



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2024 – 10:42 PM EST

PDB ID : 8GQN
Title : X-ray structure of thiolase with CoA
Authors : Hong, J.; Son, H.F.; Kim, K.J.
Deposited on : 2022-08-30
Resolution : 2.70 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 : 2.36
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) : 2.36

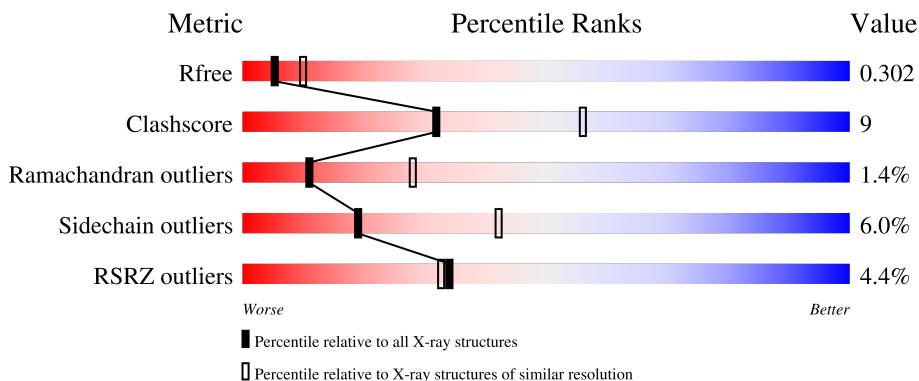
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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	2808 (2.70-2.70)
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)
RSRZ outliers	127900	2737 (2.70-2.70)

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	399	 2% 79% 18% ..
1	B	399	 4% 71% 25% ..
1	C	399	 4% 75% 22% ..
1	D	399	 8% 69% 27% ..

2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 11502 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 Thiolase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	390	2822	1747	508	546	21	0	0	0
1	B	390	2822	1747	508	546	21	0	0	0
1	C	388	2802	1735	502	544	21	0	0	0
1	D	390	2822	1747	508	546	21	0	0	0

There are 32 discrepancies between the modelled and reference sequences:

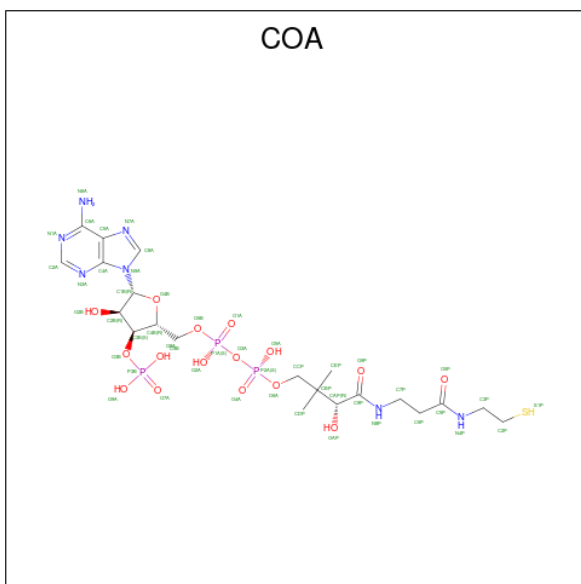
Chain	Residue	Modelled	Actual	Comment	Reference
A	392	LEU	-	expression tag	UNP G3XD40
A	393	GLU	-	expression tag	UNP G3XD40
A	394	HIS	-	expression tag	UNP G3XD40
A	395	HIS	-	expression tag	UNP G3XD40
A	396	HIS	-	expression tag	UNP G3XD40
A	397	HIS	-	expression tag	UNP G3XD40
A	398	HIS	-	expression tag	UNP G3XD40
A	399	HIS	-	expression tag	UNP G3XD40
B	392	LEU	-	expression tag	UNP G3XD40
B	393	GLU	-	expression tag	UNP G3XD40
B	394	HIS	-	expression tag	UNP G3XD40
B	395	HIS	-	expression tag	UNP G3XD40
B	396	HIS	-	expression tag	UNP G3XD40
B	397	HIS	-	expression tag	UNP G3XD40
B	398	HIS	-	expression tag	UNP G3XD40
B	399	HIS	-	expression tag	UNP G3XD40
C	392	LEU	-	expression tag	UNP G3XD40
C	393	GLU	-	expression tag	UNP G3XD40
C	394	HIS	-	expression tag	UNP G3XD40
C	395	HIS	-	expression tag	UNP G3XD40
C	396	HIS	-	expression tag	UNP G3XD40

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Chain	Residue	Modelled	Actual	Comment	Reference
C	397	HIS	-	expression tag	UNP G3XD40
C	398	HIS	-	expression tag	UNP G3XD40
C	399	HIS	-	expression tag	UNP G3XD40
D	392	LEU	-	expression tag	UNP G3XD40
D	393	GLU	-	expression tag	UNP G3XD40
D	394	HIS	-	expression tag	UNP G3XD40
D	395	HIS	-	expression tag	UNP G3XD40
D	396	HIS	-	expression tag	UNP G3XD40
D	397	HIS	-	expression tag	UNP G3XD40
D	398	HIS	-	expression tag	UNP G3XD40
D	399	HIS	-	expression tag	UNP G3XD40

- Molecule 2 is COENZYME A (three-letter code: COA) (formula: $C_{21}H_{36}N_7O_{16}P_3S$).



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

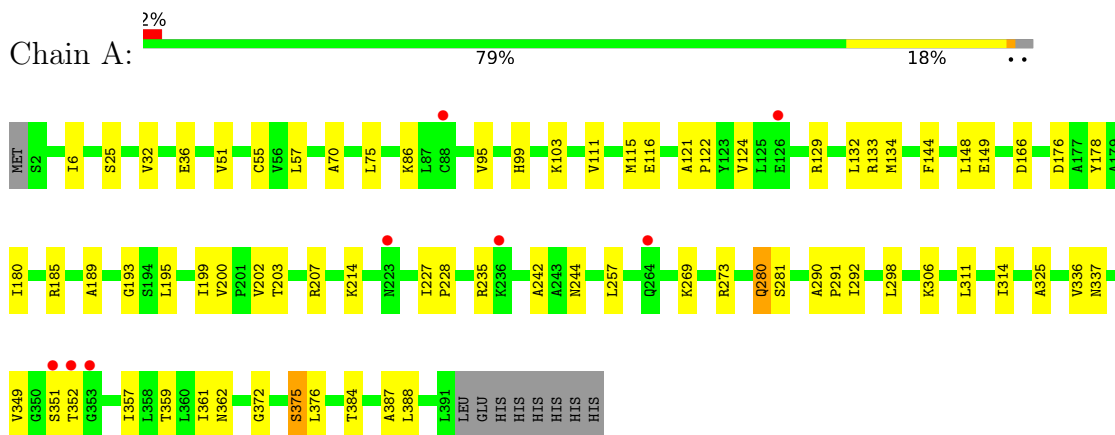
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	11	Total O 11 11	0	0
3	B	10	Total O 10 10	0	0
3	C	9	Total O 9 9	0	0
3	D	12	Total O 12 12	0	0

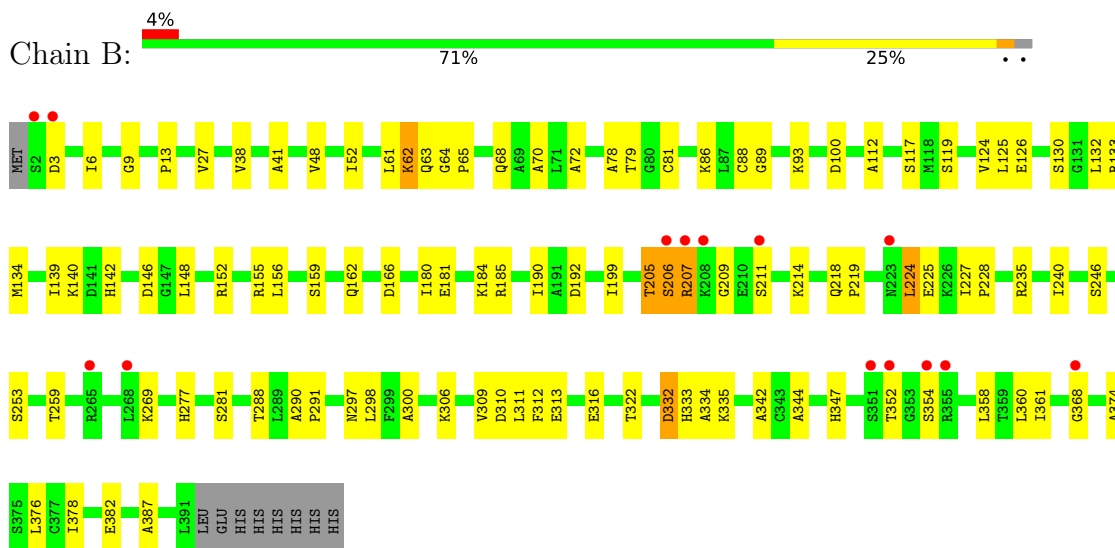
3 Residue-property plots i

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

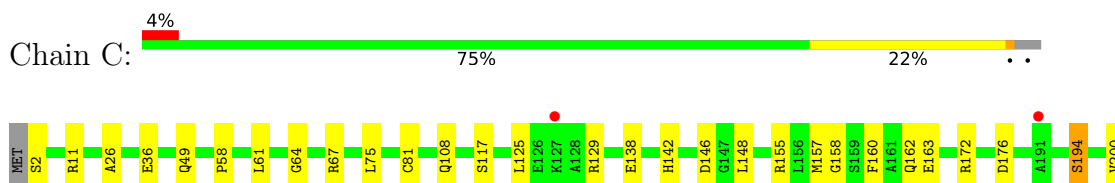
- Molecule 1: Thiolase

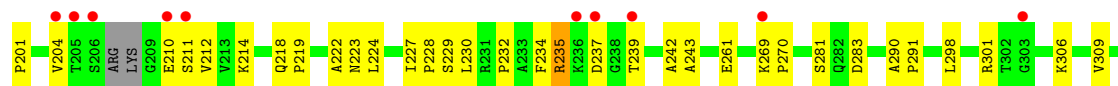


- Molecule 1: Thiolase

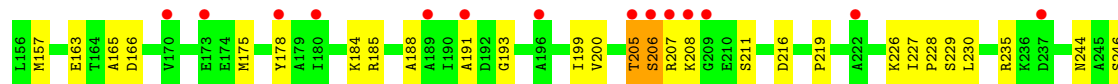
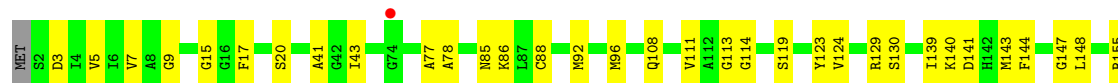


- Molecule 1: Thiolase





● Molecule 1: Thiolase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	73.84Å 94.18Å 113.25Å 90.00° 107.47° 90.00°	Depositor
Resolution (Å)	34.38 – 2.70 34.36 – 2.70	Depositor EDS
% Data completeness (in resolution range)	97.0 (34.38-2.70) 97.1 (34.36-2.70)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.02 (at 2.68Å)	Xtrriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.209 , 0.301 0.214 , 0.302	Depositor DCC
R_{free} test set	1963 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å ²)	37.6	Xtrriage
Anisotropy	0.158	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 37.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.26$	Xtrriage
Estimated twinning fraction	0.048 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	11502	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.35% 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: 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	0.75	0/2855	0.90	0/3854
1	B	0.73	0/2855	0.90	0/3854
1	C	0.75	0/2834	0.90	0/3826
1	D	0.76	0/2855	0.90	0/3854
All	All	0.74	0/11399	0.90	0/15388

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	2822	0	2869	40	0
1	B	2822	0	2869	61	0
1	C	2802	0	2842	42	0
1	D	2822	0	2869	66	0
2	A	48	0	32	3	0
2	B	48	0	32	4	0
2	C	48	0	32	3	0
2	D	48	0	32	2	0
3	A	11	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	10	0	0	2	0
3	C	9	0	0	0	0
3	D	12	0	0	1	0
All	All	11502	0	11577	204	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 9.

All (204) 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:B:89:GLY:HA2	1:B:376:LEU:HD11	1.64	0.78
1:C:148:LEU:O	1:C:157:MET:HG2	1.87	0.75
1:B:126:GLU:OE2	1:B:140:LYS:HG3	1.94	0.67
1:B:253:SER:OG	1:B:354:SER:OG	2.12	0.67
1:B:70:ALA:CB	1:B:81:CYS:SG	2.83	0.66
1:C:26:ALA:HB2	1:C:117:SER:H	1.60	0.66
1:B:125:LEU:CD1	1:C:125:LEU:HD11	2.26	0.65
1:D:41:ALA:O	1:D:268:LEU:HD22	1.97	0.65
1:B:181:GLU:OE1	1:B:185:ARG:NE	2.26	0.64
1:D:298:LEU:HD21	1:D:387:ALA:HB2	1.81	0.62
1:B:61:LEU:O	1:B:62:LYS:HB2	1.99	0.61
1:A:144:PHE:O	1:A:149:GLU:HG2	2.01	0.60
1:A:32:VAL:HG11	1:A:202:VAL:HG22	1.83	0.59
1:B:155:ARG:NH1	1:B:159:SER:OG	2.33	0.59
2:B:401:COA:H141	2:B:401:COA:N8P	2.18	0.59
1:D:294:ALA:HB2	1:D:383:ALA:HB3	1.83	0.58
1:C:316:GLU:O	1:C:342:ALA:HB3	2.03	0.58
1:B:246:SER:HB2	1:B:347:HIS:HB2	1.87	0.57
1:B:332:ASP:O	1:B:334:ALA:N	2.38	0.56
1:B:72:ALA:HB2	3:B:501:HOH:O	2.05	0.55
1:D:364:LEU:HD13	1:D:370:LYS:O	2.07	0.55
1:B:253:SER:HG	1:B:354:SER:HG	1.52	0.55
1:A:290:ALA:N	1:A:291:PRO:CD	2.70	0.55
1:B:360:LEU:HD22	1:B:374:ALA:HB2	1.89	0.55
1:C:320:MET:O	1:C:324:LEU:HG	2.06	0.55
1:A:298:LEU:HD21	1:A:387:ALA:HB2	1.88	0.54
1:D:88:CYS:O	1:D:376:LEU:HD11	2.06	0.54
1:C:314:ILE:HA	1:C:375:SER:O	2.07	0.54
1:C:172:ARG:NE	1:C:176:ASP:OD2	2.39	0.54
2:B:401:COA:HN8	2:B:401:COA:H131	1.73	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:375:SER:OG	1:A:384:THR:O	2.23	0.54
1:D:313:GLU:O	1:D:374:ALA:HA	2.08	0.54
1:C:218:GLN:HB3	1:C:219:PRO:HD3	1.89	0.53
1:D:342:ALA:HB1	1:D:346:GLY:O	2.08	0.53
1:C:158:GLY:HA3	1:C:234:PHE:CZ	2.44	0.53
1:B:86:LYS:HD2	1:B:93:LYS:HD3	1.89	0.53
1:A:388:LEU:HD12	1:A:388:LEU:O	2.09	0.53
1:B:162:GLN:HE22	1:B:240:ILE:H	1.55	0.53
1:B:246:SER:HB2	1:B:342:ALA:HB1	1.90	0.53
1:D:360:LEU:HD11	1:D:372:GLY:HA3	1.91	0.53
1:B:218:GLN:HB3	1:B:344:ALA:O	2.09	0.53
1:D:297:ASN:O	1:D:300:ALA:HB3	2.08	0.53
1:B:9:GLY:HA3	1:B:358:LEU:HD11	1.90	0.52
1:B:218:GLN:CB	1:B:344:ALA:O	2.57	0.52
1:D:155:ARG:NH1	1:D:163:GLU:OE1	2.39	0.52
1:A:281:SER:HB2	1:D:78:ALA:O	2.10	0.52
2:B:401:COA:H141	2:B:401:COA:HN8	1.74	0.52
1:D:5:VAL:HA	1:D:273:ARG:HA	1.91	0.52
1:D:227:ILE:HB	1:D:228:PRO:HD3	1.91	0.52
1:D:9:GLY:HA3	1:D:358:LEU:HD13	1.91	0.51
1:A:132:LEU:O	1:A:134:MET:N	2.44	0.51
1:C:376:LEU:H	1:C:376:LEU:HD23	1.76	0.51
2:A:401:COA:H141	2:A:401:COA:O9P	2.11	0.50
1:D:262:GLU:OE2	1:D:262:GLU:HA	2.10	0.50
1:A:6:ILE:HD13	1:A:361:ILE:HD11	1.94	0.50
1:D:141:ASP:HB3	1:D:144:PHE:HB2	1.92	0.50
1:A:269:LYS:O	1:A:269:LYS:HG3	2.12	0.50
1:B:310:ASP:O	1:B:311:LEU:HD23	2.12	0.50
1:D:114:GLY:HA3	1:D:351:SER:HA	1.93	0.49
1:B:205:THR:OG1	1:B:206:SER:N	2.45	0.49
1:D:178:TYR:OH	1:D:322:THR:HG21	2.12	0.49
1:D:216:ASP:O	1:D:219:PRO:HD2	2.12	0.49
1:D:290:ALA:N	1:D:291:PRO:CD	2.75	0.49
1:A:281:SER:HB3	1:D:77:ALA:O	2.12	0.49
1:C:230:LEU:HD12	1:C:243:ALA:HB2	1.95	0.49
1:D:280:GLN:HB2	1:D:294:ALA:HA	1.95	0.49
1:C:162:GLN:HE22	1:C:239:THR:H	1.61	0.48
1:D:7:VAL:O	1:D:271:LEU:HG	2.12	0.48
1:C:364:LEU:HD11	1:C:372:GLY:HA3	1.95	0.48
1:A:176:ASP:OD1	1:A:244:ASN:ND2	2.46	0.48
1:B:246:SER:O	2:B:401:COA:O9P	2.31	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:78:ALA:HA	1:C:281:SER:O	2.13	0.48
1:C:58:PRO:HA	1:C:61:LEU:HD12	1.95	0.48
1:D:249:SER:OG	1:D:347:HIS:N	2.44	0.48
1:C:312:PHE:HB2	1:C:336:VAL:HG22	1.96	0.48
1:A:185:ARG:NH1	1:A:337:ASN:O	2.43	0.48
1:B:290:ALA:N	1:B:291:PRO:CD	2.76	0.48
1:B:132:LEU:HD12	1:D:123:TYR:CE2	2.49	0.47
1:C:67:ARG:HA	1:C:81:CYS:SG	2.53	0.47
1:D:43:ILE:HG21	1:D:258:MET:HE1	1.96	0.47
1:B:156:LEU:O	1:B:159:SER:N	2.48	0.47
1:B:246:SER:CB	1:B:342:ALA:HB1	2.44	0.47
1:D:113:GLY:HA3	1:D:253:SER:O	2.14	0.47
1:D:185:ARG:HA	3:D:507:HOH:O	2.14	0.47
1:C:242:ALA:HB1	2:C:401:COA:H8A	1.97	0.47
1:C:223:ASN:O	2:C:401:COA:H2A	2.15	0.47
1:B:206:SER:OG	1:B:207:ARG:N	2.47	0.47
1:D:7:VAL:HA	1:D:270:PRO:HA	1.97	0.46
1:A:124:VAL:HA	1:D:123:TYR:O	2.15	0.46
1:B:184:LYS:HE3	1:B:224:LEU:HD21	1.98	0.46
1:D:124:VAL:CG2	1:D:140:LYS:HB2	2.45	0.46
1:D:280:GLN:HB2	1:D:294:ALA:CA	2.45	0.46
1:C:36:GLU:HG2	1:C:200:VAL:HB	1.98	0.46
1:B:125:LEU:HD11	1:C:125:LEU:HD11	1.95	0.46
1:C:201:PRO:HB3	1:C:212:VAL:CG1	2.45	0.46
1:C:298:LEU:HD11	1:C:387:ALA:HB2	1.98	0.46
1:B:62:LYS:CB	1:B:68:GLN:HE22	2.29	0.46
1:D:92:MET:O	1:D:96:MET:SD	2.74	0.46
1:B:70:ALA:HB2	1:B:81:CYS:SG	2.56	0.45
1:B:119:SER:O	1:C:129:ARG:HD2	2.16	0.45
1:B:166:ASP:OD2	1:B:235:ARG:NH2	2.49	0.45
1:A:311:LEU:O	1:A:372:GLY:HA2	2.17	0.45
1:B:180:ILE:HG13	1:B:227:ILE:HD13	1.99	0.45
1:D:287:PHE:CE1	1:D:288:THR:HG23	2.51	0.45
1:B:62:LYS:HB2	1:B:68:GLN:HE22	1.82	0.45
1:C:227:ILE:HB	1:C:228:PRO:HD3	1.99	0.45
1:B:332:ASP:O	1:B:335:LYS:N	2.41	0.45
1:D:378:ILE:N	1:D:382:GLU:O	2.50	0.44
1:B:225:GLU:O	1:B:228:PRO:HD2	2.17	0.44
2:D:401:COA:H8A	2:D:401:COA:O1A	2.17	0.44
1:B:63:GLN:O	1:B:68:GLN:NE2	2.41	0.44
1:C:142:HIS:ND1	1:C:146:ASP:OD2	2.51	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:189:ALA:HB1	1:A:195:LEU:HG	1.99	0.44
1:B:13:PRO:HG3	1:B:199:ILE:HG21	2.00	0.44
1:B:48:VAL:O	1:B:79:THR:HG23	2.17	0.44
1:B:88:CYS:O	1:B:376:LEU:CD1	2.66	0.44
1:D:246:SER:HB3	1:D:316:GLU:O	2.17	0.44
1:A:290:ALA:N	1:A:291:PRO:HD2	2.33	0.44
1:C:49:GLN:OE1	1:C:108:GLN:N	2.36	0.44
1:D:298:LEU:CD2	1:D:387:ALA:HB2	2.47	0.44
1:A:227:ILE:N	1:A:228:PRO:CD	2.80	0.44
1:B:190:ILE:HD12	1:B:219:PRO:HB2	2.00	0.44
1:D:364:LEU:O	1:D:369:GLY:N	2.51	0.44
1:A:199:ILE:HG21	1:A:214:LYS:O	2.18	0.43
1:C:235:ARG:NH1	1:C:237:ASP:O	2.51	0.43
1:A:314:ILE:HA	1:A:375:SER:O	2.17	0.43
1:A:129:ARG:HD3	1:D:17:PHE:HZ	1.83	0.43
1:A:36:GLU:CD	1:A:200:VAL:HG13	2.39	0.43
1:D:148:LEU:O	1:D:157:MET:HG2	2.17	0.43
1:D:353:GLY:O	1:D:357:ILE:HG13	2.18	0.43
1:B:309:VAL:HG11	1:B:312:PHE:CE1	2.53	0.43
1:C:194:SER:HB3	1:C:339:TYR:CE1	2.53	0.43
1:D:85:ASN:OD1	1:D:85:ASN:C	2.56	0.43
1:A:57:LEU:HB2	1:A:116:GLU:OE2	2.19	0.43
1:C:155:ARG:NH2	1:C:163:GLU:OE1	2.34	0.43
1:A:166:ASP:OD2	1:A:235:ARG:NH2	2.52	0.43
1:B:297:ASN:O	1:B:300:ALA:HB3	2.19	0.43
1:C:75:LEU:HD23	1:C:75:LEU:N	2.33	0.43
1:D:340:GLY:O	1:D:345:GLN:NE2	2.52	0.43
1:D:227:ILE:HA	1:D:230:LEU:HD12	2.01	0.43
1:B:298:LEU:HD21	1:B:387:ALA:HB2	2.00	0.42
1:C:329:HIS:HB3	1:C:331:LEU:HD21	2.00	0.42
1:D:3:ASP:HB3	1:D:273:ARG:HD2	2.01	0.42
1:A:95:VAL:HG21	1:A:357:ILE:HD12	2.01	0.42
1:A:121:ALA:O	1:D:129:ARG:NE	2.37	0.42
1:C:342:ALA:HA	1:C:346:GLY:O	2.19	0.42
1:C:360:LEU:HD23	1:C:388:LEU:HD21	2.00	0.42
1:D:178:TYR:HE1	1:D:316:GLU:CD	2.23	0.42
1:D:342:ALA:CB	1:D:346:GLY:O	2.67	0.42
1:A:359:THR:O	1:A:362:ASN:HB3	2.19	0.42
1:D:191:ALA:C	1:D:193:GLY:H	2.23	0.42
1:B:378:ILE:HB	1:B:382:GLU:C	2.40	0.42
1:C:222:ALA:HB1	2:C:401:COA:C2A	2.50	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:70:ALA:HB1	1:A:75:LEU:HD12	2.02	0.42
1:A:292:ILE:CG1	1:A:325:ALA:HA	2.49	0.42
2:A:401:COA:H4B	2:A:401:COA:O7A	2.20	0.42
1:B:6:ILE:HD12	1:B:361:ILE:HD11	2.01	0.42
1:D:290:ALA:N	1:D:291:PRO:HD2	2.34	0.42
1:D:352:THR:O	1:D:353:GLY:C	2.58	0.42
1:D:314:ILE:HA	1:D:375:SER:O	2.20	0.42
1:A:273:ARG:O	1:A:388:LEU:HA	2.20	0.42
1:B:27:VAL:HG11	1:B:68:GLN:HB3	2.00	0.41
1:B:64:GLY:N	1:B:65:PRO:HD3	2.34	0.41
1:B:205:THR:HA	1:B:209:GLY:O	2.19	0.41
1:D:199:ILE:CG2	1:D:200:VAL:N	2.82	0.41
1:D:41:ALA:O	1:D:268:LEU:CD2	2.68	0.41
1:A:189:ALA:O	1:A:193:GLY:N	2.52	0.41
1:B:332:ASP:C	1:B:334:ALA:N	2.73	0.41
1:D:141:ASP:OD1	1:D:143:MET:HB3	2.21	0.41
1:A:376:LEU:HD23	1:A:376:LEU:N	2.35	0.41
1:B:218:GLN:HB2	1:B:344:ALA:O	2.19	0.41
1:C:376:LEU:HD23	1:C:376:LEU:N	2.35	0.41
1:C:204:VAL:O	1:C:210:GLU:HA	2.21	0.41
1:D:317:ALA:HB1	2:D:401:COA:S1P	2.60	0.41
1:C:309:VAL:HG11	1:C:312:PHE:CE1	2.56	0.41
1:B:52:ILE:O	1:B:112:ALA:HA	2.21	0.41
1:D:15:GLY:O	1:D:250:ASP:N	2.49	0.41
1:D:184:LYS:O	1:D:188:ALA:N	2.51	0.41
1:D:205:THR:O	1:D:206:SER:CB	2.69	0.41
1:A:185:ARG:NH1	1:A:336:VAL:O	2.53	0.41
1:B:3:ASP:O	1:B:259:THR:HA	2.21	0.41
1:D:298:LEU:HD22	1:D:385:ALA:HB1	2.03	0.41
1:D:320:MET:HA	1:D:323:MET:HB2	2.03	0.41
1:A:51:VAL:HA	1:A:111:VAL:O	2.21	0.41
1:A:129:ARG:HD2	1:D:119:SER:O	2.21	0.41
1:A:280:GLN:HE21	1:A:280:GLN:HA	1.85	0.41
1:B:192:ASP:HA	3:B:507:HOH:O	2.19	0.41
1:B:313:GLU:O	1:B:374:ALA:HA	2.21	0.41
1:D:5:VAL:HG21	1:D:270:PRO:HG2	2.03	0.41
1:D:347:HIS:CE1	1:D:349:VAL:HA	2.56	0.41
1:A:148:LEU:HA	1:A:148:LEU:HD12	1.87	0.41
1:B:100:ASP:OD1	1:B:277:HIS:HE1	2.04	0.41
1:B:309:VAL:CG1	1:B:312:PHE:CE1	3.03	0.41
1:A:99:HIS:HE2	1:A:103:LYS:HE2	1.86	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:242:ALA:CB	2:A:401:COA:H52A	2.51	0.40
1:B:142:HIS:ND1	1:B:146:ASP:OD2	2.52	0.40
1:C:290:ALA:N	1:C:291:PRO:CD	2.84	0.40
1:D:353:GLY:HA2	1:D:376:LEU:HD13	2.03	0.40
1:B:38:VAL:O	1:B:41:ALA:HB3	2.21	0.40
1:C:270:PRO:HG2	1:C:391:LEU:CD1	2.51	0.40
1:C:363:ALA:O	1:C:365:ARG:N	2.54	0.40
1:C:11:ARG:HG2	1:C:358:LEU:HD23	2.02	0.40
1:A:178:TYR:CD1	1:A:178:TYR:C	2.94	0.40
1:D:111:VAL:HA	1:D:255:LEU:O	2.21	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	388/399 (97%)	343 (88%)	42 (11%)	3 (1%)	19	43
1	B	388/399 (97%)	350 (90%)	33 (8%)	5 (1%)	12	30
1	C	384/399 (96%)	341 (89%)	36 (9%)	7 (2%)	8	21
1	D	388/399 (97%)	330 (85%)	51 (13%)	7 (2%)	8	21
All	All	1548/1596 (97%)	1364 (88%)	162 (10%)	22 (1%)	11	28

All (22) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	133	ARG
1	C	232	PRO
1	C	319	ALA
1	C	364	LEU
1	D	206	SER

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Mol	Chain	Res	Type
1	A	55	CYS
1	B	62	LYS
1	B	133	ARG
1	B	206	SER
1	B	333	HIS
1	B	368	GLY
1	C	64	GLY
1	C	368	GLY
1	C	363	ALA
1	D	166	ASP
1	D	235	ARG
1	D	147	GLY
1	D	349	VAL
1	C	235	ARG
1	D	205	THR
1	D	165	ALA
1	A	122	PRO

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	286/295 (97%)	273 (96%)	13 (4%)	27	55
1	B	286/295 (97%)	266 (93%)	20 (7%)	15	35
1	C	284/295 (96%)	267 (94%)	17 (6%)	19	42
1	D	286/295 (97%)	267 (93%)	19 (7%)	16	38
All	All	1142/1180 (97%)	1073 (94%)	69 (6%)	19	42

All (69) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	SER
1	A	86	LYS
1	A	115	MET
1	A	180	ILE

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Mol	Chain	Res	Type
1	A	203	THR
1	A	207	ARG
1	A	257	LEU
1	A	280	GLN
1	A	306	LYS
1	A	349	VAL
1	A	351	SER
1	A	352	THR
1	A	375	SER
1	B	117	SER
1	B	124	VAL
1	B	130	SER
1	B	134	MET
1	B	139	ILE
1	B	148	LEU
1	B	152	ARG
1	B	205	THR
1	B	207	ARG
1	B	211	SER
1	B	214	LYS
1	B	224	LEU
1	B	269	LYS
1	B	281	SER
1	B	288	THR
1	B	306	LYS
1	B	316	GLU
1	B	322	THR
1	B	332	ASP
1	B	352	THR
1	C	2	SER
1	C	138	GLU
1	C	160	PHE
1	C	194	SER
1	C	211	SER
1	C	214	LYS
1	C	224	LEU
1	C	229	SER
1	C	261	GLU
1	C	269	LYS
1	C	283	ASP
1	C	301	ARG
1	C	306	LYS

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Mol	Chain	Res	Type
1	C	349	VAL
1	C	351	SER
1	C	354	SER
1	C	362	ASN
1	D	20	SER
1	D	86	LYS
1	D	108	GLN
1	D	130	SER
1	D	139	ILE
1	D	175	MET
1	D	207	ARG
1	D	208	LYS
1	D	211	SER
1	D	226	LYS
1	D	229	SER
1	D	244	ASN
1	D	247	SER
1	D	249	SER
1	D	261	GLU
1	D	288	THR
1	D	332	ASP
1	D	354	SER
1	D	376	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	108	GLN
1	A	280	GLN
1	A	362	ASN
1	A	366	GLN
1	B	99	HIS
1	B	162	GLN
1	B	218	GLN
1	B	277	HIS
1	B	280	GLN
1	B	362	ASN
1	B	366	GLN
1	C	63	GLN
1	C	162	GLN
1	C	277	HIS
1	C	280	GLN

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Mol	Chain	Res	Type
1	C	333	HIS
1	C	366	GLN
1	D	18	GLN
1	D	108	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

4 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	COA	C	401	-	41,50,50	0.64	0	52,75,75	0.91	1 (1%)
2	COA	A	401	-	41,50,50	0.70	1 (2%)	52,75,75	1.04	4 (7%)
2	COA	B	401	-	41,50,50	0.70	0	52,75,75	0.92	3 (5%)
2	COA	D	401	-	41,50,50	0.70	1 (2%)	52,75,75	0.78	2 (3%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	COA	C	401	-	-	7/44/64/64	0/3/3/3
2	COA	A	401	-	-	14/44/64/64	0/3/3/3
2	COA	B	401	-	-	13/44/64/64	0/3/3/3
2	COA	D	401	-	-	13/44/64/64	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	401	COA	P3B-O3B	2.97	1.64	1.59
2	D	401	COA	P3B-O3B	2.66	1.64	1.59

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	401	COA	O2B-C2B-C3B	3.45	120.95	111.17
2	B	401	COA	C5A-C6A-N6A	2.82	124.64	120.35
2	D	401	COA	C5A-C6A-N6A	2.72	124.49	120.35
2	A	401	COA	C2B-C3B-C4B	-2.55	98.71	103.22
2	C	401	COA	C5A-C6A-N6A	2.45	124.07	120.35
2	A	401	COA	C5A-C6A-N6A	2.40	123.99	120.35
2	A	401	COA	C7P-C6P-C5P	-2.22	108.66	112.36
2	D	401	COA	O4B-C1B-C2B	-2.07	103.91	106.93
2	B	401	COA	O4B-C1B-C2B	-2.05	103.93	106.93
2	B	401	COA	OAP-CAP-CBP	2.05	115.07	110.25

There are no chirality outliers.

All (47) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	401	COA	C5B-O5B-P1A-O1A
2	A	401	COA	C5B-O5B-P1A-O2A
2	A	401	COA	P2A-O3A-P1A-O5B
2	A	401	COA	CCP-O6A-P2A-O4A
2	A	401	COA	CCP-O6A-P2A-O5A
2	A	401	COA	CAP-C9P-N8P-C7P
2	B	401	COA	C5B-O5B-P1A-O1A
2	B	401	COA	C5B-O5B-P1A-O2A
2	B	401	COA	O9P-C9P-CAP-CBP
2	B	401	COA	N8P-C9P-CAP-CBP
2	B	401	COA	S1P-C2P-C3P-N4P
2	C	401	COA	P1A-O3A-P2A-O6A

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Mol	Chain	Res	Type	Atoms
2	C	401	COA	CCP-O6A-P2A-O3A
2	C	401	COA	CCP-O6A-P2A-O5A
2	C	401	COA	C5P-C6P-C7P-N8P
2	C	401	COA	S1P-C2P-C3P-N4P
2	D	401	COA	CCP-O6A-P2A-O3A
2	D	401	COA	CAP-C9P-N8P-C7P
2	D	401	COA	O9P-C9P-N8P-C7P
2	D	401	COA	C5P-C6P-C7P-N8P
2	D	401	COA	C6P-C5P-N4P-C3P
2	D	401	COA	O5P-C5P-N4P-C3P
2	D	401	COA	S1P-C2P-C3P-N4P
2	A	401	COA	O4B-C4B-C5B-O5B
2	B	401	COA	C6P-C5P-N4P-C3P
2	B	401	COA	O5P-C5P-N4P-C3P
2	D	401	COA	C3B-C4B-C5B-O5B
2	D	401	COA	O4B-C4B-C5B-O5B
2	A	401	COA	O9P-C9P-N8P-C7P
2	D	401	COA	P2A-O3A-P1A-O1A
2	C	401	COA	P2A-O3A-P1A-O1A
2	D	401	COA	C4B-C5B-O5B-P1A
2	A	401	COA	O5P-C5P-N4P-C3P
2	D	401	COA	P2A-O3A-P1A-O2A
2	B	401	COA	C4B-C5B-O5B-P1A
2	B	401	COA	C5P-C6P-C7P-N8P
2	A	401	COA	C4B-C5B-O5B-P1A
2	B	401	COA	O9P-C9P-N8P-C7P
2	A	401	COA	C3B-C4B-C5B-O5B
2	A	401	COA	C5B-O5B-P1A-O3A
2	A	401	COA	CCP-O6A-P2A-O3A
2	B	401	COA	C3B-O3B-P3B-O9A
2	B	401	COA	C5B-O5B-P1A-O3A
2	C	401	COA	P2A-O3A-P1A-O2A
2	B	401	COA	CAP-C9P-N8P-C7P
2	A	401	COA	C6P-C5P-N4P-C3P
2	D	401	COA	CCP-O6A-P2A-O4A

There are no ring outliers.

4 monomers are involved in 12 short contacts:

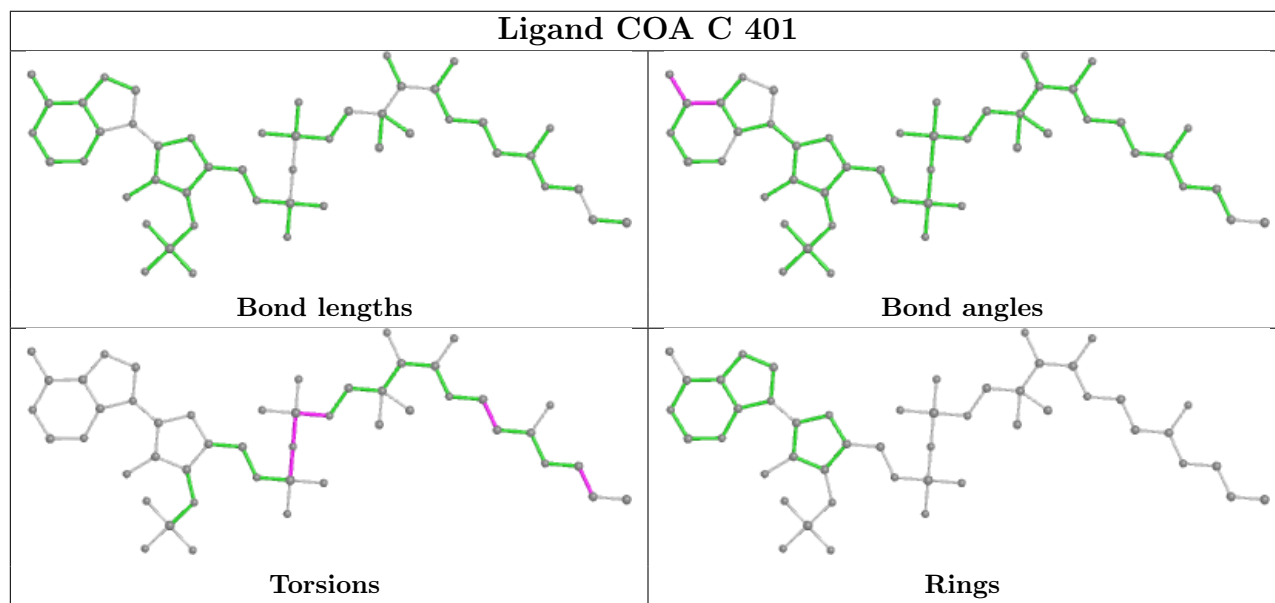
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	401	COA	3	0
2	A	401	COA	3	0

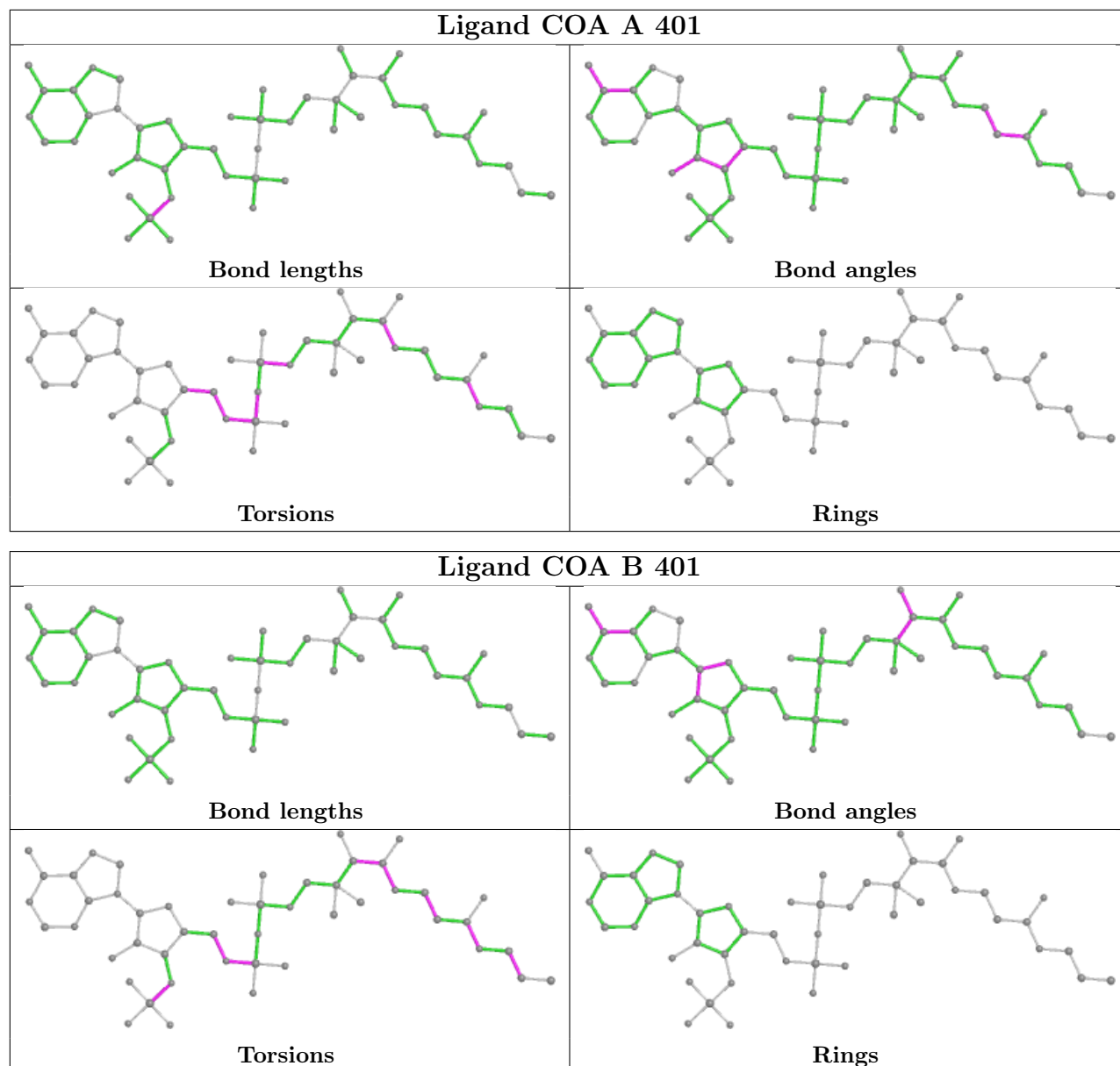
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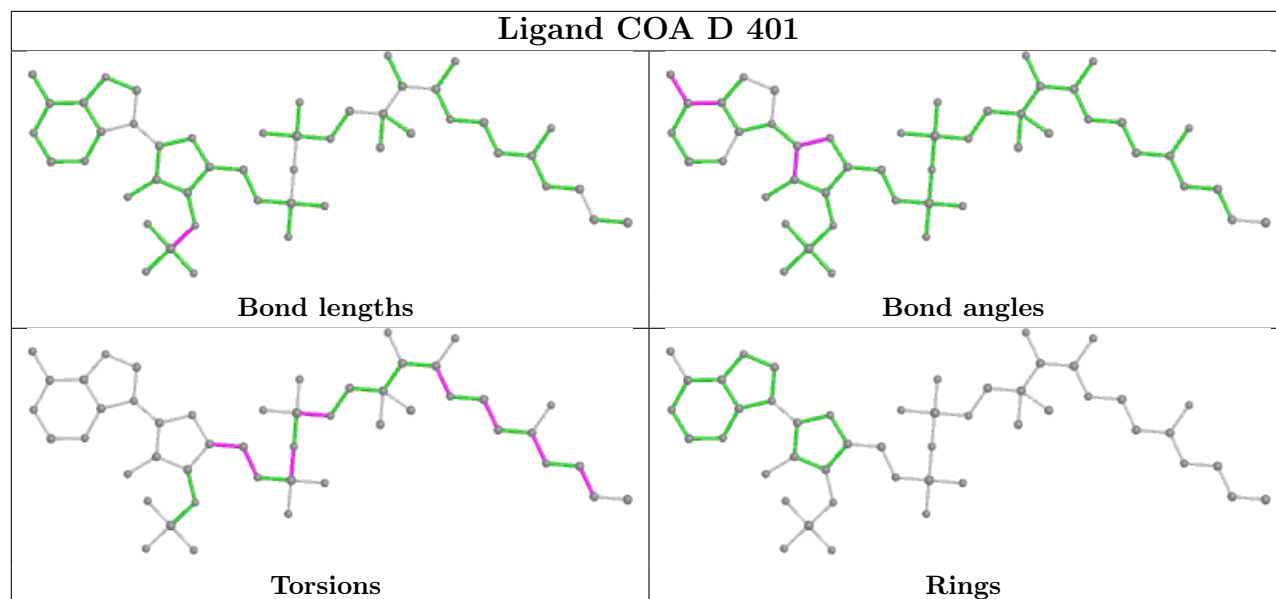
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	401	COA	4	0
2	D	401	COA	2	0

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 [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, 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	390/399 (97%)	-0.00	8 (2%) 63 65	18, 33, 52, 71	0
1	B	390/399 (97%)	0.12	14 (3%) 42 42	20, 35, 59, 92	0
1	C	388/399 (97%)	0.14	14 (3%) 42 42	19, 39, 58, 82	0
1	D	390/399 (97%)	0.44	32 (8%) 11 9	22, 45, 73, 91	0
All	All	1558/1596 (97%)	0.18	68 (4%) 34 33	18, 37, 64, 92	0

All (68) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	180	ILE	5.4
1	B	223	ASN	4.2
1	B	265	ARG	3.9
1	C	211	SER	3.9
1	D	307	ASP	3.9
1	C	206	SER	3.9
1	B	208	LYS	3.7
1	D	191	ALA	3.7
1	B	211	SER	3.4
1	B	206	SER	3.4
1	D	206	SER	3.4
1	C	210	GLU	3.3
1	D	207	ARG	3.3
1	D	209	GLY	3.2
1	D	189	ALA	3.2
1	D	237	ASP	3.2
1	A	223	ASN	3.1
1	D	208	LYS	3.1
1	B	207	ARG	3.1
1	C	236	LYS	3.1
1	D	304	TRP	3.0

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Mol	Chain	Res	Type	RSRZ
1	B	352	THR	3.0
1	C	237	ASP	2.9
1	B	355	ARG	2.9
1	D	357	ILE	2.9
1	A	88	CYS	2.8
1	D	365	ARG	2.7
1	C	204	VAL	2.7
1	D	354	SER	2.7
1	D	222	ALA	2.7
1	D	306	LYS	2.7
1	A	353	GLY	2.6
1	D	173	GLU	2.6
1	C	205	THR	2.6
1	B	2	SER	2.6
1	D	371	ARG	2.6
1	A	352	THR	2.5
1	C	269	LYS	2.5
1	B	268	LEU	2.5
1	D	350	GLY	2.5
1	D	390	LEU	2.5
1	C	341	GLY	2.5
1	C	303	GLY	2.5
1	A	264	GLN	2.5
1	C	239	THR	2.5
1	D	389	GLU	2.5
1	D	196	ALA	2.4
1	D	352	THR	2.4
1	D	355	ARG	2.4
1	B	3	ASP	2.3
1	B	351	SER	2.3
1	D	170	VAL	2.3
1	D	324	LEU	2.2
1	D	346	GLY	2.2
1	C	315	ASN	2.2
1	D	74	GLY	2.2
1	D	205	THR	2.2
1	A	351	SER	2.2
1	B	354	SER	2.2
1	D	178	TYR	2.2
1	D	331	LEU	2.2
1	B	368	GLY	2.2
1	C	127	LYS	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	126	GLU	2.1
1	D	353	GLY	2.1
1	C	191	ALA	2.1
1	D	308	ASP	2.1
1	A	236	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 monosaccharides in this entry.

6.4 Ligands [i](#)

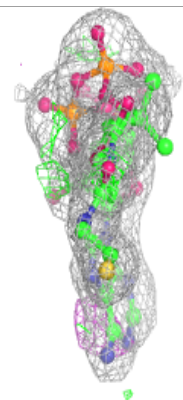
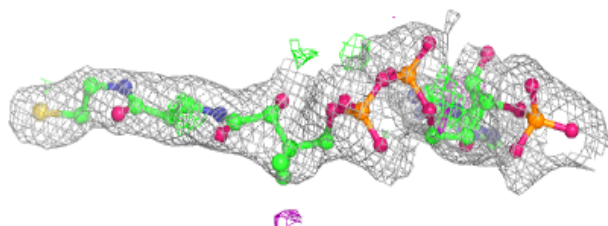
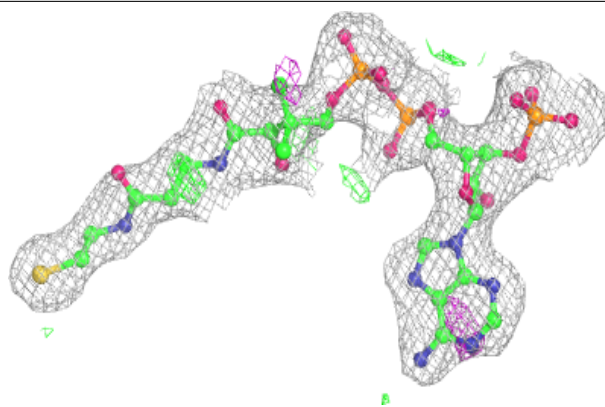
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	COA	A	401	48/48	0.89	0.18	27,42,52,55	0
2	COA	B	401	48/48	0.92	0.18	33,42,58,70	0
2	COA	D	401	48/48	0.92	0.17	46,63,79,87	0
2	COA	C	401	48/48	0.93	0.16	32,48,58,64	0

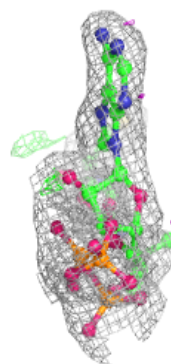
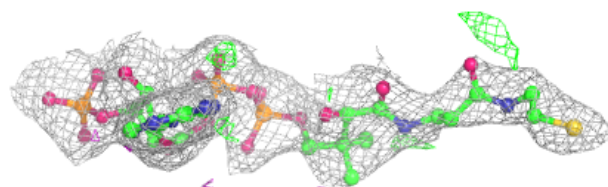
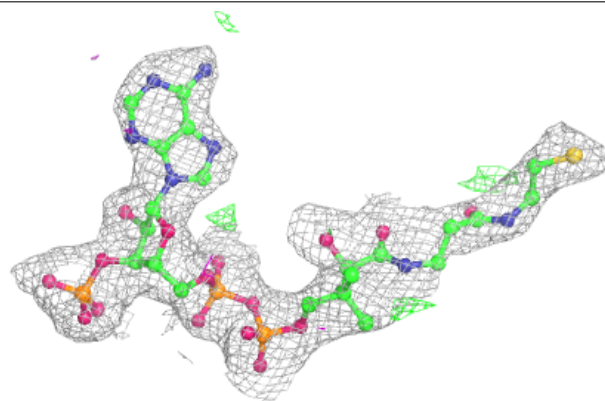
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around COA A 401:

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

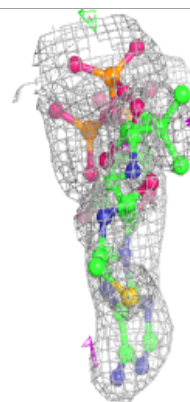
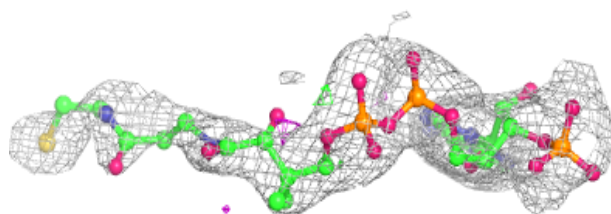
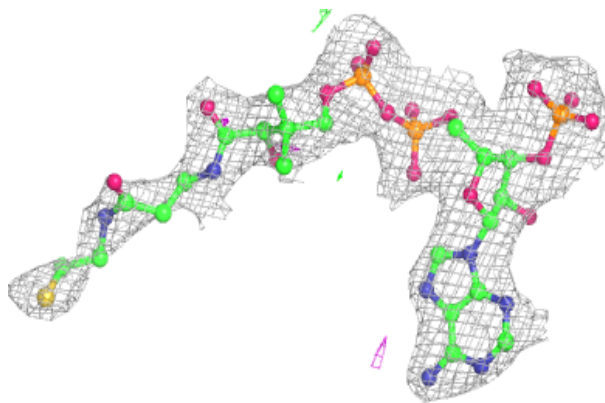
**Electron density around COA B 401:**

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

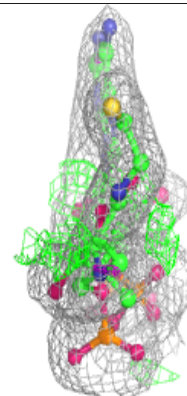
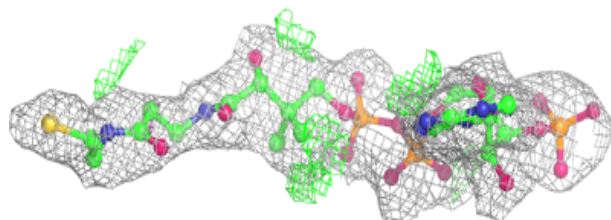
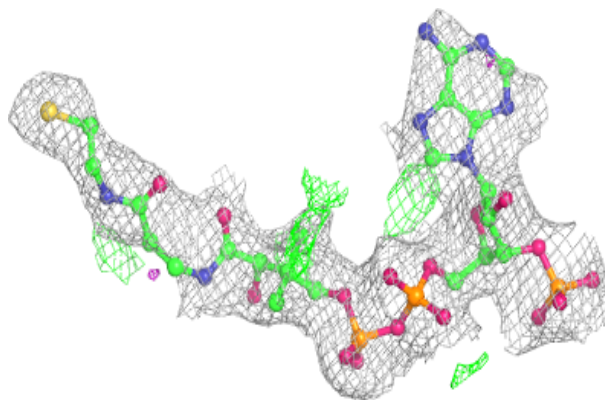


Electron density around COA D 401:

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

**Electron density around COA C 401:**

$2mF_o-DF_c$ (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.