WORLDWIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Dec 19, 2023 – 09:02 PM EST

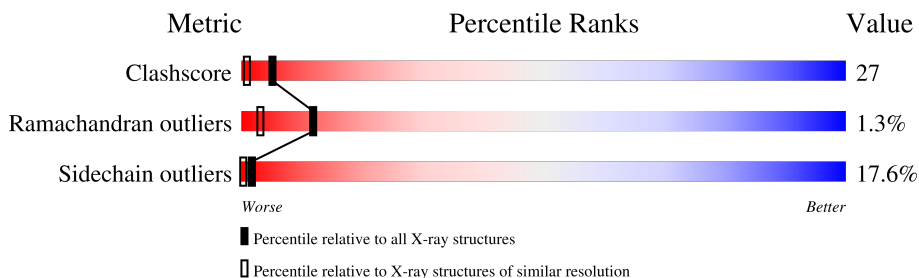|		
PDB ID	:	1UKJ
Title	:	Detailed structure of L-Methionine-Lyase from Pseudomonas putida
Authors	:	Misaki, S.; Takimoto, A.; Takakura, T.; Yoshioka, T.; Yamashita, M.; Tamura, T.; Tanaka, H.; Inagaki, K.
Deposited on	:	2003-08-24
Resolution	:	1.80 Å(reported)

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 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	Percentile Ranks	Value
Clashscore		27
Ramachandran outliers		1.3%
Sidechain outliers		17.6%

Worse   *Better*

■ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)

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 <=5%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	398	51% 38% 12%
1	B	398	53% 37% 10% •
1	C	398	56% 36% 8%
1	D	398	57% 35% 9%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 13148 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 Methionine gamma-lyase.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	398	Total	C	N	O	P	S	0	0	0
			3011	1897	533	562	1	18			
1	B	398	Total	C	N	O	P	S	0	0	0
			3011	1897	533	562	1	18			
1	C	398	Total	C	N	O	P	S	0	0	0
			3011	1897	533	562	1	18			
1	D	398	Total	C	N	O	P	S	0	0	0
			3011	1897	533	562	1	18			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	211	LLP	LYS	modified residue	UNP P13254
B	711	LLP	LYS	modified residue	UNP P13254
C	1211	LLP	LYS	modified residue	UNP P13254
D	1711	LLP	LYS	modified residue	UNP P13254

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total 5	O 4	S 1	0	0
2	B	1	Total 5	O 4	S 1	0	0
2	B	1	Total 5	O 4	S 1	0	0
2	C	1	Total 5	O 4	S 1	0	0
2	D	1	Total 5	O 4	S 1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	243	Total 243	O 243	0	0
3	B	251	Total 251	O 251	0	0
3	C	297	Total 297	O 297	0	0
3	D	288	Total 288	O 288	0	0

3   Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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.

Note EDS was not executed.

• Molecule 1: Methionine gamma-lyase

Chain A:

• Molecule 1: Methionine gamma-lyase

Chain B:

Q833 L834 V839 S840 L841 G842 A852 S853 M854 T855 H856 S857 S858 Y859 T860 P861 E862 E863 R864 A865 H866 Y867 G868 I869 S870 E871 G872 L873 L876 L880 L887 L894 A898

- Molecule 1: Methionine gamma-lyase

Chain C: 56% 36% 8%

M1001 H1002 G1003 S1004 N1005 K1006 L1007 P1008 G1009 F1010 A1011 T1012 R1013 A1014 I1015 H1016 H1017 G1018 Y1019 D1020 P1021 H1024 A1027 L1028 V1029 P1030 Q1034 T1037 F1038 V1043 A1048 Q1054 Y1059 S1060 R1061 I1062 S1063 N1068 E1071 S1076 L1077 E1078 E1081 L1084 A1085 L1086

M1090 G1091 A1092 I1093 T1094 S1095 T1099 E1106 V1107 L1108 L1109 L1113 Y1114 T1117 L1121 I1125 K1131 L1132 R1133 H1134 Q1141 A1142 L1143 M1147 T1148 R1152 V1153 I1154 A1160 N1161 P1162 M1166 A1167 D1168 I1169 V1172 A1173 K1174 I1175 A1176 R1177 K1178 H1179 G1180 A1181 D1186
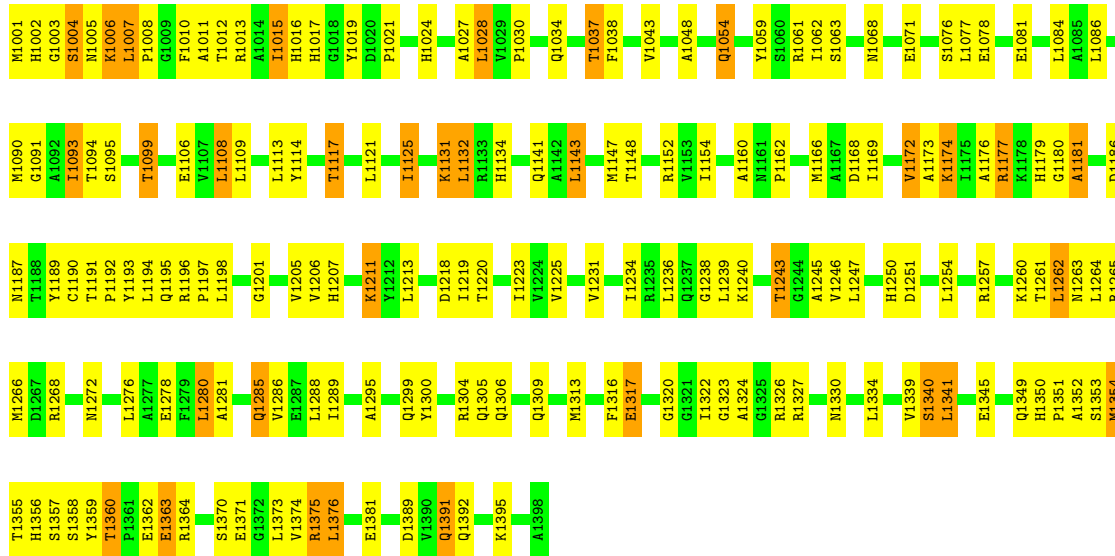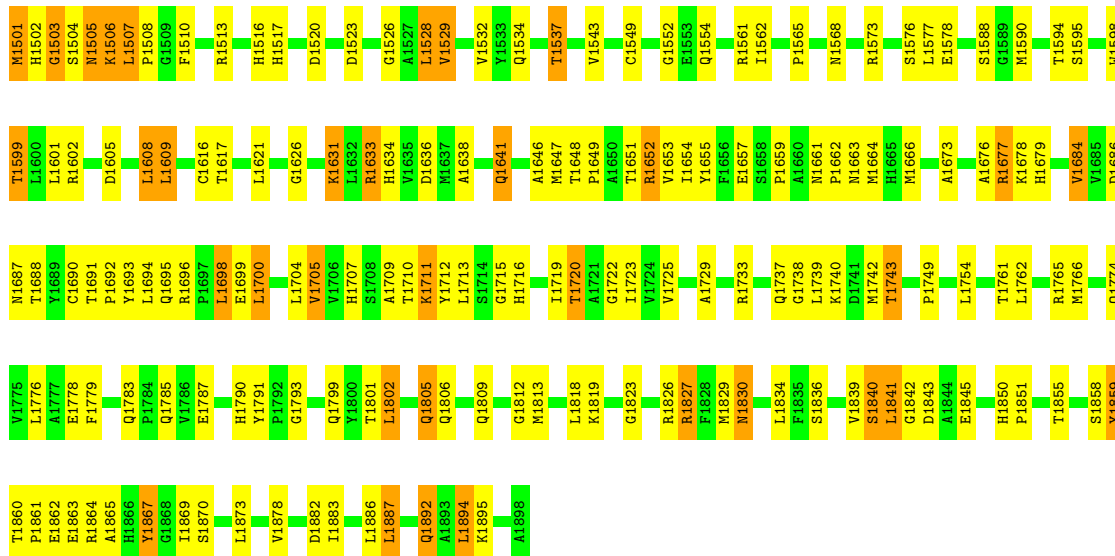
N1187 T1188 Y1189 C1190 T1191 P1192 Y1193 L1194 Q1195 R1196 P1197 L1198 G1201 V1205 V1206 H1207 K1211 Y1212 L1213 D1218 I1219 T1220 I1223 V1224 V1225 V1231 I1234 R1235 L1236 Q1237 G1238 L1239 K1240 T1243 G1244 A1245 V1246 L1247 H1250 D1251 L1254 R1257 K1260 T1261 L1262 N1263 L1264 R1265

M1266 D1267 R1268 N1272 L1276 A1277 E1278 F1279 L1280 A1281 Q1285 V1286 E1287 L1288 I1289 A1295 Q1299 Y1300 R1304 Q1305 Q1306 Q1309 M1313 F1316 E1317 G1320 G1321 I1322 G1323 A1324 G1325 R1326 R1327 N1330 L1334 V1339 S1340 L1341 E1345 Q1349 H1350 P1351 A1352 S1353 M1354

T1355 H1356 S1357 S1358 Y1359 T1360 P1361 E1362 E1363 R1364 S1370 E1371 G1372 L1373 V1374 R1375 L1376 E1381 D1389 V1390 Q1391 Q1392 K1395 A1398

- Molecule 1: Methionine gamma-lyase

Chain D: 57% 35% 9%

M1501 H1502 G1503 S1504 N1505 K1506 L1507 P1508 G1509 F1510 R1513 H1516 H1517 D1520 D1523 G1526 A1527 L1528 V1529 V1532 Y1533 S1534 T1537 V1543 C1549 G1552 E1553 Q1554 R1561 I1562 P1565 N1568 R1573 S1576 L1577 E1578 S1588 G1589 M1590 T1594 S1595 W1598

T1599 L1600 L1601 R1602 D1605 L1608 L1609 C1616 T1617 L1621 G1626 K1631 L1632 R1633 H1634 V1635 D1636 M1637 A1638 Q1641 A1646 M1647 T1648 P1649 A1650 T1651 R1652 V1653 I1654 Y1655 F1656 E1657 S1658 P1659 A1660 N1661 P1662 N1663 M1664 H1665 M1666 A1673 A1676 R1677 K1678 H1679 V1684 V1685 D1686

N1687 T1688 Y1689 C1690 T1691 P1692 Y1693 L1694 Q1695 R1696 P1697 L1698 E1699 L1700 L1704 V1705 V1706 H1707 S1708 A1709 T1710 K1711 Y1712 L1713 S1714 H1716 I1719 T1720 A1721 G1722 I1723 V1724 V1725 A1729 R1733 Q1737 G1738 L1739 K1740 D1741 M1742 T1743 P1749 L1754 T1761 L1762 R1765 M1766 Q1774

V1775 L1776 A1777 E1778 F1779 Q1783 P1784 Q1785 V1786 E1787 H1790 Y1791 P1792 G1793 Q1799 Y1800 T1801 L1802 Q1805 Q1806 Q1809 G1812 M1813 L1818 K1819 G1823 R1826 R1827 F1828 M1829 N1830 L1834 F1835 S1836 V1839 S1840 L1841 G1842 D1843 A1844 E1845 H1850 P1851 T1855 S1858 Y1859

T1860 P1861 E1862 E1863 R1864 A1865 H1866 Y1867 G1868 I1869 S1870 L1873 V1878 D1882 I1883 L1886 L1887 Q1892 A1893 L1894 K1895 A1898

4 Data and refinement statistics (i)

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α, β, γ	133.09Å 133.09Å 215.03Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	10.00 – 1.80	Depositor
% Data completeness (in resolution range)	(Not available) (10.00-1.80)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR 98.0	Depositor
R, R_{free}	0.177 , 0.295	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	13148	wwPDB-VP
Average B, all atoms (Å^2)	26.0	wwPDB-VP

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: SO4, LLP

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	0.35	0/3051	0.60	1/4139 (0.0%)
1	B	0.33	0/3051	0.61	0/4139
1	C	0.35	0/3051	0.61	0/4139
1	D	0.34	0/3051	0.59	0/4139
All	All	0.34	0/12204	0.60	1/16556 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	208	SER	N-CA-C	-5.30	96.70	111.00

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	3011	0	2970	164	0
1	B	3011	0	2967	181	0
1	C	3011	0	2967	179	0
1	D	3011	0	2967	153	0
2	A	5	0	0	0	0
2	B	10	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	5	0	0	0	0
2	D	5	0	0	0	0
3	A	243	0	0	13	0
3	B	251	0	0	17	0
3	C	297	0	0	34	0
3	D	288	0	0	23	0
All	All	13148	0	11871	643	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 27.

The worst 5 of 643 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:174:LYS:HE2	1:A:177:ARG:HH11	1.26	1.00
1:A:303:ALA:HB1	1:A:304:ARG:HH21	1.24	1.00
1:A:152:ARG:HH22	1:A:233:ARG:HH22	1.13	0.97
1:C:1219:ILE:HD11	1:C:1254:LEU:HD23	1.45	0.96
1:A:313:MET:HE1	1:A:377:SER:HB2	1.47	0.95

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	395/398 (99%)	365 (92%)	24 (6%)	6 (2%)	10	2
1	B	395/398 (99%)	357 (90%)	32 (8%)	6 (2%)	10	2
1	C	395/398 (99%)	367 (93%)	25 (6%)	3 (1%)	19	7
1	D	395/398 (99%)	357 (90%)	33 (8%)	5 (1%)	12	3
All	All	1580/1592 (99%)	1446 (92%)	114 (7%)	20 (1%)	12	3

5 of 20 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	245	ALA
1	A	340	SER
1	B	862	GLU
1	C	1181	ALA
1	A	240	LYS

5.3.2   Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	306/306 (100%)	244 (80%)	62 (20%)	1	0
1	B	306/306 (100%)	248 (81%)	58 (19%)	1	0
1	C	306/306 (100%)	260 (85%)	46 (15%)	3	0
1	D	306/306 (100%)	257 (84%)	49 (16%)	2	0
All	All	1224/1224 (100%)	1009 (82%)	215 (18%)	2	0

5 of 215 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	863	GLU
1	C	1236	LEU
1	D	1805	GLN
1	B	894	LEU
1	C	1099	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 56 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	833	GLN
1	D	1892	GLN
1	C	1187	ASN
1	D	1849	GLN
1	D	1695	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

4 non-standard protein/DNA/RNA residues are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
1	LLP	B	711	1	23,24,25	2.92	6 (26%)	25,32,34	1.72	6 (24%)
1	LLP	D	1711	1	23,24,25	2.89	6 (26%)	25,32,34	1.69	6 (24%)
1	LLP	A	211	1	23,24,25	2.90	6 (26%)	25,32,34	1.73	5 (20%)
1	LLP	C	1211	1	23,24,25	2.88	7 (30%)	25,32,34	1.65	5 (20%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	LLP	B	711	1	-	7/16/17/19	0/1/1/1
1	LLP	D	1711	1	-	4/16/17/19	0/1/1/1
1	LLP	A	211	1	-	5/16/17/19	0/1/1/1
1	LLP	C	1211	1	-	5/16/17/19	0/1/1/1

The worst 5 of 25 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	711	LLP	C6-C5	7.54	1.53	1.37
1	A	211	LLP	C6-C5	7.23	1.52	1.37
1	C	1211	LLP	C6-C5	7.13	1.52	1.37
1	D	1711	LLP	C6-C5	7.11	1.52	1.37
1	D	1711	LLP	C6-N1	5.92	1.46	1.34

The worst 5 of 22 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	211	LLP	C5-C6-N1	-5.98	113.85	123.82
1	B	711	LLP	C5-C6-N1	-5.87	114.05	123.82
1	D	1711	LLP	C5-C6-N1	-5.83	114.10	123.82
1	C	1211	LLP	C5-C6-N1	-5.83	114.11	123.82
1	A	211	LLP	C4-C4'-NZ	-2.97	110.67	124.31

There are no chirality outliers.

5 of 21 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	211	LLP	O-C-CA-CB
1	B	711	LLP	O-C-CA-CB
1	C	1211	LLP	C4-C4'-NZ-CE
1	C	1211	LLP	N-CA-CB-CG
1	C	1211	LLP	O-C-CA-CB

There are no ring outliers.

4 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	B	711	LLP	1	0
1	D	1711	LLP	2	0
1	A	211	LLP	4	0
1	C	1211	LLP	2	0

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry ⓘ

5 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	SO4	A	400	-	4,4,4	0.42	0	6,6,6	0.05	0
2	SO4	D	1900	-	4,4,4	0.37	0	6,6,6	0.05	0
2	SO4	B	1901	-	4,4,4	0.45	0	6,6,6	0.04	0
2	SO4	C	1400	-	4,4,4	0.39	0	6,6,6	0.05	0
2	SO4	B	900	-	4,4,4	0.39	0	6,6,6	0.05	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section is therefore empty.

6.4 Ligands ⓘ

EDS was not executed - this section is therefore empty.

6.5 Other polymers ⓘ

EDS was not executed - this section is therefore empty.