C	N	O	S	0	4	0
			1945	1252	328	359	6			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	144	GLU	TRP	engineered mutation	UNP P58315
B	144	GLU	TRP	engineered mutation	UNP P58315
C	144	GLU	TRP	engineered mutation	UNP P58315
D	144	GLU	TRP	engineered mutation	UNP P58315
E	144	GLU	TRP	engineered mutation	UNP P58315
F	144	GLU	TRP	engineered mutation	UNP P58315
G	144	GLU	TRP	engineered mutation	UNP P58315
H	144	GLU	TRP	engineered mutation	UNP P58315
I	144	GLU	TRP	engineered mutation	UNP P58315

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Chain	Residue	Modelled	Actual	Comment	Reference
J	144	GLU	TRP	engineered mutation	UNP P58315
A	146	PHE	TYR	engineered mutation	UNP P58315
B	146	PHE	TYR	engineered mutation	UNP P58315
C	146	PHE	TYR	engineered mutation	UNP P58315
D	146	PHE	TYR	engineered mutation	UNP P58315
E	146	PHE	TYR	engineered mutation	UNP P58315
F	146	PHE	TYR	engineered mutation	UNP P58315
G	146	PHE	TYR	engineered mutation	UNP P58315
H	146	PHE	TYR	engineered mutation	UNP P58315
I	146	PHE	TYR	engineered mutation	UNP P58315
J	146	PHE	TYR	engineered mutation	UNP P58315

- Molecule 2 is 1,6-di-O-phosphono-beta-D-fructofuranose (three-letter code: FBP) (formula: $C_6H_{14}O_{12}P_2$).
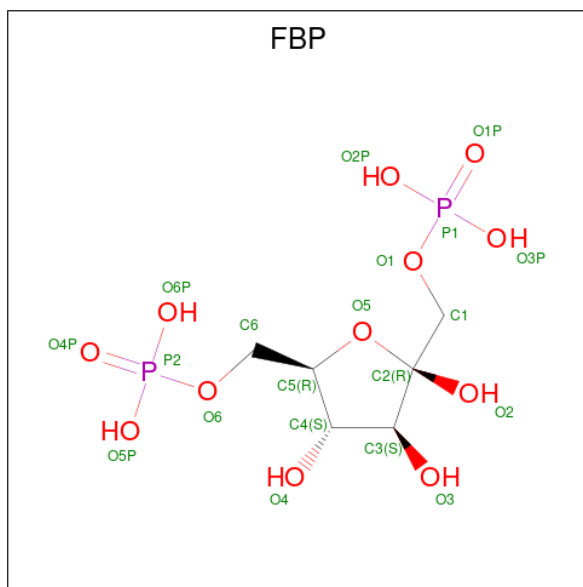
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total 20	C 6	O 12	P 2	0	0
2	B	1	Total 20	C 6	O 12	P 2	0	0
2	C	1	Total 20	C 6	O 12	P 2	0	0
2	D	1	Total 20	C 6	O 12	P 2	0	0
2	E	1	Total 20	C 6	O 12	P 2	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	F	1	Total	C	O	P	0	0
			20	6	12	2		
2	G	1	Total	C	O	P	0	0
			20	6	12	2		
2	H	1	Total	C	O	P	0	0
			20	6	12	2		
2	I	1	Total	C	O	P	0	0
			20	6	12	2		
2	J	1	Total	C	O	P	0	0
			20	6	12	2		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	140	Total	O	0	0
			140	140		
3	B	154	Total	O	0	0
			154	154		
3	C	119	Total	O	0	0
			119	119		
3	D	111	Total	O	0	0
			111	111		
3	E	135	Total	O	0	0
			135	135		
3	F	115	Total	O	0	0
			115	115		
3	G	133	Total	O	0	0
			133	133		
3	H	147	Total	O	0	0
			147	147		
3	I	149	Total	O	0	0
			149	149		
3	J	159	Total	O	0	0
			159	159		

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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. 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: FRUCTOSE-BISPHOSPHATE ALDOLASE CLASS I

Chain A:

- Molecule 1: FRUCTOSE-BISPHOSPHATE ALDOLASE CLASS I

Chain B:

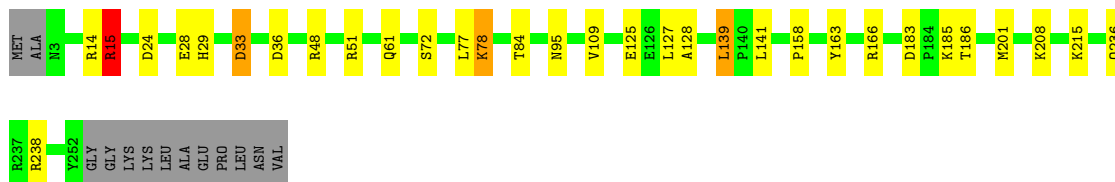- Molecule 1: FRUCTOSE-BISPHOSPHATE ALDOLASE CLASS I

Chain C:
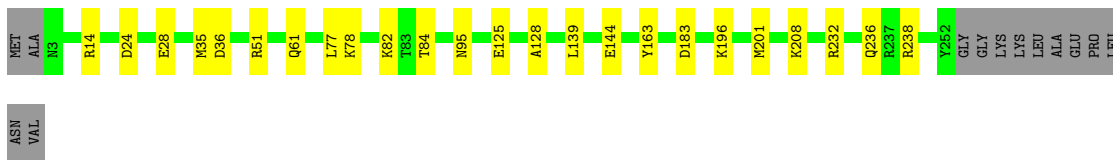
- Molecule 1: FRUCTOSE-BISPHOSPHATE ALDOLASE CLASS I

Chain D:
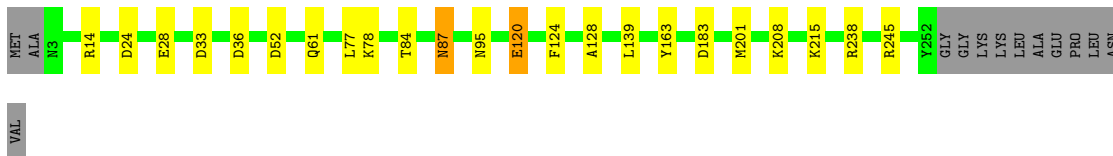
- Molecule 1: FRUCTOSE-BISPHOSPHATE ALDOLASE CLASS I

Chain E:

MET ALA N3 R14 D24 E28 D33 F34 M35 D36 R51 G57 Q61 V73 L77 K78 T84 V93 A94 N95 K122 A128 E144 Y163 K177 D183 M201 K208 D239 R245 G254 LYS LYS LEU ALA GLU PRO LEU

ASN VAL
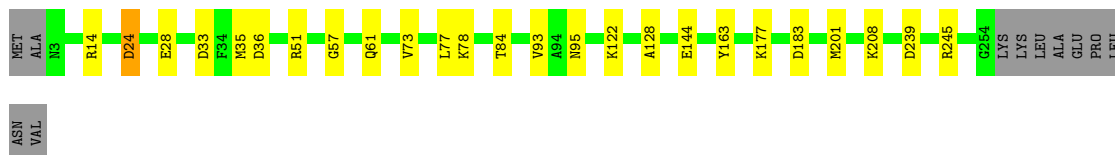
- Molecule 1: FRUCTOSE-BISPHOSPHATE ALDOLASE CLASS I

Chain F:
87%   7% · 5%

MET ALA N3 K7 Y23 D24 E28 M35 D36 I46 Q61 L77 K78 T84 N95 E120 E125 L139 Y163 K179 D183 M201 R238 Y252 GLY GLY LYS LYS LEU ALA GLU PRO LEU ASN VAL

- Molecule 1: FRUCTOSE-BISPHOSPHATE ALDOLASE CLASS I

Chain G:
87%   8% 5%

MET ALA N3 K7 K17 D24 E28 E44 R48 G57 Q61 V73 L77 K78 T84 E89 V93 G118 A128 L139 Y163 M201 K208 R238 Y252 GLY GLY LYS LYS LEU ALA GLU PRO LEU ASN VAL

- Molecule 1: FRUCTOSE-BISPHOSPHATE ALDOLASE CLASS I

Chain H:
83%   11% · 5%

MET ALA N3 R14 R15 D24 E28 H29 D33 D36 R48 R51 Q61 S72 L77 K78 T84 N95 V109 E125 E126 L127 A128 L139 P140 L141 P158 Y163 R166 D183 P184 K185 T186 M201 K208 K215 Q236

R237 R238 Y252 GLY GLY LYS LYS LEU ALA GLU PRO LEU ASN VAL

- Molecule 1: FRUCTOSE-BISPHOSPHATE ALDOLASE CLASS I

Chain I:
89%   6% 5%

MET ALA N3 D24 E28 H29 Q61 L77 K78 T84 V93 A94 N95 E120 F124 A128 L139 Y163 D183 M201 E249 Y252 GLY GLY LYS LYS LEU ALA GLU PRO LEU ASN VAL

- Molecule 1: FRUCTOSE-BISPHOSPHATE ALDOLASE CLASS I

Chain J:
87%   8% 5%

MET ALA N3 R14 K17 Y23 D24 E28 I46 L47 R48 F55 D56 G57 Q61 V73 L77 T84 N95 A128 R132 L139 Y163 D183 M201 A244 Y252 GLY GLY LYS LYS LEU ALA GLU PRO LEU ASN VAL

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	82.50Å 157.30Å 101.20Å 90.00° 107.90° 90.00°	Depositor
Resolution (Å)	40.00 – 1.85 37.39 – 1.85	Depositor EDS
% Data completeness (in resolution range)	97.3 (40.00-1.85) 95.6 (37.39-1.85)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.68 (at 1.85Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.149 , 0.187 0.198 , 0.226	Depositor DCC
R_{free} test set	2012 reflections (1.01%)	wwPDB-VP
Wilson B-factor (Å^2)	23.0	Xtriage
Anisotropy	0.041	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 46.6	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	20960	wwPDB-VP
Average B, all atoms (Å^2)	16.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.35% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: 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	0.68	0/1993	0.81	1/2695 (0.0%)
1	B	0.70	0/1976	0.80	4/2673 (0.1%)
1	C	0.66	0/1985	0.82	2/2684 (0.1%)
1	D	0.68	1/1981 (0.1%)	0.82	3/2679 (0.1%)
1	E	0.67	0/1992	0.78	3/2693 (0.1%)
1	F	0.67	0/1989	0.78	3/2689 (0.1%)
1	G	0.71	0/2007	0.84	1/2714 (0.0%)
1	H	0.72	2/2004 (0.1%)	0.85	6/2709 (0.2%)
1	I	0.71	0/1984	0.79	1/2683 (0.0%)
1	J	0.70	0/2002	0.85	3/2706 (0.1%)
All	All	0.69	3/19913 (0.0%)	0.82	27/26925 (0.1%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	H	78	LYS	CE-NZ	5.53	1.62	1.49
1	D	78	LYS	CD-CE	5.21	1.64	1.51
1	H	78	LYS	CD-CE	5.16	1.64	1.51

The worst 5 of 27 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	J	132	ARG	NE-CZ-NH1	8.32	124.46	120.30
1	G	238	ARG	NE-CZ-NH1	6.72	123.66	120.30
1	A	174	ASP	CB-CG-OD2	6.54	124.19	118.30
1	C	36	ASP	CB-CG-OD2	6.37	124.03	118.30
1	D	36	ASP	CB-CG-OD2	6.05	123.74	118.30

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	1940	0	1953	15	0
1	B	1931	0	1946	9	0
1	C	1936	0	1955	10	1
1	D	1936	0	1954	7	0
1	E	1942	0	1957	14	0
1	F	1937	0	1955	7	0
1	G	1949	0	1963	9	1
1	H	1947	0	1964	26	0
1	I	1935	0	1951	8	0
1	J	1945	0	1962	9	0
2	A	20	0	10	2	0
2	B	20	0	10	0	0
2	C	20	0	10	0	0
2	D	20	0	10	0	0
2	E	20	0	10	1	0
2	F	20	0	10	0	0
2	G	20	0	10	0	0
2	H	20	0	10	1	0
2	I	20	0	10	1	0
2	J	20	0	10	0	0
3	A	140	0	0	1	0
3	B	154	0	0	1	0
3	C	119	0	0	2	0
3	D	111	0	0	1	0
3	E	135	0	0	3	0
3	F	115	0	0	1	0
3	G	133	0	0	2	0
3	H	147	0	0	9	0
3	I	149	0	0	0	0
3	J	159	0	0	2	0
All	All	20960	0	19660	99	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 3.

The worst 5 of 99 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:H:33[B]:ASP:CG	3:H:2018:HOH:O	2.07	0.93
1:C:144:GLU:CD	3:C:2083:HOH:O	2.21	0.78
1:G:89[B]:GLU:HG2	1:G:118:GLY:H	1.50	0.76
1:E:78:LYS:CE	1:E:144:GLU:OE2	2.34	0.75
1:H:33[A]:ASP:OD1	3:H:2018:HOH:O	2.04	0.74

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:C:208:LYS:O	1:G:44:GLU:OE2[2_546]	2.13	0.07

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	251/263 (95%)	246 (98%)	5 (2%)	0	100	100
1	B	249/263 (95%)	243 (98%)	6 (2%)	0	100	100
1	C	250/263 (95%)	244 (98%)	6 (2%)	0	100	100
1	D	249/263 (95%)	244 (98%)	5 (2%)	0	100	100
1	E	252/263 (96%)	246 (98%)	6 (2%)	0	100	100
1	F	250/263 (95%)	245 (98%)	5 (2%)	0	100	100
1	G	252/263 (96%)	247 (98%)	5 (2%)	0	100	100
1	H	252/263 (96%)	246 (98%)	6 (2%)	0	100	100
1	I	250/263 (95%)	245 (98%)	5 (2%)	0	100	100
1	J	252/263 (96%)	247 (98%)	5 (2%)	0	100	100
All	All	2507/2630 (95%)	2453 (98%)	54 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	200/206 (97%)	190 (95%)	10 (5%)	24	9
1	B	198/206 (96%)	191 (96%)	7 (4%)	36	18
1	C	199/206 (97%)	191 (96%)	8 (4%)	31	14
1	D	198/206 (96%)	187 (94%)	11 (6%)	21	7
1	E	199/206 (97%)	190 (96%)	9 (4%)	27	11
1	F	199/206 (97%)	189 (95%)	10 (5%)	24	9
1	G	201/206 (98%)	194 (96%)	7 (4%)	36	18
1	H	201/206 (98%)	191 (95%)	10 (5%)	24	9
1	I	199/206 (97%)	193 (97%)	6 (3%)	41	24
1	J	201/206 (98%)	196 (98%)	5 (2%)	47	31
All	All	1995/2060 (97%)	1912 (96%)	83 (4%)	30	13

5 of 83 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	78	LYS
1	H	238	ARG
1	G	163	TYR
1	H	139	LEU
1	I	163	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 13 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	61	GLN
1	G	61	GLN
1	J	61	GLN
1	H	236	GLN
1	I	61	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

10 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	FBP	J	270	-	18,20,20	0.98	1 (5%)	23,32,32	0.60	0
2	FBP	E	270	-	18,20,20	0.70	1 (5%)	23,32,32	0.91	0
2	FBP	D	270	-	18,20,20	0.89	1 (5%)	23,32,32	0.70	0
2	FBP	C	270	-	18,20,20	0.99	1 (5%)	23,32,32	0.90	1 (4%)
2	FBP	F	270	-	18,20,20	0.89	1 (5%)	23,32,32	0.82	0
2	FBP	G	270	-	18,20,20	0.76	0	23,32,32	0.69	0
2	FBP	H	270	-	18,20,20	0.94	1 (5%)	23,32,32	0.96	1 (4%)
2	FBP	A	270	-	18,20,20	0.87	1 (5%)	23,32,32	1.06	2 (8%)
2	FBP	B	270	-	18,20,20	1.03	1 (5%)	23,32,32	0.67	0
2	FBP	I	270	-	18,20,20	0.79	1 (5%)	23,32,32	1.26	4 (17%)

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	FBP	J	270	-	-	4/13/32/32	0/1/1/1
2	FBP	E	270	-	-	3/13/32/32	0/1/1/1
2	FBP	D	270	-	-	4/13/32/32	0/1/1/1
2	FBP	C	270	-	-	4/13/32/32	0/1/1/1
2	FBP	F	270	-	-	3/13/32/32	0/1/1/1
2	FBP	G	270	-	-	3/13/32/32	0/1/1/1
2	FBP	H	270	-	-	4/13/32/32	0/1/1/1
2	FBP	A	270	-	-	3/13/32/32	0/1/1/1
2	FBP	B	270	-	-	4/13/32/32	0/1/1/1
2	FBP	I	270	-	-	3/13/32/32	0/1/1/1

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	270	FBP	O2-C2	3.19	1.46	1.40
2	J	270	FBP	O2-C2	3.14	1.46	1.40
2	C	270	FBP	O2-C2	3.12	1.46	1.40
2	D	270	FBP	O2-C2	2.81	1.45	1.40
2	E	270	FBP	O2-C2	2.46	1.45	1.40

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	I	270	FBP	O5P-P2-O6	2.89	114.42	106.73
2	A	270	FBP	O5P-P2-O6	2.69	113.88	106.73
2	C	270	FBP	O5P-P2-O6	2.68	113.86	106.73
2	H	270	FBP	O5P-P2-O6	2.38	113.07	106.73
2	I	270	FBP	O6P-P2-O6	-2.25	100.75	106.73

There are no chirality outliers.

5 of 35 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	270	FBP	C6-O6-P2-O5P
2	A	270	FBP	C6-O6-P2-O6P
2	B	270	FBP	C6-O6-P2-O4P
2	B	270	FBP	C6-O6-P2-O5P
2	B	270	FBP	C6-O6-P2-O6P

There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	270	FBP	1	0
2	H	270	FBP	1	0
2	A	270	FBP	2	0
2	I	270	FBP	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand FBP J 270

Bond lengths

Bond angles

Torsions

Rings

Ligand FBP E 270

Bond lengths

Bond angles

Torsions

Rings

Ligand FBP D 270

Bond lengths

Bond angles

Torsions

Rings

Ligand FBP C 270

Bond lengths

Bond angles

Torsions

Rings

Ligand FBP F 270

Bond lengths

Bond angles

Torsions

Rings

Ligand FBP G 270

Bond lengths

Bond angles

Torsions

Rings

Ligand FBP H 270

Bond lengths

Bond angles

Torsions

Rings

Ligand FBP A 270

Bond lengths

Bond angles

Torsions

Rings

wwPDB X-ray Structure Validation Summary Report

Ligand FBP B 270

Bond lengths

Bond angles

Torsions

Rings

Ligand FBP I 270

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6   Fit of model and data ⓘ

6.1   Protein, DNA and RNA chains ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3   Carbohydrates ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4   Ligands ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.

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 A 270:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
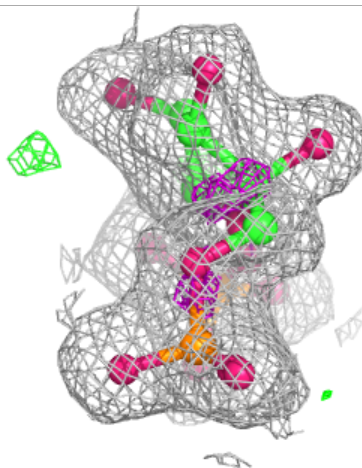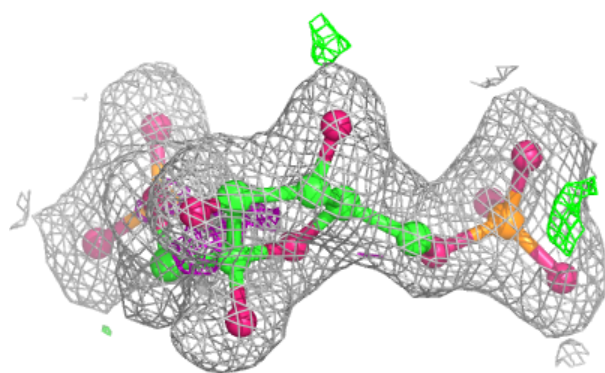$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
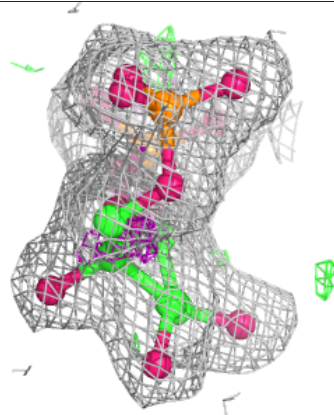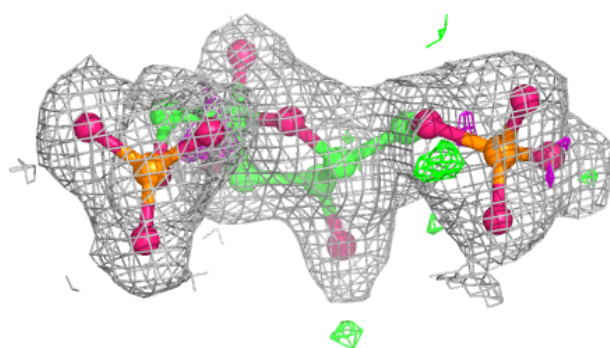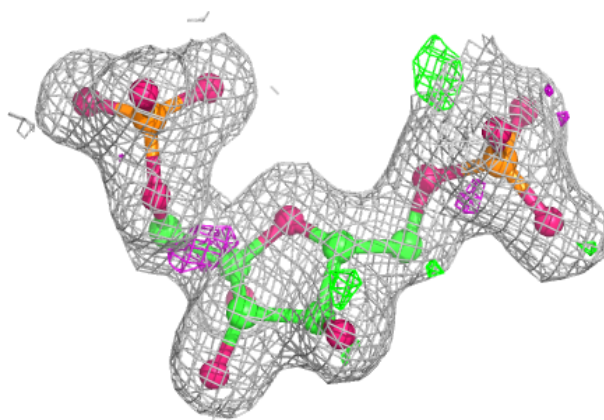
Electron density around FBP B 270:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
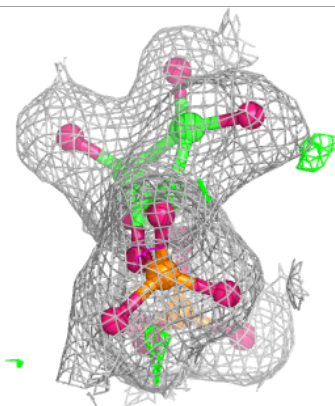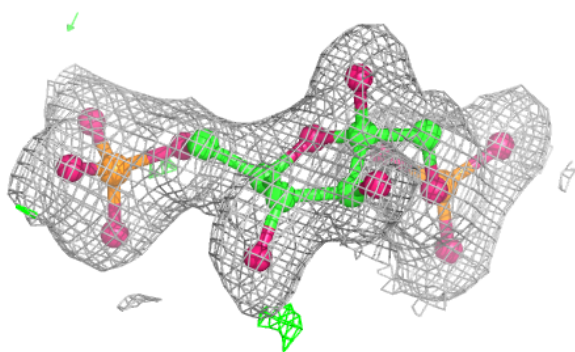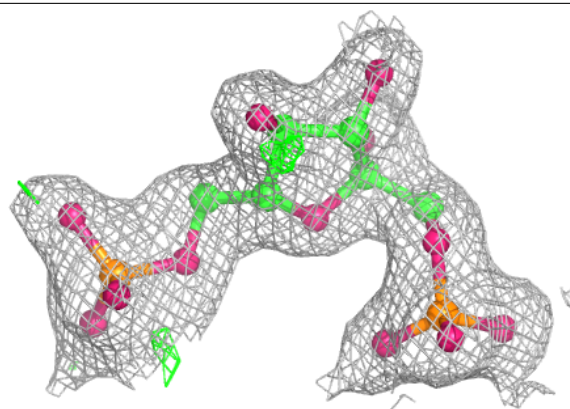mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
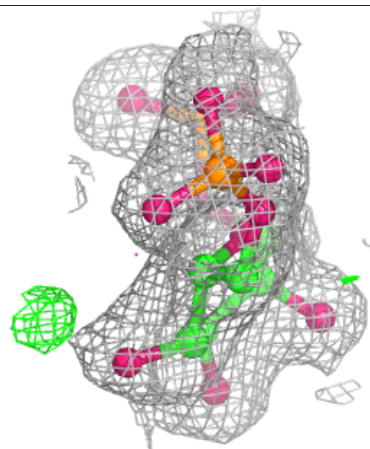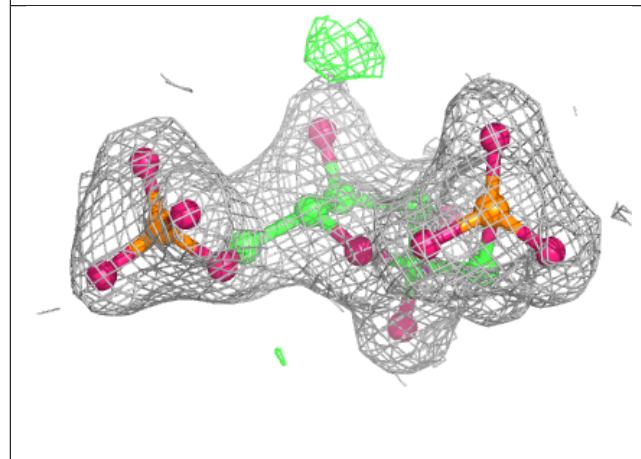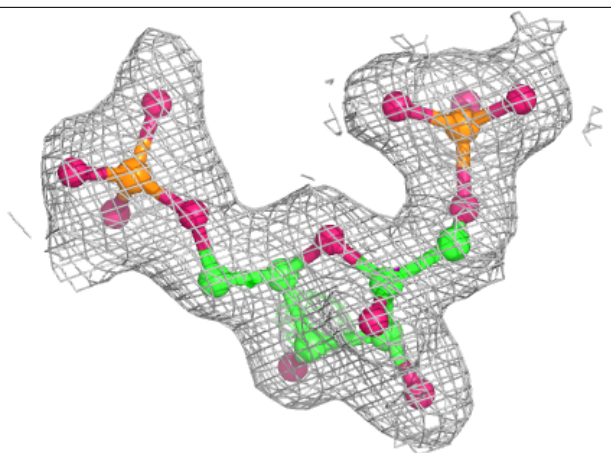
Electron density around FBP C 270:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
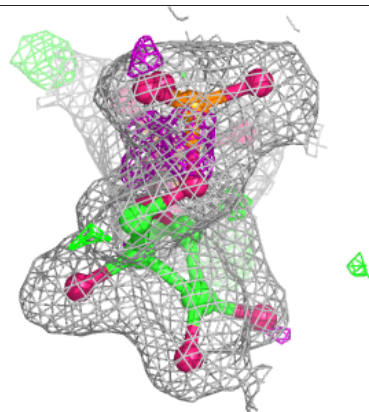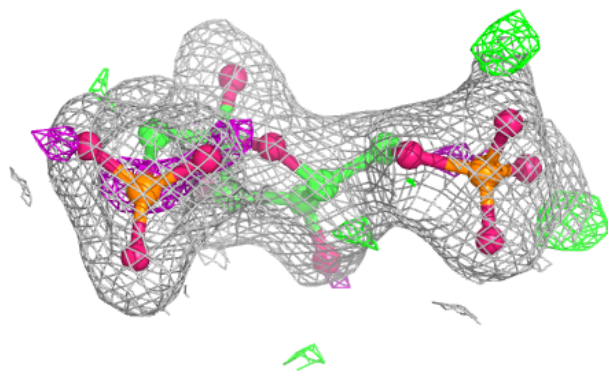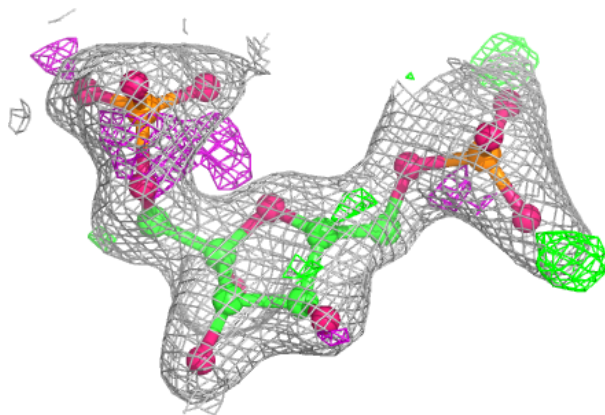
Electron density around FBP D 270:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
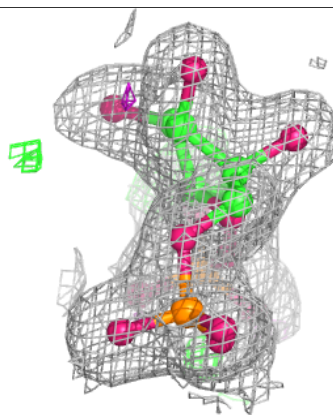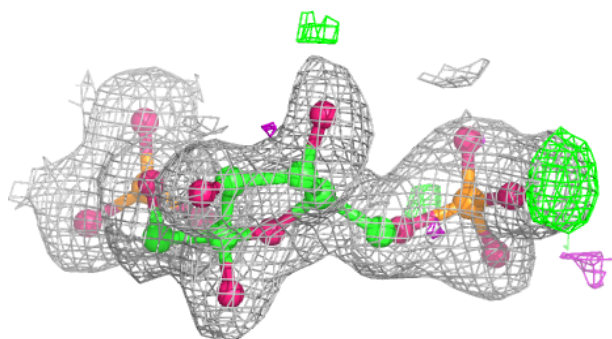and green (positive)
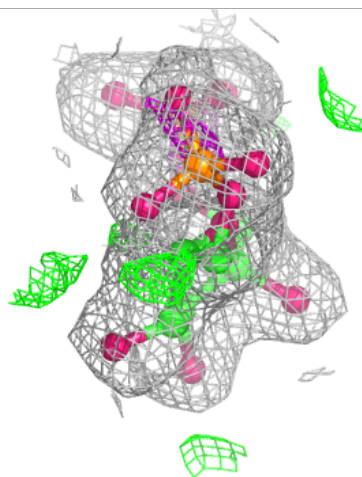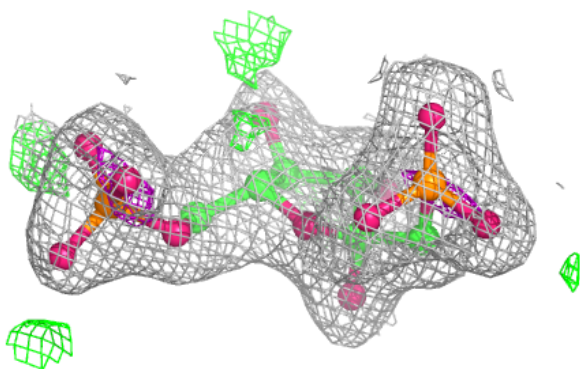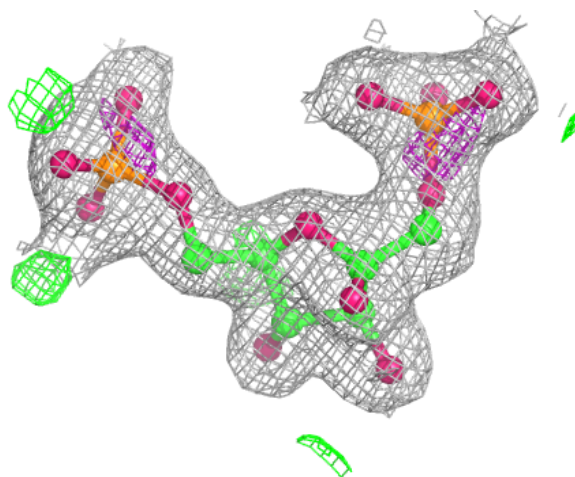
Electron density around FBP E 270:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
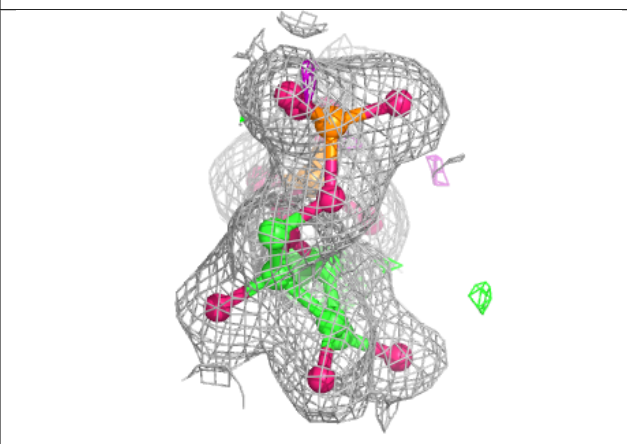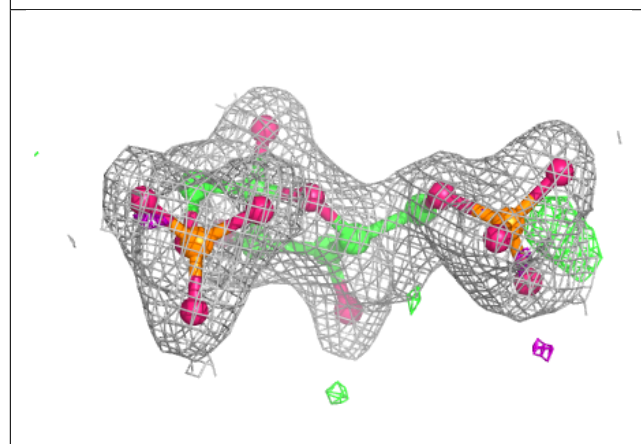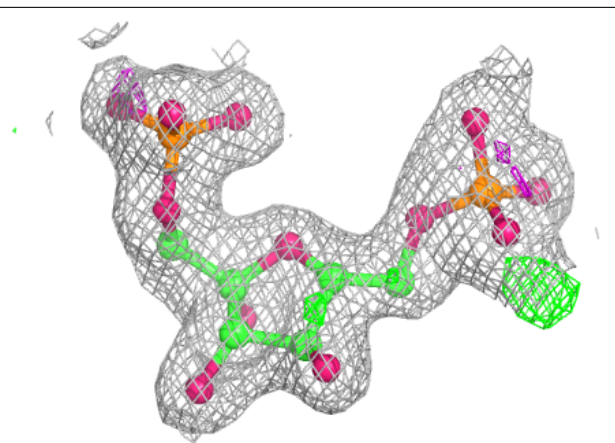
Electron density around FBP F 270:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
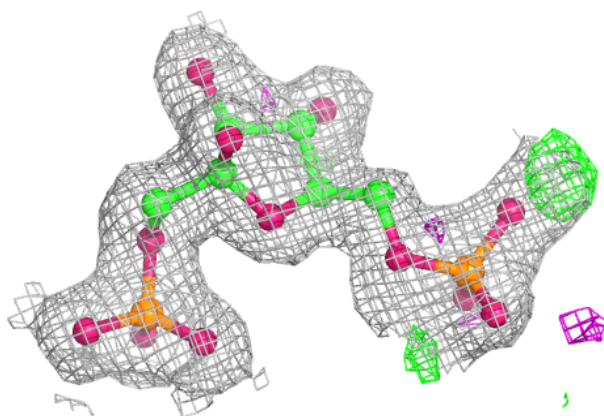and green (positive)
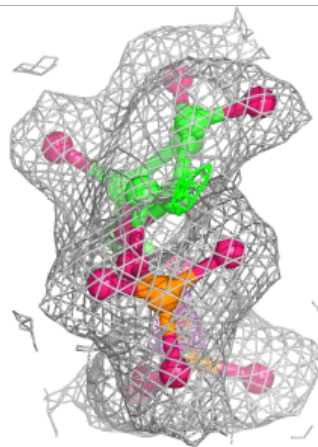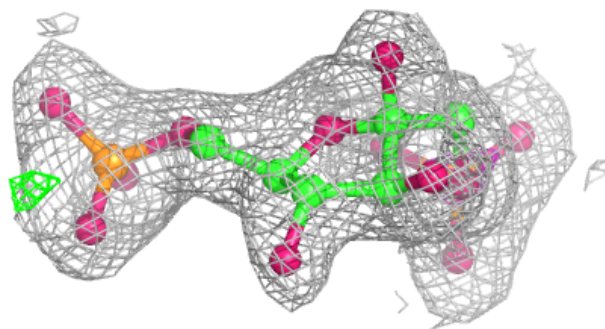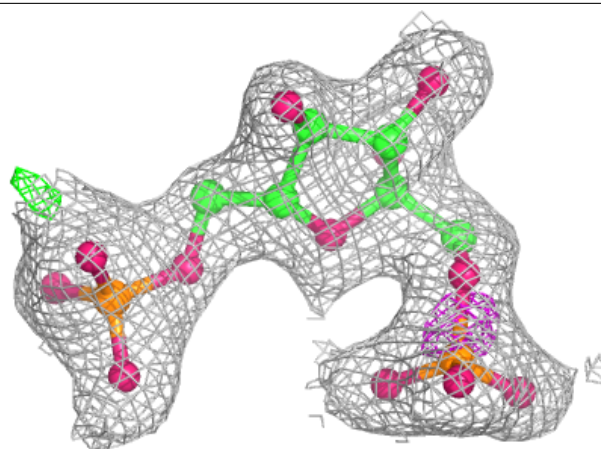
Electron density around FBP G 270:

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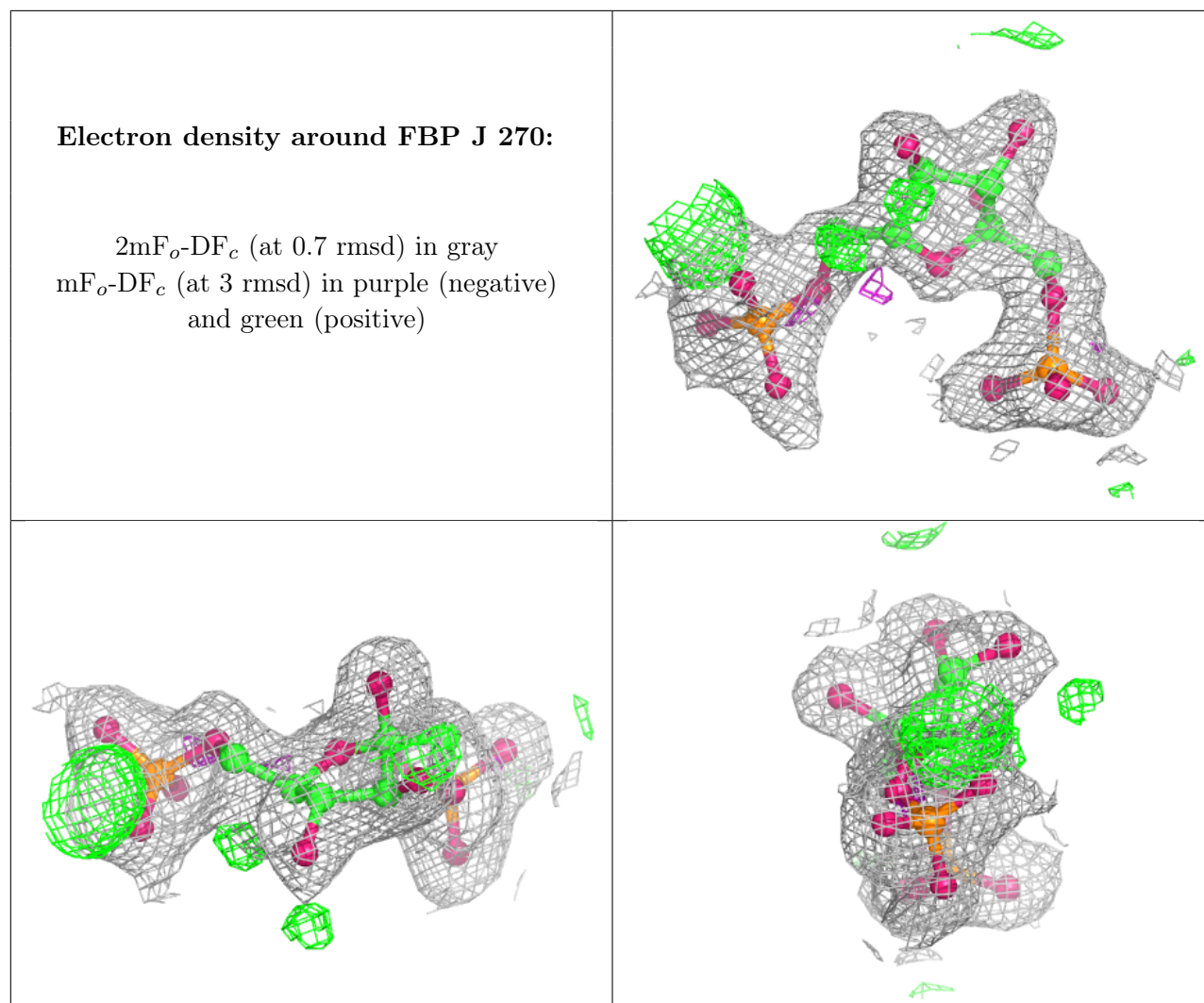mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around FBP H 270:

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

Electron density around FBP I 270:

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

Electron density around FBP J 270:

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

6.5　Other polymers ⓘ

Unable to reproduce the depositors R factor - this section is therefore empty.