



wwPDB X-ray Structure Validation Summary Report ⓘ

May 23, 2020 – 02:05 am BST

PDB ID : 1OD2
Title : Acetyl-CoA Carboxylase Carboxyltransferase Domain
Authors : Zhang, H.; Yang, Z.; Shen, Y.; Tong, L.
Deposited on : 2003-02-12
Resolution : 2.70 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

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

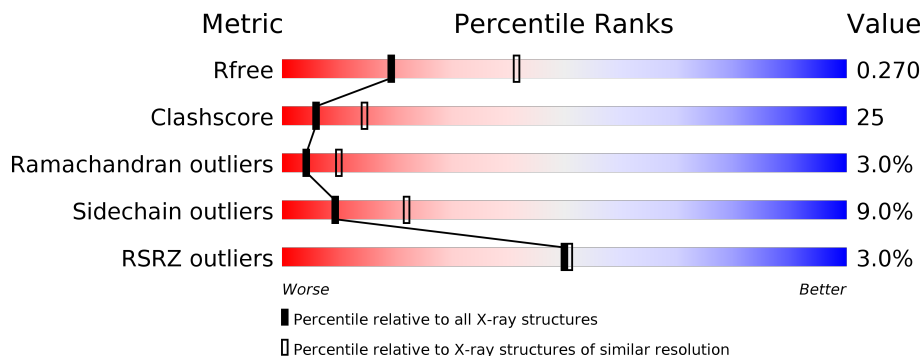
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	805	 3% 52% 32% 5% 11%
1	B	805	 2% 44% 37% 5% 14%

2 Entry composition [i](#)

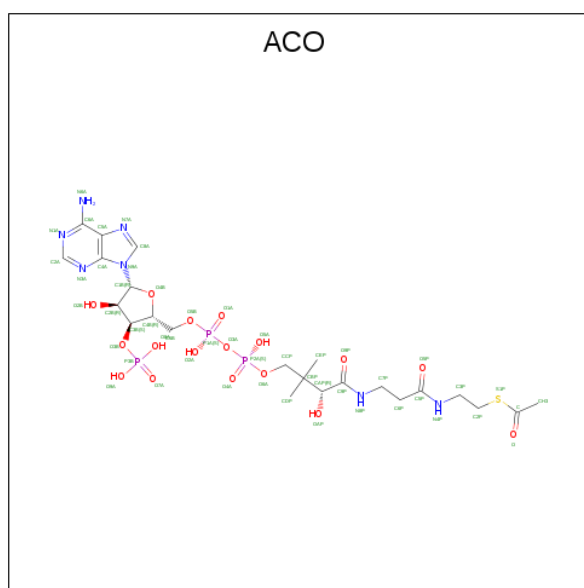
There are 4 unique types of molecules in this entry. The entry contains 11433 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 ACETYL-COENZYME A CARBOXYLASE.

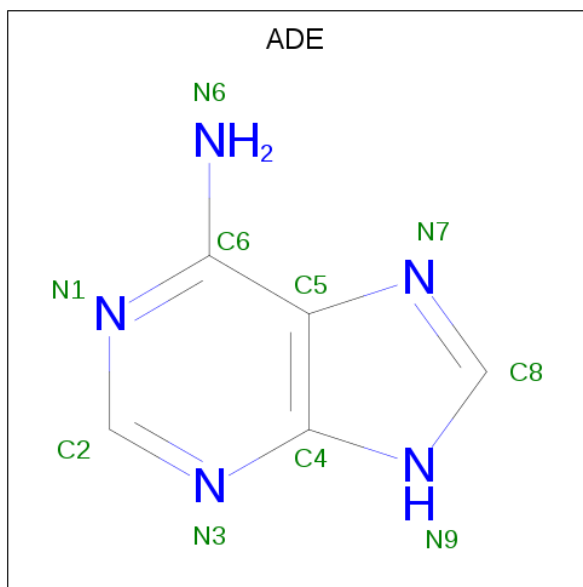
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	N	O	S				Se
1	A	720	Total	C	N	O	S	Se	0	0	1
			5742	3650	994	1079	2	17			
1	B	696	Total	C	N	O	S	Se	0	0	1
			5544	3518	963	1044	2	17			

- Molecule 2 is ACETYL COENZYME *A (three-letter code: ACO) (formula: $C_{23}H_{38}N_7O_{17}P_3S$).



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

- Molecule 3 is ADENINE (three-letter code: ADE) (formula: $C_5H_5N_5$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	B	1	Total	C	N	0	0
			10	5	5		

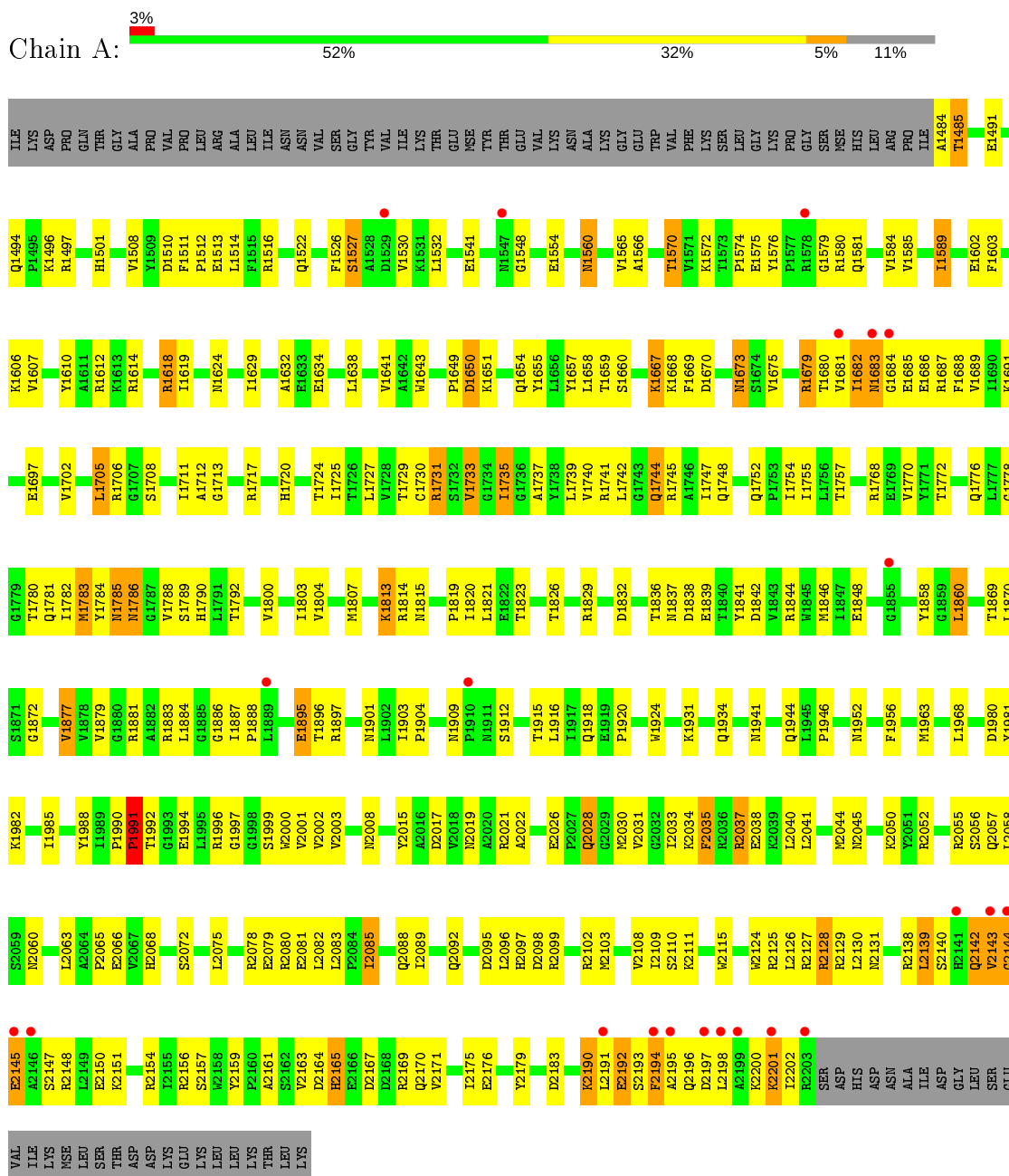
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	47	Total	O	0	0
			47	47		
4	B	42	Total	O	0	0
			42	42		

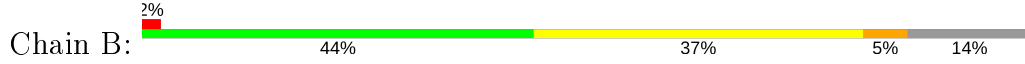
3 Residue-property plots [i](#)

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

- Molecule 1: ACETYL-COENZYME A CARBOXYLASE



● Molecule 1: ACETYL-COENZYME A CARBOXYLASE



ILE	VAL	M1560	M1643	A1742	D1796	R1883	V1975	R2061	Q2142	ILE
LYS	LYS	F1567	M1644	G1713	L1797	I1887	V1979	R2062	V2143	ASP
PRO	GLU	I1569	D1645	M1717	E1801	V1891	D1980	S2063	E2144	GLY
GLN	LEU	K1572	A1646	I1725	E1807	E1895	K1982	A2064	E2145	LEU
GLY	GLN	E1575	A1647	T1726	M1807	T1896	Q1983	V2067	S2147	SER
ALA	K1496	G1579	P1649	L1727	V1810	R1897	P1984	Q2070	R2148	VAL
PRO	R1497	V1583	D1650	M1728	A1811	M1901	I1986	L2071	E2149	ILE
VAL	K1498	V1584	G1652	T1729	A1812	L1902	I1987	L2072	E2150	LYS
LEU	K1499	V1585	F1653	C1730	K1813	I1903	P1990	L2073	L2151	LEU
THR	L1502	V1586	Q1654	R1731	R1814	L1904	P1991	L2074	R2152	SER
ARG	L1506	V1587	Q1655	S1732	M1815	P1904	E1991	L2075	R2153	THR
ALA	T1505	V1588	L1656	G1734	M1816	A1906	T1992	L2076	I2155	ASP
LEU	T1506	V1589	L1657	I1735	P1817	D1906	G1993	D2077	W2158	ASP
LEU	T1507	D1588	L1658	I1736	V1818	D1907	G1998	R2078	W2159	LYS
ILE	A1507	D1589	L1659	I1737	V1819	D1908	G1999	E2079	P2160	GLU
ASN	V1508	T1590	E1661	I1738	I1820	M1911	R1996	L2081	P2161	LYS
VAL	E1513	F1591	M1662	L1739	W1827	S1912	G1997	E2082	V2163	LEU
SER	L1514	K1592	E1664	W1740	D1828	A1913	G1998	L2083	D2164	LEU
GLY	F1515	I1593	E1665	R1741	R1829	E1914	G1999	L2084	R2165	LYS
TYR	R1516	G1594	M1666	Q1744	R1830	E1915	W2000	P2084	E2166	THR
ILE	Q1517	P1598	K1668	I1747	V1831	I1917	V2001	Y2085	D2167	LEU
LYS	W1523	P1599	F1669	I1748	V1832	G1921	D2010	Y2086	D2168	LEU
THR	F1526	Q1599	D1670	W1749	T1834	Q1922	D2011	Q2087	V2171	LEU
GLU	S1527	E1600	K1671	V1752	P1835	V1923	Q2012	Q2088	W2172	LEU
MSE	T1528	D1601	E1672	Q1755	R1836	M1924	M2013	S2089	N2178	LEU
THR	A1528	E1602	S1674	I1756	N1837	H1925	M2014	S2090	Y2179	LEU
TYR	D1529	F1606	L1675	L1757	D1838	P1926	M2015	Q2092	K2180	LEU
GLU	V1530	K1607	L1676	T1758	E1839	M1927	R2021	R2097	T2181	LEU
VAL	A1531	V1607	R1679	G1759	D1842	S1928	V2024	E2097	L2182	LEU
LYS	L1532	Y1610	T1680	A1759	V1843	Q1934	L2025	S2100	D2183	LEU
ALA	T1533	G1615	V1681	P1760	R1844	A1935	L2026	D2184	E2184	LEU
LYS	D1534	I1616	I1682	M1765	T1852	I1936	E2027	M2103	K2185	LEU
GLY	F1536	P1617	M1683	L1766	E1853	M1940	Q2028	R2106	L2186	LEU
GLU	I1537	R1618	G1684	G1767	S1854	M1941	G2029	G2107	G2187	LEU
TRP	T1538	I1619	E1685	M1768	G1855	M1942	F2035	V2108	G2188	LEU
VAL	S1539	Y1620	E1686	T1772	F1856	L1949	R2036	L2109	L2189	LEU
LYS	N1540	L1621	R1687	S1773	L1860	L1950	E2037	R2119	K2190	LEU
SER	E1541	A1622	F1688	Q1776	L1863	L1951	E2038	R2125	GLU	GLU
LEU	L1542	A1623	V1689	G1779	K1863	M1952	K2039	L2126	SER	SER
GLY	I1543	N1624	I1690	T1780	G1864	M1953	L2040	L2127	PHE	PHE
LYS	E1544	S1625	K1691	T1781	S1865	M1954	L2041	R2128	ALA	ALA
PRO	D1545	G1626	T1692	Q1782	L1870	G1955	M2044	R2129	GLN	GLN
LYS	E1546	M1631	I1693	M1782	S1871	R1954	W2045	L2130	ASP	ASP
GLY	M1547	A1632	I1694	M1783	G1872	Q1960	R2046	L2131	LEU	LEU
MSE	G1548	E1633	D1698	M1784	A1874	R1961	R2047	E2132	LYS	LYS
HIS	E1549	E1634	G1699	M1785	A1874	D1962	L2047	L2133	ILE	ILE
LEU	E1552	P1637	L1700	M1786	A1874	M1963	K2050	L2135	ARG	ARG
ARG	V1553	F1638	G1701	M1787	V1877	M1966	Y2051	L2136	SER	SER
PRO	E1554	Q1640	V1702	S1788	V1878	E1967	R2052	L2137	THR	THR
PRO	E1555	F1639	E1703	S1789	V1878	V1967	R2053	R2138	ASP	ASP
ILE	E1556	Q1641	C1704	H1790	V1878	L1968	R2055	R2139	HIS	HIS
THR	E1557	A1642	L1705	L1791	R1881	L1969	L2058	S2140	ASP	ASP
THR	G1558	A1642	I1711	T1792	A1882	K1969		R2141	ASN	ASN
PRO	A1559								ALA	ALA

4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	92.87Å 138.13Å 101.40Å 90.00° 114.42° 90.00°	Depositor
Resolution (Å)	28.85 – 2.70 28.85 – 2.69	Depositor EDS
% Data completeness (in resolution range)	93.2 (28.85-2.70) 92.7 (28.85-2.69)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	5.54 (at 2.68Å)	Xtrriage
Refinement program	CNS 1.1	Depositor
R, R_{free}	0.226 , 0.279 0.217 , 0.270	Depositor DCC
R_{free} test set	6032 reflections (10.04%)	wwPDB-VP
Wilson B-factor (Å ²)	41.8	Xtrriage
Anisotropy	0.414	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 41.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.019 for h,-k,-h-l	Xtrriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	11433	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 4.15% of the height of the origin peak. No significant pseudotranslation is detected.*

¹ Intensities estimated from amplitudes.

² Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ADE, ACO

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	0.45	0/5850	0.66	0/7893
1	B	0.45	0/5646	0.67	0/7615
All	All	0.45	0/11496	0.66	0/15508

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	5742	0	5688	271	0
1	B	5544	0	5483	318	0
2	A	48	0	31	4	0
3	B	10	0	4	0	0
4	A	47	0	0	1	0
4	B	42	0	0	2	0
All	All	11433	0	11206	558	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 25.

The worst 5 of 558 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:2085:ILE:HD12	1:A:2085:ILE:H	1.17	1.06
1:A:2085:ILE:HG12	1:B:1650:ASP:HA	1.38	1.01
1:A:1730:CYS:HA	1:A:1752:GLN:HE21	1.18	0.99
1:A:2034:LYS:HB2	1:B:1631:MSE:HE3	1.48	0.96
1:B:1940:ASN:HD22	1:B:1983:GLN:HE22	1.07	0.94

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	718/805 (89%)	640 (89%)	61 (8%)	17 (2%)	6	15
1	B	694/805 (86%)	608 (88%)	61 (9%)	25 (4%)	3	7
All	All	1412/1610 (88%)	1248 (88%)	122 (9%)	42 (3%)	4	10

5 of 42 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1683	ASN
1	A	1991	PRO
1	A	2144	GLY
1	A	2194	PHE
1	B	1838	ASP

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	612/668 (92%)	556 (91%)	56 (9%)	9	21
1	B	591/668 (88%)	539 (91%)	52 (9%)	10	23
All	All	1203/1336 (90%)	1095 (91%)	108 (9%)	9	22

5 of 108 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2163	VAL
1	B	1540	ASN
1	B	2091	LEU
1	A	2179	TYR
1	A	2194	PHE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 47 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2060	ASN
1	B	1525	ASN
1	B	2097	HIS
1	A	2131	ASN
1	B	1540	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](#)

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

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry

2 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	ADE	B	3190	-	9,11,11	1.53	2 (22%)	7,15,15	0.92	0
2	ACO	A	3203	-	41,50,53	1.22	4 (9%)	52,75,79	1.65	6 (11%)

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	ADE	B	3190	-	-	-	0/2/2/2
2	ACO	A	3203	-	-	9/44/64/67	0/3/3/3

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	3190	ADE	C2-N3	3.30	1.37	1.32
2	A	3203	ACO	C2A-N3A	3.06	1.37	1.32
2	A	3203	ACO	C4A-N3A	2.84	1.39	1.35
3	B	3190	ADE	C4-N9	2.48	1.39	1.34
2	A	3203	ACO	C8A-N7A	-2.34	1.30	1.34

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	3203	ACO	C3P-N4P-C5P	5.53	133.10	122.84
2	A	3203	ACO	O6A-CCP-CBP	5.46	119.33	110.55
2	A	3203	ACO	P2A-O3A-P1A	-3.42	121.08	132.83
2	A	3203	ACO	C2P-C3P-N4P	-3.36	104.64	112.31
2	A	3203	ACO	O2B-C2B-C3B	2.09	117.09	111.17

There are no chirality outliers.

5 of 9 torsion outliers are listed below:

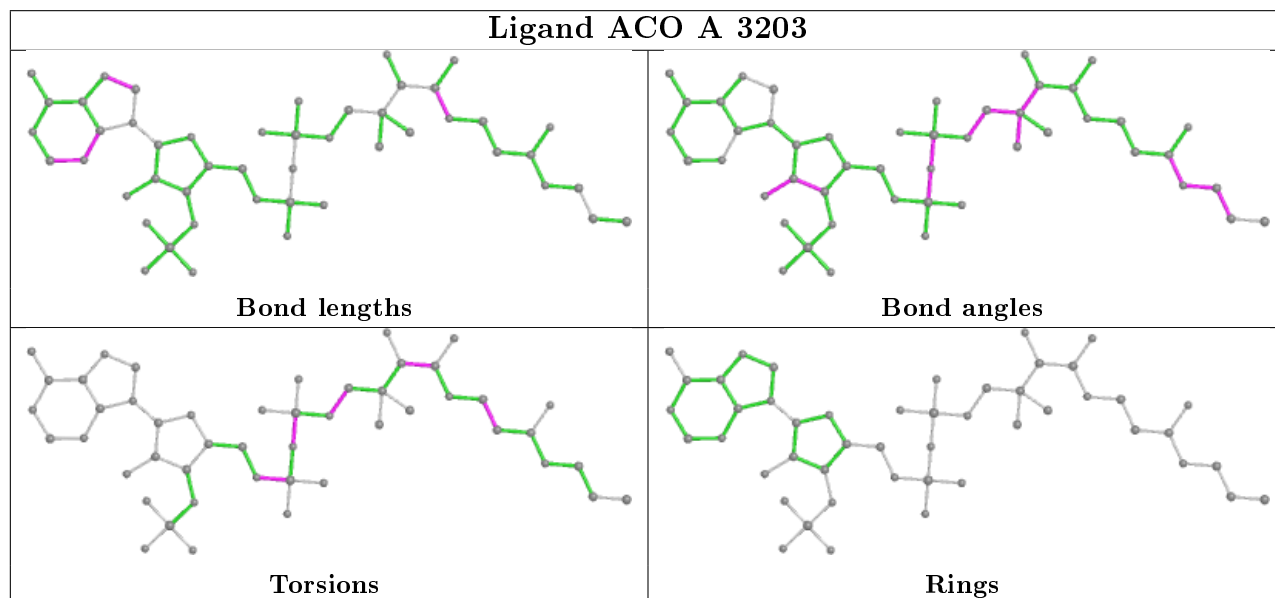
Mol	Chain	Res	Type	Atoms
2	A	3203	ACO	C5B-O5B-P1A-O1A
2	A	3203	ACO	C5B-O5B-P1A-O2A
2	A	3203	ACO	CBP-CCP-O6A-P2A
2	A	3203	ACO	N8P-C9P-CAP-CBP
2	A	3203	ACO	P1A-O3A-P2A-O5A

There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	3203	ACO	4	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	703/805 (87%)	-0.01	22 (3%) 49 49	22, 37, 58, 74	0
1	B	679/805 (84%)	-0.05	19 (2%) 53 54	20, 38, 59, 69	0
All	All	1382/1610 (85%)	-0.03	41 (2%) 50 51	20, 38, 59, 74	0

The worst 5 of 41 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	2143	VAL	7.9
1	A	2194	PHE	5.1
1	A	2146	ALA	4.5
1	A	2203	ARG	4.3
1	A	2201	LYS	4.2

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

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

6.3 Carbohydrates [i](#)

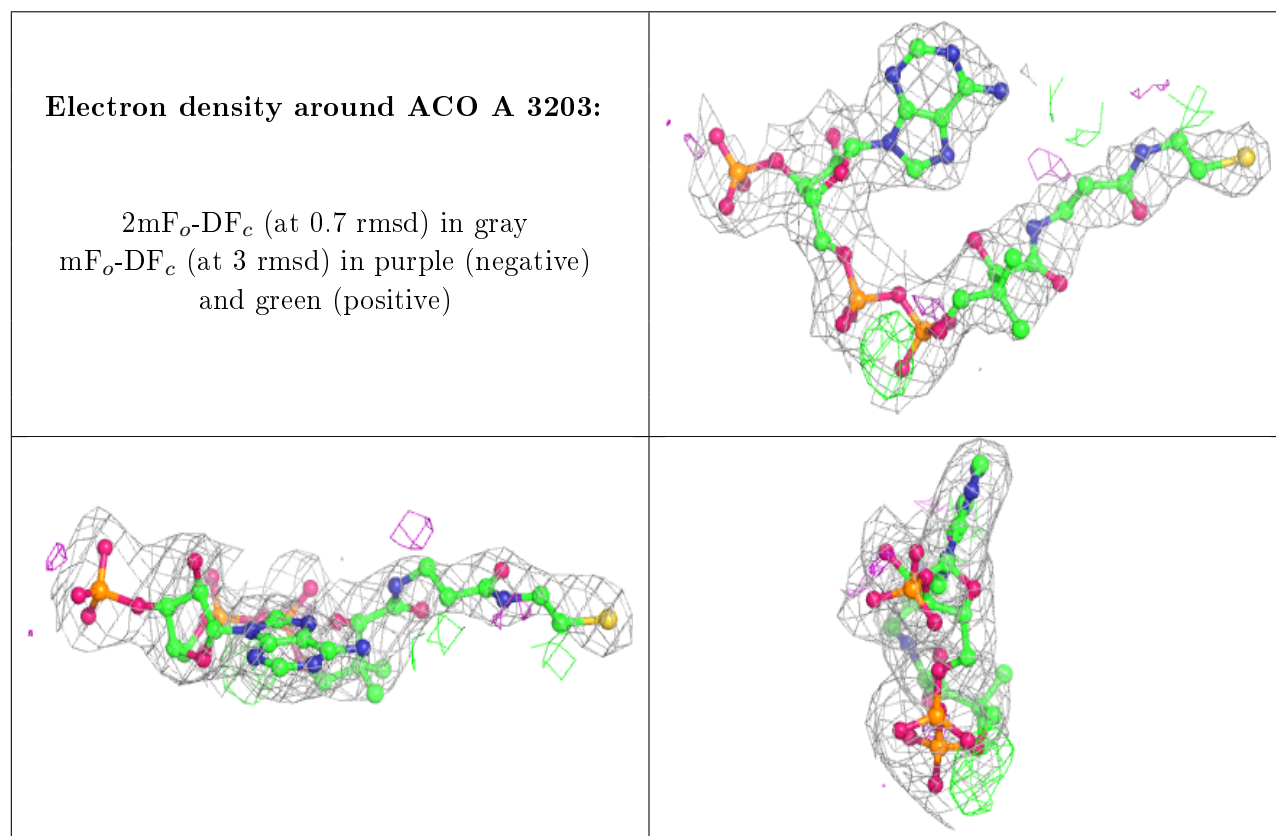
There are no carbohydrates in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	ADE	B	3190	10/10	0.85	0.28	61,63,63,64	0
2	ACO	A	3203	48/51	0.91	0.17	56,68,77,79	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.



6.5 Other polymers [i](#)

There are no such residues in this entry.