



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 15, 2020 – 02:23 am BST

PDB ID : 6C2M  
Title : Crystal structure of HCV NS3/4A protease variant Y56H in complex with MK-5172  
Authors : Matthew, A.N.; Schiffer, C.A.  
Deposited on : 2018-01-08  
Resolution : 1.86 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](mailto: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 following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.11
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

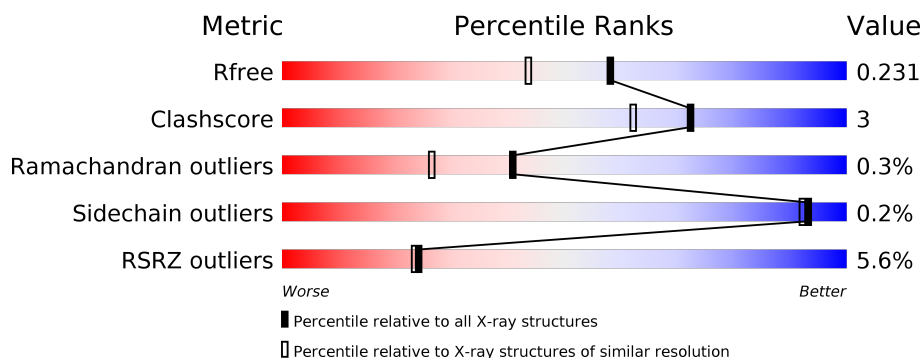
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.86 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))
$R_{free}$	130704	2469 (1.86-1.86)
Clashscore	141614	2625 (1.86-1.86)
Ramachandran outliers	138981	2592 (1.86-1.86)
Sidechain outliers	138945	2592 (1.86-1.86)
RSRZ outliers	127900	2436 (1.86-1.86)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	197	<div> <div>4%</div> <div> <div></div> <div>92%</div> <div>5%</div> <div>••</div> </div> </div>
1	B	197	<div> <div>3%</div> <div> <div></div> <div>94%</div> <div>•</div> </div> </div>
1	C	197	<div> <div>5%</div> <div> <div></div> <div>89%</div> <div>8%</div> <div>•</div> </div> </div>
1	D	197	<div> <div>10%</div> <div> <div></div> <div>85%</div> <div>12%</div> <div>•</div> </div> </div>

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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	SUE	A	1202	X	-	-	-
3	SUE	B	1202	X	-	-	-
3	SUE	C	1203	X	-	-	-
3	SUE	D	1202	X	-	-	-

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 11237 atoms, of which 5409 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 NS3 protease.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	191	Total	C	H	N	O	S	0	1	0
			2669	840	1312	243	268	6			
1	B	191	Total	C	H	N	O	S	0	1	0
			2640	836	1295	238	265	6			
1	C	191	Total	C	H	N	O	S	0	1	0
			2649	838	1302	242	261	6			
1	D	191	Total	C	H	N	O	S	0	1	0
			2645	837	1300	242	260	6			

There are 132 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	983	MET	-	expression tag	UNP C1KIK8
A	984	ALA	-	expression tag	UNP C1KIK8
A	985	SER	-	expression tag	UNP C1KIK8
A	986	MET	-	expression tag	UNP C1KIK8
A	987	LYS	-	expression tag	UNP C1KIK8
A	988	LYS	-	expression tag	UNP C1KIK8
A	989	LYS	-	expression tag	UNP C1KIK8
A	990	GLY	-	expression tag	UNP C1KIK8
A	991	SER	-	expression tag	UNP C1KIK8
A	992	VAL	-	expression tag	UNP C1KIK8
A	993	VAL	-	expression tag	UNP C1KIK8
A	994	ILE	-	expression tag	UNP C1KIK8
A	995	VAL	-	expression tag	UNP C1KIK8
A	996	GLY	-	expression tag	UNP C1KIK8
A	997	ARG	-	expression tag	UNP C1KIK8
A	998	ILE	-	expression tag	UNP C1KIK8
A	999	ASN	-	expression tag	UNP C1KIK8
A	1000	LEU	-	expression tag	UNP C1KIK8
A	1001	SER	-	expression tag	UNP C1KIK8
A	1002	GLY	-	expression tag	UNP C1KIK8
A	1003	ASP	-	expression tag	UNP C1KIK8

*Continued on next page...*

*Continued from previous page...*

Chain	Residue	Modelled	Actual	Comment	Reference
A	1013	GLU	LEU	engineered mutation	UNP C1KIK8
A	1014	GLU	LEU	engineered mutation	UNP C1KIK8
A	1017	GLN	ILE	engineered mutation	UNP C1KIK8
A	1018	GLU	ILE	engineered mutation	UNP C1KIK8
A	1021	GLN	LEU	engineered mutation	UNP C1KIK8
A	1040	THR	ALA	engineered mutation	UNP C1KIK8
A	1047	SER	CYS	engineered mutation	UNP C1KIK8
A	1052	LEU	CYS	engineered mutation	UNP C1KIK8
A	1056	HIS	TYR	engineered mutation	UNP C1KIK8
A	1072	THR	ILE	engineered mutation	UNP C1KIK8
A	1086	GLN	PRO	engineered mutation	UNP C1KIK8
A	1159	SER	CYS	engineered mutation	UNP C1KIK8
B	983	MET	-	expression tag	UNP C1KIK8
B	984	ALA	-	expression tag	UNP C1KIK8
B	985	SER	-	expression tag	UNP C1KIK8
B	986	MET	-	expression tag	UNP C1KIK8
B	987	LYS	-	expression tag	UNP C1KIK8
B	988	LYS	-	expression tag	UNP C1KIK8
B	989	LYS	-	expression tag	UNP C1KIK8
B	990	GLY	-	expression tag	UNP C1KIK8
B	991	SER	-	expression tag	UNP C1KIK8
B	992	VAL	-	expression tag	UNP C1KIK8
B	993	VAL	-	expression tag	UNP C1KIK8
B	994	ILE	-	expression tag	UNP C1KIK8
B	995	VAL	-	expression tag	UNP C1KIK8
B	996	GLY	-	expression tag	UNP C1KIK8
B	997	ARG	-	expression tag	UNP C1KIK8
B	998	ILE	-	expression tag	UNP C1KIK8
B	999	ASN	-	expression tag	UNP C1KIK8
B	1000	LEU	-	expression tag	UNP C1KIK8
B	1001	SER	-	expression tag	UNP C1KIK8
B	1002	GLY	-	expression tag	UNP C1KIK8
B	1003	ASP	-	expression tag	UNP C1KIK8
B	1013	GLU	LEU	engineered mutation	UNP C1KIK8
B	1014	GLU	LEU	engineered mutation	UNP C1KIK8
B	1017	GLN	ILE	engineered mutation	UNP C1KIK8
B	1018	GLU	ILE	engineered mutation	UNP C1KIK8
B	1021	GLN	LEU	engineered mutation	UNP C1KIK8
B	1040	THR	ALA	engineered mutation	UNP C1KIK8
B	1047	SER	CYS	engineered mutation	UNP C1KIK8
B	1052	LEU	CYS	engineered mutation	UNP C1KIK8
B	1056	HIS	TYR	engineered mutation	UNP C1KIK8

*Continued on next page...*

*Continued from previous page...*

Chain	Residue	Modelled	Actual	Comment	Reference
B	1072	THR	ILE	engineered mutation	UNP C1KIK8
B	1086	GLN	PRO	engineered mutation	UNP C1KIK8
B	1159	SER	CYS	engineered mutation	UNP C1KIK8
C	983	MET	-	expression tag	UNP C1KIK8
C	984	ALA	-	expression tag	UNP C1KIK8
C	985	SER	-	expression tag	UNP C1KIK8
C	986	MET	-	expression tag	UNP C1KIK8
C	987	LYS	-	expression tag	UNP C1KIK8
C	988	LYS	-	expression tag	UNP C1KIK8
C	989	LYS	-	expression tag	UNP C1KIK8
C	990	GLY	-	expression tag	UNP C1KIK8
C	991	SER	-	expression tag	UNP C1KIK8
C	992	VAL	-	expression tag	UNP C1KIK8
C	993	VAL	-	expression tag	UNP C1KIK8
C	994	ILE	-	expression tag	UNP C1KIK8
C	995	VAL	-	expression tag	UNP C1KIK8
C	996	GLY	-	expression tag	UNP C1KIK8
C	997	ARG	-	expression tag	UNP C1KIK8
C	998	ILE	-	expression tag	UNP C1KIK8
C	999	ASN	-	expression tag	UNP C1KIK8
C	1000	LEU	-	expression tag	UNP C1KIK8
C	1001	SER	-	expression tag	UNP C1KIK8
C	1002	GLY	-	expression tag	UNP C1KIK8
C	1003	ASP	-	expression tag	UNP C1KIK8
C	1013	GLU	LEU	engineered mutation	UNP C1KIK8
C	1014	GLU	LEU	engineered mutation	UNP C1KIK8
C	1017	GLN	ILE	engineered mutation	UNP C1KIK8
C	1018	GLU	ILE	engineered mutation	UNP C1KIK8
C	1021	GLN	LEU	engineered mutation	UNP C1KIK8
C	1040	THR	ALA	engineered mutation	UNP C1KIK8
C	1047	SER	CYS	engineered mutation	UNP C1KIK8
C	1052	LEU	CYS	engineered mutation	UNP C1KIK8
C	1056	HIS	TYR	engineered mutation	UNP C1KIK8
C	1072	THR	ILE	engineered mutation	UNP C1KIK8
C	1086	GLN	PRO	engineered mutation	UNP C1KIK8
C	1159	SER	CYS	engineered mutation	UNP C1KIK8
D	983	MET	-	expression tag	UNP C1KIK8
D	984	ALA	-	expression tag	UNP C1KIK8
D	985	SER	-	expression tag	UNP C1KIK8
D	986	MET	-	expression tag	UNP C1KIK8
D	987	LYS	-	expression tag	UNP C1KIK8
D	988	LYS	-	expression tag	UNP C1KIK8

*Continued on next page...*

*Continued from previous page...*

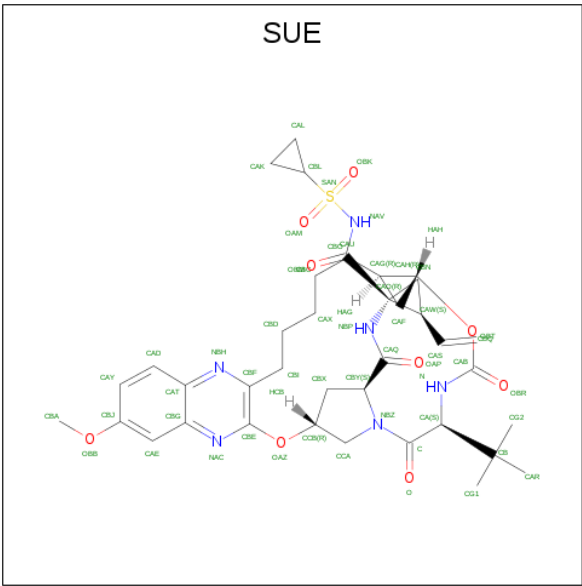
Chain	Residue	Modelled	Actual	Comment	Reference
D	989	LYS	-	expression tag	UNP C1KIK8
D	990	GLY	-	expression tag	UNP C1KIK8
D	991	SER	-	expression tag	UNP C1KIK8
D	992	VAL	-	expression tag	UNP C1KIK8
D	993	VAL	-	expression tag	UNP C1KIK8
D	994	ILE	-	expression tag	UNP C1KIK8
D	995	VAL	-	expression tag	UNP C1KIK8
D	996	GLY	-	expression tag	UNP C1KIK8
D	997	ARG	-	expression tag	UNP C1KIK8
D	998	ILE	-	expression tag	UNP C1KIK8
D	999	ASN	-	expression tag	UNP C1KIK8
D	1000	LEU	-	expression tag	UNP C1KIK8
D	1001	SER	-	expression tag	UNP C1KIK8
D	1002	GLY	-	expression tag	UNP C1KIK8
D	1003	ASP	-	expression tag	UNP C1KIK8
D	1013	GLU	LEU	engineered mutation	UNP C1KIK8
D	1014	GLU	LEU	engineered mutation	UNP C1KIK8
D	1017	GLN	ILE	engineered mutation	UNP C1KIK8
D	1018	GLU	ILE	engineered mutation	UNP C1KIK8
D	1021	GLN	LEU	engineered mutation	UNP C1KIK8
D	1040	THR	ALA	engineered mutation	UNP C1KIK8
D	1047	SER	CYS	engineered mutation	UNP C1KIK8
D	1052	LEU	CYS	engineered mutation	UNP C1KIK8
D	1056	HIS	TYR	engineered mutation	UNP C1KIK8
D	1072	THR	ILE	engineered mutation	UNP C1KIK8
D	1086	GLN	PRO	engineered mutation	UNP C1KIK8
D	1159	SER	CYS	engineered mutation	UNP C1KIK8

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	B	1	Total Zn 1 1	0	0
2	A	1	Total Zn 1 1	0	0
2	D	1	Total Zn 1 1	0	0
2	C	1	Total Zn 1 1	0	0

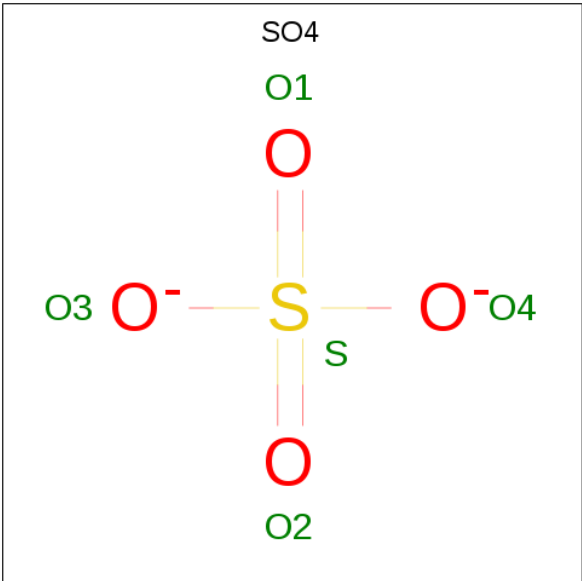
- Molecule 3 is (1aR,5S,8S,10R,22aR)-5-tert-butyl-N-{(1R,2S)-1-[(cyclopropylsulfonyl)carbamoyl]-2-ethenylcyclopropyl}-14-methoxy-3,6-dioxo-1,1a,3,4,5,6,9,10,18,19,20,21,22,22a-tetradecahydro-8H-7,10-methanocyclopropa[18,19][1,10,3,6]dioxadiazacyclononadecino[11,12-b]q

uinoxaline-8-carboxamide (three-letter code: SUE) (formula: C<sub>38</sub>H<sub>50</sub>N<sub>6</sub>O<sub>9</sub>S).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
3	A	1	Total	C	H	N	O	S	0	0
			104	38	50	6	9	1		
3	B	1	Total	C	H	N	O	S	0	0
			104	38	50	6	9	1		
3	C	1	Total	C	H	N	O	S	0	0
			104	38	50	6	9	1		
3	D	1	Total	C	H	N	O	S	0	0
			104	38	50	6	9	1		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	C	1	Total	O	S	0	0
			5	4	1		

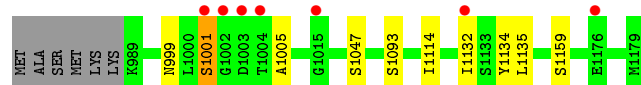
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	65	Total	O	0	0
			65	65		
5	B	63	Total	O	0	0
			63	63		
5	C	45	Total	O	0	0
			45	45		
5	D	36	Total	O	0	0
			36	36		

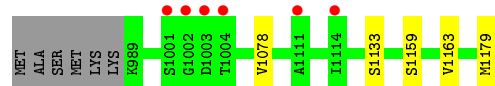
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

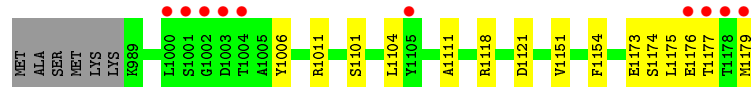
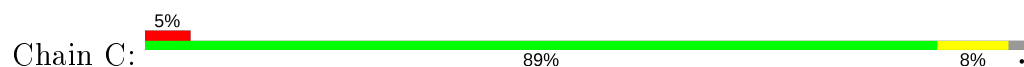
- Molecule 1: NS3 protease



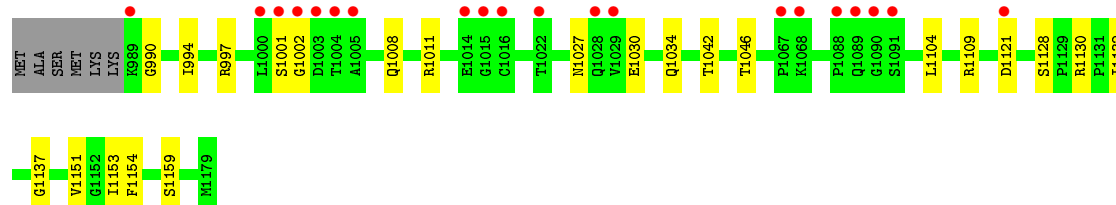
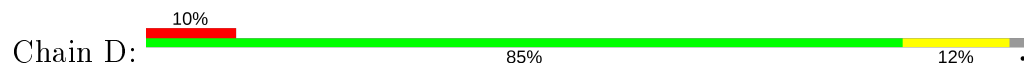
- Molecule 1: NS3 protease



- Molecule 1: NS3 protease



- Molecule 1: NS3 protease



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	56.63Å 103.33Å 73.96Å 90.00° 112.01° 90.00°	Depositor
Resolution (Å)	35.73 – 1.86 35.72 – 1.86	Depositor EDS
% Data completeness (in resolution range)	95.8 (35.73-1.86) 93.0 (35.72-1.86)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.07	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.25 (at 1.85Å)	Xtriage
Refinement program	PHENIX (1.12_2829: ???)	Depositor
R, $R_{free}$	0.180 , 0.224 0.187 , 0.231	Depositor DCC
$R_{free}$ test set	1983 reflections (3.12%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	21.7	Xtriage
Anisotropy	0.118	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 30.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.41$ , $\langle L^2 \rangle = 0.23$	Xtriage
Estimated twinning fraction	0.247 for h,-k,-h-l	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	11237	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.98% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: SUE, ZN, SO4

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	0.32	0/1384	0.53	0/1891
1	B	0.31	0/1372	0.50	0/1877
1	C	0.32	0/1374	0.55	0/1878
1	D	0.31	0/1372	0.54	0/1876
All	All	0.32	0/5502	0.53	0/7522

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	1357	1312	1312	6	0
1	B	1345	1295	1295	3	0
1	C	1347	1302	1303	10	0
1	D	1345	1300	1298	17	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	54	50	47	2	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	54	50	48	1	0
3	C	54	50	48	1	0
3	D	54	50	49	1	0
4	C	5	0	0	0	0
5	A	65	0	0	1	2
5	B	63	0	0	1	2
5	C	45	0	0	1	1
5	D	36	0	0	3	1
All	All	5828	5409	5400	37	3

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 3.

The worst 5 of 37 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)
3:A:1202:SUE:OBK	5:A:1301:HOH:O	1.98	0.79
1:D:1001:SER:O	5:D:1301:HOH:O	2.01	0.79
1:D:997:ARG:NH2	1:D:1008:GLN:OE1	2.34	0.61
1:B:1078:VAL:HG23	3:B:1202:SUE:HAY	1.83	0.59
1:D:1132:ILE:HD11	1:D:1159:SER:HB3	1.86	0.58

All (3) 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)
5:A:1348:HOH:O	5:B:1315:HOH:O[2_545]	1.97	0.23
5:C:1338:HOH:O	5:D:1309:HOH:O[2_645]	2.07	0.13
5:A:1340:HOH:O	5:B:1338:HOH:O[2_645]	2.19	0.01

## 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	190/197 (96%)	179 (94%)	10 (5%)	1 (0%)	29	15
1	B	190/197 (96%)	185 (97%)	5 (3%)	0	100	100
1	C	190/197 (96%)	186 (98%)	4 (2%)	0	100	100
1	D	190/197 (96%)	179 (94%)	10 (5%)	1 (0%)	29	15
All	All	760/788 (96%)	729 (96%)	29 (4%)	2 (0%)	41	26

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1001	SER
1	D	990	GLY

### 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	143/160 (89%)	143 (100%)	0	100	100
1	B	140/160 (88%)	139 (99%)	1 (1%)	84	79
1	C	139/160 (87%)	139 (100%)	0	100	100
1	D	138/160 (86%)	138 (100%)	0	100	100
All	All	560/640 (88%)	559 (100%)	1 (0%)	93	92

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	1133	SER

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA ⓘ

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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 9 ligands modelled in this entry, 4 are monoatomic - leaving 5 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	$\# Z  > 2$
3	SUE	B	1202	-	54,60,60	3.91	23 (42%)	73,92,92	3.16	16 (21%)
3	SUE	C	1203	-	54,60,60	3.99	24 (44%)	73,92,92	3.31	15 (20%)
3	SUE	A	1202	-	54,60,60	3.88	22 (40%)	73,92,92	3.08	16 (21%)
3	SUE	D	1202	-	54,60,60	4.00	23 (42%)	73,92,92	3.15	15 (20%)
4	SO4	C	1201	-	4,4,4	0.16	0	6,6,6	0.20	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	SUE	B	1202	-	1/1/19/19	7/61/91/91	0/6/7/7
3	SUE	C	1203	-	1/1/19/19	9/61/91/91	0/6/7/7
3	SUE	A	1202	-	1/1/19/19	7/61/91/91	0/6/7/7
3	SUE	D	1202	-	1/1/19/19	4/61/91/91	0/6/7/7

The worst 5 of 92 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	1202	SUE	CBF-NBH	10.94	1.46	1.32
3	C	1203	SUE	CBF-NBH	10.84	1.46	1.32
3	B	1202	SUE	CBF-NBH	10.57	1.45	1.32
3	A	1202	SUE	CBF-NBH	10.28	1.45	1.32
3	C	1203	SUE	CAE-CBJ	9.79	1.54	1.37

The worst 5 of 62 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1203	SUE	OBK-SAN-OAM	-24.48	100.87	119.24
3	D	1202	SUE	OBK-SAN-OAM	-22.12	102.64	119.24
3	B	1202	SUE	OBK-SAN-OAM	-22.08	102.68	119.24
3	A	1202	SUE	OBK-SAN-OAM	-21.80	102.88	119.24
3	D	1202	SUE	CAU-CAG-CAH	7.23	140.12	122.75

All (4) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	B	1202	SUE	NBZ
3	C	1203	SUE	NBZ
3	A	1202	SUE	NBZ
3	D	1202	SUE	NBZ

5 of 27 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	1202	SUE	CBO-NAV-SAN-CBL
3	B	1202	SUE	CAX-CBD-CBI-CBF
3	C	1203	SUE	CBO-NAV-SAN-OAM
3	C	1203	SUE	CBO-NAV-SAN-CBL
3	A	1202	SUE	CAH-CAG-CAU-CBC

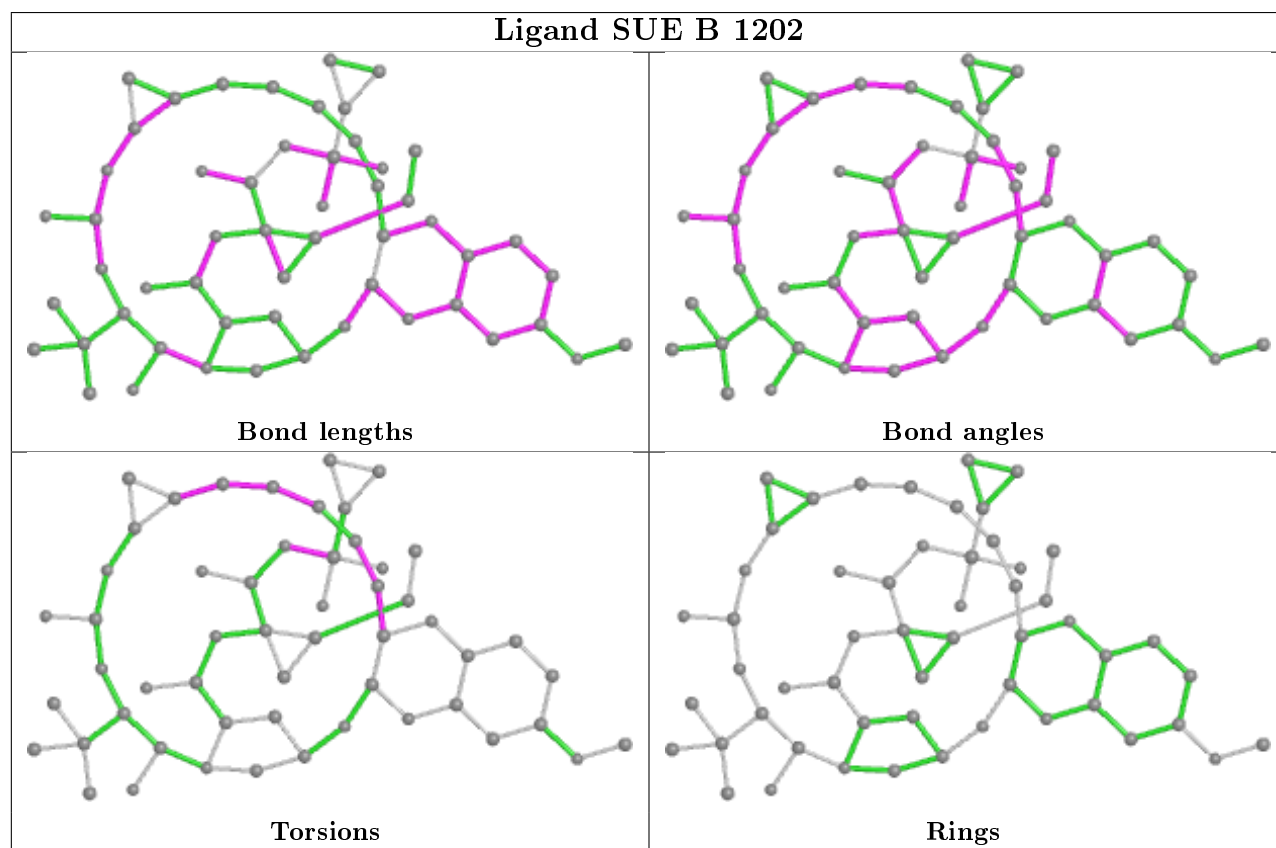
There are no ring outliers.

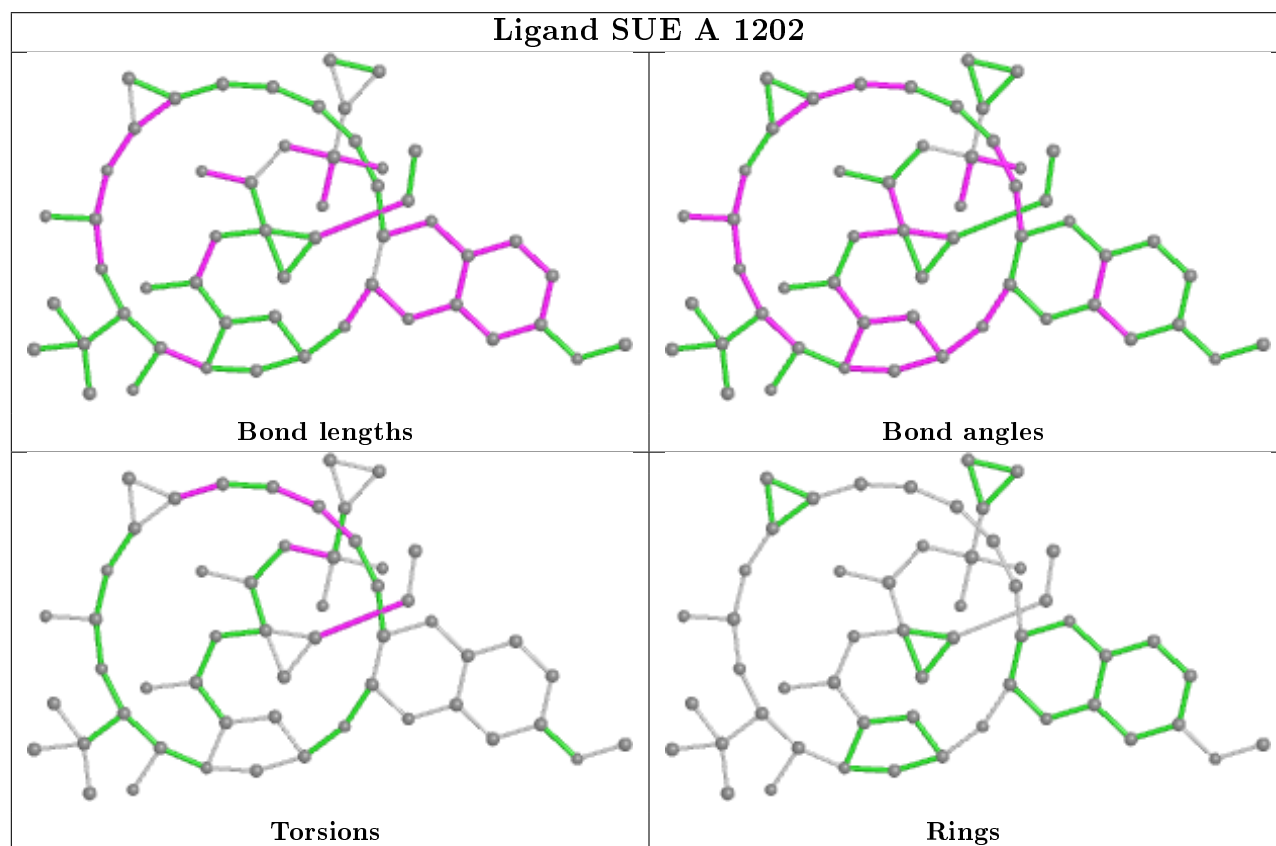
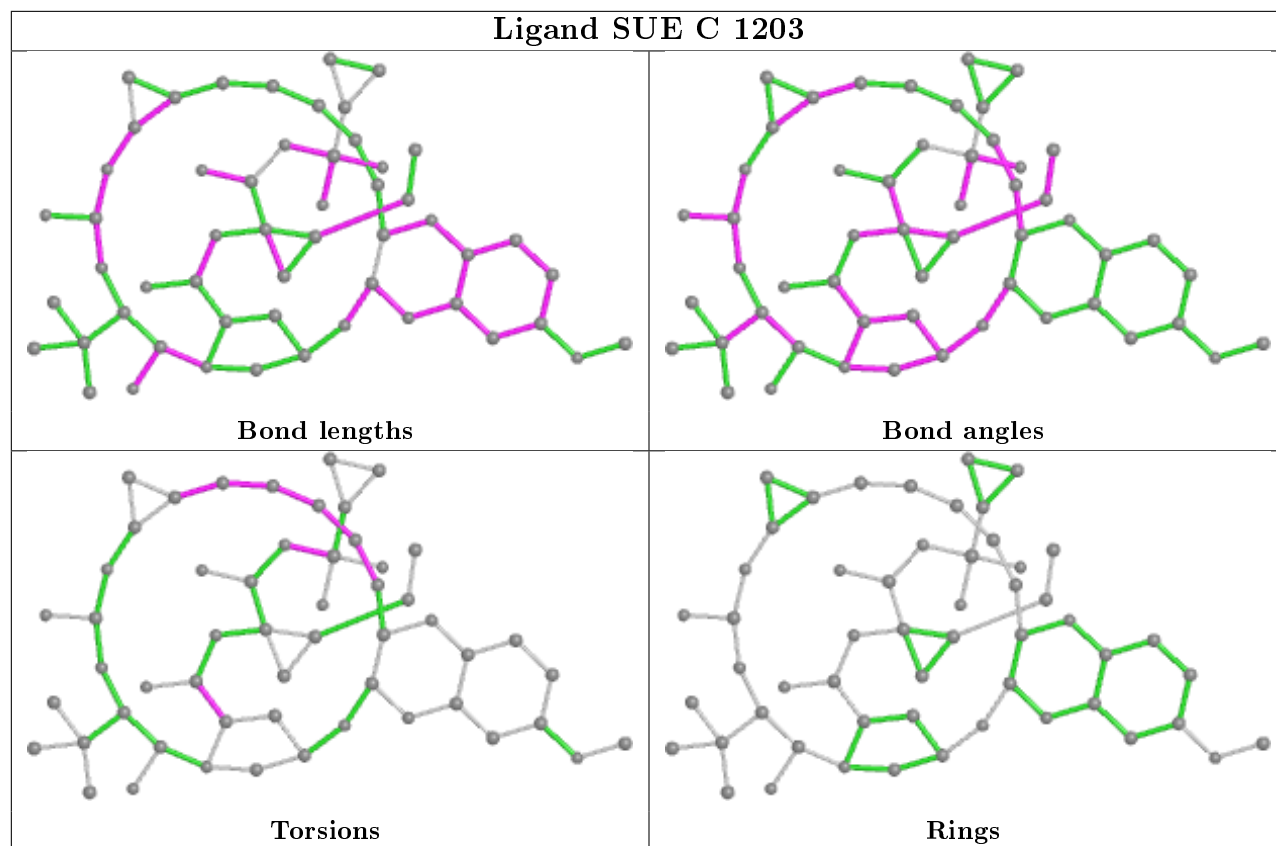
4 monomers are involved in 5 short contacts:

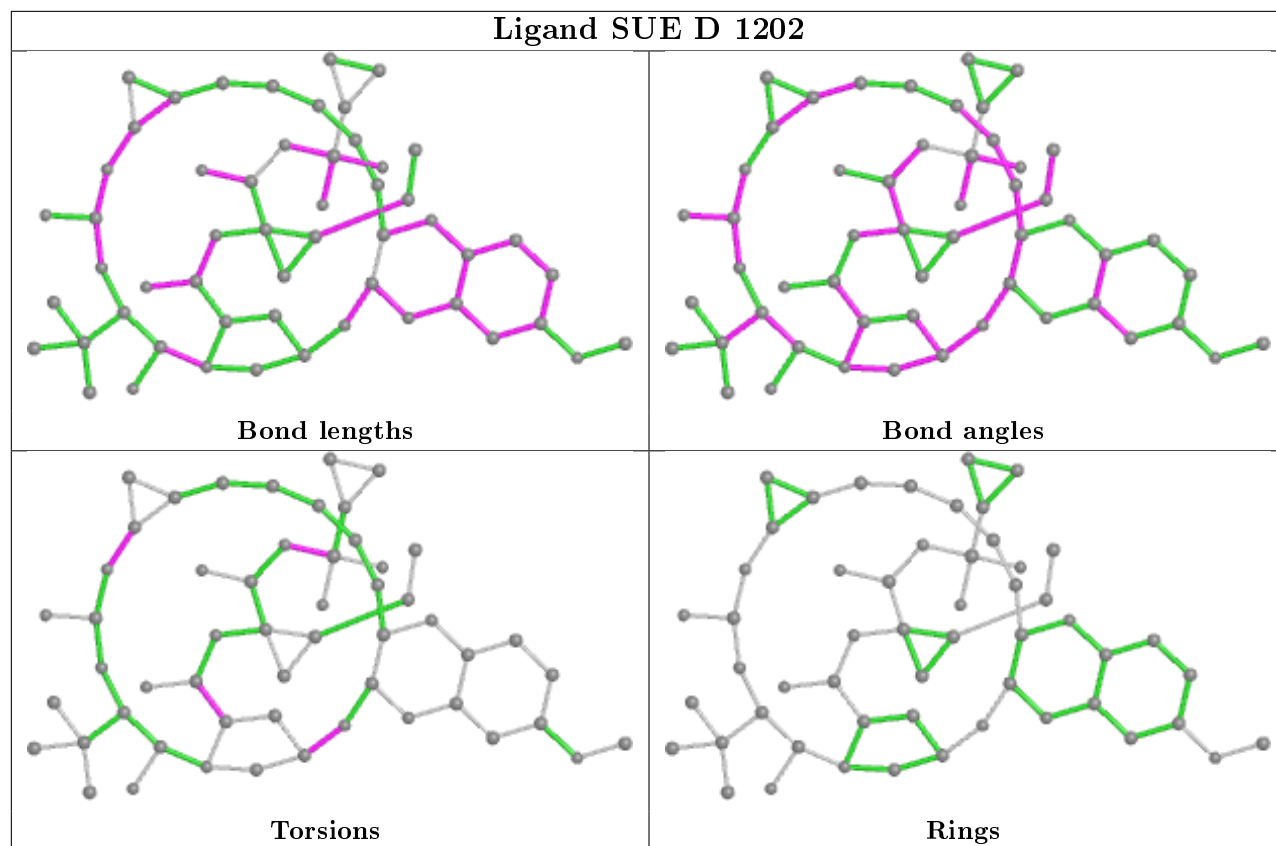
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	1202	SUE	1	0
3	C	1203	SUE	1	0
3	A	1202	SUE	2	0
3	D	1202	SUE	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







## 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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	191/197 (96%)	0.11	7 (3%) 41 39	13, 24, 49, 72	0
1	B	191/197 (96%)	0.05	6 (3%) 49 47	14, 26, 45, 79	0
1	C	191/197 (96%)	0.22	10 (5%) 27 26	14, 26, 49, 87	0
1	D	191/197 (96%)	0.62	20 (10%) 6 6	16, 30, 68, 81	0
All	All	764/788 (96%)	0.25	43 (5%) 24 23	13, 26, 55, 87	0

The worst 5 of 43 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1001	SER	10.8
1	D	1004	THR	10.1
1	C	1003	ASP	9.4
1	C	1178	THR	8.9
1	C	1177	THR	8.8

### 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](#)

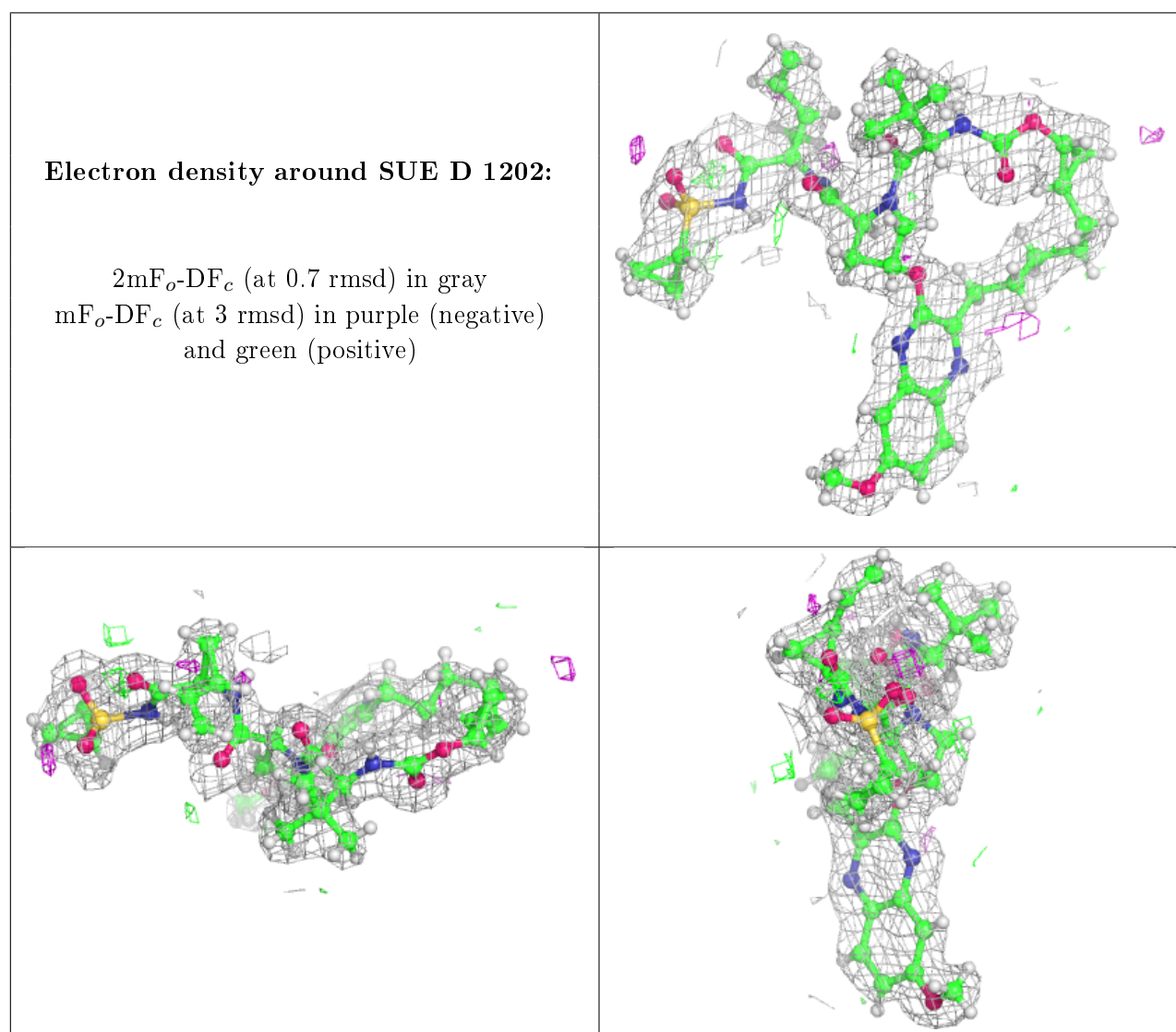
There are no carbohydrates in this entry.

### 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<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

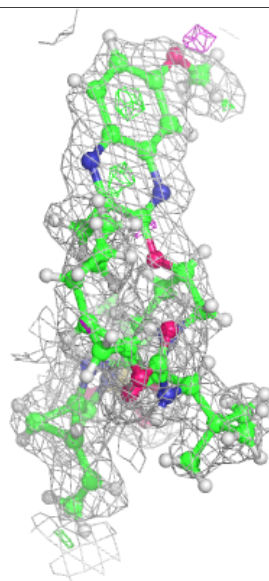
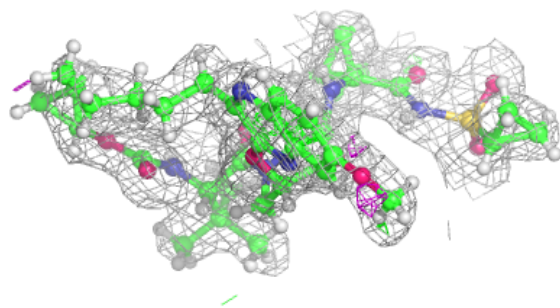
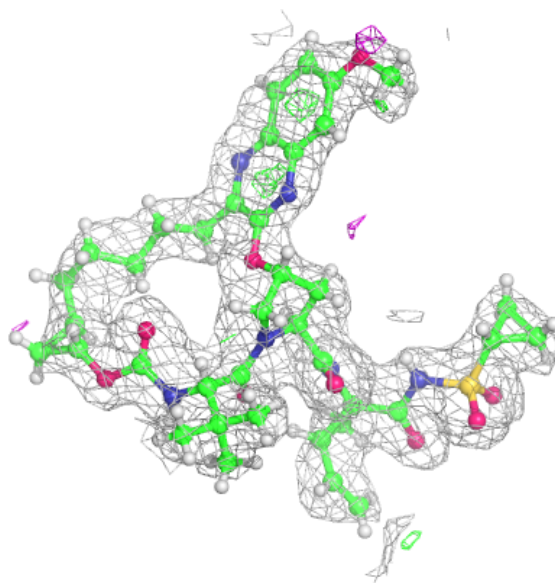
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	SUE	D	1202	54/54	0.92	0.12	11,25,40,54	0
3	SUE	A	1202	54/54	0.93	0.13	16,29,43,55	0
3	SUE	B	1202	54/54	0.93	0.11	17,27,39,41	0
3	SUE	C	1203	54/54	0.94	0.11	14,22,36,45	0
4	SO4	C	1201	5/5	0.96	0.13	23,36,41,43	0
2	ZN	D	1201	1/1	0.98	0.09	27,27,27,27	0
2	ZN	A	1201	1/1	0.98	0.11	24,24,24,24	0
2	ZN	B	1201	1/1	0.98	0.12	26,26,26,26	0
2	ZN	C	1202	1/1	0.99	0.08	24,24,24,24	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.



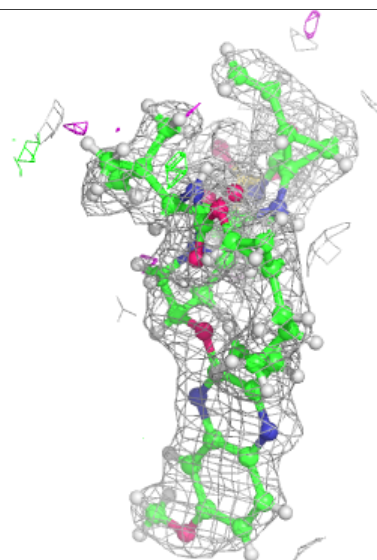
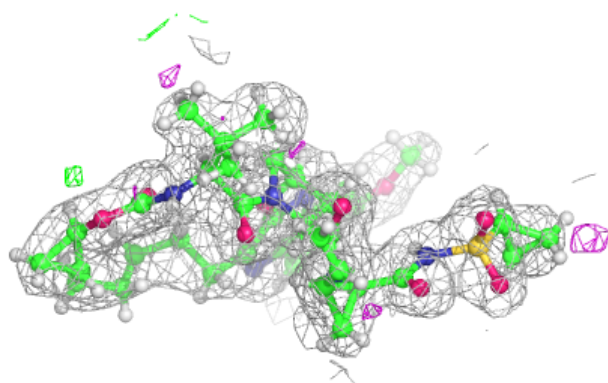
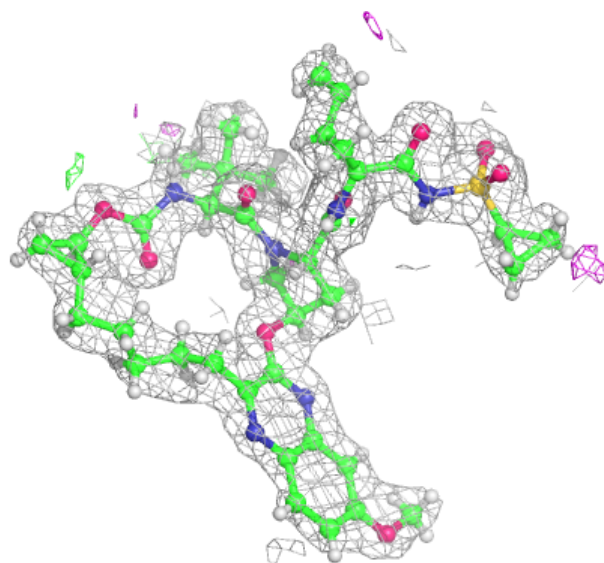
**Electron density around SUE A 1202:**

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



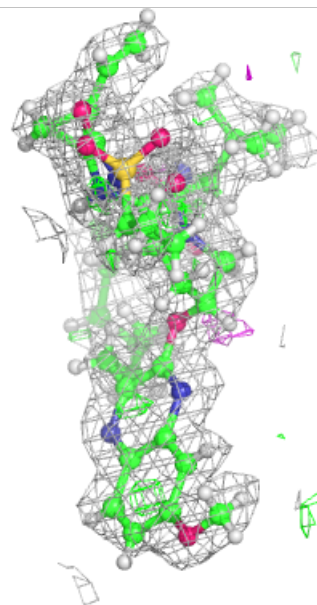
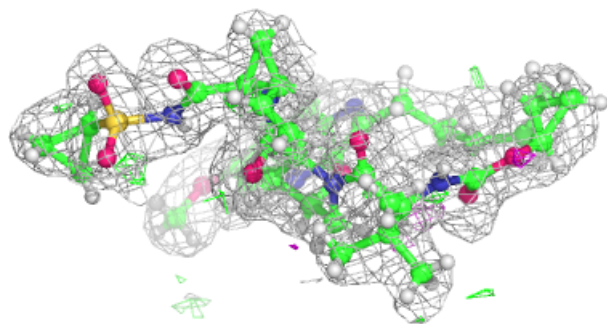
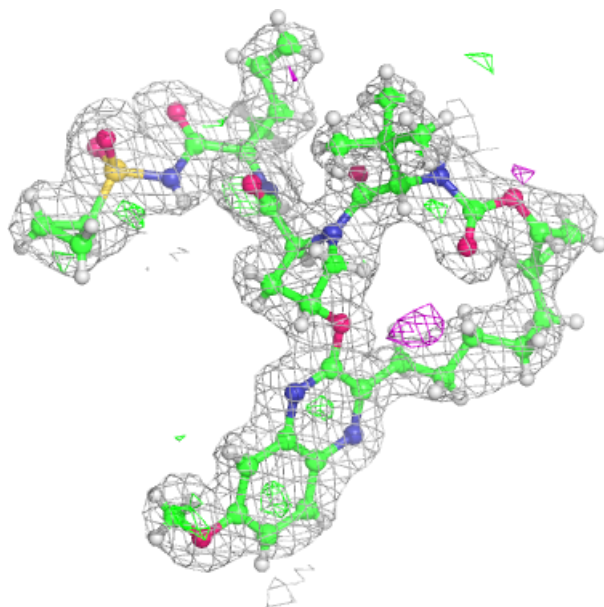
**Electron density around SUE B 1202:**

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



**Electron density around SUE C 1203:**

$2mF_o-DF_c$  (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.