



wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 5, 2023 – 08:43 PM EST

PDB ID : 4WHS
Title : 4-fluorocatechol bound to Protocatechuate 3,4-dioxygenase (pseudomonas putida) at pH 8.5
Authors : Knoot, C.J.; Purpero, V.M.; Lipscomb, J.D.
Deposited on : 2014-09-23
Resolution : 1.35 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 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
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

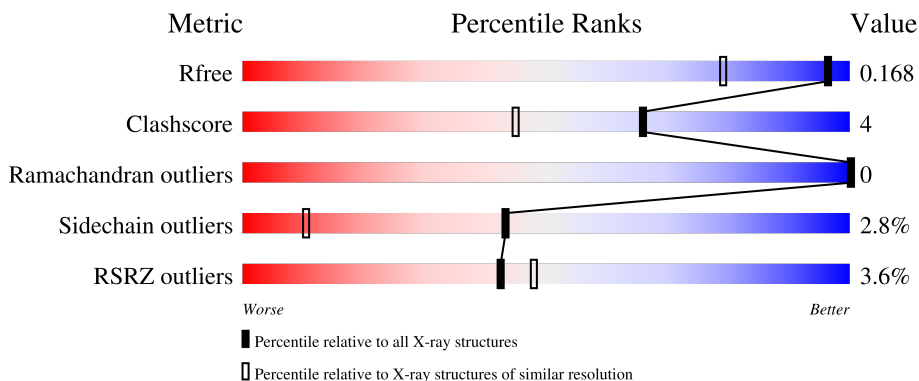
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.35 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.



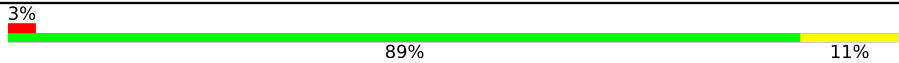
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1509 (1.38-1.34)
Clashscore	141614	1551 (1.38-1.34)
Ramachandran outliers	138981	1530 (1.38-1.34)
Sidechain outliers	138945	1530 (1.38-1.34)
RSRZ outliers	127900	1487 (1.38-1.34)

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	200	 4% 96%
1	C	200	 2% 92% 8%
1	E	200	 6% 92% 7%
2	B	238	 3% 90% 9%
2	F	238	 4% 90% 9%

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Mol	Chain	Length	Quality of chain
3	D	238	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into three segments: a small red segment on the left labeled '3%', a large green segment in the middle labeled '89%', and a small yellow segment on the right labeled '11%'.</p>

2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 12126 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 Protocatechuate 3,4-dioxygenase alpha chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	200	Total 1614	C 1022	N 284	O 305	S 3	0	5	0
1	E	200	Total 1618	C 1023	N 287	O 305	S 3	0	5	0
1	C	200	Total 1612	C 1022	N 282	O 305	S 3	0	5	0

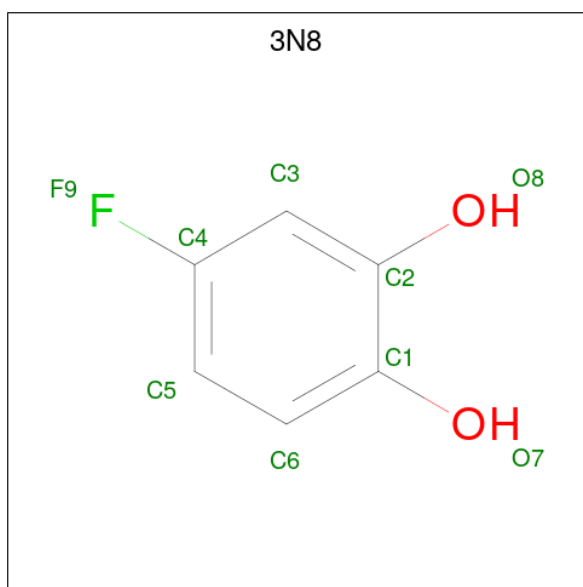
- Molecule 2 is a protein called Protocatechuate 3,4-dioxygenase beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	F	238	Total 1928	C 1223	N 350	O 346	S 9	0	6	0
2	B	238	Total 1944	C 1234	N 353	O 348	S 9	0	8	0

- Molecule 3 is a protein called Protocatechuate 3,4-dioxygenase beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	D	238	Total 1941	C 1232	N 352	O 348	S 9	0	7	0

- Molecule 4 is 4-fluorobenzene-1,2-diol (three-letter code: 3N8) (formula: C₆H₅FO₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	F	O	0	0
			9	6	1	2		
4	F	1	Total	C	F	O	0	0
			9	6	1	2		
4	F	1	Total	C	F	O	0	0
			9	6	1	2		
4	F	1	Total	C	F	O	0	1
			18	12	2	4		
4	E	1	Total	C	F	O	0	0
			9	6	1	2		
4	C	1	Total	C	F	O	0	0
			9	6	1	2		
4	D	1	Total	C	F	O	0	1
			18	12	2	4		
4	D	1	Total	C	F	O	0	0
			9	6	1	2		
4	B	1	Total	C	F	O	0	1
			18	12	2	4		
4	B	1	Total	C	F	O	0	0
			9	6	1	2		

- Molecule 5 is SULFATE ION (three-letter code: SO4) (formula: O₄S).

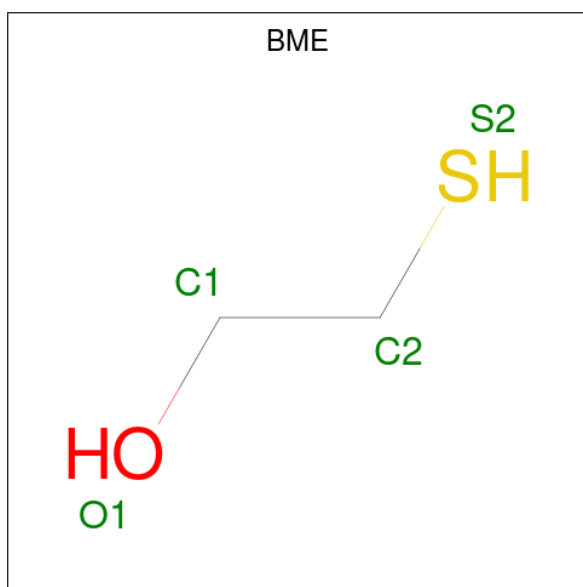


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total O S 5 4 1	0	0

- Molecule 6 is FE (III) ION (three-letter code: FE) (formula: Fe).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	F	1	Total Fe 1 1	0	0
6	D	1	Total Fe 1 1	0	0
6	B	1	Total Fe 1 1	0	0

- Molecule 7 is BETA-MERCAPTOETHANOL (three-letter code: BME) (formula: C₂H₆OS).

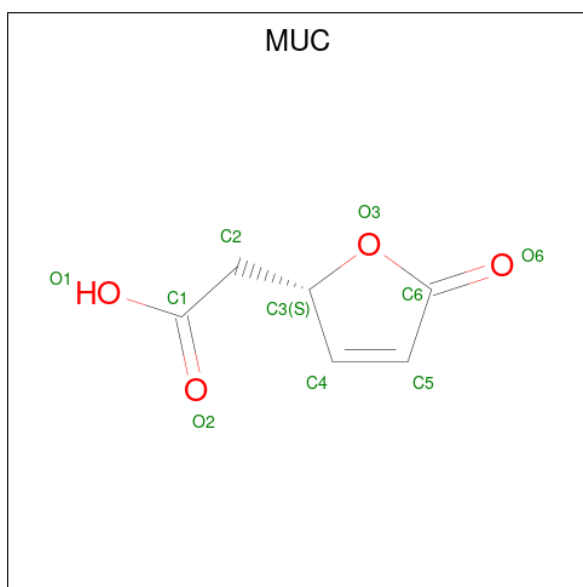


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	F	1	Total C O S 4 2 1 1	0	0
7	C	1	Total C O S 4 2 1 1	0	0
7	C	1	Total C O S 4 2 1 1	0	0
7	B	1	Total C O S 4 2 1 1	0	0

- Molecule 8 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	F	1	Total Cl 1 1	0	0
8	B	2	Total Cl 2 2	0	0

- Molecule 9 is [(2S)-5-oxo-2,5-dihydrofuran-2-yl]acetic acid (three-letter code: MUC) (formula: C₆H₆O₄).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	E	1	Total C O 10 6 4	0	0
9	C	1	Total C O 10 6 4	0	0

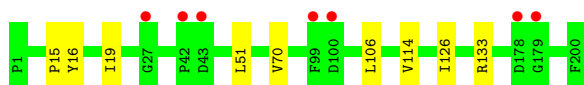
- Molecule 10 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	184	Total O 186 186	0	2
10	F	243	Total O 246 246	0	3
10	E	153	Total O 155 155	0	2
10	C	198	Total O 200 200	0	2
10	D	255	Total O 255 255	0	0
10	B	261	Total O 263 263	0	2

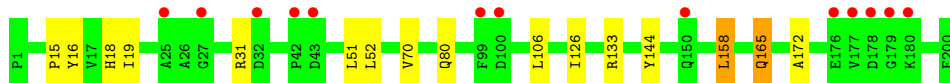
3 Residue-property plots [i](#)

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.

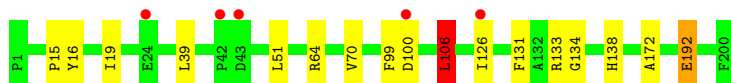
- Molecule 1: Protocatechuate 3,4-dioxygenase alpha chain



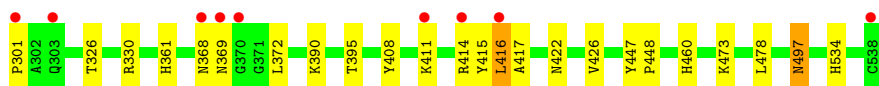
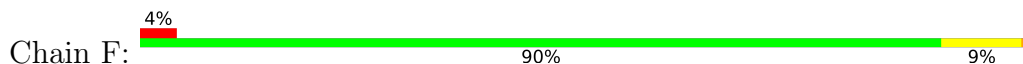
- Molecule 1: Protocatechuate 3,4-dioxygenase alpha chain



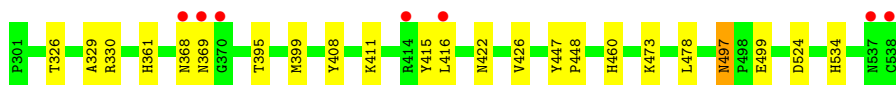
- Molecule 1: Protocatechuate 3,4-dioxygenase alpha chain



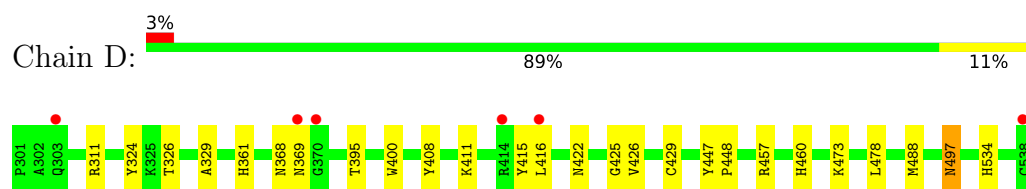
- Molecule 2: Protocatechuate 3,4-dioxygenase beta chain



- Molecule 2: Protocatechuate 3,4-dioxygenase beta chain



- Molecule 3: Protocatechuate 3,4-dioxygenase beta chain



4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	128.01Å 140.66Å 168.14Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.55 – 1.35 24.13 – 1.35	Depositor EDS
% Data completeness (in resolution range)	94.5 (29.55-1.35) 94.6 (24.13-1.35)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.99 (at 1.35Å)	Xtrriage
Refinement program	REFMAC 5.7.0029	Depositor
R, R_{free}	0.136 , 0.167 0.137 , 0.168	Depositor DCC
R_{free} test set	15583 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	12.8	Xtrriage
Anisotropy	0.591	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.46 , 61.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	12126	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.88% 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: MHO, 3N8, FE, MUC, CSO, BME, SO4, CL

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	0.41	0/1655	0.67	0/2254
1	C	0.40	1/1653 (0.1%)	0.71	2/2251 (0.1%)
1	E	0.38	0/1659	0.67	2/2259 (0.1%)
2	B	0.44	0/2001	0.69	0/2723
2	F	0.40	0/1984	0.71	0/2701
3	D	0.41	0/1979	0.68	2/2691 (0.1%)
All	All	0.41	1/10931 (0.0%)	0.69	6/14879 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	192	GLU	CD-OE1	-5.12	1.20	1.25

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	311	ARG	NE-CZ-NH2	-6.02	117.29	120.30
1	E	31	ARG	NE-CZ-NH2	-5.89	117.36	120.30
3	D	457	ARG	NE-CZ-NH1	5.68	123.14	120.30
1	E	31	ARG	NE-CZ-NH1	5.32	122.96	120.30
1	C	106[A]	LEU	CA-CB-CG	5.18	127.21	115.30

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	1614	0	1548	8	0
1	C	1612	0	1552	14	0
1	E	1618	0	1552	14	0
2	B	1944	0	1897	19	0
2	F	1928	0	1879	20	0
3	D	1941	0	1895	20	0
4	A	9	0	4	0	0
4	B	27	0	9	3	0
4	C	9	0	5	0	0
4	D	27	0	9	4	0
4	E	9	0	3	0	0
4	F	36	0	13	3	0
5	A	5	0	0	0	0
6	B	1	0	0	0	0
6	D	1	0	0	0	0
6	F	1	0	0	0	0
7	B	4	0	6	1	0
7	C	8	0	12	0	0
7	F	4	0	6	0	0
8	B	2	0	0	0	0
8	F	1	0	0	0	0
9	C	10	0	5	1	0
9	E	10	0	5	1	0
10	A	186	0	0	0	0
10	B	263	0	0	5	1
10	C	200	0	0	0	0
10	D	255	0	0	4	2
10	E	155	0	0	2	0
10	F	246	0	0	3	0
All	All	12126	0	10400	86	3

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 4.

The worst 5 of 86 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)
2:F:447[A]:TYR:CE1	10:F:903:HOH:O	2.26	0.88
2:B:447[B]:TYR:CE1	10:B:907:HOH:O	2.29	0.84

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:447[A]:TYR:CE1	10:D:930:HOH:O	2.34	0.79
1:A:19:ILE:HG22	2:B:426[A]:VAL:HG22	1.67	0.74
1:C:64:ARG:NE	1:C:99:PHE:O	2.26	0.69

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
10:D:702:HOH:O	10:D:726:HOH:O[4_555]	1.64	0.56
10:D:726:HOH:O	10:D:726:HOH:O[4_555]	1.72	0.48
10:B:741:HOH:O	10:B:741:HOH:O[2_555]	2.10	0.10

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	203/200 (102%)	201 (99%)	2 (1%)	0	100	100
1	C	202/200 (101%)	199 (98%)	3 (2%)	0	100	100
1	E	203/200 (102%)	199 (98%)	4 (2%)	0	100	100
2	B	243/238 (102%)	238 (98%)	5 (2%)	0	100	100
2	F	241/238 (101%)	237 (98%)	4 (2%)	0	100	100
3	D	240/238 (101%)	234 (98%)	6 (2%)	0	100	100
All	All	1332/1314 (101%)	1308 (98%)	24 (2%)	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 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	168/163 (103%)	166 (99%)	2 (1%)	71	42
1	C	168/163 (103%)	164 (98%)	4 (2%)	49	15
1	E	168/163 (103%)	164 (98%)	4 (2%)	49	15
2	B	210/202 (104%)	202 (96%)	8 (4%)	33	4
2	F	208/202 (103%)	199 (96%)	9 (4%)	29	3
3	D	207/200 (104%)	200 (97%)	7 (3%)	37	7
All	All	1129/1093 (103%)	1095 (97%)	34 (3%)	43	9

5 of 34 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	399	MET
2	B	411	LYS
2	B	497	ASN
1	E	158[A]	LEU
1	E	52	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 23 such sidechains are listed below:

Mol	Chain	Res	Type
3	D	497	ASN
2	B	368	ASN
2	B	361	HIS
2	B	369	ASN
2	F	503	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	CSO	D	429	3	3,6,7	0.79	0	0,6,8	-	-
3	MHO	D	488	3	7,8,9	1.04	0	4,9,11	1.53	1 (25%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	CSO	D	429	3	-	0/1/5/7	-
3	MHO	D	488	3	-	2/6/7/9	-

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	488	MHO	CE-SD-CG	-2.80	91.34	97.71

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	488	MHO	CB-CG-SD-OD1
3	D	488	MHO	CB-CG-SD-CE

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	429	CSO	1	0

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 26 ligands modelled in this entry, 6 are monoatomic - leaving 20 for Mogul analysis.

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
9	MUC	C	304	-	10,10,10	1.93	1 (10%)	13,13,13	2.52	6 (46%)
7	BME	C	302	-	3,3,3	0.32	0	1,2,2	0.16	0
4	3N8	D	603	-	9,9,9	0.82	0	12,12,12	1.14	1 (8%)
7	BME	B	602	-	3,3,3	0.30	0	1,2,2	0.03	0
4	3N8	F	604	-	9,9,9	0.78	0	12,12,12	0.97	0
7	BME	C	303	-	3,3,3	0.35	0	1,2,2	0.73	0
4	3N8	C	301	-	9,9,9	0.86	0	12,12,12	1.08	1 (8%)
5	SO4	A	302	-	4,4,4	0.32	0	6,6,6	0.10	0
4	3N8	B	603[B]	-	9,9,9	0.65	0	12,12,12	1.05	1 (8%)
7	BME	F	603	-	3,3,3	0.21	0	1,2,2	0.13	0
4	3N8	B	603[A]	-	9,9,9	0.74	0	12,12,12	1.14	1 (8%)
4	3N8	F	602	-	9,9,9	0.66	0	12,12,12	1.06	1 (8%)
4	3N8	B	604	-	9,9,9	0.71	0	12,12,12	1.06	0
9	MUC	E	302	-	10,10,10	1.81	1 (10%)	13,13,13	2.66	7 (53%)
4	3N8	F	605[B]	-	9,9,9	0.59	0	12,12,12	1.14	1 (8%)
4	3N8	F	605[A]	-	9,9,9	0.64	0	12,12,12	1.13	1 (8%)
4	3N8	D	602[B]	-	9,9,9	0.70	0	12,12,12	1.08	1 (8%)
4	3N8	A	301	-	9,9,9	0.77	0	12,12,12	1.07	1 (8%)
4	3N8	D	602[A]	-	9,9,9	0.76	0	12,12,12	1.16	1 (8%)
4	3N8	E	301	-	9,9,9	0.77	0	12,12,12	0.97	1 (8%)

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
9	MUC	C	304	-	-	3/4/13/13	0/1/1/1
7	BME	C	302	-	-	0/1/1/1	-
4	3N8	D	603	-	-	-	0/1/1/1
7	BME	B	602	-	-	1/1/1/1	-
4	3N8	F	604	-	-	-	0/1/1/1
7	BME	C	303	-	-	1/1/1/1	-
4	3N8	C	301	-	-	-	0/1/1/1
4	3N8	B	603[B]	-	-	-	0/1/1/1
7	BME	F	603	-	-	1/1/1/1	-
4	3N8	B	603[A]	-	-	-	0/1/1/1
4	3N8	F	602	-	-	-	0/1/1/1
4	3N8	B	604	-	-	-	0/1/1/1
9	MUC	E	302	-	-	1/4/13/13	0/1/1/1
4	3N8	F	605[B]	-	-	-	0/1/1/1
4	3N8	F	605[A]	-	-	-	0/1/1/1
4	3N8	D	602[B]	-	-	-	0/1/1/1
4	3N8	A	301	-	-	-	0/1/1/1
4	3N8	D	602[A]	-	-	-	0/1/1/1
4	3N8	E	301	-	-	-	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
9	C	304	MUC	O3-C6	5.62	1.46	1.36
9	E	302	MUC	O3-C6	5.27	1.45	1.36

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
9	E	302	MUC	C2-C3-C4	-5.47	103.42	114.36
9	C	304	MUC	C3-O3-C6	-4.92	104.40	109.14
9	E	302	MUC	C3-O3-C6	-4.54	104.76	109.14
9	C	304	MUC	C2-C3-C4	-3.83	106.69	114.36
9	C	304	MUC	O6-C6-C5	-3.57	125.17	130.91

There are no chirality outliers.

5 of 7 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	F	603	BME	O1-C1-C2-S2
9	E	302	MUC	C1-C2-C3-C4
9	C	304	MUC	C1-C2-C3-C4
9	C	304	MUC	C1-C2-C3-O3
7	C	303	BME	O1-C1-C2-S2

There are no ring outliers.

9 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
9	C	304	MUC	1	0
7	B	602	BME	1	0
4	B	603[B]	3N8	2	0
4	B	603[A]	3N8	1	0
9	E	302	MUC	1	0
4	F	605[B]	3N8	2	0
4	F	605[A]	3N8	1	0
4	D	602[B]	3N8	2	0
4	D	602[A]	3N8	2	0

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	200/200 (100%)	-0.27	7 (3%) 44 49	12, 17, 32, 52	0
1	C	200/200 (100%)	-0.25	5 (2%) 57 63	12, 17, 28, 49	0
1	E	200/200 (100%)	-0.02	13 (6%) 18 21	13, 21, 38, 59	0
2	B	238/238 (100%)	-0.33	7 (2%) 51 59	13, 15, 25, 45	0
2	F	238/238 (100%)	-0.28	9 (3%) 40 45	13, 17, 29, 44	1 (0%)
3	D	236/238 (99%)	-0.33	6 (2%) 57 63	13, 15, 26, 45	0
All	All	1312/1314 (99%)	-0.25	47 (3%) 42 48	12, 17, 30, 59	1 (0%)

The worst 5 of 47 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	178	ASP	6.2
1	E	100	ASP	4.5
3	D	414	ARG	4.4
2	F	301	PRO	4.3
1	E	179	GLY	4.2

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

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	MHO	D	488	9/10	0.97	0.08	16,18,31,37	0
3	CSO	D	429	7/8	0.98	0.05	13,14,18,22	1

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
7	BME	F	603	4/4	0.62	0.18	32,33,43,43	0
7	BME	C	303	4/4	0.67	0.21	26,35,40,56	0
9	MUC	E	302	10/10	0.82	0.15	29,35,52,52	0
9	MUC	C	304	10/10	0.85	0.17	24,33,56,57	0
7	BME	B	602	4/4	0.86	0.23	29,32,43,51	0
4	3N8	C	301	9/9	0.88	0.17	27,28,32,32	0
4	3N8	F	602	9/9	0.89	0.09	30,31,39,49	0
7	BME	C	302	4/4	0.89	0.20	36,38,43,49	0
4	3N8	F	604	9/9	0.90	0.09	24,28,35,41	0
4	3N8	D	603	9/9	0.90	0.15	32,36,42,54	0
4	3N8	E	301	9/9	0.91	0.11	29,30,37,38	0
4	3N8	A	301	9/9	0.93	0.12	23,25,30,31	0
5	SO4	A	302	5/5	0.93	0.16	26,31,35,36	5
4	3N8	B	603[A]	9/9	0.95	0.11	15,16,18,19	9
4	3N8	B	603[B]	9/9	0.95	0.11	16,18,19,23	9
4	3N8	B	604	9/9	0.95	0.07	25,27,35,42	0
4	3N8	F	605[B]	9/9	0.95	0.10	16,17,18,22	9
4	3N8	F	605[A]	9/9	0.95	0.10	15,16,18,21	9
4	3N8	D	602[B]	9/9	0.96	0.10	15,16,18,20	9
4	3N8	D	602[A]	9/9	0.96	0.10	15,17,18,18	9
8	CL	F	606	1/1	0.98	0.07	43,43,43,43	0
8	CL	B	605	1/1	0.98	0.12	49,49,49,49	0
8	CL	B	606	1/1	0.99	0.06	35,35,35,35	0
6	FE	F	601	1/1	1.00	0.03	14,14,14,14	1
6	FE	D	601	1/1	1.00	0.03	13,13,13,13	1
6	FE	B	601	1/1	1.00	0.04	14,14,14,14	1

6.5 Other polymers [i](#)

There are no such residues in this entry.