Full wwPDB EM Validation Report ⓘ

Mar 15, 2026 – 12:09 AM JST

PDB ID	:	9WZU / pdb_00009wzu
EMDB ID	:	EMD-66409
Title	:	Cryo-EM structure of Fks1 in complex with enfumafungin
Authors	:	Bai, L.; Wang, L.X.
Deposited on	:	2025-09-29
Resolution	:	2.97 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp
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:

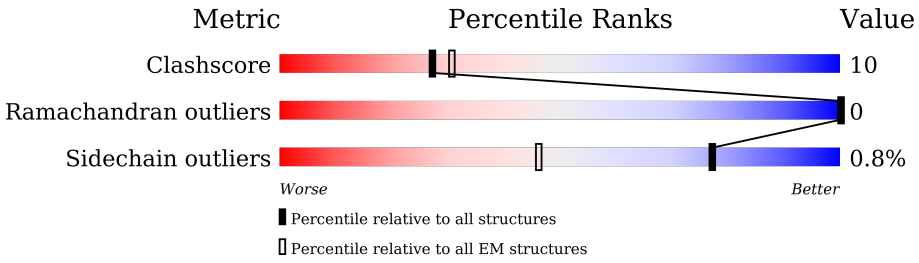
EMDB validation analysis	:	FAILED
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics	:	NOT EXECUTED
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.48.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 2.97 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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Mol	Chain	Length	Quality of chain
1	A	1876	69% 13% 19%
2	B	2	100%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 13115 atoms, of which 279 are hydrogens and 0 are deuteriums.

In the tables below, 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.

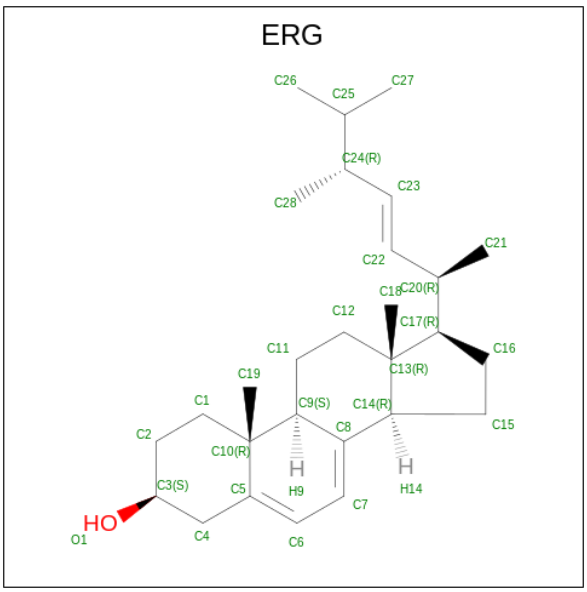
- Molecule 1 is a protein called 1,3-beta-glucan synthase component FKS1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1527	12445	8126	2087	2158	74	0	0

- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

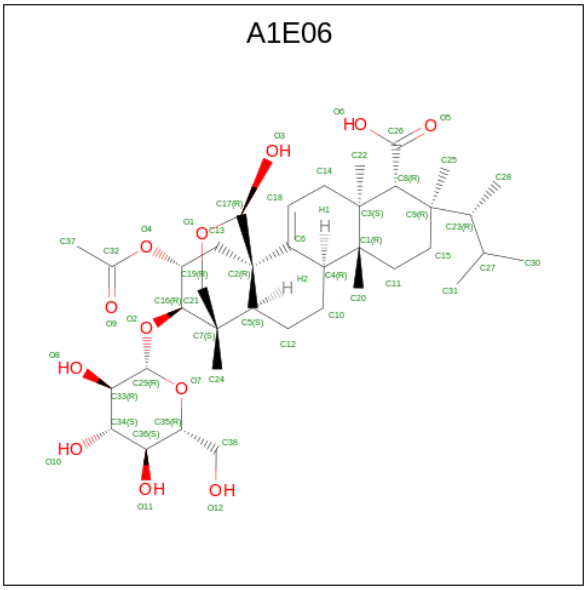
Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
2	B	2	28	16	2	10	0	0

- Molecule 3 is ERGOSTEROL (CCD ID: ERG) (formula: $C_{28}H_{44}O$).



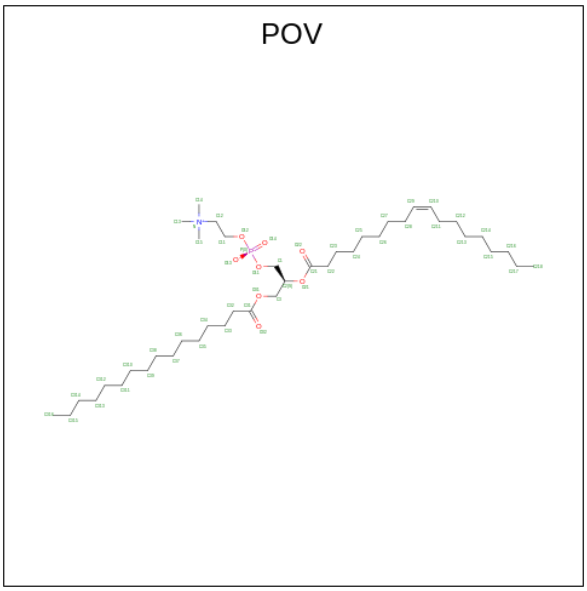
Mol	Chain	Residues	Atoms	AltConf
3	A	1	Total C O 29 28 1	0
3	A	1	Total C H O 73 28 44 1	0
3	A	1	Total C H O 73 28 44 1	0
3	A	1	Total C H O 73 28 44 1	0
3	A	1	Total C H O 73 28 44 1	0
3	A	1	Total C O 29 28 1	0
3	A	1	Total C O 29 28 1	0
3	A	1	Total C O 29 28 1	0
3	A	1	Total C H O 73 28 44 1	0

- Molecule 4 is Enfumafungin (CCD ID: A1E06) (formula: $C_{38}H_{60}O_{12}$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	AltConf
4	A	1	Total C H O 109 38 59 12	0

- Molecule 5 is (2S)-3-(hexadecanoyloxy)-2-[(9Z)-octadec-9-enoyloxy]propyl 2-(trimethylammonio)ethyl phosphate (CCD ID: POV) (formula: $C_{42}H_{82}NO_8P$).



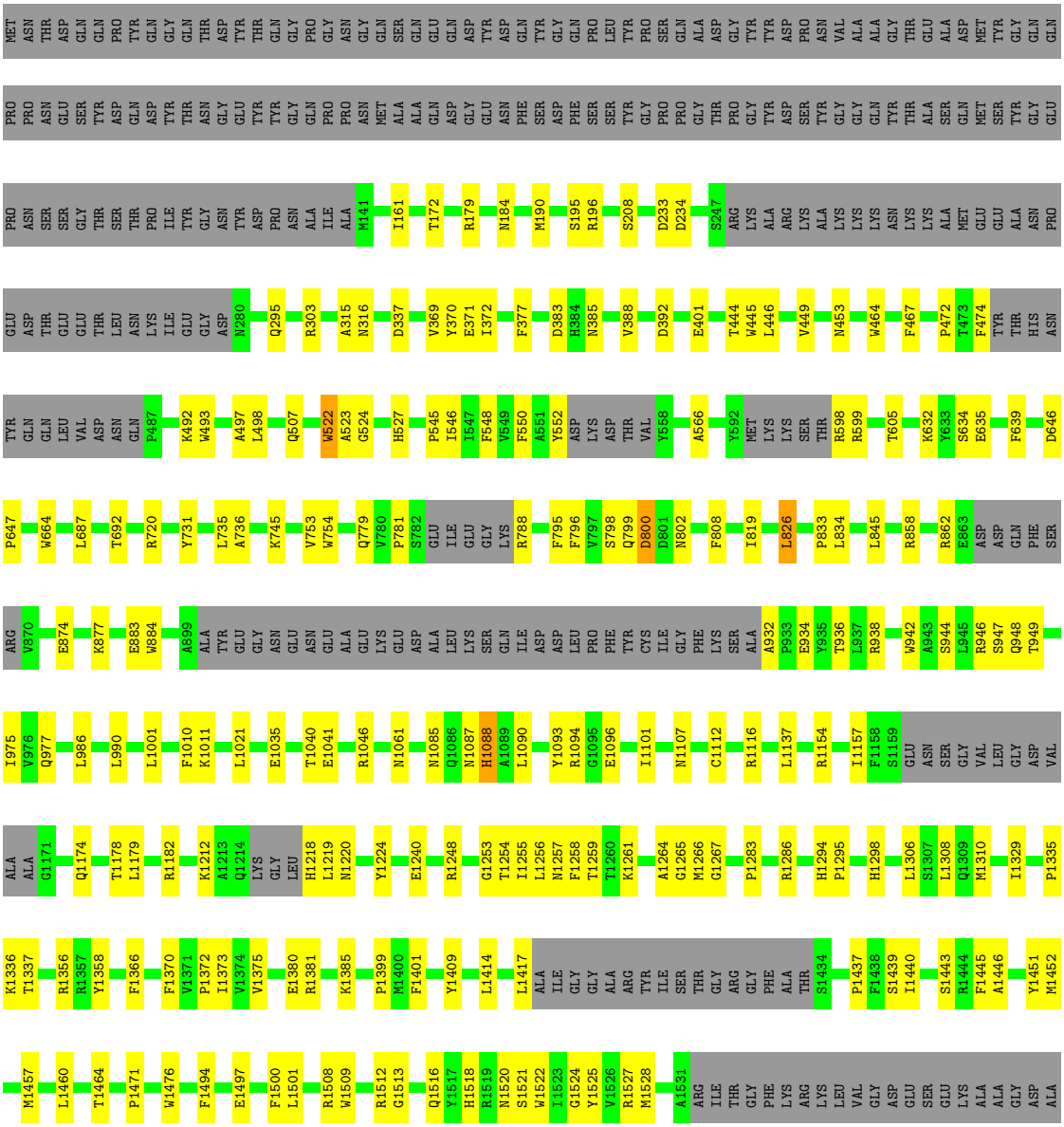
Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
5	A	1	52	42	1	8	1	0

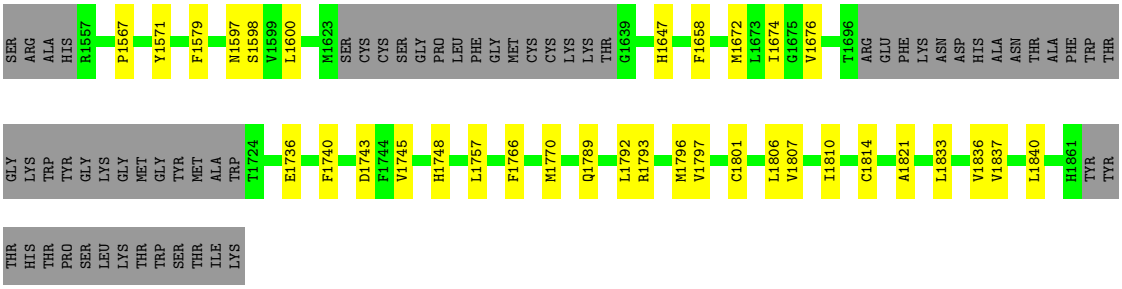
3 Residue-property plots (i)

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. 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. 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: 1,3-beta-glucan synthase component FKS1

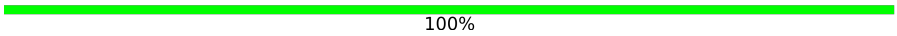
Chain A:





• Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain B:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	301005	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TECNAI F30	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ERG, POV, NAG, A1E06

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	0.33	0/12779	0.50	0/17329

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	12445	0	12413	224	0
2	B	28	0	25	0	0
3	A	261	220	396	49	0
4	A	50	59	0	5	0
5	A	52	0	82	6	0
All	All	12836	279	12916	248	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 10.

All (248) 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:1658:PHE:CE1	1:A:1676:VAL:HG21	1.57	1.37
1:A:1658:PHE:CZ	5:A:1911:POV:H215	1.64	1.31
1:A:467:PHE:HB3	3:A:1902:ERG:C26	1.68	1.23
1:A:467:PHE:CB	3:A:1902:ERG:H263	1.70	1.20
3:A:1908:ERG:H9	3:A:1910:ERG:H282	1.29	1.14
1:A:1446:ALA:HB1	1:A:1451:TYR:HE2	1.14	1.12
1:A:1522:TRP:HZ3	1:A:1736:GLU:OE2	1.33	1.05
1:A:1522:TRP:HZ2	1:A:1743:ASP:OD2	1.41	1.01
1:A:664:TRP:HB2	3:A:1904:ERG:H122	1.42	0.99
1:A:234:ASP:HB3	1:A:599:ARG:NH2	1.79	0.98
3:A:1908:ERG:H122	3:A:1910:ERG:H281	1.44	0.97
1:A:1446:ALA:HB1	1:A:1451:TYR:CE2	2.00	0.96
1:A:1658:PHE:HE1	1:A:1676:VAL:HG21	1.16	0.96
1:A:664:TRP:HB3	3:A:1904:ERG:H14	1.48	0.95
1:A:1658:PHE:CD1	1:A:1676:VAL:HG21	2.02	0.93
1:A:720:ARG:HB3	1:A:800:ASP:HA	1.51	0.92
1:A:1658:PHE:CE1	1:A:1676:VAL:CG2	2.51	0.92
1:A:1658:PHE:CZ	5:A:1911:POV:C215	2.52	0.91
1:A:1522:TRP:CZ2	1:A:1743:ASP:OD2	2.23	0.91
1:A:1522:TRP:CZ3	1:A:1736:GLU:OE2	2.24	0.91
1:A:234:ASP:HB3	1:A:599:ARG:HH22	1.34	0.90
3:A:1908:ERG:H9	3:A:1910:ERG:C28	2.02	0.89
1:A:1439:SER:OG	1:A:1509:TRP:CD2	2.25	0.88
1:A:1446:ALA:CB	1:A:1451:TYR:HE2	1.85	0.88
1:A:1525:TYR:HA	1:A:1528:MET:HE2	1.57	0.85
1:A:1259:THR:HB	1:A:1409:TYR:CE1	2.16	0.81
1:A:1658:PHE:CD1	1:A:1676:VAL:CG2	2.64	0.81
1:A:1658:PHE:CE1	5:A:1911:POV:H215	2.16	0.79
1:A:527:HIS:HB2	1:A:599:ARG:O	1.85	0.77
1:A:664:TRP:HA	3:A:1904:ERG:H9	1.68	0.76
1:A:467:PHE:CB	3:A:1902:ERG:C26	2.45	0.74
1:A:1219:LEU:HA	1:A:1261:LYS:HE2	1.69	0.74
1:A:720:ARG:HB3	1:A:800:ASP:CA	2.17	0.74
1:A:1107:ASN:ND2	1:A:1112:CYS:SG	2.63	0.72
1:A:1255:ILE:HG21	1:A:1401:PHE:HZ	1.55	0.71
1:A:467:PHE:HB3	3:A:1902:ERG:H263	0.80	0.71
1:A:720:ARG:CB	1:A:800:ASP:HA	2.20	0.71
4:A:1906:A1E06:O12	3:A:1907:ERG:C2	2.37	0.71
1:A:664:TRP:CB	3:A:1904:ERG:H122	2.20	0.69
1:A:1439:SER:OG	1:A:1509:TRP:CE2	2.46	0.69
1:A:1259:THR:CA	1:A:1409:TYR:HE1	2.05	0.69
4:A:1906:A1E06:O12	3:A:1907:ERG:H11	1.93	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1833:LEU:HB3	1:A:1837:VAL:HG13	1.76	0.68
1:A:1040:THR:OG1	1:A:1041:GLU:N	2.28	0.67
1:A:1512:ARG:HH12	1:A:1520:ASN:HD22	1.42	0.67
1:A:1513:GLY:HA2	1:A:1516:GLN:O	1.95	0.67
1:A:472:PRO:HG2	3:A:1902:ERG:C12	2.26	0.66
1:A:497:ALA:HB3	1:A:546:ILE:HD11	1.78	0.66
3:A:1908:ERG:C9	3:A:1910:ERG:H282	2.17	0.66
3:A:1905:ERG:H7	3:A:1908:ERG:C18	2.27	0.65
3:A:1908:ERG:C12	3:A:1910:ERG:H281	2.25	0.65
1:A:472:PRO:HG2	3:A:1902:ERG:H122	1.80	0.64
1:A:1460:LEU:O	1:A:1464:THR:HG23	1.96	0.64
1:A:1439:SER:HG	1:A:1509:TRP:CG	2.13	0.63
1:A:472:PRO:HG2	3:A:1902:ERG:H112	1.81	0.63
1:A:1264:ALA:O	1:A:1267:GLY:N	2.31	0.62
1:A:1356:ARG:HG2	1:A:1471:PRO:HG2	1.81	0.62
1:A:1266:MET:HG2	1:A:1298:HIS:ND1	2.13	0.62
1:A:303:ARG:NH2	1:A:337:ASP:OD1	2.31	0.62
1:A:234:ASP:HB3	1:A:599:ARG:CZ	2.30	0.61
1:A:736:ALA:HB2	1:A:833:PRO:HG2	1.83	0.61
1:A:1464:THR:HG21	1:A:1476:TRP:HE1	1.65	0.61
1:A:172:THR:HG21	1:A:179:ARG:HD2	1.84	0.60
1:A:720:ARG:HB3	1:A:800:ASP:O	2.01	0.60
1:A:646:ASP:HB3	1:A:647:PRO:HD3	1.82	0.60
1:A:1509:TRP:HZ2	1:A:1525:TYR:CD2	2.19	0.60
1:A:1658:PHE:CZ	1:A:1672:MET:SD	2.94	0.60
1:A:1259:THR:HA	1:A:1409:TYR:HE1	1.66	0.60
1:A:1792:LEU:O	1:A:1796:MET:HG2	2.00	0.60
1:A:1253:GLY:HA2	1:A:1256:LEU:HD12	1.84	0.60
1:A:1518:HIS:H	1:A:1521:SER:HB3	1.67	0.60
1:A:401:GLU:OE2	1:A:598:ARG:NH2	2.35	0.59
1:A:1658:PHE:HE1	1:A:1676:VAL:CG2	2.04	0.59
3:A:1910:ERG:H161	3:A:1910:ERG:H23	1.83	0.59
1:A:1157:ILE:HG21	1:A:1248:ARG:HD3	1.84	0.59
1:A:735:LEU:HD21	1:A:753:VAL:HG21	1.85	0.58
1:A:195:SER:OG	1:A:1096:GLU:OE1	2.21	0.58
1:A:472:PRO:CG	3:A:1902:ERG:H122	2.33	0.58
1:A:1256:LEU:HD13	1:A:1445:PHE:CZ	2.38	0.58
1:A:369:VAL:HG12	1:A:370:TYR:CD1	2.38	0.58
1:A:1821:ALA:CB	3:A:1905:ERG:H193	2.34	0.57
1:A:1821:ALA:HB1	3:A:1905:ERG:H193	1.85	0.57
1:A:523:ALA:HB1	1:A:598:ARG:HG3	1.86	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:550:PHE:CD2	1:A:552:TYR:HB2	2.38	0.57
3:A:1905:ERG:H151	3:A:1908:ERG:H181	1.85	0.57
1:A:472:PRO:HG2	3:A:1902:ERG:C11	2.34	0.57
1:A:1366:PHE:HZ	1:A:1399:PRO:HB3	1.69	0.56
1:A:527:HIS:CG	1:A:599:ARG:O	2.58	0.56
1:A:1521:SER:O	1:A:1524:GLY:N	2.38	0.56
4:A:1906:A1E06:O12	3:A:1907:ERG:C1	2.53	0.56
1:A:845:LEU:HD13	1:A:1001:LEU:HD23	1.87	0.56
3:A:1905:ERG:H7	3:A:1908:ERG:H181	1.87	0.56
1:A:524:GLY:H	1:A:598:ARG:HB2	1.71	0.56
1:A:444:THR:HG22	1:A:446:LEU:HB2	1.87	0.56
1:A:1256:LEU:HD13	1:A:1445:PHE:HZ	1.72	0.55
1:A:1259:THR:CB	1:A:1409:TYR:CE1	2.89	0.55
1:A:1525:TYR:HD1	1:A:1528:MET:HE2	1.70	0.55
1:A:370:TYR:HD2	1:A:377:PHE:HB3	1.72	0.55
1:A:527:HIS:CD2	1:A:599:ARG:O	2.59	0.55
1:A:1451:TYR:CD1	5:A:1911:POV:H3	2.42	0.55
3:A:1905:ERG:H7	3:A:1908:ERG:H182	1.90	0.54
1:A:1497:GLU:O	1:A:1501:LEU:HG	2.07	0.54
1:A:1509:TRP:HZ2	1:A:1525:TYR:CE2	2.26	0.54
3:A:1908:ERG:H14	3:A:1910:ERG:H24	1.89	0.54
1:A:1521:SER:OG	1:A:1524:GLY:HA3	2.08	0.54
1:A:1789:GLN:O	1:A:1793:ARG:HG3	2.08	0.54
1:A:635:GLU:HG2	1:A:639:PHE:HD2	1.73	0.53
1:A:369:VAL:HG12	1:A:370:TYR:HD1	1.73	0.53
1:A:1512:ARG:NH1	1:A:1520:ASN:HD22	2.07	0.53
1:A:1310:MET:HG2	3:A:1909:ERG:H193	1.90	0.53
1:A:1509:TRP:CZ2	1:A:1525:TYR:CE2	2.95	0.53
1:A:1525:TYR:HD1	1:A:1528:MET:CE	2.22	0.53
1:A:1446:ALA:CA	1:A:1451:TYR:CE2	2.90	0.52
1:A:527:HIS:CB	1:A:599:ARG:O	2.55	0.52
1:A:1294:HIS:HB2	1:A:1295:PRO:HD3	1.91	0.52
1:A:1500:PHE:CE2	1:A:1801:CYS:HB2	2.44	0.52
1:A:1597:ASN:ND2	1:A:1836:VAL:O	2.42	0.52
1:A:942:TRP:O	1:A:946:ARG:HG2	2.09	0.52
1:A:385:ASN:O	1:A:385:ASN:ND2	2.43	0.52
1:A:1748:HIS:CD2	1:A:1807:VAL:HG11	2.45	0.52
1:A:664:TRP:HB2	3:A:1904:ERG:C12	2.28	0.51
1:A:720:ARG:HB3	1:A:800:ASP:C	2.35	0.51
1:A:1658:PHE:CD1	1:A:1676:VAL:HG22	2.45	0.51
1:A:1266:MET:HG2	1:A:1298:HIS:CG	2.45	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1446:ALA:CA	1:A:1451:TYR:HE2	2.19	0.51
1:A:1821:ALA:HB1	3:A:1905:ERG:C19	2.41	0.50
1:A:874:GLU:HA	1:A:877:LYS:HD2	1.93	0.50
1:A:754:TRP:CH2	1:A:819:ILE:HD11	2.47	0.50
1:A:1264:ALA:O	1:A:1265:GLY:C	2.54	0.50
1:A:883:GLU:OE1	1:A:946:ARG:NH1	2.44	0.50
1:A:635:GLU:HG2	1:A:639:PHE:CD2	2.47	0.50
1:A:862:ARG:O	1:A:862:ARG:NE	2.46	0.49
1:A:934:GLU:O	1:A:938:ARG:HG3	2.10	0.49
1:A:947:SER:OG	1:A:948:GLN:N	2.46	0.49
1:A:720:ARG:CA	1:A:800:ASP:HA	2.42	0.49
1:A:161:ILE:HG22	1:A:190:MET:HE2	1.95	0.49
1:A:545:PRO:HA	1:A:548:PHE:CD2	2.47	0.49
1:A:664:TRP:CA	3:A:1904:ERG:H9	2.41	0.49
1:A:944:SER:HB3	1:A:949:THR:HG21	1.94	0.48
1:A:1174:GLN:O	1:A:1178:THR:HG23	2.12	0.48
4:A:1906:A1E06:O12	3:A:1907:ERG:H22A	2.12	0.48
1:A:444:THR:O	1:A:445:TRP:CD1	2.67	0.48
1:A:464:TRP:CD1	1:A:464:TRP:C	2.91	0.48
3:A:1901:ERG:H213	3:A:1901:ERG:H25	1.94	0.48
1:A:779:GLN:HB3	1:A:788:ARG:HB3	1.96	0.47
1:A:798:SER:HB3	1:A:808:PHE:HZ	1.79	0.47
1:A:1647:HIS:HB3	1:A:1740:PHE:CE1	2.49	0.47
1:A:233:ASP:OD1	1:A:605:THR:OG1	2.31	0.47
3:A:1910:ERG:H121	3:A:1910:ERG:H212	1.97	0.47
1:A:1182:ARG:NH1	1:A:1240:GLU:HG2	2.30	0.47
1:A:493:TRP:HB2	1:A:566:ALA:HB1	1.95	0.47
1:A:524:GLY:N	1:A:598:ARG:HB2	2.29	0.47
1:A:1814:CYS:SG	3:A:1905:ERG:H282	2.55	0.47
1:A:1766:PHE:N	1:A:1766:PHE:CD1	2.82	0.47
3:A:1908:ERG:C9	3:A:1910:ERG:C28	2.84	0.47
1:A:1524:GLY:O	1:A:1527:ARG:HG2	2.15	0.46
1:A:383:ASP:OD1	1:A:383:ASP:N	2.47	0.46
1:A:1306:LEU:HD21	3:A:1903:ERG:H12	1.97	0.46
3:A:1910:ERG:H161	3:A:1910:ERG:C23	2.45	0.46
1:A:1525:TYR:O	1:A:1528:MET:HG2	2.16	0.46
1:A:1600:LEU:HD23	1:A:1840:LEU:HD13	1.98	0.45
1:A:1259:THR:CB	1:A:1409:TYR:HE1	2.27	0.45
1:A:1370:PHE:N	1:A:1370:PHE:CD1	2.84	0.45
1:A:316:ASN:O	1:A:1087:ASN:ND2	2.46	0.45
1:A:720:ARG:HA	1:A:800:ASP:HA	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:745:LYS:HD2	1:A:745:LYS:HA	1.62	0.45
1:A:1380:GLU:O	1:A:1381:ARG:NH1	2.49	0.45
1:A:550:PHE:C	1:A:552:TYR:H	2.25	0.45
1:A:800:ASP:OD1	1:A:800:ASP:N	2.41	0.45
1:A:634:SER:HB3	4:A:1906:A1E06:C25	2.47	0.45
1:A:1494:PHE:CD1	1:A:1757:LEU:HD11	2.52	0.45
1:A:1658:PHE:HD1	1:A:1676:VAL:HG22	1.81	0.44
1:A:1745:VAL:HG21	5:A:1911:POV:H28A	2.00	0.44
1:A:449:VAL:HG22	3:A:1903:ERG:H281	2.00	0.44
1:A:1011:LYS:HE2	1:A:1011:LYS:HA	2.00	0.44
1:A:1522:TRP:O	1:A:1525:TYR:HB2	2.17	0.44
1:A:522:TRP:CG	1:A:523:ALA:H	2.35	0.44
1:A:1336:LYS:O	1:A:1337:THR:HG22	2.17	0.44
1:A:1218:HIS:NE2	1:A:1220:ASN:HB3	2.33	0.44
1:A:1154:ARG:NH1	1:A:1240:GLU:OE2	2.50	0.44
1:A:1283:PRO:HG2	1:A:1286:ARG:HG3	2.00	0.44
1:A:1329:ILE:C	1:A:1329:ILE:HD12	2.43	0.44
1:A:1035:GLU:HA	1:A:1046:ARG:O	2.18	0.44
1:A:1509:TRP:CZ2	1:A:1525:TYR:CD2	3.04	0.44
1:A:388:VAL:HG13	1:A:392:ASP:HB2	2.00	0.43
1:A:498:LEU:HD21	1:A:546:ILE:HG21	1.99	0.43
1:A:1509:TRP:CZ2	1:A:1525:TYR:HE2	2.36	0.43
1:A:1806:LEU:O	1:A:1810:ILE:HG23	2.18	0.43
1:A:1257:ASN:OD1	1:A:1258:PHE:N	2.51	0.43
1:A:1508:ARG:O	1:A:1512:ARG:HG3	2.18	0.43
1:A:1508:ARG:O	1:A:1512:ARG:N	2.52	0.43
1:A:315:ALA:O	1:A:316:ASN:HB3	2.19	0.43
1:A:453:ASN:OD1	1:A:507:GLN:NE2	2.37	0.43
1:A:1218:HIS:CE1	1:A:1220:ASN:HB3	2.53	0.43
1:A:474:PHE:CD2	1:A:492:LYS:HG3	2.53	0.43
1:A:1385:LYS:HD2	1:A:1385:LYS:O	2.19	0.43
1:A:826:LEU:HD12	1:A:826:LEU:HA	1.85	0.43
1:A:1521:SER:O	1:A:1522:TRP:C	2.62	0.43
1:A:802:ASN:OD1	1:A:802:ASN:N	2.52	0.43
1:A:196:ARG:NH1	1:A:208:SER:OG	2.52	0.42
1:A:1212:LYS:HG3	1:A:1224:TYR:HB3	2.01	0.42
1:A:1254:THR:HA	1:A:1257:ASN:ND2	2.33	0.42
1:A:796:PHE:C	1:A:800:ASP:OD1	2.62	0.42
1:A:295:GLN:O	1:A:295:GLN:HG2	2.19	0.42
1:A:1061:ASN:OD1	1:A:1061:ASN:N	2.53	0.42
1:A:731:TYR:HA	1:A:735:LEU:HD12	2.00	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:A:1910:ERG:H23	3:A:1910:ERG:C16	2.46	0.42
1:A:795:PHE:O	1:A:799:GLN:HB3	2.19	0.42
1:A:1672:MET:HE3	1:A:1672:MET:HB3	1.92	0.42
3:A:1908:ERG:H17	3:A:1910:ERG:H272	2.02	0.42
1:A:371:GLU:OE2	1:A:372:ILE:N	2.47	0.42
1:A:1085:ASN:O	1:A:1088:HIS:HB3	2.20	0.41
3:A:1908:ERG:H22	3:A:1908:ERG:H162	1.60	0.41
1:A:946:ARG:HA	1:A:946:ARG:HD3	1.87	0.41
1:A:1452:MET:HE2	1:A:1452:MET:HB3	1.97	0.41
1:A:1579:PHE:CE2	1:A:1598:SER:HB2	2.55	0.41
3:A:1908:ERG:H17	3:A:1910:ERG:C27	2.50	0.41
1:A:781:PRO:HA	1:A:788:ARG:HA	2.03	0.41
1:A:1090:LEU:O	1:A:1093:TYR:HD1	2.02	0.41
1:A:1770:MET:HE3	1:A:1770:MET:HB3	1.95	0.41
1:A:467:PHE:CB	3:A:1902:ERG:H261	2.44	0.41
1:A:522:TRP:CE3	1:A:522:TRP:HA	2.56	0.41
3:A:1907:ERG:H183	3:A:1907:ERG:H20	1.99	0.41
1:A:1256:LEU:CD1	1:A:1445:PHE:HZ	2.34	0.41
1:A:1259:THR:HA	1:A:1409:TYR:CE1	2.52	0.41
1:A:1414:LEU:HD23	1:A:1414:LEU:HA	1.95	0.41
1:A:184:ASN:OD1	1:A:1094:ARG:NH2	2.41	0.41
1:A:687:LEU:HD21	1:A:1358:TYR:CE1	2.56	0.41
1:A:1137:LEU:HD23	1:A:1137:LEU:HA	1.91	0.41
1:A:1439:SER:O	1:A:1443:SER:OG	2.36	0.41
1:A:467:PHE:HB2	3:A:1902:ERG:C26	2.46	0.41
1:A:1579:PHE:HD1	1:A:1674:ILE:HG23	1.86	0.41
1:A:834:LEU:O	1:A:1116:ARG:HD2	2.21	0.41
1:A:1021:LEU:HD23	1:A:1021:LEU:HA	1.89	0.41
1:A:1101:ILE:HD13	1:A:1101:ILE:HA	1.88	0.41
1:A:1335:PRO:C	1:A:1337:THR:H	2.29	0.41
1:A:1567:PRO:HB3	3:A:1909:ERG:H41	2.01	0.41
1:A:632:LYS:HE2	1:A:692:THR:OG1	2.21	0.40
1:A:1497:GLU:HG2	1:A:1797:VAL:HG21	2.03	0.40
1:A:858:ARG:HA	1:A:862:ARG:HB3	2.03	0.40
1:A:1373:ILE:HD13	1:A:1373:ILE:N	2.36	0.40
1:A:932:ALA:O	1:A:936:THR:HG22	2.21	0.40
1:A:986:LEU:O	1:A:990:LEU:HG	2.22	0.40
1:A:1451:TYR:CE1	5:A:1911:POV:H3	2.56	0.40
1:A:877:LYS:HE2	1:A:884:TRP:CZ2	2.57	0.40
1:A:977:GLN:C	1:A:977:GLN:OE1	2.65	0.40
1:A:1179:LEU:HD23	1:A:1372:PRO:HB3	2.02	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1437:PRO:HG2	1:A:1440:ILE:HG12	2.04	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 PDB entries followed by that with respect to all EM entries.

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	1499/1876 (80%)	1433 (96%)	66 (4%)	0	100	100

There are no Ramachandran outliers to report.

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 PDB entries followed by that with respect to all EM entries.

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	1339/1620 (83%)	1328 (99%)	11 (1%)	79	90

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	522	TRP
1	A	800	ASP
1	A	826	LEU
1	A	975	ILE
1	A	1010	PHE

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Mol	Chain	Res	Type
1	A	1088	HIS
1	A	1308	LEU
1	A	1375	VAL
1	A	1417	LEU
1	A	1457	MET
1	A	1571	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	145	ASN
1	A	178	GLN
1	A	204	GLN
1	A	368	GLN
1	A	385	ASN
1	A	604	GLN
1	A	880	HIS
1	A	1107	ASN
1	A	1126	ASN
1	A	1228	ASN
1	A	1269	GLN
1	A	1323	HIS
1	A	1469	GLN
1	A	1516	GLN
1	A	1520	ASN
1	A	1767	HIS
1	A	1789	GLN
1	A	1861	HIS

5.3.3 RNA (i)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

2 monosaccharides 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	NAG	B	1	1,2	14,14,15	0.46	0	17,19,21	0.45	0
2	NAG	B	2	2	14,14,15	0.24	0	17,19,21	0.43	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAG	B	1	1,2	-	4/6/23/26	0/1/1/1
2	NAG	B	2	2	-	2/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

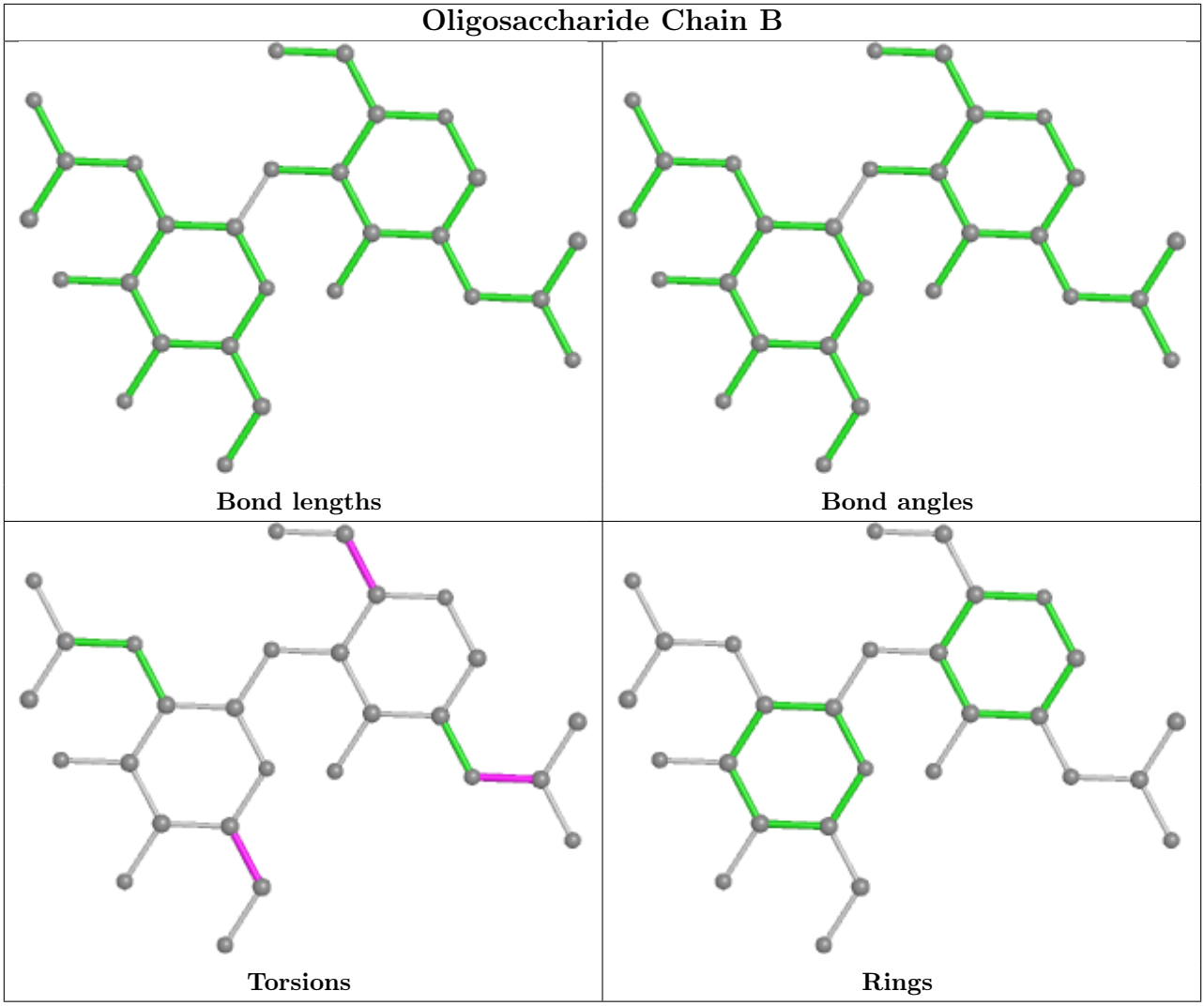
All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	2	NAG	C4-C5-C6-O6
2	B	1	NAG	C4-C5-C6-O6
2	B	1	NAG	O5-C5-C6-O6
2	B	2	NAG	O5-C5-C6-O6
2	B	1	NAG	C8-C7-N2-C2
2	B	1	NAG	O7-C7-N2-C2

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.



5.6 Ligand geometry (i)

11 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	ERG	A	1907	-	31,32,32	0.49	0	47,50,50	0.67	0
5	POV	A	1911	-	51,51,51	0.49	0	57,59,59	0.46	0
4	A1E06	A	1906	-	52,55,55	0.37	0	69,91,91	1.43	5 (7%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
3	ERG	A	1905	-	31,32,32	0.61	1 (3%)	47,50,50	0.95	2 (4%)
3	ERG	A	1910	-	31,32,32	0.61	1 (3%)	47,50,50	0.68	1 (2%)
3	ERG	A	1904	-	31,32,32	0.62	1 (3%)	47,50,50	0.60	0
3	ERG	A	1901	-	31,32,32	0.51	0	47,50,50	1.16	4 (8%)
3	ERG	A	1903	-	31,32,32	0.68	1 (3%)	47,50,50	0.52	0
3	ERG	A	1909	-	31,32,32	0.50	0	47,50,50	0.84	1 (2%)
3	ERG	A	1902	-	31,32,32	0.62	1 (3%)	47,50,50	0.61	0
3	ERG	A	1908	-	31,32,32	0.46	0	47,50,50	0.66	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	ERG	A	1907	-	-	6/13/71/71	0/4/4/4
5	POV	A	1911	-	-	14/55/55/55	-
4	A1E06	A	1906	-	-	5/24/138/138	0/7/6/6
3	ERG	A	1905	-	-	2/13/71/71	0/4/4/4
3	ERG	A	1910	-	-	3/13/71/71	0/4/4/4
3	ERG	A	1904	-	-	4/13/71/71	0/4/4/4
3	ERG	A	1901	-	-	8/13/71/71	0/4/4/4
3	ERG	A	1903	-	-	3/13/71/71	0/4/4/4
3	ERG	A	1909	-	-	11/13/71/71	0/4/4/4
3	ERG	A	1902	-	-	4/13/71/71	0/4/4/4
3	ERG	A	1908	-	-	6/13/71/71	0/4/4/4

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1903	ERG	C10-C9	3.37	1.60	1.55
3	A	1910	ERG	C10-C9	3.01	1.59	1.55
3	A	1902	ERG	C10-C9	2.90	1.59	1.55
3	A	1904	ERG	C10-C9	2.88	1.59	1.55
3	A	1905	ERG	C10-C9	2.69	1.59	1.55

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	A	1906	A1E06	C7-C5-C2	-8.65	105.76	115.07
4	A	1906	A1E06	C29-O2-C16	4.84	124.65	116.25
3	A	1905	ERG	C14-C8-C9	3.76	120.31	114.66
3	A	1901	ERG	C20-C22-C23	3.18	135.54	125.67
3	A	1905	ERG	C14-C8-C7	-3.11	118.25	124.38
3	A	1901	ERG	C24-C23-C22	3.09	135.26	125.67
4	A	1906	A1E06	C22-C3-C8	2.74	113.23	110.39
3	A	1909	ERG	C19-C10-C5	-2.68	104.00	108.34
3	A	1901	ERG	C14-C13-C17	2.68	102.58	99.72
4	A	1906	A1E06	C3-C8-C9	-2.50	116.27	118.10
3	A	1901	ERG	C16-C15-C14	-2.50	101.18	105.30
3	A	1910	ERG	C16-C17-C13	-2.13	101.28	103.84
4	A	1906	A1E06	C12-C5-C2	2.11	113.98	111.18

There are no chirality outliers.

All (66) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	1901	ERG	C22-C23-C24-C25
3	A	1902	ERG	C17-C20-C22-C23
3	A	1902	ERG	C22-C23-C24-C25
3	A	1903	ERG	C20-C22-C23-C24
3	A	1904	ERG	C17-C20-C22-C23
3	A	1904	ERG	C22-C23-C24-C25
3	A	1907	ERG	C13-C17-C20-C21
3	A	1907	ERG	C16-C17-C20-C21
3	A	1907	ERG	C16-C17-C20-C22
3	A	1908	ERG	C13-C17-C20-C21
3	A	1908	ERG	C13-C17-C20-C22
3	A	1908	ERG	C16-C17-C20-C21
3	A	1908	ERG	C16-C17-C20-C22
3	A	1909	ERG	C13-C17-C20-C21
3	A	1909	ERG	C16-C17-C20-C21
3	A	1909	ERG	C16-C17-C20-C22
3	A	1909	ERG	C23-C24-C25-C27
3	A	1909	ERG	C28-C24-C25-C26
3	A	1909	ERG	C28-C24-C25-C27
3	A	1910	ERG	C17-C20-C22-C23
5	A	1911	POV	C1-O11-P-O13
4	A	1906	A1E06	O7-C29-O2-C16
4	A	1906	A1E06	C33-C29-O2-C16
3	A	1905	ERG	C22-C23-C24-C28
3	A	1905	ERG	C22-C23-C24-C25

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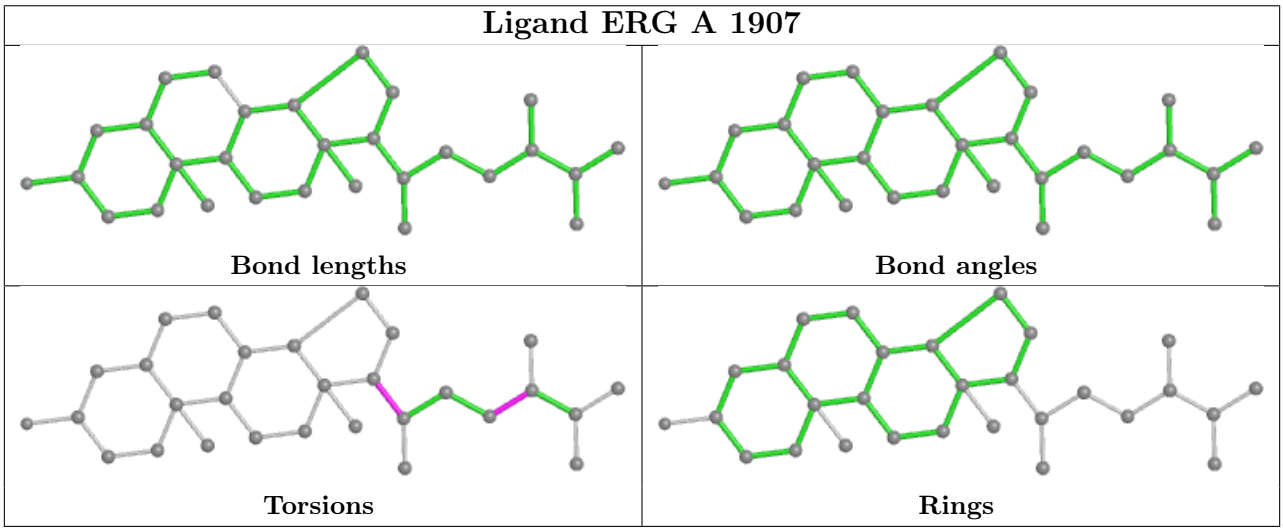
Mol	Chain	Res	Type	Atoms
3	A	1909	ERG	C22-C23-C24-C25
3	A	1910	ERG	C22-C23-C24-C25
3	A	1909	ERG	C22-C23-C24-C28
3	A	1910	ERG	C22-C23-C24-C28
5	A	1911	POV	C310-C311-C312-C313
5	A	1911	POV	C22-C21-O21-C2
3	A	1909	ERG	C23-C24-C25-C26
5	A	1911	POV	O22-C21-O21-C2
5	A	1911	POV	C210-C211-C212-C213
3	A	1901	ERG	C13-C17-C20-C22
3	A	1901	ERG	C16-C17-C20-C22
3	A	1907	ERG	C13-C17-C20-C22
3	A	1909	ERG	C13-C17-C20-C22
3	A	1908	ERG	C17-C20-C22-C23
3	A	1909	ERG	C17-C20-C22-C23
3	A	1901	ERG	C21-C20-C22-C23
3	A	1908	ERG	C21-C20-C22-C23
5	A	1911	POV	C35-C36-C37-C38
5	A	1911	POV	C311-C310-C39-C38
4	A	1906	A1E06	O7-C35-C38-O12
4	A	1906	A1E06	C13-C19-O4-C32
4	A	1906	A1E06	C16-C19-O4-C32
3	A	1904	ERG	C22-C23-C24-C28
5	A	1911	POV	C37-C38-C39-C310
3	A	1901	ERG	C20-C22-C23-C24
5	A	1911	POV	C311-C312-C313-C314
5	A	1911	POV	C11-O12-P-O11
3	A	1902	ERG	C22-C23-C24-C28
3	A	1901	ERG	C16-C17-C20-C21
5	A	1911	POV	C34-C35-C36-C37
3	A	1901	ERG	C17-C20-C22-C23
3	A	1902	ERG	C21-C20-C22-C23
3	A	1904	ERG	C21-C20-C22-C23
3	A	1903	ERG	C17-C20-C22-C23
5	A	1911	POV	C32-C33-C34-C35
3	A	1907	ERG	C22-C23-C24-C25
3	A	1903	ERG	C22-C23-C24-C28
3	A	1907	ERG	C22-C23-C24-C28
5	A	1911	POV	C1-O11-P-O14
5	A	1911	POV	C11-O12-P-O14
3	A	1901	ERG	C13-C17-C20-C21

There are no ring outliers.

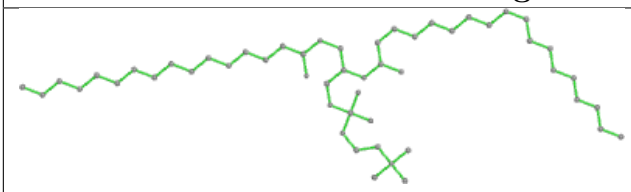
11 monomers are involved in 56 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1907	ERG	5	0
5	A	1911	POV	6	0
4	A	1906	A1E06	5	0
3	A	1905	ERG	8	0
3	A	1910	ERG	13	0
3	A	1904	ERG	6	0
3	A	1901	ERG	1	0
3	A	1903	ERG	2	0
3	A	1909	ERG	2	0
3	A	1902	ERG	11	0
3	A	1908	ERG	14	0

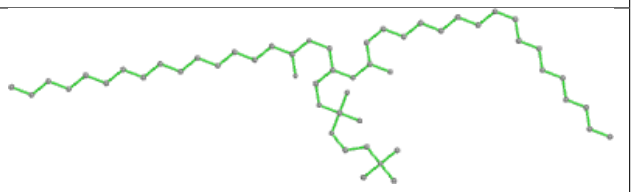
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



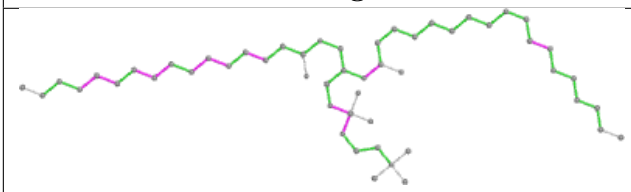
Ligand POV A 1911



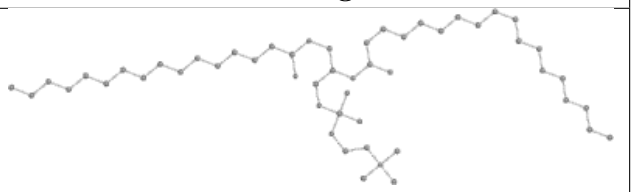
Bond lengths



Bond angles

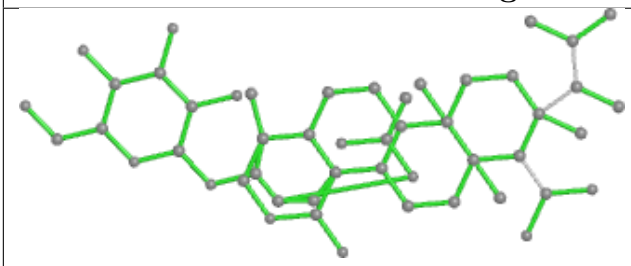


Torsions



Rings

Ligand A1E06 A 1906



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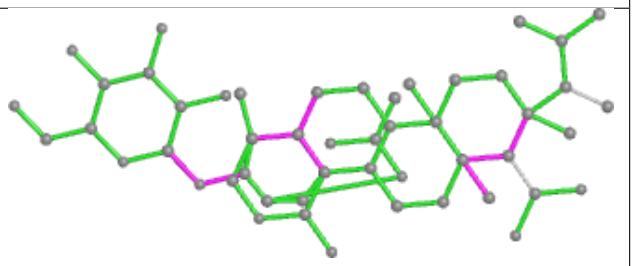
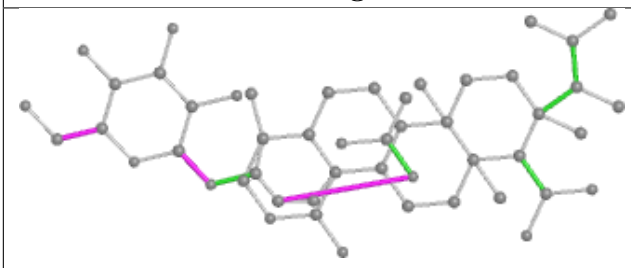


Bond angles



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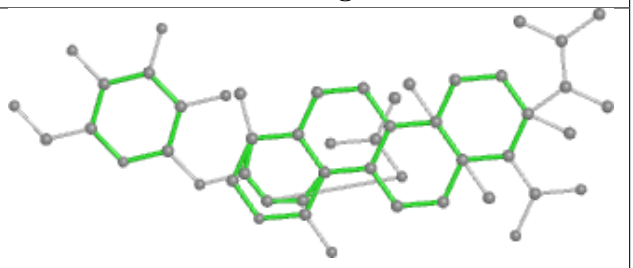
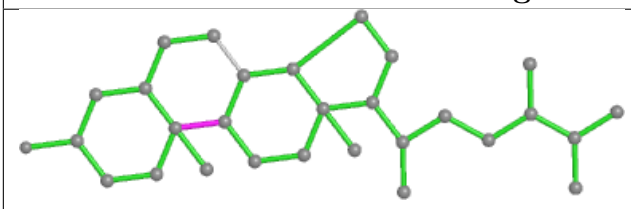
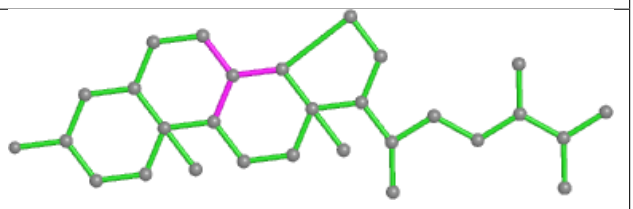


Rings

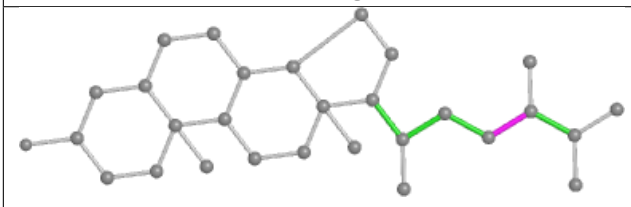
Ligand ERG A 1905



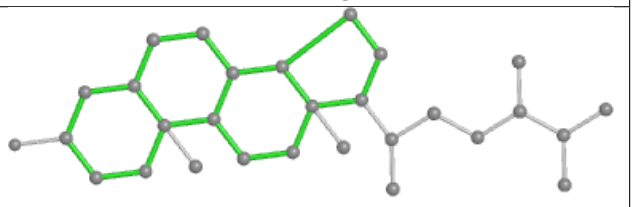
Bond lengths



Bond angles

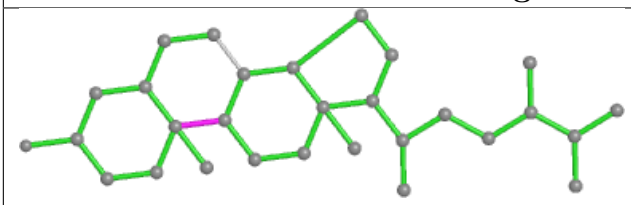


Torsions



Rings

Ligand ERG A 1910



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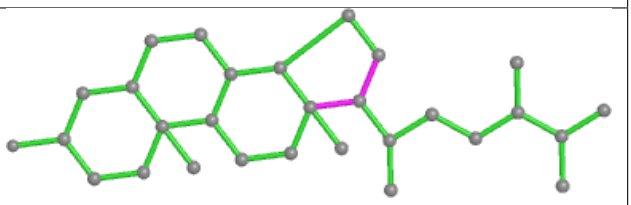
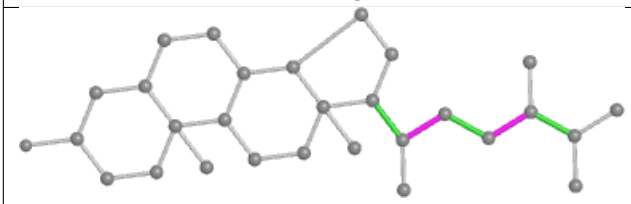
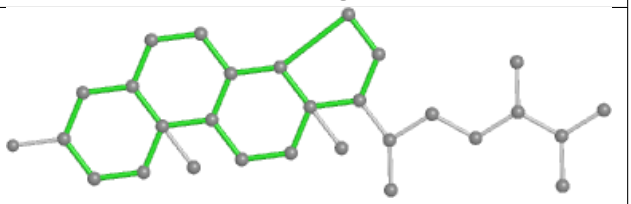


Bond angles

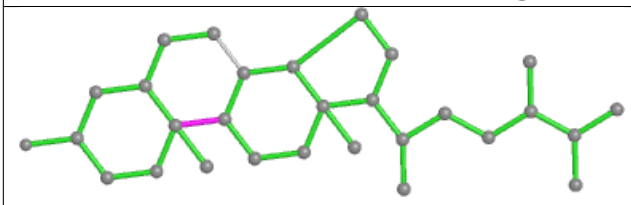


Torsions



Rings

Ligand ERG A 1904



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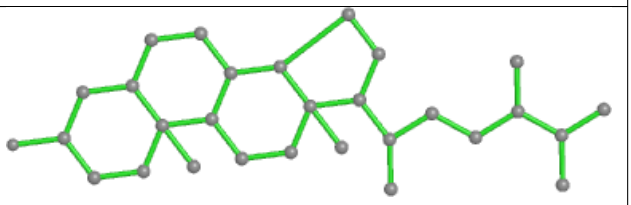

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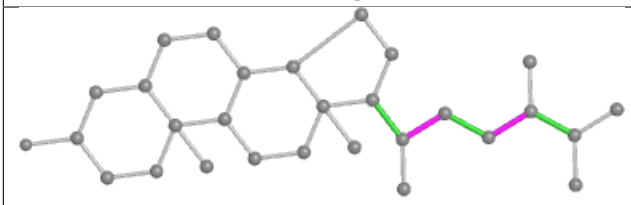

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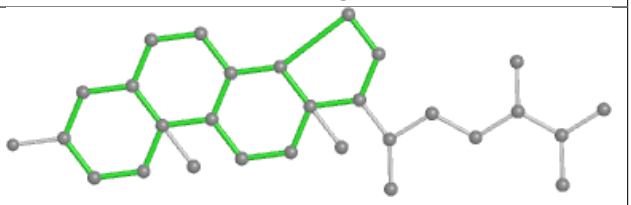

Rings

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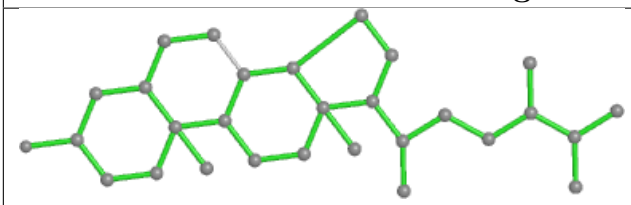

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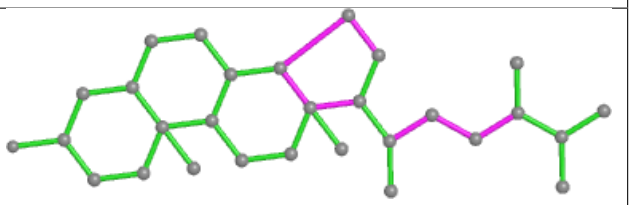

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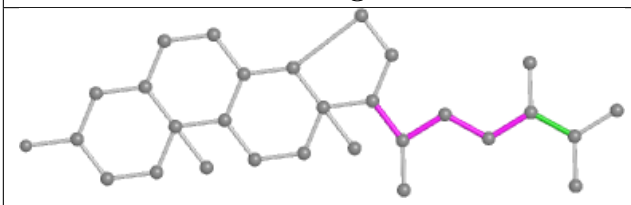

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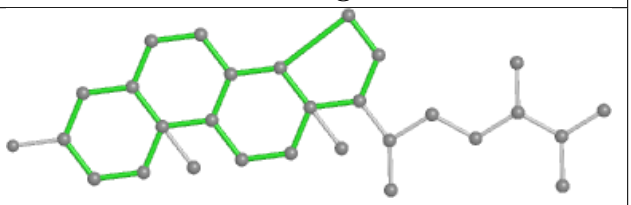
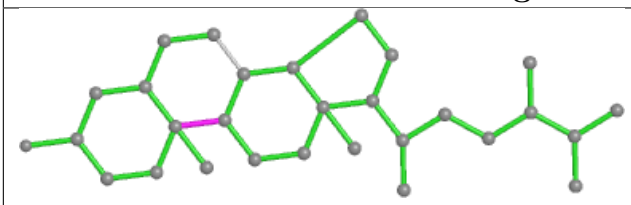


Rings

Ligand ERG A 1903



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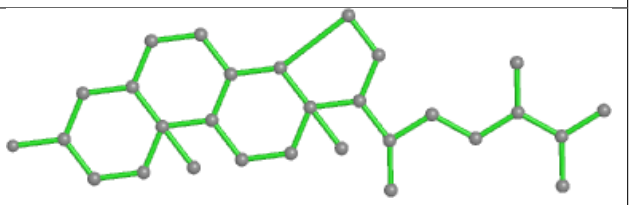

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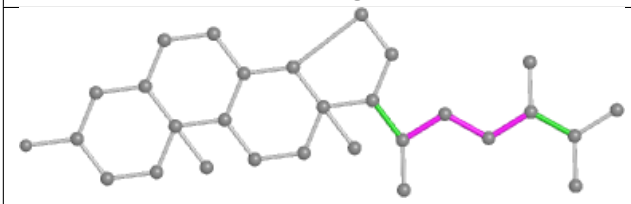

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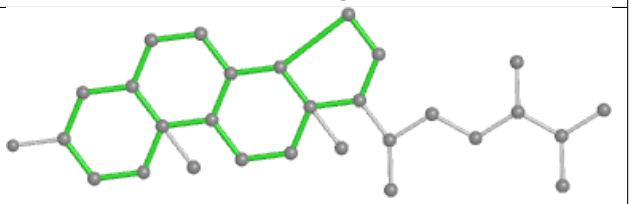
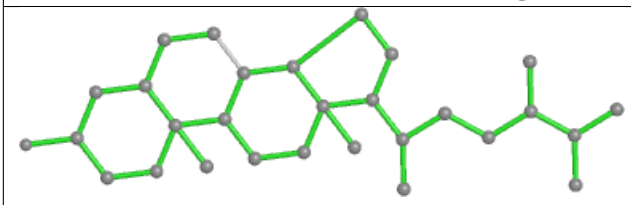


Rings

Ligand ERG A 1909



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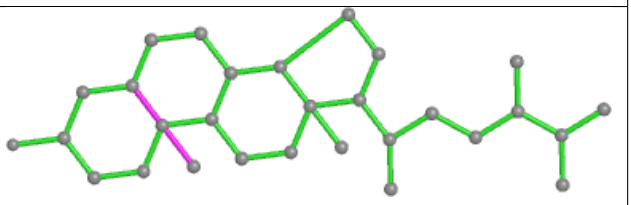

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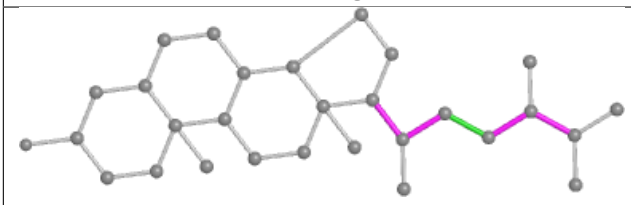

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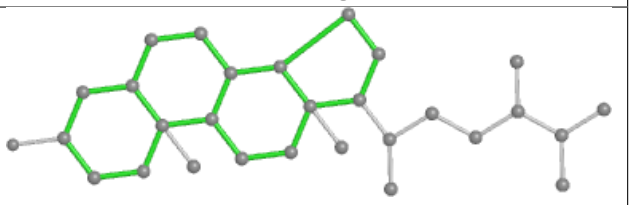
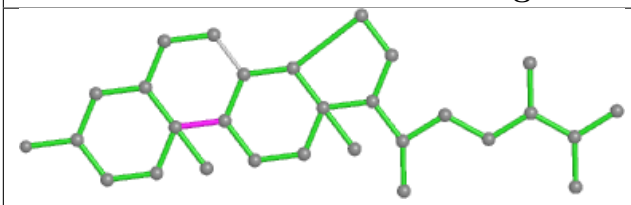


Rings

Ligand ERG A 1902



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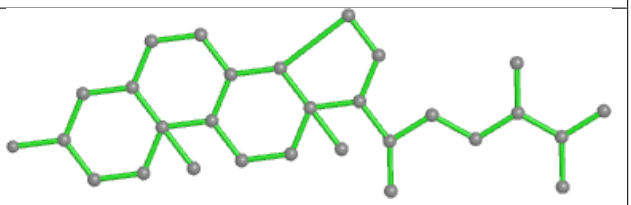
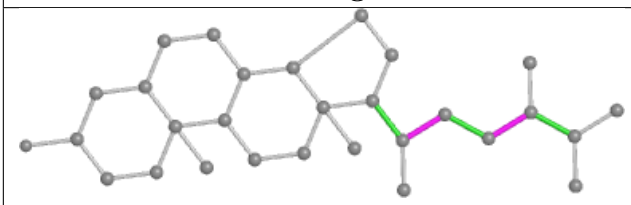


Bond angles



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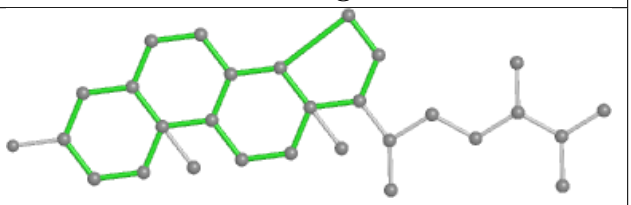
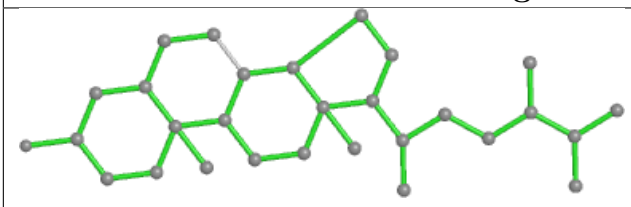


Rings

Ligand ERG A 1908



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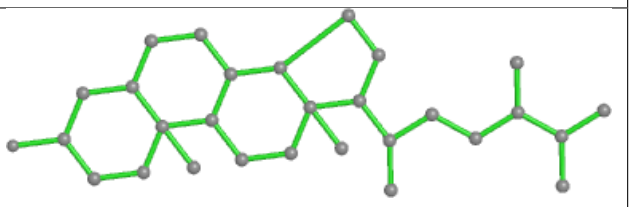

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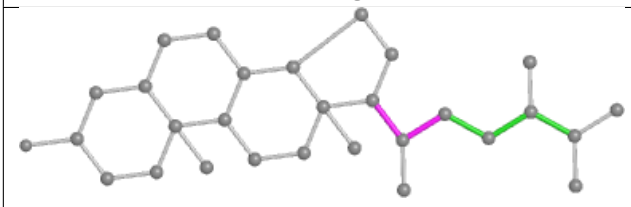

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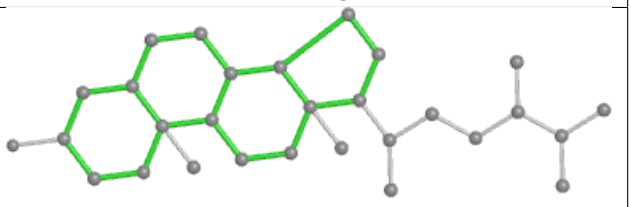

Rings

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.