Full wwPDB X-ray Structure Validation Report ⓘ

Sep 3, 2025 – 04:07 PM EDT

PDB ID	:	9Q7X / pdb_00009q7x
Title	:	Crystal structure of the MKP5 loop mutant N448A in complex with the allosteric inhibitor
Authors	:	Manjula, R.; Bennett, A.M.; Lolis, E.
Deposited on	:	2025-08-25
Resolution	:	2.95 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:

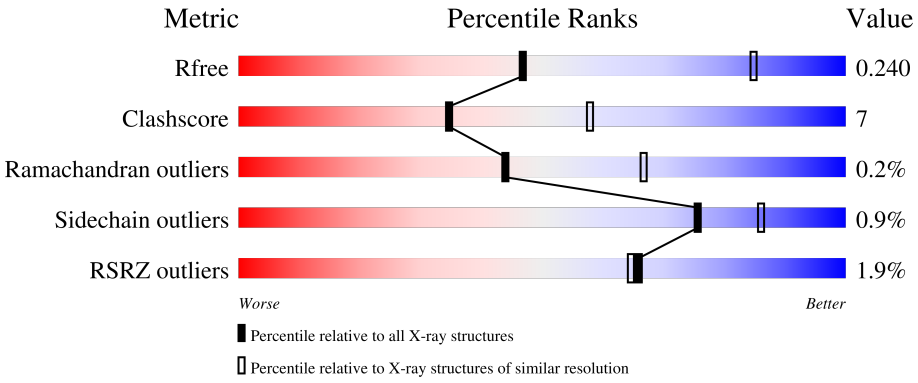
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.45.1

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.95 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}	164625	1044 (2.98-2.94)
Clashscore	180529	1097 (2.98-2.94)
Ramachandran outliers	177936	1049 (2.98-2.94)
Sidechain outliers	177891	1049 (2.98-2.94)
RSRZ outliers	164620	1044 (2.98-2.94)

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	148	79% 20%
1	B	148	86% 14%
1	C	148	2% 83% 16%
1	D	148	85% 14%
1	E	148	3% 82% 18%

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Mol	Chain	Length	Quality of chain
1	F	148	

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 14352 atoms, of which 7123 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.

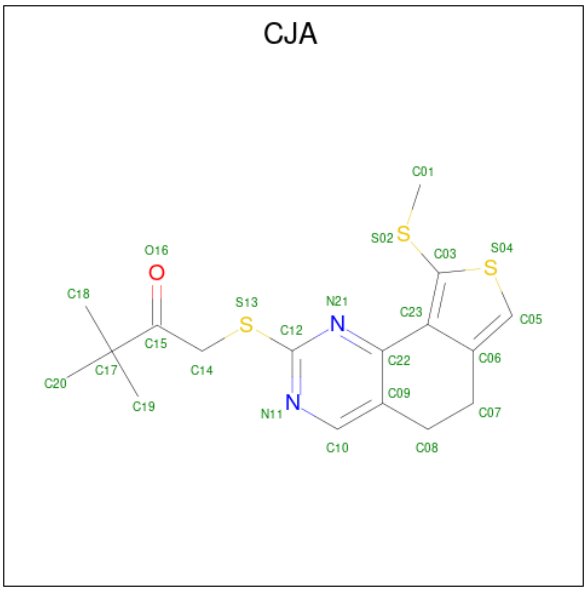
- Molecule 1 is a protein called Dual specificity protein phosphatase 10.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	147	Total	C	H	N	O	S	0	1	0
			2360	763	1172	200	218	7			
1	B	147	Total	C	H	N	O	S	0	0	0
			2345	758	1166	199	215	7			
1	C	147	Total	C	H	N	O	S	0	0	0
			2353	760	1170	199	217	7			
1	D	147	Total	C	H	N	O	S	0	0	0
			2345	758	1166	199	215	7			
1	E	147	Total	C	H	N	O	S	0	0	0
			2338	757	1159	198	217	7			
1	F	147	Total	C	H	N	O	S	0	0	0
			2353	760	1170	199	217	7			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	319	MET	-	initiating methionine	UNP Q9Y6W6
A	448	ALA	ASN	conflict	UNP Q9Y6W6
B	319	MET	-	initiating methionine	UNP Q9Y6W6
B	448	ALA	ASN	conflict	UNP Q9Y6W6
C	319	MET	-	initiating methionine	UNP Q9Y6W6
C	448	ALA	ASN	conflict	UNP Q9Y6W6
D	319	MET	-	initiating methionine	UNP Q9Y6W6
D	448	ALA	ASN	conflict	UNP Q9Y6W6
E	319	MET	-	initiating methionine	UNP Q9Y6W6
E	448	ALA	ASN	conflict	UNP Q9Y6W6
F	319	MET	-	initiating methionine	UNP Q9Y6W6
F	448	ALA	ASN	conflict	UNP Q9Y6W6

- Molecule 2 is 3,3-dimethyl-1-{[9-(methylsulfanyl)-5,6-dihydrothieno[3,4-h]quinazolin-2-yl]sulfanyl}butan-2-one (CCD ID: CJA) (formula: $C_{17}H_{20}N_2OS_3$).



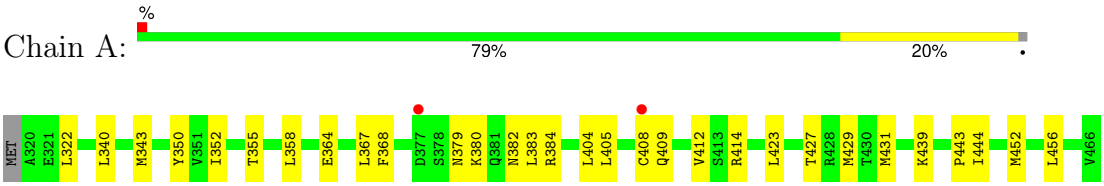
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	H	N	O	S	0	0
			43	17	20	2	1	3		
2	B	1	Total	C	H	N	O	S	0	0
			43	17	20	2	1	3		
2	C	1	Total	C	H	N	O	S	0	0
			43	17	20	2	1	3		
2	D	1	Total	C	H	N	O	S	0	0
			43	17	20	2	1	3		
2	E	1	Total	C	H	N	O	S	0	0
			43	17	20	2	1	3		
2	F	1	Total	C	H	N	O	S	0	0
			43	17	20	2	1	3		

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.

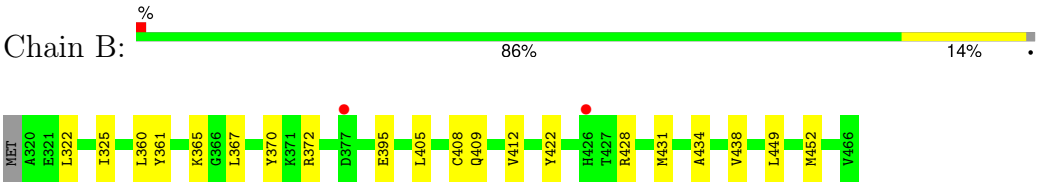
• Molecule 1: Dual specificity protein phosphatase 10

Chain A:



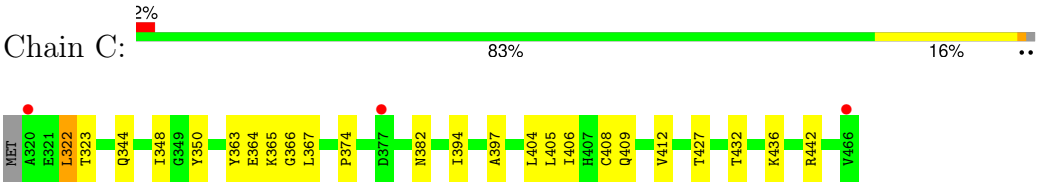
• Molecule 1: Dual specificity protein phosphatase 10

Chain B:



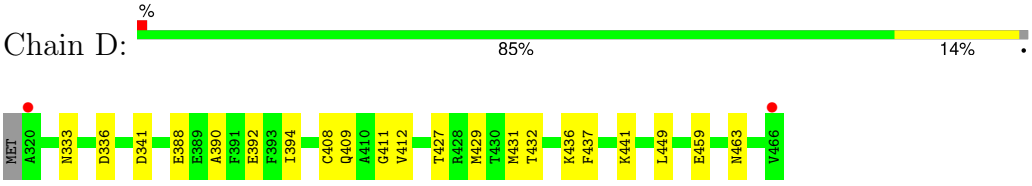
• Molecule 1: Dual specificity protein phosphatase 10

Chain C:



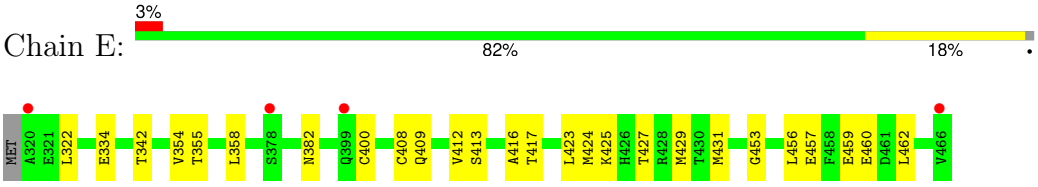
• Molecule 1: Dual specificity protein phosphatase 10

Chain D:



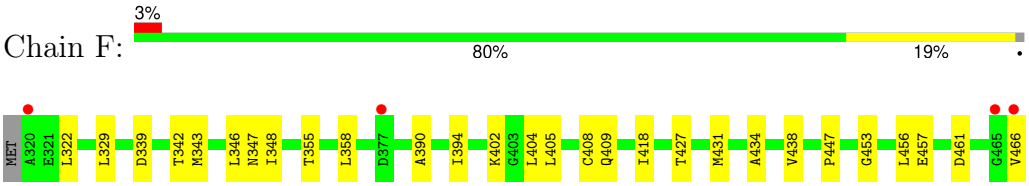
• Molecule 1: Dual specificity protein phosphatase 10

Chain E:



• Molecule 1: Dual specificity protein phosphatase 10

Chain F:


3%
80%
19%
MET
A320
E321
L322
L329
D339
T342
M343
L346
N347
I348
T355
L358
D377
A390
I394
K402
G403
L404
L405
C408
Q409
I418
T427
M431
A434
V438
P447
G453
L456
E457
D461
G465
V466

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	65.86Å 129.95Å 84.01Å 90.00° 91.38° 90.00°	Depositor
Resolution (Å)	65.84 – 2.95 65.84 – 2.95	Depositor EDS
% Data completeness (in resolution range)	95.1 (65.84-2.95) 95.1 (65.84-2.95)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.93 (at 2.96Å)	Xtriage
Refinement program	PHENIX (1.21.1_5286: ???)	Depositor
R, R_{free}	0.181 , 0.241 0.184 , 0.240	Depositor DCC
R_{free} test set	1484 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å^2)	46.7	Xtriage
Anisotropy	0.399	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 35.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.038 for h,-k,-l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	14352	wwPDB-VP
Average B, all atoms (Å^2)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.39% 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

5.1 Standard geometry

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

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	0.24	0/1214	0.41	0/1641
1	B	0.25	0/1205	0.46	0/1629
1	C	0.23	0/1209	0.45	0/1634
1	D	0.25	0/1205	0.46	0/1629
1	E	0.18	0/1205	0.36	0/1630
1	F	0.17	0/1209	0.34	0/1634
All	All	0.22	0/7247	0.42	0/9797

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

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	1188	1172	1171	20	0
1	B	1179	1166	1166	14	0
1	C	1183	1170	1170	20	0
1	D	1179	1166	1166	14	0
1	E	1179	1159	1159	17	0
1	F	1183	1170	1170	19	0
2	A	23	20	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	23	20	0	1	0
2	C	23	20	0	0	0
2	D	23	20	0	1	0
2	E	23	20	0	3	0
2	F	23	20	0	1	0
All	All	7229	7123	7002	105	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 7.

All (105) 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:364:GLU:OE1	1:C:364:GLU:N	2.05	0.89
1:A:408:CYS:SG	1:A:409:GLN:N	2.59	0.75
1:D:408:CYS:SG	1:D:409:GLN:N	2.65	0.69
1:A:439:LYS:NZ	1:A:443:PRO:O	2.23	0.67
1:F:322:LEU:HD22	1:F:405:LEU:HD13	1.76	0.66
1:C:322:LEU:HD21	1:C:405:LEU:HD13	1.78	0.65
1:B:449:LEU:HD13	1:B:452:MET:HE2	1.81	0.63
1:B:449:LEU:HD13	1:B:452:MET:CE	2.30	0.61
1:F:355:THR:HG21	1:F:358:LEU:HD12	1.83	0.61
1:E:355:THR:HG21	1:E:358:LEU:HD12	1.85	0.59
1:F:431:MET:HE1	1:F:456:LEU:HG	1.87	0.56
1:C:322:LEU:HD21	1:C:405:LEU:CD1	2.37	0.54
1:F:342:THR:HG22	1:F:346:LEU:HD21	1.90	0.54
1:C:344:GLN:HE21	1:C:367:LEU:HD23	1.72	0.54
2:E:501:CJA:N21	2:E:501:CJA:S02	2.81	0.54
1:D:432:THR:HG22	1:D:436:LYS:HZ2	1.72	0.53
1:E:427:THR:HG21	1:E:429:MET:HE3	1.91	0.53
1:C:427:THR:O	1:C:427:THR:HG22	2.09	0.52
1:E:334:GLU:OE1	1:E:409:GLN:HG2	2.10	0.52
1:E:453:GLY:O	1:E:457:GLU:OE1	2.28	0.52
1:A:444:ILE:O	1:A:444:ILE:HG22	2.09	0.50
1:A:352:ILE:HD12	1:A:404:LEU:HD21	1.92	0.50
1:F:453:GLY:O	1:F:457:GLU:HG3	2.12	0.49
1:A:364:GLU:H	1:A:364:GLU:CD	2.20	0.49
1:D:390:ALA:O	1:D:394:ILE:HG13	2.12	0.49
1:F:447:PRO:HA	2:F:501:CJA:S13	2.52	0.49
1:A:379:ASN:OD1	1:A:380:LYS:HG2	2.11	0.49
1:C:365:LYS:CB	1:C:367:LEU:HD13	2.41	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:434:ALA:O	1:B:438:VAL:HG23	2.12	0.49
1:A:383:LEU:HD11	1:A:414:ARG:HG2	1.95	0.49
1:E:431:MET:HE2	2:E:501:CJA:S04	2.53	0.49
1:D:437:PHE:CZ	1:D:441:LYS:HE3	2.48	0.48
1:F:390:ALA:O	1:F:394:ILE:HG13	2.13	0.48
1:D:432:THR:CG2	1:D:436:LYS:NZ	2.77	0.48
1:A:355:THR:HG21	1:A:358:LEU:HD12	1.94	0.47
1:F:339:ASP:O	1:F:343:MET:HG3	2.14	0.47
1:A:322:LEU:CD2	1:A:405:LEU:HD13	2.44	0.47
1:A:412:VAL:HG12	1:A:412:VAL:O	2.15	0.47
1:D:459:GLU:O	1:D:463:ASN:OD1	2.33	0.47
1:A:382:ASN:OD1	1:A:384[A]:ARG:N	2.48	0.47
1:E:382:ASN:OD1	1:E:382:ASN:C	2.57	0.47
1:C:432:THR:O	1:C:436:LYS:HG3	2.14	0.47
1:C:363:TYR:N	1:C:364:GLU:OE1	2.47	0.47
1:B:431:MET:HE3	2:B:501:CJA:S04	2.55	0.47
1:F:408:CYS:SG	1:F:409:GLN:N	2.85	0.46
1:C:348:ILE:HD13	1:C:405:LEU:HB2	1.97	0.46
1:E:423:LEU:O	1:E:427:THR:HB	2.16	0.46
1:A:427:THR:HG22	1:A:429:MET:HG3	1.97	0.46
1:C:408:CYS:SG	1:C:412:VAL:HA	2.55	0.46
1:F:346:LEU:O	1:F:347:ASN:HB3	2.15	0.46
1:D:427:THR:HG22	1:D:427:THR:O	2.15	0.46
1:E:322:LEU:HD13	1:E:342:THR:HG21	1.98	0.46
1:E:412:VAL:HG23	1:E:416:ALA:HB2	1.97	0.46
1:D:432:THR:HG22	1:D:436:LYS:NZ	2.30	0.46
1:C:408:CYS:SG	1:C:409:GLN:N	2.80	0.45
1:A:382:ASN:OD1	1:A:384[B]:ARG:N	2.50	0.45
1:D:336:ASP:N	1:D:336:ASP:OD1	2.49	0.45
1:C:366:GLY:C	1:C:367:LEU:HD12	2.42	0.45
1:C:344:GLN:NE2	1:C:367:LEU:HD23	2.32	0.45
1:E:408:CYS:SG	1:E:412:VAL:HA	2.57	0.45
1:F:322:LEU:HD23	1:F:322:LEU:HA	1.88	0.45
1:F:461:ASP:O	1:F:466:VAL:N	2.47	0.45
1:E:460:GLU:HA	1:E:460:GLU:OE2	2.16	0.44
1:D:333:ASN:OD1	1:D:336:ASP:OD1	2.36	0.44
1:A:350:TYR:HB3	1:A:404:LEU:HD12	1.98	0.44
1:D:431:MET:CE	2:D:501:CJA:N11	2.81	0.44
1:B:361:TYR:O	1:B:370:TYR:OH	2.30	0.44
1:B:395:GLU:OE1	1:B:422:TYR:OH	2.36	0.44
1:B:408:CYS:SG	1:B:412:VAL:HA	2.58	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:323:THR:OG1	1:C:442:ARG:NH1	2.50	0.44
1:F:347:ASN:OD1	1:F:402:LYS:HE2	2.18	0.44
1:B:325:ILE:HD12	1:B:438:VAL:HG13	2.00	0.43
1:B:365:LYS:HB2	1:B:367:LEU:HD12	1.99	0.43
1:C:367:LEU:HD12	1:C:367:LEU:N	2.33	0.43
1:A:423:LEU:O	1:A:427:THR:HB	2.18	0.43
1:E:424:MET:HE3	1:E:459:GLU:HB2	2.01	0.43
1:C:382:ASN:OD1	1:C:382:ASN:C	2.62	0.43
1:C:365:LYS:HB3	1:C:367:LEU:HD13	2.01	0.43
1:C:350:TYR:CD1	1:C:397:ALA:HB2	2.53	0.43
1:A:350:TYR:CB	1:A:404:LEU:HD12	2.49	0.42
1:A:343:MET:HE2	1:A:368:PHE:CZ	2.54	0.42
1:B:360:LEU:HD13	1:B:372:ARG:NH2	2.33	0.42
1:A:431:MET:HE2	1:A:456:LEU:HA	2.01	0.42
1:E:408:CYS:SG	1:E:409:GLN:N	2.92	0.42
1:F:434:ALA:O	1:F:438:VAL:HG23	2.20	0.42
1:E:431:MET:HE3	2:E:501:CJA:C01	2.49	0.42
1:F:427:THR:HG22	1:F:427:THR:O	2.20	0.42
1:B:322:LEU:HD22	1:B:405:LEU:HD13	2.00	0.42
1:F:329:LEU:HD11	1:F:394:ILE:HD13	2.02	0.42
1:A:452:MET:HE3	2:A:501:CJA:S02	2.60	0.42
1:F:342:THR:O	1:F:346:LEU:CD2	2.68	0.41
1:E:425:LYS:HA	1:E:462:LEU:HD21	2.03	0.41
1:B:428:ARG:HA	1:B:428:ARG:HD2	1.98	0.41
1:D:411:GLY:O	1:D:412:VAL:HG22	2.21	0.41
1:B:408:CYS:SG	1:B:409:GLN:N	2.94	0.41
1:E:334:GLU:H	1:E:334:GLU:HG2	1.68	0.41
1:F:394:ILE:HA	1:F:404:LEU:HD13	2.01	0.41
1:A:340:LEU:HD11	1:A:367:LEU:HD12	2.02	0.41
1:B:449:LEU:CD1	1:B:452:MET:HE2	2.48	0.40
1:D:388:GLU:O	1:D:392:GLU:HG3	2.20	0.40
1:E:413:SER:O	1:E:417:THR:OG1	2.36	0.40
1:C:322:LEU:CD2	1:C:405:LEU:HD13	2.50	0.40
1:C:394:ILE:HA	1:C:404:LEU:HD13	2.04	0.40
1:D:427:THR:HG22	1:D:429:MET:HG3	2.03	0.40
1:F:343:MET:HA	1:F:348:ILE:HD12	2.03	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	146/148 (99%)	138 (94%)	8 (6%)	0	100 100
1	B	145/148 (98%)	138 (95%)	7 (5%)	0	100 100
1	C	145/148 (98%)	138 (95%)	6 (4%)	1 (1%)	19 41
1	D	145/148 (98%)	136 (94%)	9 (6%)	0	100 100
1	E	145/148 (98%)	133 (92%)	11 (8%)	1 (1%)	19 41
1	F	145/148 (98%)	135 (93%)	10 (7%)	0	100 100
All	All	871/888 (98%)	818 (94%)	51 (6%)	2 (0%)	44 67

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	374	PRO
1	E	354	VAL

5.3.2 Protein sidechains (i)

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	127/129 (98%)	127 (100%)	0	100 100
1	B	126/129 (98%)	126 (100%)	0	100 100
1	C	127/129 (98%)	125 (98%)	2 (2%)	58 77
1	D	126/129 (98%)	124 (98%)	2 (2%)	58 77
1	E	126/129 (98%)	124 (98%)	2 (2%)	58 77

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	F	127/129 (98%)	126 (99%)	1 (1%)	79 88
All	All	759/774 (98%)	752 (99%)	7 (1%)	75 86

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	322	LEU
1	C	406	ILE
1	D	341	ASP
1	D	449	LEU
1	E	400	CYS
1	E	456	LEU
1	F	418	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	335	GLN
1	A	362	HIS
1	A	426	HIS
1	B	379	ASN
1	C	344	GLN
1	C	357	HIS
1	C	369	ASN
1	C	398	HIS
1	D	335	GLN
1	D	338	GLN
1	D	347	ASN
1	D	450	ASN
1	E	407	HIS
1	F	426	HIS

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

6 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	CJA	A	501	-	23,25,25	1.38	3 (13%)	24,37,37	2.48	6 (25%)
2	CJA	C	501	-	23,25,25	1.34	3 (13%)	24,37,37	3.70	6 (25%)
2	CJA	E	501	-	23,25,25	1.52	3 (13%)	24,37,37	3.46	6 (25%)
2	CJA	D	501	-	23,25,25	1.44	3 (13%)	24,37,37	2.98	6 (25%)
2	CJA	F	501	-	23,25,25	1.36	3 (13%)	24,37,37	2.94	7 (29%)
2	CJA	B	501	-	23,25,25	1.34	3 (13%)	24,37,37	4.47	6 (25%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	CJA	A	501	-	-	3/13/22/22	0/3/3/3
2	CJA	C	501	-	-	0/13/22/22	0/3/3/3
2	CJA	E	501	-	-	7/13/22/22	0/3/3/3
2	CJA	D	501	-	-	1/13/22/22	0/3/3/3
2	CJA	F	501	-	-	3/13/22/22	0/3/3/3
2	CJA	B	501	-	-	0/13/22/22	0/3/3/3

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	501	CJA	C23-C22	-5.51	1.39	1.48

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	501	CJA	C23-C22	-5.18	1.40	1.48
2	A	501	CJA	C23-C22	-4.88	1.40	1.48
2	F	501	CJA	C23-C22	-4.70	1.40	1.48
2	C	501	CJA	C23-C22	-4.57	1.41	1.48
2	B	501	CJA	C23-C22	-4.55	1.41	1.48
2	D	501	CJA	C03-S04	-2.97	1.67	1.72
2	E	501	CJA	C03-S04	-2.90	1.67	1.72
2	F	501	CJA	C03-S04	-2.81	1.67	1.72
2	B	501	CJA	C03-S04	-2.78	1.67	1.72
2	A	501	CJA	C03-S04	-2.78	1.67	1.72
2	C	501	CJA	C03-S04	-2.76	1.67	1.72
2	B	501	CJA	C23-C06	2.65	1.45	1.40
2	C	501	CJA	C23-C06	2.63	1.45	1.40
2	F	501	CJA	C23-C06	2.56	1.45	1.40
2	A	501	CJA	C23-C06	2.56	1.45	1.40
2	D	501	CJA	C23-C06	2.44	1.45	1.40
2	E	501	CJA	C23-C06	2.38	1.45	1.40

All (37) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	501	CJA	C14-S13-C12	20.48	127.96	101.65
2	C	501	CJA	C14-S13-C12	16.44	122.77	101.65
2	E	501	CJA	C14-S13-C12	14.65	120.47	101.65
2	D	501	CJA	C14-S13-C12	12.28	117.42	101.65
2	F	501	CJA	C14-S13-C12	12.27	117.41	101.65
2	A	501	CJA	C14-S13-C12	9.66	114.06	101.65
2	C	501	CJA	C05-C06-C23	3.85	112.37	105.29
2	B	501	CJA	C05-C06-C23	3.82	112.31	105.29
2	E	501	CJA	C07-C08-C09	3.79	119.97	110.71
2	F	501	CJA	C05-C06-C23	3.78	112.24	105.29
2	B	501	CJA	C10-N11-C12	3.72	118.43	115.39
2	A	501	CJA	C05-C06-C23	3.71	112.11	105.29
2	D	501	CJA	C05-C06-C23	3.62	111.95	105.29
2	E	501	CJA	C05-C06-C23	3.57	111.86	105.29
2	D	501	CJA	C10-N11-C12	3.45	118.22	115.39
2	C	501	CJA	C10-N11-C12	3.33	118.12	115.39
2	E	501	CJA	N11-C12-N21	-3.33	123.45	127.57
2	E	501	CJA	C10-N11-C12	3.29	118.08	115.39
2	A	501	CJA	C10-N11-C12	3.10	117.93	115.39
2	B	501	CJA	N11-C12-N21	-3.09	123.74	127.57
2	D	501	CJA	N11-C12-N21	-2.99	123.86	127.57

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	F	501	CJA	C10-N11-C12	2.98	117.83	115.39
2	C	501	CJA	N11-C12-N21	-2.91	123.96	127.57
2	A	501	CJA	N11-C12-N21	-2.83	124.06	127.57
2	F	501	CJA	N11-C12-N21	-2.70	124.22	127.57
2	D	501	CJA	C07-C08-C09	2.67	117.22	110.71
2	C	501	CJA	C09-C22-N21	-2.66	119.81	122.70
2	F	501	CJA	C09-C22-N21	-2.63	119.83	122.70
2	B	501	CJA	C23-C22-N21	2.62	120.89	118.02
2	C	501	CJA	C23-C22-N21	2.53	120.79	118.02
2	A	501	CJA	C09-C22-N21	-2.50	119.97	122.70
2	D	501	CJA	C09-C22-N21	-2.46	120.03	122.70
2	B	501	CJA	C09-C22-N21	-2.45	120.03	122.70
2	E	501	CJA	C09-C22-N21	-2.43	120.05	122.70
2	F	501	CJA	C23-C22-N21	2.33	120.58	118.02
2	A	501	CJA	C23-C22-N21	2.21	120.44	118.02
2	F	501	CJA	O16-C15-C14	2.04	122.99	120.96

There are no chirality outliers.

All (14) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	F	501	CJA	S13-C14-C15-C17
2	F	501	CJA	S13-C14-C15-O16
2	F	501	CJA	C15-C14-S13-C12
2	A	501	CJA	N21-C12-S13-C14
2	A	501	CJA	C15-C14-S13-C12
2	E	501	CJA	C15-C14-S13-C12
2	A	501	CJA	N11-C12-S13-C14
2	D	501	CJA	C15-C14-S13-C12
2	E	501	CJA	O16-C15-C17-C20
2	E	501	CJA	O16-C15-C17-C18
2	E	501	CJA	C14-C15-C17-C20
2	E	501	CJA	C14-C15-C17-C18
2	E	501	CJA	O16-C15-C17-C19
2	E	501	CJA	C14-C15-C17-C19

There are no ring outliers.

5 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	CJA	1	0

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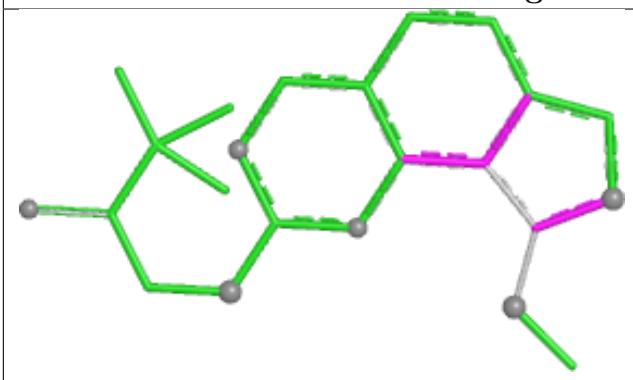
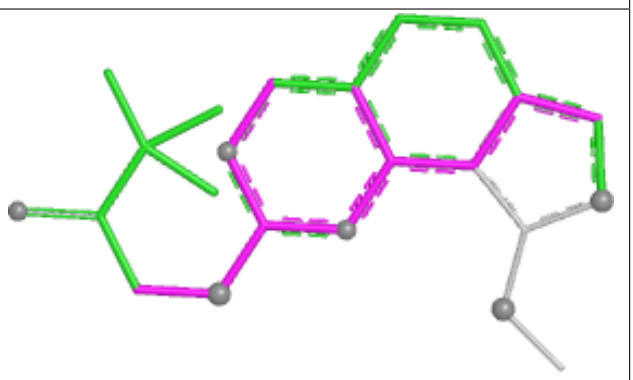
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	501	CJA	3	0
2	D	501	CJA	1	0
2	F	501	CJA	1	0
2	B	501	CJA	1	0

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.

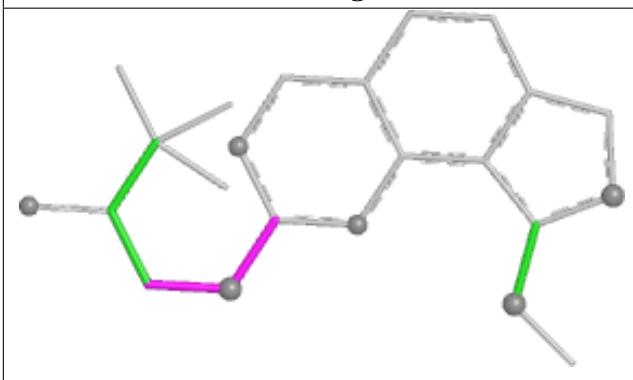
Ligand CJA A 501



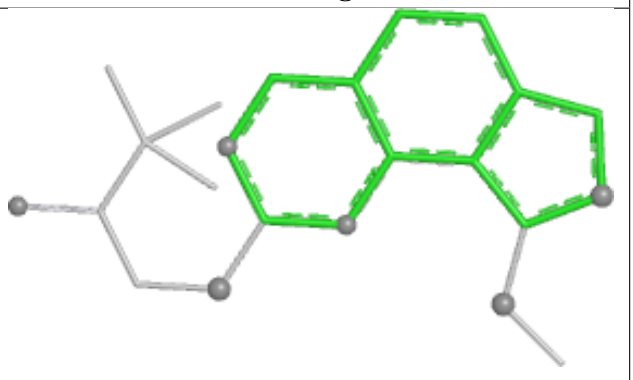
Bond lengths



Bond angles

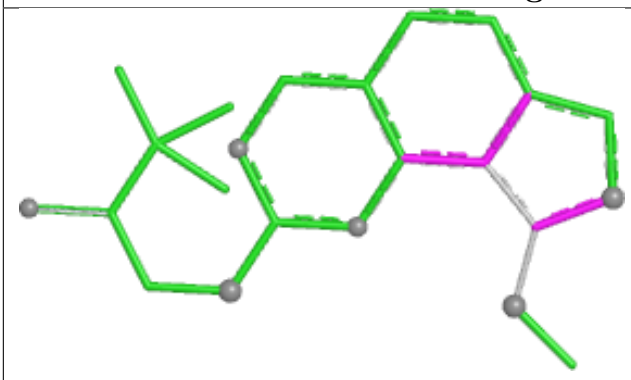


Torsions

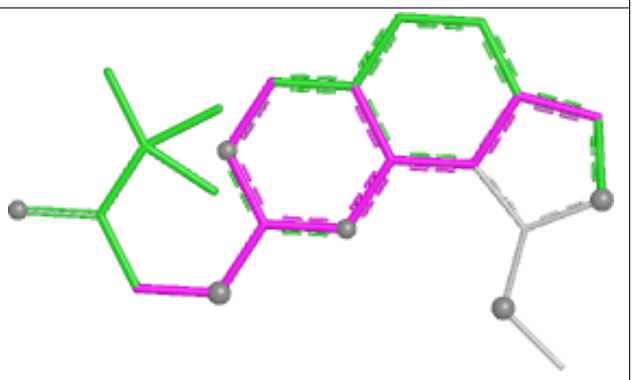


Rings

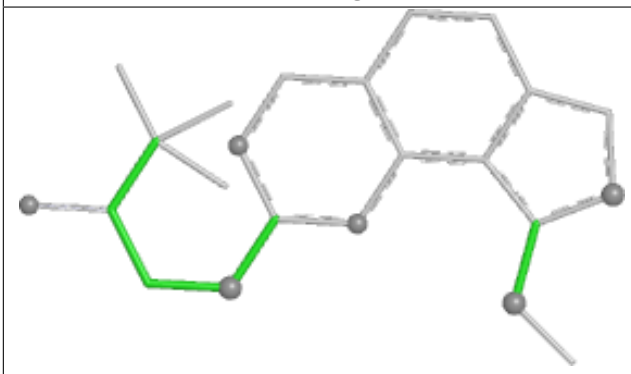
Ligand CJA C 501



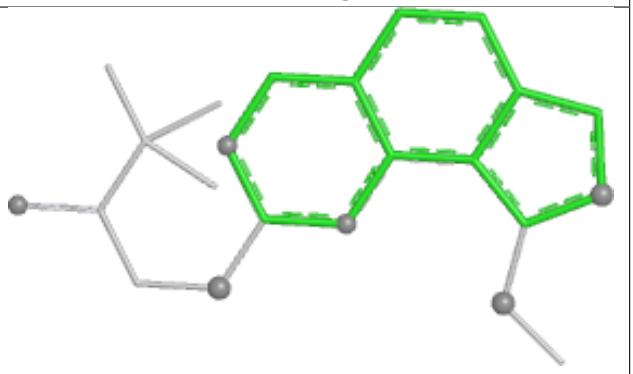
Bond lengths



Bond angles

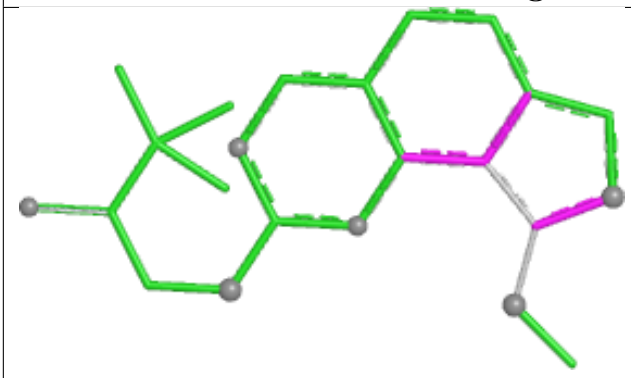


Torsions

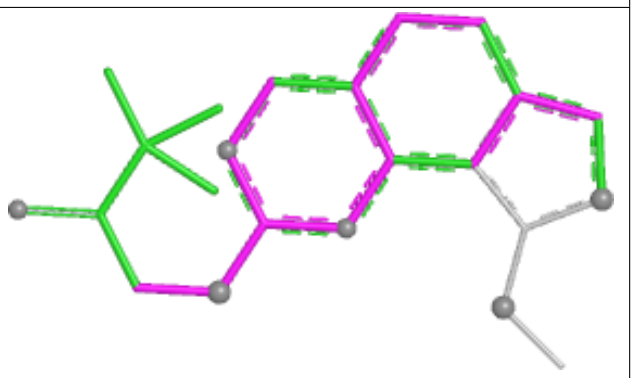


Rings

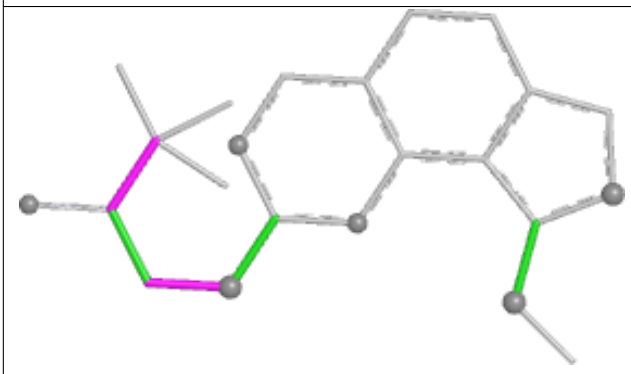
Ligand CJA E 501



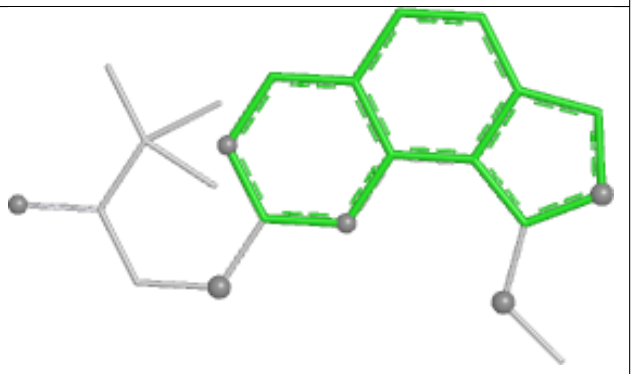
Bond lengths



Bond angles

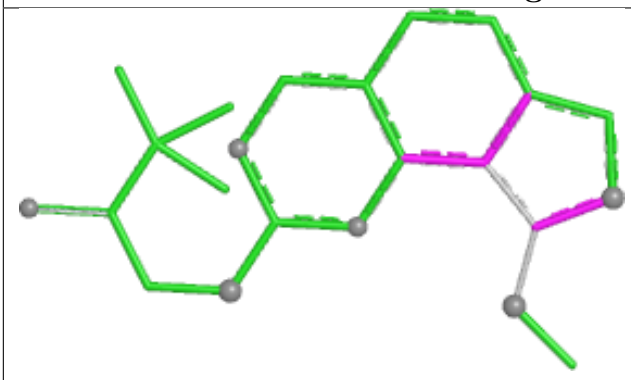


Torsions

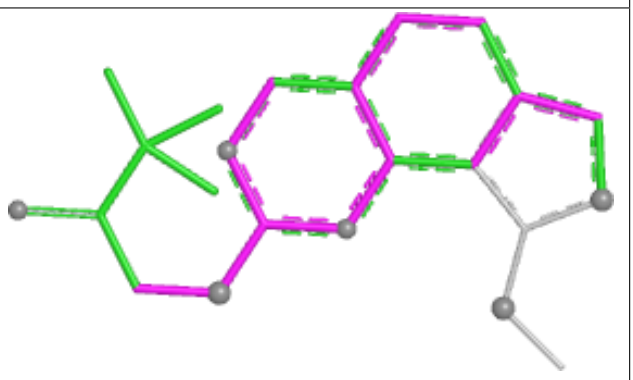


Rings

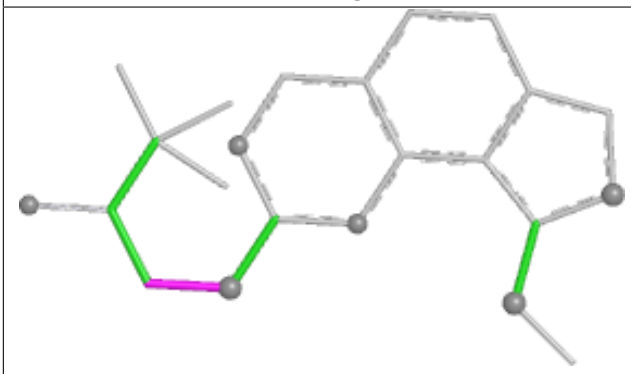
Ligand CJA D 501



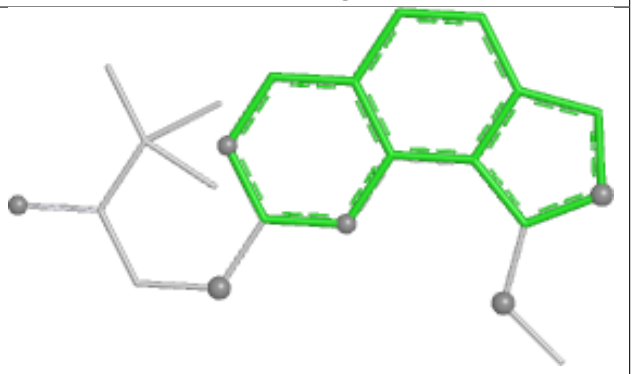
Bond lengths



Bond angles

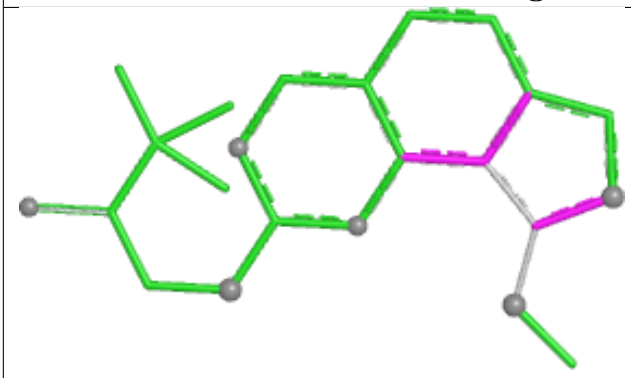


Torsions

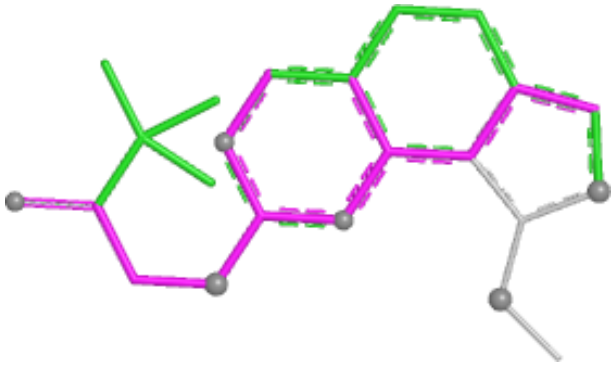


Rings

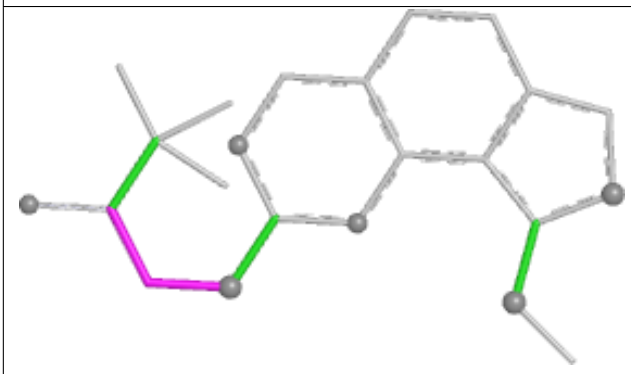
Ligand CJA F 501



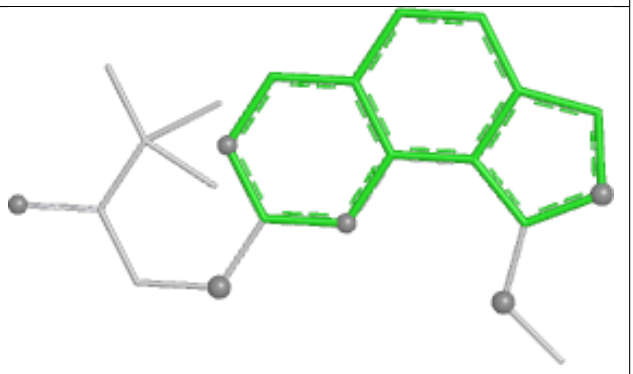
Bond lengths



Bond angles

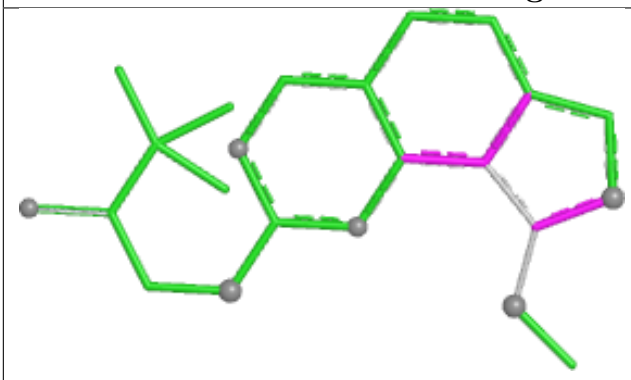


Torsions

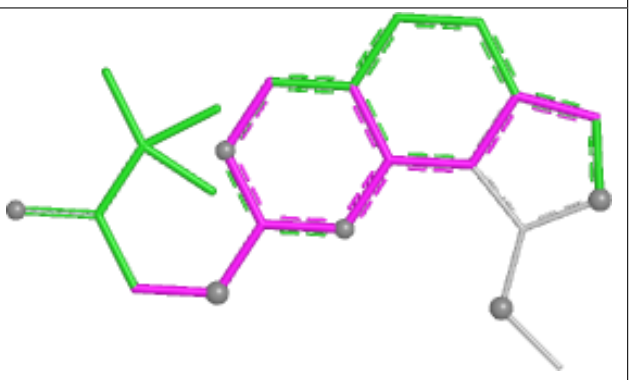


Rings

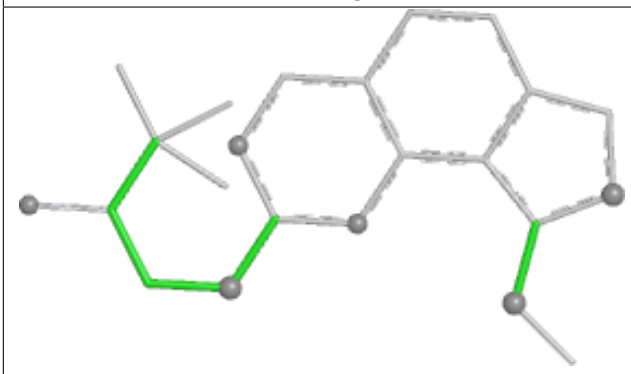
Ligand CJA B 501



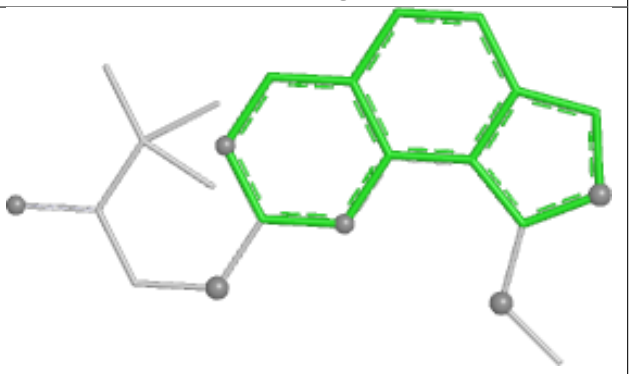
Bond lengths



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, 95^{th} 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	147/148 (99%)	-0.06	2 (1%)	73	71	23, 48, 72, 107	1 (0%)
1	B	147/148 (99%)	-0.37	2 (1%)	73	71	27, 44, 66, 85	0
1	C	147/148 (99%)	-0.13	3 (2%)	64	63	30, 52, 77, 100	0
1	D	147/148 (99%)	0.08	2 (1%)	73	71	32, 58, 83, 93	0
1	E	147/148 (99%)	-0.03	4 (2%)	56	53	36, 55, 81, 100	0
1	F	147/148 (99%)	-0.10	4 (2%)	56	53	29, 51, 78, 106	0
All	All	882/888 (99%)	-0.10	17 (1%)	66	64	23, 52, 79, 107	1 (0%)

All (17) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	320	ALA	4.6
1	F	466	VAL	4.6
1	A	408	CYS	3.1
1	B	426	HIS	2.9
1	C	466	VAL	2.7
1	D	320	ALA	2.7
1	A	377	ASP	2.7
1	B	377	ASP	2.5
1	F	465	GLY	2.4
1	F	320	ALA	2.3
1	E	378	SER	2.3
1	E	320	ALA	2.2
1	D	466	VAL	2.2
1	E	399	GLN	2.1
1	E	466	VAL	2.1
1	F	377	ASP	2.0
1	C	377	ASP	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)

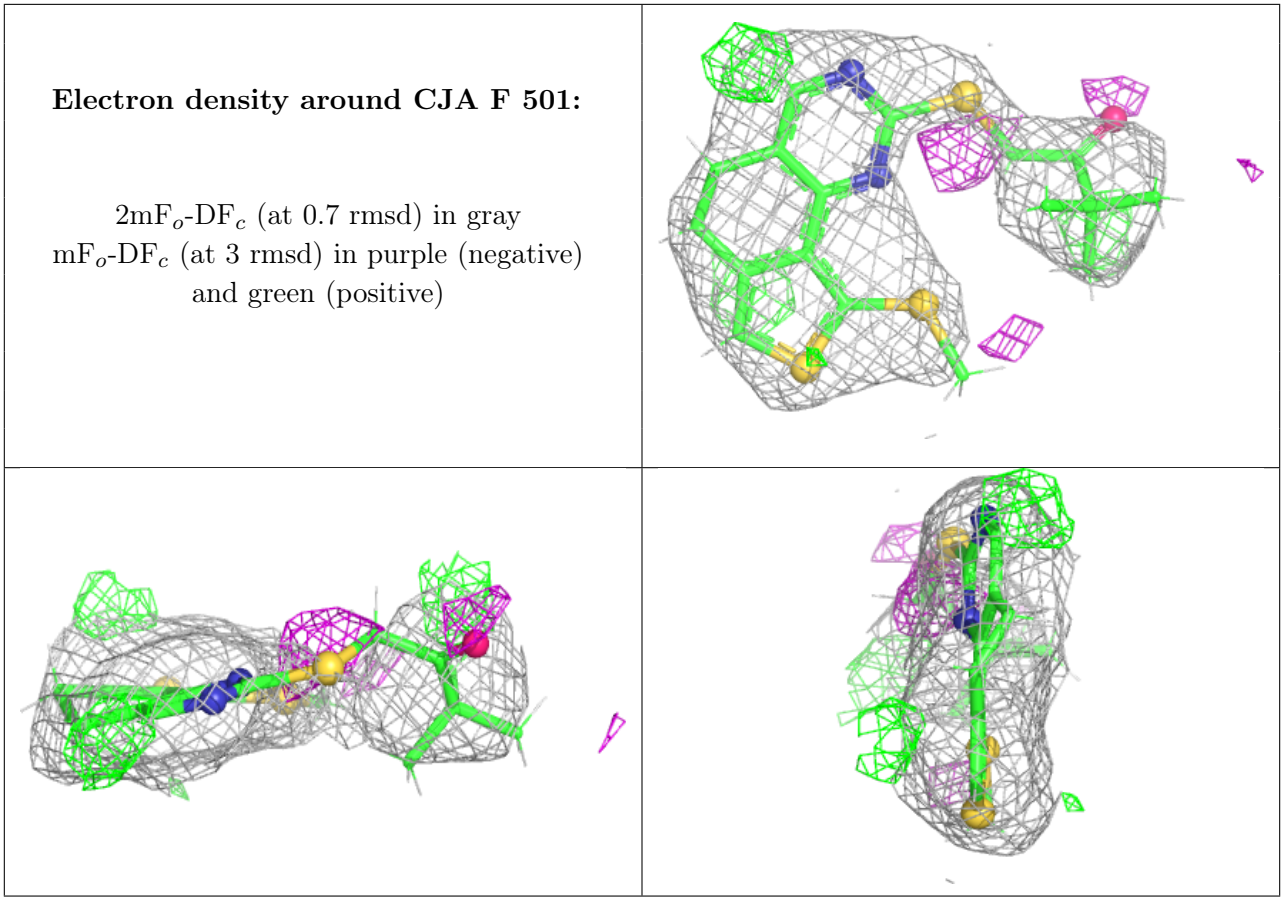
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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	CJA	F	501	23/23	0.87	0.18	46,71,91,109	0
2	CJA	D	501	23/23	0.88	0.19	41,70,101,119	0
2	CJA	E	501	23/23	0.91	0.15	35,70,91,100	0
2	CJA	C	501	23/23	0.93	0.13	39,61,83,88	0
2	CJA	A	501	23/23	0.93	0.14	33,58,89,92	0
2	CJA	B	501	23/23	0.94	0.13	27,56,84,92	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.

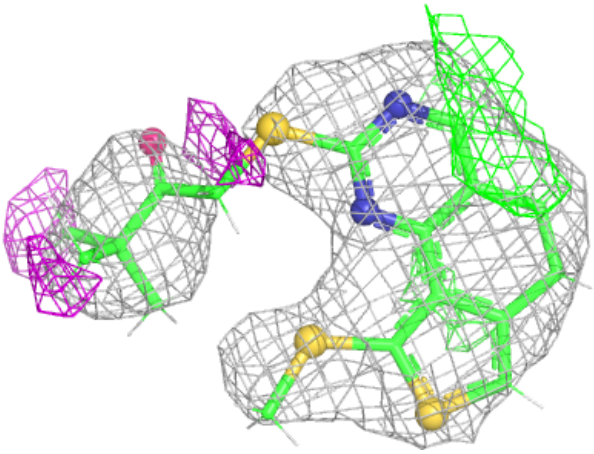
Electron density around CJA F 501:

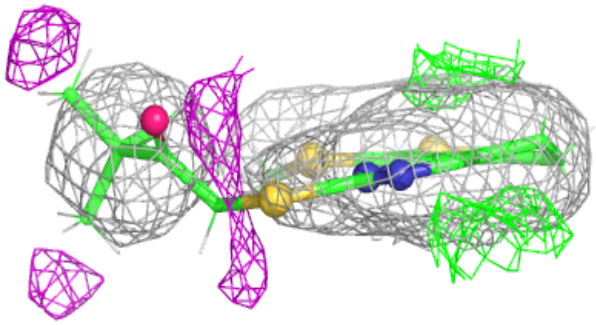
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

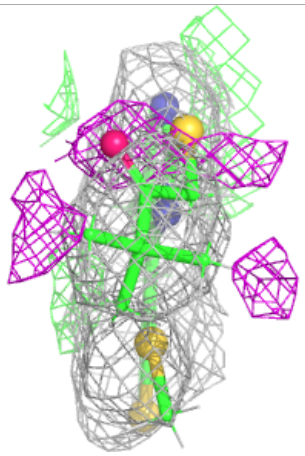


Electron density around CJA D 501:

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

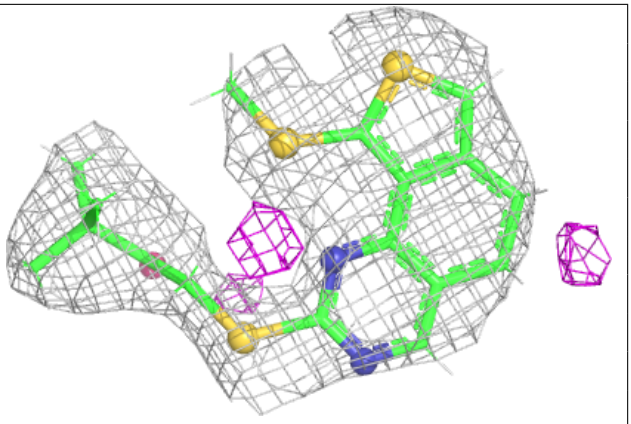


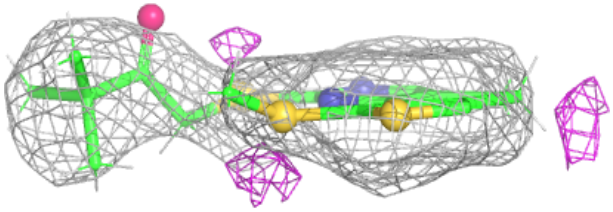


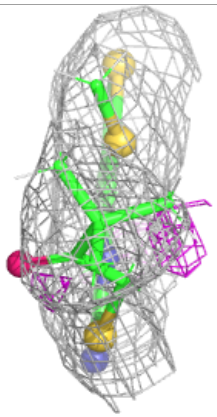


Electron density around CJA E 501:

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

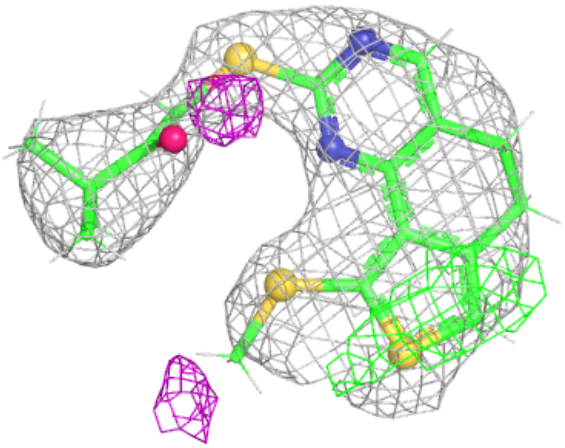


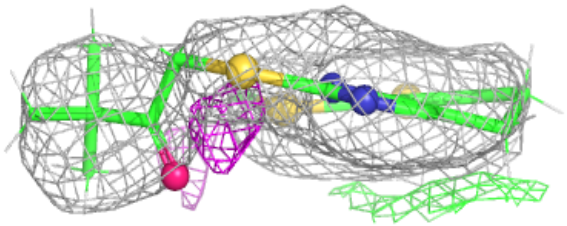


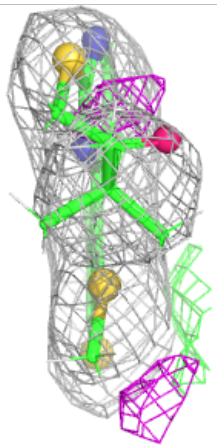


Electron density around CJA C 501:

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

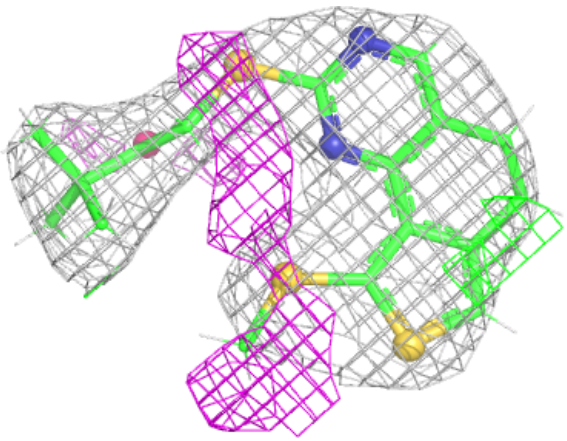


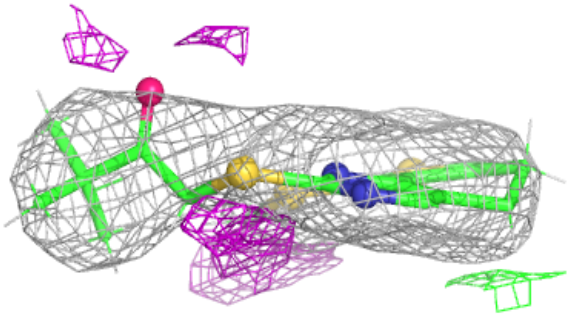


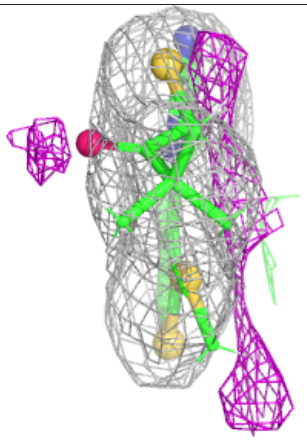


Electron density around CJA A 501:

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

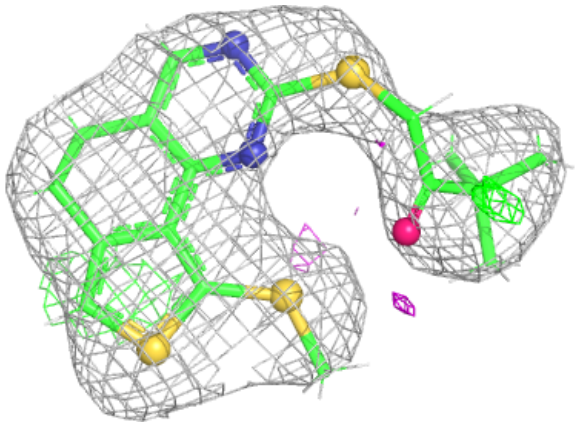


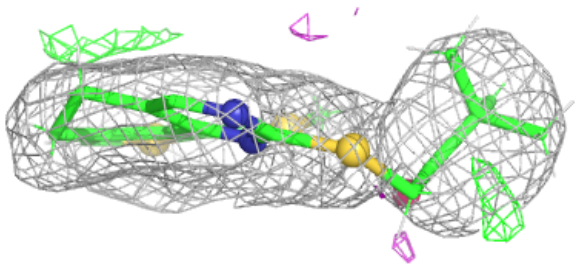


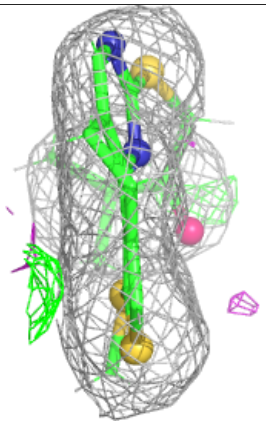


Electron density around CJA B 501:

$2mF_o$-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.