



Full wwPDB X-ray Structure Validation Report ⓘ

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PDB ID : 2XUE / pdb_00002xue
Title : CRYSTAL STRUCTURE OF JMJD3
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Deposited on : 2010-10-19
Resolution : 2.00 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

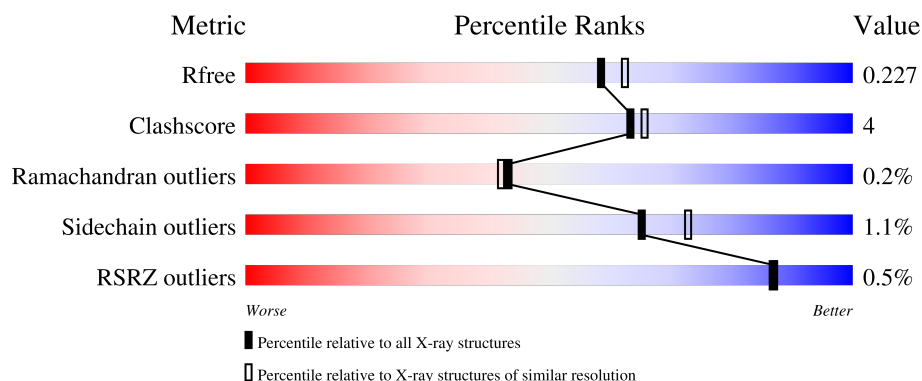
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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}	180053	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

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	509	 77% 6% 16%
1	B	509	 75% 8% 17%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 7434 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 LYSINE-SPECIFIC DEMETHYLASE 6B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	427	Total	C	N	O	S	0	2	0
			3437	2188	603	627	19			
1	B	423	Total	C	N	O	S	0	2	0
			3403	2167	595	622	19			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1644	HIS	-	expression tag	UNP O15054
A	1645	HIS	-	expression tag	UNP O15054
A	1646	HIS	-	expression tag	UNP O15054
A	1647	HIS	-	expression tag	UNP O15054
A	1648	HIS	-	expression tag	UNP O15054
A	1649	HIS	-	expression tag	UNP O15054
B	1644	HIS	-	expression tag	UNP O15054
B	1645	HIS	-	expression tag	UNP O15054
B	1646	HIS	-	expression tag	UNP O15054
B	1647	HIS	-	expression tag	UNP O15054
B	1648	HIS	-	expression tag	UNP O15054
B	1649	HIS	-	expression tag	UNP O15054

- Molecule 2 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		
2	B	1	Total	Zn	0	0
			1	1		

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

- Molecule 4 is FE (III) ION (CCD ID: FE) (formula: Fe).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Fe	0	0
			1	1		
4	B	1	Total	Fe	0	0
			1	1		

- Molecule 5 is 2-OXOGLUTARIC ACID (CCD ID: AKG) (formula: C₅H₆O₅).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			10	5	5		
5	B	1	Total	C	O	0	0
			10	5	5		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	318	Total	O	0	0
			318	318		
6	B	242	Total	O	0	0
			242	242		

4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	61.22Å 65.15Å 77.46Å 86.09° 67.19° 68.26°	Depositor
Resolution (Å)	71.13 – 2.00 71.13 – 2.00	Depositor EDS
% Data completeness (in resolution range)	89.8 (71.13-2.00) 78.8 (71.13-2.00)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.19 (at 2.00Å)	Xtriage
Refinement program	REFMAC 5.5.0109	Depositor
R, R_{free}	0.179 , 0.216 0.189 , 0.227	Depositor DCC
R_{free} test set	2154 reflections (3.71%)	wwPDB-VP
Wilson B-factor (Å ²)	27.9	Xtriage
Anisotropy	0.250	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 39.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	7434	wwPDB-VP
Average B, all atoms (Å ²)	44.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.55% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: AKG, FE, ZN, SO4

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	0.51	0/3526	0.71	0/4799
1	B	0.50	0/3491	0.71	0/4755
All	All	0.51	0/7017	0.71	0/9554

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	2
All	All	0	4

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1404	GLY	Peptide,Mainchain
1	B	1404	GLY	Peptide,Mainchain

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	3437	0	3349	24	0
1	B	3403	0	3304	30	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
3	A	5	0	0	0	0
3	B	5	0	0	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
5	A	10	0	4	0	0
5	B	10	0	4	0	0
6	A	318	0	0	2	0
6	B	242	0	0	6	0
All	All	7434	0	6661	54	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 4.

All (54) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1629:GLN:NE2	1:B:1629:GLN:CG	2.43	0.82
1:A:1351:PRO:CG	1:A:1354:MET:HE2	2.15	0.76
1:A:1190:LEU:HD13	1:A:1196:ALA:HB2	1.72	0.71
1:B:1629:GLN:CG	1:B:1629:GLN:OE1	2.39	0.70
1:B:1629:GLN:NE2	1:B:1629:GLN:OE1	2.25	0.68
1:A:1351:PRO:HG2	1:A:1354:MET:HE2	1.78	0.65
1:B:1351:PRO:CG	1:B:1354:MET:HE2	2.26	0.65
1:B:1199:PRO:O	1:B:1203:GLN:HG3	1.97	0.64
1:A:1373:MET:HA	1:A:1484:ASN:HD22	1.65	0.62
1:B:1248:GLN:HE22	1:B:1386:ARG:H	1.48	0.61
1:B:1373:MET:HA	1:B:1484:ASN:HD22	1.65	0.61
1:B:1190:LEU:HD13	1:B:1196:ALA:HB2	1.85	0.58
1:B:1242:THR:HG22	6:B:2038:HOH:O	2.03	0.58
1:A:1275:THR:HG22	1:A:1276:THR:H	1.68	0.58
1:A:1234:LEU:HD13	1:A:1378:LEU:HD21	1.84	0.58
1:B:1511:ILE:HD12	6:B:2175:HOH:O	2.02	0.58
1:A:1432:TYR:HD2	1:A:1433:LEU:HD13	1.68	0.58
1:B:1351:PRO:HG2	1:B:1354:MET:HE2	1.85	0.56
1:B:1588:VAL:HB	1:B:1617:VAL:HG23	1.85	0.56
1:B:1351:PRO:HD2	1:B:1354:MET:HE2	1.87	0.56
1:A:1463:TRP:CH2	1:A:1485:VAL:HG21	2.42	0.55
1:B:1351:PRO:HD2	1:B:1354:MET:CE	2.38	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:1608:ARG:NH2	6:B:2219:HOH:O	2.41	0.53
1:B:1291:SER:O	1:B:1292:LEU:C	2.53	0.51
1:B:1351:PRO:CD	1:B:1354:MET:HE2	2.40	0.51
1:B:1234:LEU:HD13	1:B:1378:LEU:HD21	1.93	0.50
1:A:1366:VAL:HG12	1:A:1368:HIS:CD2	2.47	0.49
1:B:1511:ILE:CD1	6:B:2175:HOH:O	2.61	0.48
1:A:1432:TYR:CD2	1:A:1433:LEU:HD13	2.48	0.48
1:A:1578:CYS:SG	1:A:1580[A]:VAL:HG22	2.55	0.47
1:A:1372:GLY:HA2	1:A:1377:GLN:HG3	1.97	0.47
1:A:1397:CYS:HB2	1:A:1485:VAL:HG23	1.97	0.46
1:B:1490:ALA:HA	1:B:1535:MET:HE1	1.97	0.46
1:A:1268:CYS:O	1:A:1436:SER:OG	2.23	0.46
1:A:1218:LEU:HD22	1:A:1461:LEU:HD13	1.97	0.46
1:B:1532:LEU:HA	1:B:1535:MET:HE2	1.98	0.45
1:A:1523:ARG:NH2	6:A:2227:HOH:O	2.50	0.45
1:A:1580[B]:VAL:HG22	6:A:2266:HOH:O	2.16	0.44
1:B:1372:GLY:HA2	1:B:1377:GLN:CG	2.48	0.44
1:B:1252:PRO:O	1:B:1386:ARG:NH2	2.52	0.43
1:B:1362:MET:HE3	1:B:1396:PHE:CE2	2.53	0.43
1:A:1218:LEU:HD22	1:A:1461:LEU:CD1	2.48	0.43
1:B:1381:LYS:HD3	1:B:1474:ALA:HB2	2.00	0.43
1:B:1393:ASN:OD1	1:B:1511:ILE:HD13	2.18	0.43
1:A:1522:ALA:CB	1:A:1540:LEU:HD21	2.48	0.43
1:A:1463:TRP:CZ3	1:A:1485:VAL:HG21	2.54	0.42
1:B:1551:ARG:NH2	6:B:2189:HOH:O	2.52	0.42
1:A:1351:PRO:HD2	1:A:1354:MET:CE	2.49	0.42
1:B:1433:LEU:HD22	6:B:2123:HOH:O	2.19	0.42
1:A:1218:LEU:HD22	1:A:1461:LEU:HB2	2.01	0.42
1:B:1420:THR:HG21	1:B:1449:ILE:HD11	2.02	0.41
1:A:1398:SER:HB3	1:A:1464:ILE:HD13	2.02	0.41
1:B:1245:VAL:CG2	1:B:1275:THR:HG22	2.51	0.40
1:A:1245:VAL:HG21	1:A:1275:THR:OG1	2.20	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	423/509 (83%)	413 (98%)	9 (2%)	1 (0%)	43	42
1	B	419/509 (82%)	409 (98%)	9 (2%)	1 (0%)	43	42
All	All	842/1018 (83%)	822 (98%)	18 (2%)	2 (0%)	43	42

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1405	PRO
1	B	1405	PRO

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	375/451 (83%)	371 (99%)	4 (1%)	65	73
1	B	371/451 (82%)	367 (99%)	4 (1%)	65	73
All	All	746/902 (83%)	738 (99%)	8 (1%)	65	73

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1275	THR
1	A	1433	LEU
1	A	1488	LEU
1	A	1521	VAL
1	B	1292	LEU
1	B	1433	LEU
1	B	1488	LEU
1	B	1540	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (24)

such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1203	GLN
1	A	1210	ASN
1	A	1284	GLN
1	A	1394	ASN
1	A	1395	ASN
1	A	1402	ASN
1	A	1479	ASN
1	A	1480	ASN
1	A	1484	ASN
1	A	1614	GLN
1	B	1182	ASN
1	B	1203	GLN
1	B	1210	ASN
1	B	1241	HIS
1	B	1248	GLN
1	B	1284	GLN
1	B	1331	ASN
1	B	1345	GLN
1	B	1377	GLN
1	B	1395	ASN
1	B	1402	ASN
1	B	1479	ASN
1	B	1480	ASN
1	B	1484	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 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$
3	SO4	A	5000	-	4,4,4	0.24	0	6,6,6	0.09	0
3	SO4	B	5000	-	4,4,4	0.24	0	6,6,6	0.10	0
5	AKG	B	4000	4	9,9,9	1.96	2 (22%)	11,11,11	2.13	3 (27%)
5	AKG	A	4000	4	9,9,9	1.85	2 (22%)	11,11,11	2.17	4 (36%)

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
5	AKG	B	4000	4	-	3/9/9/9	-
5	AKG	A	4000	4	-	3/9/9/9	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	4000	AKG	O3-C5	3.75	1.34	1.22
5	A	4000	AKG	O3-C5	3.68	1.34	1.22
5	B	4000	AKG	C3-C2	3.17	1.54	1.51
5	A	4000	AKG	C3-C2	2.67	1.54	1.51

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	4000	AKG	C3-C2-C1	4.78	123.98	115.86
5	B	4000	AKG	C3-C2-C1	4.77	123.97	115.86
5	A	4000	AKG	O4-C5-C4	2.96	123.35	114.00
5	B	4000	AKG	O4-C5-C4	2.91	123.21	114.00
5	A	4000	AKG	O3-C5-C4	-2.21	116.09	123.09

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	4000	AKG	C3-C4-C5	-2.08	108.14	113.67
5	B	4000	AKG	O3-C5-C4	-2.05	116.58	123.09

There are no chirality outliers.

All (6) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	4000	AKG	C1-C2-C3-C4
5	B	4000	AKG	C1-C2-C3-C4
5	A	4000	AKG	C3-C4-C5-O3
5	A	4000	AKG	C3-C4-C5-O4
5	B	4000	AKG	C3-C4-C5-O3
5	B	4000	AKG	C3-C4-C5-O4

There are no ring outliers.

No monomer is involved in short contacts.

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	427/509 (83%)	-0.16	2 (0%) 87 87	18, 41, 62, 86	2 (0%)
1	B	423/509 (83%)	-0.11	2 (0%) 87 87	19, 42, 64, 80	2 (0%)
All	All	850/1018 (83%)	-0.14	4 (0%) 87 87	18, 41, 64, 86	4 (0%)

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1592	ASN	3.0
1	A	1569	ASP	2.4
1	B	1292	LEU	2.3
1	B	1269	GLU	2.1

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 oligosaccharides 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
3	SO4	A	5000	5/5	0.85	0.09	103,104,104,104	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	AKG	A	4000	10/10	0.92	0.09	45,47,47,47	0
3	SO4	B	5000	5/5	0.94	0.08	101,101,101,101	0
5	AKG	B	4000	10/10	0.94	0.08	45,47,48,48	0
4	FE	B	3000	1/1	0.98	0.18	49,49,49,49	0
4	FE	A	3000	1/1	0.99	0.14	49,49,49,49	0
2	ZN	A	2000	1/1	0.99	0.02	42,42,42,42	0
2	ZN	B	2000	1/1	1.00	0.02	45,45,45,45	0

6.5 Other polymers [i](#)

There are no such residues in this entry.