



Full wwPDB X-ray Structure Validation Report ⓘ

May 12, 2020 – 11:36 pm BST

PDB ID : 4CKE
Title : Vaccinia virus capping enzyme complexed with SAH in P1 form
Authors : Kyrieleis, O.J.P.; Chang, J.; de la Pena, M.; Shuman, S.; Cusack, S.
Deposited on : 2014-01-03
Resolution : 2.90 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 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

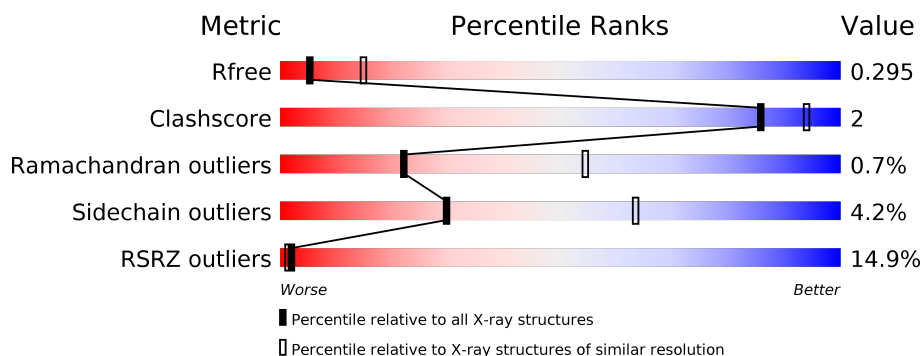
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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 ≥ 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	844	<div> <div>20%</div> <div> <div>86%</div> <div>9%</div> <div>5%</div> </div> </div>
1	D	844	<div> <div>13%</div> <div> <div>85%</div> <div>11%</div> <div>• •</div> </div> </div>
2	B	287	<div> <div>7%</div> <div> <div>92%</div> <div>7%</div> <div>•</div> </div> </div>
2	E	287	<div> <div>9%</div> <div> <div>89%</div> <div>8%</div> <div>•</div> </div> </div>

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 17794 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

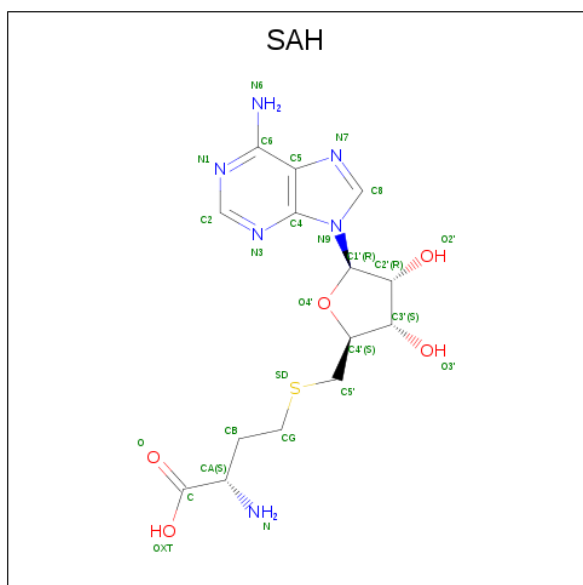
- Molecule 1 is a protein called MRNA-CAPPING ENZYME CATALYTIC SUBUNIT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	802	Total	C	N	O	S	0	1	0
			6485	4181	1060	1226	18			
1	D	813	Total	C	N	O	S	0	1	0
			6583	4245	1080	1239	19			

- Molecule 2 is a protein called MRNA-CAPPING ENZYME REGULATORY SUBUNIT.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	284	Total	C	N	O	S	0	0	0
			2320	1492	385	430	13			
2	E	278	Total	C	N	O	S	0	0	0
			2278	1468	375	422	13			

- Molecule 3 is S-ADENOSYL-L-HOMOCYSTEINE (three-letter code: SAH) (formula: $C_{14}H_{20}N_6O_5S$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	S	0	0
			26	14	6	5	1		
3	D	1	Total	C	N	O	S	0	0
			26	14	6	5	1		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	23	Total	O	0	0
			23	23		
4	B	11	Total	O	0	0
			11	11		
4	D	37	Total	O	0	0
			37	37		
4	E	5	Total	O	0	0
			5	5		

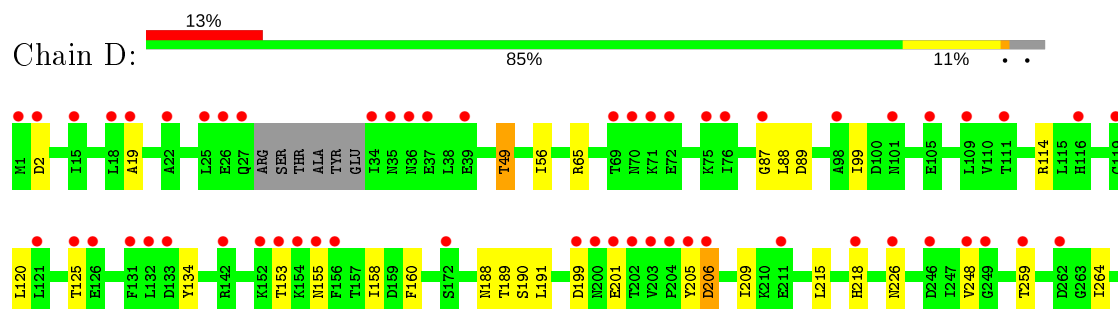
3 Residue-property plots

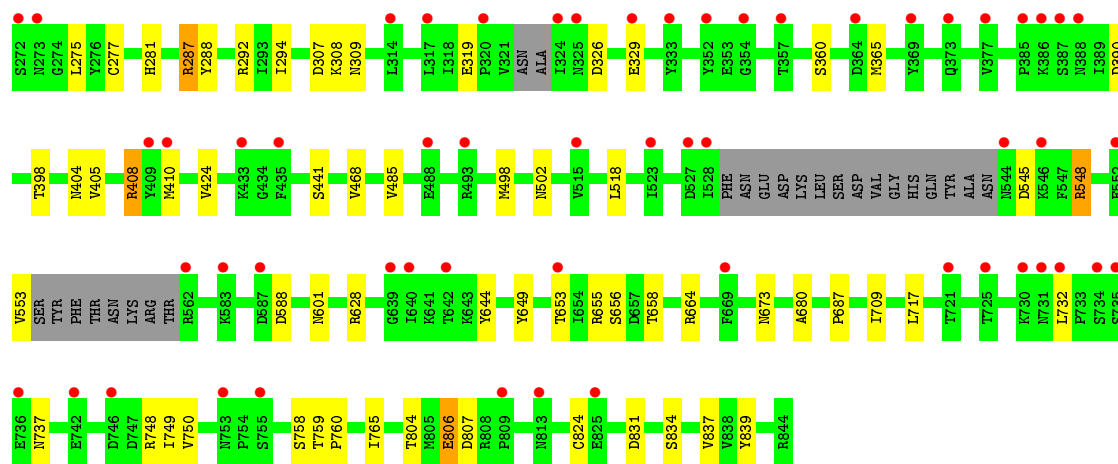
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are 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: MRNA-CAPPING ENZYME CATALYTIC SUBUNIT

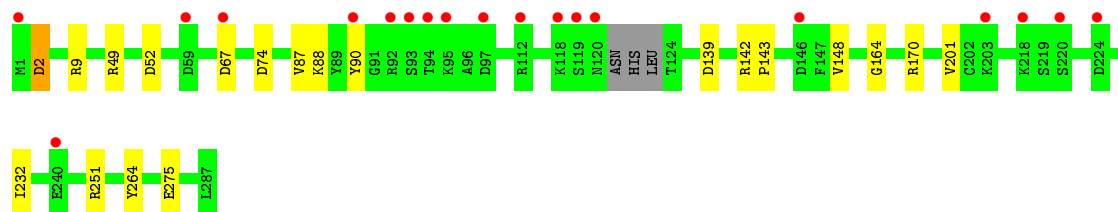
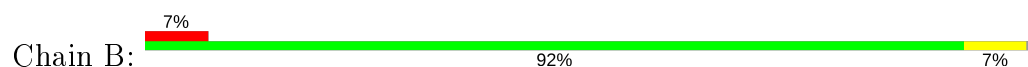


• Molecule 1: MRNA-CAPPING ENZYME CATALYTIC SUBUNIT

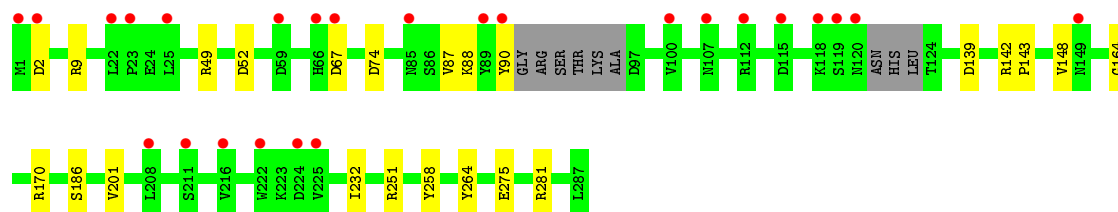
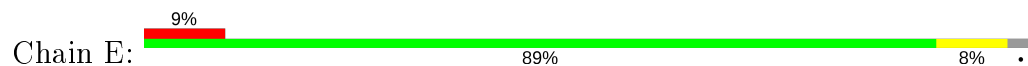




• Molecule 2: MRNA-CAPPING ENZYME REGULATORY SUBUNIT



• Molecule 2: MRNA-CAPPING ENZYME REGULATORY SUBUNIT



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	61.13Å 62.02Å 198.50Å 90.01° 85.53° 71.69°	Depositor
Resolution (Å)	41.81 – 2.90 48.23 – 2.90	Depositor EDS
% Data completeness (in resolution range)	94.8 (41.81-2.90) 94.8 (48.23-2.90)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.69 (at 2.91Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, R_{free}	0.255 , 0.295 0.258 , 0.295	Depositor DCC
R_{free} test set	2929 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	43.1	Xtriage
Anisotropy	0.493	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 60.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	0.035 for k,h,-l	Xtriage
F_o, F_c correlation	0.86	EDS
Total number of atoms	17794	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.70% 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: SAH

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	0.23	0/6612	0.44	0/8936
1	D	0.24	0/6715	0.45	0/9078
2	B	0.23	0/2365	0.41	0/3189
2	E	0.23	0/2322	0.41	0/3131
All	All	0.23	0/18014	0.44	0/24334

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	6485	0	6552	30	0
1	D	6583	0	6669	38	0
2	B	2320	0	2363	6	0
2	E	2278	0	2316	6	0
3	A	26	0	19	1	0
3	D	26	0	19	1	0
4	A	23	0	0	1	0
4	B	11	0	0	0	0
4	D	37	0	0	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	E	5	0	0	0	0
All	All	17794	0	17938	78	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 2.

All (78) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:87:GLY:O	1:A:89:ASP:N	2.30	0.64
1:D:87:GLY:O	1:D:89:ASP:N	2.30	0.64
1:A:485:VAL:HG11	1:A:518:LEU:HA	1.83	0.61
1:D:99:ILE:O	1:D:134:TYR:OH	2.18	0.61
1:A:99:ILE:O	1:A:134:TYR:OH	2.18	0.60
1:D:485:VAL:HG11	1:D:518:LEU:HA	1.81	0.60
1:D:226:ASN:OD1	1:D:287:ARG:NH1	2.38	0.56
1:A:588:ASP:O	1:A:592:ARG:NH2	2.38	0.56
1:D:545:ASP:OD1	1:D:655:ARG:NH1	2.41	0.53
2:B:74:ASP:OD1	2:B:74:ASP:N	2.43	0.52
1:A:545:ASP:OD1	1:A:655:ARG:NH1	2.42	0.52
1:D:548:ARG:NH2	4:D:2020:HOH:O	2.43	0.51
2:E:74:ASP:OD1	2:E:74:ASP:N	2.44	0.51
1:A:226:ASN:OD1	1:A:287:ARG:NH1	2.46	0.49
1:D:498:MET:O	1:D:502:ASN:ND2	2.45	0.49
1:A:19:ALA:HB3	1:A:209:ILE:HD11	1.95	0.49
1:A:685:PHE:N	4:A:2018:HOH:O	2.45	0.49
1:A:201:GLU:N	1:A:201:GLU:OE1	2.46	0.49
1:D:19:ALA:HB3	1:D:209:ILE:HD11	1.94	0.49
1:D:275:LEU:N	1:D:288:TYR:O	2.40	0.49
1:D:709:ILE:HB	1:D:839:TYR:HB2	1.97	0.47
1:D:2:ASP:N	1:D:2:ASP:OD1	2.46	0.47
1:A:709:ILE:HB	1:A:839:TYR:HB2	1.96	0.46
1:A:498:MET:O	1:A:502:ASN:ND2	2.47	0.46
1:A:759:THR:HB	1:A:760:PRO:HD2	1.98	0.45
1:D:206:ASP:OD1	1:D:206:ASP:N	2.49	0.45
1:A:264:ILE:HD11	1:A:281:HIS:HB3	1.98	0.45
2:B:2:ASP:N	2:B:2:ASP:OD1	2.50	0.45
1:A:271:THR:HG22	1:A:273:ASN:H	1.82	0.45
1:A:307:ASP:O	1:A:309:ASN:N	2.50	0.45
1:A:717:LEU:HD13	1:A:749:ILE:CD1	2.46	0.45
1:D:759:THR:HB	1:D:760:PRO:HD2	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:52:ASP:HB3	2:E:264:TYR:CE1	2.51	0.44
1:D:717:LEU:HD13	1:D:749:ILE:CD1	2.48	0.44
1:D:601:ASN:OD1	1:D:628:ARG:NH1	2.49	0.44
1:A:601:ASN:OD1	1:A:628:ARG:NH1	2.51	0.43
2:B:87:VAL:HG12	2:B:88:LYS:N	2.33	0.43
2:E:87:VAL:HG12	2:E:88:LYS:N	2.33	0.43
1:A:2:ASP:OD1	1:A:2:ASP:N	2.47	0.43
1:A:806:GLU:HA	2:B:49:ARG:HH12	1.83	0.43
1:A:806:GLU:OE1	1:A:807:ASP:N	2.52	0.43
1:D:153:THR:O	1:D:155:ASN:N	2.43	0.42
2:E:258:TYR:OH	2:E:281:ARG:NH2	2.52	0.42
1:A:749:ILE:HG22	1:A:750:VAL:N	2.34	0.42
1:D:748:ARG:NH2	4:D:2019:HOH:O	2.52	0.42
1:D:806:GLU:OE1	1:D:807:ASP:N	2.52	0.42
1:D:205:TYR:CZ	1:D:209:ILE:HG13	2.55	0.42
1:A:153:THR:O	1:A:155:ASN:N	2.44	0.41
1:D:56:ILE:HG23	1:D:218:HIS:NE2	2.35	0.41
1:A:206:ASP:OD1	1:A:206:ASP:N	2.53	0.41
1:D:656:SER:HG	1:D:658:THR:HG1	1.58	0.41
1:D:405:VAL:HG13	1:D:424:VAL:HG22	2.02	0.41
1:D:806:GLU:HA	2:E:49:ARG:HH12	1.86	0.41
1:A:732:LEU:HB3	1:A:737:ASN:HB3	2.03	0.41
1:A:749:ILE:HD11	1:A:765:ILE:HG12	2.03	0.41
1:D:114:ARG:HB2	1:D:120:LEU:HD23	2.02	0.41
1:D:264:ILE:HD11	1:D:281:HIS:HB3	2.03	0.41
1:D:655:ARG:NH2	3:D:1845:SAH:N7	2.68	0.41
1:A:580:TYR:O	1:A:592:ARG:NH1	2.54	0.41
1:D:408:ARG:C	1:D:410:MET:H	2.24	0.41
1:A:655:ARG:NH2	3:A:1845:SAH:N7	2.69	0.41
1:D:49:THR:HG21	1:D:191:LEU:HD22	2.03	0.41
1:D:749:ILE:HD11	1:D:765:ILE:HG12	2.02	0.41
2:B:52:ASP:HB3	2:B:264:TYR:CE1	2.56	0.41
1:D:732:LEU:HB3	1:D:737:ASN:HB3	2.02	0.41
1:A:732:LEU:HD23	1:A:733:PRO:HD2	2.03	0.41
2:B:142:ARG:N	2:B:143:PRO:CD	2.84	0.41
1:D:158:ILE:HD11	1:D:215:LEU:HD11	2.01	0.41
1:D:831:ASP:O	1:D:834:SER:OG	2.35	0.40
1:A:405:VAL:HG13	1:A:424:VAL:HG22	2.03	0.40
1:D:158:ILE:CD1	1:D:215:LEU:HD11	2.50	0.40
1:D:307:ASP:O	1:D:309:ASN:N	2.54	0.40
1:D:588:ASP:OD2	4:D:2024:HOH:O	2.22	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:158:ILE:CD1	1:A:215:LEU:HD11	2.52	0.40
1:D:749:ILE:HG22	1:D:750:VAL:N	2.35	0.40
1:D:160:PHE:CZ	1:D:189:THR:HG23	2.56	0.40
1:D:326:ASP:OD2	1:D:329:GLU:N	2.50	0.40
2:E:142:ARG:N	2:E:143:PRO:CD	2.84	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	787/844 (93%)	719 (91%)	62 (8%)	6 (1%)	19	51
1	D	804/844 (95%)	734 (91%)	65 (8%)	5 (1%)	25	58
2	B	280/287 (98%)	257 (92%)	21 (8%)	2 (1%)	22	54
2	E	272/287 (95%)	250 (92%)	20 (7%)	2 (1%)	22	54
All	All	2143/2262 (95%)	1960 (92%)	168 (8%)	15 (1%)	22	54

All (15) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	88	LEU
1	D	88	LEU
2	B	164	GLY
2	E	164	GLY
1	A	308	LYS
1	A	680	ALA
1	D	680	ALA
2	B	148	VAL
1	D	308	LYS
2	E	148	VAL

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Mol	Chain	Res	Type
1	A	248	VAL
1	A	564	PRO
1	A	687	PRO
1	D	248	VAL
1	D	687	PRO

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	737/774 (95%)	708 (96%)	29 (4%)	32	66
1	D	748/774 (97%)	714 (96%)	34 (4%)	27	61
2	B	269/272 (99%)	259 (96%)	10 (4%)	34	68
2	E	265/272 (97%)	254 (96%)	11 (4%)	30	63
All	All	2019/2092 (96%)	1935 (96%)	84 (4%)	30	63

All (84) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	49	THR
1	A	65	ARG
1	A	125	THR
1	A	190	SER
1	A	206	ASP
1	A	259	THR
1	A	277	CYS
1	A	287	ARG
1	A	294	ILE
1	A	319	GLU
1	A	360	SER
1	A	365	MET
1	A	390	ASP
1	A	398	THR
1	A	404	ASN
1	A	468	VAL

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Mol	Chain	Res	Type
1	A	548	ARG
1	A	553	VAL
1	A	619	THR
1	A	644	TYR
1	A	649	TYR
1	A	653	THR
1	A	664	ARG
1	A	673	ASN
1	A	758	SER
1	A	804	THR
1	A	806	GLU
1	A	824	CYS
1	A	837	VAL
2	B	2	ASP
2	B	9	ARG
2	B	67	ASP
2	B	90	TYR
2	B	139	ASP
2	B	170	ARG
2	B	201	VAL
2	B	232	ILE
2	B	251	ARG
2	B	275	GLU
1	D	49	THR
1	D	65	ARG
1	D	125	THR
1	D	188	ASN
1	D	190	SER
1	D	199	ASP
1	D	201	GLU
1	D	206	ASP
1	D	259	THR
1	D	277	CYS
1	D	287	ARG
1	D	292	ARG
1	D	294	ILE
1	D	319	GLU
1	D	360	SER
1	D	365	MET
1	D	390	ASP
1	D	398	THR
1	D	404	ASN

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Mol	Chain	Res	Type
1	D	408	ARG
1	D	441	SER
1	D	468	VAL
1	D	548	ARG
1	D	553	VAL
1	D	644	TYR
1	D	649	TYR
1	D	653	THR
1	D	664	ARG
1	D	673	ASN
1	D	758	SER
1	D	804	THR
1	D	806	GLU
1	D	824	CYS
1	D	837	VAL
2	E	2	ASP
2	E	9	ARG
2	E	67	ASP
2	E	90	TYR
2	E	139	ASP
2	E	170	ARG
2	E	186	SER
2	E	201	VAL
2	E	232	ILE
2	E	251	ARG
2	E	275	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	278	HIS
2	E	278	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 [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
3	SAH	A	1845	-	21,28,28	1.20	2 (9%)	20,40,40	1.64	2 (10%)
3	SAH	D	1845	-	21,28,28	1.19	2 (9%)	20,40,40	1.59	3 (15%)

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	SAH	A	1845	-	-	1/7/31/31	0/3/3/3
3	SAH	D	1845	-	-	0/7/31/31	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1845	SAH	C2-N3	4.00	1.38	1.32
3	D	1845	SAH	C2-N3	3.96	1.38	1.32
3	A	1845	SAH	C2-N1	2.45	1.38	1.33
3	D	1845	SAH	C2-N1	2.37	1.38	1.33

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	1845	SAH	N3-C2-N1	-5.36	120.30	128.68
3	D	1845	SAH	N3-C2-N1	-5.31	120.37	128.68
3	A	1845	SAH	C5'-SD-CG	-3.12	92.90	102.27

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	1845	SAH	C5'-SD-CG	-2.31	95.33	102.27
3	D	1845	SAH	C3'-C2'-C1'	2.12	104.17	100.98

There are no chirality outliers.

All (1) torsion outliers are listed below:

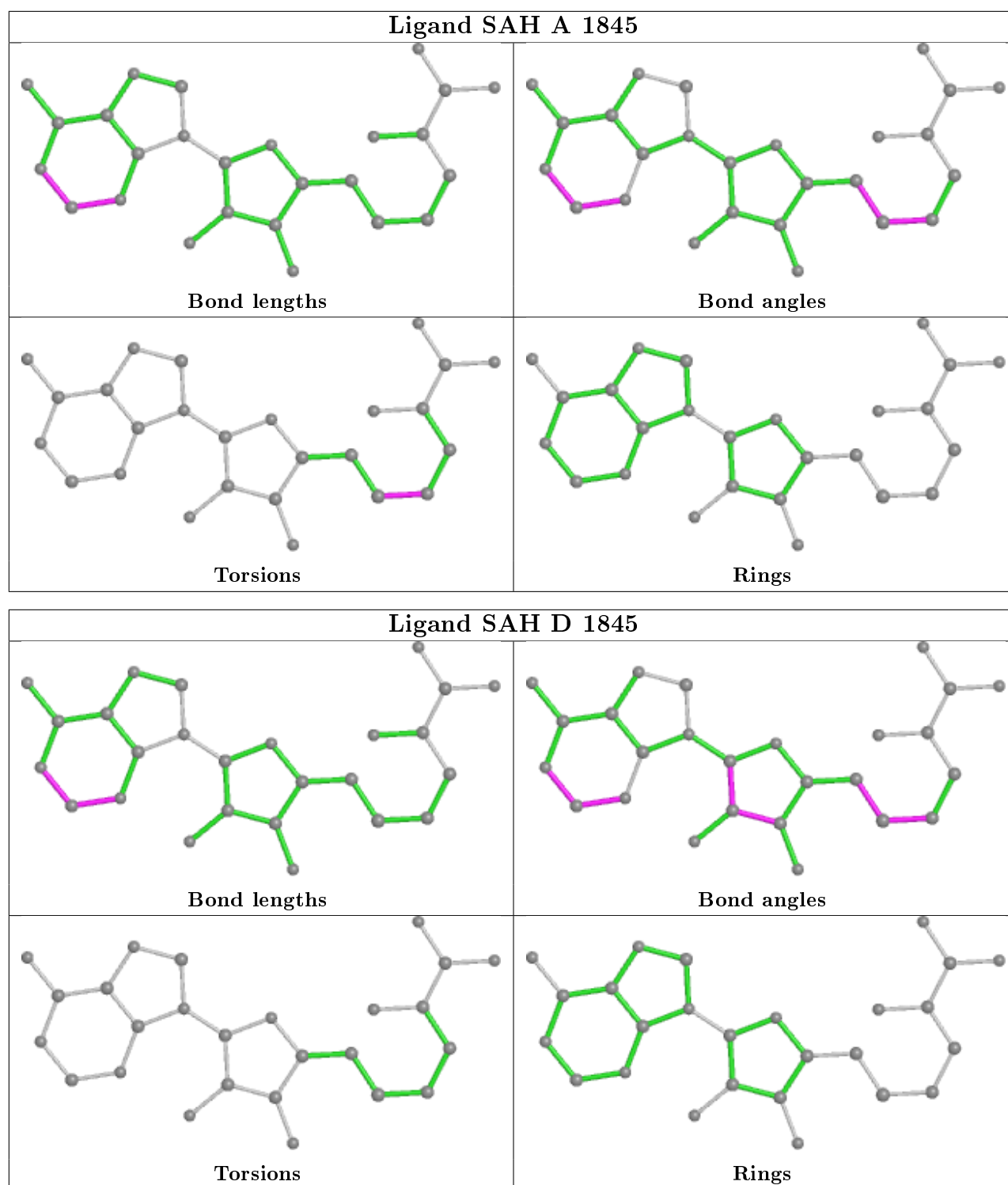
Mol	Chain	Res	Type	Atoms
3	A	1845	SAH	CB-CG-SD-C5'

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1845	SAH	1	0
3	D	1845	SAH	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 ⓘ

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	802/844 (95%)	1.21	168 (20%) 1 0	17, 63, 107, 133	0
1	D	813/844 (96%)	0.94	113 (13%) 2 2	22, 49, 88, 114	0
2	B	284/287 (98%)	0.61	19 (6%) 17 13	15, 39, 78, 130	0
2	E	278/287 (96%)	0.94	25 (8%) 9 7	23, 54, 89, 131	0
All	All	2177/2262 (96%)	0.99	325 (14%) 2 1	15, 54, 97, 133	0

All (325) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	25	LEU	9.1
2	B	93	SER	8.8
1	A	200	ASN	7.0
2	B	94	THR	6.9
2	B	120	ASN	6.8
2	E	120	ASN	6.5
1	A	111	THR	6.4
1	A	2	ASP	6.1
1	A	153	THR	6.1
1	D	200	ASN	6.0
1	A	248	VAL	5.8
1	A	211	GLU	5.6
1	D	153	THR	5.5
1	A	91	LYS	5.4
1	A	330	GLU	5.3
2	E	211	SER	5.3
1	A	730	LYS	5.2
1	A	735	SER	5.1
1	D	71	LYS	5.0
1	A	35	ASN	4.9
1	A	552	GLU	4.8

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Mol	Chain	Res	Type	RSRZ
1	A	203	VAL	4.7
1	A	154	LYS	4.6
1	A	109	LEU	4.5
2	E	112	ARG	4.5
1	A	734	SER	4.5
1	D	735	SER	4.5
1	A	294	ILE	4.4
1	A	341	ILE	4.4
1	A	373	GLN	4.3
1	D	528	ILE	4.3
1	A	338	LEU	4.2
1	D	435	PHE	4.2
2	E	118	LYS	4.2
1	D	133	ASP	4.2
1	A	22	ALA	4.1
1	A	125	THR	4.1
1	D	142	ARG	4.1
1	D	202	THR	4.1
1	A	119	CYS	4.1
1	D	27	GLN	4.0
1	A	204	PRO	4.0
1	A	206	ASP	4.0
1	D	325	ASN	4.0
1	D	373	GLN	4.0
1	A	131	PHE	4.0
1	D	639	GLY	3.9
1	D	154	LYS	3.9
1	A	352	TYR	3.9
1	A	435	PHE	3.8
1	D	22	ALA	3.8
1	A	155	ASN	3.8
2	E	222	TRP	3.8
1	D	527	ASP	3.8
2	E	100	VAL	3.8
1	D	742	GLU	3.8
1	D	109	LEU	3.8
1	A	317	LEU	3.8
1	A	39	GLU	3.8
1	D	249	GLY	3.7
1	D	731	ASN	3.7
1	D	126	GLU	3.7
1	A	325	ASN	3.7

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Mol	Chain	Res	Type	RSRZ
1	A	296	SER	3.7
1	A	92	ASN	3.7
2	E	89	TYR	3.7
1	A	640	ILE	3.7
1	A	36	ASN	3.7
2	E	1	MET	3.7
1	A	72	GLU	3.7
1	A	1	MET	3.7
2	B	95	LYS	3.6
1	A	136	LYS	3.6
1	D	2	ASP	3.6
2	E	115	ASP	3.6
1	A	156	PHE	3.6
1	A	126	GLU	3.6
1	A	319	GLU	3.6
1	D	105	GLU	3.5
1	A	218	HIS	3.5
1	D	35	ASN	3.5
1	D	36	ASN	3.5
1	A	731	ASN	3.5
1	D	734	SER	3.5
1	D	72	GLU	3.5
1	A	106	LYS	3.5
1	D	26	GLU	3.5
2	E	59	ASP	3.5
1	A	273	ASN	3.5
1	A	226	ASN	3.4
1	D	248	VAL	3.4
1	A	199	ASP	3.4
1	A	195	PHE	3.4
1	A	544	ASN	3.4
1	A	13	THR	3.4
1	D	18	LEU	3.4
1	D	732	LEU	3.4
1	D	205	TYR	3.4
1	D	25	LEU	3.3
1	A	227	VAL	3.3
1	A	329	GLU	3.3
1	D	37	GLU	3.3
2	B	118	LYS	3.3
1	A	210	LYS	3.3
1	A	123	LEU	3.2

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Mol	Chain	Res	Type	RSRZ
2	E	90	TYR	3.2
1	A	20	LYS	3.2
1	D	199	ASP	3.2
1	A	202	THR	3.2
1	D	19	ALA	3.2
1	D	354	GLY	3.2
1	D	317	LEU	3.2
1	D	111	THR	3.1
1	A	101	ASN	3.1
1	D	825	GLU	3.1
1	A	113	ASN	3.1
2	E	119	SER	3.1
1	D	552	GLU	3.1
1	D	34	ILE	3.1
2	B	92	ARG	3.1
1	A	334	VAL	3.1
1	A	142	ARG	3.1
1	A	488	GLU	3.1
2	E	67	ASP	3.1
1	A	105	GLU	3.1
2	B	203	LYS	3.1
1	A	344	ARG	3.1
2	E	85	ASN	3.1
1	A	151	ALA	3.1
2	B	59	ASP	3.1
1	D	357	THR	3.1
1	D	172	SER	3.0
1	D	329	GLU	3.0
1	A	357	THR	3.0
2	E	225	VAL	3.0
1	A	732	LEU	3.0
1	A	362	VAL	3.0
1	A	24	GLU	3.0
1	A	8	SER	3.0
1	A	371	PRO	3.0
1	A	433	LYS	3.0
1	D	155	ASN	3.0
1	A	271	THR	3.0
1	A	23	SER	3.0
1	A	205	TYR	2.9
1	D	206	ASP	2.9
1	A	354	GLY	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	349	SER	2.9
1	A	324	ILE	2.9
1	A	112	GLU	2.9
2	E	107	ASN	2.9
1	A	201	GLU	2.8
1	A	295	ASP	2.8
1	D	131	PHE	2.8
1	A	172	SER	2.8
1	A	246	ASP	2.8
1	A	377	VAL	2.8
1	A	669[A]	PHE	2.8
1	A	376	GLY	2.8
2	E	216	VAL	2.8
1	A	17	ALA	2.8
1	A	348	LYS	2.8
1	D	515	VAL	2.8
1	A	336	SER	2.8
1	D	746	ASP	2.8
1	D	721	THR	2.8
1	D	562	ARG	2.7
1	A	639	GLY	2.7
1	A	26	GLU	2.7
1	A	122	ARG	2.7
1	D	753	ASN	2.7
1	D	640	ILE	2.7
1	D	121	LEU	2.7
1	A	642	THR	2.7
1	A	121	LEU	2.7
1	D	364	ASP	2.7
1	D	730	LYS	2.7
1	A	18	LEU	2.7
1	D	725	THR	2.7
1	A	332	LYS	2.7
2	B	220	SER	2.6
1	D	39	GLU	2.6
1	A	314	LEU	2.6
1	A	34	ILE	2.6
1	A	223	SER	2.6
2	B	224	ASP	2.6
1	A	196	THR	2.6
2	E	2	ASP	2.6
1	A	638	SER	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	385	PRO	2.6
1	D	69	THR	2.6
1	D	736	GLU	2.6
1	D	272	SER	2.5
1	D	132	LEU	2.5
1	D	119	CYS	2.5
2	B	119	SER	2.5
1	D	70	ASN	2.5
1	A	228	ILE	2.5
1	A	104	TRP	2.5
1	A	300	VAL	2.5
1	A	262	ASP	2.5
1	A	249	GLY	2.5
1	A	312	VAL	2.5
2	B	112	ARG	2.5
2	B	218	LYS	2.5
1	A	756	THR	2.5
1	D	324	ILE	2.5
1	A	212	LEU	2.5
1	D	386	LYS	2.5
1	D	211	GLU	2.4
1	D	203	VAL	2.4
1	A	383	LYS	2.4
1	D	587	ASP	2.4
2	E	23	PRO	2.4
1	A	454	ASN	2.4
2	B	67	ASP	2.4
1	A	19	ALA	2.4
1	A	120	LEU	2.4
1	D	669[A]	PHE	2.4
1	A	307	ASP	2.4
1	A	152	LYS	2.4
1	A	267	THR	2.4
1	D	369	TYR	2.4
1	A	87	GLY	2.4
1	A	15	ILE	2.4
1	D	116	HIS	2.4
1	A	275	LEU	2.4
1	A	75	LYS	2.4
1	A	315	ILE	2.4
1	D	544	ASN	2.4
2	E	66	HIS	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	826	GLY	2.4
1	A	133	ASP	2.4
1	A	76	ILE	2.4
1	A	345	ILE	2.4
1	D	273	ASN	2.3
1	D	410	MET	2.3
1	D	204	PRO	2.3
1	D	262	ASP	2.3
1	A	318	ILE	2.3
1	A	328	LEU	2.3
1	D	388	ASN	2.3
2	E	149	ASN	2.3
1	A	340	ASP	2.3
1	A	364	ASP	2.3
1	D	15	ILE	2.3
1	A	412	SER	2.3
1	A	524	LYS	2.3
1	D	87	GLY	2.3
1	D	755	SER	2.3
1	D	433	LYS	2.3
1	D	218	HIS	2.3
1	A	70	ASN	2.3
1	D	152	LYS	2.3
1	A	302	GLY	2.3
2	E	22	LEU	2.3
1	A	728	ILE	2.3
1	D	493	ARG	2.2
2	B	1	MET	2.2
2	B	146	ASP	2.2
1	D	1	MET	2.2
1	D	156	PHE	2.2
1	D	809	PRO	2.2
1	A	308	LYS	2.2
1	A	823	LYS	2.2
1	A	331	SER	2.2
1	A	722	ASP	2.2
1	A	381	TYR	2.2
1	D	246	ASP	2.2
1	A	247	ILE	2.2
1	A	16	ASP	2.2
1	A	432	ASP	2.2
1	D	101	ASN	2.2

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Mol	Chain	Res	Type	RSRZ
1	D	546	LYS	2.2
1	A	256	TYR	2.2
1	D	409	TYR	2.2
1	A	494	ILE	2.2
1	D	98	ALA	2.2
1	D	813	ASN	2.2
1	A	339	VAL	2.2
1	D	523	ILE	2.1
1	A	760	PRO	2.1
1	D	385	PRO	2.1
1	D	76	ILE	2.1
1	D	226	ASN	2.1
1	D	387	SER	2.1
1	A	721	THR	2.1
1	D	333	TYR	2.1
1	A	356	PHE	2.1
1	D	314	LEU	2.1
1	D	201	GLU	2.1
1	A	108	SER	2.1
1	A	333	TYR	2.1
1	D	352	TYR	2.1
2	E	224	ASP	2.1
1	A	753	ASN	2.1
2	B	97	ASP	2.1
1	D	75	LYS	2.1
1	A	825	GLU	2.1
1	D	259	THR	2.1
1	D	653	THR	2.1
1	A	526	GLY	2.1
1	A	562	ARG	2.1
1	A	276	TYR	2.1
1	A	254	ASN	2.1
2	E	25	LEU	2.1
1	A	824	CYS	2.1
1	A	3	ALA	2.1
1	A	761	MET	2.1
1	D	320	PRO	2.1
1	D	642	THR	2.0
2	B	90	TYR	2.0
1	A	225	GLU	2.0
2	E	208	LEU	2.0
1	A	124	SER	2.0

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Mol	Chain	Res	Type	RSRZ
1	A	84	LYS	2.0
1	A	257	ALA	2.0
1	A	298	VAL	2.0
1	D	377	VAL	2.0
1	A	523	ILE	2.0
1	D	488	GLU	2.0
2	B	240	GLU	2.0
1	A	198	ARG	2.0
1	D	125	THR	2.0
1	D	583	LYS	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 carbohydrates in this entry.

6.4 Ligands [i](#)

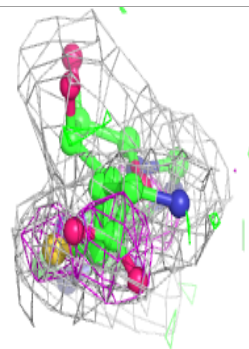
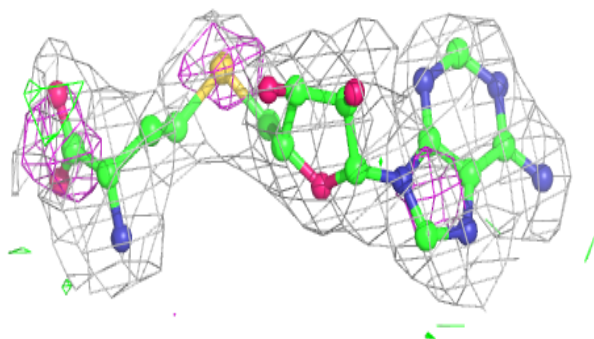
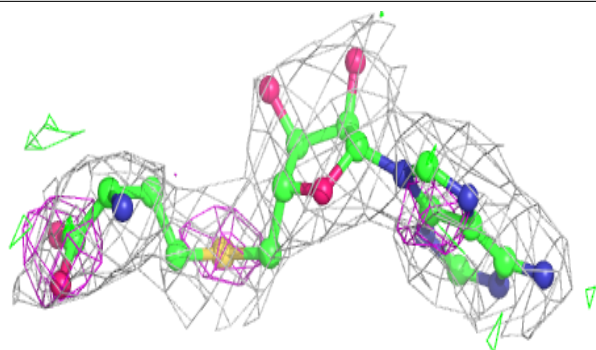
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	SAH	D	1845	26/26	0.88	0.21	22,28,32,33	0
3	SAH	A	1845	26/26	0.92	0.22	23,32,38,39	0

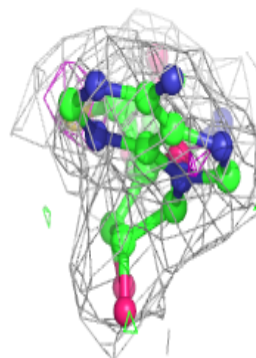
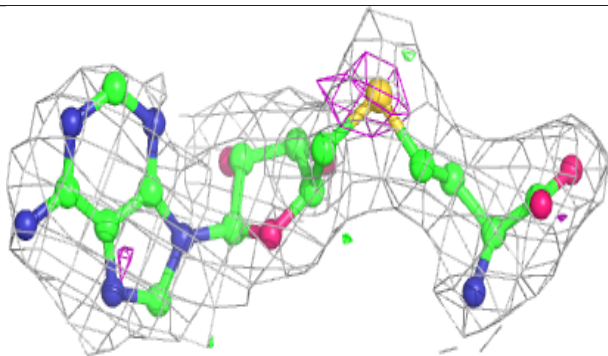
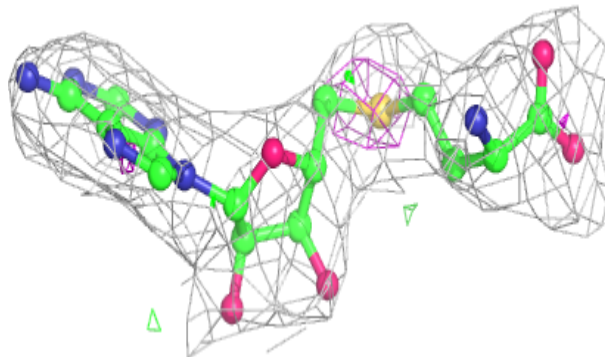
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around SAH D 1845:

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

**Electron density around SAH A 1845:**

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



6.5 Other polymers [i](#)

There are no such residues in this entry.