Full wwPDB X-ray Structure Validation Report (i)

Jul 10, 2023 – 07:44 pm BST

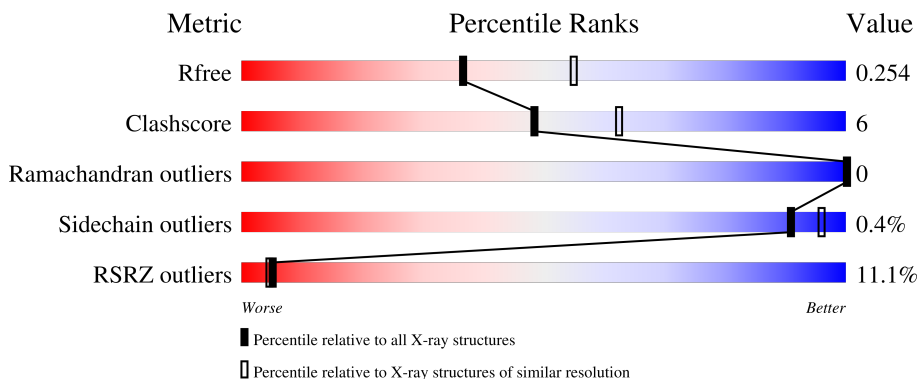|		
PDB ID	:	8PC7
Title	:	STRUCTURE OF ESTER-HYDROLASE EH3 FROM THE METAGENOME OF MARINE SEDIMENTS AT MILAZZO HARBOR (SICILY, ITALY) COMPLEXED WITH A DERIVATIVE OF BIPYRIDINE PHOSPHONATE
Authors	:	Cea-Rama, I.; Sanz-Aparicio, J.
Deposited on	:	2023-06-09
Resolution	:	2.40 Å(reported)

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 2.40 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		0.254
Clashscore		6
Ramachandran outliers		0
Sidechain outliers		0.4%
RSRZ outliers		11.1%

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	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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% 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	368	5% / 79% 12% 9%
1	B	368	6% / 81% 9% 9%
1	C	368	15% / 79% 12% 8%
1	D	368	15% / 80% 11% 9%

2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 10427 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 Esterase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	336	Total	C	N	O	S	0	0	0
			2547	1592	439	492	24			
1	B	334	Total	C	N	O	S	0	0	0
			2529	1582	435	488	24			
1	C	338	Total	C	N	O	S	0	0	0
			2564	1601	441	496	26			
1	D	335	Total	C	N	O	S	0	0	0
			2538	1587	437	490	24			

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-18	MET	-	initiating methionine	UNP A0A2K8JN75
A	-17	HIS	-	expression tag	UNP A0A2K8JN75
A	-16	HIS	-	expression tag	UNP A0A2K8JN75
A	-15	HIS	-	expression tag	UNP A0A2K8JN75
A	-14	HIS	-	expression tag	UNP A0A2K8JN75
A	-13	HIS	-	expression tag	UNP A0A2K8JN75
A	-12	HIS	-	expression tag	UNP A0A2K8JN75
A	-11	HIS	-	expression tag	UNP A0A2K8JN75
A	-10	HIS	-	expression tag	UNP A0A2K8JN75
A	-9	HIS	-	expression tag	UNP A0A2K8JN75
A	-8	HIS	-	expression tag	UNP A0A2K8JN75
A	-7	LEU	-	expression tag	UNP A0A2K8JN75
A	-6	GLU	-	expression tag	UNP A0A2K8JN75
A	-5	VAL	-	expression tag	UNP A0A2K8JN75
A	-4	LEU	-	expression tag	UNP A0A2K8JN75
A	-3	PHE	-	expression tag	UNP A0A2K8JN75
A	-2	GLN	-	expression tag	UNP A0A2K8JN75
A	-1	GLY	-	expression tag	UNP A0A2K8JN75
A	0	PRO	-	expression tag	UNP A0A2K8JN75
A	1	SER	-	expression tag	UNP A0A2K8JN75
A	349	ALA	-	expression tag	UNP A0A2K8JN75

Continued on next page...
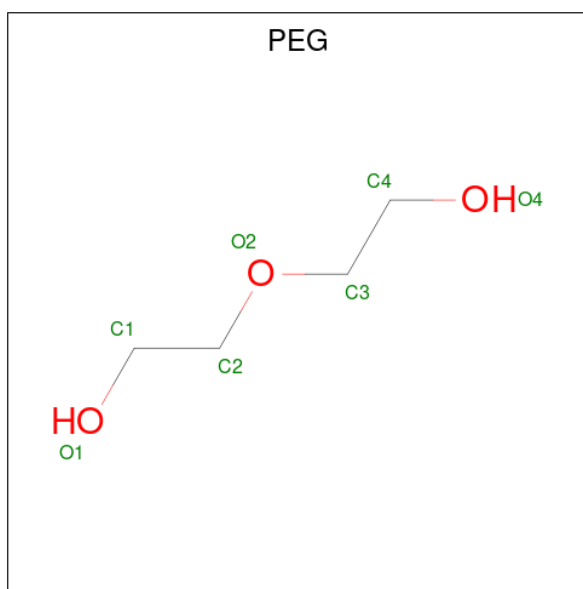
Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	MET	-	initiating methionine	UNP A0A2K8JN75
B	-17	HIS	-	expression tag	UNP A0A2K8JN75
B	-16	HIS	-	expression tag	UNP A0A2K8JN75
B	-15	HIS	-	expression tag	UNP A0A2K8JN75
B	-14	HIS	-	expression tag	UNP A0A2K8JN75
B	-13	HIS	-	expression tag	UNP A0A2K8JN75
B	-12	HIS	-	expression tag	UNP A0A2K8JN75
B	-11	HIS	-	expression tag	UNP A0A2K8JN75
B	-10	HIS	-	expression tag	UNP A0A2K8JN75
B	-9	HIS	-	expression tag	UNP A0A2K8JN75
B	-8	HIS	-	expression tag	UNP A0A2K8JN75
B	-7	LEU	-	expression tag	UNP A0A2K8JN75
B	-6	GLU	-	expression tag	UNP A0A2K8JN75
B	-5	VAL	-	expression tag	UNP A0A2K8JN75
B	-4	LEU	-	expression tag	UNP A0A2K8JN75
B	-3	PHE	-	expression tag	UNP A0A2K8JN75
B	-2	GLN	-	expression tag	UNP A0A2K8JN75
B	-1	GLY	-	expression tag	UNP A0A2K8JN75
B	0	PRO	-	expression tag	UNP A0A2K8JN75
B	1	SER	-	expression tag	UNP A0A2K8JN75
B	349	ALA	-	expression tag	UNP A0A2K8JN75
C	-18	MET	-	initiating methionine	UNP A0A2K8JN75
C	-17	HIS	-	expression tag	UNP A0A2K8JN75
C	-16	HIS	-	expression tag	UNP A0A2K8JN75
C	-15	HIS	-	expression tag	UNP A0A2K8JN75
C	-14	HIS	-	expression tag	UNP A0A2K8JN75
C	-13	HIS	-	expression tag	UNP A0A2K8JN75
C	-12	HIS	-	expression tag	UNP A0A2K8JN75
C	-11	HIS	-	expression tag	UNP A0A2K8JN75
C	-10	HIS	-	expression tag	UNP A0A2K8JN75
C	-9	HIS	-	expression tag	UNP A0A2K8JN75
C	-8	HIS	-	expression tag	UNP A0A2K8JN75
C	-7	LEU	-	expression tag	UNP A0A2K8JN75
C	-6	GLU	-	expression tag	UNP A0A2K8JN75
C	-5	VAL	-	expression tag	UNP A0A2K8JN75
C	-4	LEU	-	expression tag	UNP A0A2K8JN75
C	-3	PHE	-	expression tag	UNP A0A2K8JN75
C	-2	GLN	-	expression tag	UNP A0A2K8JN75
C	-1	GLY	-	expression tag	UNP A0A2K8JN75
C	0	PRO	-	expression tag	UNP A0A2K8JN75
C	1	SER	-	expression tag	UNP A0A2K8JN75
C	349	ALA	-	expression tag	UNP A0A2K8JN75

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
D	-18	MET	-	initiating methionine	UNP A0A2K8JN75
D	-17	HIS	-	expression tag	UNP A0A2K8JN75
D	-16	HIS	-	expression tag	UNP A0A2K8JN75
D	-15	HIS	-	expression tag	UNP A0A2K8JN75
D	-14	HIS	-	expression tag	UNP A0A2K8JN75
D	-13	HIS	-	expression tag	UNP A0A2K8JN75
D	-12	HIS	-	expression tag	UNP A0A2K8JN75
D	-11	HIS	-	expression tag	UNP A0A2K8JN75
D	-10	HIS	-	expression tag	UNP A0A2K8JN75
D	-9	HIS	-	expression tag	UNP A0A2K8JN75
D	-8	HIS	-	expression tag	UNP A0A2K8JN75
D	-7	LEU	-	expression tag	UNP A0A2K8JN75
D	-6	GLU	-	expression tag	UNP A0A2K8JN75
D	-5	VAL	-	expression tag	UNP A0A2K8JN75
D	-4	LEU	-	expression tag	UNP A0A2K8JN75
D	-3	PHE	-	expression tag	UNP A0A2K8JN75
D	-2	GLN	-	expression tag	UNP A0A2K8JN75
D	-1	GLY	-	expression tag	UNP A0A2K8JN75
D	0	PRO	-	expression tag	UNP A0A2K8JN75
D	1	SER	-	expression tag	UNP A0A2K8JN75
D	349	ALA	-	expression tag	UNP A0A2K8JN75

- Molecule 2 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: $C_4H_{10}O_3$).

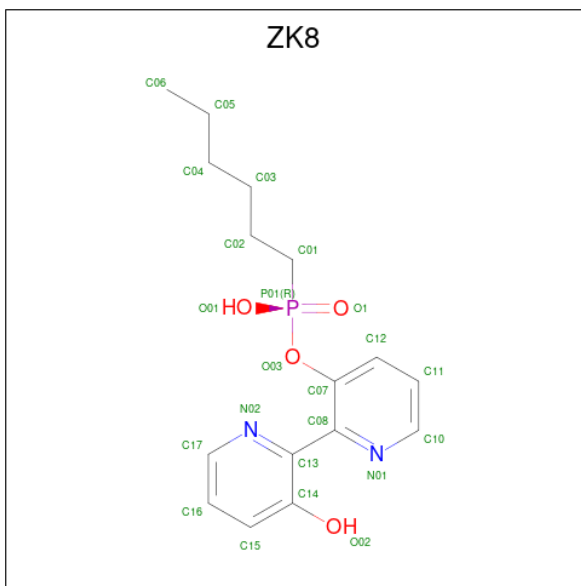

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
2	A	1	7	4	3	0	0

Continued on next page...

WORLDWIDE PDB
PROTEIN DATA BANK

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	B	1	Total 7	C 4	O 3	0	0
2	C	1	Total 7	C 4	O 3	0	0

- Molecule 3 is hexyl-[2-(3-oxidanylpyridin-2-yl)pyridin-3-yl]oxy-phosphinic acid (three-letter code: ZK8) (formula: $C_{16}H_{21}N_2O_4P$) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 22	C 16	N 2	O 3	P 1	0	0
3	B	1	Total 22	C 16	N 2	O 3	P 1	0	0
3	C	1	Total 22	C 16	N 2	O 3	P 1	0	0
3	D	1	Total 22	C 16	N 2	O 3	P 1	0	0

- Molecule 4 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

GOL

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	C	1	Total 6	C 3	O 3	0	0
4	C	1	Total 6	C 3	O 3	0	0
4	D	1	Total 6	C 3	O 3	0	0

• Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	42	Total 42	O 42	0	0
5	B	30	Total 30	O 30	0	0
5	C	26	Total 26	O 26	0	0
5	D	24	Total 24	O 24	0	0

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: Esterase

Chain A:

- Molecule 1: Esterase

Chain B:

- Molecule 1: Esterase

Chain C:

• Molecule 1: Esterase

Chain D:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	56.76Å 189.39Å 75.95Å 90.00° 111.93° 90.00°	Depositor
Resolution (Å)	47.35 – 2.40 47.35 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.9 (47.35-2.40) 99.9 (47.35-2.40)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.21 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.244 , 0.253 0.245 , 0.254	Depositor DCC
R_{free} test set	2927 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å^2)	34.1	Xtriage
Anisotropy	0.602	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 19.2	EDS
L-test for twinning[2]	$< |L| > = 0.43, < L^2 > = 0.25$	Xtriage
Estimated twinning fraction	0.398 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.90	EDS
Total number of atoms	10427	wwPDB-VP
Average B, all atoms (Å^2)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.53% of the height of the origin peak. No significant pseudotranslation is detected.*

---

[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: ZK8, GOL, PEG

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	0.69	0/2597	0.81	1/3517 (0.0%)
1	B	0.68	0/2579	0.80	1/3493 (0.0%)
1	C	0.69	0/2615	0.82	1/3541 (0.0%)
1	D	0.68	0/2588	0.81	1/3505 (0.0%)
All	All	0.68	0/10379	0.81	4/14056 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	192	SER	N-CA-CB	-6.47	100.80	110.50
1	A	192	SER	N-CA-CB	-6.13	101.31	110.50
1	D	192	SER	N-CA-CB	-6.12	101.31	110.50
1	B	192	SER	N-CA-CB	-5.06	102.91	110.50

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	2547	0	2488	34	0
1	B	2529	0	2472	25	0
1	C	2564	0	2502	38	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2538	0	2480	28	0
2	A	7	0	10	0	0
2	B	7	0	10	3	0
2	C	7	0	10	3	0
3	A	22	0	0	1	0
3	B	22	0	0	1	0
3	C	22	0	0	0	0
3	D	22	0	0	0	0
4	C	12	0	16	0	0
4	D	6	0	8	2	0
5	A	42	0	0	0	0
5	B	30	0	0	1	0
5	C	26	0	0	0	0
5	D	24	0	0	0	0
All	All	10427	0	9996	121	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 6.

All (121) 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:37:ARG:HA	1:A:40:GLN:OE1	1.79	0.82
1:D:90:ILE:HG23	1:D:142:ASP:O	1.80	0.81
1:A:90:ILE:HG23	1:A:142:ASP:O	1.80	0.81
1:B:90:ILE:HG23	1:B:142:ASP:O	1.80	0.80
1:C:90:ILE:HG23	1:C:142:ASP:O	1.81	0.79
1:C:50:THR:HG23	1:C:53:ARG:NH2	2.02	0.73
1:C:50:THR:HG23	1:C:53:ARG:HH21	1.56	0.70
1:C:135:GLY:HA3	2:C:401:PEG:H32	1.73	0.70
1:A:34:PHE:CD1	1:A:40:GLN:HG2	2.29	0.67
1:A:9:ILE:HG21	1:A:11:ASP:OD2	1.94	0.67
1:D:53:ARG:O	1:D:56:LEU:HG	1.95	0.66
1:A:149:PRO:HG3	1:A:155:VAL:CG2	2.27	0.65
1:D:115:MET:HG2	1:D:146:CYS:SG	2.39	0.62
1:D:156:ALA:HB1	1:D:157:PRO:HD2	1.80	0.62
1:C:50:THR:CB	1:C:53:ARG:HH21	2.13	0.61
1:B:130:MET:HG2	2:B:401:PEG:H22	1.83	0.61
1:B:115:MET:HG2	1:B:146:CYS:SG	2.43	0.58
1:C:50:THR:CG2	1:C:53:ARG:HH21	2.15	0.58
1:C:115:MET:HG3	1:C:147:LEU:HB3	1.86	0.58

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:135:GLY:HA2	2:C:401:PEG:H22	1.85	0.58
1:A:37:ARG:HA	1:A:40:GLN:CD	2.24	0.57
1:A:61:ASP:HA	1:A:122:GLY:HA3	1.86	0.57
1:A:149:PRO:HG3	1:A:155:VAL:HG23	1.87	0.56
1:C:204:LYS:HG2	1:C:204:LYS:O	2.05	0.56
1:C:115:MET:HG3	1:C:147:LEU:CB	2.36	0.55
1:B:133:ASN:HB2	2:B:401:PEG:H21	1.91	0.53
1:C:50:THR:HA	1:C:53:ARG:HH21	1.75	0.52
1:A:64:ASP:HA	1:A:126:ALA:HB2	1.92	0.52
1:C:135:GLY:CA	2:C:401:PEG:H32	2.38	0.52
1:B:64:ASP:HA	1:B:126:ALA:HB2	1.92	0.52
1:A:243:MET:HE1	1:A:326:PHE:HE2	1.74	0.51
1:B:189:ALA:HA	1:B:218:TYR:O	2.11	0.51
1:C:189:ALA:HA	1:C:218:TYR:O	2.11	0.51
1:A:23:LEU:HA	1:A:26:PHE:HB2	1.93	0.51
1:A:23:LEU:HA	1:A:26:PHE:CB	2.41	0.50
1:C:37:ARG:O	1:C:40:GLN:HB2	2.12	0.50
1:A:23:LEU:O	1:A:26:PHE:HB3	2.11	0.49
1:C:64:ASP:HA	1:C:126:ALA:HB2	1.94	0.49
1:D:64:ASP:HA	1:D:126:ALA:HB2	1.94	0.49
1:D:189:ALA:HA	1:D:218:TYR:O	2.12	0.49
1:A:189:ALA:HA	1:A:218:TYR:O	2.12	0.49
1:B:37:ARG:O	1:B:40:GLN:HB2	2.13	0.49
1:B:225:ALA:HB3	1:B:228:TRP:CE2	2.48	0.49
1:D:44:ALA:HB1	1:D:53:ARG:NH2	2.28	0.49
1:C:225:ALA:HB3	1:C:228:TRP:CE2	2.48	0.48
1:D:225:ALA:HB3	1:D:228:TRP:CE2	2.47	0.48
1:D:56:LEU:HD12	1:D:57:LYS:N	2.28	0.48
1:A:36:THR:HB	1:A:38:GLU:OE1	2.14	0.48
1:A:225:ALA:HB3	1:A:228:TRP:CE2	2.48	0.48
1:A:244:ILE:HD12	1:A:246:LEU:HD21	1.96	0.48
1:C:175:ASN:HA	1:C:178:GLU:OE1	2.13	0.48
1:B:40:GLN:HB3	1:B:147:LEU:HD11	1.96	0.48
1:D:36:THR:HB	1:D:38:GLU:OE1	2.13	0.48
1:D:330:ILE:O	1:D:330:ILE:HG13	2.13	0.48
1:A:55:GLN:HA	1:A:58:MET:HB2	1.96	0.48
1:B:243:MET:HE1	1:B:326:PHE:HE2	1.78	0.48
1:D:34:PHE:HZ	1:D:43:ASN:HD22	1.62	0.47
1:C:286:ASN:ND2	1:C:314:ARG:HE	2.12	0.47
1:D:286:ASN:ND2	1:D:314:ARG:HE	2.13	0.47
1:D:61:ASP:HA	1:D:122:GLY:HA3	1.95	0.47

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:286:ASN:ND2	1:B:314:ARG:HE	2.13	0.47
1:C:244:ILE:HD12	1:C:246:LEU:HD21	1.97	0.47
1:D:244:ILE:HD12	1:D:246:LEU:HD21	1.97	0.47
1:A:286:ASN:HD22	1:A:314:ARG:HE	1.63	0.47
1:B:244:ILE:HD12	1:B:246:LEU:HD21	1.97	0.46
1:C:286:ASN:HD22	1:C:314:ARG:HE	1.62	0.46
1:D:286:ASN:HD22	1:D:314:ARG:HE	1.63	0.46
1:B:154:GLU:HG3	5:B:520:HOH:O	2.16	0.46
1:B:286:ASN:HD22	1:B:314:ARG:HE	1.62	0.46
1:C:29:MET:O	1:C:29:MET:HG3	2.15	0.46
1:D:150:SER:OG	1:D:152:ALA:HB3	2.16	0.45
1:D:13:VAL:HG12	4:D:401:GOL:H32	1.98	0.45
1:C:35:GLN:O	1:C:253:LEU:HD21	2.16	0.45
1:B:150:SER:OG	1:B:152:ALA:HB3	2.17	0.45
1:C:150:SER:OG	1:C:152:ALA:HB3	2.16	0.45
1:C:50:THR:HA	1:C:53:ARG:HE	1.81	0.45
1:A:312:ARG:HG3	1:B:333:VAL:HG22	1.99	0.45
1:A:150:SER:OG	1:A:152:ALA:HB3	2.17	0.44
1:B:149:PRO:HA	1:B:155:VAL:HG22	2.00	0.44
1:C:26:PHE:CG	1:C:27:PRO:HD2	2.52	0.44
1:C:50:THR:CA	1:C:53:ARG:HH21	2.31	0.44
1:C:115:MET:HA	1:C:146:CYS:SG	2.57	0.44
1:D:12:ASP:HA	4:D:401:GOL:O2	2.17	0.44
1:D:324:ASP:O	1:D:334:SER:HA	2.18	0.44
1:C:312:ARG:HG3	1:D:333:VAL:HG22	2.00	0.43
1:A:115:MET:HA	1:A:146:CYS:SG	2.58	0.43
1:A:153:PRO:HD2	1:A:154:GLU:H	1.82	0.43
1:B:225:ALA:HB3	1:B:228:TRP:CZ2	2.54	0.43
1:A:225:ALA:HB3	1:A:228:TRP:CZ2	2.53	0.43
1:C:324:ASP:O	1:C:334:SER:HA	2.19	0.43
1:B:115:MET:CG	1:B:146:CYS:SG	3.07	0.43
1:C:313:CYS:HB3	1:D:317:MET:HB2	2.01	0.43
1:D:53:ARG:HA	1:D:56:LEU:CD2	2.49	0.43
1:A:286:ASN:ND2	1:A:314:ARG:HE	2.16	0.42
1:A:324:ASP:O	1:A:334:SER:HA	2.19	0.42
1:B:191:GLU:HA	1:B:220:LEU:HB2	1.99	0.42
1:B:324:ASP:O	1:B:334:SER:HA	2.19	0.42
1:D:149:PRO:HA	1:D:155:VAL:HG22	2.01	0.42
1:C:225:ALA:HB3	1:C:228:TRP:CZ2	2.55	0.42
1:A:313:CYS:HB3	1:B:317:MET:HB2	2.00	0.42
1:B:130:MET:CG	2:B:401:PEG:H22	2.50	0.42

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:225:ALA:HB3	1:D:228:TRP:CZ2	2.54	0.42
1:C:191:GLU:HA	1:C:220:LEU:HB2	2.00	0.42
1:C:22:MET:O	1:C:26:PHE:HB2	2.19	0.42
1:A:112:GLY:HA2	3:A:402:ZK8:O02	2.20	0.42
1:C:243:MET:HE1	1:C:321:HIS:O	2.19	0.42
1:D:191:GLU:HA	1:D:220:LEU:HB2	2.01	0.42
1:B:301:TYR:CG	1:B:313:CYS:HB2	2.55	0.41
1:C:285:ILE:O	1:C:313:CYS:HA	2.20	0.41
1:C:330:ILE:HG13	1:C:330:ILE:O	2.19	0.41
1:A:285:ILE:O	1:A:313:CYS:HA	2.21	0.41
1:C:149:PRO:HA	1:C:155:VAL:HG22	2.03	0.41
1:A:115:MET:HG2	1:A:146:CYS:SG	2.60	0.41
1:A:149:PRO:HA	1:A:155:VAL:HG22	2.02	0.41
1:A:191:GLU:HA	1:A:220:LEU:HB2	2.01	0.41
1:A:322:ALA:O	1:A:325:MET:HG2	2.21	0.41
1:A:211:ILE:HD12	1:A:211:ILE:HA	1.98	0.41
1:D:115:MET:HA	1:D:146:CYS:SG	2.61	0.41
1:D:285:ILE:O	1:D:313:CYS:HA	2.21	0.41
1:B:115:MET:HE2	3:B:402:ZK8:C06	2.51	0.40
1:C:61:ASP:HA	1:C:122:GLY:HA3	2.02	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	332/368 (90%)	303 (91%)	29 (9%)	0	100	100
1	B	330/368 (90%)	302 (92%)	28 (8%)	0	100	100
1	C	336/368 (91%)	306 (91%)	30 (9%)	0	100	100
1	D	331/368 (90%)	302 (91%)	29 (9%)	0	100	100
All	All	1329/1472 (90%)	1213 (91%)	116 (9%)	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	269/298 (90%)	268 (100%)	1 (0%)	91	96
1	B	267/298 (90%)	266 (100%)	1 (0%)	91	96
1	C	271/298 (91%)	270 (100%)	1 (0%)	91	96
1	D	268/298 (90%)	267 (100%)	1 (0%)	91	96
All	All	1075/1192 (90%)	1071 (100%)	4 (0%)	91	96

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	192	SER
1	B	192	SER
1	C	192	SER
1	D	192	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	286	ASN
1	B	286	ASN
1	C	286	ASN
1	D	286	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

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	#$|Z| > 2$
3	ZK8	A	402	1	19,23,24	1.68	5 (26%)	21,29,32	2.76	7 (33%)
4	GOL	C	403	-	5,5,5	0.16	0	5,5,5	0.28	0
3	ZK8	C	404	1	19,23,24	1.73	7 (36%)	21,29,32	2.79	7 (33%)
2	PEG	A	401	-	6,6,6	0.16	0	5,5,5	0.06	0
4	GOL	D	401	-	5,5,5	0.08	0	5,5,5	0.30	0
3	ZK8	D	402	1	19,23,24	1.65	7 (36%)	21,29,32	2.84	6 (28%)
2	PEG	C	401	-	6,6,6	0.13	0	5,5,5	0.11	0
2	PEG	B	401	-	6,6,6	0.26	0	5,5,5	0.12	0
3	ZK8	B	402	1	19,23,24	1.69	6 (31%)	21,29,32	2.93	8 (38%)
4	GOL	C	402	-	5,5,5	0.13	0	5,5,5	0.31	0

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	ZK8	A	402	1	-	6/10/14/16	0/2/2/2
4	GOL	C	403	-	-	0/4/4/4	-
3	ZK8	C	404	1	-	0/10/14/16	0/2/2/2
2	PEG	A	401	-	-	1/4/4/4	-
4	GOL	D	401	-	-	0/4/4/4	-
3	ZK8	D	402	1	-	4/10/14/16	0/2/2/2
2	PEG	C	401	-	-	0/4/4/4	-
2	PEG	B	401	-	-	1/4/4/4	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	ZK8	B	402	1	-	5/10/14/16	0/2/2/2
4	GOL	C	402	-	-	0/4/4/4	-

All (25) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	402	ZK8	C07-C08	3.83	1.46	1.40
3	A	402	ZK8	C07-C08	3.76	1.46	1.40
3	B	402	ZK8	C07-C08	3.65	1.46	1.40
3	C	404	ZK8	C07-C08	3.23	1.45	1.40
3	A	402	ZK8	C10-N01	-3.03	1.28	1.34
3	D	402	ZK8	C08-C13	2.91	1.54	1.49
3	C	404	ZK8	C15-C14	2.84	1.44	1.39
3	C	404	ZK8	C10-N01	-2.71	1.28	1.34
3	A	402	ZK8	C08-C13	2.69	1.54	1.49
3	B	402	ZK8	C17-N02	-2.65	1.29	1.34
3	C	404	ZK8	C08-C13	2.62	1.54	1.49
3	B	402	ZK8	C10-N01	-2.57	1.29	1.34
3	D	402	ZK8	C17-N02	-2.54	1.29	1.34
3	B	402	ZK8	C08-C13	2.52	1.54	1.49
3	A	402	ZK8	C17-N02	-2.49	1.29	1.34
3	C	404	ZK8	C17-N02	-2.47	1.29	1.34
3	B	402	ZK8	C12-C07	2.36	1.44	1.39
3	A	402	ZK8	C15-C14	2.36	1.43	1.39
3	B	402	ZK8	C15-C14	2.35	1.43	1.39
3	C	404	ZK8	C12-C07	2.23	1.44	1.39
3	C	404	ZK8	O02-C14	2.19	1.40	1.36
3	D	402	ZK8	O02-C14	2.13	1.40	1.36
3	D	402	ZK8	C15-C14	2.10	1.43	1.39
3	D	402	ZK8	C10-N01	-2.09	1.30	1.34
3	D	402	ZK8	C12-C07	2.01	1.43	1.39

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	D	402	ZK8	C07-C08-N01	-7.65	115.61	121.68
3	B	402	ZK8	C07-C08-N01	-7.49	115.74	121.68
3	C	404	ZK8	C07-C08-N01	-7.22	115.95	121.68
3	A	402	ZK8	C07-C08-N01	-7.08	116.06	121.68
3	A	402	ZK8	C10-N01-C08	5.46	127.50	116.81
3	B	402	ZK8	C17-N02-C13	5.31	127.20	116.81
3	B	402	ZK8	C10-N01-C08	5.30	127.19	116.81

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	404	ZK8	C17-N02-C13	5.26	127.11	116.81
3	D	402	ZK8	C14-C13-N02	-5.26	113.99	121.20
3	D	402	ZK8	C17-N02-C13	5.24	127.06	116.81
3	D	402	ZK8	C10-N01-C08	5.12	126.83	116.81
3	C	404	ZK8	C14-C13-N02	-5.08	114.23	121.20
3	C	404	ZK8	C10-N01-C08	5.06	126.71	116.81
3	A	402	ZK8	C17-N02-C13	5.05	126.69	116.81
3	B	402	ZK8	C14-C13-N02	-4.86	114.54	121.20
3	A	402	ZK8	C14-C13-N02	-4.76	114.66	121.20
3	B	402	ZK8	C14-C13-C08	4.19	126.45	121.53
3	A	402	ZK8	C14-C13-C08	3.67	125.83	121.53
3	D	402	ZK8	C08-C13-N02	3.18	121.10	114.84
3	C	404	ZK8	C08-C13-N02	3.00	120.76	114.84
3	D	402	ZK8	C14-C13-C08	2.88	124.91	121.53
3	C	404	ZK8	C14-C13-C08	2.86	124.88	121.53
3	C	404	ZK8	C12-C07-C08	-2.67	115.96	119.23
3	B	402	ZK8	C04-C03-C02	-2.49	101.80	114.42
3	A	402	ZK8	C08-C13-N02	2.36	119.49	114.84
3	B	402	ZK8	C08-C13-N02	2.12	119.01	114.84
3	B	402	ZK8	C12-C07-C08	-2.04	116.73	119.23
3	A	402	ZK8	C11-C10-N01	-2.01	120.15	123.43

There are no chirality outliers.

All (17) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	402	ZK8	P01-C01-C02-C03
3	B	402	ZK8	N01-C08-C13-C14
3	B	402	ZK8	C07-C08-C13-N02
3	B	402	ZK8	P01-C01-C02-C03
3	D	402	ZK8	P01-C01-C02-C03
3	B	402	ZK8	N01-C08-C13-N02
3	A	402	ZK8	C01-C02-C03-C04
3	B	402	ZK8	C07-C08-C13-C14
3	A	402	ZK8	C07-C08-C13-C14
3	D	402	ZK8	C07-C08-C13-C14
3	A	402	ZK8	C07-C08-C13-N02
3	A	402	ZK8	N01-C08-C13-N02
3	D	402	ZK8	C01-C02-C03-C04
3	D	402	ZK8	C02-C03-C04-C05
2	B	401	PEG	C1-C2-O2-C3
3	A	402	ZK8	N01-C08-C13-C14

Continued on next page...

Continued from previous page...

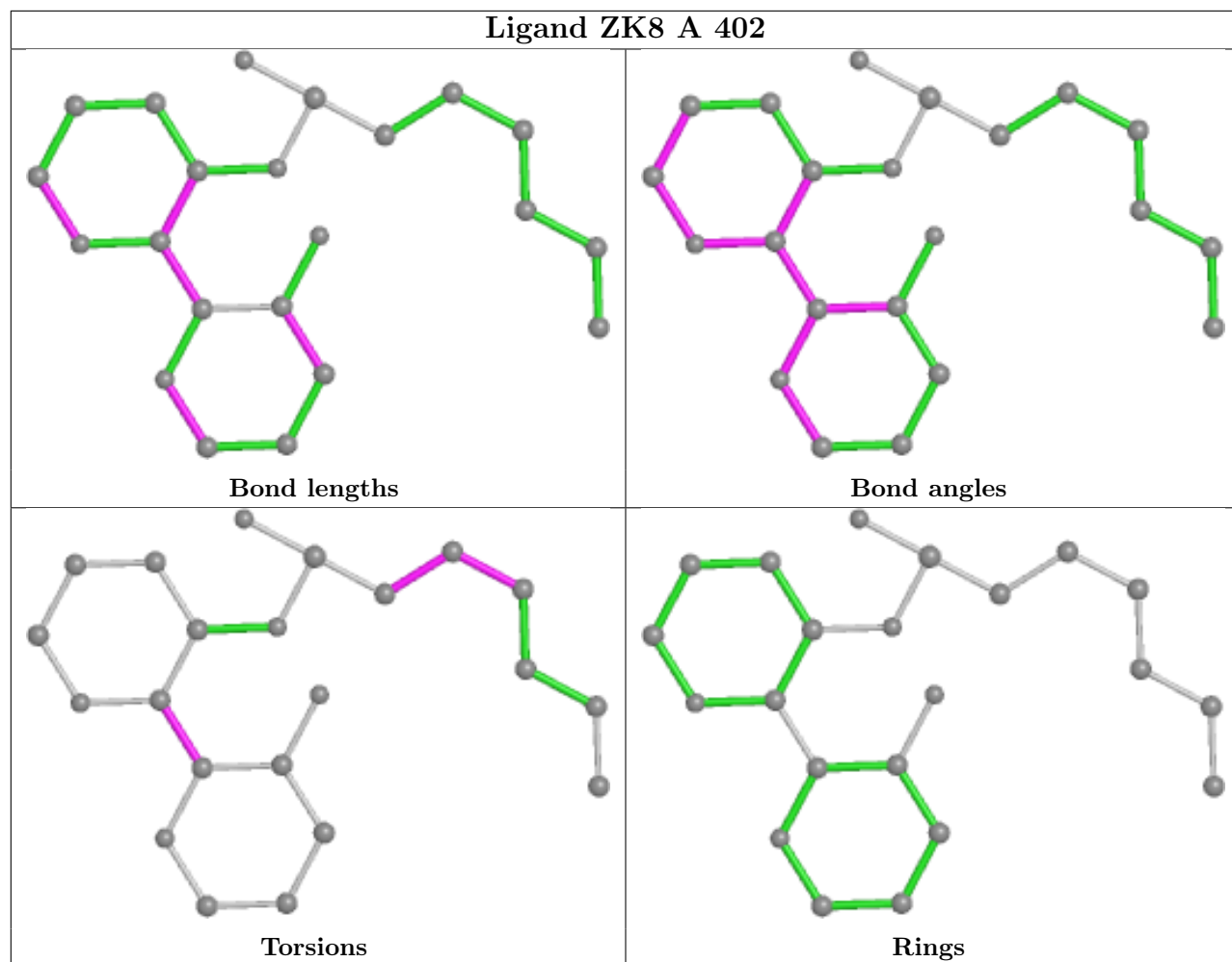| Mol	Chain	Res	Type	Atoms
2	A	401	PEG	C4-C3-O2-C2

There are no ring outliers.

5 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	402	ZK8	1	0
4	D	401	GOL	2	0
2	C	401	PEG	3	0
2	B	401	PEG	3	0
3	B	402	ZK8	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 ZK8 A 402

Bond lengths

Bond angles

Torsions

Rings

Ligand ZK8 C 404

Bond lengths

Bond angles

Torsions

Rings

Ligand ZK8 D 402

Bond lengths

Bond angles

Torsions

Rings

Ligand ZK8 B 402

Bond lengths

Bond angles

Torsions

Rings
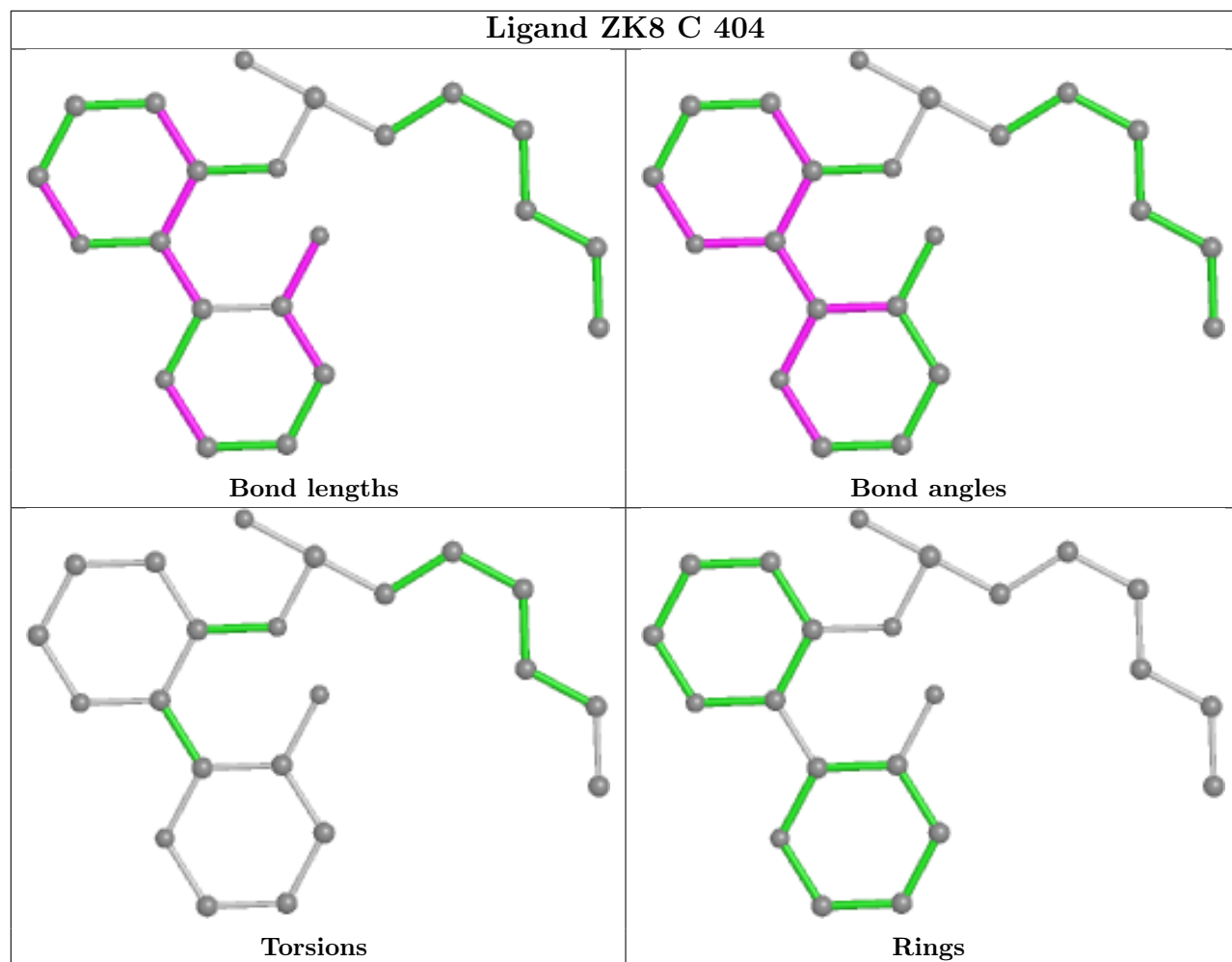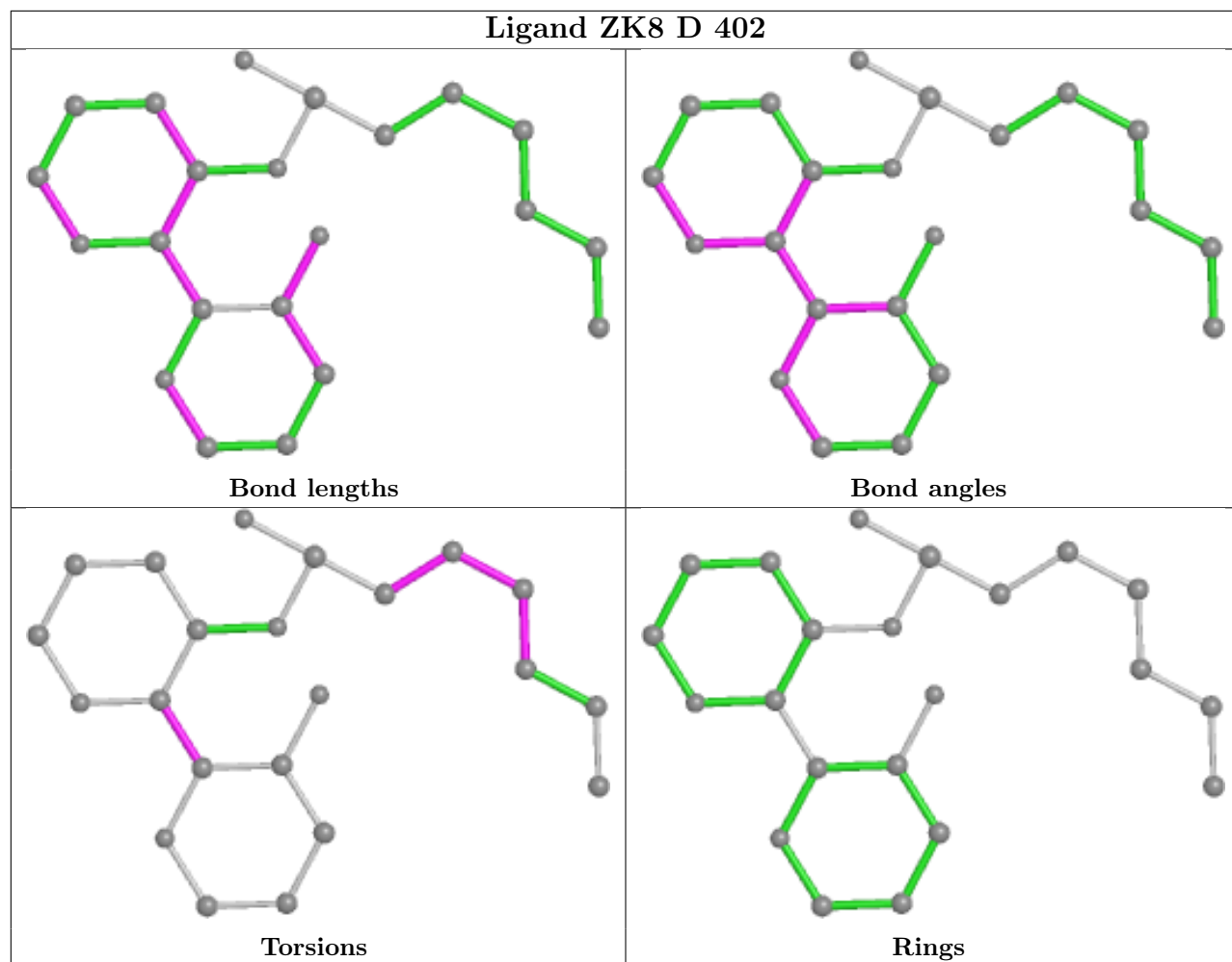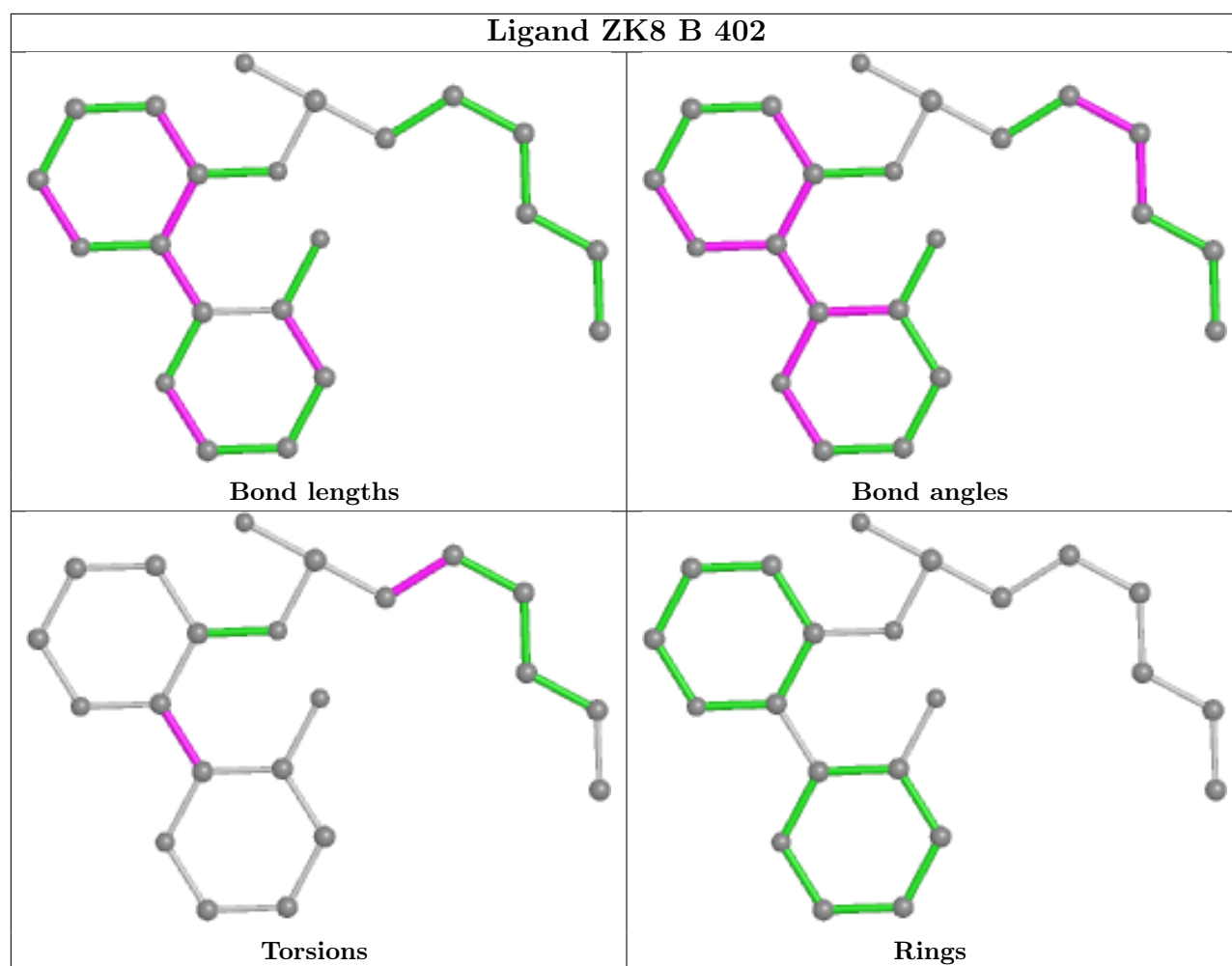
5.7 Other polymers ⓘ

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 ⓘ

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(Å²)	Q<0.9
1	A	336/368 (91%)	0.42	18 (5%)	25	24	17, 39, 71, 85	0
1	B	334/368 (90%)	0.49	22 (6%)	18	17	14, 39, 71, 79	0
1	C	338/368 (91%)	0.90	54 (15%)	1	1	17, 49, 80, 99	0
1	D	335/368 (91%)	0.96	55 (16%)	1	1	16, 50, 73, 85	0
All	All	1343/1472 (91%)	0.69	149 (11%)	5	4	14, 43, 74, 99	0

All (149) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	253	LEU	6.2
1	C	147	LEU	5.2
1	D	62	MET	5.0
1	D	51	ALA	5.0
1	D	155	VAL	4.7
1	D	266	LEU	4.6
1	D	121	TYR	4.6
1	D	167	SER	4.6
1	C	59	MET	4.5
1	D	153	PRO	4.4
1	C	35	GLN	4.3
1	D	35	GLN	4.3
1	D	159	PRO	4.3
1	C	62	MET	4.2
1	A	51	ALA	4.0
1	C	249	ASN	4.0
1	C	117	MET	4.0
1	A	155	VAL	4.0
1	C	151	SER	4.0
1	D	255	TYR	3.9
1	C	157	PRO	3.8

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	D	27	PRO	3.8
1	D	9	ILE	3.8
1	D	55	GLN	3.8
1	D	147	LEU	3.7
1	D	115	MET	3.7
1	D	90	ILE	3.7
1	C	156	ALA	3.6
1	B	253	LEU	3.5
1	C	153	PRO	3.5
1	C	31	GLN	3.5
1	C	29	MET	3.5
1	C	257	ILE	3.4
1	A	147	LEU	3.4
1	C	247	HIS	3.4
1	B	33	THR	3.4
1	C	90	ILE	3.4
1	A	27	PRO	3.3
1	C	252	ALA	3.3
1	C	23	LEU	3.3
1	C	92	ILE	3.3
1	D	152	ALA	3.2
1	A	275	GLU	3.1
1	C	253	LEU	3.1
1	D	172	VAL	3.1
1	D	275	GLU	3.1
1	D	145	ASN	3.1
1	B	247	HIS	3.1
1	C	154	GLU	3.0
1	A	153	PRO	3.0
1	D	26	PHE	2.9
1	C	228	TRP	2.9
1	A	26	PHE	2.9
1	B	11	ASP	2.9
1	C	51	ALA	2.9
1	D	257	ILE	2.9
1	D	22	MET	2.9
1	A	39	GLU	2.9
1	D	160	ALA	2.9
1	D	59	MET	2.8
1	D	148	SER	2.8
1	B	23	LEU	2.8
1	D	42	ALA	2.8

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	C	41	VAL	2.8
1	B	35	GLN	2.8
1	C	254	ALA	2.8
1	D	47	PRO	2.8
1	C	32	GLN	2.7
1	D	149	PRO	2.7
1	C	43	ASN	2.7
1	A	58	MET	2.7
1	C	47	PRO	2.7
1	A	157	PRO	2.7
1	A	35	GLN	2.7
1	C	274	ALA	2.6
1	B	252	ALA	2.6
1	D	247	HIS	2.6
1	D	92	ILE	2.6
1	B	147	LEU	2.6
1	C	179	LEU	2.6
1	C	26	PHE	2.6
1	D	24	ALA	2.6
1	B	47	PRO	2.6
1	B	257	ILE	2.6
1	D	274	ALA	2.6
1	C	25	ALA	2.6
1	D	223	TYR	2.6
1	C	152	ALA	2.5
1	D	267	ALA	2.5
1	D	278	GLN	2.4
1	D	57	LYS	2.4
1	B	261	GLU	2.4
1	D	54	GLU	2.4
1	D	201	THR	2.4
1	B	228	TRP	2.4
1	A	55	GLN	2.4
1	D	81	PHE	2.4
1	A	47	PRO	2.4
1	C	155	VAL	2.4
1	A	160	ALA	2.4
1	B	227	LYS	2.4
1	A	42	ALA	2.4
1	C	89	ALA	2.4
1	C	275	GLU	2.4
1	B	43	ASN	2.3

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	D	163	ASN	2.3
1	C	246	LEU	2.3
1	A	171	TRP	2.3
1	C	212	ASP	2.3
1	D	48	GLU	2.3
1	B	9	ILE	2.3
1	D	56	LEU	2.3
1	D	94	PHE	2.3
1	D	91	LYS	2.3
1	D	116	ILE	2.3
1	B	146	CYS	2.3
1	A	89	ALA	2.2
1	C	174	GLU	2.2
1	C	251	GLY	2.2
1	C	243	MET	2.2
1	C	244	ILE	2.2
1	C	63	MET	2.2
1	A	150	SER	2.2
1	C	167	SER	2.2
1	C	22	MET	2.2
1	D	85	PRO	2.2
1	C	58	MET	2.2
1	B	26	PHE	2.2
1	C	121	TYR	2.2
1	D	120	PHE	2.2
1	C	54	GLU	2.2
1	D	80	GLU	2.2
1	B	25	ALA	2.1
1	C	84	SER	2.1
1	B	58	MET	2.1
1	C	61	ASP	2.1
1	C	52	ALA	2.1
1	C	261	GLU	2.1
1	C	160	ALA	2.1
1	B	157	PRO	2.1
1	D	256	GLY	2.1
1	D	254	ALA	2.1
1	D	52	ALA	2.1
1	D	204	LYS	2.1
1	B	152	ALA	2.0
1	B	259	GLN	2.0
1	D	49	ALA	2.0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	RSRZ
1	C	226	GLY	2.0
1	C	161	GLY	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 monosaccharides in this entry.

6.4   Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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(Å^2)	Q<0.9
2	PEG	C	401	7/7	0.63	0.35	56,58,58,60	0
2	PEG	B	401	7/7	0.84	0.21	31,34,36,38	0
4	GOL	D	401	6/6	0.84	0.20	52,55,56,57	0
4	GOL	C	402	6/6	0.85	0.19	42,47,49,50	0
3	ZK8	A	402	22/23	0.85	0.42	39,58,62,63	0
2	PEG	A	401	7/7	0.86	0.19	47,47,49,49	0
4	GOL	C	403	6/6	0.87	0.16	26,26,27,28	0
3	ZK8	D	402	22/23	0.89	0.37	42,54,63,65	0
3	ZK8	B	402	22/23	0.89	0.32	40,54,62,63	0
3	ZK8	C	404	22/23	0.90	0.39	39,52,60,63	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.
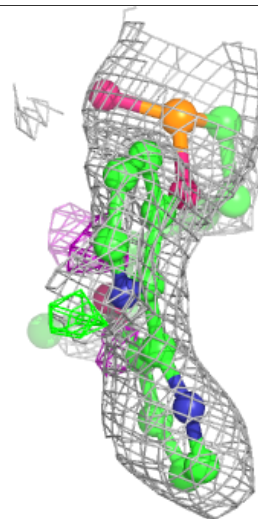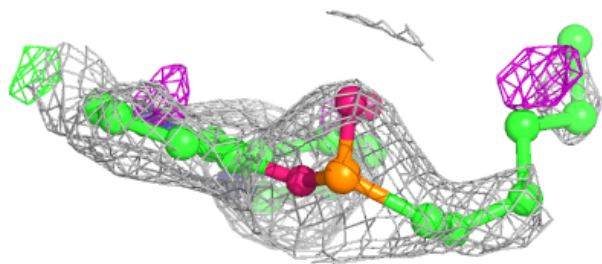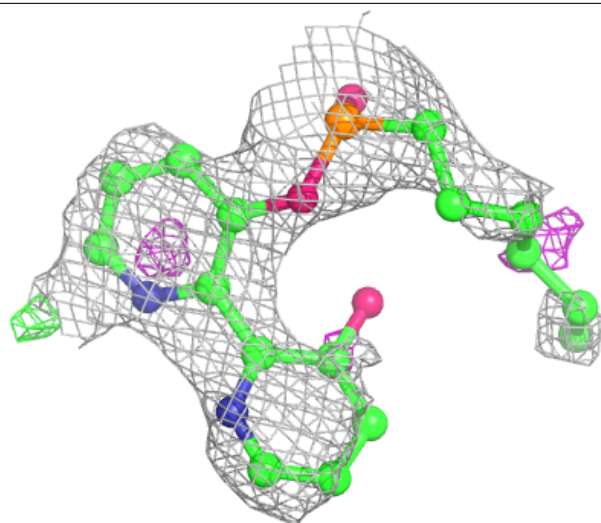
Electron density around ZK8 A 402:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
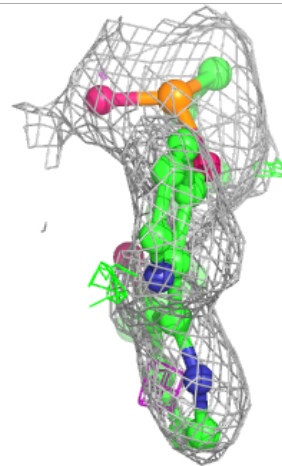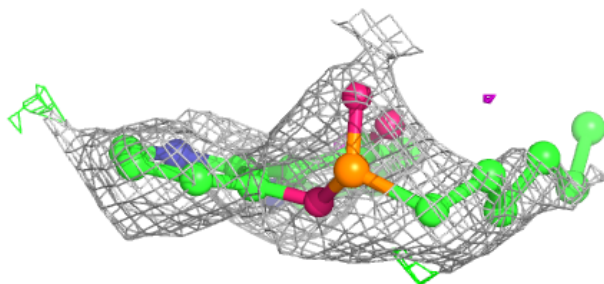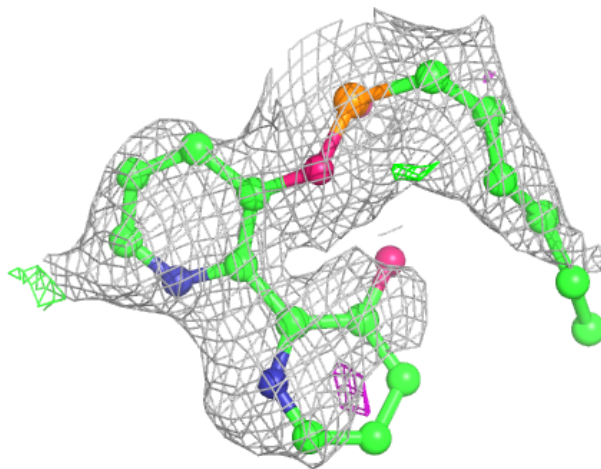and green (positive)
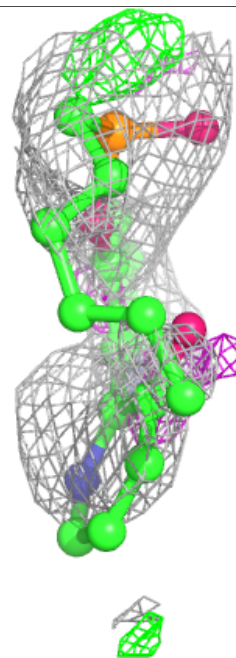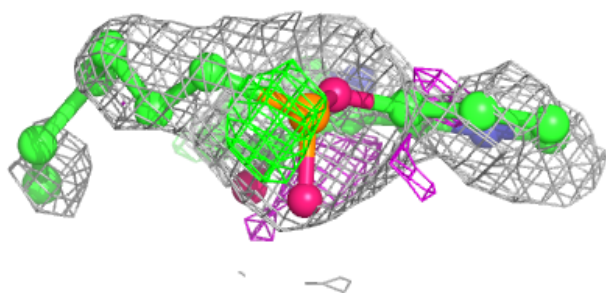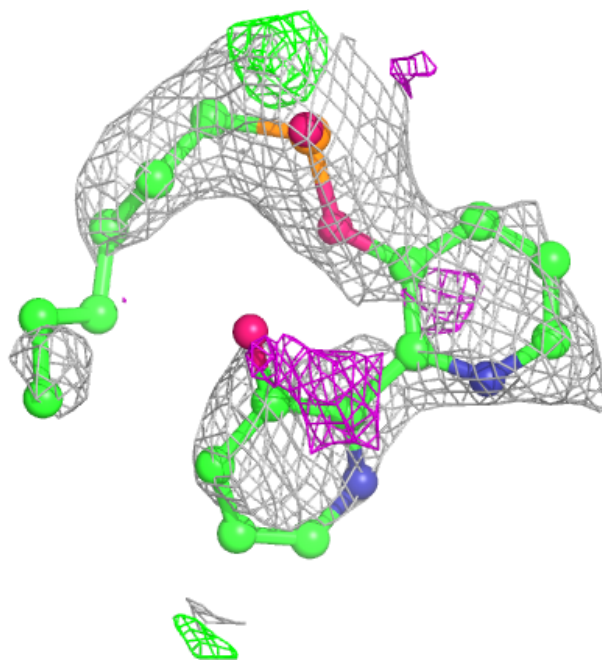
Electron density around ZK8 D 402:

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 ZK8 B 402:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
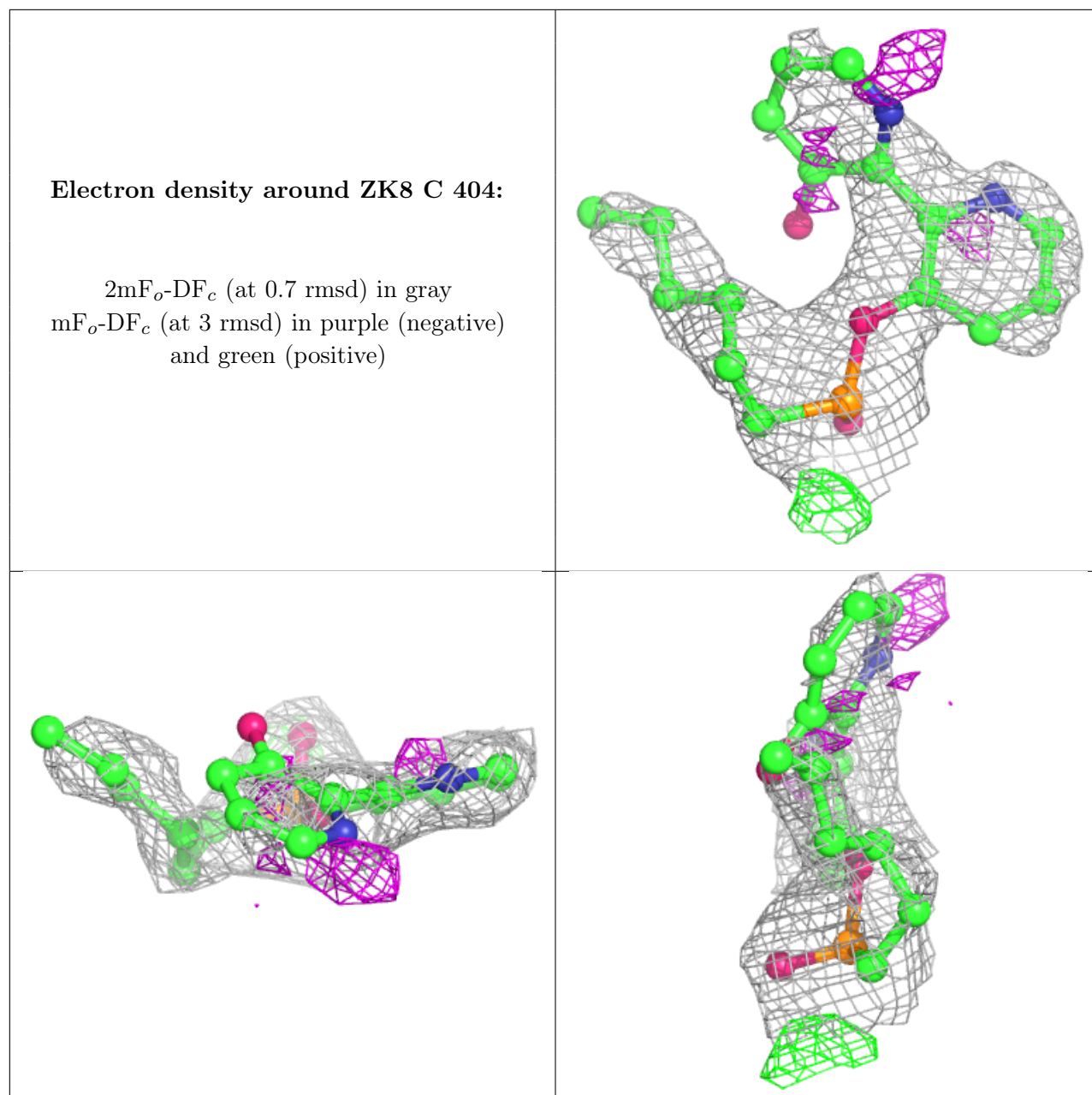and green (positive)

Electron density around ZK8 C 404:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.