



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 20, 2023 – 07:12 PM EDT

PDB ID : 2NU6
Title : C123aA Mutant of E. coli Succinyl-CoA Synthetase
Authors : Fraser, M.E.
Deposited on : 2006-11-08
Resolution : 2.55 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.35
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) : 2.35

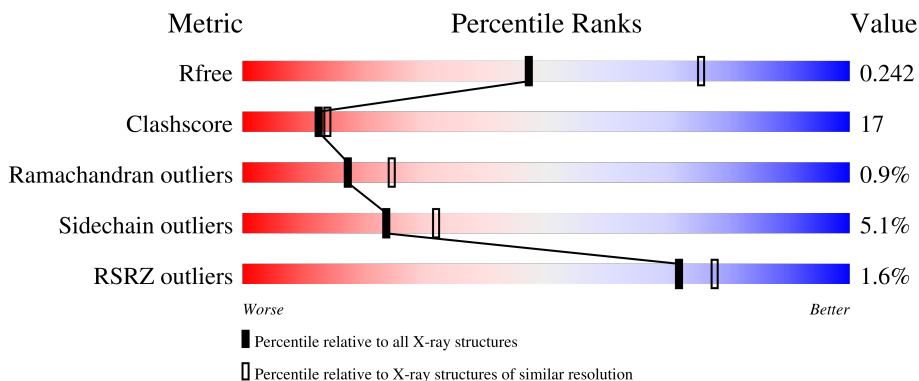
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.55 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	1284 (2.56-2.52)
Clashscore	141614	1332 (2.56-2.52)
Ramachandran outliers	138981	1315 (2.56-2.52)
Sidechain outliers	138945	1315 (2.56-2.52)
RSRZ outliers	127900	1272 (2.56-2.52)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	288	 74% 23% •
1	D	288	 2% 74% 23% •
2	B	388	 % 65% 32% •
2	E	388	 3% 65% 30% ••

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	COA	B	1025	-	X	-	-
4	COA	B	1325	-	X	-	-
4	COA	E	1025	-	X	-	-
4	COA	E	1325	-	X	-	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 10368 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 Succinyl-CoA ligase [ADP-forming] subunit alpha.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	N	O	P	S			
1	A	287	2072	1313	346	402	1	10	0	0	0
1	D	287	2072	1313	346	402	1	10	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	123	ALA	CYS	engineered mutation	UNP P0AGE9
A	246	NEP	HIS	modified residue	UNP P0AGE9
D	123	ALA	CYS	engineered mutation	UNP P0AGE9
D	246	NEP	HIS	modified residue	UNP P0AGE9

- Molecule 2 is a protein called Succinyl-CoA synthetase beta chain.

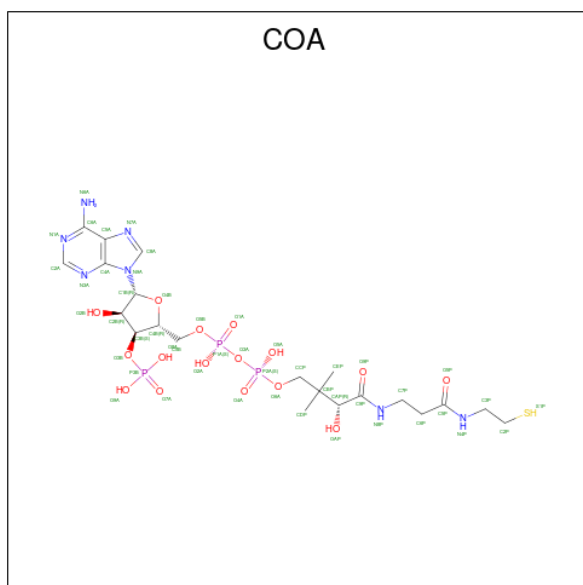
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	388	2908	1836	509	550	13	0	0	0
2	E	385	2885	1823	505	544	13	0	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total O S 5 4 1	0	0
3	B	1	Total O S 5 4 1	0	0
3	E	1	Total O S 5 4 1	0	0
3	E	1	Total O S 5 4 1	0	0

- Molecule 4 is COENZYME A (three-letter code: COA) (formula: $C_{21}H_{36}N_7O_{16}P_3S$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C N O P S 48 21 7 16 3 1	0	0
4	B	1	Total C N O S 18 11 2 4 1	0	0
4	B	1	Total C N O S 18 11 2 4 1	0	0
4	D	1	Total C N O P S 48 21 7 16 3 1	0	0
4	E	1	Total C N O S 18 11 2 4 1	0	0
4	E	1	Total C N O S 18 11 2 4 1	0	0

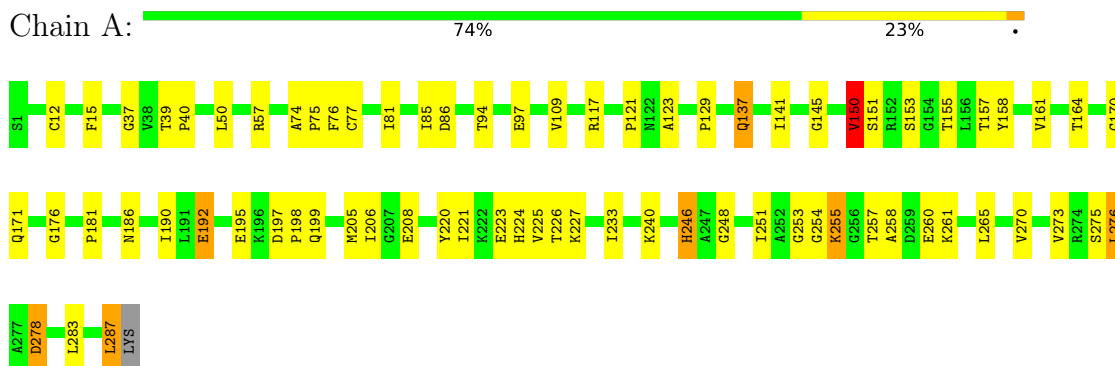
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	67	Total O 67 67	0	0
5	B	70	Total O 70 70	0	0
5	D	49	Total O 49 49	0	0
5	E	57	Total O 57 57	0	0

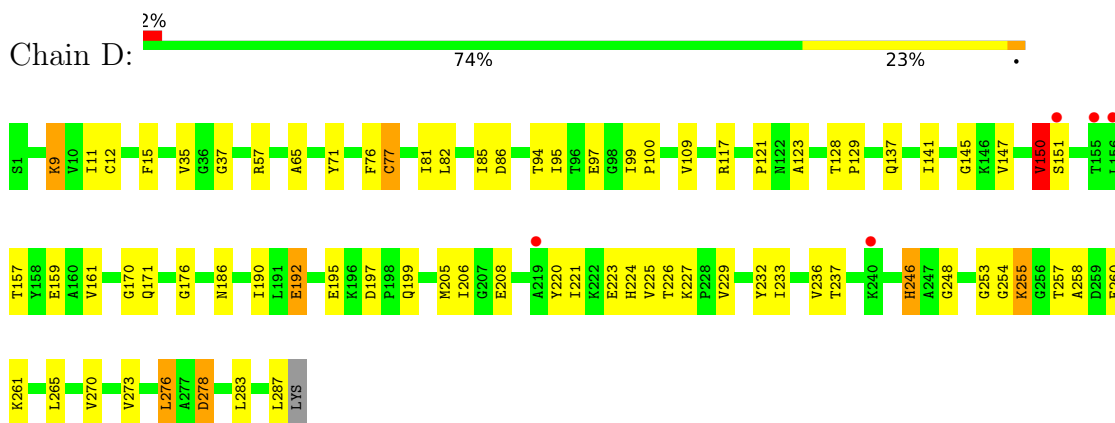
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

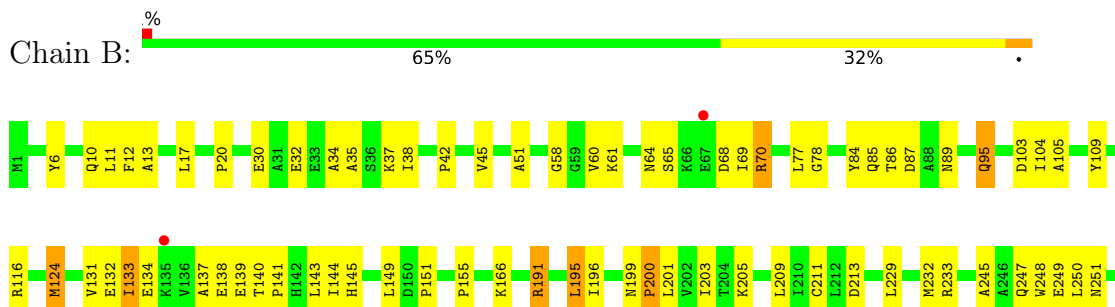
- Molecule 1: Succinyl-CoA ligase [ADP-forming] subunit alpha



- Molecule 1: Succinyl-CoA ligase [ADP-forming] subunit alpha

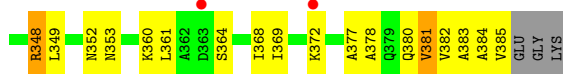
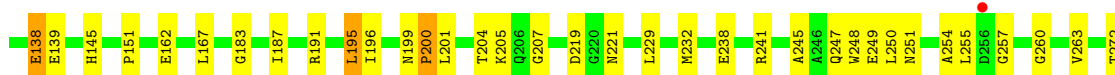
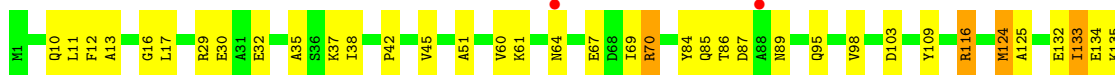


- Molecule 2: Succinyl-CoA synthetase beta chain





• Molecule 2: Succinyl-CoA synthetase beta chain



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 2 2	Depositor
Cell constants a, b, c, α , β , γ	97.22Å 97.22Å 386.56Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	34.37 – 2.55 34.37 – 2.51	Depositor EDS
% Data completeness (in resolution range)	89.1 (34.37-2.55) 87.2 (34.37-2.51)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.30 (at 2.51Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.196 , 0.247 0.190 , 0.242	Depositor DCC
R_{free} test set	6521 reflections (11.50%)	wwPDB-VP
Wilson B-factor (Å ²)	46.7	Xtrriage
Anisotropy	0.084	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 31.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	10368	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.12% 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: NEP, SO4, COA

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	0.83	1/2090 (0.0%)	0.86	2/2830 (0.1%)
1	D	0.81	1/2090 (0.0%)	0.88	3/2830 (0.1%)
2	B	0.83	1/2950 (0.0%)	0.87	1/3989 (0.0%)
2	E	0.80	3/2927 (0.1%)	0.89	5/3961 (0.1%)
All	All	0.82	6/10057 (0.1%)	0.88	11/13610 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	D	0	1

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	77	CYS	CB-SG	-7.46	1.69	1.82
1	A	77	CYS	CB-SG	-7.03	1.70	1.82
2	E	132	GLU	CG-CD	5.63	1.60	1.51
2	E	238	GLU	CG-CD	5.53	1.60	1.51
2	B	124	MET	SD-CE	5.42	2.08	1.77
2	E	67	GLU	CG-CD	5.33	1.59	1.51

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	201	LEU	N-CA-C	-6.61	93.15	111.00
1	D	150	VAL	CB-CA-C	-6.42	99.21	111.40
1	D	77	CYS	CA-CB-SG	-5.75	103.64	114.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	150	VAL	CB-CA-C	-5.68	100.60	111.40
2	B	201	LEU	N-CA-C	-5.57	95.97	111.00
2	E	292	GLY	N-CA-C	-5.54	99.25	113.10
2	E	116	ARG	NE-CZ-NH2	-5.47	117.56	120.30
2	E	116	ARG	CB-CG-CD	-5.37	97.64	111.60
1	A	77	CYS	CA-CB-SG	-5.34	104.38	114.00
1	D	128	THR	N-CA-C	-5.17	97.04	111.00
2	E	286	PHE	N-CA-C	-5.04	97.38	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	232	TYR	Sidechain

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	2072	0	2127	64	0
1	D	2072	0	2127	61	0
2	B	2908	0	2961	127	0
2	E	2885	0	2939	102	0
3	A	5	0	0	0	0
3	B	5	0	0	0	0
3	E	10	0	0	0	0
4	A	48	0	32	2	0
4	B	36	0	40	12	0
4	D	48	0	32	2	0
4	E	36	0	40	14	0
5	A	67	0	0	0	0
5	B	70	0	0	3	0
5	D	49	0	0	1	0
5	E	57	0	0	3	0
All	All	10368	0	10298	344	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 17.

All (344) 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)
4:E:1325:COA:CBP	4:E:1325:COA:CAP	1.83	1.52
4:E:1025:COA:CBP	4:E:1025:COA:CAP	1.85	1.51
4:B:1025:COA:CAP	4:B:1025:COA:CBP	1.86	1.50
2:B:124:MET:SD	2:B:124:MET:CE	2.08	1.42
1:D:246:NEP:NE2	1:D:246:NEP:P	2.22	1.13
1:A:246:NEP:NE2	1:A:246:NEP:P	2.22	1.11
1:D:223:GLU:HG2	1:D:224:HIS:CD2	2.08	0.89
2:B:336:VAL:HG13	2:B:341:VAL:HB	1.58	0.85
2:E:320:GLY:HA2	4:E:1325:COA:H32	1.59	0.84
2:E:330:ASP:OD1	2:E:360:LYS:HD3	1.78	0.82
1:A:57:ARG:NH1	1:A:86:ASP:OD2	2.11	0.82
1:A:254:GLY:C	1:A:255:LYS:HE2	2.00	0.82
1:D:254:GLY:C	1:D:255:LYS:HE2	2.00	0.82
2:B:137:ALA:O	2:B:141:PRO:HG3	1.81	0.80
2:E:32:GLU:OE1	2:E:70:ARG:HD2	1.82	0.79
2:B:84:TYR:CE1	2:B:85:GLN:HG3	2.18	0.79
1:A:223:GLU:HG2	1:A:224:HIS:CD2	2.18	0.79
2:E:229:LEU:HD23	2:E:232:MET:CE	2.13	0.79
2:E:343:VAL:HB	2:E:344:PRO:HD2	1.63	0.79
2:E:84:TYR:CE1	2:E:85:GLN:HG3	2.18	0.77
1:D:57:ARG:NH1	1:D:86:ASP:OD2	2.16	0.77
1:D:223:GLU:HG2	1:D:224:HIS:NE2	2.00	0.76
2:B:291:GLY:HA3	2:B:297:ARG:NH2	2.01	0.76
1:A:257:THR:OG1	1:A:260:GLU:HG3	1.85	0.75
2:B:247:GLN:HG2	5:E:1557:HOH:O	1.85	0.75
1:D:257:THR:OG1	1:D:260:GLU:HG3	1.87	0.75
2:B:248:TRP:CD2	2:B:300:GLU:HG3	2.21	0.75
2:B:229:LEU:HD23	2:B:232:MET:CE	2.18	0.74
1:D:205:MET:CE	1:D:265:LEU:HD21	2.17	0.74
2:B:32:GLU:OE1	2:B:70:ARG:HD2	1.87	0.73
2:B:291:GLY:HA3	2:B:297:ARG:HH22	1.52	0.73
2:B:272:THR:O	2:B:275:ILE:HG22	1.90	0.72
1:A:205:MET:CE	1:A:265:LEU:HD21	2.20	0.72
2:B:124:MET:CE	2:B:124:MET:HB2	2.20	0.71
2:E:248:TRP:CD2	2:E:300:GLU:HG3	2.26	0.71
2:E:272:THR:O	2:E:275:ILE:HG22	1.89	0.71
1:A:223:GLU:HG2	1:A:224:HIS:NE2	2.06	0.71
2:E:295:LYS:HG2	2:E:331:GLY:HA2	1.72	0.70

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:306:LEU:CD1	2:E:341:VAL:HG22	2.21	0.69
1:A:205:MET:HE1	1:A:265:LEU:HD21	1.73	0.68
2:E:312:LYS:HA	2:E:343:VAL:HG11	1.75	0.68
2:B:295:LYS:HG2	2:B:331:GLY:HA2	1.74	0.68
2:B:248:TRP:CE2	2:B:300:GLU:HG3	2.28	0.68
1:D:248:GLY:O	2:E:116:ARG:NH2	2.27	0.68
2:B:289:VAL:O	2:B:291:GLY:N	2.26	0.67
1:D:205:MET:HE1	1:D:265:LEU:HD21	1.77	0.65
2:E:87:ASP:OD1	2:E:89:ASN:N	2.30	0.65
1:A:15:PHE:CD2	1:A:37:GLY:HA3	2.32	0.64
1:D:283:LEU:O	1:D:287:LEU:HB2	1.96	0.64
1:A:283:LEU:O	1:A:287:LEU:HB2	1.97	0.64
2:E:248:TRP:CE2	2:E:300:GLU:HG3	2.33	0.64
2:B:369:ILE:HD13	2:B:369:ILE:N	2.12	0.64
2:E:292:GLY:O	2:E:294:THR:HG23	1.98	0.63
1:A:76:PHE:HZ	2:E:37:LYS:HG2	1.63	0.63
2:B:320:GLY:HA2	4:B:1325:COA:H32	1.82	0.62
1:A:195:GLU:OE2	1:A:226:THR:HG23	1.99	0.62
2:B:124:MET:CE	2:B:124:MET:CB	2.78	0.61
1:D:237:THR:HG23	2:E:274:ASP:OD1	2.00	0.61
4:E:1025:COA:CBP	4:E:1025:COA:H10	2.18	0.61
2:B:87:ASP:OD1	2:B:89:ASN:N	2.33	0.61
2:B:291:GLY:CA	2:B:297:ARG:HH22	2.14	0.61
2:B:140:THR:CB	2:B:143:LEU:HD12	2.31	0.61
2:E:35:ALA:HB2	2:E:69:ILE:HD12	1.82	0.61
2:E:292:GLY:O	2:E:294:THR:N	2.30	0.61
1:A:123:ALA:C	4:A:1300:COA:H22	2.22	0.60
2:E:124:MET:HA	2:E:145:HIS:O	2.00	0.60
2:B:140:THR:HB	2:B:143:LEU:HD12	1.82	0.60
2:B:35:ALA:HB2	2:B:69:ILE:HD12	1.84	0.60
1:D:205:MET:HE2	1:D:265:LEU:HD21	1.84	0.60
4:B:1025:COA:CBP	4:B:1025:COA:H10	2.19	0.59
1:D:192:GLU:HB2	1:D:220:TYR:OH	2.02	0.59
2:E:369:ILE:N	2:E:369:ILE:HD13	2.17	0.59
2:B:291:GLY:CA	2:B:297:ARG:NH2	2.66	0.58
1:D:15:PHE:CD2	1:D:37:GLY:HA3	2.38	0.58
1:A:150:VAL:HG13	1:A:190:ILE:HG21	1.84	0.58
1:D:150:VAL:HG13	1:D:190:ILE:HG21	1.85	0.58
1:A:254:GLY:O	1:A:255:LYS:HE2	2.02	0.58
1:D:273:VAL:HG21	1:D:278:ASP:HB2	1.84	0.58
2:B:318:ILE:HG21	2:B:328:ILE:HD13	1.86	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:123:ALA:C	4:D:1301:COA:H22	2.25	0.57
1:D:145:GLY:HA3	1:D:170:GLY:HA3	1.87	0.57
1:D:195:GLU:OE2	1:D:226:THR:HG23	2.04	0.56
1:A:248:GLY:O	2:B:116:ARG:NH2	2.37	0.56
1:A:253:GLY:O	1:A:255:LYS:HD2	2.05	0.56
2:E:318:ILE:HG21	2:E:328:ILE:HD13	1.87	0.56
2:B:277:LYS:NZ	2:B:282:GLU:OE2	2.39	0.56
1:A:273:VAL:HG21	1:A:278:ASP:HB2	1.87	0.56
1:D:254:GLY:O	1:D:255:LYS:HE2	2.05	0.56
2:B:58:GLY:HA2	5:B:1427:HOH:O	2.06	0.55
4:B:1025:COA:CAP	4:B:1025:COA:CDP	2.83	0.55
2:E:277:LYS:NZ	2:E:282:GLU:OE2	2.39	0.55
2:E:369:ILE:HG21	2:E:380:GLN:OE1	2.07	0.55
1:A:145:GLY:HA3	1:A:170:GLY:HA3	1.89	0.54
1:D:109:VAL:HG21	2:E:151:PRO:HG2	1.87	0.54
4:E:1325:COA:CBP	4:E:1325:COA:OAP	2.55	0.54
2:B:84:TYR:CD1	2:B:85:GLN:HG3	2.43	0.54
2:B:139:GLU:C	2:B:141:PRO:HD3	2.27	0.54
2:B:328:ILE:O	2:B:332:ILE:HG13	2.08	0.54
1:D:221:ILE:HA	1:D:225:VAL:HG23	1.89	0.54
2:E:45:VAL:HG23	2:E:45:VAL:O	2.07	0.54
2:E:37:LYS:HZ1	4:E:1025:COA:H121	1.73	0.54
2:B:332:ILE:O	2:B:336:VAL:HG23	2.08	0.54
2:E:308:ASP:OD1	2:E:310:LYS:HG2	2.09	0.53
2:B:254:ALA:C	2:B:255:LEU:HD12	2.29	0.53
1:A:255:LYS:HE2	1:A:255:LYS:N	2.24	0.53
1:D:255:LYS:HE2	1:D:255:LYS:N	2.23	0.53
2:B:37:LYS:HZ1	4:B:1025:COA:H121	1.74	0.53
2:E:84:TYR:CD1	2:E:85:GLN:HG3	2.44	0.53
2:E:332:ILE:O	2:E:336:VAL:HG23	2.08	0.53
1:A:74:ALA:HB3	1:A:75:PRO:HD3	1.91	0.53
2:E:361:LEU:O	2:E:364:SER:HB3	2.08	0.53
2:B:30:GLU:HB3	4:B:1025:COA:H21	1.90	0.53
1:D:253:GLY:HA2	2:E:134:GLU:OE1	2.10	0.52
2:E:260:GLY:HA2	2:E:285:ASN:OD1	2.09	0.52
2:E:352:ASN:O	2:E:353:ASN:HB2	2.09	0.52
2:E:103:ASP:HB3	2:E:205:LYS:HG3	1.91	0.52
1:D:208:GLU:O	1:D:261:LYS:HE3	2.10	0.52
2:E:30:GLU:HB3	4:E:1025:COA:H21	1.90	0.52
2:E:32:GLU:CD	2:E:70:ARG:HH11	2.13	0.52
1:A:205:MET:HE2	1:A:265:LEU:HD21	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:138:GLU:OE1	2:E:138:GLU:HA	2.09	0.52
4:E:1325:COA:CAP	4:E:1325:COA:CCP	2.80	0.52
1:A:208:GLU:O	1:A:261:LYS:HE3	2.10	0.51
2:B:78:GLY:HA2	2:E:247:GLN:HE22	1.75	0.51
1:D:205:MET:HE2	1:D:265:LEU:CD2	2.40	0.51
1:A:197:ASP:O	1:A:227:LYS:NZ	2.44	0.51
2:B:103:ASP:HB3	2:B:205:LYS:HG3	1.92	0.51
2:E:320:GLY:CA	4:E:1325:COA:H32	2.35	0.51
4:E:1025:COA:CAP	4:E:1025:COA:CDP	2.84	0.51
2:B:336:VAL:HA	2:B:341:VAL:HG23	1.93	0.51
1:A:195:GLU:OE1	1:A:227:LYS:HG3	2.11	0.50
2:E:330:ASP:OD1	2:E:360:LYS:CD	2.54	0.50
2:E:378:ALA:O	2:E:382:VAL:HG23	2.10	0.50
1:A:240:LYS:HG2	1:A:251:ILE:HG21	1.93	0.50
2:B:37:LYS:CE	4:B:1025:COA:HN8	2.24	0.50
2:B:260:GLY:HA2	2:B:285:ASN:OD1	2.11	0.50
2:B:315:LEU:HD22	2:B:381:VAL:HG21	1.93	0.50
1:D:12:CYS:O	1:D:15:PHE:HB2	2.12	0.50
1:D:253:GLY:O	1:D:255:LYS:HD2	2.12	0.50
2:E:328:ILE:O	2:E:332:ILE:HG13	2.12	0.50
1:D:197:ASP:O	1:D:227:LYS:NZ	2.45	0.50
2:B:333:ILE:HG23	2:B:366:LEU:HD11	1.92	0.50
2:E:10:GLN:O	2:E:13:ALA:HB3	2.12	0.49
2:E:306:LEU:HD13	2:E:341:VAL:HG22	1.94	0.49
2:E:245:ALA:HB1	2:E:250:LEU:HB2	1.94	0.49
2:E:377:ALA:O	2:E:381:VAL:HG23	2.11	0.49
2:B:133:ILE:HD11	2:B:144:ILE:HD13	1.93	0.49
2:B:369:ILE:HG21	2:B:380:GLN:OE1	2.11	0.49
2:B:292:GLY:HA3	2:B:322:ILE:HD11	1.93	0.49
1:A:109:VAL:HG21	2:B:151:PRO:HG2	1.95	0.49
1:A:12:CYS:O	1:A:15:PHE:HB2	2.11	0.49
1:D:94:THR:O	1:D:121:PRO:HA	2.12	0.49
1:D:129:PRO:HG2	1:D:171:GLN:HB2	1.94	0.49
2:E:309:ASP:HB2	2:E:310:LYS:NZ	2.28	0.48
1:A:155:THR:HB	2:B:268:LEU:HB2	1.94	0.48
2:E:335:ALA:O	2:E:339:VAL:HB	2.14	0.48
2:B:104:ILE:O	2:B:205:LYS:HE3	2.14	0.48
1:D:246:NEP:P	1:D:246:NEP:CE1	2.98	0.48
1:D:273:VAL:CG2	1:D:278:ASP:HB2	2.43	0.48
2:B:254:ALA:O	2:B:255:LEU:HD12	2.14	0.48
2:B:341:VAL:HG12	2:B:343:VAL:H	1.79	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:97:GLU:HB3	4:A:1300:COA:H71	1.95	0.48
2:B:140:THR:N	2:B:141:PRO:HD3	2.29	0.48
2:B:315:LEU:HB2	2:B:381:VAL:HG21	1.94	0.48
2:E:248:TRP:O	2:E:249:GLU:HB2	2.13	0.48
1:D:205:MET:CE	1:D:265:LEU:HD11	2.44	0.48
2:B:306:LEU:C	2:B:308:ASP:H	2.17	0.48
2:B:322:ILE:HG13	2:B:323:VAL:HG23	1.95	0.47
1:D:195:GLU:OE1	1:D:227:LYS:HG3	2.14	0.47
2:B:199:ASN:HA	2:B:200:PRO:HA	1.66	0.47
2:B:37:LYS:NZ	4:B:1025:COA:CCP	2.77	0.47
2:E:299:THR:HA	2:E:335:ALA:HB1	1.97	0.47
1:A:192:GLU:HB2	1:A:220:TYR:OH	2.14	0.47
2:E:306:LEU:C	2:E:308:ASP:H	2.16	0.47
2:B:124:MET:HB2	2:B:124:MET:HE2	1.94	0.47
2:B:233:ARG:NH1	5:B:1416:HOH:O	2.47	0.47
2:B:195:LEU:HG	2:B:196:ILE:N	2.30	0.47
1:A:275:SER:HB2	2:B:278:LEU:CD2	2.44	0.47
2:B:291:GLY:C	2:B:297:ARG:NH2	2.68	0.47
2:B:336:VAL:HA	2:B:341:VAL:CG2	2.44	0.47
1:A:199:GLN:O	1:A:199:GLN:HG2	2.13	0.47
2:B:32:GLU:CD	2:B:70:ARG:HH11	2.18	0.47
2:B:37:LYS:HG2	1:D:76:PHE:HZ	1.79	0.47
2:B:213:ASP:HB3	5:B:1408:HOH:O	2.15	0.47
1:D:151:SER:HB3	1:D:157:THR:OG1	2.14	0.47
2:E:251:ASN:O	2:E:287:LEU:HA	2.15	0.47
1:D:276:LEU:HD23	1:D:276:LEU:H	1.80	0.46
1:D:229:VAL:O	1:D:270:VAL:HG13	2.15	0.46
2:E:12:PHE:HB3	2:E:17:LEU:HB2	1.96	0.46
2:E:162:GLU:HG3	5:E:1529:HOH:O	2.14	0.46
1:A:129:PRO:HG2	1:A:171:GLN:HB2	1.96	0.46
2:E:103:ASP:HB3	2:E:205:LYS:CG	2.46	0.46
2:B:297:ARG:NH1	2:B:297:ARG:HG3	2.30	0.46
1:D:233:ILE:HG21	1:D:258:ALA:HA	1.97	0.46
2:E:229:LEU:HD23	2:E:232:MET:HE2	1.95	0.46
2:B:335:ALA:O	2:B:339:VAL:HB	2.16	0.46
1:A:153:SER:OG	2:B:267:GLY:HA3	2.17	0.46
1:A:205:MET:HE2	1:A:265:LEU:CD2	2.45	0.46
2:B:348:ARG:C	2:B:348:ARG:HD2	2.37	0.46
2:B:45:VAL:HG23	2:B:45:VAL:O	2.16	0.45
2:E:348:ARG:HD2	2:E:348:ARG:C	2.36	0.45
1:A:195:GLU:O	1:A:227:LYS:HE3	2.15	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:251:ASN:O	2:B:287:LEU:HA	2.16	0.45
2:E:37:LYS:CE	4:E:1025:COA:HN8	2.30	0.45
2:B:34:ALA:O	2:B:38:ILE:HG13	2.17	0.45
2:E:38:ILE:CD1	2:E:98:VAL:HG12	2.46	0.45
1:A:123:ALA:HB1	1:A:176:GLY:O	2.16	0.45
1:A:276:LEU:H	1:A:276:LEU:HD23	1.81	0.45
2:E:254:ALA:C	2:E:255:LEU:HD12	2.36	0.45
2:E:315:LEU:HD22	2:E:381:VAL:HG21	1.99	0.45
2:B:149:LEU:HD22	2:B:155:PRO:HB3	1.99	0.45
2:B:124:MET:HG3	2:B:144:ILE:HG23	1.99	0.45
2:B:245:ALA:HB1	2:B:250:LEU:HB2	1.98	0.45
2:B:299:THR:HG23	2:B:339:VAL:HG23	1.98	0.45
2:E:42:PRO:HB3	2:E:64:ASN:HB3	1.97	0.45
2:E:37:LYS:NZ	4:E:1025:COA:H121	2.31	0.45
1:A:246:NEP:P	1:A:246:NEP:CE1	3.01	0.45
1:D:287:LEU:HD12	1:D:287:LEU:HA	1.76	0.45
2:B:105:ALA:HB3	2:B:203:ILE:O	2.17	0.45
2:B:131:VAL:HG12	2:B:132:GLU:N	2.32	0.44
2:B:318:ILE:HG21	2:B:328:ILE:CD1	2.47	0.44
2:E:29:ARG:O	2:E:32:GLU:HG2	2.15	0.44
2:E:109:TYR:CD1	2:E:109:TYR:C	2.90	0.44
1:D:97:GLU:HB3	4:D:1301:COA:H71	1.99	0.44
2:E:339:VAL:HG12	2:E:339:VAL:O	2.16	0.44
1:A:137:GLN:H	1:A:137:GLN:CD	2.20	0.44
2:E:322:ILE:HG13	2:E:323:VAL:HG23	1.99	0.44
1:D:199:GLN:O	1:D:199:GLN:HG2	2.17	0.44
2:E:299:THR:HG23	2:E:339:VAL:HG23	1.99	0.44
1:A:233:ILE:HG21	1:A:258:ALA:HA	2.00	0.44
2:B:291:GLY:C	2:B:297:ARG:HH22	2.21	0.44
1:D:11:ILE:HG23	1:D:65:ALA:CB	2.47	0.44
1:D:81:ILE:O	1:D:85:ILE:HG13	2.17	0.44
2:E:241:ARG:HD3	2:E:307:SER:OG	2.17	0.44
2:E:263:VAL:HG13	2:E:317:ASN:O	2.18	0.44
1:A:205:MET:CE	1:A:265:LEU:HD11	2.48	0.44
2:B:37:LYS:NZ	4:B:1025:COA:H121	2.32	0.44
2:B:103:ASP:HB3	2:B:205:LYS:CG	2.48	0.44
2:B:140:THR:OG1	2:B:143:LEU:HD12	2.17	0.44
4:E:1025:COA:CBP	4:E:1025:COA:OAP	2.60	0.44
1:D:208:GLU:OE2	1:D:246:NEP:ND1	2.51	0.44
2:E:60:VAL:O	2:E:61:LYS:HG2	2.17	0.44
2:E:229:LEU:HA	2:E:232:MET:HE2	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:297:ARG:HD3	5:E:1531:HOH:O	2.17	0.44
1:A:273:VAL:CG2	1:A:278:ASP:HB2	2.48	0.44
1:A:141:ILE:HG13	1:A:161:VAL:HG11	2.00	0.44
1:A:246:NEP:CD2	2:B:266:ALA:HB3	2.48	0.44
2:B:12:PHE:HB3	2:B:17:LEU:HB2	2.00	0.44
2:B:308:ASP:OD1	2:B:310:LYS:HG2	2.18	0.44
2:B:352:ASN:O	2:B:353:ASN:HB2	2.18	0.44
2:B:377:ALA:O	2:B:381:VAL:HG23	2.17	0.44
2:E:17:LEU:N	2:E:17:LEU:HD23	2.28	0.44
2:E:135:LYS:HE3	2:E:139:GLU:OE2	2.18	0.44
2:E:345:VAL:O	2:E:368:ILE:HA	2.18	0.44
1:D:159:GLU:CD	2:E:319:PHE:CD2	2.91	0.43
2:E:383:ALA:C	2:E:385:VAL:H	2.22	0.43
2:B:37:LYS:HE3	4:B:1025:COA:HN8	1.83	0.43
2:E:109:TYR:CE2	2:E:133:ILE:HB	2.53	0.43
2:E:339:VAL:O	2:E:339:VAL:CG1	2.66	0.43
2:B:191:ARG:HA	2:B:191:ARG:HD2	1.90	0.43
2:E:87:ASP:OD1	2:E:89:ASN:CB	2.66	0.43
1:A:253:GLY:HA2	2:B:134:GLU:OE2	2.19	0.43
2:E:199:ASN:HA	2:E:200:PRO:HA	1.70	0.43
2:B:291:GLY:O	2:B:292:GLY:C	2.56	0.43
2:E:195:LEU:HG	2:E:196:ILE:N	2.34	0.43
2:B:51:ALA:CB	2:B:86:THR:HG22	2.49	0.43
1:D:236:VAL:HA	1:D:258:ALA:HB3	2.01	0.43
2:B:299:THR:HA	2:B:335:ALA:HB1	2.00	0.43
2:B:356:LEU:O	2:B:360:LYS:HG3	2.18	0.43
2:E:37:LYS:NZ	4:E:1025:COA:CCP	2.82	0.43
1:A:155:THR:CB	2:B:268:LEU:HB2	2.49	0.43
1:D:141:ILE:HG13	1:D:161:VAL:HG11	2.00	0.43
1:D:221:ILE:HA	1:D:225:VAL:CG2	2.49	0.43
2:E:16:GLY:C	2:E:17:LEU:HD23	2.40	0.42
1:D:151:SER:HA	1:D:206:ILE:O	2.19	0.42
1:A:151:SER:HA	1:A:206:ILE:O	2.19	0.42
2:B:145:HIS:CD2	2:B:166:LYS:HB3	2.54	0.42
2:E:51:ALA:CB	2:E:86:THR:HG22	2.49	0.42
1:A:158:TYR:CD1	1:A:158:TYR:N	2.85	0.42
1:A:197:ASP:HA	1:A:198:PRO:HD2	1.76	0.42
1:A:157:THR:O	1:A:161:VAL:HG23	2.19	0.42
2:B:6:TYR:O	2:B:10:GLN:HG3	2.19	0.42
2:B:42:PRO:HB3	2:B:64:ASN:HB3	2.01	0.42
1:D:9:LYS:HG2	1:D:35:VAL:HG11	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:99:ILE:HD12	1:D:121:PRO:CB	2.50	0.42
1:A:205:MET:CE	1:A:265:LEU:CD2	2.95	0.42
2:B:10:GLN:O	2:B:13:ALA:HB3	2.20	0.42
2:B:37:LYS:HZ3	4:B:1025:COA:H122	1.84	0.42
2:B:65:SER:O	2:B:68:ASP:HB2	2.19	0.42
2:B:109:TYR:CD1	2:B:109:TYR:C	2.93	0.42
2:B:109:TYR:CE2	2:B:133:ILE:HB	2.54	0.42
2:E:191:ARG:HB3	2:E:229:LEU:HD11	2.02	0.42
2:E:254:ALA:O	2:E:255:LEU:HD12	2.20	0.42
2:E:306:LEU:HD11	2:E:341:VAL:HG22	2.01	0.42
2:E:382:VAL:O	2:E:385:VAL:HG23	2.19	0.42
1:D:123:ALA:HB1	1:D:176:GLY:O	2.18	0.42
2:E:306:LEU:C	2:E:308:ASP:N	2.73	0.42
2:E:383:ALA:O	2:E:385:VAL:N	2.53	0.42
1:A:39:THR:O	1:A:40:PRO:C	2.58	0.42
1:A:221:ILE:HA	1:A:225:VAL:HG23	2.01	0.42
2:B:263:VAL:HG13	2:B:317:ASN:O	2.18	0.42
1:D:12:CYS:SG	1:D:15:PHE:HA	2.59	0.42
2:E:219:ASP:OD1	2:E:221:ASN:N	2.52	0.42
2:B:37:LYS:NZ	4:B:1025:COA:H122	2.35	0.42
1:A:164:THR:HG22	1:A:283:LEU:CD1	2.49	0.41
2:E:84:TYR:CD1	2:E:84:TYR:C	2.92	0.41
2:B:77:LEU:HD23	2:B:77:LEU:HA	1.86	0.41
2:B:209:LEU:HD23	2:B:209:LEU:HA	1.88	0.41
2:B:292:GLY:HA2	2:B:322:ILE:HG12	2.02	0.41
1:A:155:THR:HB	2:B:268:LEU:HD22	2.02	0.41
1:A:50:LEU:HD23	1:A:50:LEU:HA	1.74	0.41
2:B:95:GLN:HE21	2:B:95:GLN:HB2	1.60	0.41
2:B:309:ASP:HB2	2:B:310:LYS:NZ	2.35	0.41
1:D:205:MET:HE3	1:D:265:LEU:HD11	2.01	0.41
2:E:191:ARG:HA	2:E:191:ARG:HD2	1.88	0.41
1:A:246:NEP:O3P	2:B:265:GLY:HA2	2.21	0.41
2:B:124:MET:HG3	2:B:144:ILE:CG2	2.51	0.41
2:B:306:LEU:C	2:B:308:ASP:N	2.72	0.41
2:B:292:GLY:HA3	2:B:322:ILE:CD1	2.51	0.41
1:A:81:ILE:O	1:A:85:ILE:HG13	2.21	0.41
2:B:32:GLU:OE2	2:B:70:ARG:NH1	2.54	0.41
1:D:236:VAL:HG21	5:D:1335:HOH:O	2.21	0.41
2:E:287:LEU:CD1	2:E:287:LEU:C	2.88	0.41
1:A:265:LEU:HD22	1:A:270:VAL:HG21	2.03	0.41
2:B:20:PRO:HD3	2:B:211:CYS:O	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:51:ALA:HB2	2:B:86:THR:HG22	2.02	0.41
1:D:265:LEU:HD23	1:D:265:LEU:HA	1.91	0.41
2:B:87:ASP:OD1	2:B:87:ASP:C	2.58	0.41
2:B:140:THR:HB	2:B:143:LEU:CD1	2.47	0.41
1:D:147:VAL:O	1:D:171:GLN:HA	2.21	0.41
2:E:183:GLY:O	2:E:187:ILE:HG13	2.20	0.41
2:E:204:THR:O	2:E:207:GLY:N	2.47	0.40
2:B:248:TRP:O	2:B:249:GLU:HB2	2.21	0.40
2:E:325:CYS:HB3	2:E:349:LEU:HD13	2.03	0.40
1:A:94:THR:O	1:A:121:PRO:HA	2.21	0.40
1:A:181:PRO:O	2:B:116:ARG:HD3	2.22	0.40
2:B:60:VAL:O	2:B:61:LYS:HG2	2.22	0.40
2:E:125:ALA:HB1	2:E:167:LEU:HD11	2.02	0.40
1:A:181:PRO:CA	2:B:116:ARG:HD3	2.51	0.40
1:D:82:LEU:HD23	1:D:82:LEU:HA	1.92	0.40
2:E:315:LEU:HB2	2:E:381:VAL:HG21	2.04	0.40
2:B:333:ILE:HG23	2:B:366:LEU:CD1	2.51	0.40
2:B:357:GLY:O	2:B:361:LEU:HG	2.21	0.40
1:D:71:TYR:CE1	1:D:95:ILE:HG13	2.56	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	284/288 (99%)	274 (96%)	10 (4%)	0	100	100
1	D	284/288 (99%)	274 (96%)	10 (4%)	0	100	100
2	B	386/388 (100%)	363 (94%)	17 (4%)	6 (2%)	9	12
2	E	383/388 (99%)	364 (95%)	13 (3%)	6 (2%)	9	12
All	All	1337/1352 (99%)	1275 (95%)	50 (4%)	12 (1%)	17	24

All (12) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	290	GLY
2	E	293	ALA
2	B	257	GLY
2	B	293	ALA
2	E	257	GLY
2	E	384	ALA
2	B	294	THR
2	B	338	GLU
2	E	292	GLY
2	E	294	THR
2	E	338	GLU
2	B	292	GLY

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	215/216 (100%)	206 (96%)	9 (4%)	30	40
1	D	215/216 (100%)	204 (95%)	11 (5%)	24	32
2	B	298/298 (100%)	282 (95%)	16 (5%)	22	29
2	E	296/298 (99%)	280 (95%)	16 (5%)	22	29
All	All	1024/1028 (100%)	972 (95%)	52 (5%)	24	32

All (52) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	117	ARG
1	A	137	GLN
1	A	150	VAL
1	A	186	ASN
1	A	192	GLU
1	A	255	LYS
1	A	276	LEU
1	A	278	ASP

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Mol	Chain	Res	Type
1	A	287	LEU
2	B	11	LEU
2	B	70	ARG
2	B	95	GLN
2	B	133	ILE
2	B	138	GLU
2	B	191	ARG
2	B	195	LEU
2	B	200	PRO
2	B	287	LEU
2	B	288	ASP
2	B	309	ASP
2	B	319	PHE
2	B	342	ASN
2	B	348	ARG
2	B	372	LYS
2	B	381	VAL
1	D	9	LYS
1	D	77	CYS
1	D	100	PRO
1	D	117	ARG
1	D	137	GLN
1	D	150	VAL
1	D	186	ASN
1	D	192	GLU
1	D	255	LYS
1	D	276	LEU
1	D	278	ASP
2	E	11	LEU
2	E	70	ARG
2	E	95	GLN
2	E	124	MET
2	E	133	ILE
2	E	138	GLU
2	E	195	LEU
2	E	200	PRO
2	E	287	LEU
2	E	288	ASP
2	E	295	LYS
2	E	309	ASP
2	E	342	ASN
2	E	348	ARG

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Mol	Chain	Res	Type
2	E	372	LYS
2	E	381	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	95	GLN
2	B	247	GLN
2	B	353	ASN
2	E	94	ASN
2	E	95	GLN
2	E	247	GLN
2	E	342	ASN
2	E	353	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

2 non-standard protein/DNA/RNA residues 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
1	NEP	D	246	1	10,14,15	1.64	3 (30%)	5,20,22	2.81	4 (80%)
1	NEP	A	246	1	10,14,15	1.66	2 (20%)	5,20,22	3.11	4 (80%)

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
1	NEP	D	246	1	-	1/5/12/14	0/1/1/1
1	NEP	A	246	1	-	1/5/12/14	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	246	NEP	P-O2P	-3.82	1.47	1.54
1	D	246	NEP	P-O1P	-3.11	1.48	1.54
1	D	246	NEP	P-O2P	-3.02	1.48	1.54
1	A	246	NEP	P-O3P	2.83	1.49	1.47
1	D	246	NEP	P-O3P	2.19	1.49	1.47

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	246	NEP	O2P-P-O3P	-5.41	101.74	113.44
1	D	246	NEP	O2P-P-O3P	-4.52	103.67	113.44
1	D	246	NEP	O1P-P-O2P	-2.73	95.83	106.57
1	D	246	NEP	CB-CG-CD2	2.64	133.38	127.95
1	A	246	NEP	CB-CG-CD2	2.57	133.24	127.95
1	A	246	NEP	CB-CA-C	-2.57	106.66	111.47
1	A	246	NEP	O1P-P-O2P	-2.35	97.32	106.57
1	D	246	NEP	CB-CA-C	-2.02	107.67	111.47

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	246	NEP	CA-CB-CG-CD2
1	D	246	NEP	CA-CB-CG-CD2

There are no ring outliers.

2 monomers are involved in 7 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	D	246	NEP	3	0
1	A	246	NEP	4	0

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry

10 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
4	COA	B	1025	2	14,17,50	4.15	7 (50%)	19,22,75	5.73	16 (84%)
3	SO4	A	1500	-	4,4,4	0.39	0	6,6,6	0.30	0
3	SO4	B	1400	-	4,4,4	0.37	0	6,6,6	0.24	0
4	COA	B	1325	2	14,17,50	3.36	7 (50%)	19,22,75	7.13	14 (73%)
4	COA	A	1300	-	41,50,50	1.06	2 (4%)	52,75,75	1.97	12 (23%)
3	SO4	E	1401	-	4,4,4	0.45	0	6,6,6	0.23	0
4	COA	E	1325	2	14,17,50	3.72	7 (50%)	19,22,75	5.07	16 (84%)
3	SO4	E	1501	-	4,4,4	0.36	0	6,6,6	0.22	0
4	COA	E	1025	2	14,17,50	3.17	7 (50%)	19,22,75	5.95	15 (78%)
4	COA	D	1301	-	41,50,50	0.90	2 (4%)	52,75,75	2.16	13 (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
4	COA	B	1025	2	-	13/23/23/64	-
4	COA	B	1325	2	-	7/23/23/64	-
4	COA	A	1300	-	-	6/44/64/64	0/3/3/3
4	COA	E	1325	2	-	5/23/23/64	-
4	COA	E	1025	2	-	14/23/23/64	-
4	COA	D	1301	-	-	6/44/64/64	0/3/3/3

All (32) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	1025	COA	CCP-CBP	10.56	1.60	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	E	1325	COA	CCP-CBP	10.07	1.60	1.53
4	B	1325	COA	C6P-C5P	7.62	1.65	1.51
4	E	1025	COA	CCP-CBP	6.40	1.57	1.53
4	B	1025	COA	C3P-N4P	6.11	1.60	1.46
4	B	1025	COA	C6P-C5P	6.07	1.62	1.51
4	B	1325	COA	C7P-N8P	5.45	1.58	1.46
4	E	1325	COA	C6P-C5P	5.45	1.61	1.51
4	E	1025	COA	C6P-C5P	5.42	1.61	1.51
4	B	1325	COA	C3P-N4P	4.73	1.57	1.46
4	E	1025	COA	C3P-N4P	4.60	1.56	1.46
4	B	1325	COA	C2P-S1P	4.12	1.95	1.80
4	E	1025	COA	C7P-N8P	3.81	1.54	1.46
4	B	1025	COA	CDP-CBP	3.74	1.62	1.53
4	B	1025	COA	CEP-CBP	3.67	1.61	1.53
4	E	1325	COA	CEP-CBP	3.63	1.61	1.53
4	B	1325	COA	OAP-CAP	3.59	1.48	1.42
4	E	1025	COA	CEP-CBP	3.54	1.61	1.53
4	E	1325	COA	C7P-N8P	3.52	1.54	1.46
4	E	1325	COA	OAP-CAP	3.30	1.48	1.42
4	B	1025	COA	C2P-S1P	3.03	1.91	1.80
4	E	1025	COA	C2P-S1P	3.03	1.91	1.80
4	E	1025	COA	CDP-CBP	2.76	1.59	1.53
4	E	1325	COA	C2P-S1P	2.63	1.90	1.80
4	A	1300	COA	CDP-CBP	2.60	1.59	1.53
4	B	1025	COA	C7P-N8P	2.58	1.52	1.46
4	D	1301	COA	CDP-CBP	2.51	1.59	1.53
4	E	1325	COA	C3P-N4P	2.48	1.51	1.46
4	A	1300	COA	P3B-O3B	2.20	1.63	1.59
4	B	1325	COA	C5P-N4P	2.19	1.38	1.33
4	B	1325	COA	CCP-CBP	2.06	1.55	1.53
4	D	1301	COA	C8A-N7A	-2.05	1.31	1.34

All (86) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1325	COA	CAP-C9P-N8P	12.99	142.44	116.58
4	B	1325	COA	C6P-C5P-N4P	12.79	137.95	116.42
4	E	1025	COA	CAP-C9P-N8P	12.50	141.47	116.58
4	B	1325	COA	CDP-CBP-CAP	12.33	130.20	108.82
4	B	1025	COA	CAP-C9P-N8P	12.18	140.83	116.58
4	E	1025	COA	C7P-C6P-C5P	12.12	132.54	112.36
4	E	1325	COA	C6P-C5P-N4P	11.33	135.50	116.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1025	COA	C7P-C6P-C5P	10.52	129.87	112.36
4	E	1025	COA	C2P-C3P-N4P	10.34	135.94	112.31
4	B	1025	COA	C2P-C3P-N4P	9.99	135.12	112.31
4	B	1325	COA	O5P-C5P-C6P	-8.68	106.14	122.02
4	B	1325	COA	C6P-C7P-N8P	8.53	129.12	111.90
4	E	1325	COA	O5P-C5P-N4P	-8.26	107.42	123.01
4	B	1325	COA	CDP-CBP-CCP	-8.13	94.00	108.90
4	B	1325	COA	C3P-N4P-C5P	7.88	137.47	122.84
4	B	1325	COA	O9P-C9P-N8P	-7.63	106.62	122.99
4	B	1325	COA	OAP-CAP-CBP	-7.58	92.39	110.25
4	E	1325	COA	CAP-C9P-N8P	6.72	129.96	116.58
4	B	1025	COA	CEP-CBP-CAP	6.68	120.40	108.82
4	E	1325	COA	CEP-CBP-CAP	6.54	120.16	108.82
4	D	1301	COA	O5P-C5P-C6P	-6.40	110.32	122.02
4	B	1025	COA	CEP-CBP-CCP	-6.39	97.20	108.90
4	E	1325	COA	CEP-CBP-CCP	-6.13	97.68	108.90
4	E	1325	COA	C7P-C6P-C5P	6.00	122.35	112.36
4	A	1300	COA	O5P-C5P-C6P	-5.92	111.19	122.02
4	B	1025	COA	CEP-CBP-CDP	-5.73	97.49	109.17
4	E	1025	COA	CEP-CBP-CDP	-5.66	97.62	109.17
4	E	1025	COA	O9P-C9P-N8P	-5.59	110.98	122.99
4	D	1301	COA	C6P-C5P-N4P	5.57	125.80	116.42
4	E	1025	COA	CEP-CBP-CAP	5.39	118.16	108.82
4	B	1325	COA	C7P-C6P-C5P	5.29	121.16	112.36
4	E	1325	COA	C6P-C7P-N8P	5.21	122.42	111.90
4	E	1025	COA	C3P-N4P-C5P	5.15	132.40	122.84
4	E	1025	COA	CEP-CBP-CCP	-4.96	99.82	108.90
4	B	1025	COA	O9P-C9P-CAP	-4.89	106.13	121.06
4	D	1301	COA	C3P-N4P-C5P	4.88	131.90	122.84
4	B	1025	COA	C6P-C5P-N4P	4.69	124.32	116.42
4	B	1025	COA	O9P-C9P-N8P	-4.64	113.04	122.99
4	B	1325	COA	CEP-CBP-CCP	-4.62	100.43	108.90
4	E	1025	COA	C6P-C5P-N4P	4.54	124.07	116.42
4	E	1025	COA	C7P-N8P-C9P	4.50	130.61	122.59
4	E	1025	COA	OAP-CAP-C9P	-4.44	88.03	109.42
4	D	1301	COA	C7P-C6P-C5P	-4.44	104.96	112.36
4	E	1025	COA	O9P-C9P-CAP	-4.43	107.55	121.06
4	D	1301	COA	O6A-CCP-CBP	-4.29	103.66	110.55
4	A	1300	COA	CEP-CBP-CCP	-4.27	101.27	108.23
4	E	1025	COA	O5P-C5P-N4P	-4.26	114.97	123.01
4	E	1325	COA	OAP-CAP-CBP	-4.21	100.35	110.25
4	B	1025	COA	OAP-CAP-C9P	-4.17	89.37	109.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	1325	COA	CDP-CBP-CAP	4.12	115.96	108.82
4	B	1025	COA	C3P-N4P-C5P	4.12	130.48	122.84
4	E	1325	COA	O9P-C9P-N8P	-4.05	114.29	122.99
4	A	1300	COA	O6A-CCP-CBP	-4.04	104.06	110.55
4	A	1300	COA	C7P-C6P-C5P	-3.86	105.93	112.36
4	B	1325	COA	O5P-C5P-N4P	-3.78	115.88	123.01
4	B	1325	COA	C2P-C3P-N4P	3.72	120.81	112.31
4	E	1325	COA	O6A-CCP-CBP	3.61	119.42	112.96
4	A	1300	COA	C6P-C5P-N4P	3.53	122.36	116.42
4	D	1301	COA	CEP-CBP-CCP	-3.34	102.78	108.23
4	D	1301	COA	CEP-CBP-CAP	3.34	114.61	108.82
4	B	1325	COA	O9P-C9P-CAP	-3.32	110.93	121.06
4	B	1025	COA	C7P-N8P-C9P	3.31	128.49	122.59
4	D	1301	COA	P2A-O3A-P1A	-3.30	121.52	132.83
4	A	1300	COA	C6P-C7P-N8P	-3.18	105.47	111.90
4	A	1300	COA	CEP-CBP-CAP	3.17	114.32	108.82
4	B	1025	COA	OAP-CAP-CBP	-3.10	102.95	110.25
4	D	1301	COA	CDP-CBP-CCP	3.09	113.28	108.23
4	A	1300	COA	CDP-CBP-CCP	2.98	113.09	108.23
4	A	1300	COA	P2A-O3A-P1A	-2.92	122.80	132.83
4	E	1025	COA	OAP-CAP-CBP	-2.91	103.40	110.25
4	E	1325	COA	C3P-N4P-C5P	2.89	128.21	122.84
4	D	1301	COA	C7P-N8P-C9P	2.88	127.72	122.59
4	A	1300	COA	C3P-N4P-C5P	2.86	128.15	122.84
4	D	1301	COA	C6P-C7P-N8P	-2.80	106.25	111.90
4	E	1325	COA	C7P-N8P-C9P	2.79	127.56	122.59
4	B	1025	COA	O5P-C5P-N4P	-2.75	117.83	123.01
4	E	1325	COA	O5P-C5P-C6P	-2.71	117.06	122.02
4	B	1025	COA	C6P-C7P-N8P	2.66	117.27	111.90
4	A	1300	COA	CDP-CBP-CAP	-2.64	104.24	108.82
4	E	1025	COA	C6P-C7P-N8P	2.51	116.96	111.90
4	D	1301	COA	C5A-C6A-N6A	2.48	124.12	120.35
4	E	1325	COA	C2P-C3P-N4P	-2.46	106.69	112.31
4	B	1025	COA	O5P-C5P-C6P	-2.29	117.83	122.02
4	D	1301	COA	O3B-P3B-O7A	-2.27	100.61	109.39
4	A	1300	COA	C7P-N8P-C9P	2.20	126.51	122.59
4	E	1325	COA	CDP-CBP-CCP	-2.09	105.08	108.90

There are no chirality outliers.

All (51) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1300	COA	C3B-O3B-P3B-O7A
4	A	1300	COA	S1P-C2P-C3P-N4P
4	B	1025	COA	CDP-CBP-CCP-O6A
4	B	1025	COA	CEP-CBP-CCP-O6A
4	B	1025	COA	CAP-CBP-CCP-O6A
4	B	1025	COA	C9P-CAP-CBP-CCP
4	B	1025	COA	C9P-CAP-CBP-CDP
4	B	1025	COA	C9P-CAP-CBP-CEP
4	B	1025	COA	O9P-C9P-CAP-CBP
4	B	1025	COA	N8P-C9P-CAP-CBP
4	B	1025	COA	C2P-C3P-N4P-C5P
4	B	1325	COA	OAP-CAP-CBP-CEP
4	B	1325	COA	C9P-CAP-CBP-CEP
4	D	1301	COA	C3B-O3B-P3B-O7A
4	D	1301	COA	S1P-C2P-C3P-N4P
4	E	1025	COA	CDP-CBP-CCP-O6A
4	E	1025	COA	CEP-CBP-CCP-O6A
4	E	1025	COA	CAP-CBP-CCP-O6A
4	E	1025	COA	C9P-CAP-CBP-CCP
4	E	1025	COA	C9P-CAP-CBP-CDP
4	E	1025	COA	C9P-CAP-CBP-CEP
4	E	1025	COA	O9P-C9P-CAP-CBP
4	E	1025	COA	N8P-C9P-CAP-CBP
4	E	1025	COA	C2P-C3P-N4P-C5P
4	E	1325	COA	CDP-CBP-CCP-O6A
4	E	1325	COA	O9P-C9P-CAP-CBP
4	E	1325	COA	N8P-C9P-CAP-CBP
4	E	1325	COA	O9P-C9P-CAP-OAP
4	E	1325	COA	N8P-C9P-CAP-OAP
4	B	1025	COA	C6P-C7P-N8P-C9P
4	E	1025	COA	C6P-C7P-N8P-C9P
4	B	1025	COA	O9P-C9P-CAP-OAP
4	E	1025	COA	O9P-C9P-CAP-OAP
4	B	1325	COA	O9P-C9P-CAP-CBP
4	B	1325	COA	N8P-C9P-CAP-CBP
4	A	1300	COA	C2B-C3B-O3B-P3B
4	A	1300	COA	C4B-C3B-O3B-P3B
4	A	1300	COA	C3B-O3B-P3B-O9A
4	D	1301	COA	C3B-O3B-P3B-O9A
4	B	1325	COA	C9P-CAP-CBP-CCP
4	B	1325	COA	O9P-C9P-CAP-OAP
4	D	1301	COA	C2B-C3B-O3B-P3B
4	E	1025	COA	O5P-C5P-C6P-C7P

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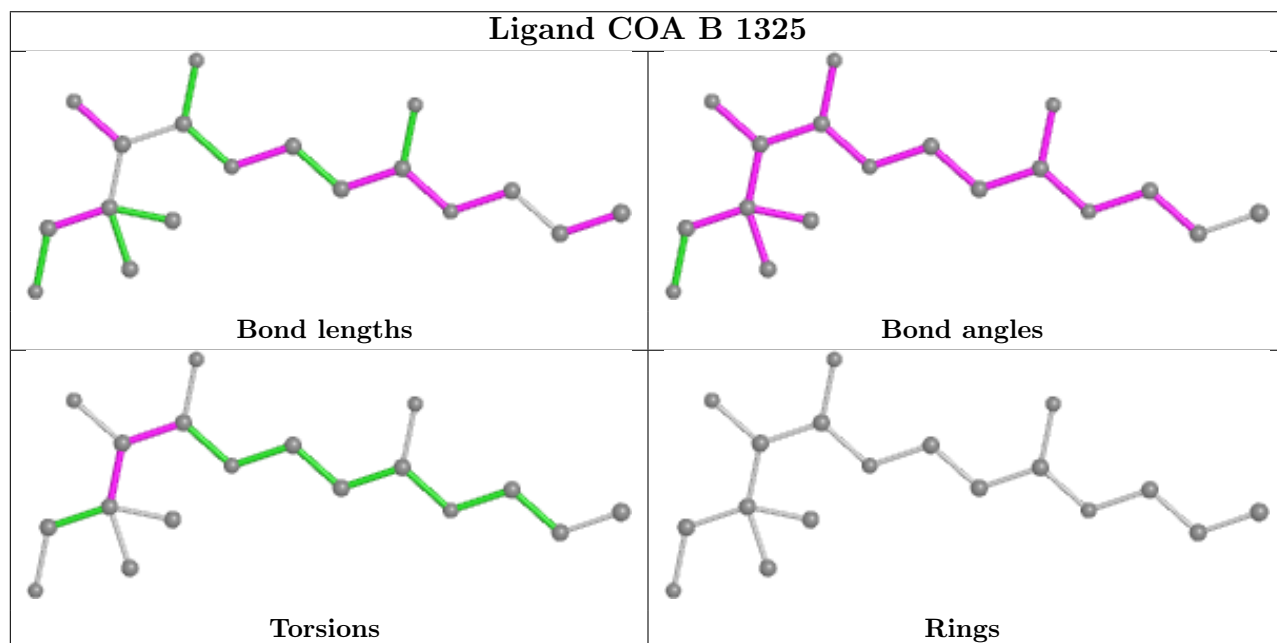
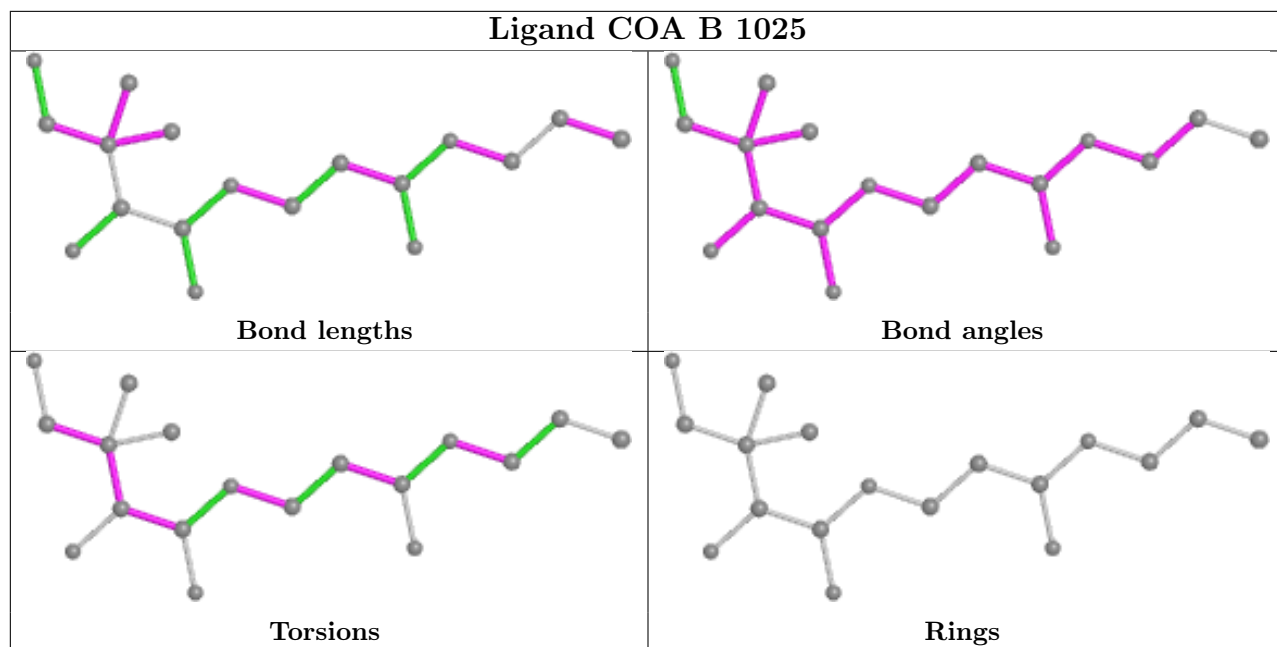
Mol	Chain	Res	Type	Atoms
4	E	1025	COA	N4P-C5P-C6P-C7P
4	D	1301	COA	C4B-C3B-O3B-P3B
4	B	1325	COA	N8P-C9P-CAP-OAP
4	B	1025	COA	N4P-C5P-C6P-C7P
4	E	1025	COA	OAP-CAP-CBP-CEP
4	B	1025	COA	O5P-C5P-C6P-C7P
4	A	1300	COA	O4B-C4B-C5B-O5B
4	D	1301	COA	O4B-C4B-C5B-O5B

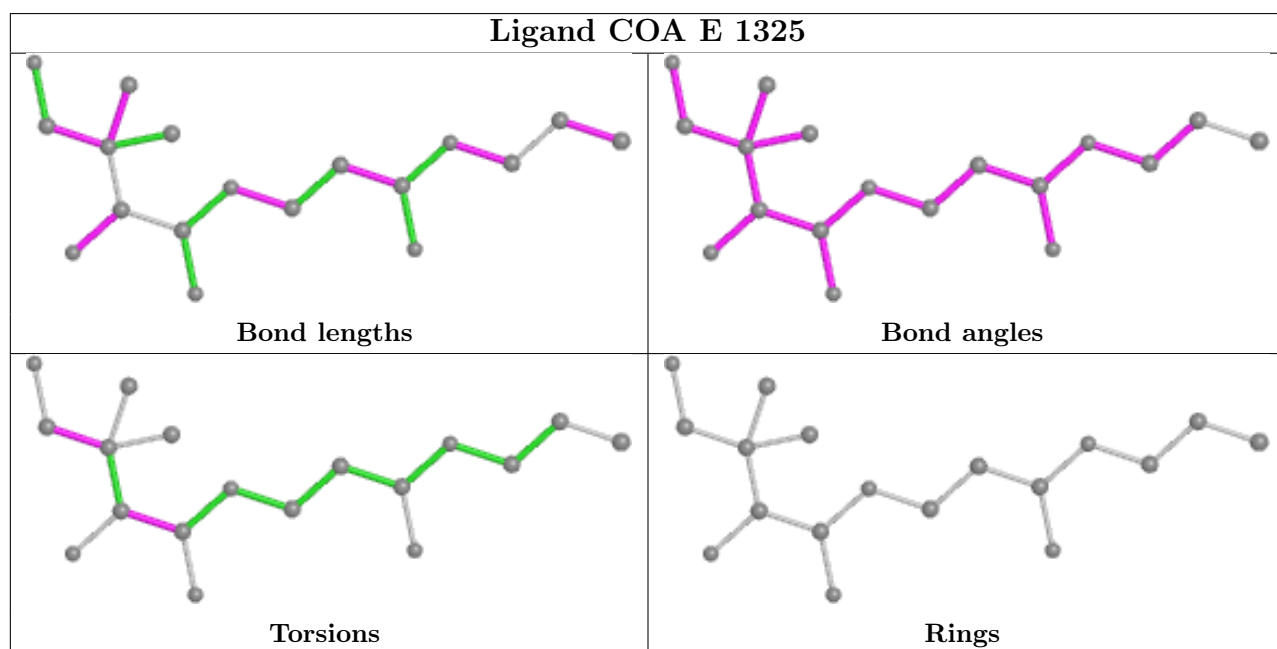
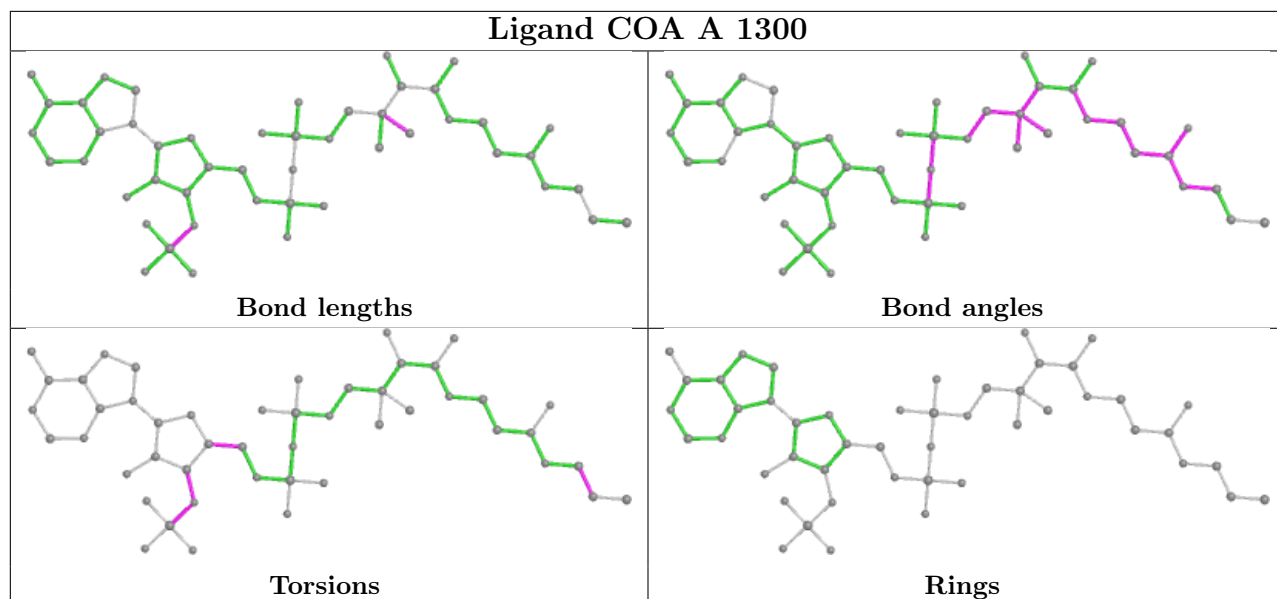
There are no ring outliers.

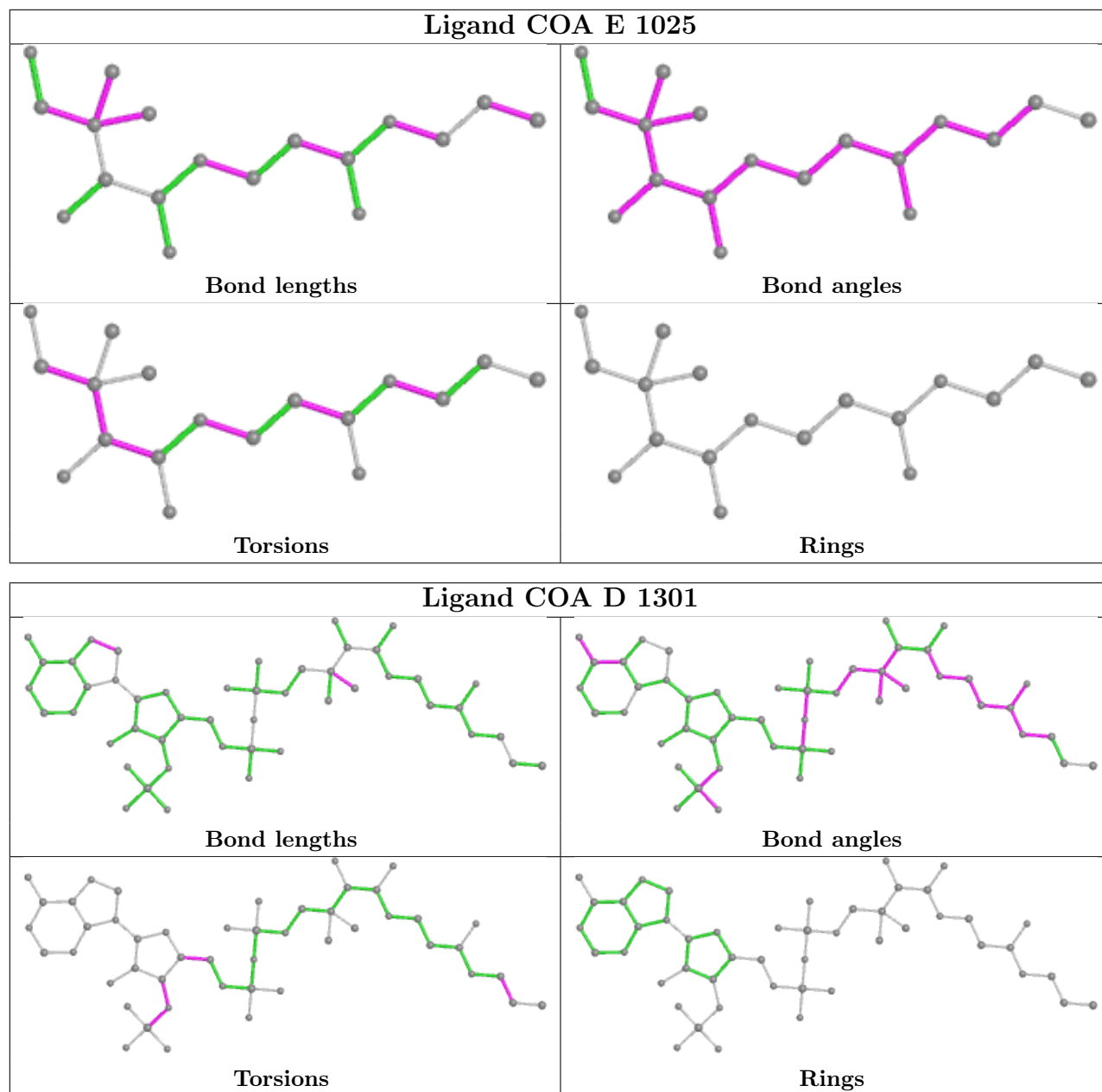
6 monomers are involved in 30 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	1025	COA	11	0
4	B	1325	COA	1	0
4	A	1300	COA	2	0
4	E	1325	COA	5	0
4	E	1025	COA	9	0
4	D	1301	COA	2	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

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	286/288 (99%)	-0.27	0 100 100	25, 39, 55, 69	0
1	D	286/288 (99%)	-0.12	5 (1%) 70 76	26, 43, 59, 75	0
2	B	388/388 (100%)	-0.13	5 (1%) 77 82	25, 47, 66, 84	0
2	E	385/388 (99%)	-0.09	11 (2%) 51 59	25, 48, 74, 86	0
All	All	1345/1352 (99%)	-0.14	21 (1%) 72 78	25, 44, 67, 86	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	E	309	ASP	3.8
2	E	88	ALA	3.0
2	E	310	LYS	2.7
2	B	135	LYS	2.7
2	E	363	ASP	2.5
2	B	323	VAL	2.4
1	D	155	THR	2.4
2	E	64	ASN	2.3
2	E	256	ASP	2.3
2	B	67	GLU	2.2
2	B	309	ASP	2.2
1	D	219	ALA	2.2
2	E	311	VAL	2.2
2	E	293	ALA	2.1
2	E	372	LYS	2.1
2	B	322	ILE	2.1
1	D	151	SER	2.1
2	E	330	ASP	2.1
2	E	338	GLU	2.1
1	D	156	LEU	2.0
1	D	240	LYS	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
1	NEP	D	246	14/15	0.94	0.18	32,38,47,49	0
1	NEP	A	246	14/15	0.97	0.15	36,40,45,45	0

6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

6.4 Ligands [i](#)

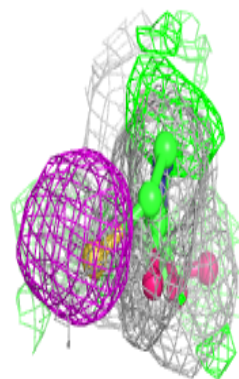
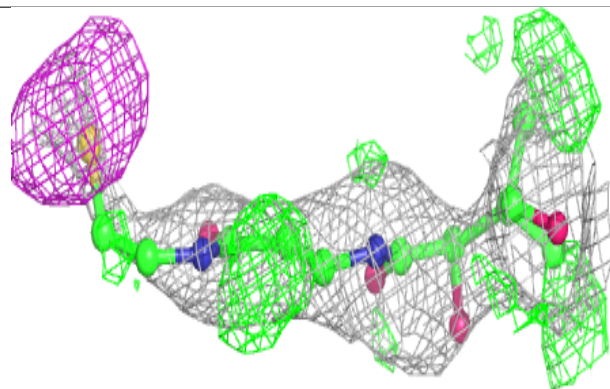
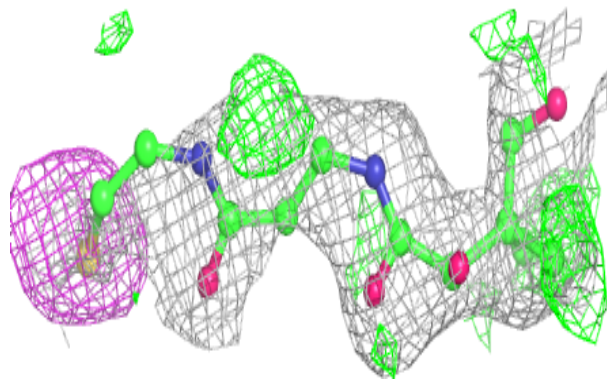
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	COA	E	1025	18/48	0.66	0.28	69,73,74,74	0
4	COA	B	1025	18/48	0.68	0.24	65,73,76,76	0
4	COA	E	1325	18/48	0.69	0.20	75,79,83,84	0
3	SO4	E	1501	5/5	0.85	0.26	106,107,107,107	0
4	COA	B	1325	18/48	0.87	0.16	62,68,75,76	0
3	SO4	A	1500	5/5	0.91	0.16	91,91,92,93	0
4	COA	D	1301	48/48	0.95	0.14	40,44,56,63	0
3	SO4	B	1400	5/5	0.95	0.12	81,82,83,83	0
4	COA	A	1300	48/48	0.95	0.14	39,44,58,65	0
3	SO4	E	1401	5/5	0.98	0.13	70,70,71,72	0

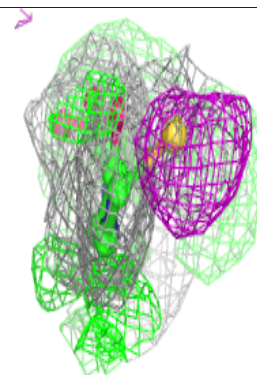
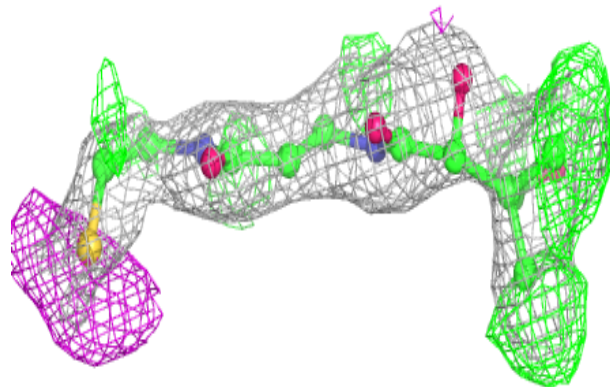
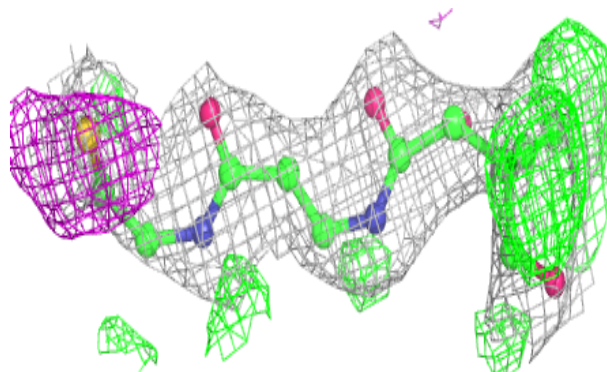
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around COA E 1025:

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

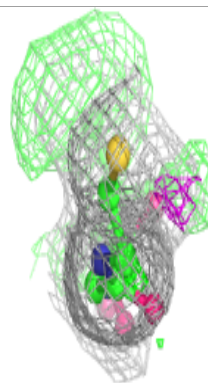
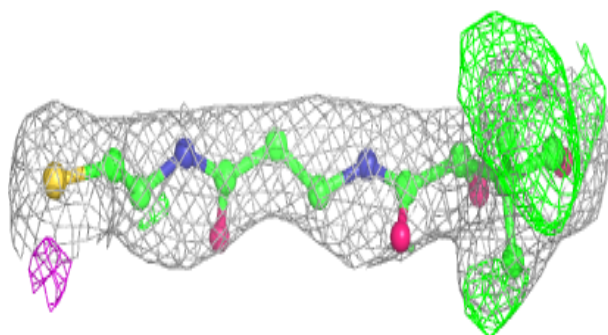
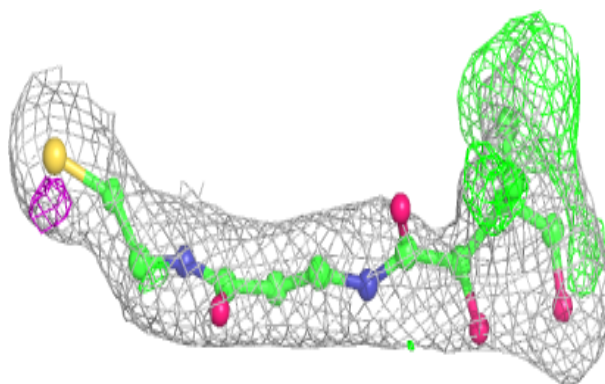
**Electron density around COA B 1025:**

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

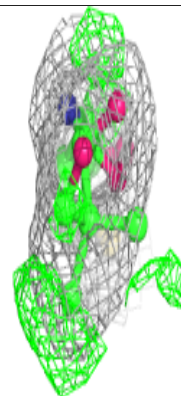
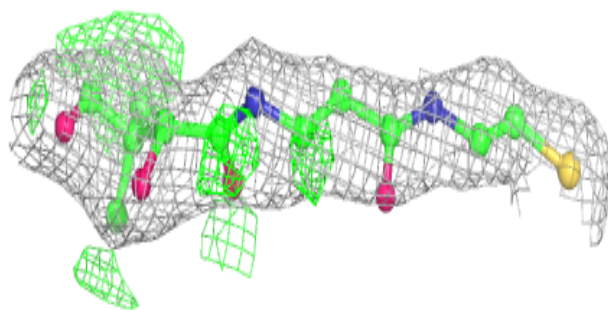
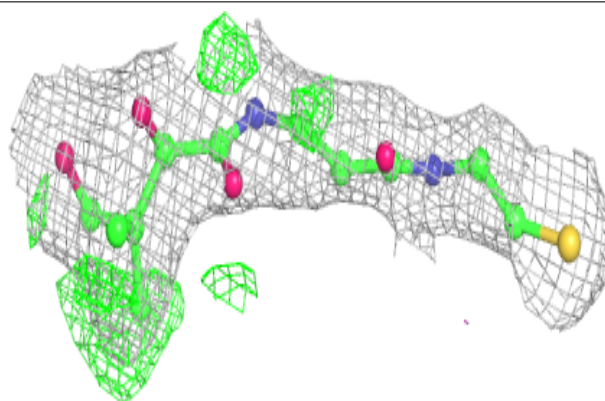


Electron density around COA E 1325:

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

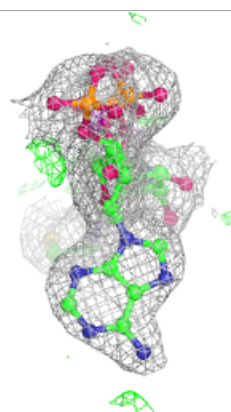
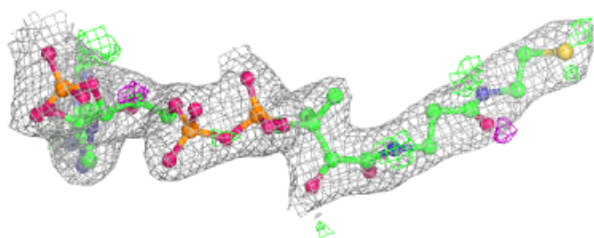
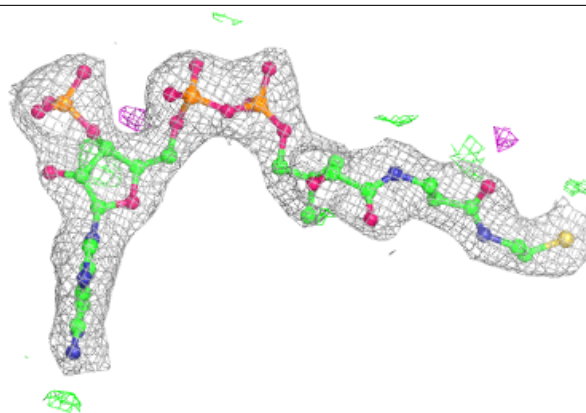
**Electron density around COA B 1325:**

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and green (positive)

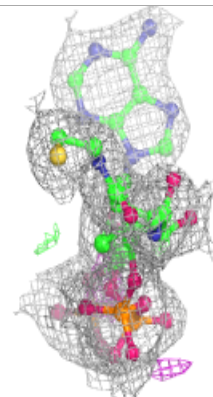
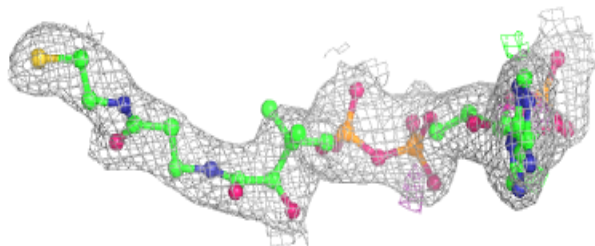
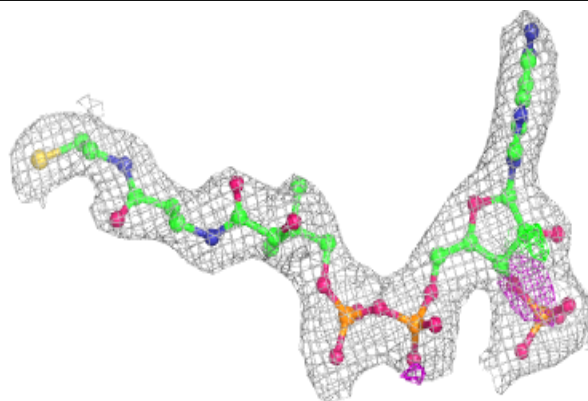


Electron density around COA D 1301:

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

**Electron density around COA A 1300:**

$2mF_o-DF_c$ (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.