



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 05:38 AM UTC

PDB ID : 7EZf / pdb_00007ezf
Title : Indole-2-carboxylic acid derivatives as allosteric inhibitors of fructose-1,6-bisphosphatase
Authors : Wang, X.Y.; Zhou, J.; Xu, B.L.
Deposited on : 2021-06-01
Resolution : 2.76 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

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

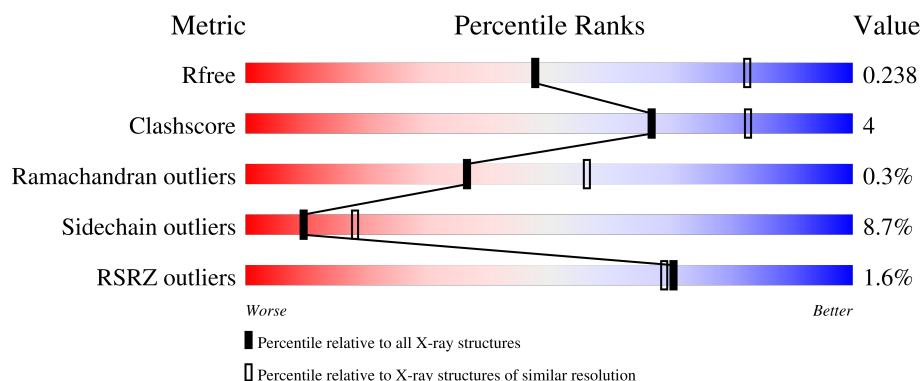
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.76 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	1009 (2.76-2.76)
Clashscore	190562	1044 (2.76-2.76)
Ramachandran outliers	187476	1024 (2.76-2.76)
Sidechain outliers	187428	1024 (2.76-2.76)
RSRZ outliers	180081	1009 (2.76-2.76)

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	338	80% 14% • 6%
1	B	338	81% 13% 6%
1	C	338	76% 18% • 5%
1	D	338	80% 16% • •

2 Entry composition [i](#)

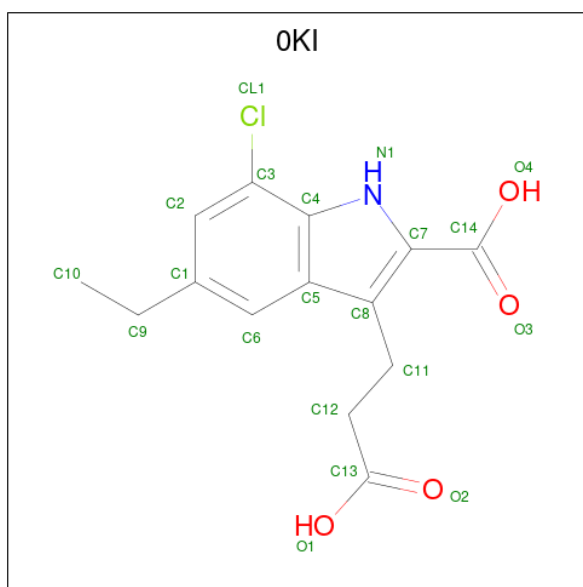
There are 4 unique types of molecules in this entry. The entry contains 10149 atoms, of which 0 are hydrogens and 0 are deuteriums.

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-1,6-bisphosphatase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	318	Total	C	N	O	S	0	0	0
			2434	1549	409	459	17			
1	B	318	Total	C	N	O	S	0	0	0
			2433	1548	409	459	17			
1	C	320	Total	C	N	O	S	0	0	0
			2445	1555	411	462	17			
1	D	329	Total	C	N	O	S	0	0	0
			2511	1594	423	477	17			

- Molecule 2 is 7-chloranyl-5-ethyl-3-(3-hydroxy-3-oxopropyl)-1H-indole-2-carboxylic acid (CCD ID: 0KI) (formula: C₁₄H₁₄ClNO₄) (labeled as "Ligand of Interest" by depositor).



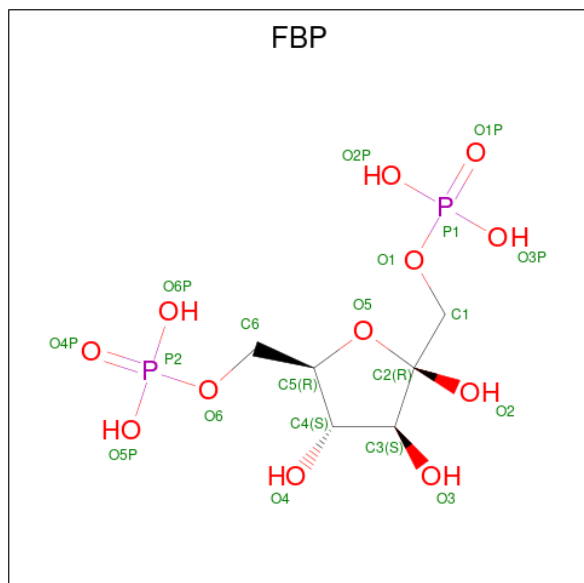
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	Cl	N O	0	0
			20	14	1	1 4		
2	B	1	Total	C	Cl	N O	0	0
			20	14	1	1 4		

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
2	C	1	Total	C	Cl	N	O	0	0
			20	14	1	1	4		
2	D	1	Total	C	Cl	N	O	0	0
			20	14	1	1	4		

- Molecule 3 is 1,6-di-O-phosphono-beta-D-fructofuranose (CCD ID: FBP) (formula: $C_6H_{14}O_{12}P_2$) (labeled as "Ligand of Interest" by depositor).



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 water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	32	Total	O	0	0
			32	32		
4	B	38	Total	O	0	0
			38	38		
4	C	49	Total	O	0	0
			49	49		

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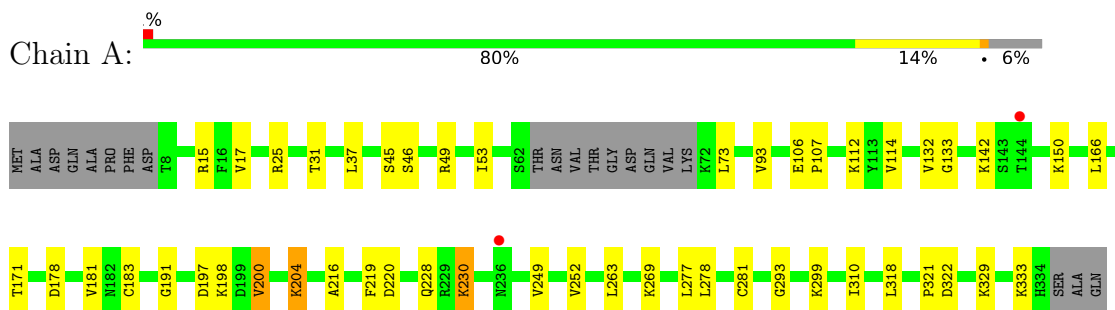
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	47	Total	O	0	0
			47	47		

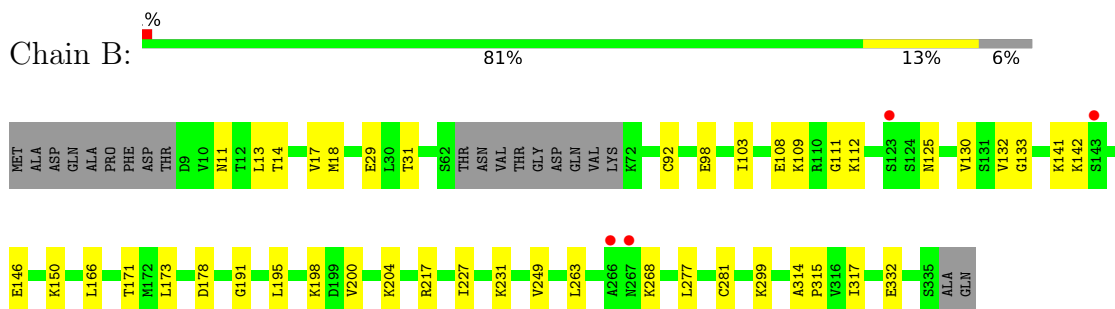
3 Residue-property plots

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

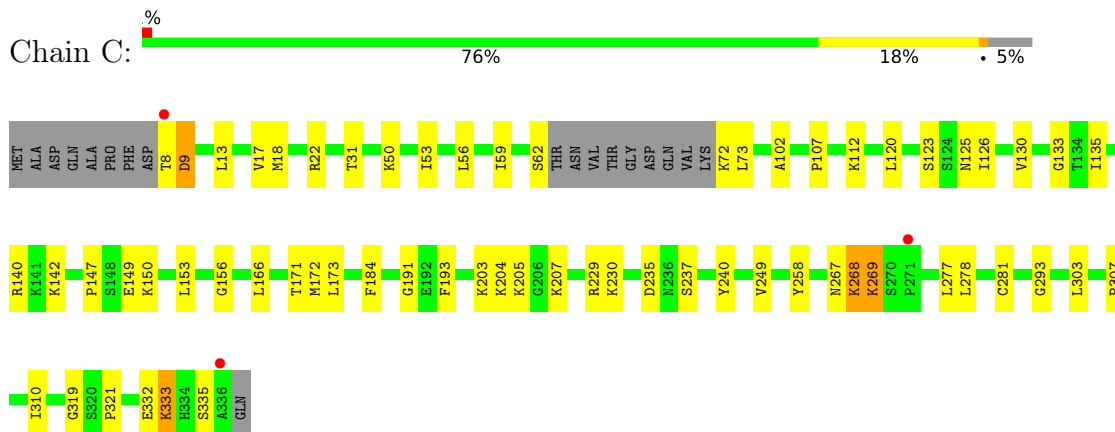
• Molecule 1: Fructose-1,6-bisphosphatase 1



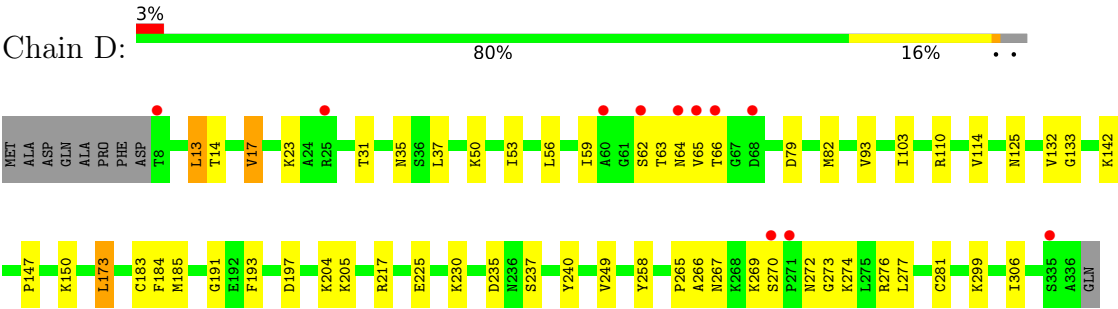
• Molecule 1: Fructose-1,6-bisphosphatase 1



• Molecule 1: Fructose-1,6-bisphosphatase 1



• Molecule 1: Fructose-1,6-bisphosphatase 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	67.08Å 143.33Å 73.49Å 90.00° 108.14° 90.00°	Depositor
Resolution (Å)	47.67 – 2.76 47.67 – 2.76	Depositor EDS
% Data completeness (in resolution range)	99.3 (47.67-2.76) 99.4 (47.67-2.76)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.23 (at 2.77Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.192 , 0.236 0.196 , 0.238	Depositor DCC
R_{free} test set	1717 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	41.4	Xtriage
Anisotropy	0.059	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 45.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	10149	wwPDB-VP
Average B, all atoms (Å ²)	43.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.29% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: 0KI, 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	1.00	0/2477	1.36	1/3346 (0.0%)
1	B	1.00	0/2476	1.35	0/3344
1	C	1.01	1/2488 (0.0%)	1.35	2/3361 (0.1%)
1	D	1.03	0/2555	1.35	0/3454
All	All	1.01	1/9996 (0.0%)	1.35	3/13505 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	319	GLY	C-O	5.66	1.27	1.23

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	322	ASP	CA-CB-CG	5.32	117.92	112.60
1	C	267	ASN	CA-CB-CG	5.14	117.74	112.60
1	C	9	ASP	CA-CB-CG	5.05	117.65	112.60

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	2434	0	2476	18	0
1	B	2433	0	2474	12	0
1	C	2445	0	2486	28	0
1	D	2511	0	2553	20	0
2	A	20	0	0	0	0
2	B	20	0	0	0	0
2	C	20	0	0	0	0
2	D	20	0	0	0	0
3	A	20	0	9	0	0
3	B	20	0	9	0	0
3	C	20	0	10	1	0
3	D	20	0	10	0	0
4	A	32	0	0	0	0
4	B	38	0	0	0	0
4	C	49	0	0	3	0
4	D	47	0	0	2	0
All	All	10149	0	10027	74	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (74) 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:C:277:LEU:HA	1:C:281:CYS:HB2	1.68	0.75
1:A:277:LEU:HA	1:A:281:CYS:HB2	1.72	0.70
1:B:133:GLY:HA3	1:B:249:VAL:HG21	1.73	0.69
1:D:277:LEU:HA	1:D:281:CYS:HB2	1.81	0.63
1:D:183:CYS:HB2	1:D:197:ASP:HB2	1.81	0.61
1:C:72:LYS:N	4:C:503:HOH:O	2.34	0.60
1:D:13:LEU:HD11	1:D:173:LEU:HD22	1.84	0.59
1:C:133:GLY:HA3	1:C:249:VAL:HG21	1.85	0.58
1:A:191:GLY:HA3	1:C:191:GLY:HA3	1.86	0.58
1:C:153:LEU:O	1:C:307:PRO:HD2	2.05	0.57
1:D:272:ASN:HA	4:D:509:HOH:O	2.04	0.56
1:B:191:GLY:HA3	1:D:191:GLY:HA3	1.89	0.55
1:A:17:VAL:HG12	1:A:31:THR:HG23	1.90	0.54
1:A:45:SER:O	1:A:49:ARG:HG2	2.06	0.54
1:C:102:ALA:HB3	1:C:149:GLU:HG2	1.91	0.52
1:C:166:LEU:O	1:C:171:THR:HA	2.11	0.50
1:D:184:PHE:HB3	1:D:193:PHE:HB3	1.92	0.50
1:D:14:THR:HA	1:D:35:ASN:HD21	1.75	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:50:LYS:HG3	1:D:185:MET:HE3	1.94	0.50
1:A:278:LEU:HD12	1:A:310:ILE:HA	1.94	0.49
1:D:266:ALA:HB2	1:D:273:GLY:H	1.78	0.49
1:D:110:ARG:HD3	1:D:147:PRO:HG2	1.96	0.48
1:C:17:VAL:HG12	1:C:31:THR:HA	1.96	0.48
1:B:263:LEU:HD23	1:B:317:ILE:HD12	1.96	0.47
1:A:216:ALA:HA	1:A:219:PHE:CD1	2.49	0.47
1:C:269:LYS:HE3	1:C:269:LYS:HB3	1.65	0.47
1:D:82:MET:HE1	1:D:103:ILE:HG21	1.97	0.46
1:D:133:GLY:HA3	1:D:249:VAL:HG21	1.97	0.46
1:A:93:VAL:HB	1:A:114:VAL:HG13	1.98	0.46
1:C:8:THR:N	4:C:506:HOH:O	2.48	0.46
1:A:230:LYS:HA	1:A:230:LYS:HD3	1.61	0.46
1:C:333:LYS:HE2	1:C:333:LYS:HB3	1.64	0.46
1:C:156:GLY:HA3	1:C:303:LEU:HD22	1.98	0.46
3:C:402:FBP:O2	3:C:402:FBP:O3P	2.34	0.46
1:B:227:ILE:HG22	1:B:231:LYS:HD2	1.99	0.44
1:D:79:ASP:OD1	4:D:501:HOH:O	2.21	0.44
1:D:230:LYS:HB3	1:D:240:TYR:HB2	1.98	0.44
1:A:53:ILE:HD12	1:A:53:ILE:HA	1.93	0.44
1:C:73:LEU:HD23	1:C:73:LEU:HA	1.84	0.44
1:C:123:SER:HA	1:C:126:ILE:HB	2.00	0.44
1:C:184:PHE:HB3	1:C:193:PHE:HB3	2.00	0.44
1:C:278:LEU:HD12	1:C:310:ILE:HA	2.00	0.44
1:A:181:VAL:HB	1:A:200:VAL:HG22	2.00	0.43
1:C:13:LEU:O	1:C:17:VAL:HG23	2.18	0.43
1:C:235:ASP:OD2	1:C:237:SER:HB3	2.18	0.43
1:C:293:GLY:HA2	1:C:321:PRO:HD3	2.00	0.43
1:A:183:CYS:HB2	1:A:197:ASP:HB2	2.00	0.43
1:B:125:ASN:O	1:B:130:VAL:HG22	2.19	0.43
1:C:258:TYR:OH	1:D:125:ASN:HA	2.19	0.42
1:A:73:LEU:HD23	1:A:73:LEU:HA	1.87	0.42
1:A:133:GLY:HA3	1:A:249:VAL:HG21	2.01	0.42
1:C:125:ASN:HA	1:D:258:TYR:OH	2.19	0.42
1:D:270:SER:HB3	1:D:273:GLY:O	2.20	0.42
1:B:166:LEU:O	1:B:171:THR:HA	2.20	0.42
1:A:166:LEU:O	1:A:171:THR:HA	2.20	0.42
1:B:14:THR:HG22	1:B:18:MET:HE2	2.00	0.42
1:C:229:ARG:HD2	4:C:513:HOH:O	2.19	0.42
1:C:230:LYS:HB3	1:C:240:TYR:HB2	2.02	0.42
1:C:268:LYS:HE2	1:C:268:LYS:HB3	1.81	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:204:LYS:HA	1:A:321:PRO:HG2	2.02	0.41
1:B:92:CYS:HB3	1:B:111:GLY:O	2.20	0.41
1:B:277:LEU:HA	1:B:281:CYS:HB2	2.02	0.41
1:A:252:VAL:HG22	1:A:318:LEU:HD11	2.03	0.41
1:B:314:ALA:HA	1:B:315:PRO:HD3	1.96	0.41
1:B:17:VAL:HG23	1:B:31:THR:HG23	2.02	0.41
1:A:278:LEU:HD23	1:A:278:LEU:HA	1.89	0.41
1:A:293:GLY:HA2	1:A:321:PRO:HD3	2.03	0.41
1:C:17:VAL:CG1	1:C:31:THR:HA	2.51	0.41
1:D:50:LYS:HD2	1:D:53:ILE:HD12	2.03	0.41
1:C:102:ALA:CB	1:C:149:GLU:HG2	2.50	0.41
1:D:93:VAL:HB	1:D:114:VAL:HG13	2.01	0.41
1:B:29:GLU:OE1	1:B:112:LYS:HG2	2.21	0.40
1:D:17:VAL:HG13	1:D:31:THR:HA	2.02	0.40
1:C:120:LEU:HD12	1:C:120:LEU:HA	1.89	0.40

There are no symmetry-related clashes.

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	314/338 (93%)	300 (96%)	14 (4%)	0	100	100
1	B	314/338 (93%)	306 (98%)	8 (2%)	0	100	100
1	C	316/338 (94%)	297 (94%)	18 (6%)	1 (0%)	36	56
1	D	327/338 (97%)	305 (93%)	19 (6%)	3 (1%)	14	28
All	All	1271/1352 (94%)	1208 (95%)	59 (5%)	4 (0%)	36	56

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	268	LYS
1	D	269	LYS
1	D	265	PRO
1	D	267	ASN

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	265/281 (94%)	243 (92%)	22 (8%)	10	19
1	B	265/281 (94%)	244 (92%)	21 (8%)	11	21
1	C	266/281 (95%)	241 (91%)	25 (9%)	8	16
1	D	274/281 (98%)	249 (91%)	25 (9%)	9	17
All	All	1070/1124 (95%)	977 (91%)	93 (9%)	9	18

All (93) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	15	ARG
1	A	25	ARG
1	A	37	LEU
1	A	46	SER
1	A	106	GLU
1	A	107	PRO
1	A	112	LYS
1	A	132	VAL
1	A	142	LYS
1	A	150	LYS
1	A	178	ASP
1	A	198	LYS
1	A	200	VAL
1	A	204	LYS
1	A	220	ASP
1	A	228	GLN
1	A	230	LYS
1	A	263	LEU

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Mol	Chain	Res	Type
1	A	269	LYS
1	A	299	LYS
1	A	329	LYS
1	A	333	LYS
1	B	11	ASN
1	B	13	LEU
1	B	98	GLU
1	B	103	ILE
1	B	108	GLU
1	B	109	LYS
1	B	132	VAL
1	B	141	LYS
1	B	142	LYS
1	B	146	GLU
1	B	150	LYS
1	B	173	LEU
1	B	178	ASP
1	B	195	LEU
1	B	198	LYS
1	B	200	VAL
1	B	204	LYS
1	B	217	ARG
1	B	268	LYS
1	B	299	LYS
1	B	332	GLU
1	C	9	ASP
1	C	18	MET
1	C	22	ARG
1	C	53	ILE
1	C	56	LEU
1	C	59	ILE
1	C	62	SER
1	C	107	PRO
1	C	112	LYS
1	C	130	VAL
1	C	135	ILE
1	C	140	ARG
1	C	142	LYS
1	C	147	PRO
1	C	150	LYS
1	C	172	MET
1	C	173	LEU

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Mol	Chain	Res	Type
1	C	203	LYS
1	C	204	LYS
1	C	205	LYS
1	C	207	LYS
1	C	269	LYS
1	C	332	GLU
1	C	333	LYS
1	C	335	SER
1	D	13	LEU
1	D	17	VAL
1	D	23	LYS
1	D	37	LEU
1	D	56	LEU
1	D	59	ILE
1	D	62	SER
1	D	63	THR
1	D	64	ASN
1	D	65	VAL
1	D	66	THR
1	D	132	VAL
1	D	142	LYS
1	D	150	LYS
1	D	173	LEU
1	D	204	LYS
1	D	205	LYS
1	D	217	ARG
1	D	225	GLU
1	D	235	ASP
1	D	237	SER
1	D	274	LYS
1	D	276	ARG
1	D	299	LYS
1	D	306	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	83	ASN
1	A	154	GLN
1	A	158	ASN
1	A	228	GLN
1	A	236	ASN

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Mol	Chain	Res	Type
1	B	32	GLN
1	B	158	ASN
1	B	272	ASN
1	C	32	GLN
1	C	83	ASN
1	C	334	HIS
1	D	35	ASN
1	D	64	ASN
1	D	69	GLN
1	D	154	GLN
1	D	228	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

8 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
3	FBP	C	402	-	18,20,20	3.19	8 (44%)	21,32,32	0.91	0
2	OKI	D	401	-	21,21,21	1.78	6 (28%)	28,30,30	0.91	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	OKI	C	401	-	21,21,21	1.86	5 (23%)	28,30,30	1.36	6 (21%)
3	FBP	B	402	-	18,20,20	3.27	7 (38%)	21,32,32	1.14	2 (9%)
3	FBP	D	402	-	18,20,20	3.19	7 (38%)	21,32,32	0.89	0
3	FBP	A	402	-	18,20,20	3.26	7 (38%)	21,32,32	0.84	1 (4%)
2	OKI	A	401	-	21,21,21	1.92	6 (28%)	28,30,30	1.45	5 (17%)
2	OKI	B	401	-	21,21,21	1.84	5 (23%)	28,30,30	1.19	2 (7%)

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	C	402	-	-	3/13/32/32	0/1/1/1
2	OKI	D	401	-	-	1/11/11/11	0/2/2/2
2	OKI	C	401	-	-	2/11/11/11	0/2/2/2
3	FBP	B	402	-	-	1/13/32/32	0/1/1/1
3	FBP	D	402	-	-	4/13/32/32	0/1/1/1
3	FBP	A	402	-	-	2/13/32/32	0/1/1/1
2	OKI	A	401	-	-	7/11/11/11	0/2/2/2
2	OKI	B	401	-	-	11/11/11/11	0/2/2/2

All (51) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	402	FBP	O5-C2	-8.92	1.29	1.43
3	B	402	FBP	O5-C2	-8.75	1.29	1.43
3	D	402	FBP	O5-C2	-8.11	1.30	1.43
3	C	402	FBP	O5-C2	-7.57	1.31	1.43
3	A	402	FBP	C4-C3	-6.15	1.28	1.53
3	C	402	FBP	C4-C3	-6.09	1.28	1.53
3	D	402	FBP	C4-C3	-6.03	1.29	1.53
3	B	402	FBP	C4-C3	-6.00	1.29	1.53
2	B	401	OKI	C7-N1	-5.19	1.31	1.38
3	C	402	FBP	O5-C5	5.19	1.55	1.43
2	C	401	OKI	C7-N1	-4.82	1.31	1.38
3	D	402	FBP	O5-C5	4.74	1.54	1.43
3	A	402	FBP	O5-C5	4.61	1.54	1.43
3	B	402	FBP	O5-C5	4.61	1.54	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	402	FBP	C6-C5	-4.52	1.38	1.51
2	A	401	OKI	C7-C14	4.48	1.55	1.48
3	D	402	FBP	C6-C5	-4.46	1.38	1.51
2	D	401	OKI	C7-N1	-4.33	1.32	1.38
3	C	402	FBP	C6-C5	-4.29	1.38	1.51
3	A	402	FBP	C6-C5	-4.15	1.39	1.51
3	B	402	FBP	O4-C4	4.06	1.53	1.43
2	C	401	OKI	C5-C4	-4.04	1.36	1.41
2	A	401	OKI	C7-N1	-3.83	1.32	1.38
3	C	402	FBP	O4-C4	3.66	1.52	1.43
3	D	402	FBP	O4-C4	3.50	1.51	1.43
3	A	402	FBP	O4-C4	3.08	1.50	1.43
3	C	402	FBP	O3-C3	2.88	1.48	1.42
2	C	401	OKI	C7-C14	2.87	1.52	1.48
2	A	401	OKI	C5-C4	-2.85	1.37	1.41
2	D	401	OKI	C5-C4	-2.80	1.38	1.41
2	D	401	OKI	C4-N1	-2.73	1.32	1.38
3	A	402	FBP	O3-C3	2.67	1.48	1.42
3	C	402	FBP	C4-C5	2.66	1.59	1.53
2	B	401	OKI	C3-CL1	2.64	1.79	1.73
2	A	401	OKI	C12-C13	2.55	1.56	1.50
2	B	401	OKI	C7-C14	2.54	1.52	1.48
3	B	402	FBP	O3-C3	2.53	1.47	1.42
3	D	402	FBP	C4-C5	2.51	1.59	1.53
2	A	401	OKI	C4-N1	-2.46	1.33	1.38
2	D	401	OKI	C7-C14	2.44	1.52	1.48
3	D	402	FBP	O3-C3	2.44	1.47	1.42
2	C	401	OKI	C4-N1	-2.41	1.33	1.38
3	B	402	FBP	C4-C5	2.36	1.59	1.53
2	D	401	OKI	C3-CL1	2.33	1.79	1.73
3	A	402	FBP	C4-C5	2.32	1.58	1.53
2	B	401	OKI	C11-C8	2.27	1.54	1.51
2	B	401	OKI	C4-N1	-2.27	1.33	1.38
2	A	401	OKI	C3-CL1	2.16	1.78	1.73
2	D	401	OKI	O3-C14	2.08	1.27	1.22
2	C	401	OKI	O4-C14	-2.07	1.24	1.30
3	C	402	FBP	P1-O1	2.03	1.66	1.60

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	401	OKI	C4-N1-C7	3.22	112.18	108.77

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	401	0KI	O4-C14-C7	3.07	121.59	116.73
2	A	401	0KI	O4-C14-O3	-3.05	116.63	123.90
2	C	401	0KI	C8-C7-N1	-2.96	106.92	109.59
3	B	402	FBP	O1-P1-O1P	2.83	114.10	106.44
2	C	401	0KI	O4-C14-O3	-2.78	117.29	123.90
2	C	401	0KI	C4-N1-C7	2.72	111.65	108.77
2	A	401	0KI	C8-C7-N1	-2.59	107.25	109.59
2	C	401	0KI	O4-C14-C7	2.45	120.61	116.73
2	C	401	0KI	C3-C4-N1	2.17	131.52	128.90
2	A	401	0KI	O3-C14-C7	2.17	123.97	120.20
2	A	401	0KI	C3-C2-C1	-2.08	119.11	120.46
2	B	401	0KI	C2-C3-C4	-2.08	119.08	121.86
3	B	402	FBP	O6P-P2-O5P	2.04	115.44	107.80
2	C	401	0KI	C12-C11-C8	-2.03	106.97	112.54
3	A	402	FBP	O3P-P1-O1	2.03	111.95	106.67

There are no chirality outliers.

All (31) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	0KI	O3-C14-C7-C8
2	A	401	0KI	O4-C14-C7-C8
2	A	401	0KI	O3-C14-C7-N1
2	A	401	0KI	O4-C14-C7-N1
2	B	401	0KI	O3-C14-C7-C8
2	B	401	0KI	O4-C14-C7-C8
2	B	401	0KI	O3-C14-C7-N1
2	B	401	0KI	O4-C14-C7-N1
2	B	401	0KI	C12-C11-C8-C5
2	B	401	0KI	C12-C11-C8-C7
3	A	402	FBP	O1-C1-C2-O5
3	D	402	FBP	C1-O1-P1-O3P
3	C	402	FBP	C4-C5-C6-O6
3	C	402	FBP	O5-C5-C6-O6
2	B	401	0KI	C8-C11-C12-C13
3	D	402	FBP	C1-O1-P1-O1P
2	A	401	0KI	C8-C11-C12-C13
3	C	402	FBP	C2-C1-O1-P1
2	D	401	0KI	C8-C11-C12-C13
3	B	402	FBP	C1-O1-P1-O1P
2	B	401	0KI	C11-C12-C13-O2
3	A	402	FBP	O1-C1-C2-C3

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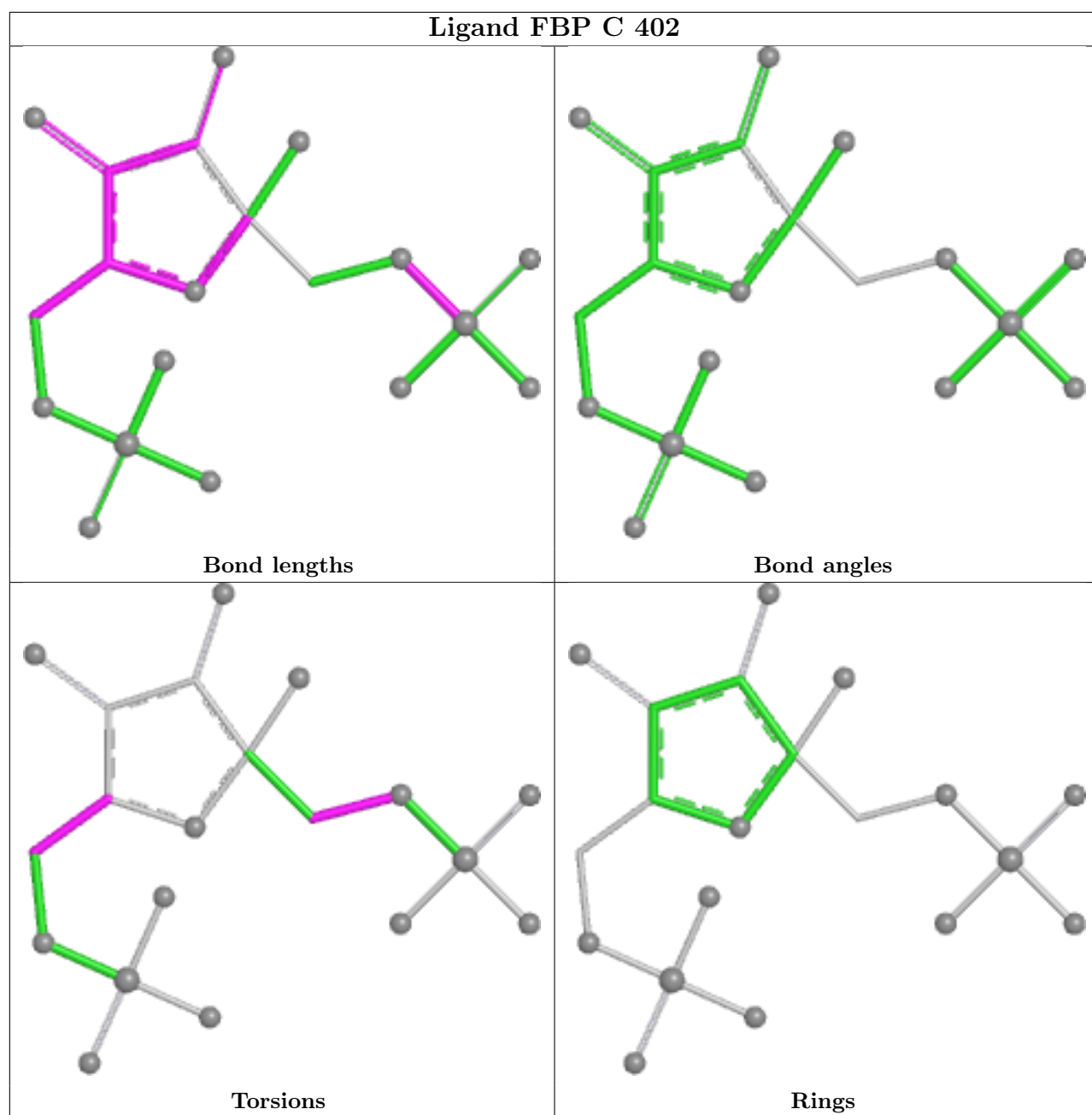
Mol	Chain	Res	Type	Atoms
2	A	401	0KI	C11-C12-C13-O1
2	C	401	0KI	C11-C12-C13-O1
3	D	402	FBP	C1-O1-P1-O2P
2	A	401	0KI	C11-C12-C13-O2
2	B	401	0KI	C11-C12-C13-O1
2	C	401	0KI	C11-C12-C13-O2
3	D	402	FBP	O1-C1-C2-O2
2	B	401	0KI	C6-C1-C9-C10
2	B	401	0KI	C2-C1-C9-C10

There are no ring outliers.

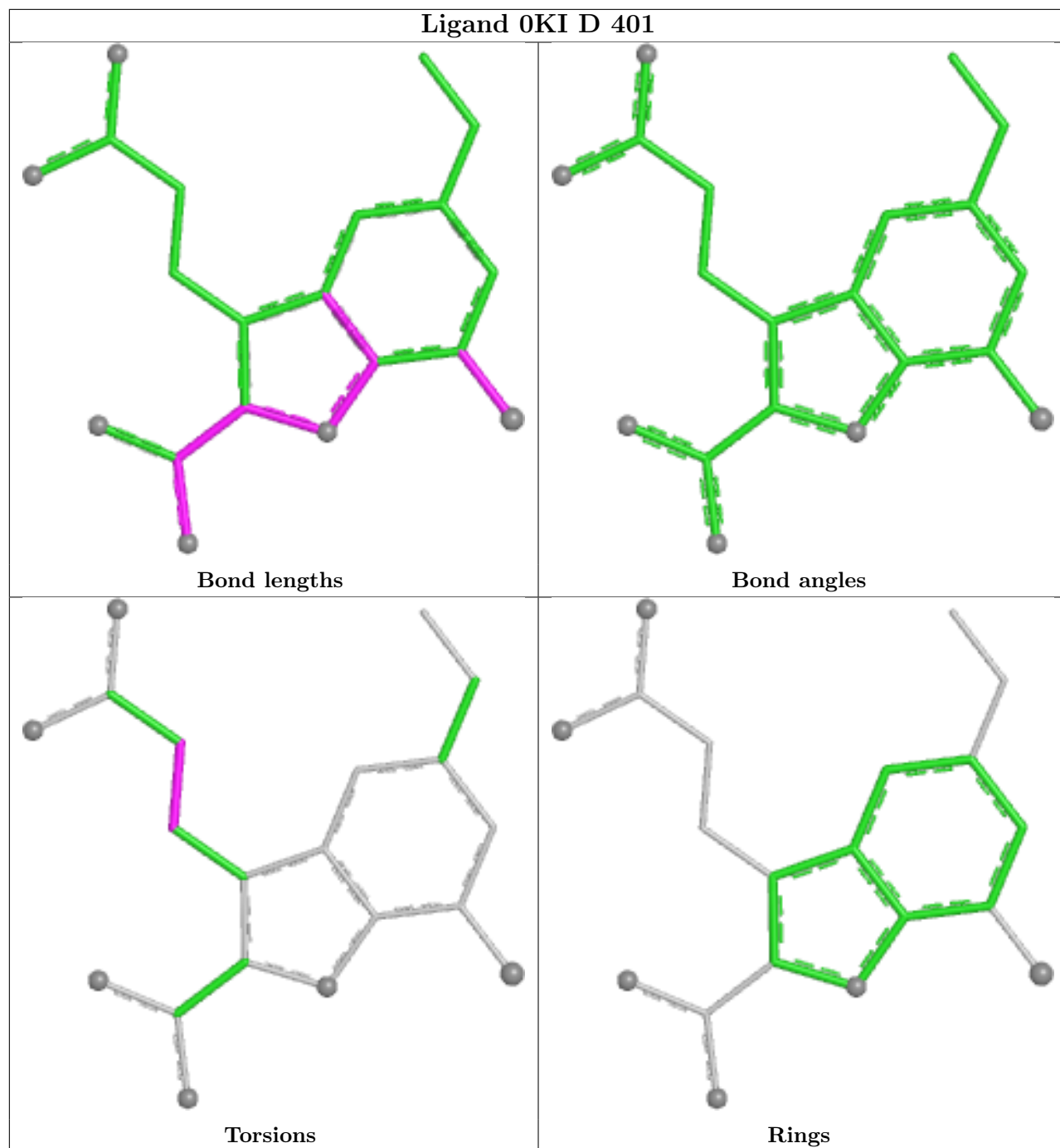
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	402	FBP	1	0

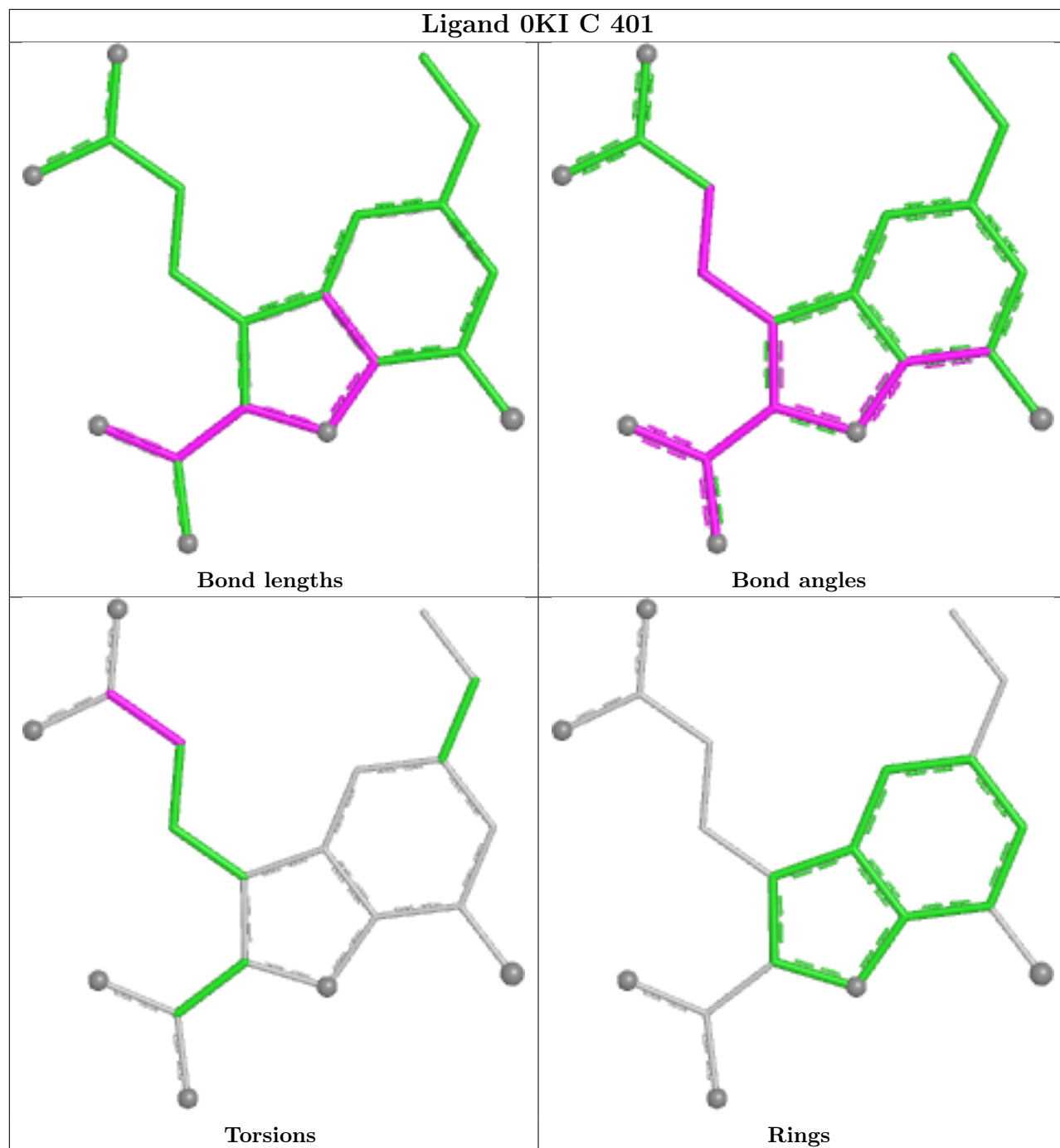
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

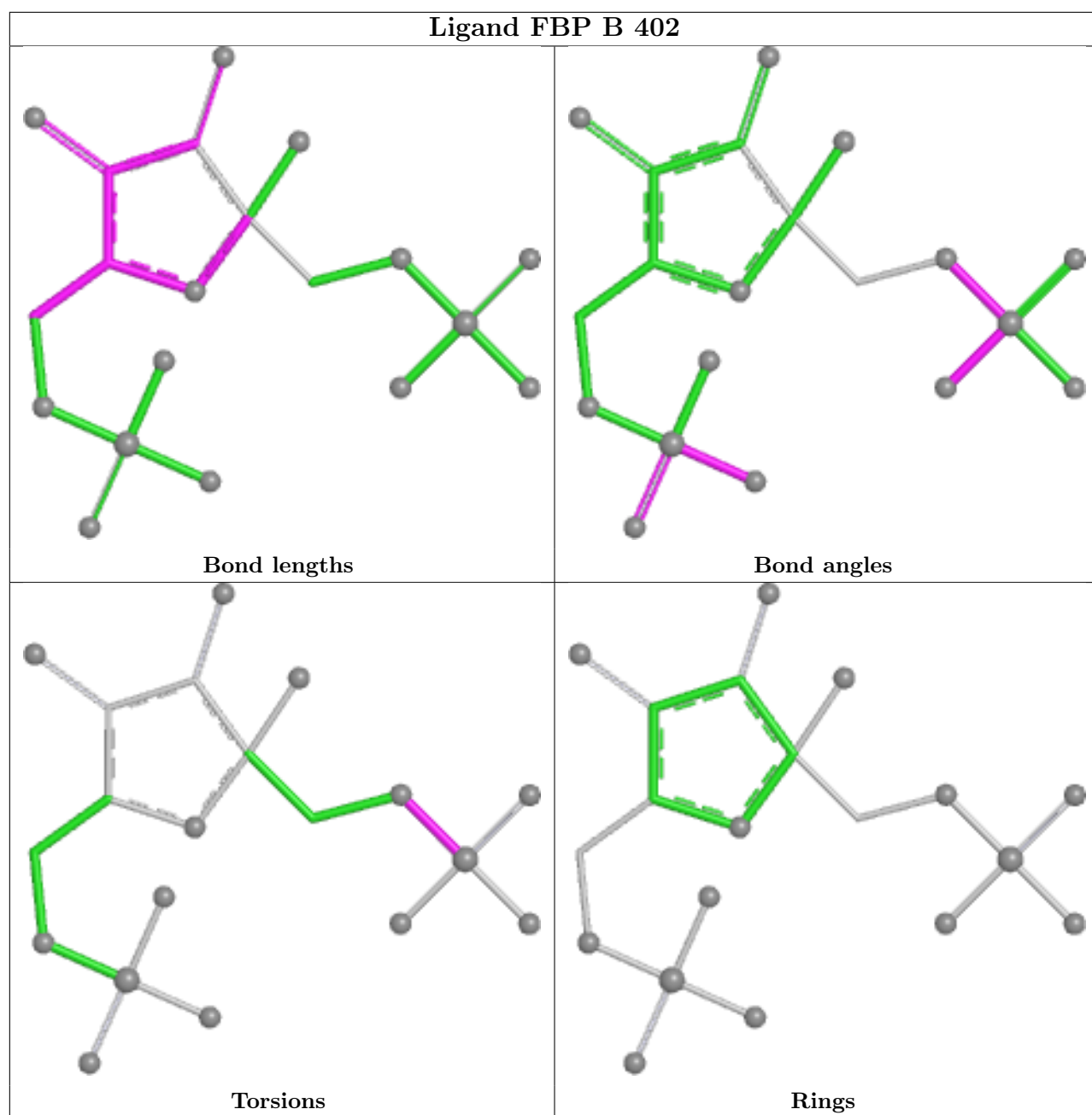


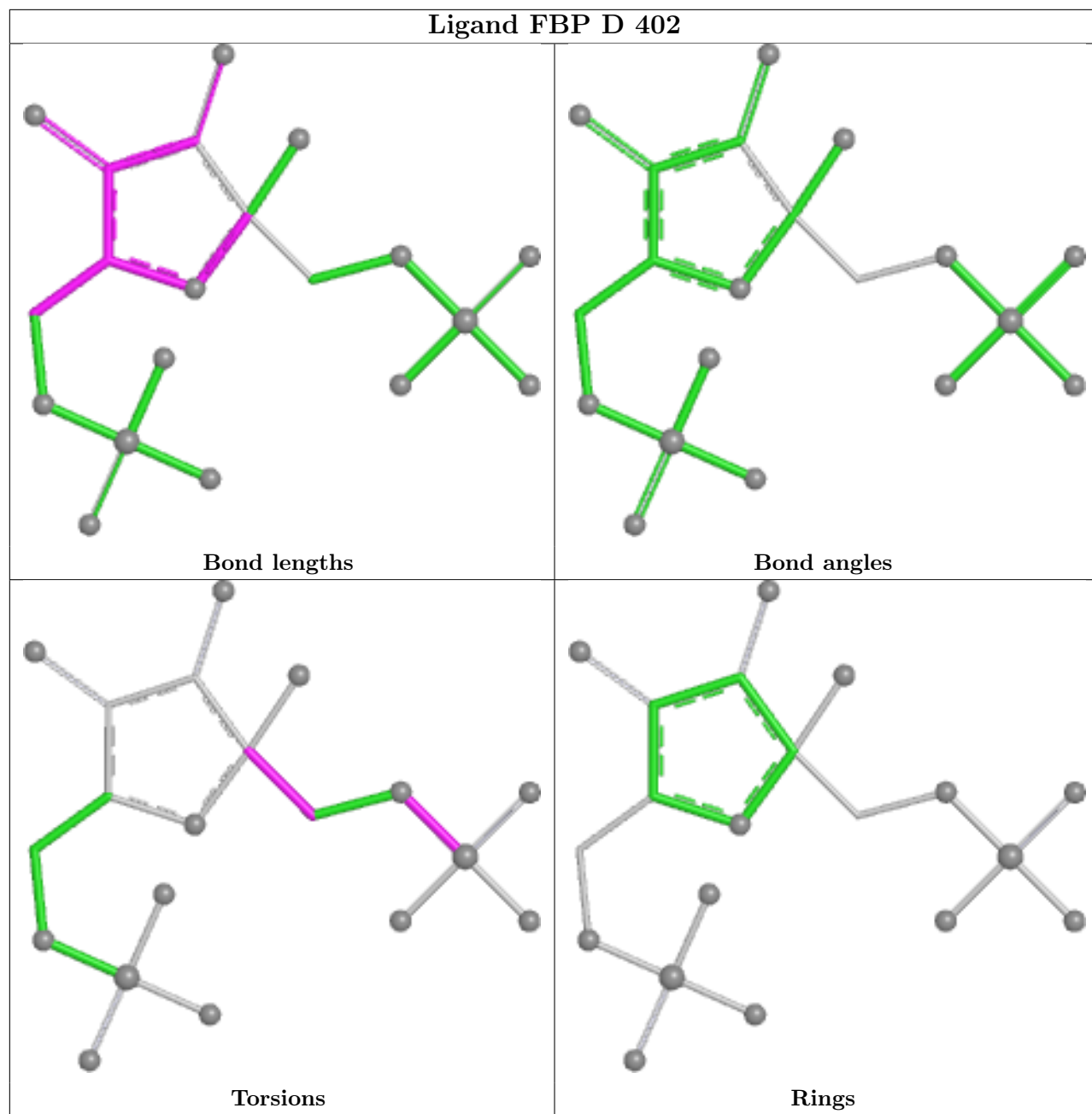
Ligand 0KI D 401

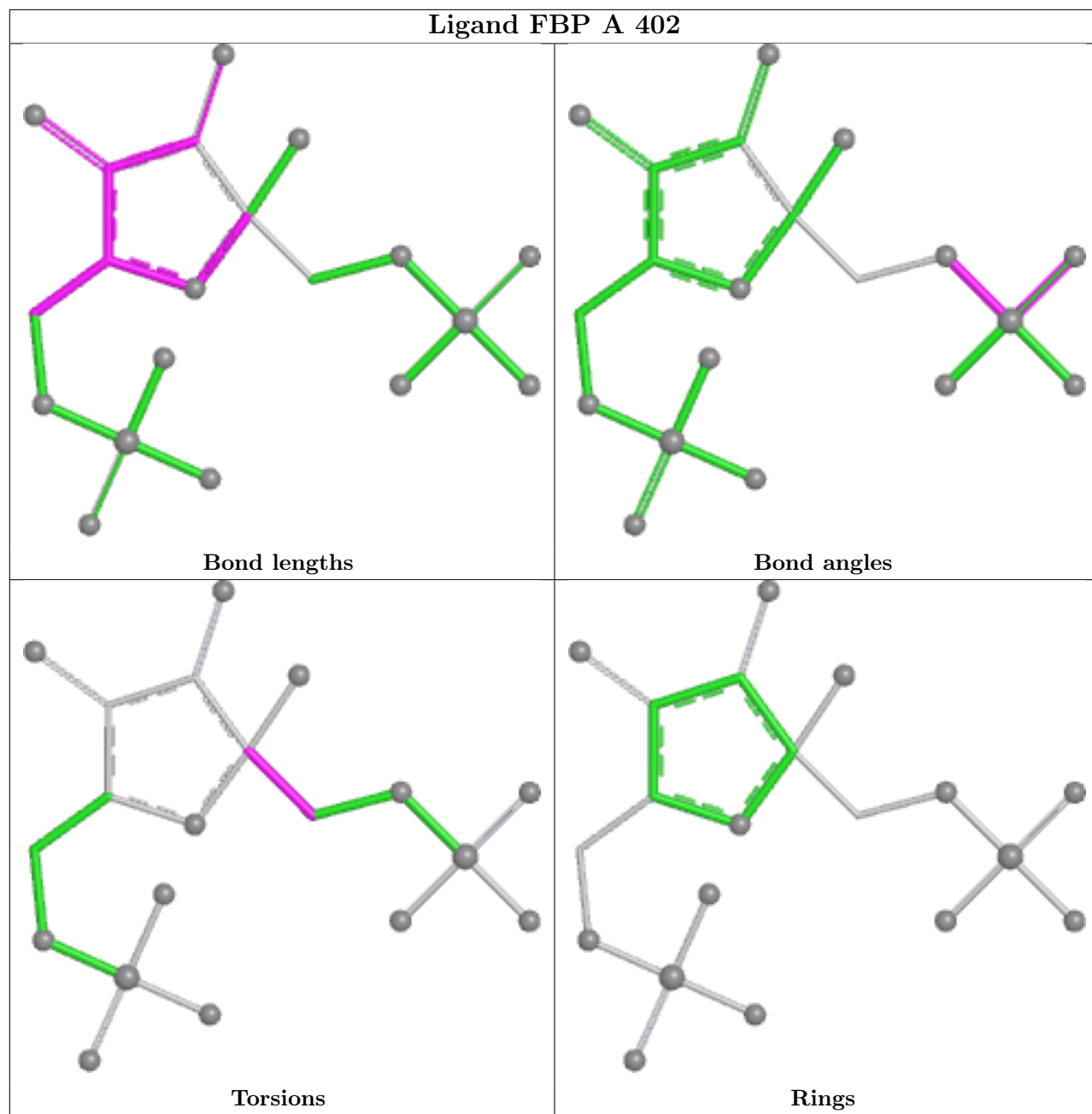


Ligand 0KI C 401

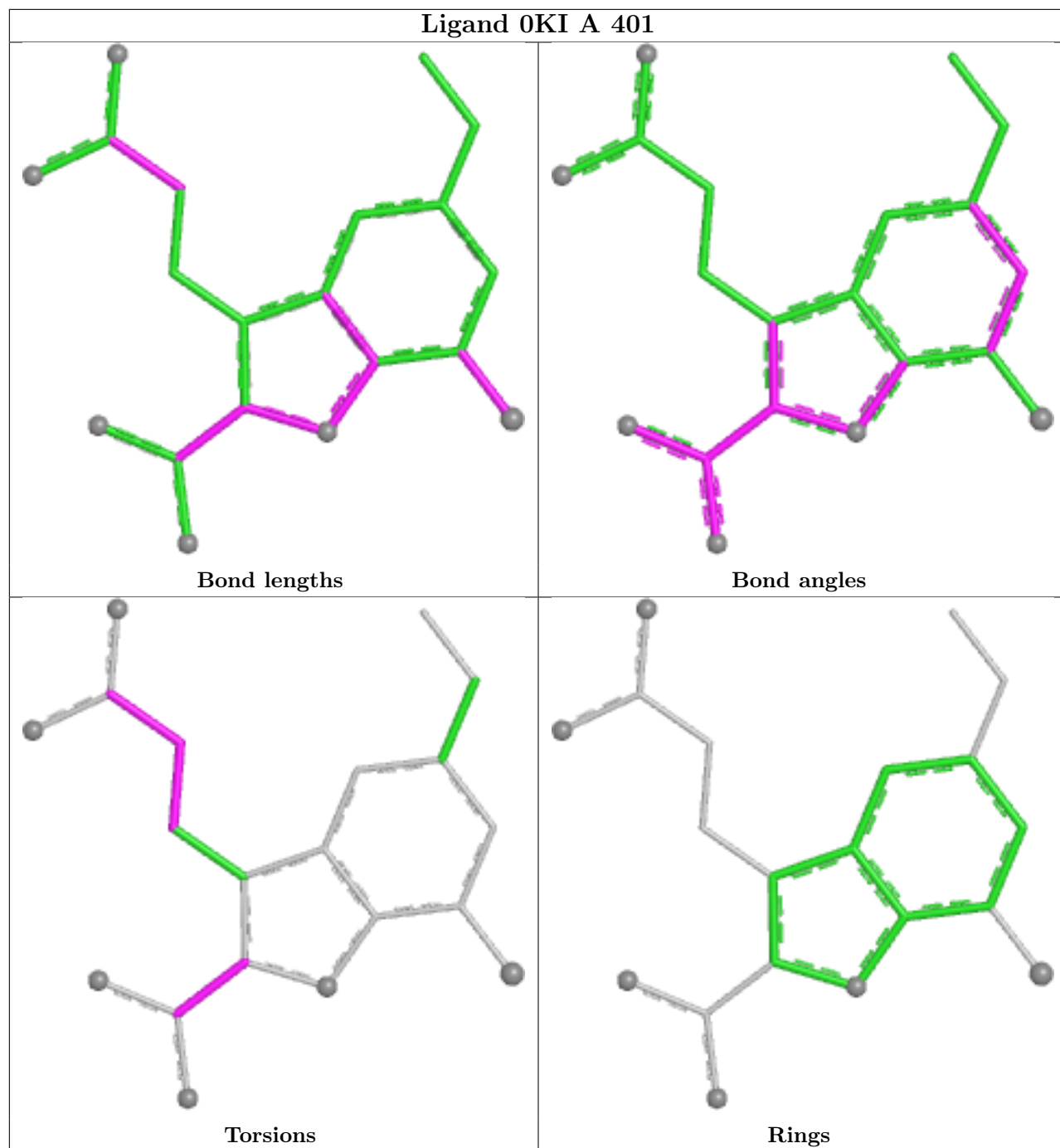


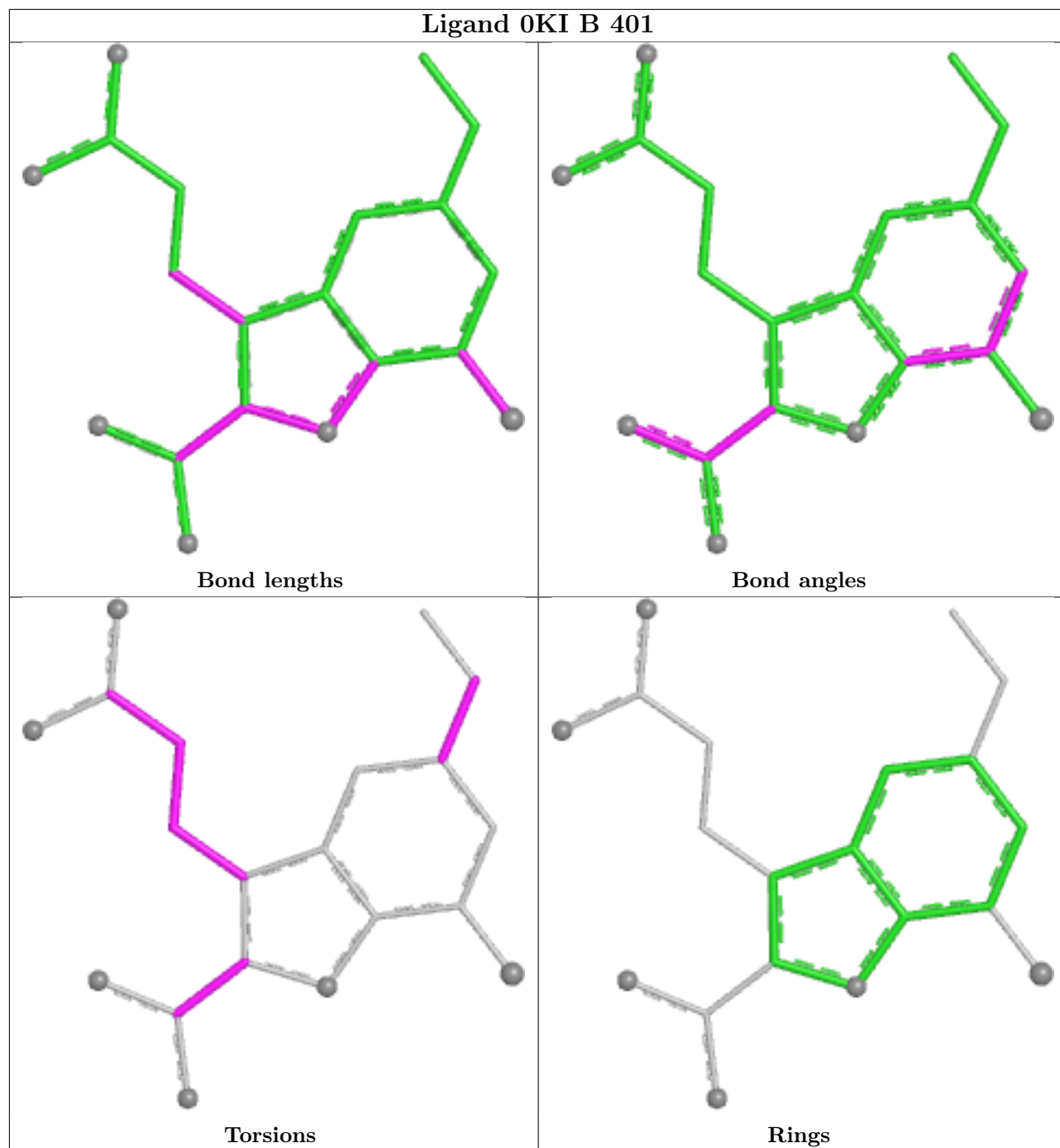






Ligand 0KI A 401





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, 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	318/338 (94%)	0.10	2 (0%) 85 86	23, 42, 70, 91	0
1	B	318/338 (94%)	0.07	4 (1%) 75 75	22, 39, 74, 99	0
1	C	320/338 (94%)	0.06	3 (0%) 81 81	19, 40, 72, 98	0
1	D	329/338 (97%)	0.10	11 (3%) 49 47	21, 38, 80, 123	0
All	All	1285/1352 (95%)	0.08	20 (1%) 70 69	19, 40, 74, 123	0

All (20) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	65	VAL	3.5
1	C	336	ALA	3.1
1	D	62	SER	3.1
1	B	267	ASN	3.0
1	D	68	ASP	2.9
1	C	8	THR	2.9
1	D	64	ASN	2.8
1	B	123	SER	2.8
1	A	236	ASN	2.6
1	B	266	ALA	2.5
1	D	60	ALA	2.4
1	D	271	PRO	2.4
1	D	66	THR	2.4
1	D	8	THR	2.3
1	D	25	ARG	2.2
1	D	335	SER	2.2
1	B	143	SER	2.1
1	A	144	THR	2.1
1	C	271	PRO	2.1
1	D	270	SER	2.0

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](#)

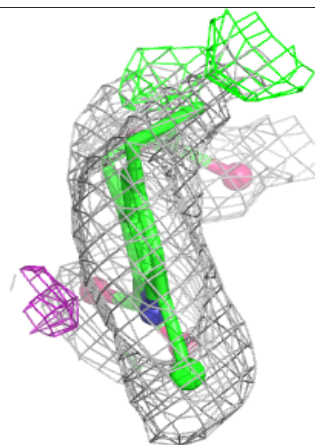
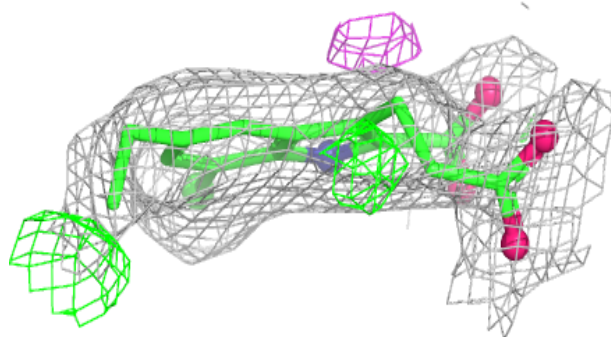
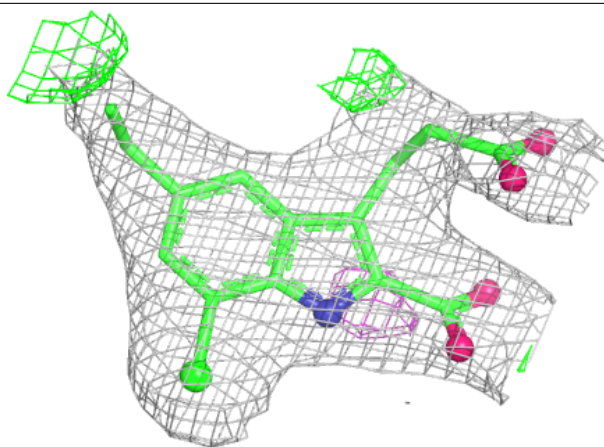
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists 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
2	OKI	A	401	20/20	0.90	0.11	41,46,59,61	0
2	OKI	B	401	20/20	0.93	0.11	38,47,62,62	0
3	FBP	A	402	20/20	0.94	0.08	33,38,47,51	0
2	OKI	D	401	20/20	0.95	0.07	35,38,44,45	0
2	OKI	C	401	20/20	0.95	0.07	33,40,43,47	0
3	FBP	B	402	20/20	0.95	0.07	33,37,46,49	0
3	FBP	C	402	20/20	0.95	0.07	35,40,46,47	0
3	FBP	D	402	20/20	0.96	0.07	35,39,45,51	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.

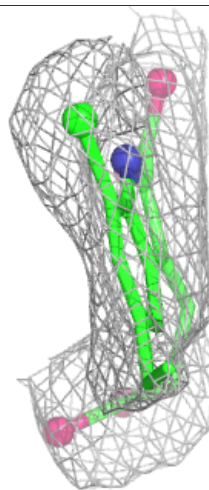
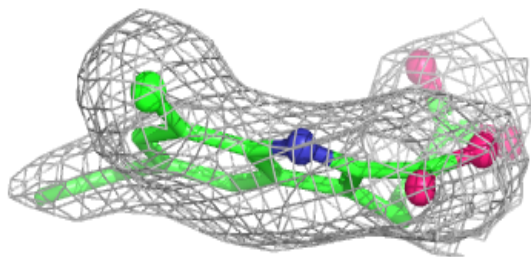
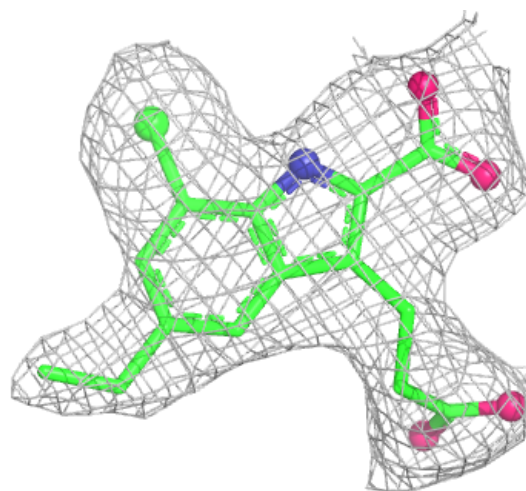
Electron density around 0KI A 401:

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



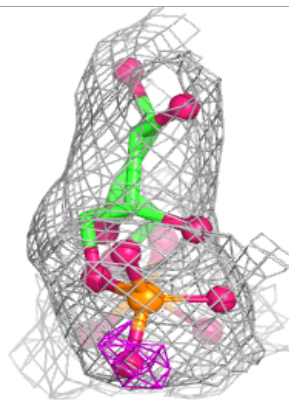
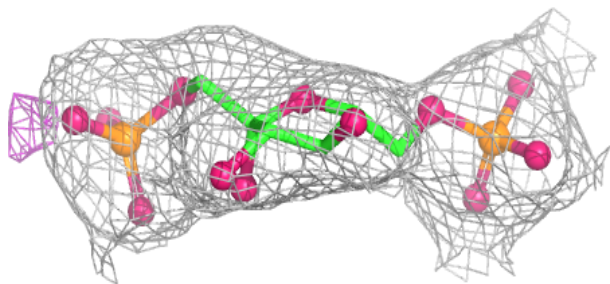
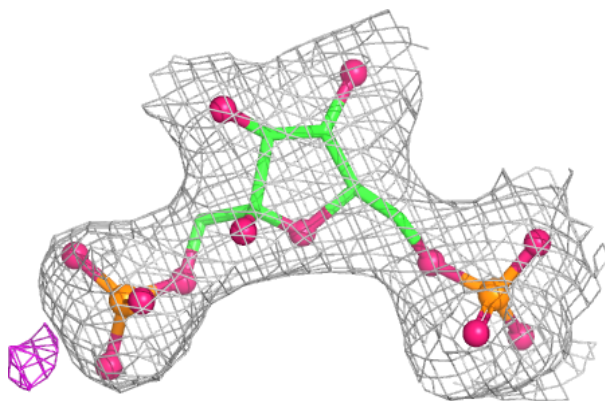
Electron density around 0KI B 401:

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



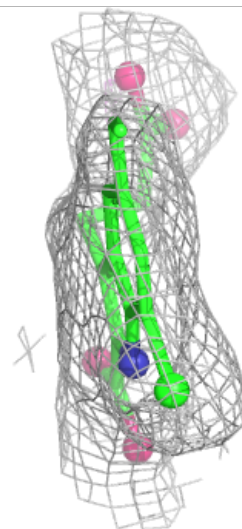
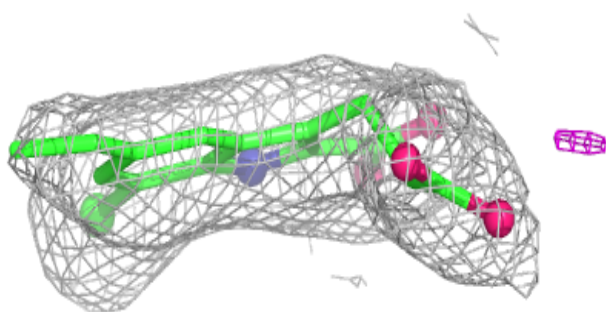
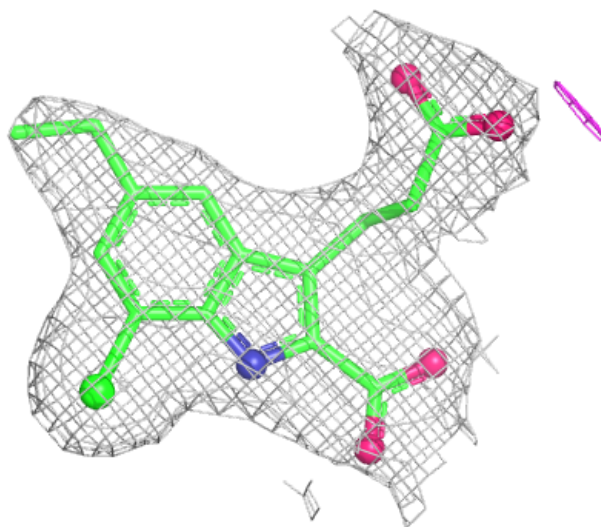
Electron density around FBP A 402:

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



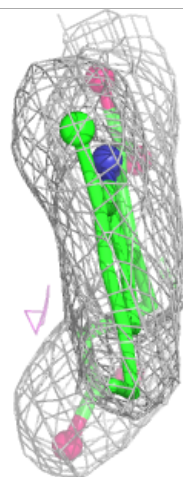
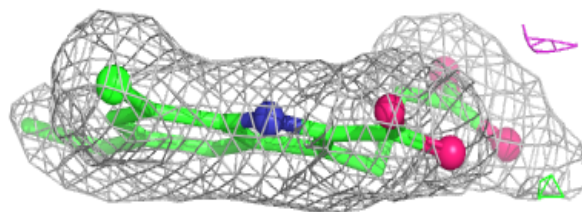
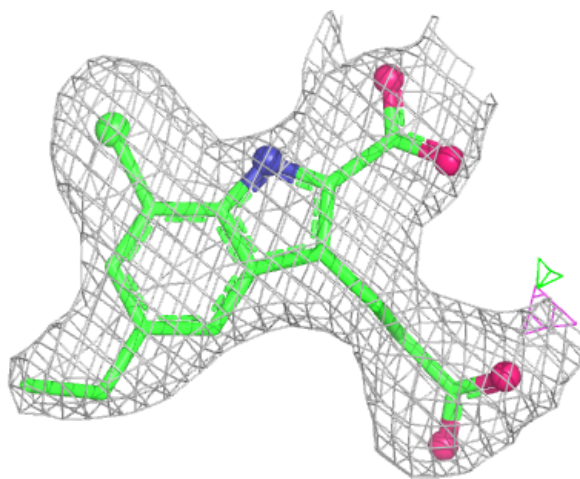
Electron density around 0KI D 401:

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



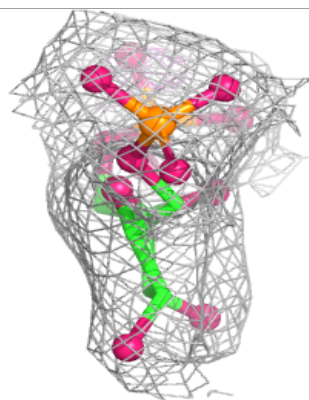
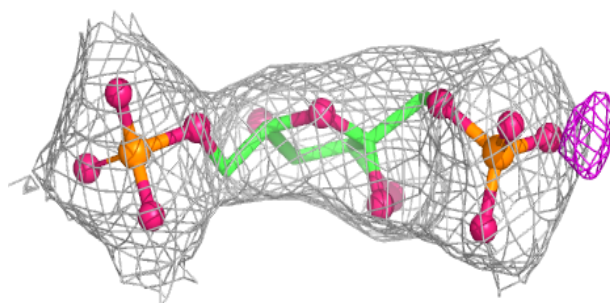
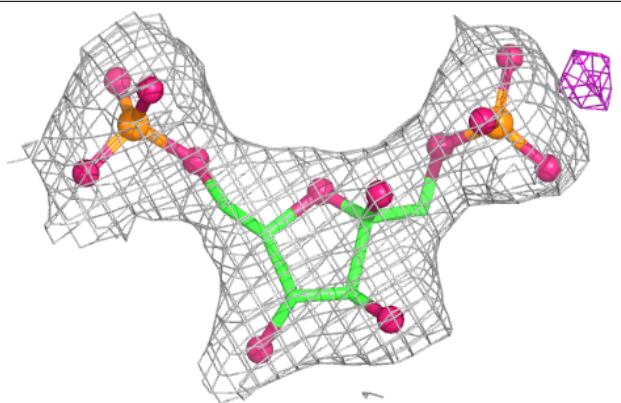
Electron density around 0KI C 401:

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

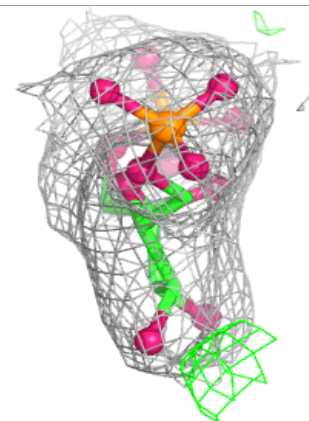
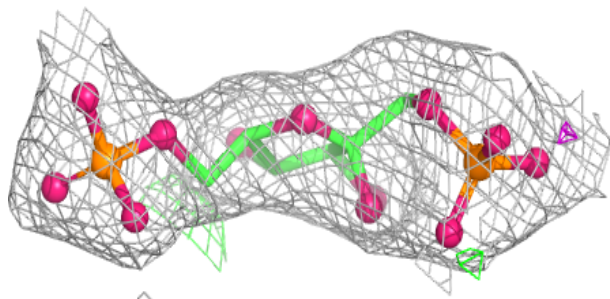
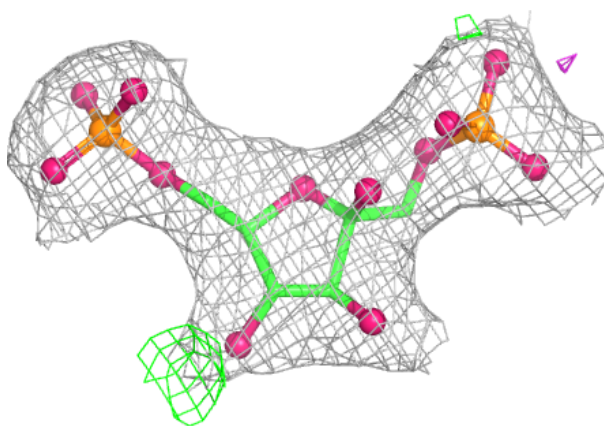


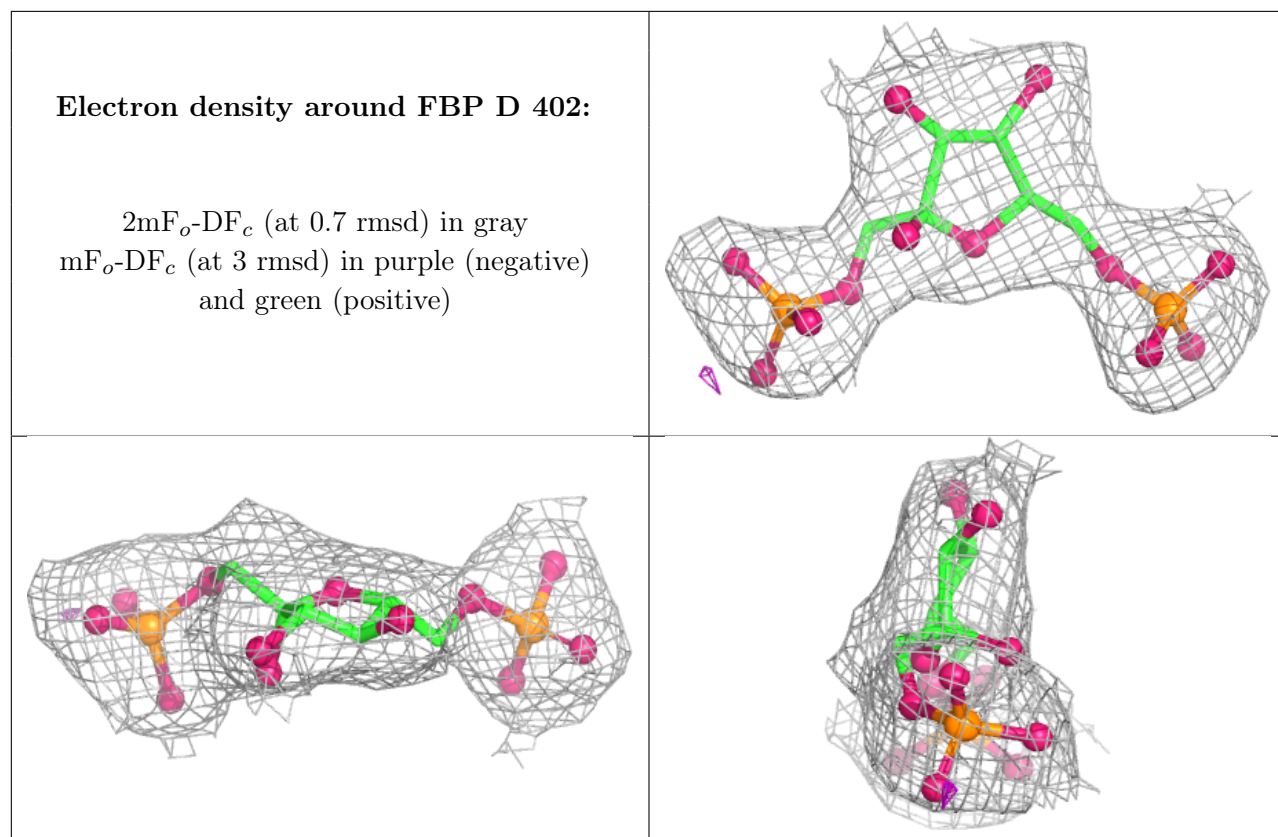
Electron density around FBP B 402:

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

**Electron density around FBP C 402:**

$2mF_o - DF_c$ (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.