



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 07:32 PM UTC

PDB ID : 9FIE / pdb_00009fie
Title : X-ray structure of furin (PCSK3) in complex with the PC1/3 (PCSK1) prodomain mutant R77A,R80A,R81A
Authors : Dahms, S.O.; Brandstetter, H.
Deposited on : 2024-05-29
Resolution : 2.00 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

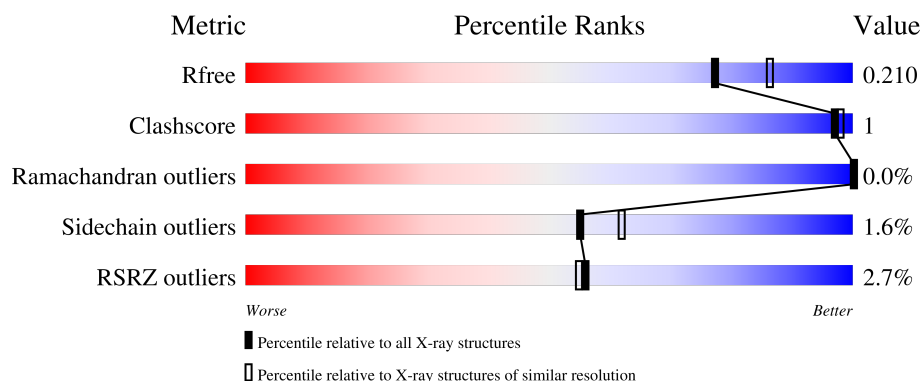
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	482	
1	C	482	
1	E	482	
1	G	482	
2	B	84	

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Mol	Chain	Length	Quality of chain
2	D	84	<div><div></div><div>42%</div><div></div><div>92%</div><div></div><div>6%</div><div></div></div>
2	F	84	<div><div></div><div>%</div><div></div><div>88%</div><div></div><div>10%</div><div></div></div>
2	H	84	<div><div></div><div>2%</div><div></div><div>96%</div><div></div><div></div><div></div></div>

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 34599 atoms, of which 16380 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 Furin.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	465	Total	C	H	N	O	S	123	26	0
			7150	2271	3477	662	724	16			
1	C	467	Total	C	H	N	O	S	106	19	0
			7100	2256	3451	656	721	16			
1	E	465	Total	C	H	N	O	S	104	18	0
			7053	2239	3426	657	715	16			
1	G	467	Total	C	H	N	O	S	81	24	0
			7151	2270	3475	661	729	16			

There are 60 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	575	SER	-	expression tag	UNP P09958
A	576	GLY	-	expression tag	UNP P09958
A	577	SER	-	expression tag	UNP P09958
A	578	LEU	-	expression tag	UNP P09958
A	579	VAL	-	expression tag	UNP P09958
A	580	PRO	-	expression tag	UNP P09958
A	581	ARG	-	expression tag	UNP P09958
A	582	GLY	-	expression tag	UNP P09958
A	583	SER	-	expression tag	UNP P09958
A	584	HIS	-	expression tag	UNP P09958
A	585	HIS	-	expression tag	UNP P09958
A	586	HIS	-	expression tag	UNP P09958
A	587	HIS	-	expression tag	UNP P09958
A	588	HIS	-	expression tag	UNP P09958
A	589	HIS	-	expression tag	UNP P09958
C	575	SER	-	expression tag	UNP P09958
C	576	GLY	-	expression tag	UNP P09958
C	577	SER	-	expression tag	UNP P09958
C	578	LEU	-	expression tag	UNP P09958
C	579	VAL	-	expression tag	UNP P09958
C	580	PRO	-	expression tag	UNP P09958

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Chain	Residue	Modelled	Actual	Comment	Reference
C	581	ARG	-	expression tag	UNP P09958
C	582	GLY	-	expression tag	UNP P09958
C	583	SER	-	expression tag	UNP P09958
C	584	HIS	-	expression tag	UNP P09958
C	585	HIS	-	expression tag	UNP P09958
C	586	HIS	-	expression tag	UNP P09958
C	587	HIS	-	expression tag	UNP P09958
C	588	HIS	-	expression tag	UNP P09958
C	589	HIS	-	expression tag	UNP P09958
E	575	SER	-	expression tag	UNP P09958
E	576	GLY	-	expression tag	UNP P09958
E	577	SER	-	expression tag	UNP P09958
E	578	LEU	-	expression tag	UNP P09958
E	579	VAL	-	expression tag	UNP P09958
E	580	PRO	-	expression tag	UNP P09958
E	581	ARG	-	expression tag	UNP P09958
E	582	GLY	-	expression tag	UNP P09958
E	583	SER	-	expression tag	UNP P09958
E	584	HIS	-	expression tag	UNP P09958
E	585	HIS	-	expression tag	UNP P09958
E	586	HIS	-	expression tag	UNP P09958
E	587	HIS	-	expression tag	UNP P09958
E	588	HIS	-	expression tag	UNP P09958
E	589	HIS	-	expression tag	UNP P09958
G	575	SER	-	expression tag	UNP P09958
G	576	GLY	-	expression tag	UNP P09958
G	577	SER	-	expression tag	UNP P09958
G	578	LEU	-	expression tag	UNP P09958
G	579	VAL	-	expression tag	UNP P09958
G	580	PRO	-	expression tag	UNP P09958
G	581	ARG	-	expression tag	UNP P09958
G	582	GLY	-	expression tag	UNP P09958
G	583	SER	-	expression tag	UNP P09958
G	584	HIS	-	expression tag	UNP P09958
G	585	HIS	-	expression tag	UNP P09958
G	586	HIS	-	expression tag	UNP P09958
G	587	HIS	-	expression tag	UNP P09958
G	588	HIS	-	expression tag	UNP P09958
G	589	HIS	-	expression tag	UNP P09958

- Molecule 2 is a protein called Neuroendocrine convertase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	82	Total	C	H	N	O	29	4	0
			1336	427	649	128	132			
2	D	82	Total	C	H	N	O	163	0	0
			1290	415	627	122	126			
2	F	82	Total	C	H	N	O	33	2	0
			1301	418	632	123	128			
2	H	82	Total	C	H	N	O	28	1	0
			1301	419	630	123	129			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	27	GLY	-	expression tag	UNP P29120
B	77	ALA	ARG	engineered mutation	UNP P29120
B	80	ALA	ARG	engineered mutation	UNP P29120
B	81	ALA	ARG	engineered mutation	UNP P29120
D	27	GLY	-	expression tag	UNP P29120
D	77	ALA	ARG	engineered mutation	UNP P29120
D	80	ALA	ARG	engineered mutation	UNP P29120
D	81	ALA	ARG	engineered mutation	UNP P29120
F	27	GLY	-	expression tag	UNP P29120
F	77	ALA	ARG	engineered mutation	UNP P29120
F	80	ALA	ARG	engineered mutation	UNP P29120
F	81	ALA	ARG	engineered mutation	UNP P29120
H	27	GLY	-	expression tag	UNP P29120
H	77	ALA	ARG	engineered mutation	UNP P29120
H	80	ALA	ARG	engineered mutation	UNP P29120
H	81	ALA	ARG	engineered mutation	UNP P29120

- Molecule 3 is CALCIUM ION (CCD ID: CA) (formula: Ca) (labeled as "Ligand of Interest" by depositor).

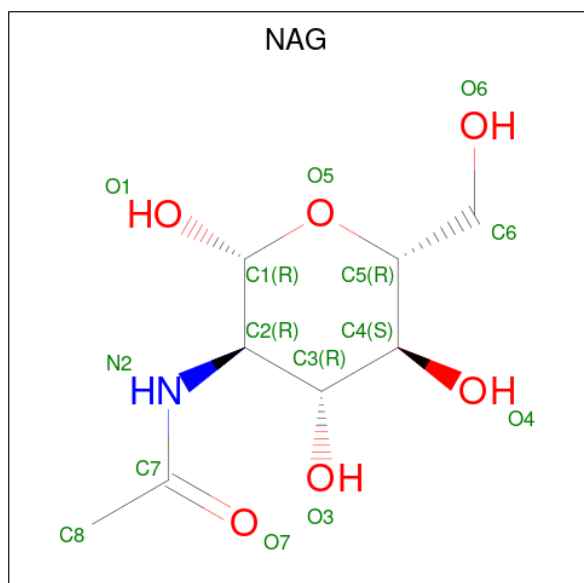
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	3	Total	Ca	0	0
			3	3		
3	C	3	Total	Ca	0	0
			3	3		
3	E	3	Total	Ca	0	0
			3	3		
3	G	3	Total	Ca	0	0
			3	3		

- Molecule 4 is SODIUM ION (CCD ID: NA) (formula: Na) (labeled as "Ligand of Interest"

by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Na	0	0
			1	1		
4	B	1	Total	Na	0	0
			1	1		
4	C	1	Total	Na	0	0
			1	1		
4	E	1	Total	Na	0	0
			1	1		
4	F	1	Total	Na	0	0
			1	1		
4	G	1	Total	Na	0	0
			1	1		
4	H	1	Total	Na	0	0
			1	1		

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	E	1	Total	C	H	N	O	0	1
			27	8	13	1	5		

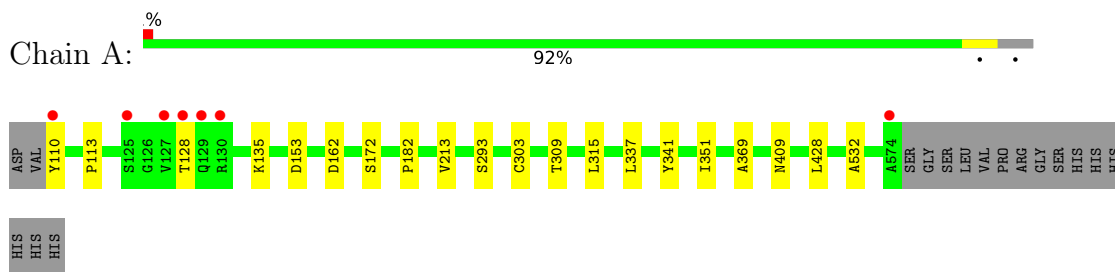
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	174	Total 174	O 174	0	0
6	B	33	Total 33	O 33	0	0
6	C	185	Total 185	O 185	0	0
6	D	10	Total 10	O 10	0	0
6	E	184	Total 184	O 184	0	0
6	F	37	Total 37	O 37	0	0
6	G	223	Total 223	O 223	0	0
6	H	25	Total 25	O 25	0	0

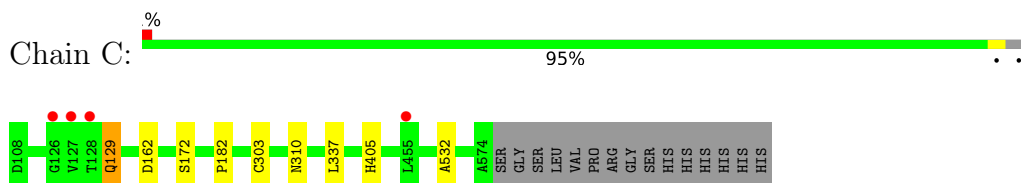
3 Residue-property plots [i](#)

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.

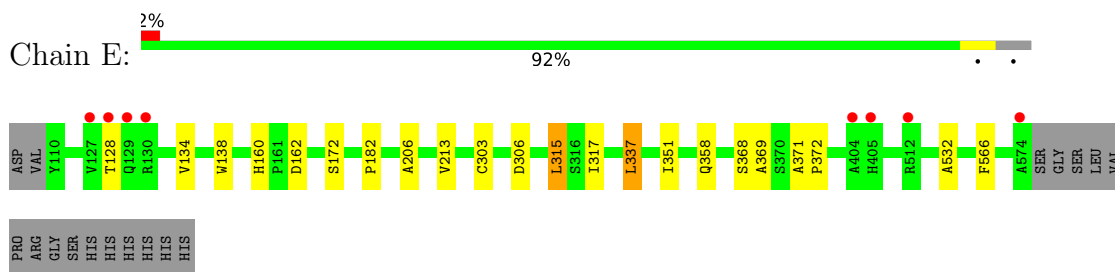
- Molecule 1: Furin



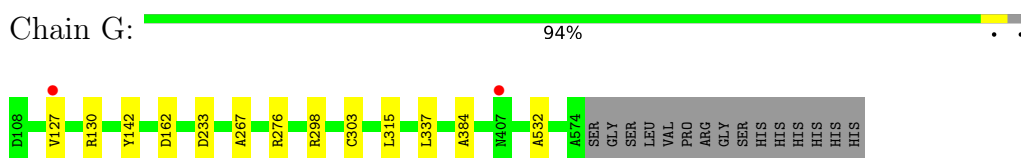
- Molecule 1: Furin



- Molecule 1: Furin

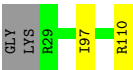


- Molecule 1: Furin

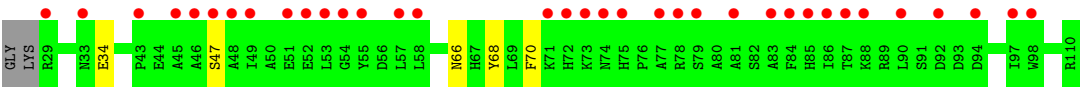
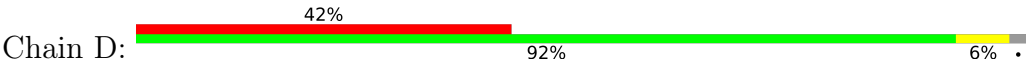


- Molecule 2: Neuroendocrine convertase 1

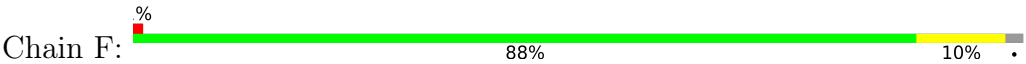




• Molecule 2: Neuroendocrine convertase 1



• Molecule 2: Neuroendocrine convertase 1



• Molecule 2: Neuroendocrine convertase 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	82.80Å 83.74Å 103.16Å 98.50° 89.93° 95.94°	Depositor
Resolution (Å)	46.60 – 2.00 46.60 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.6 (46.60-2.00) 99.7 (46.60-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.40 (at 2.00Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487, PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.196 , 0.219 (Not available) , 0.210	Depositor DCC
R_{free} test set	9180 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	25.3	Xtriage
Anisotropy	0.627	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.40 , 31.7	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	0.95	EDS
Total number of atoms	34599	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.69% 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: NAG, CA, NA

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	0.12	0/3836	0.33	0/5227
1	C	0.13	0/3799	0.33	0/5177
1	E	0.14	0/3770	0.33	0/5135
1	G	0.13	0/3831	0.34	0/5222
2	B	0.11	0/711	0.28	0/952
2	D	0.10	0/679	0.25	0/914
2	F	0.14	0/694	0.30	0/933
2	H	0.11	0/687	0.28	0/925
All	All	0.13	0/18007	0.33	0/24485

There are no bond length outliers.

There are no bond angle outliers.

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	3673	3477	3407	6	0
1	C	3649	3451	3388	3	0
1	E	3627	3426	3374	12	0
1	G	3676	3475	3410	4	0
2	B	687	649	640	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	663	627	631	2	0
2	F	669	632	623	4	0
2	H	671	630	634	1	0
3	A	3	0	0	0	0
3	C	3	0	0	0	0
3	E	3	0	0	0	0
3	G	3	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	E	1	0	0	0	0
4	F	1	0	0	0	0
4	G	1	0	0	0	0
4	H	1	0	0	0	0
5	E	14	13	13	0	0
6	A	174	0	0	0	0
6	B	33	0	0	0	0
6	C	185	0	0	0	0
6	D	10	0	0	0	0
6	E	184	0	0	0	0
6	F	37	0	0	0	0
6	G	223	0	0	0	0
6	H	25	0	0	1	0
All	All	18219	16380	16120	31	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 1.

All (31) 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:129:GLN:HB3	1:C:405:HIS:CE1	2.44	0.53
1:E:351:ILE:HG13	1:E:369:ALA:HB1	1.91	0.52
1:A:351:ILE:HG13	1:A:369:ALA:HB1	1.92	0.50
1:G:298:ARG:HG3	1:G:298:ARG:HH11	1.76	0.50
1:C:310:ASN:ND2	1:C:532:ALA:O	2.43	0.47
1:A:293:SER:HA	1:A:309[A]:THR:HG21	1.95	0.47
2:H:110:ARG:NH1	6:H:301:HOH:O	2.35	0.46
1:A:172:SER:HB3	1:A:182:PRO:HG3	1.97	0.46
1:E:315:LEU:HD22	1:E:317:ILE:HD11	1.98	0.46
1:E:315:LEU:HG	1:E:337:LEU:HD12	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:371:ALA:HB3	1:E:372:PRO:HD3	2.01	0.42
1:G:233:ASP:CG	1:G:267:ALA:HB3	2.44	0.42
2:D:66:ASN:HA	2:D:68:TYR:CE2	2.54	0.42
1:E:206:ALA:HA	1:E:213:VAL:HG12	2.02	0.42
2:D:34:GLU:HA	2:D:70:PHE:O	2.19	0.42
2:F:40:PRO:HD3	2:F:97:ILE:HG12	2.01	0.42
1:G:142:TYR:CE1	1:G:384:ALA:HA	2.55	0.42
1:E:134:VAL:HG12	1:E:138:TRP:CE2	2.54	0.42
1:E:566:PHE:C	1:E:566:PHE:CD1	2.98	0.41
1:A:113:PRO:HB3	1:A:213:VAL:HG11	2.02	0.41
1:E:172:SER:HB3	1:E:182:PRO:HG3	2.03	0.41
1:A:341:TYR:CE2	1:A:428:LEU:HD21	2.56	0.41
1:E:160:HIS:CD2	1:E:358:GLN:HA	2.55	0.41
2:F:66:ASN:HA	2:F:68:TYR:CE2	2.56	0.41
1:E:368:SER:HB3	2:F:110:ARG:C	2.47	0.40
1:E:306:ASP:C	1:E:306:ASP:OD1	2.65	0.40
2:F:75:HIS:CG	2:F:76:PRO:HD2	2.57	0.40
1:C:172:SER:HB3	1:C:182:PRO:HG3	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	489/482 (102%)	471 (96%)	17 (4%)	1 (0%)	43	42
1	C	484/482 (100%)	467 (96%)	17 (4%)	0	100	100
1	E	481/482 (100%)	463 (96%)	18 (4%)	0	100	100
1	G	489/482 (102%)	471 (96%)	18 (4%)	0	100	100
2	B	83/84 (99%)	81 (98%)	2 (2%)	0	100	100
2	D	80/84 (95%)	80 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	F	82/84 (98%)	80 (98%)	2 (2%)	0	100	100
2	H	81/84 (96%)	81 (100%)	0	0	100	100
All	All	2269/2264 (100%)	2194 (97%)	74 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	153	ASP

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	398/390 (102%)	390 (98%)	8 (2%)	48	54
1	C	394/390 (101%)	390 (99%)	4 (1%)	68	75
1	E	390/390 (100%)	385 (99%)	5 (1%)	61	68
1	G	398/390 (102%)	391 (98%)	7 (2%)	51	58
2	B	70/67 (104%)	67 (96%)	3 (4%)	26	25
2	D	66/67 (98%)	65 (98%)	1 (2%)	57	64
2	F	68/67 (102%)	67 (98%)	1 (2%)	57	64
2	H	67/67 (100%)	67 (100%)	0	100	100
All	All	1851/1828 (101%)	1822 (98%)	29 (2%)	55	62

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	110	TYR
1	A	128	THR
1	A	135	LYS
1	A	162	ASP
1	A	303	CYS
1	A	315	LEU

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Mol	Chain	Res	Type
1	A	337	LEU
1	A	409	ASN
2	B	97	ILE
2	B	110[A]	ARG
2	B	110[B]	ARG
1	C	129	GLN
1	C	162	ASP
1	C	303	CYS
1	C	337	LEU
2	D	47	SER
1	E	128	THR
1	E	162	ASP
1	E	303	CYS
1	E	315	LEU
1	E	337	LEU
2	F	91	SER
1	G	127	VAL
1	G	130	ARG
1	G	162	ASP
1	G	276	ARG
1	G	303	CYS
1	G	315	LEU
1	G	337	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	192	ASN
1	A	300	HIS
1	C	140	GLN
1	C	521	HIS
2	D	30	GLN
1	E	192	ASN
1	G	140	GLN
1	G	358	GLN
1	G	521	HIS
2	H	74	ASN
2	H	75	HIS

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 ⓘ

Of 20 ligands modelled in this entry, 19 are monoatomic - leaving 1 for Mogul analysis.

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	$\# Z > 2$
5	NAG	E	605[A]	1	14,14,15	0.28	0	17,19,21	0.41	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
5	NAG	E	605[A]	1	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

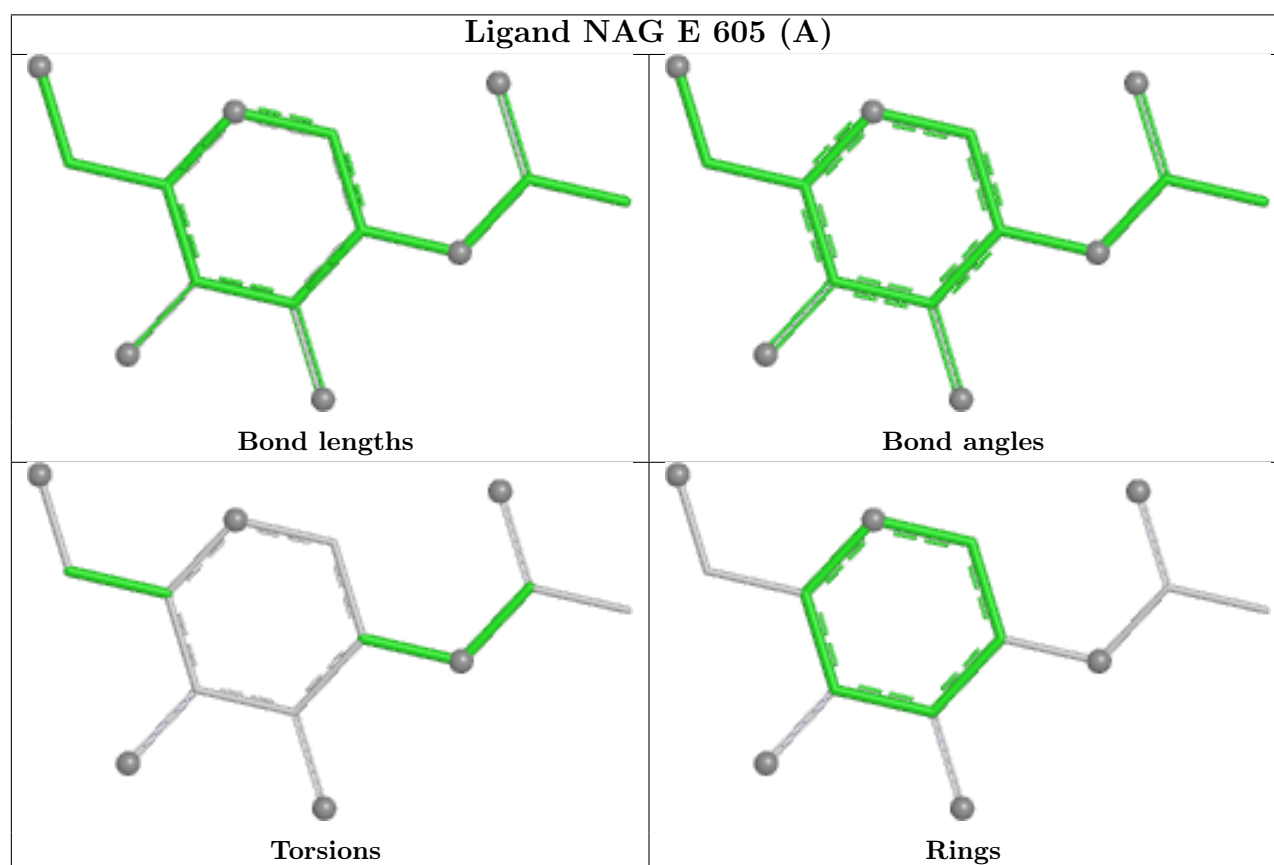
There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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.



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	465/482 (96%)	-0.14	7 (1%) 72 71	12, 30, 43, 67	32 (6%)
1	C	467/482 (96%)	-0.27	4 (0%) 81 80	14, 30, 41, 69	27 (5%)
1	E	465/482 (96%)	-0.11	8 (1%) 69 68	16, 31, 45, 61	24 (5%)
1	G	467/482 (96%)	-0.29	2 (0%) 88 88	13, 28, 38, 60	27 (5%)
2	B	82/84 (97%)	0.11	0 100 100	17, 36, 46, 60	8 (9%)
2	D	82/84 (97%)	1.88	35 (42%) 0 1	20, 57, 84, 92	23 (28%)
2	F	82/84 (97%)	0.12	1 (1%) 76 76	19, 38, 48, 64	8 (9%)
2	H	82/84 (97%)	0.27	2 (2%) 59 59	27, 39, 54, 61	6 (7%)
All	All	2192/2264 (96%)	-0.08	59 (2%) 56 55	12, 31, 48, 92	155 (7%)

All (59) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	127	VAL	5.4
2	D	74	ASN	5.2
1	E	129	GLN	5.1
1	E	128	THR	5.1
1	A	129	GLN	5.1
1	A	128	THR	4.9
1	C	127	VAL	4.8
1	G	127	VAL	4.5
1	E	127	VAL	4.2
1	A	110	TYR	4.2
2	D	53	LEU	4.2
2	D	49	ILE	3.9
2	D	52	GLU	3.7
2	D	77	ALA	3.5
2	H	84	PHE	3.5
2	D	79	SER	3.4

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Mol	Chain	Res	Type	RSRZ
2	D	78	ARG	3.4
2	D	47	SER	3.4
2	D	57	LEU	3.4
2	D	73	LYS	3.3
2	D	43	PRO	3.3
2	D	48	ALA	3.3
2	D	58	LEU	3.3
2	D	71	LYS	3.2
1	A	125	SER	3.2
2	D	90	LEU	3.1
2	D	98	TRP	3.1
2	D	51	GLU	3.1
2	D	83	ALA	3.1
2	D	94	ASP	3.1
2	D	55	TYR	3.0
2	D	81	ALA	3.0
2	D	54	GLY	2.9
1	E	405	HIS	2.9
2	D	86	ILE	2.9
2	D	72	HIS	2.8
2	D	84	PHE	2.7
2	H	78	ARG	2.7
2	D	46	ALA	2.7
2	D	88	LYS	2.6
2	F	97	ILE	2.6
1	C	126	GLY	2.5
1	E	512[A]	ARG	2.5
2	D	92	ASP	2.5
2	D	75	HIS	2.4
1	A	574	ALA	2.4
2	D	87	THR	2.4
1	C	455	LEU	2.4
2	D	85	HIS	2.3
1	G	407[A]	ASN	2.3
1	E	130	ARG	2.3
2	D	97	ILE	2.2
1	E	574	ALA	2.2
2	D	33	ASN	2.1
1	A	130	ARG	2.1
1	C	128	THR	2.1
2	D	29	ARG	2.1
1	E	404	ALA	2.1

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Mol	Chain	Res	Type	RSRZ
2	D	45	ALA	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.

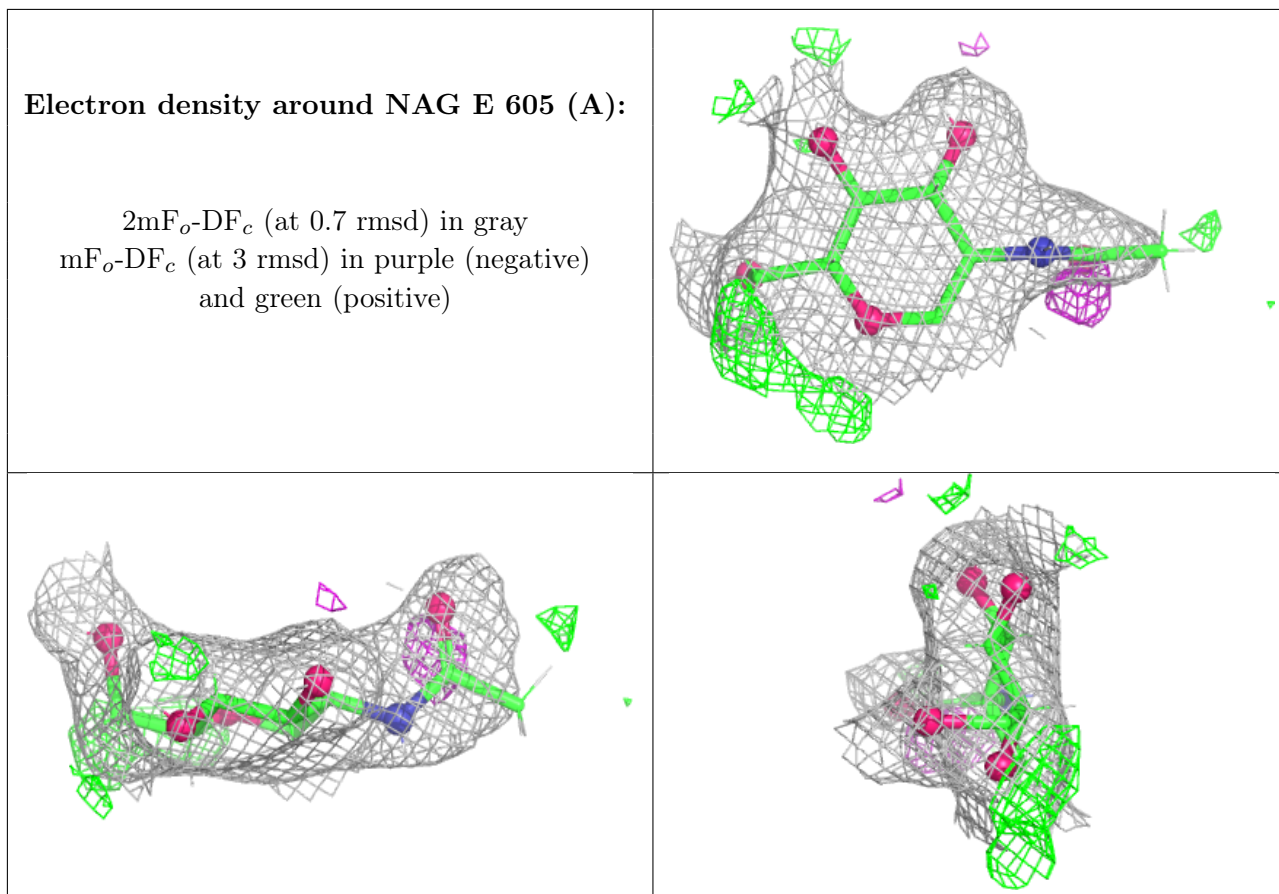
6.4 Ligands [i](#)

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(Å ²)	Q<0.9
5	NAG	E	605[A]	14/15	0.83	0.13	43,53,63,65	0
4	NA	H	201	1/1	0.95	0.07	38,38,38,38	0
4	NA	F	201	1/1	0.95	0.06	36,36,36,36	0
4	NA	B	201	1/1	0.96	0.04	35,35,35,35	0
4	NA	A	604	1/1	0.97	0.04	24,24,24,24	0
4	NA	E	604	1/1	0.98	0.06	25,25,25,25	0
3	CA	A	601	1/1	0.98	0.03	28,28,28,28	0
4	NA	G	604	1/1	0.98	0.06	25,25,25,25	0
3	CA	E	601	1/1	0.98	0.04	27,27,27,27	0
4	NA	C	604	1/1	0.98	0.06	23,23,23,23	0
3	CA	A	603	1/1	0.99	0.03	17,17,17,17	0
3	CA	E	602	1/1	0.99	0.02	29,29,29,29	0
3	CA	G	601	1/1	0.99	0.06	29,29,29,29	0
3	CA	G	602	1/1	0.99	0.06	27,27,27,27	0
3	CA	C	601	1/1	0.99	0.02	27,27,27,27	0
3	CA	C	603	1/1	0.99	0.03	26,26,26,26	0
3	CA	E	603	1/1	1.00	0.04	26,26,26,26	0
3	CA	C	602	1/1	1.00	0.01	27,27,27,27	0
3	CA	A	602	1/1	1.00	0.02	25,25,25,25	0
3	CA	G	603	1/1	1.00	0.02	20,20,20,20	0

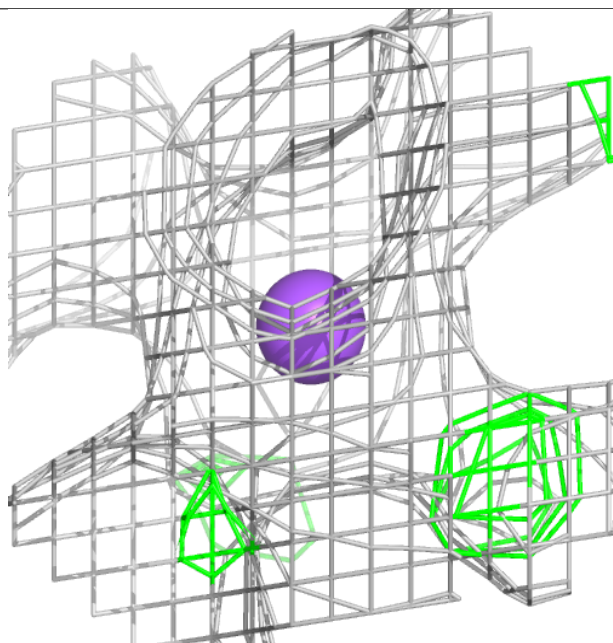
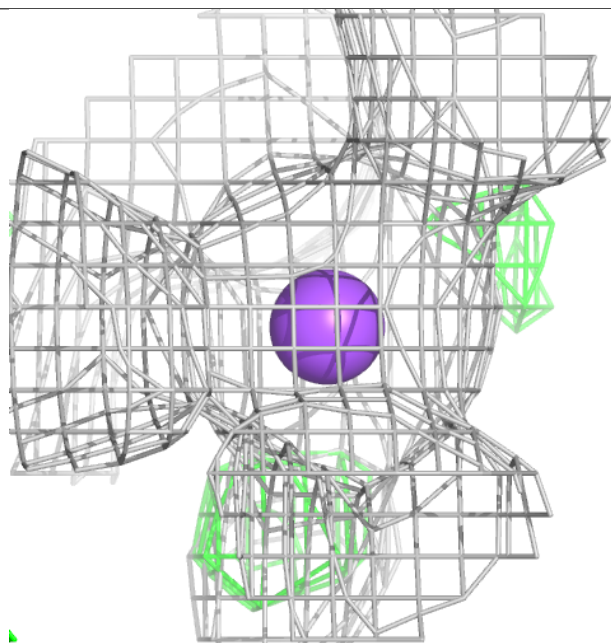
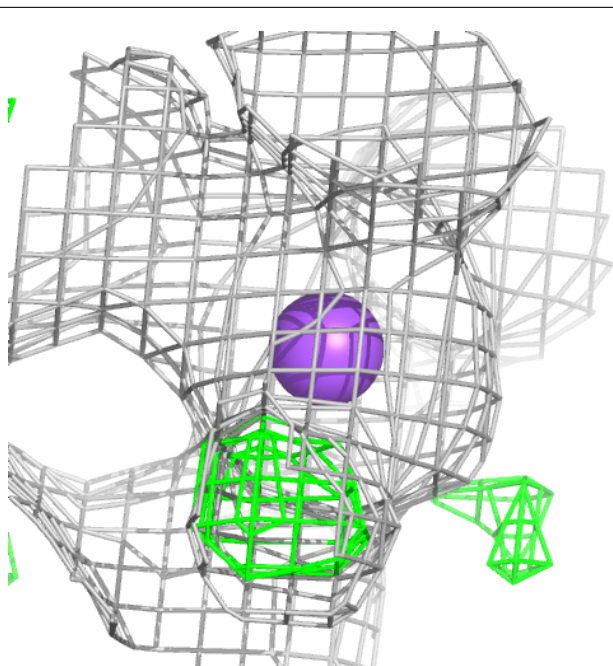
The following is a graphical depiction of the model fit to experimental electron density of all

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.



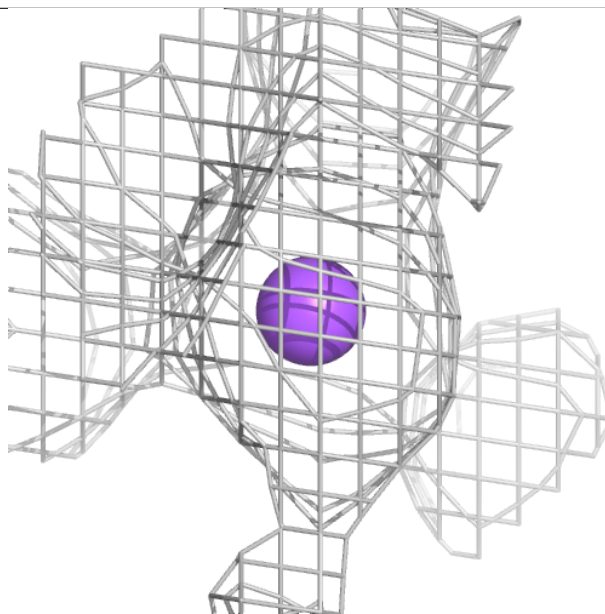
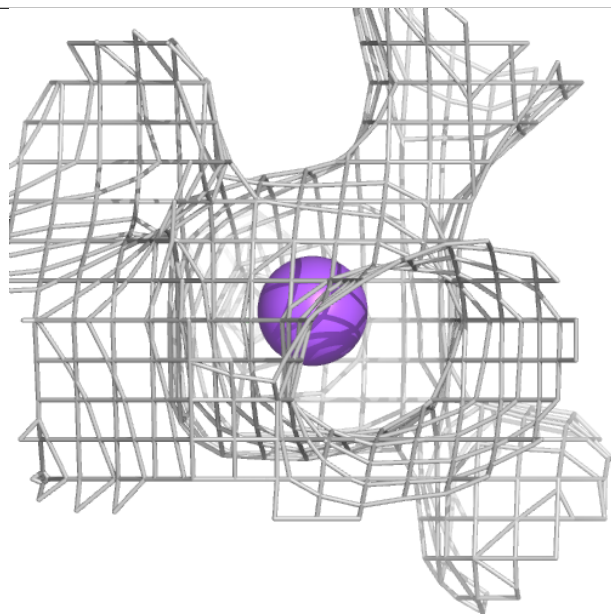
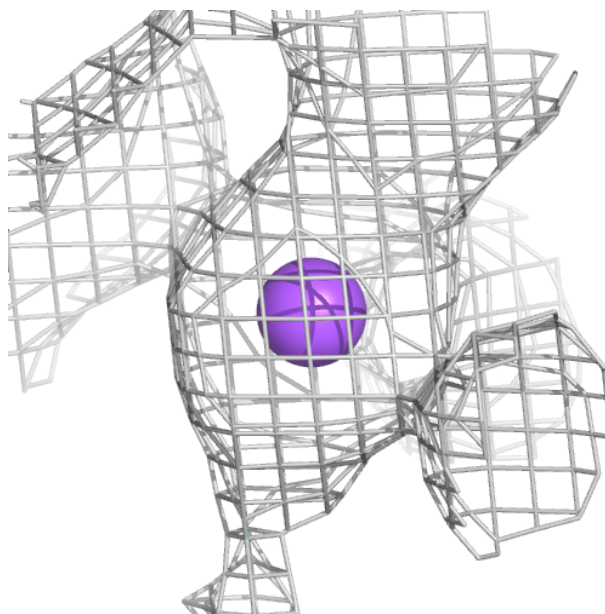
Electron density around NA H 201:

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



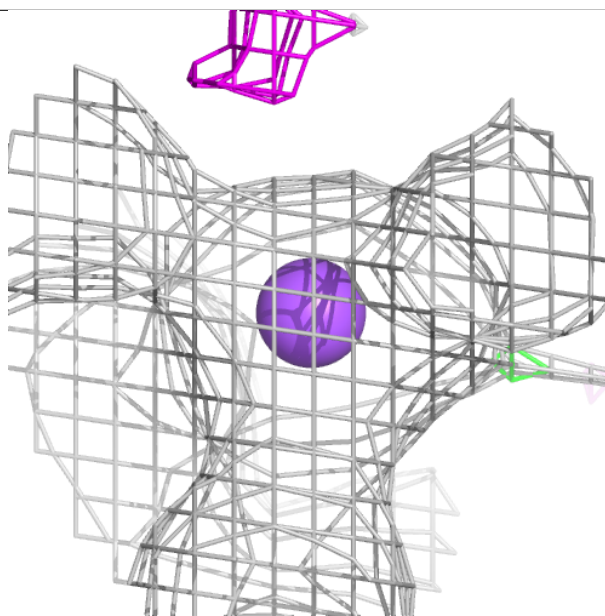
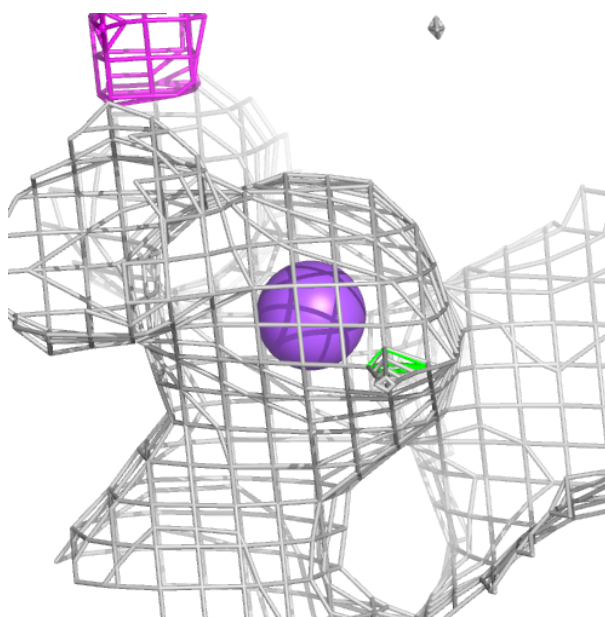
Electron density around NA F 201:

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



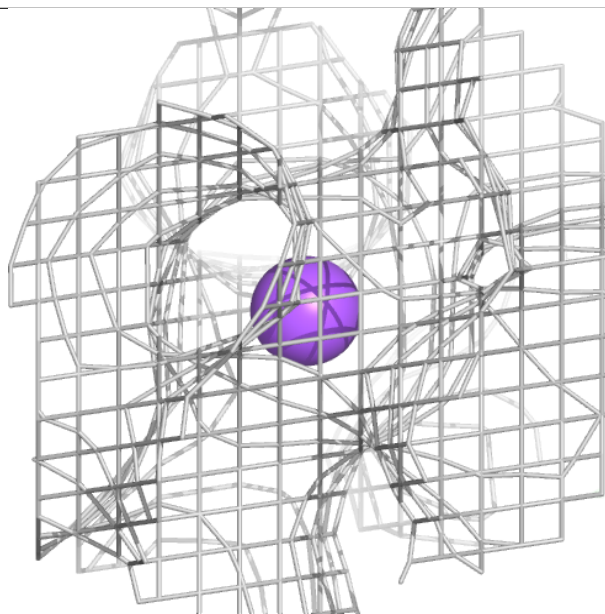
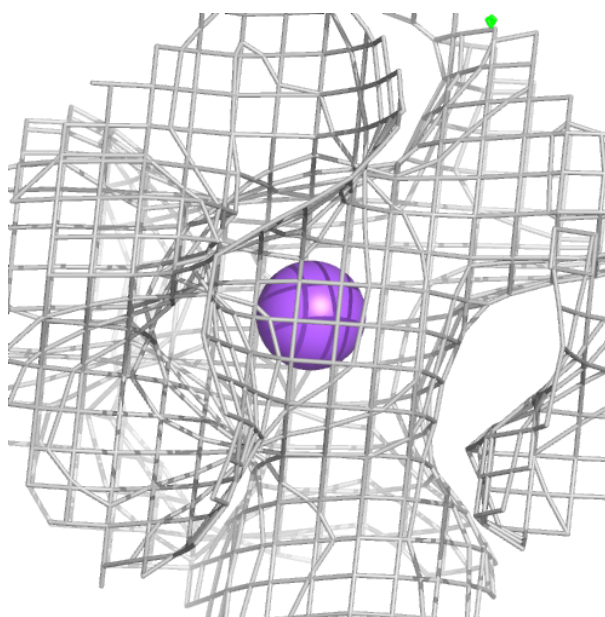
Electron density around NA B 201:

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



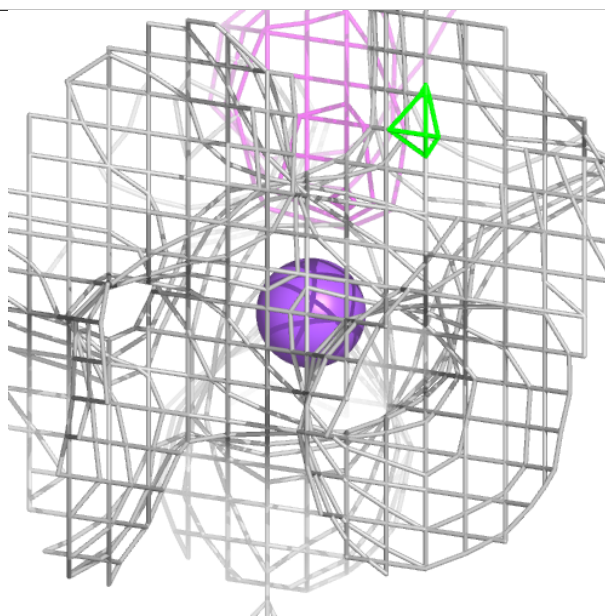
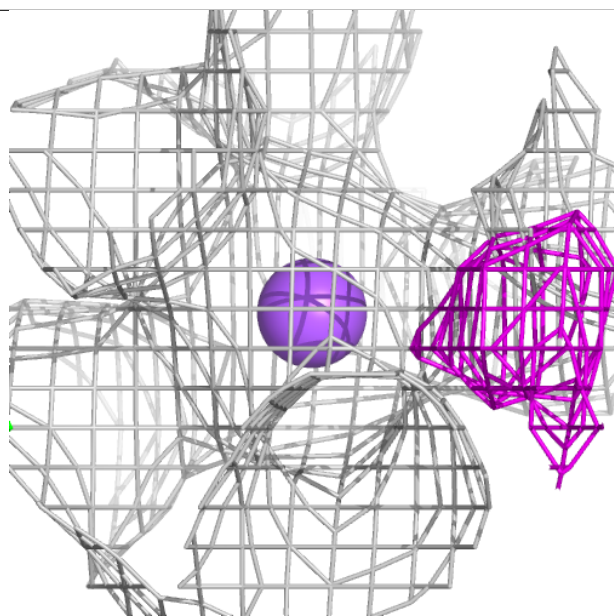
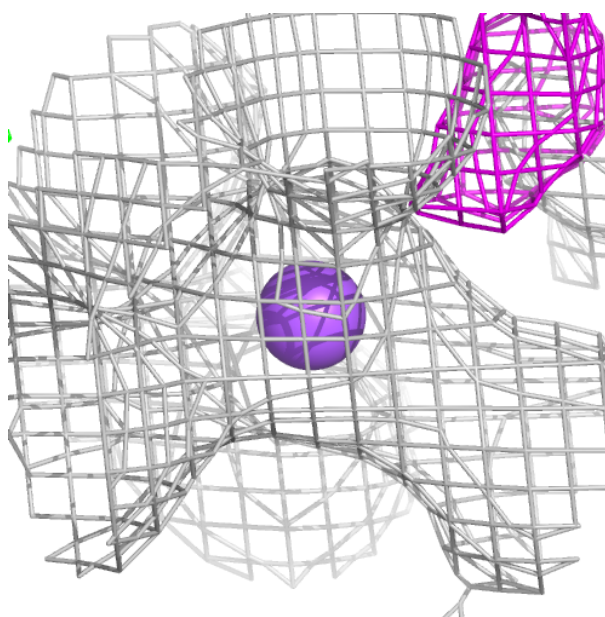
Electron density around NA A 604:

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



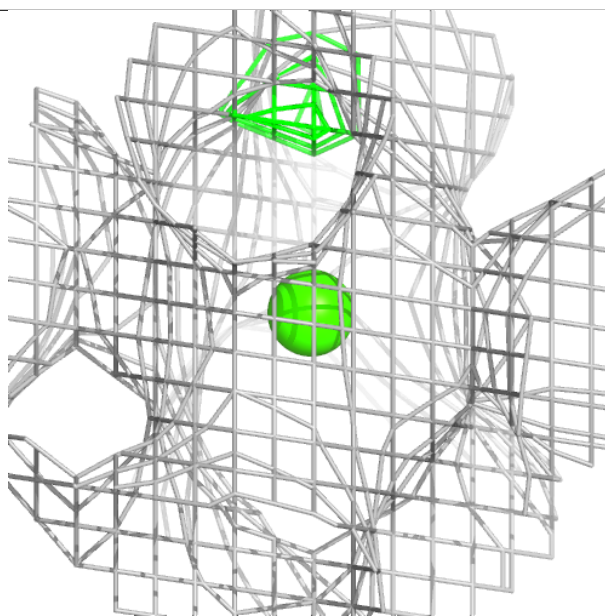
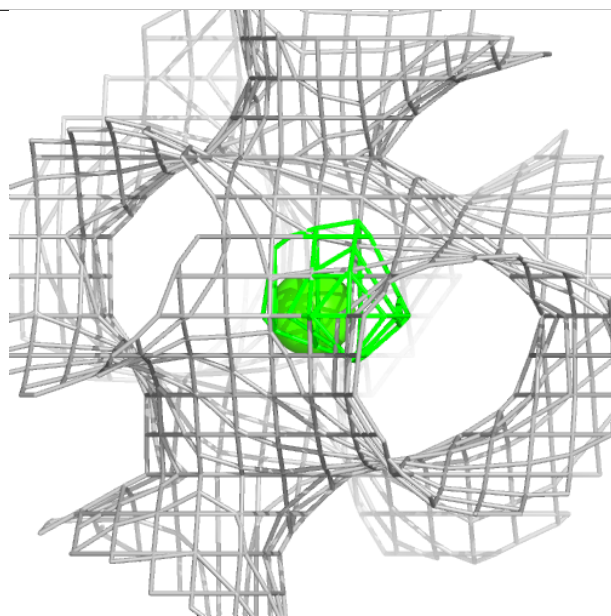
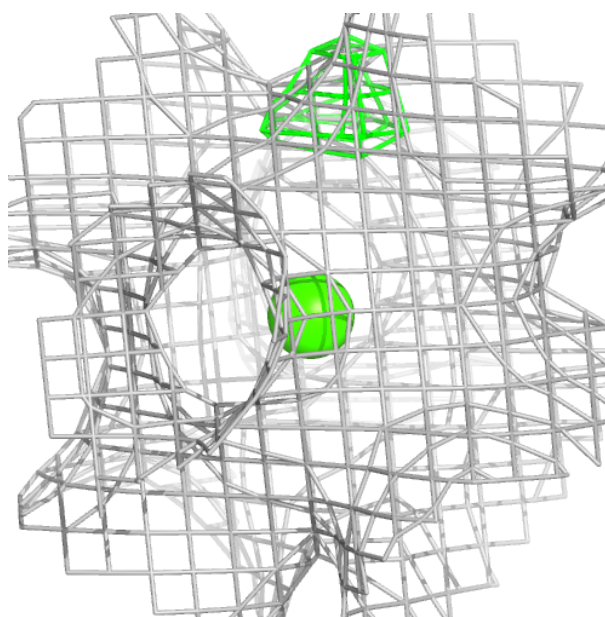
Electron density around NA E 604:

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and green (positive)



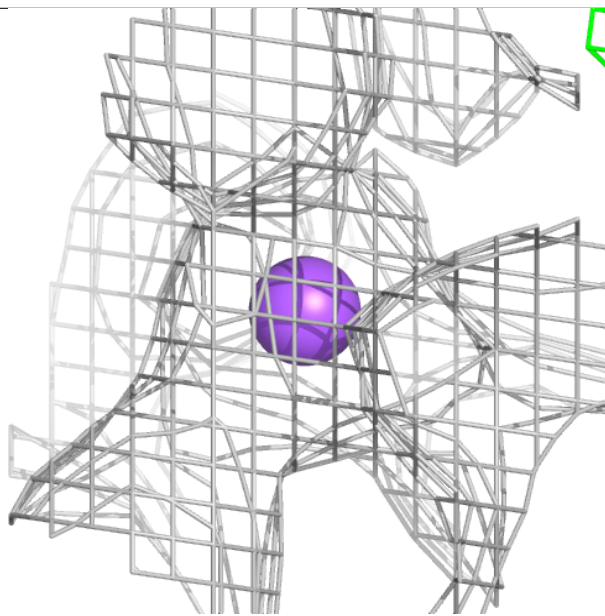
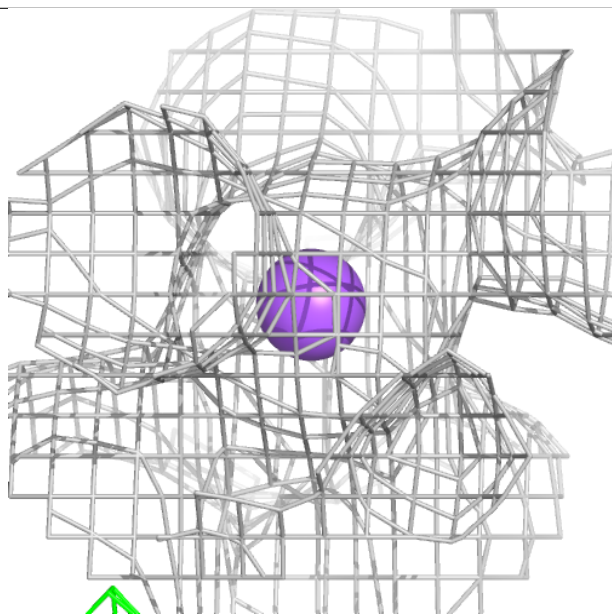
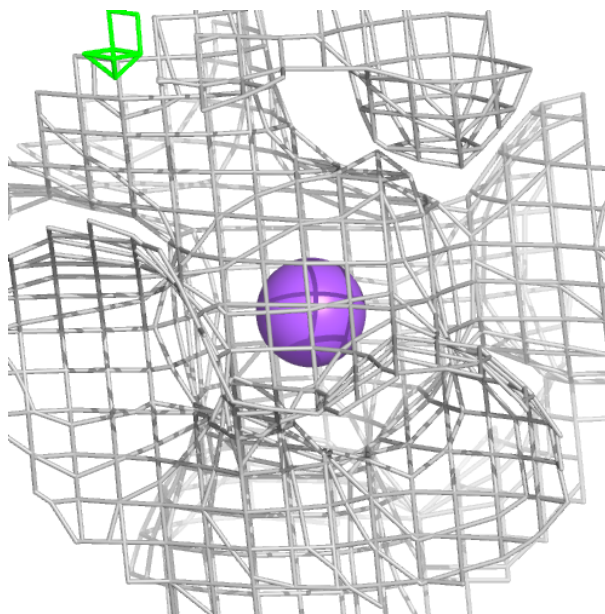
Electron density around CA A 601:

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



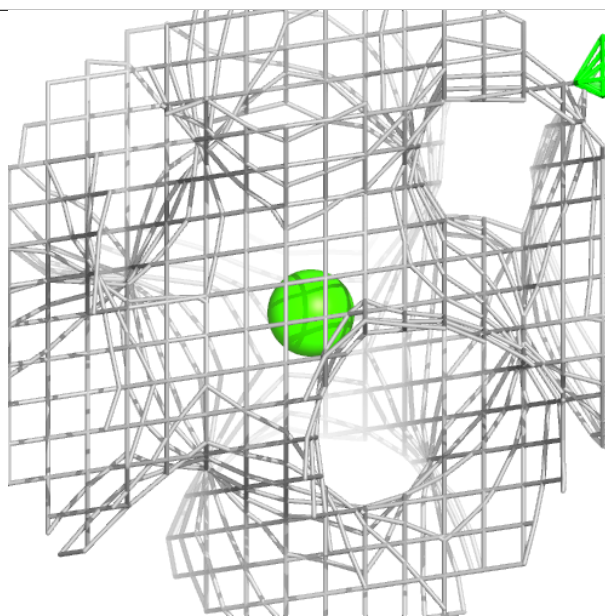
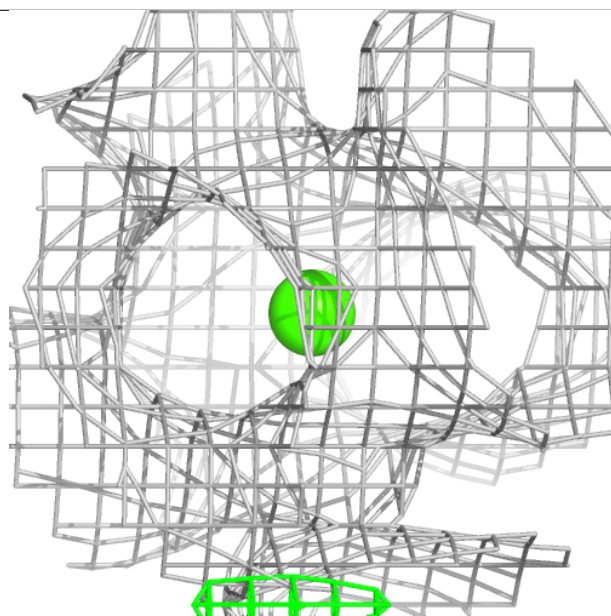
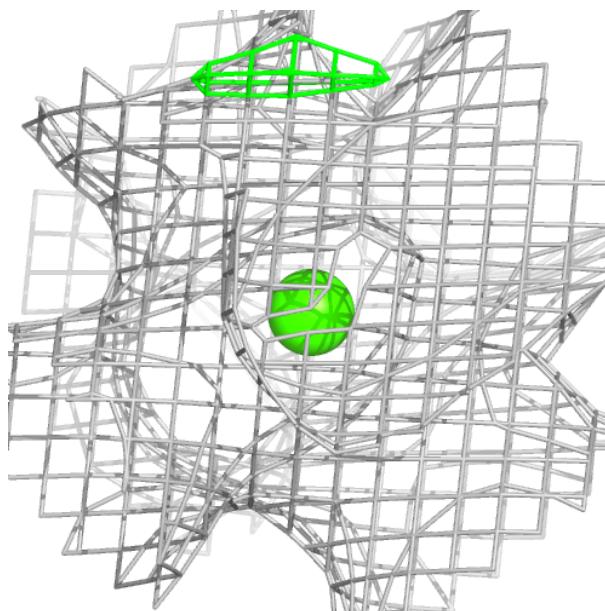
Electron density around NA G 604:

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and green (positive)



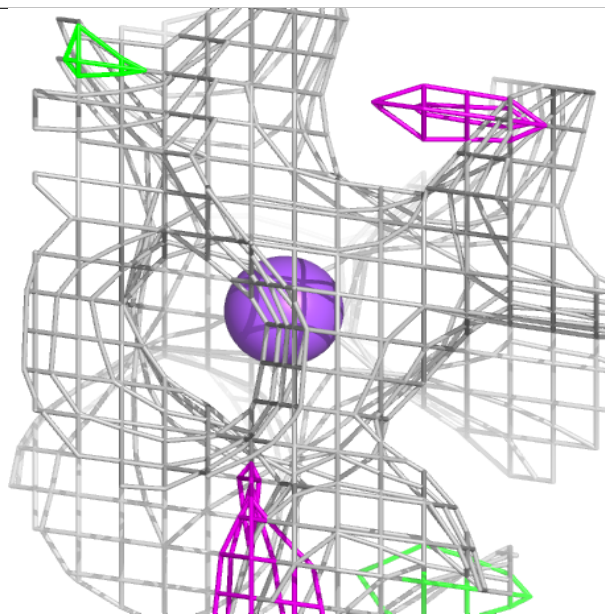
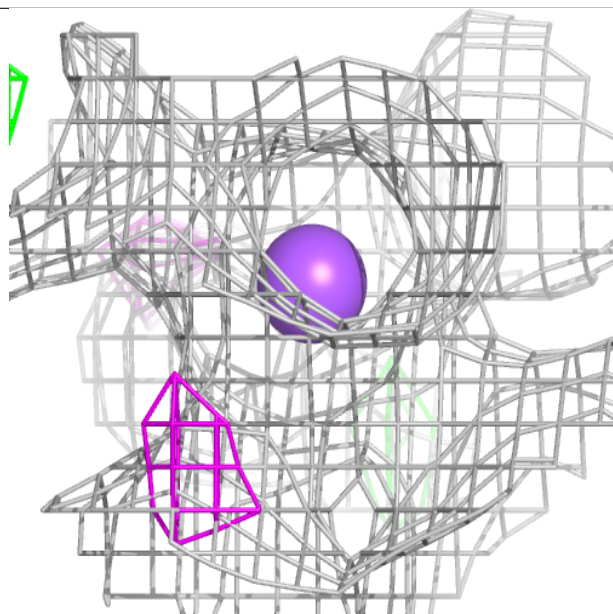
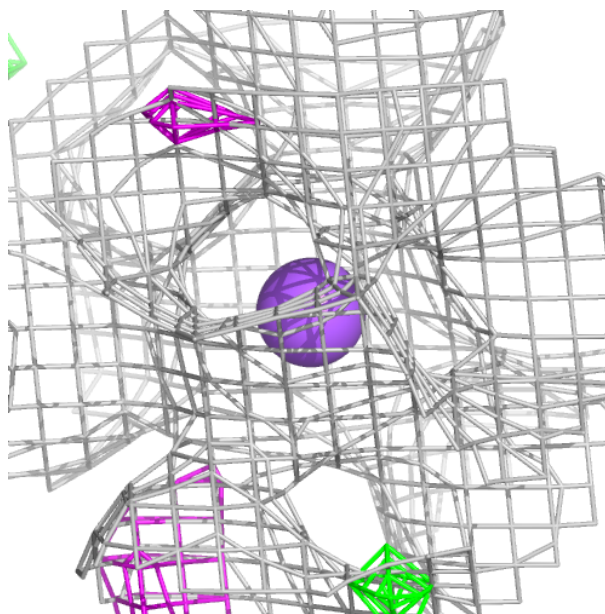
Electron density around CA E 601:

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and green (positive)



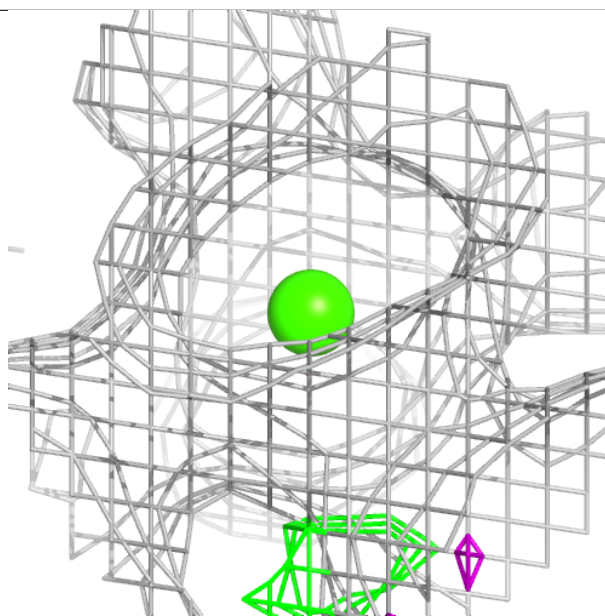
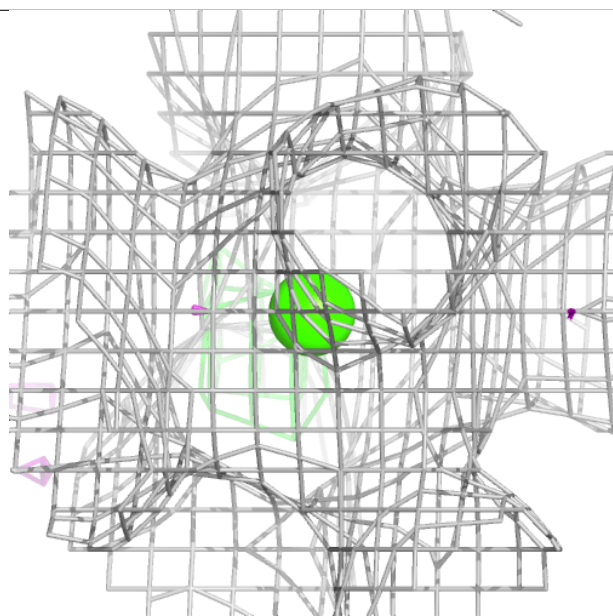
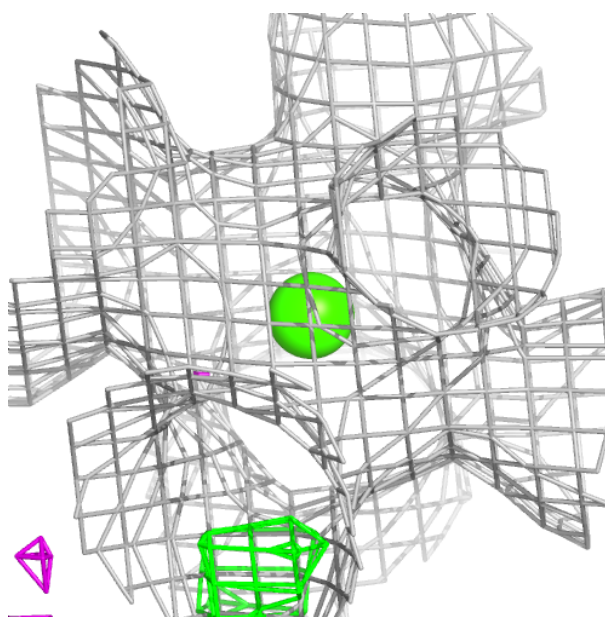
Electron density around NA C 604:

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and green (positive)



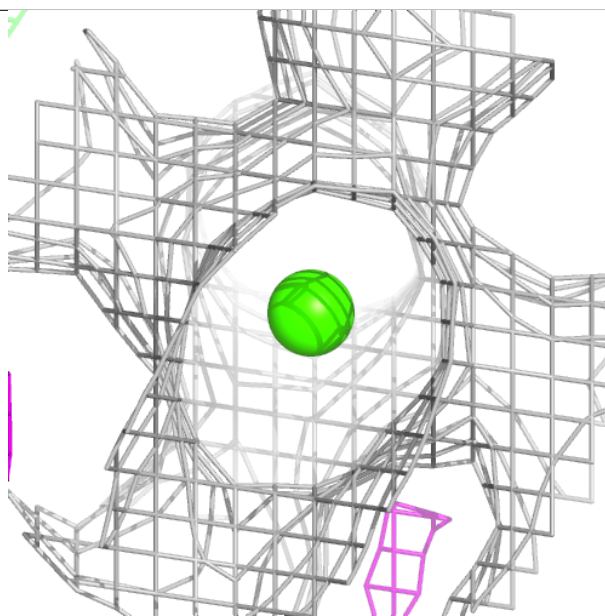
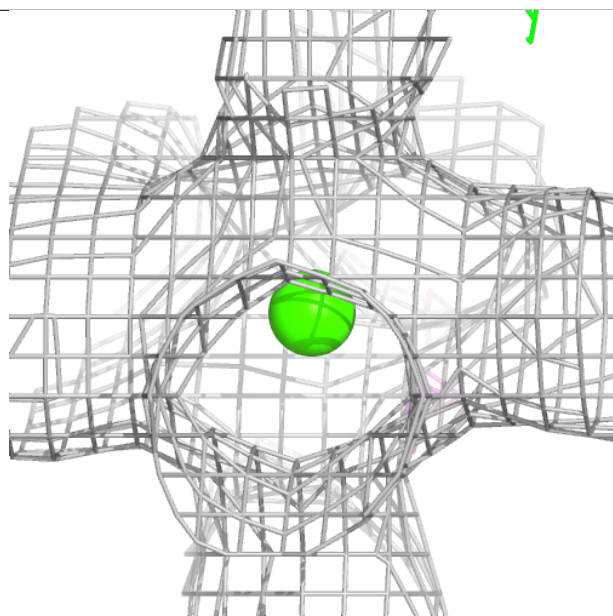
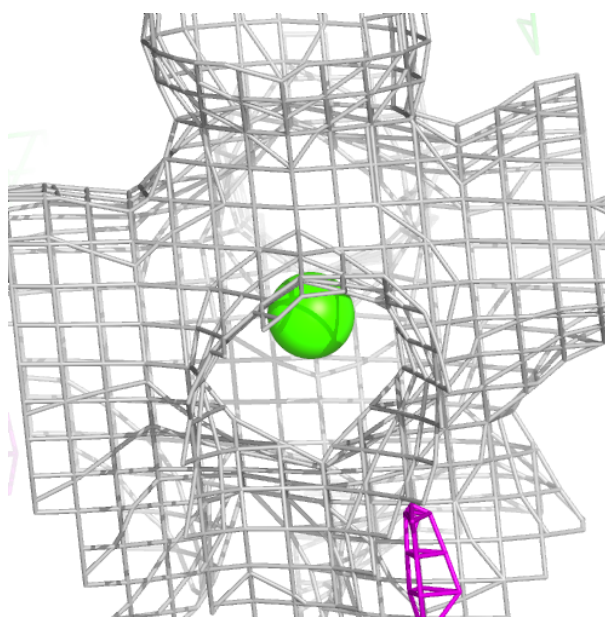
Electron density around CA A 603:

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



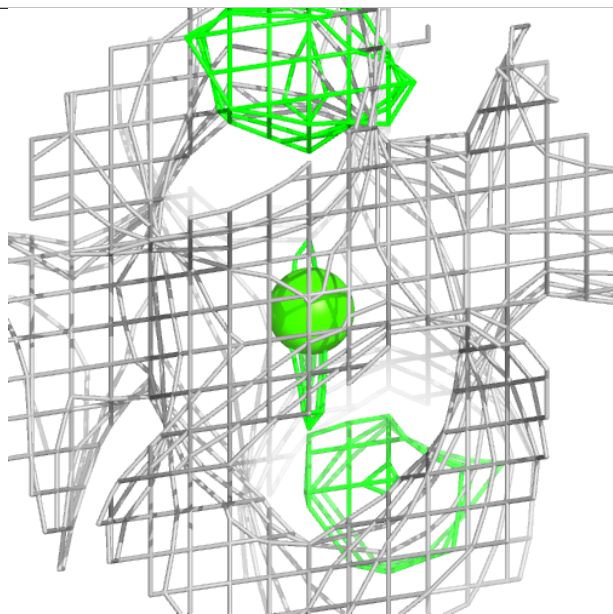
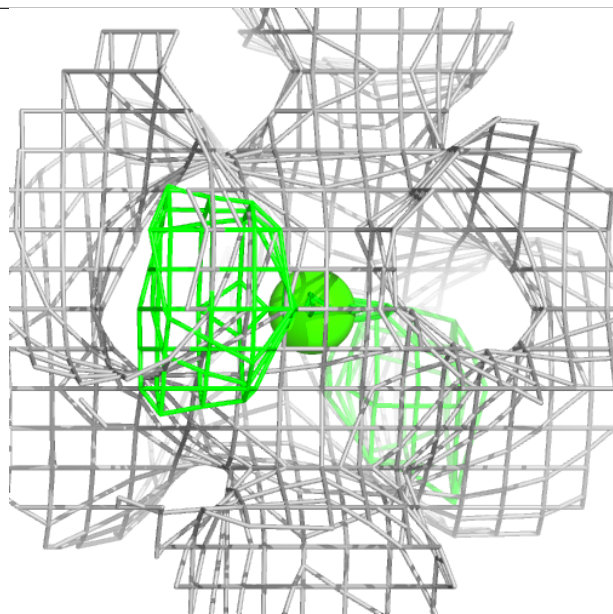
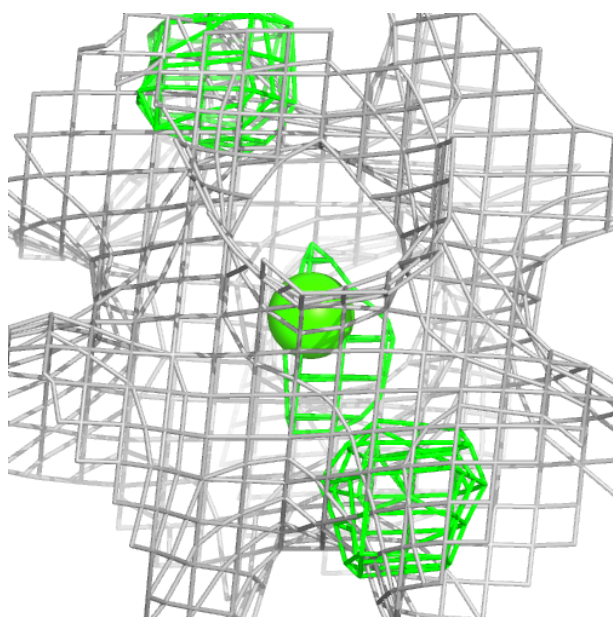
Electron density around CA E 602:

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



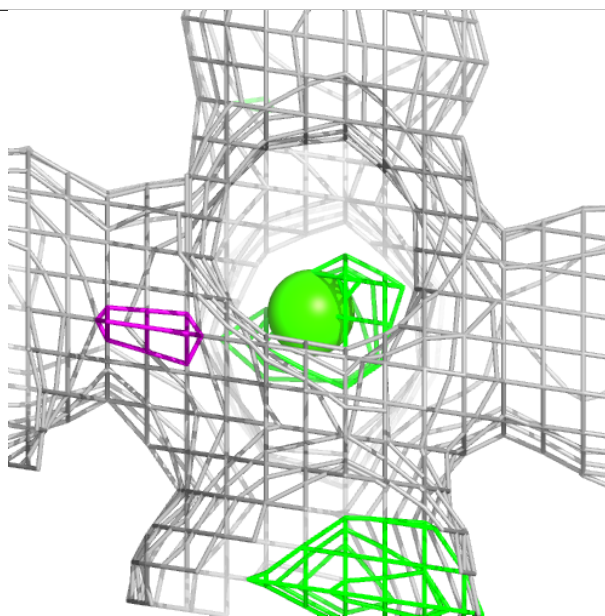
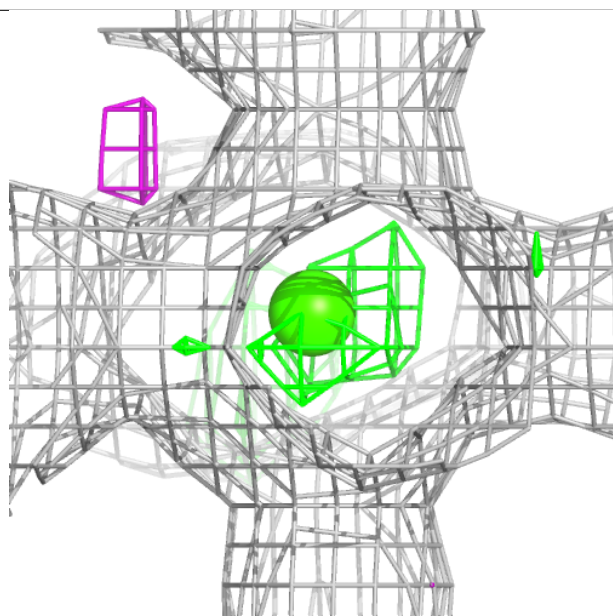
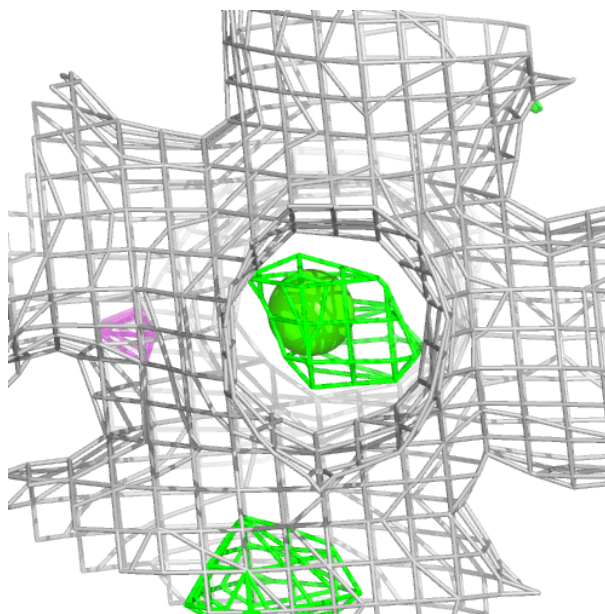
Electron density around CA G 601:

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and green (positive)



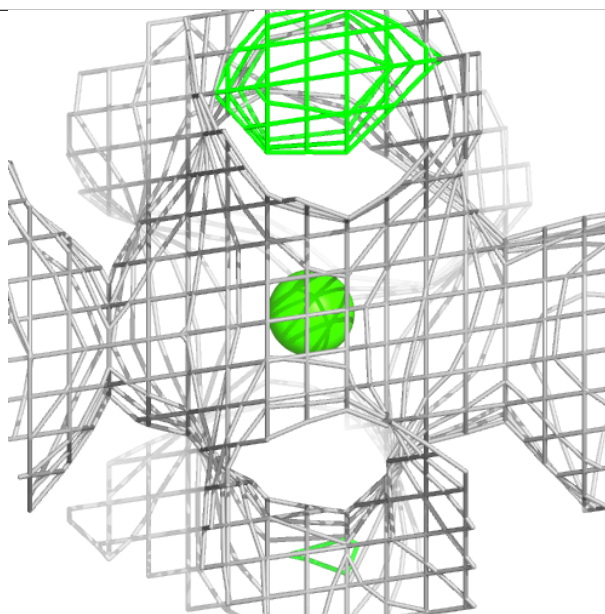
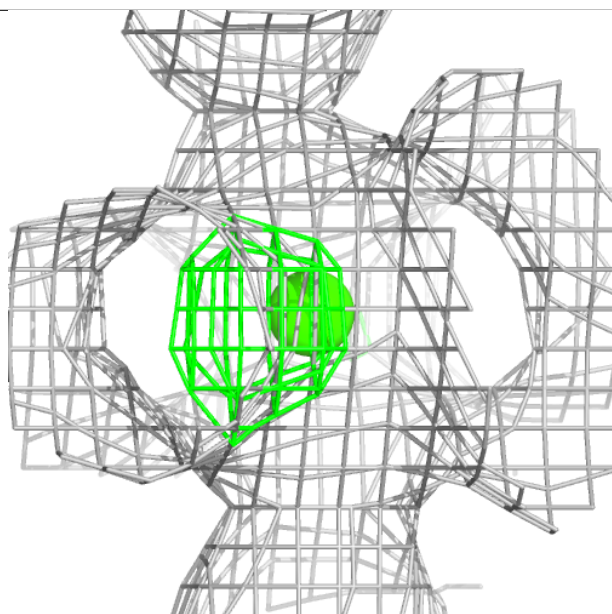
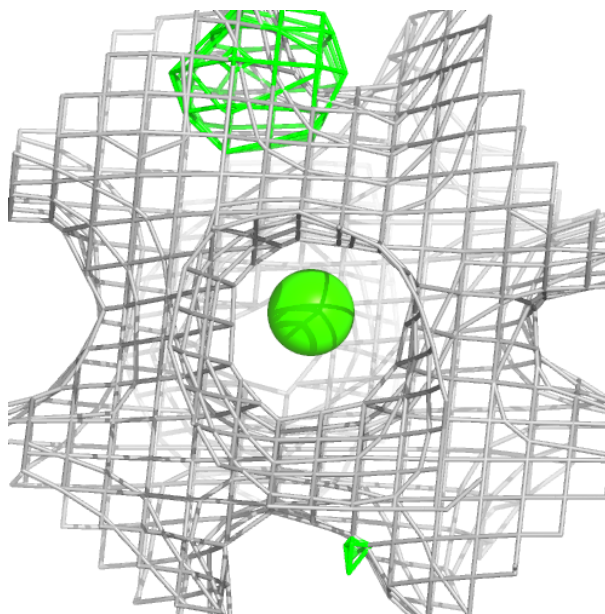
Electron density around CA G 602:

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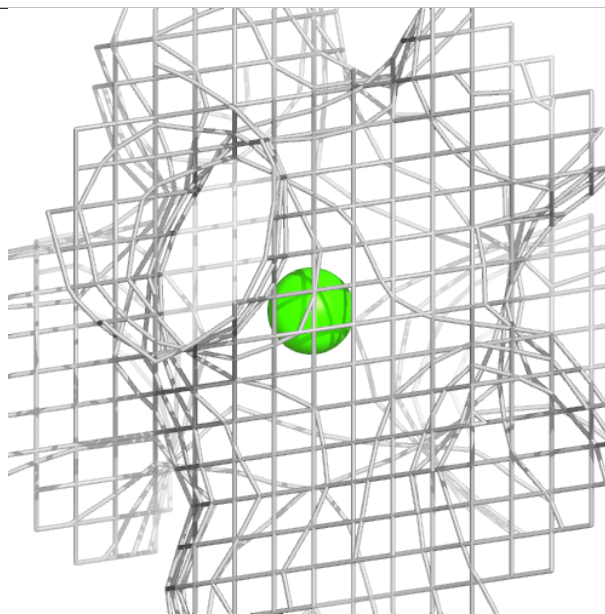
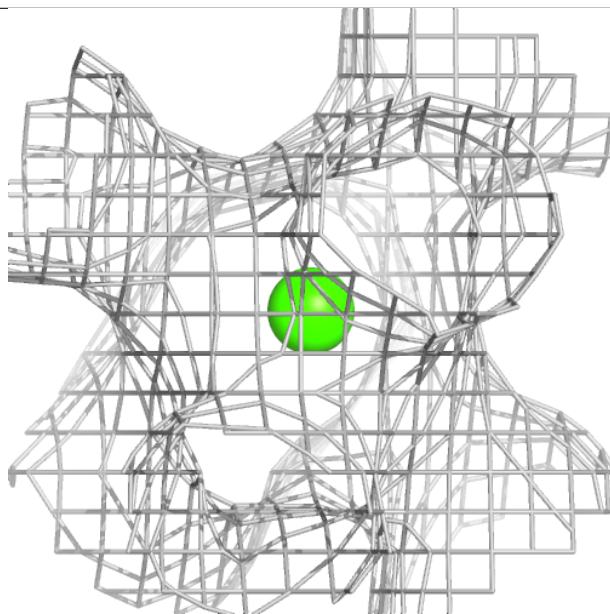
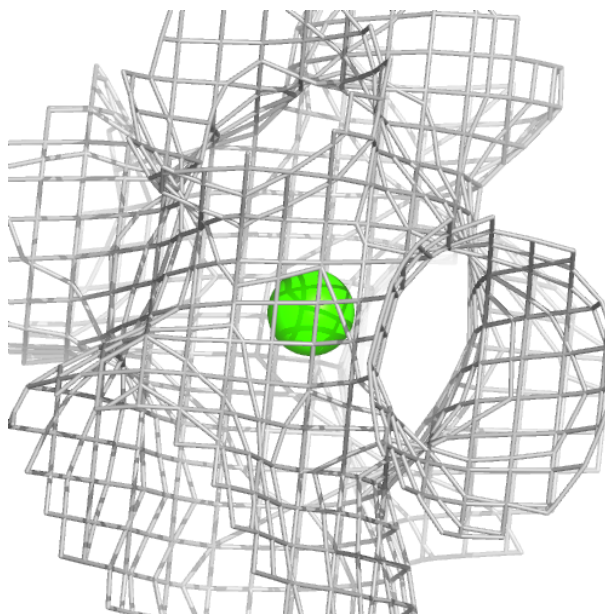
Electron density around CA C 601:

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



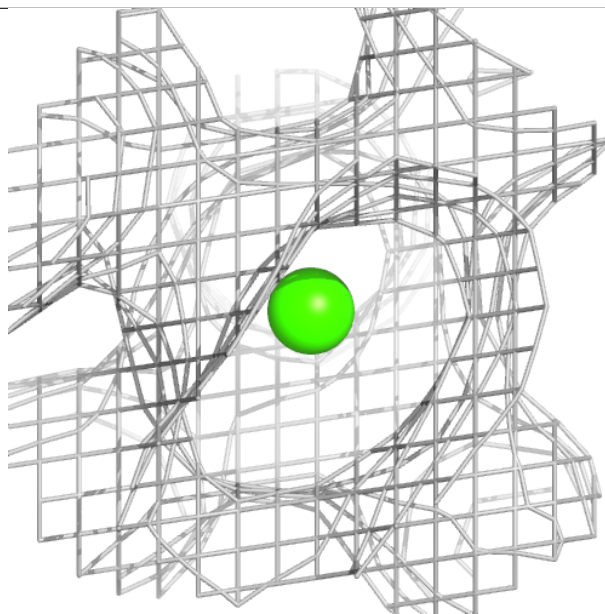
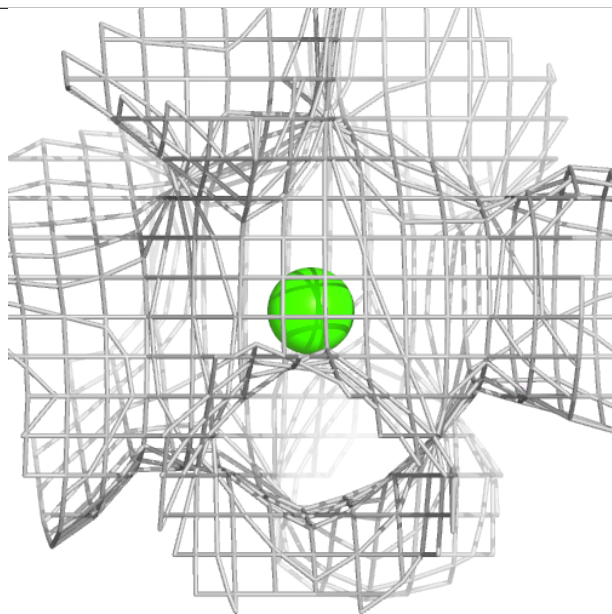
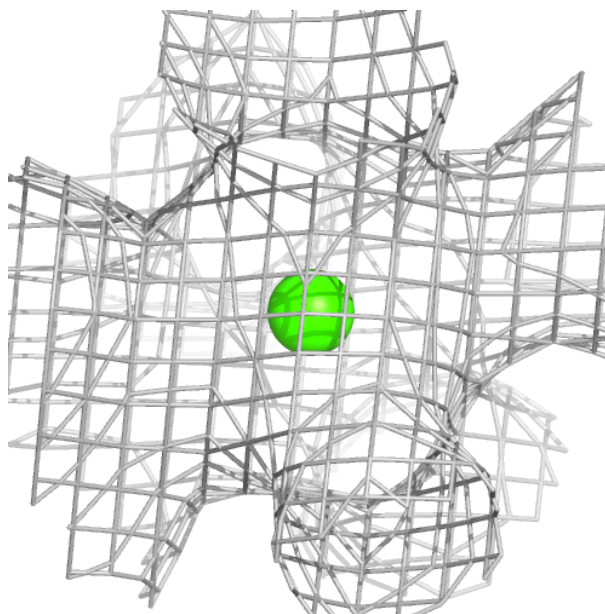
Electron density around CA C 603:

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



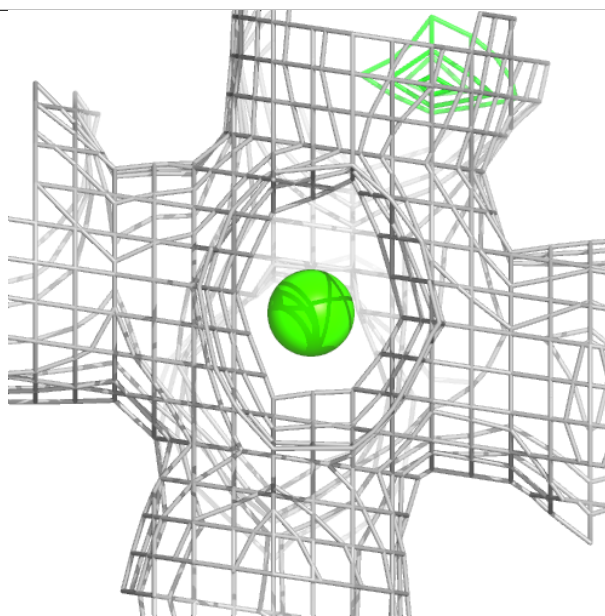
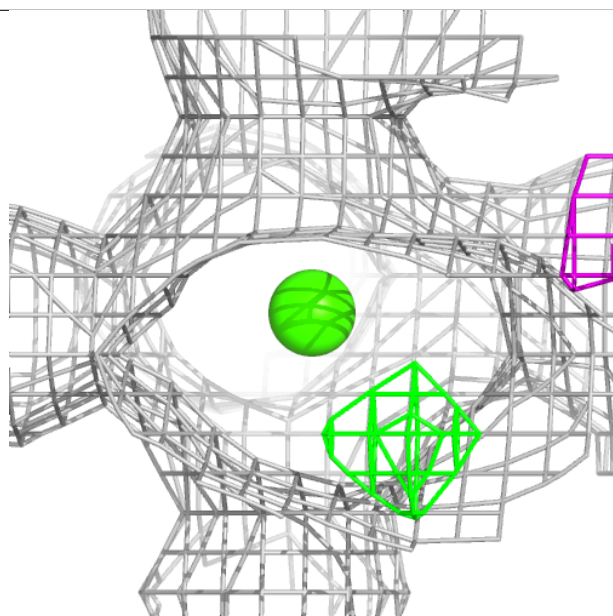
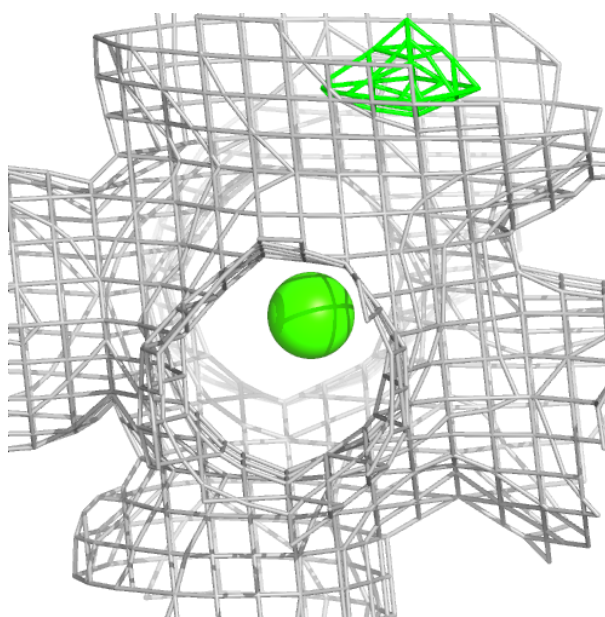
Electron density around CA E 603:

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



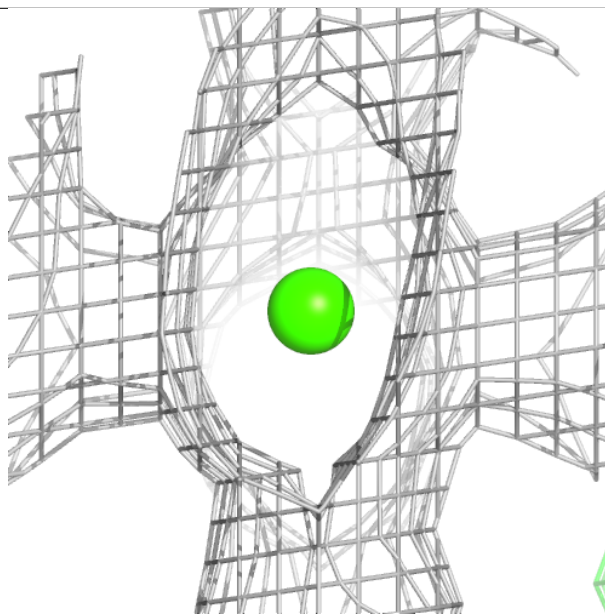
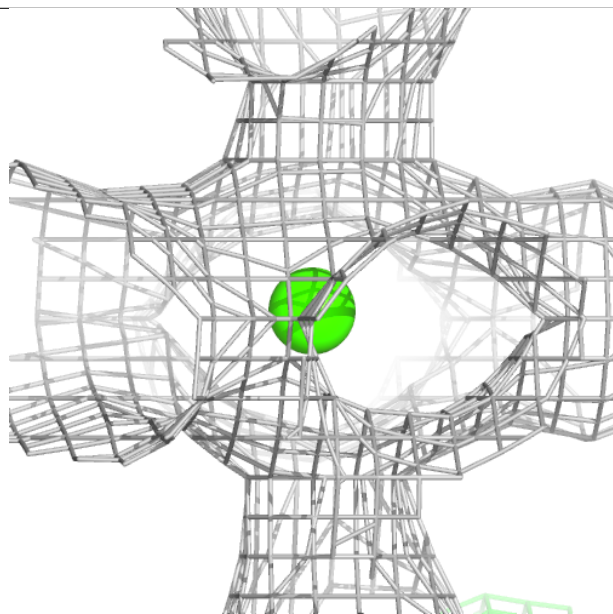
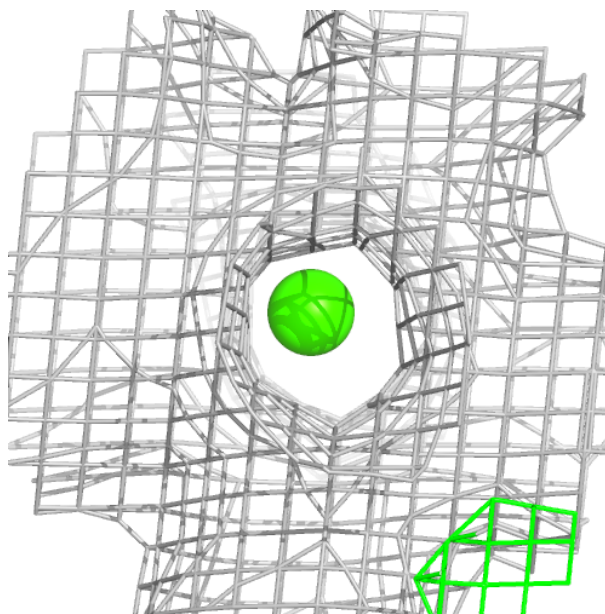
Electron density around CA C 602:

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



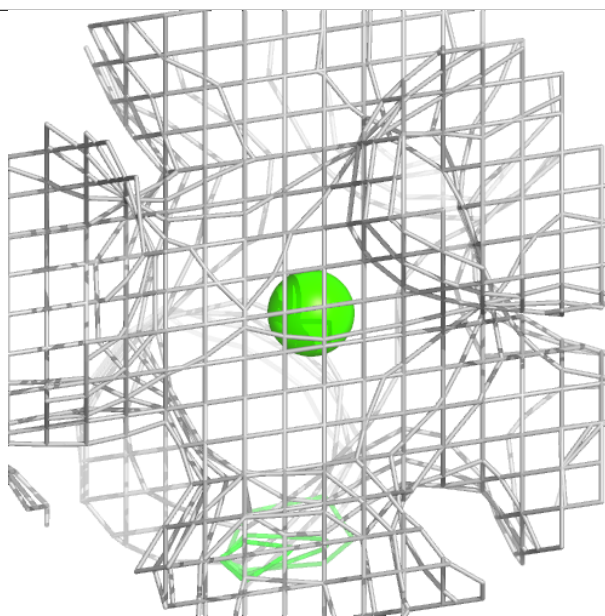
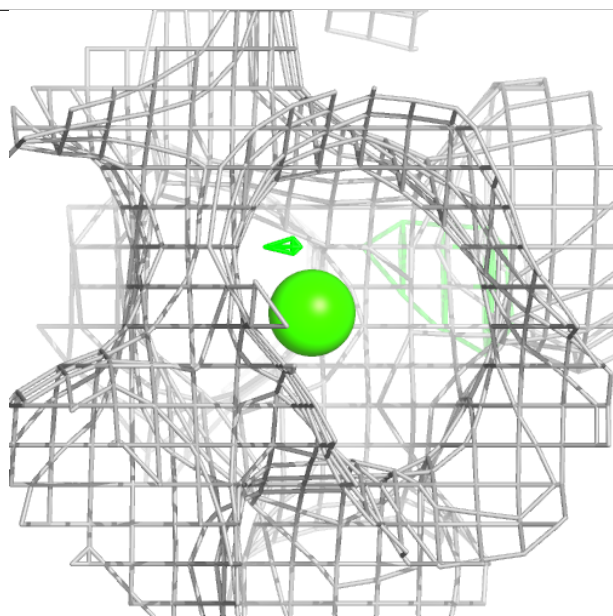
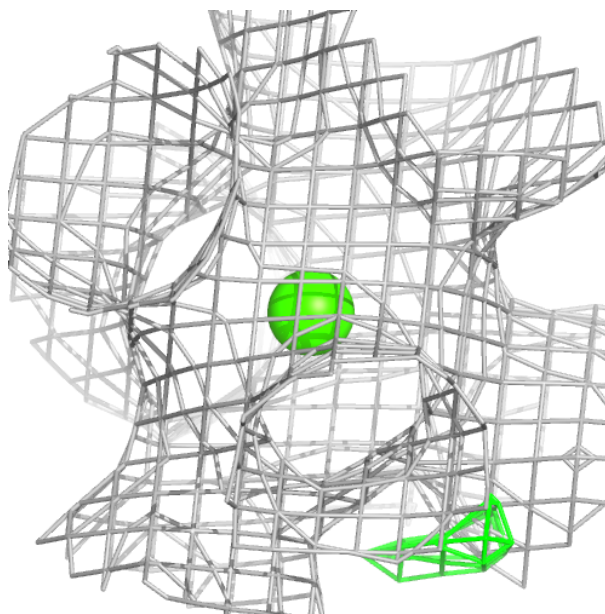
Electron density around CA A 602:

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



Electron density around CA G 603:

$2mF_o-DF_c$ (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.