WORLDWIDE PDB
PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 28, 2024 – 10:03 PM EDT

PDB ID	:	9D2C
Title	:	Crystal Structure of Tungbindin Treated with Proteinase K
Authors	:	Zhou, D.; Chen, L.; Rose, J.P.; Wang, B.C.
Deposited on	:	2024-08-08
Resolution	:	2.38 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

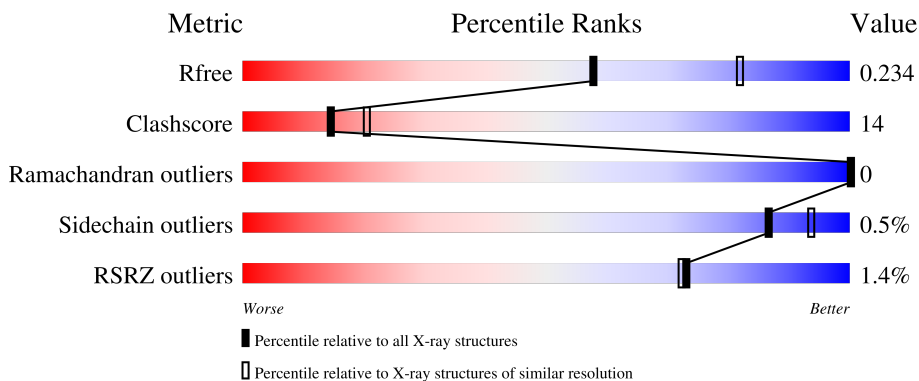|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.002 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.38.3

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 2.38 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		0.234
Clashscore		14
Ramachandran outliers		0
Sidechain outliers		0.5%
RSRZ outliers		1.4%

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}	164625	6699 (2.40-2.36)
Clashscore	180529	7414 (2.40-2.36)
Ramachandran outliers	177936	7337 (2.40-2.36)
Sidechain outliers	177891	7338 (2.40-2.36)
RSRZ outliers	164620	6699 (2.40-2.36)

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	78	5% · 76% · 19% · 5%
1	B	78	% · 69% · 19% · 12%
1	C	78	65% · 23% · 12%
1	D	78	77% · 12% · 12%
1	E	78	% · 76% · 14% · 9%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	F	78	83% · · · 6% · 10%
1	H	78	6% · 73% · 22% · 5%
1	I	78	71% · 18% · 12%
1	J	78	77% · 12% · 12%
1	K	78	73% · 15% · 12%
1	L	78	% · 79% · 12% · 9%
1	M	78	73% · 17% · 10%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	MOO	A	101	-	-	X	-
2	MOO	B	101	-	-	X	-
2	MOO	B	102	-	-	X	-
2	MOO	C	101	-	-	X	-
2	MOO	C	102	-	-	X	-
2	MOO	D	101	-	-	X	-
2	MOO	E	101	-	-	X	-
2	MOO	F	101	-	-	X	-
2	MOO	H	101	-	-	X	-
2	MOO	H	102	-	-	X	-
2	MOO	I	101	-	-	X	-
2	MOO	I	102	-	-	X	-
2	MOO	J	101	-	-	X	-
2	MOO	K	101	-	-	X	-
2	MOO	L	101	-	-	X	-
2	MOO	M	101	-	-	X	-

2   Entry composition ⓘ

There are 3 unique types of molecules in this entry. The entry contains 12830 atoms, of which 6378 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 Molybdenum-pterin binding domain-containing protein.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	74	Total 1092	C 334	H 556	N 93	O 106	S 3	0	0	0
1	B	69	Total 1014	C 305	H 523	N 85	O 98	S 3	0	0	0
1	C	69	Total 1014	C 305	H 523	N 85	O 98	S 3	0	0	0
1	D	69	Total 1014	C 305	H 523	N 85	O 98	S 3	0	0	0
1	E	71	Total 1050	C 320	H 537	N 88	O 102	S 3	0	0	0
1	F	70	Total 1026	C 309	H 527	N 86	O 101	S 3	0	0	0
1	H	74	Total 1092	C 334	H 556	N 93	O 106	S 3	0	0	0
1	I	69	Total 1014	C 305	H 523	N 85	O 98	S 3	0	0	0
1	J	69	Total 1014	C 305	H 523	N 85	O 98	S 3	0	0	0
1	K	69	Total 1014	C 305	H 523	N 85	O 98	S 3	0	0	0
1	L	71	Total 1050	C 320	H 537	N 88	O 102	S 3	0	0	0
1	M	70	Total 1026	C 309	H 527	N 86	O 101	S 3	0	0	0

There are 96 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	71	TRP	-	expression tag	UNP A0A0U3FVB3
A	72	SER	-	expression tag	UNP A0A0U3FVB3
A	73	HIS	-	expression tag	UNP A0A0U3FVB3
A	74	PRO	-	expression tag	UNP A0A0U3FVB3
A	75	GLN	-	expression tag	UNP A0A0U3FVB3

Continued on next page...

W O R L D W I D E
wwPDB
PROTEIN DATA BANK

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
A	76	PHE	-	expression tag	UNP A0A0U3FVB3
A	77	GLU	-	expression tag	UNP A0A0U3FVB3
A	78	LYS	-	expression tag	UNP A0A0U3FVB3
B	71	TRP	-	expression tag	UNP A0A0U3FVB3
B	72	SER	-	expression tag	UNP A0A0U3FVB3
B	73	HIS	-	expression tag	UNP A0A0U3FVB3
B	74	PRO	-	expression tag	UNP A0A0U3FVB3
B	75	GLN	-	expression tag	UNP A0A0U3FVB3
B	76	PHE	-	expression tag	UNP A0A0U3FVB3
B	77	GLU	-	expression tag	UNP A0A0U3FVB3
B	78	LYS	-	expression tag	UNP A0A0U3FVB3
C	71	TRP	-	expression tag	UNP A0A0U3FVB3
C	72	SER	-	expression tag	UNP A0A0U3FVB3
C	73	HIS	-	expression tag	UNP A0A0U3FVB3
C	74	PRO	-	expression tag	UNP A0A0U3FVB3
C	75	GLN	-	expression tag	UNP A0A0U3FVB3
C	76	PHE	-	expression tag	UNP A0A0U3FVB3
C	77	GLU	-	expression tag	UNP A0A0U3FVB3
C	78	LYS	-	expression tag	UNP A0A0U3FVB3
D	71	TRP	-	expression tag	UNP A0A0U3FVB3
D	72	SER	-	expression tag	UNP A0A0U3FVB3
D	73	HIS	-	expression tag	UNP A0A0U3FVB3
D	74	PRO	-	expression tag	UNP A0A0U3FVB3
D	75	GLN	-	expression tag	UNP A0A0U3FVB3
D	76	PHE	-	expression tag	UNP A0A0U3FVB3
D	77	GLU	-	expression tag	UNP A0A0U3FVB3
D	78	LYS	-	expression tag	UNP A0A0U3FVB3
E	71	TRP	-	expression tag	UNP A0A0U3FVB3
E	72	SER	-	expression tag	UNP A0A0U3FVB3
E	73	HIS	-	expression tag	UNP A0A0U3FVB3
E	74	PRO	-	expression tag	UNP A0A0U3FVB3
E	75	GLN	-	expression tag	UNP A0A0U3FVB3
E	76	PHE	-	expression tag	UNP A0A0U3FVB3
E	77	GLU	-	expression tag	UNP A0A0U3FVB3
E	78	LYS	-	expression tag	UNP A0A0U3FVB3
F	71	TRP	-	expression tag	UNP A0A0U3FVB3
F	72	SER	-	expression tag	UNP A0A0U3FVB3
F	73	HIS	-	expression tag	UNP A0A0U3FVB3
F	74	PRO	-	expression tag	UNP A0A0U3FVB3
F	75	GLN	-	expression tag	UNP A0A0U3FVB3
F	76	PHE	-	expression tag	UNP A0A0U3FVB3
F	77	GLU	-	expression tag	UNP A0A0U3FVB3

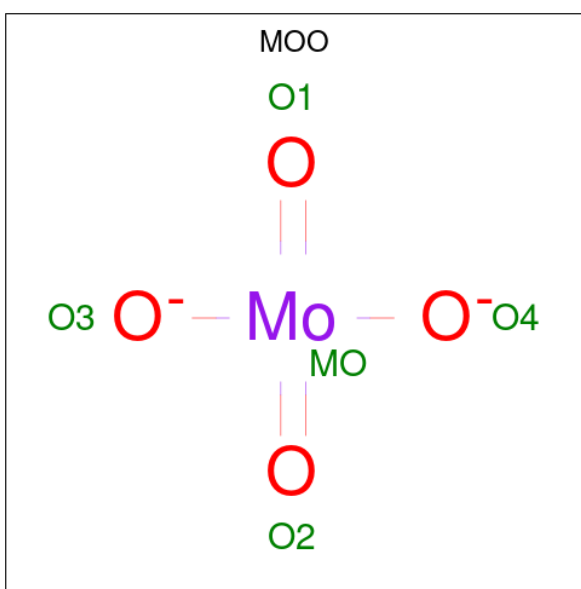*Continued on next page...*

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
F	78	LYS	-	expression tag	UNP A0A0U3FVB3
H	71	TRP	-	expression tag	UNP A0A0U3FVB3
H	72	SER	-	expression tag	UNP A0A0U3FVB3
H	73	HIS	-	expression tag	UNP A0A0U3FVB3
H	74	PRO	-	expression tag	UNP A0A0U3FVB3
H	75	GLN	-	expression tag	UNP A0A0U3FVB3
H	76	PHE	-	expression tag	UNP A0A0U3FVB3
H	77	GLU	-	expression tag	UNP A0A0U3FVB3
H	78	LYS	-	expression tag	UNP A0A0U3FVB3
I	71	TRP	-	expression tag	UNP A0A0U3FVB3
I	72	SER	-	expression tag	UNP A0A0U3FVB3
I	73	HIS	-	expression tag	UNP A0A0U3FVB3
I	74	PRO	-	expression tag	UNP A0A0U3FVB3
I	75	GLN	-	expression tag	UNP A0A0U3FVB3
I	76	PHE	-	expression tag	UNP A0A0U3FVB3
I	77	GLU	-	expression tag	UNP A0A0U3FVB3
I	78	LYS	-	expression tag	UNP A0A0U3FVB3
J	71	TRP	-	expression tag	UNP A0A0U3FVB3
J	72	SER	-	expression tag	UNP A0A0U3FVB3
J	73	HIS	-	expression tag	UNP A0A0U3FVB3
J	74	PRO	-	expression tag	UNP A0A0U3FVB3
J	75	GLN	-	expression tag	UNP A0A0U3FVB3
J	76	PHE	-	expression tag	UNP A0A0U3FVB3
J	77	GLU	-	expression tag	UNP A0A0U3FVB3
J	78	LYS	-	expression tag	UNP A0A0U3FVB3
K	71	TRP	-	expression tag	UNP A0A0U3FVB3
K	72	SER	-	expression tag	UNP A0A0U3FVB3
K	73	HIS	-	expression tag	UNP A0A0U3FVB3
K	74	PRO	-	expression tag	UNP A0A0U3FVB3
K	75	GLN	-	expression tag	UNP A0A0U3FVB3
K	76	PHE	-	expression tag	UNP A0A0U3FVB3
K	77	GLU	-	expression tag	UNP A0A0U3FVB3
K	78	LYS	-	expression tag	UNP A0A0U3FVB3
L	71	TRP	-	expression tag	UNP A0A0U3FVB3
L	72	SER	-	expression tag	UNP A0A0U3FVB3
L	73	HIS	-	expression tag	UNP A0A0U3FVB3
L	74	PRO	-	expression tag	UNP A0A0U3FVB3
L	75	GLN	-	expression tag	UNP A0A0U3FVB3
L	76	PHE	-	expression tag	UNP A0A0U3FVB3
L	77	GLU	-	expression tag	UNP A0A0U3FVB3
L	78	LYS	-	expression tag	UNP A0A0U3FVB3
M	71	TRP	-	expression tag	UNP A0A0U3FVB3

Continued on next page...

Continued from previous page...

Chain	Residue	Modelled	Actual	Comment	Reference
M	72	SER	-	expression tag	UNP A0A0U3FVB3
M	73	HIS	-	expression tag	UNP A0A0U3FVB3
M	74	PRO	-	expression tag	UNP A0A0U3FVB3
M	75	GLN	-	expression tag	UNP A0A0U3FVB3
M	76	PHE	-	expression tag	UNP A0A0U3FVB3
M	77	GLU	-	expression tag	UNP A0A0U3FVB3
M	78	LYS	-	expression tag	UNP A0A0U3FVB3

- Molecule 2 is MOLYBDATE ION (three-letter code: MOO) (formula: MoO_4) (labeled as "Ligand of Interest" by depositor).

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

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	F	1	Total 5	Mo 1	O 4	0	0
2	H	1	Total 5	Mo 1	O 4	0	0
2	H	1	Total 5	Mo 1	O 4	0	0
2	I	1	Total 5	Mo 1	O 4	0	0
2	I	1	Total 5	Mo 1	O 4	0	0
2	J	1	Total 5	Mo 1	O 4	0	0
2	K	1	Total 5	Mo 1	O 4	0	0
2	L	1	Total 5	Mo 1	O 4	0	0
2	M	1	Total 5	Mo 1	O 4	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	30	Total 30	O 30	0	0
3	B	33	Total 33	O 33	0	0
3	C	23	Total 23	O 23	0	0
3	D	32	Total 32	O 32	0	0
3	E	23	Total 23	O 23	0	0
3	F	23	Total 23	O 23	0	0
3	H	32	Total 32	O 32	0	0
3	I	42	Total 42	O 42	0	0
3	J	24	Total 24	O 24	0	0
3	K	22	Total 22	O 22	0	0

Continued from previous page...

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	L	17	Total 17	O 17	0	0
3	M	29	Total 29	O 29	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: Molybdenum-pterin binding domain-containing protein
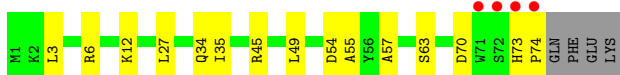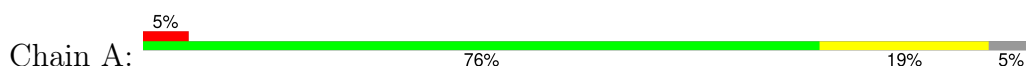
Chain A:

- Molecule 1: Molybdenum-pterin binding domain-containing protein

Chain B:

- Molecule 1: Molybdenum-pterin binding domain-containing protein

Chain C:

- Molecule 1: Molybdenum-pterin binding domain-containing protein
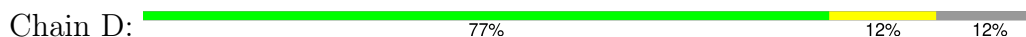
Chain D:

- Molecule 1: Molybdenum-pterin binding domain-containing protein
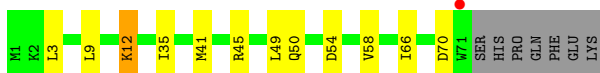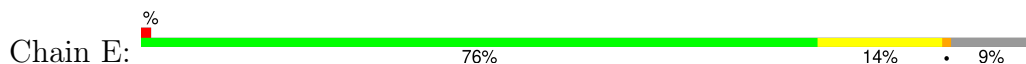
Chain E:

- Molecule 1: Molybdenum-pterin binding domain-containing protein

Chain F:

83%   6%   10%

M1 K2 L3 R45 V58 I59 M65 D70 TRP SER HIS PRO GLN PHE GLU LYS

- Molecule 1: Molybdenum-pterin binding domain-containing protein

6%

Chain H:

73%   22%   5%

M1 K2 L3 S4 A5 R6 V13 V14 V21 L27 D28 N33 Q34 I35 M41 R45 L49 I59 V64 M65 I66 D70 W71 S72 H73 P74 GLN PHE GLU LYS

- Molecule 1: Molybdenum-pterin binding domain-containing protein

Chain I:

71%   18%   12%

M1 K2 L3 L9 K12 V13 V14 L27 G48 L49 D54 V58 I59 V64 M65 I66 D69 ASP TRP SER HIS PRO GLN PHE GLU LYS

- Molecule 1: Molybdenum-pterin binding domain-containing protein

Chain J:

77%   12%   12%

M1 K12 V13 L27 L47 G52 V58 I59 V64 M65 I66 D69 ASP TRP SER HIS PRO GLN PHE GLU LYS

- Molecule 1: Molybdenum-pterin binding domain-containing protein

Chain K:

73%   15%   12%

M1 K2 L3 S4 A5 R6 N7 K12 V13 V14 I35 G52 S53 D54 V58 I59 S63 I66 D69 ASP TRP SER HIS PRO GLN PHE GLU LYS

- Molecule 1: Molybdenum-pterin binding domain-containing protein

%

Chain L:

79%   12%   9%

M1 K2 L3 R6 S37 L49 Q50 V58 I59 D69 D70 W71 SER HIS PRO GLN PHE GLU LYS
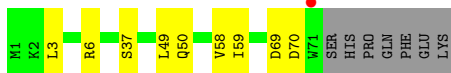
- Molecule 1: Molybdenum-pterin binding domain-containing protein

Chain M:

73%   17%   10%

M1 K2 L3 N7 Q8 L9 K17 E18 G19 I35 D42 R45 L49 I59 M65 D70 TRP SER HIS PRO GLN PHE GLU LYS

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	54.90Å 76.70Å 103.12Å 90.00° 102.32° 90.00°	Depositor
Resolution (Å)	43.95 – 2.38 43.95 – 2.38	Depositor EDS
% Data completeness (in resolution range)	81.3 (43.95-2.38) 87.1 (43.95-2.38)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.26 (at 2.39Å)	Xtriage
Refinement program	PHENIX 1.21_5207	Depositor
R, R_{free}	0.183 , 0.234 0.183 , 0.234	Depositor DCC
R_{free} test set	31644 reflections (6.79%)	wwPDB-VP
Wilson B-factor (Å^2)	35.6	Xtriage
Anisotropy	0.116	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 44.1	EDS
L-test for twinning[2]	$< \lvert L \rvert > = 0.48, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	12830	wwPDB-VP
Average B, all atoms (Å^2)	40.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.70% of the height of the origin peak. No significant pseudotranslation is detected.*

---

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

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: MOO

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	0.45	0/540	0.68	0/728
1	B	0.44	0/491	0.75	0/659
1	C	0.56	1/491 (0.2%)	0.80	1/659 (0.2%)
1	D	0.43	0/491	0.71	0/659
1	E	0.42	0/515	0.71	0/693
1	F	0.41	0/499	0.69	0/670
1	H	0.41	0/540	0.67	0/728
1	I	0.44	0/491	0.72	0/659
1	J	0.44	0/491	0.70	0/659
1	K	0.38	0/491	0.71	0/659
1	L	0.39	0/515	0.70	0/693
1	M	0.49	0/499	0.72	0/670
All	All	0.44	1/6054 (0.0%)	0.71	1/8136 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	17	LYS	CD-CE	5.59	1.65	1.51

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	17	LYS	CD-CE-NZ	7.61	129.21	111.70

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	536	556	556	21	0
1	B	491	523	523	14	0
1	C	491	523	523	17	0
1	D	491	523	523	9	0
1	E	513	537	537	13	0
1	F	499	527	527	8	0
1	H	536	556	556	18	1
1	I	491	523	523	14	0
1	J	491	523	523	9	0
1	K	491	523	523	11	0
1	L	513	537	537	12	0
1	M	499	527	527	17	0
2	A	5	0	0	4	0
2	B	10	0	0	6	0
2	C	10	0	0	7	0
2	D	5	0	0	4	0
2	E	5	0	0	3	0
2	F	5	0	0	3	0
2	H	10	0	0	7	0
2	I	10	0	0	7	0
2	J	5	0	0	3	0
2	K	5	0	0	4	0
2	L	5	0	0	4	0
2	M	5	0	0	4	0
3	A	30	0	0	9	0
3	B	33	0	0	4	0
3	C	23	0	0	6	2
3	D	32	0	0	3	0
3	E	23	0	0	0	0
3	F	23	0	0	1	1
3	H	32	0	0	2	0
3	I	42	0	0	1	0
3	J	24	0	0	2	0
3	K	22	0	0	2	0
3	L	17	0	0	3	0
3	M	29	0	0	4	0
All	All	6452	6378	6378	172	2

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 14.

The worst 5 of 172 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:6:ARG:NH1	3:C:201:HOH:O	1.70	1.24
1:A:45:ARG:NH2	3:A:201:HOH:O	1.83	1.08
1:B:8:GLN:NE2	3:B:201:HOH:O	1.79	1.05
1:K:35:ILE:HD11	1:M:9:LEU:HD11	1.45	0.95
1:L:69:ASP:O	3:L:201:HOH:O	1.86	0.94

All (2) 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:H:28:ASP:OD1	3:C:204:HOH:O[2_655]	2.13	0.07
3:C:223:HOH:O	3:F:221:HOH:O[1_655]	2.19	0.01

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	72/78 (92%)	70 (97%)	2 (3%)	0	100	100
1	B	67/78 (86%)	66 (98%)	1 (2%)	0	100	100
1	C	67/78 (86%)	67 (100%)	0	0	100	100
1	D	67/78 (86%)	67 (100%)	0	0	100	100
1	E	69/78 (88%)	69 (100%)	0	0	100	100
1	F	68/78 (87%)	67 (98%)	1 (2%)	0	100	100
1	H	72/78 (92%)	71 (99%)	1 (1%)	0	100	100
1	I	67/78 (86%)	66 (98%)	1 (2%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	J	67/78 (86%)	66 (98%)	1 (2%)	0	100	100
1	K	67/78 (86%)	66 (98%)	1 (2%)	0	100	100
1	L	69/78 (88%)	69 (100%)	0	0	100	100
1	M	68/78 (87%)	68 (100%)	0	0	100	100
All	All	820/936 (88%)	812 (99%)	8 (1%)	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	59/63 (94%)	59 (100%)	0	100	100
1	B	54/63 (86%)	54 (100%)	0	100	100
1	C	54/63 (86%)	54 (100%)	0	100	100
1	D	54/63 (86%)	54 (100%)	0	100	100
1	E	56/63 (89%)	55 (98%)	1 (2%)	54	72
1	F	55/63 (87%)	55 (100%)	0	100	100
1	H	59/63 (94%)	58 (98%)	1 (2%)	56	73
1	I	54/63 (86%)	54 (100%)	0	100	100
1	J	54/63 (86%)	54 (100%)	0	100	100
1	K	54/63 (86%)	53 (98%)	1 (2%)	52	70
1	L	56/63 (89%)	56 (100%)	0	100	100
1	M	55/63 (87%)	55 (100%)	0	100	100
All	All	664/756 (88%)	661 (100%)	3 (0%)	86	93

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	12	LYS

Continued on next page...

WORLDWIDE
wwPDB
PROTEIN DATA BANK

Continued from previous page...

Mol	Chain	Res	Type
1	H	14	VAL
1	K	14	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	34	GLN
1	D	8	GLN
1	F	50	GLN
1	H	34	GLN
1	L	50	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 oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

16 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	MOO	A	101	-	2,4,4	0.85	0	-		
2	MOO	J	101	-	2,4,4	0.63	0	-		

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
2	MOO	B	102	-	2,4,4	0.97	0	-		
2	MOO	I	101	-	2,4,4	0.64	0	-		
2	MOO	L	101	-	2,4,4	0.50	0	-		
2	MOO	M	101	-	2,4,4	0.86	0	-		
2	MOO	E	101	-	2,4,4	0.75	0	-		
2	MOO	F	101	-	2,4,4	0.45	0	-		
2	MOO	I	102	-	2,4,4	0.59	0	-		
2	MOO	C	101	-	2,4,4	0.64	0	-		
2	MOO	K	101	-	2,4,4	0.54	0	-		
2	MOO	H	101	-	2,4,4	0.61	0	-		
2	MOO	D	101	-	2,4,4	0.82	0	-		
2	MOO	C	102	-	2,4,4	0.53	0	-		
2	MOO	B	101	-	2,4,4	0.53	0	-		
2	MOO	H	102	-	2,4,4	0.87	0	-		

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

16 monomers are involved in 56 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	101	MOO	4	0
2	J	101	MOO	3	0
2	B	102	MOO	3	0
2	I	101	MOO	4	0
2	L	101	MOO	4	0
2	M	101	MOO	4	0
2	E	101	MOO	3	0
2	F	101	MOO	3	0
2	I	102	MOO	3	0
2	C	101	MOO	4	0
2	K	101	MOO	4	0
2	H	101	MOO	4	0
2	D	101	MOO	4	0
2	C	102	MOO	3	0
2	B	101	MOO	3	0
2	H	102	MOO	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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 MOO A 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO J 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO B 102

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO I 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO L 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO M 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO E 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO F 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO I 102

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO C 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO K 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO H 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO D 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO C 102

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO B 101

Bond lengths

Bond angles

Torsions

Rings

Ligand MOO H 102

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(Å^2)	Q<0.9
1	A	74/78 (94%)	0.06	4 (5%)	32	32	26, 38, 64, 98	0
1	B	69/78 (88%)	-0.17	1 (1%)	73	72	21, 34, 56, 60	0
1	C	69/78 (88%)	-0.16	0	100	100	26, 36, 53, 73	0
1	D	69/78 (88%)	-0.21	0	100	100	26, 37, 50, 83	0
1	E	71/78 (91%)	-0.06	1 (1%)	73	72	27, 39, 53, 85	0
1	F	70/78 (89%)	-0.21	0	100	100	27, 36, 49, 68	0
1	H	74/78 (94%)	0.03	5 (6%)	25	25	29, 41, 81, 124	0
1	I	69/78 (88%)	-0.18	0	100	100	29, 37, 51, 63	0
1	J	69/78 (88%)	-0.26	0	100	100	28, 37, 47, 71	0
1	K	69/78 (88%)	-0.24	0	100	100	28, 38, 47, 60	0
1	L	71/78 (91%)	-0.13	1 (1%)	73	72	27, 39, 62, 94	0
1	M	70/78 (89%)	-0.18	0	100	100	29, 37, 57, 76	0
All	All	844/936 (90%)	-0.14	12 (1%)	73	72	21, 37, 57, 124	0

The worst 5 of 12 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	74	PRO	7.6
1	E	71	TRP	7.2
1	A	72	SER	6.2
1	A	71	TRP	5.9
1	L	71	TRP	4.3

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

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

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

6.4 Ligands ⓘ

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	MOO	B	102	5/5	0.99	0.05	17,25,30,34	0
2	MOO	I	101	5/5	0.99	0.05	27,27,32,40	0
2	MOO	K	101	5/5	0.99	0.04	23,27,33,35	0
2	MOO	C	101	5/5	1.00	0.04	16,19,29,29	0
2	MOO	C	102	5/5	1.00	0.04	21,22,29,39	0
2	MOO	D	101	5/5	1.00	0.04	23,26,29,33	0
2	MOO	E	101	5/5	1.00	0.04	19,24,31,33	0
2	MOO	F	101	5/5	1.00	0.04	18,21,30,31	0
2	MOO	H	101	5/5	1.00	0.04	26,27,34,35	0
2	MOO	H	102	5/5	1.00	0.04	20,25,32,33	0
2	MOO	B	101	5/5	1.00	0.05	25,28,33,37	0
2	MOO	I	102	5/5	1.00	0.04	27,30,34,34	0
2	MOO	J	101	5/5	1.00	0.04	23,23,33,36	0
2	MOO	A	101	5/5	1.00	0.03	24,25,30,34	0
2	MOO	L	101	5/5	1.00	0.04	24,27,29,33	0
2	MOO	M	101	5/5	1.00	0.04	27,28,31,32	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.

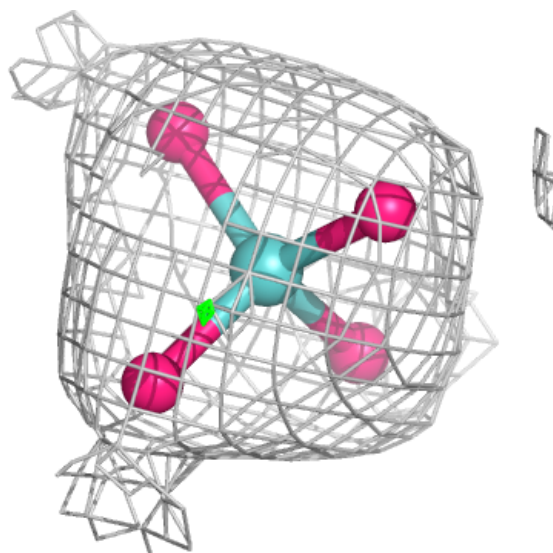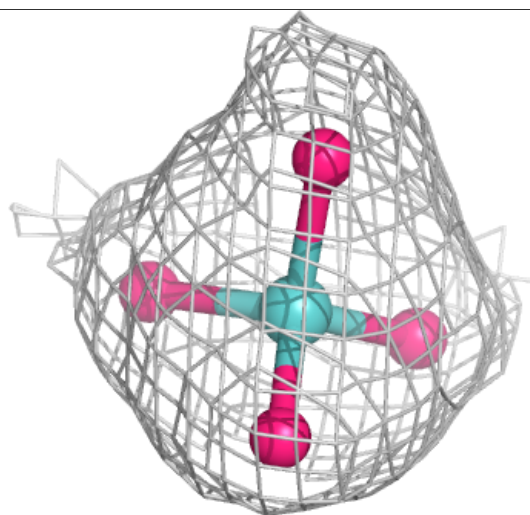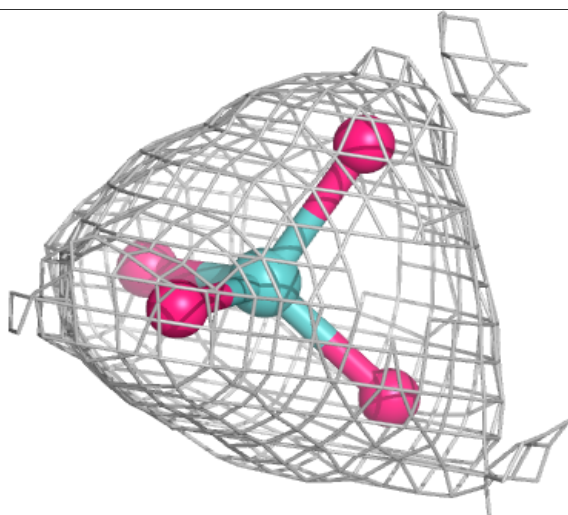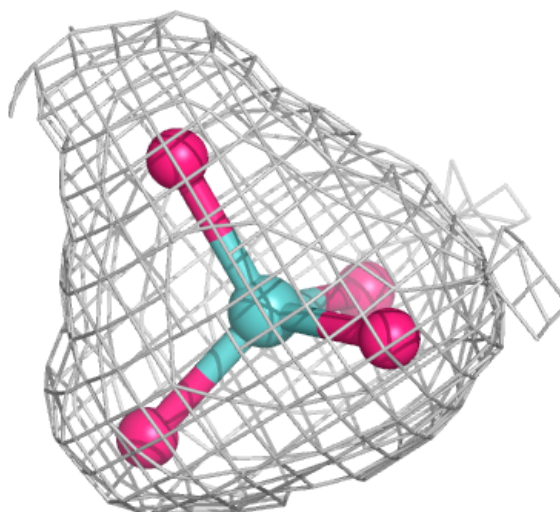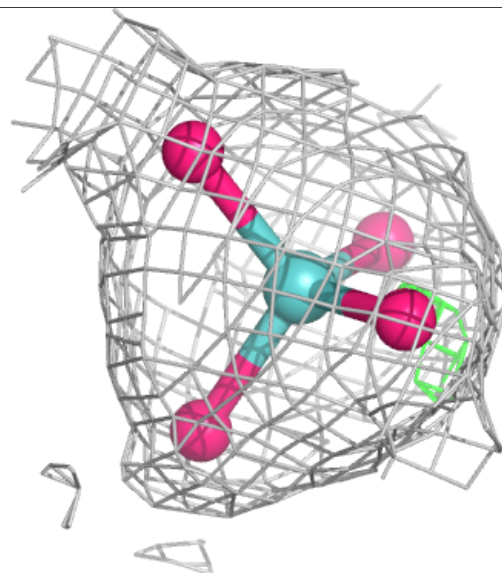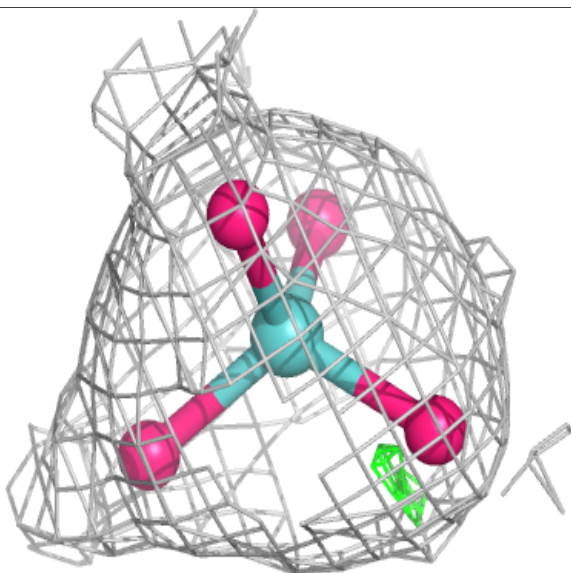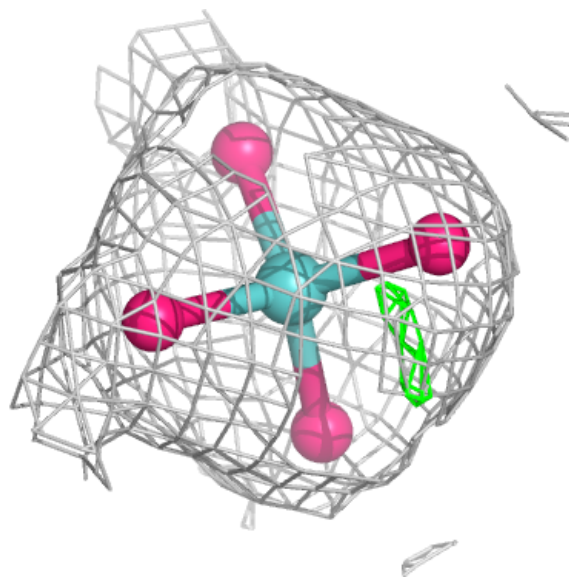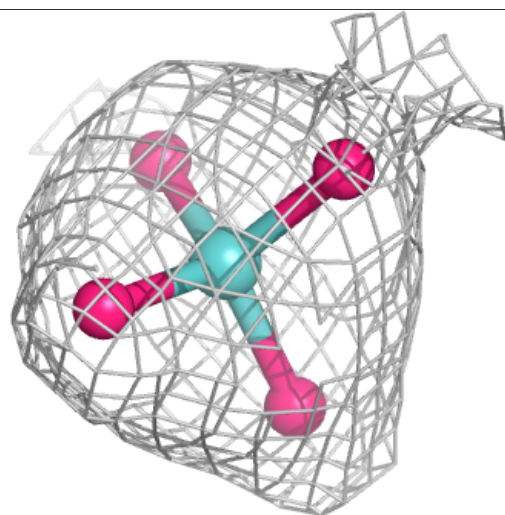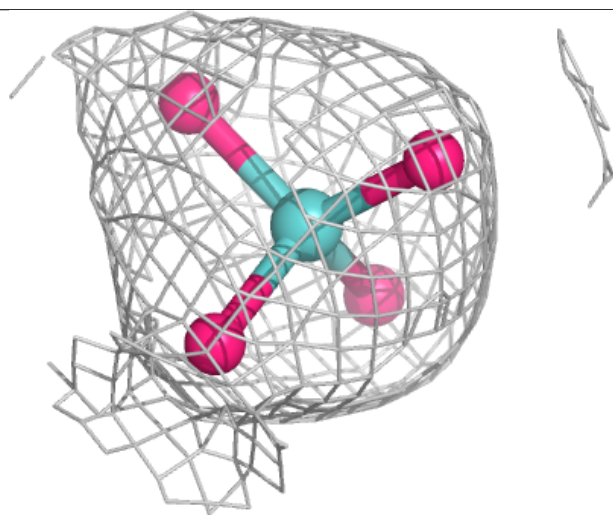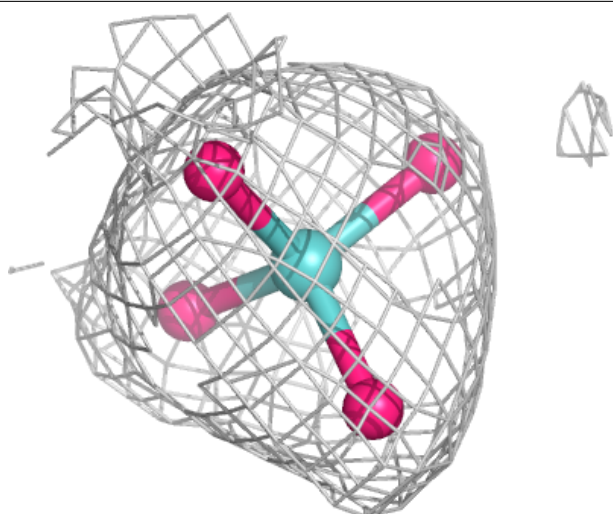**Electron density around MOO B 102:**

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
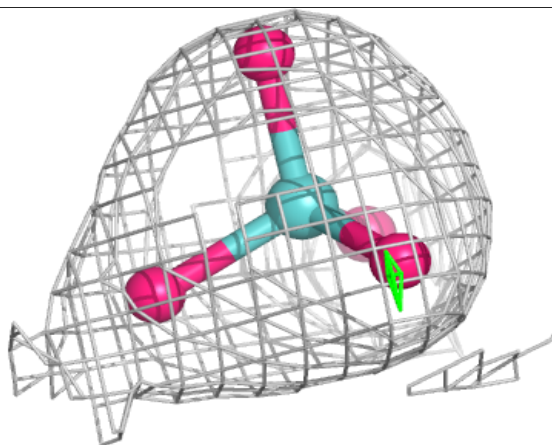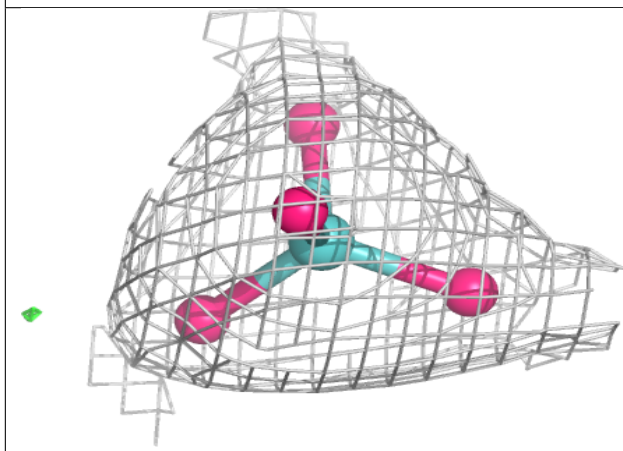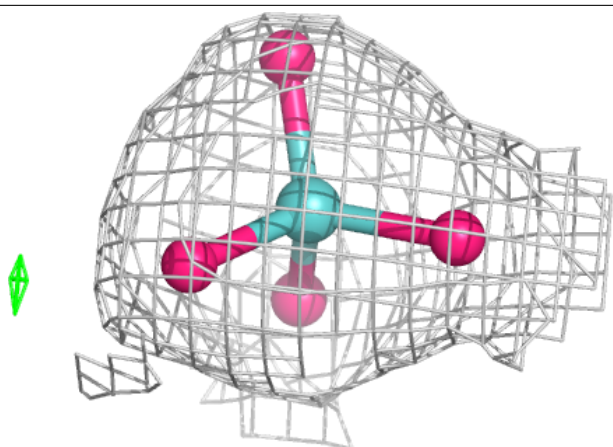
Electron density around MOO I 101:

$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
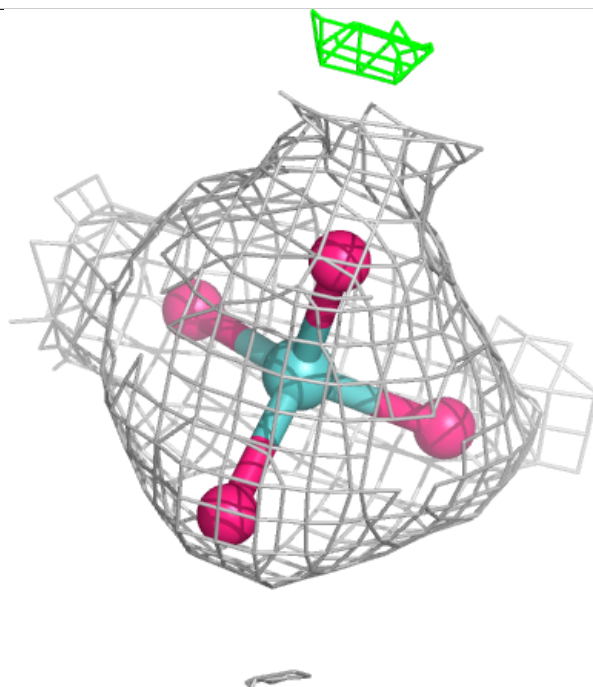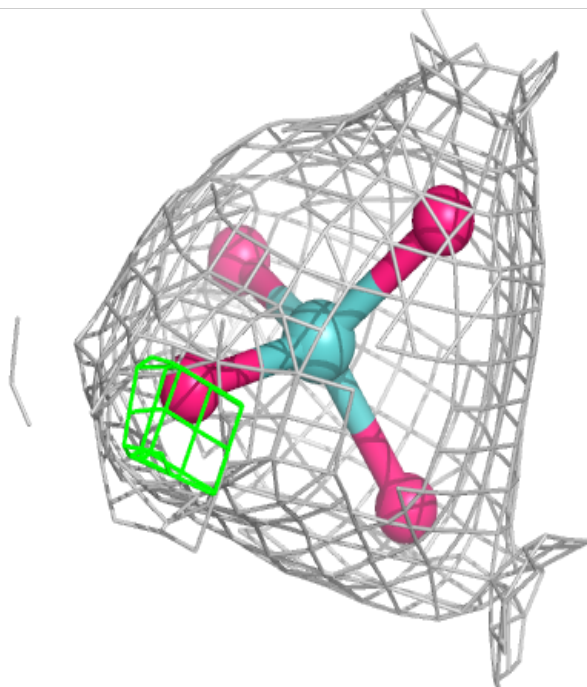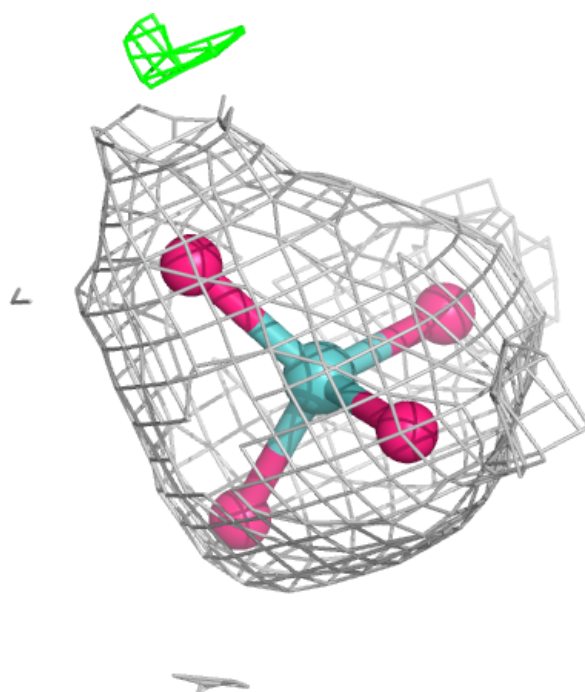
Electron density around MOO K 101:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
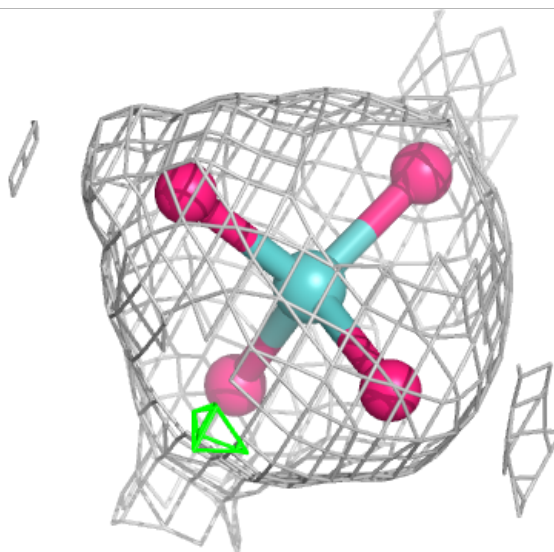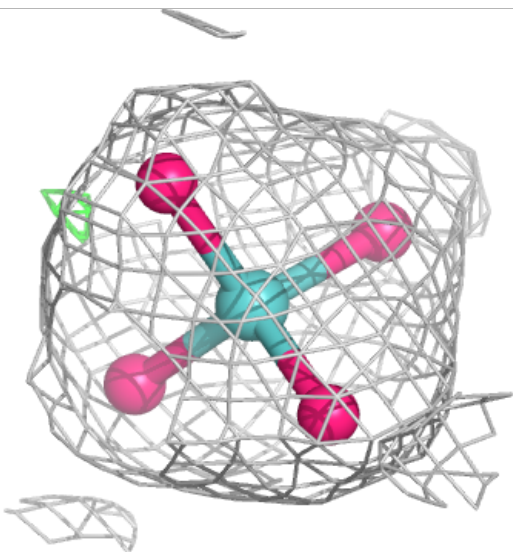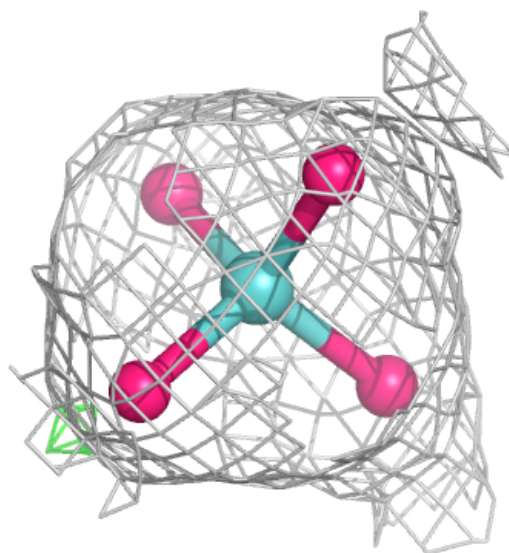and green (positive)
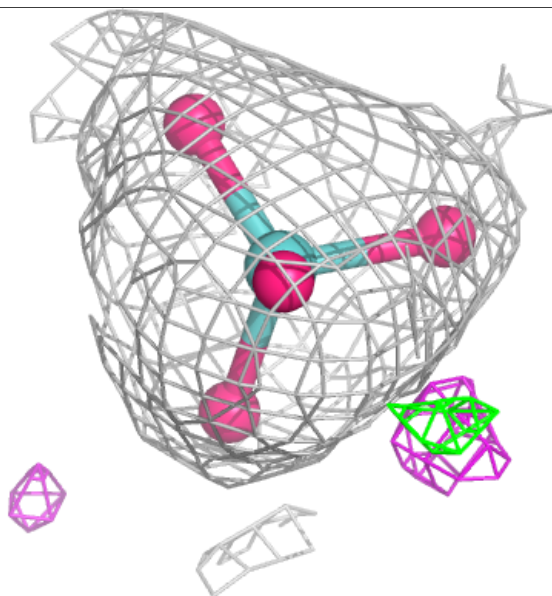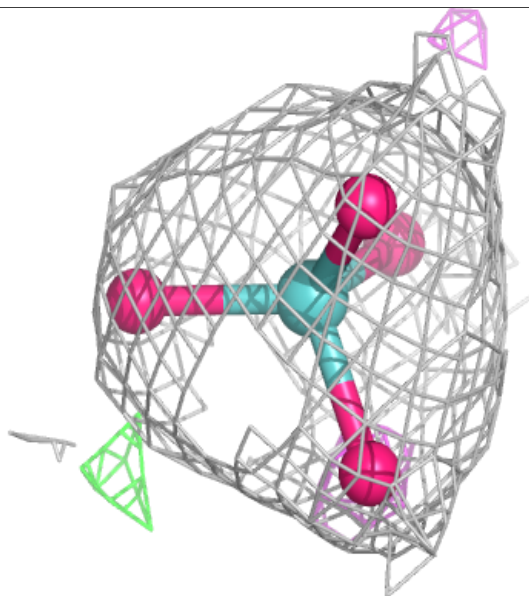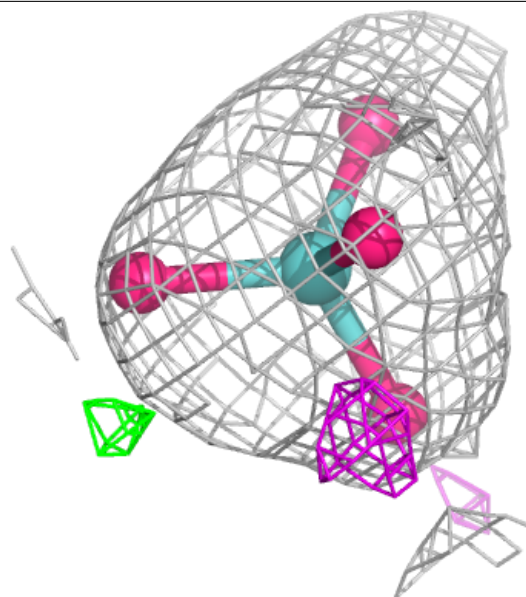
Electron density around MOO C 101:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
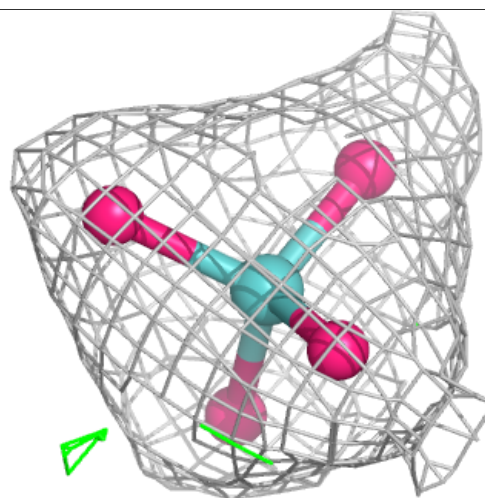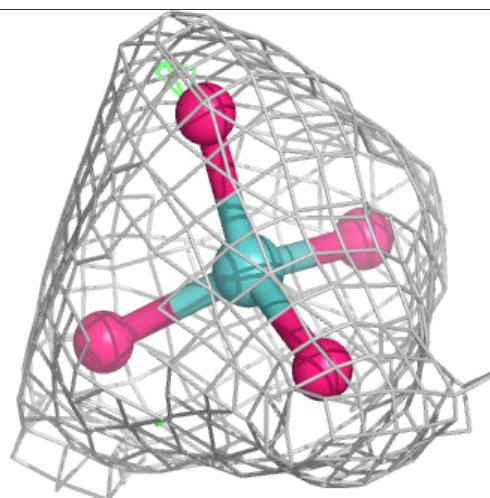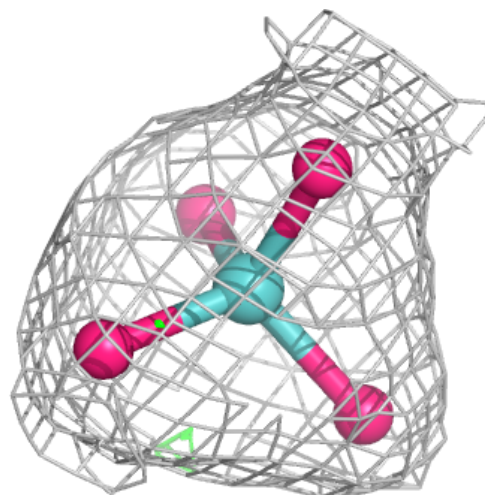
Electron density around MOO C 102:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
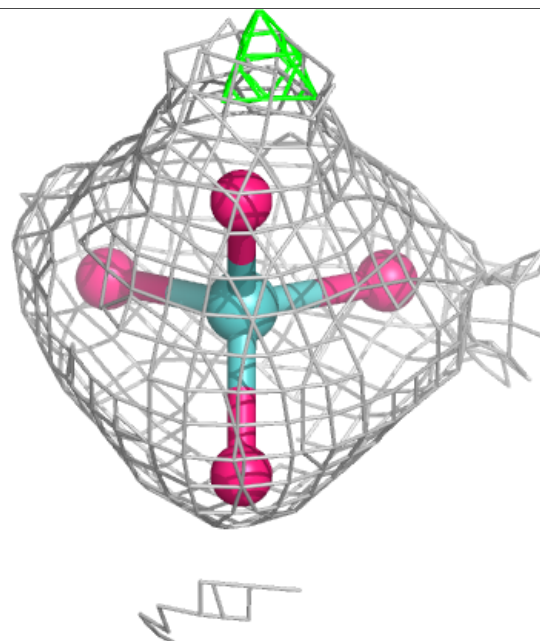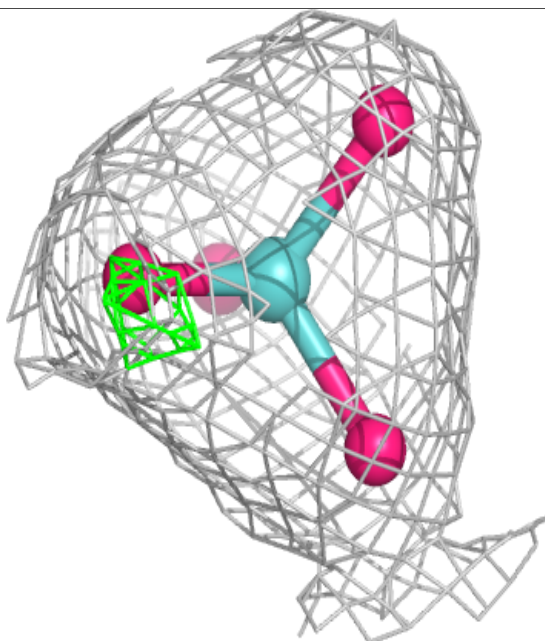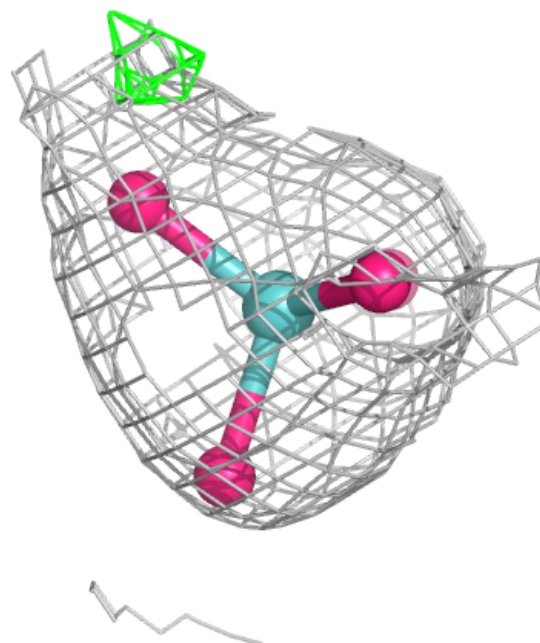
Electron density around MOO D 101:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
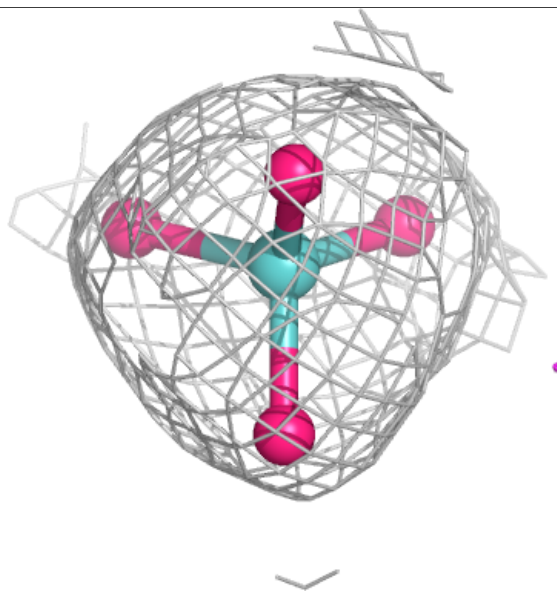and green (positive)
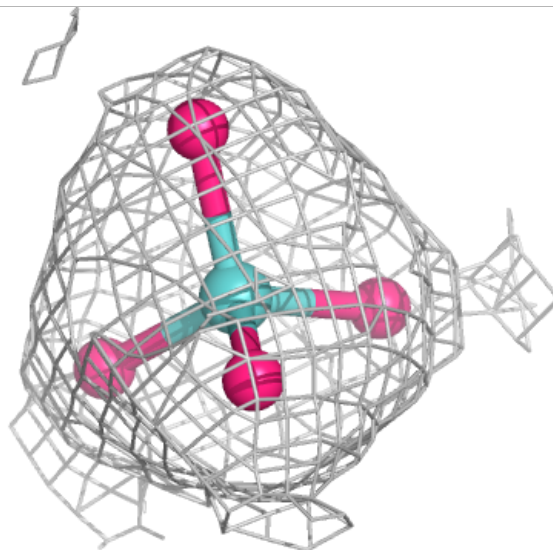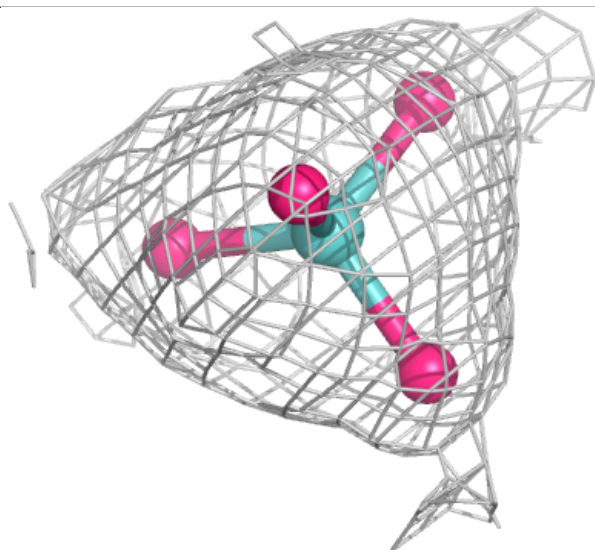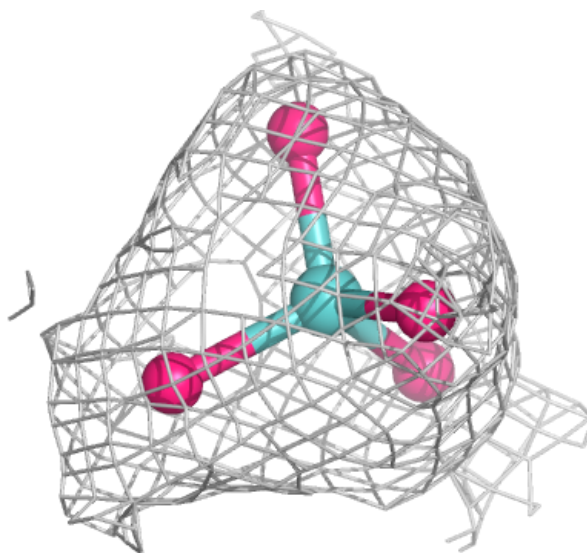
Electron density around MOO E 101:

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

Electron density around MOO F 101:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
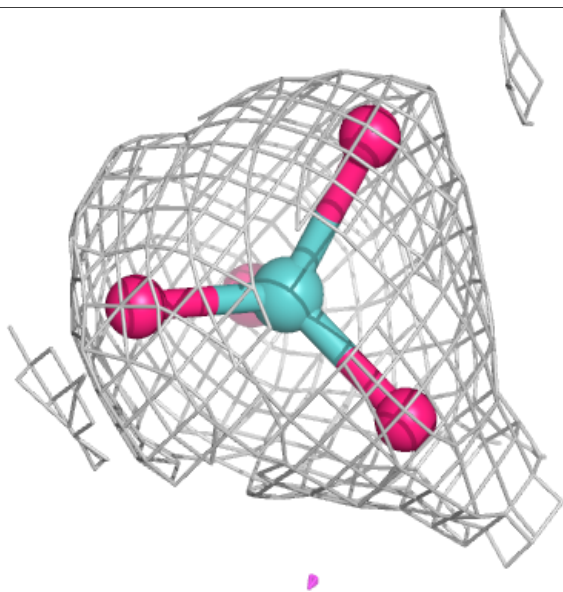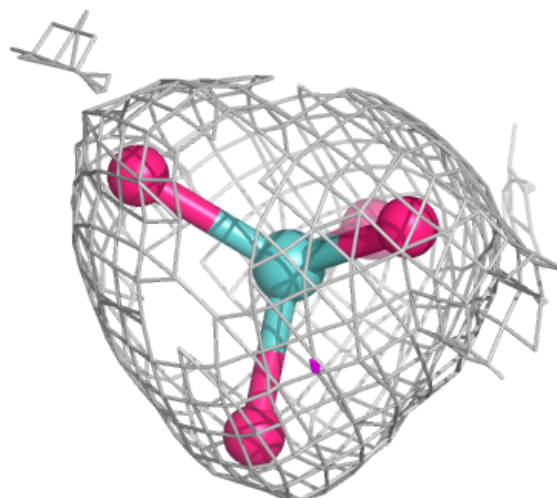and green (positive)
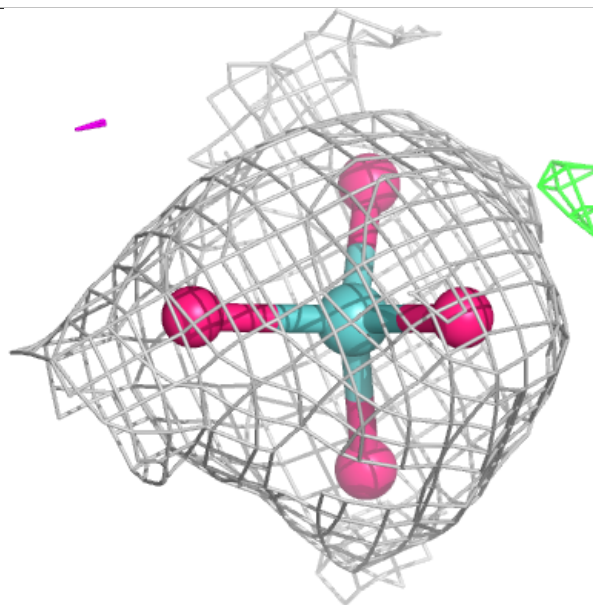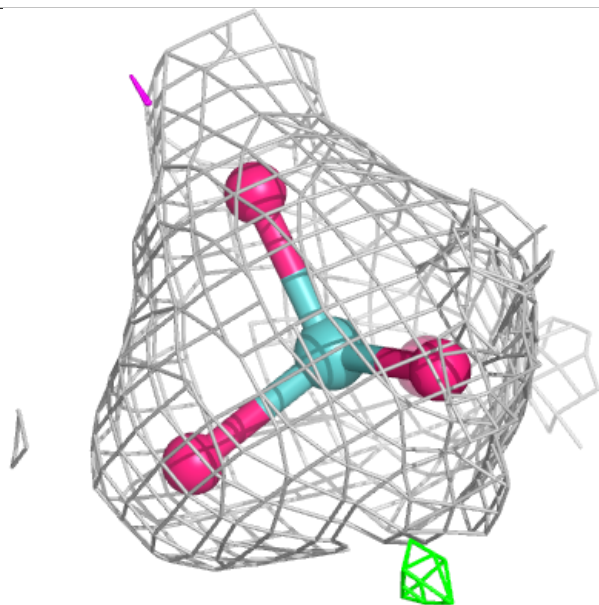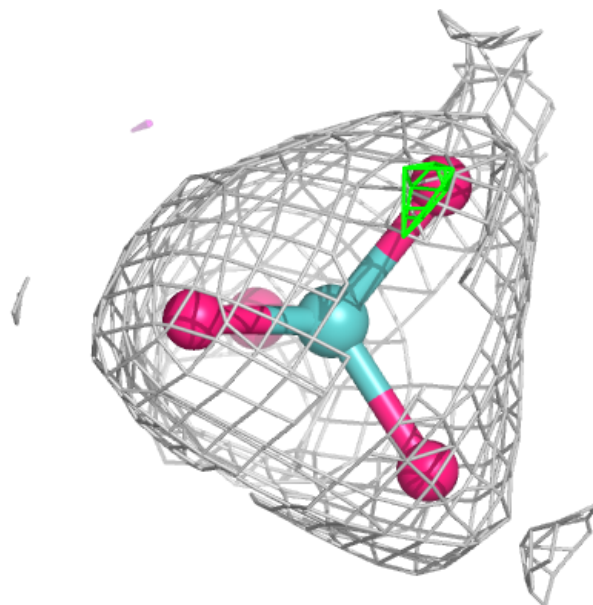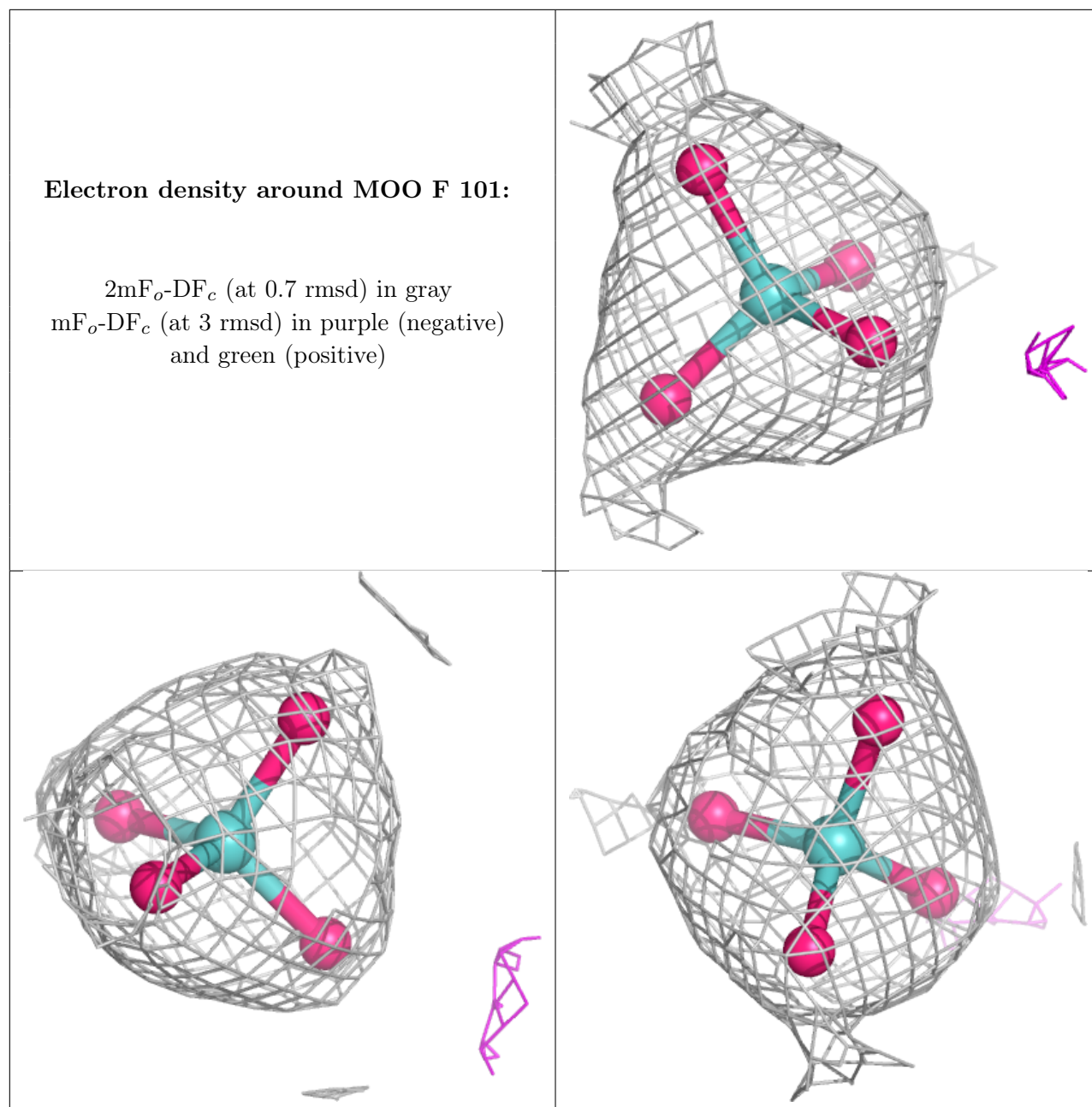
Electron density around MOO H 101:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
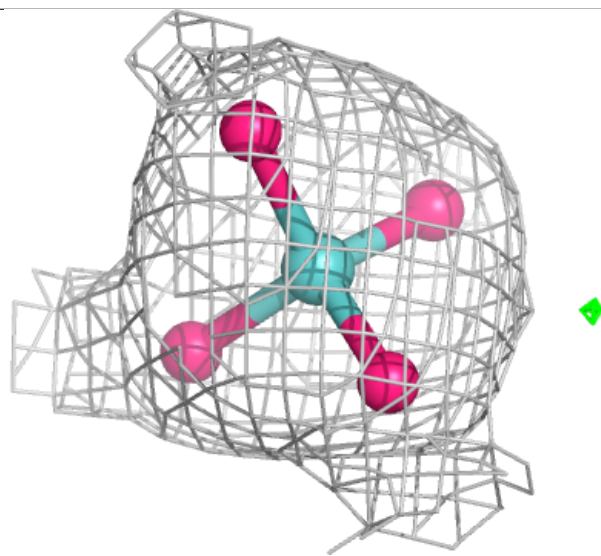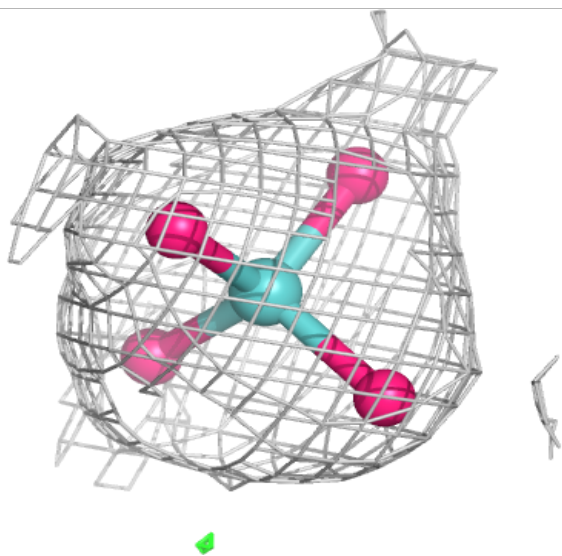
Electron density around MOO H 102:

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

Electron density around MOO B 101:

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

Electron density around MOO I 102:

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

Electron density around MOO J 101:

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

Electron density around MOO A 101:

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

Electron density around MOO L 101:
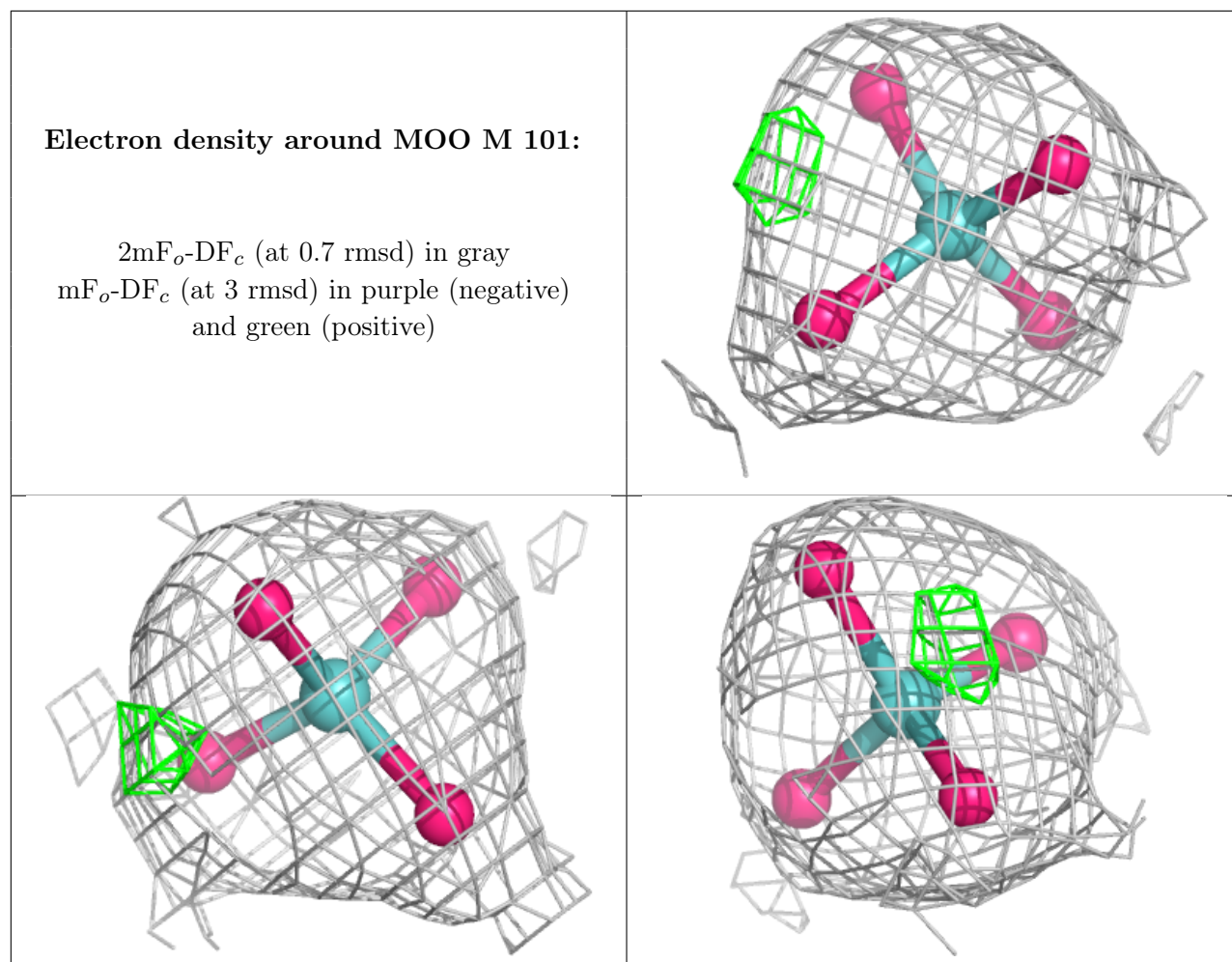
$2mF_o\text{-}DF_c$ (at 0.7 rmsd) in gray
$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around MOO M 101:

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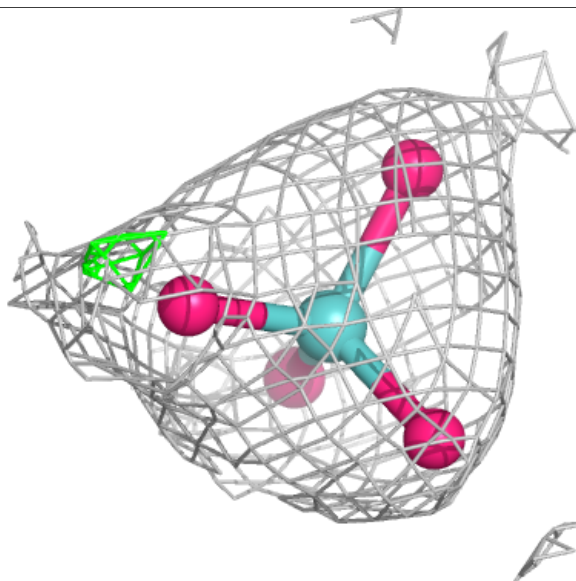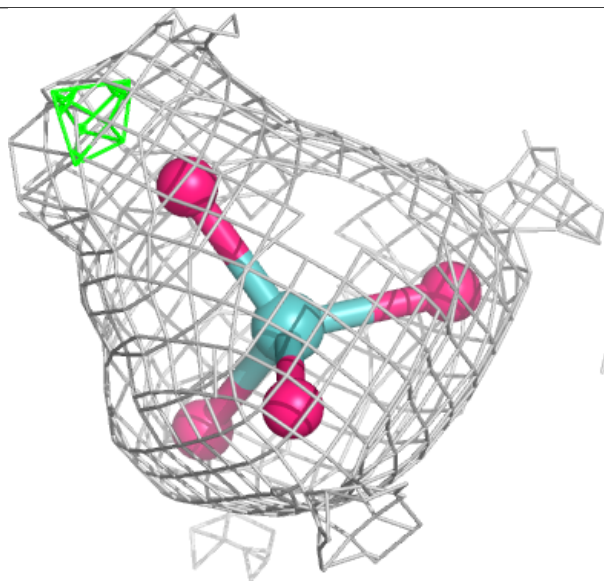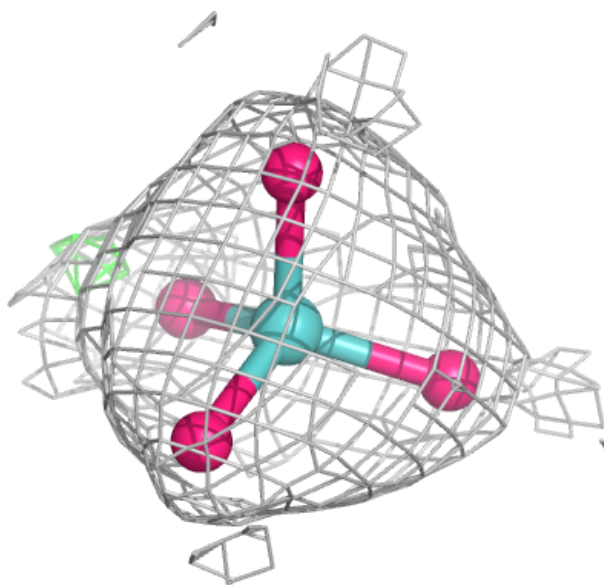
6.5 Other polymers (i)

There are no such residues in this entry.