



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 09:58 PM GMT

PDB ID : 1RH2  
Title : RECOMBINANT HUMAN INTERFERON-ALPHA 2B  
Authors : Walter, M.R.  
Deposited on : 1996-11-07  
Resolution : 2.90 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](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

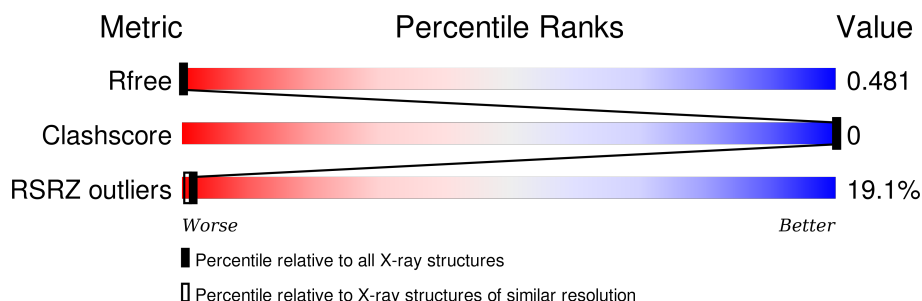
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 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))
$R_{free}$	91344	1451 (2.90-2.90)
Clashscore	102246	1668 (2.90-2.90)
RSRZ outliers	91569	1456 (2.90-2.90)

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	165	<div> <div>15%</div> <div>88%</div> <div>12%</div> </div>
1	B	165	<div> <div>10%</div> <div>83%</div> <div>17%</div> </div>
1	C	165	<div> <div>13%</div> <div>74%</div> <div>26%</div> </div>
1	D	165	<div> <div>16%</div> <div>79%</div> <div>21%</div> </div>
1	E	165	<div> <div>16%</div> <div>80%</div> <div>20%</div> </div>
1	F	165	<div> <div>20%</div> <div>73%</div> <div>27%</div> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 791 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 INTERFERON-ALPHA 2B.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf	Trace
1	A	145	Total C 145 145	0	0	145
1	B	137	Total C 137 137	0	0	137
1	C	122	Total C 122 122	0	0	122
1	D	131	Total C 131 131	0	0	131
1	E	132	Total C 132 132	0	0	132
1	F	120	Total C 120 120	0	0	120

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	23	ARG	LYS	CONFLICT	UNP P01563
A	112	ASN	LYS	CONFLICT	UNP P01563
B	23	ARG	LYS	CONFLICT	UNP P01563
B	112	ASN	LYS	CONFLICT	UNP P01563
C	23	ARG	LYS	CONFLICT	UNP P01563
C	112	ASN	LYS	CONFLICT	UNP P01563
D	23	ARG	LYS	CONFLICT	UNP P01563
D	112	ASN	LYS	CONFLICT	UNP P01563
E	23	ARG	LYS	CONFLICT	UNP P01563
E	112	ASN	LYS	CONFLICT	UNP P01563
F	23	ARG	LYS	CONFLICT	UNP P01563
F	112	ASN	LYS	CONFLICT	UNP P01563

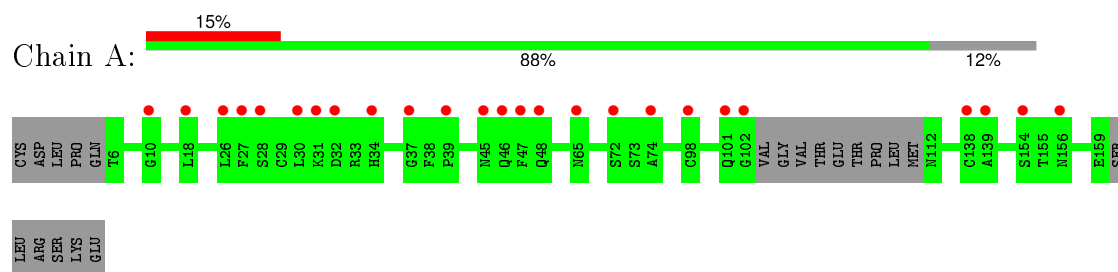
- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

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

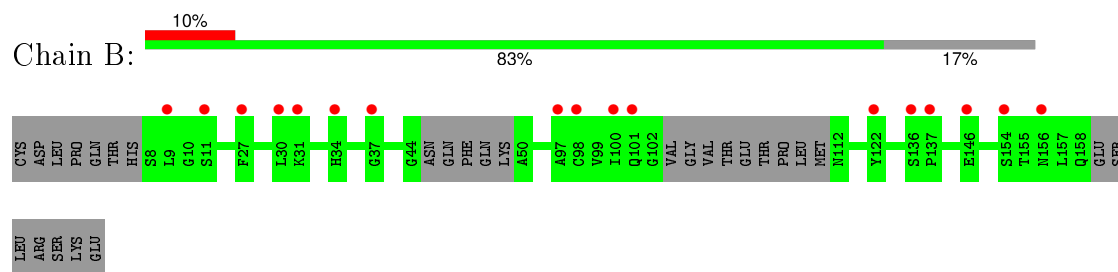
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

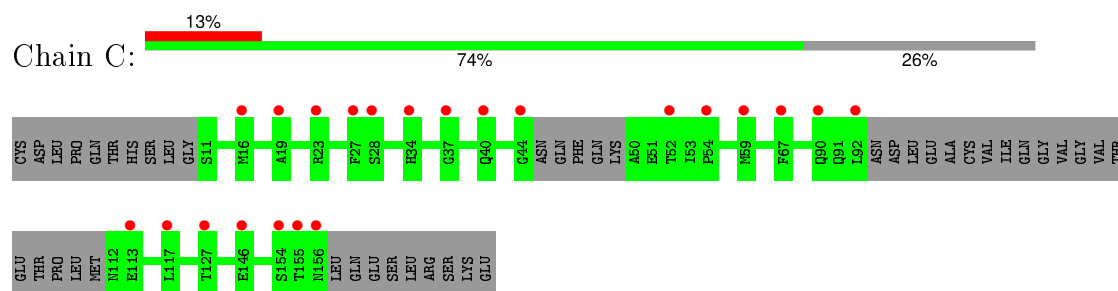
#### • Molecule 1: INTERFERON-ALPHA 2B



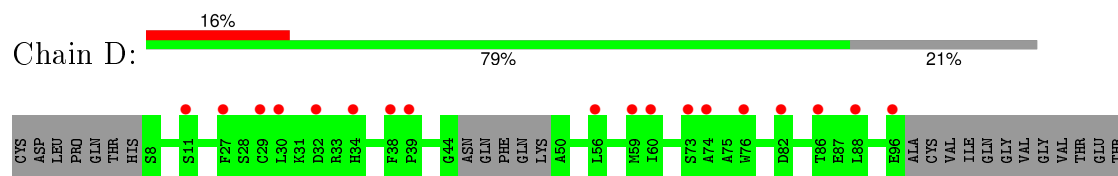
#### • Molecule 1: INTERFERON-ALPHA 2B

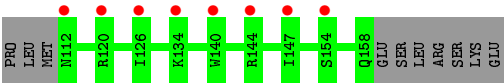


#### • Molecule 1: INTERFERON-ALPHA 2B

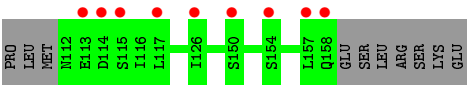
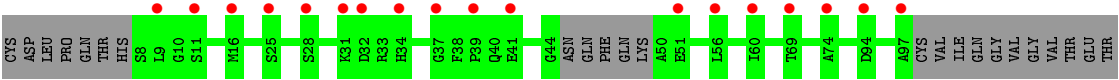
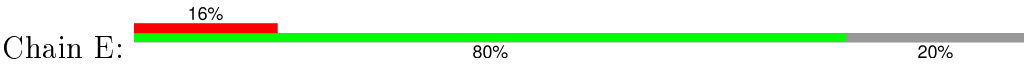


#### • Molecule 1: INTERFERON-ALPHA 2B

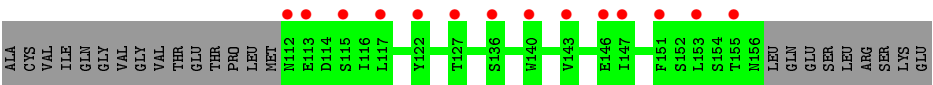
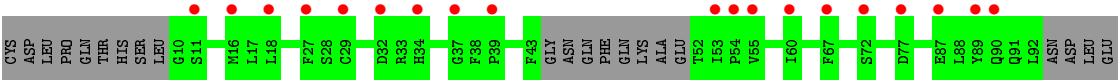




● Molecule 1: INTERFERON-ALPHA 2B



● Molecule 1: INTERFERON-ALPHA 2B



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	62.40 Å 75.50 Å 148.20 Å 90.00° 90.80° 90.00°	Depositor
Resolution (Å)	6.00 – 2.90 10.00 – 2.56	Depositor EDS
% Data completeness (in resolution range)	99.2 (6.00-2.90) 86.2 (10.00-2.56)	Depositor EDS
$R_{merge}$	0.10	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.43 (at 2.56 Å)	Xtriage
Refinement program	X-PLOR 3.1	Depositor
R, $R_{free}$	0.227 , 0.311 0.471 , 0.481	Depositor DCC
$R_{free}$ test set	1481 reflections (4.97%)	DCC
Wilson B-factor (Å <sup>2</sup> )	42.3	Xtriage
Anisotropy	0.158	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.29 , 145.8	EDS
Estimated twinning fraction	0.030 for h,-k,-l	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	3 of 37889 reflections (0.008%)	Xtriage
$F_o, F_c$ correlation	0.54	EDS
Total number of atoms	791	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.89% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: ZN

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).

There are no protein, RNA or DNA chains available to summarize Z scores of covalent bonds and angles.

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	145	0	0	0	0
1	B	137	0	0	0	0
1	C	122	0	0	0	0
1	D	131	0	0	0	0
1	E	132	0	0	0	0
1	F	120	0	0	0	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	E	1	0	0	0	0
All	All	791	0	0	0	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 0.

There are no clashes within the asymmetric unit.

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

There are no protein backbone outliers to report in this entry.

### 5.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

### 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 [i](#)

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

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 [i](#)

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 ⓘ

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	145/165 (87%)	0.95	25 (17%) 2 1	5, 20, 56, 81	0
1	B	137/165 (83%)	0.79	17 (12%) 5 3	5, 20, 51, 70	0
1	C	122/165 (73%)	1.33	22 (18%) 2 1	5, 28, 60, 71	0
1	D	131/165 (79%)	1.26	26 (19%) 1 1	5, 29, 61, 80	0
1	E	132/165 (80%)	1.37	27 (20%) 1 1	5, 34, 56, 76	0
1	F	120/165 (72%)	1.49	33 (27%) 1 0	14, 34, 60, 74	0
All	All	787/990 (79%)	1.19	150 (19%) 2 1	5, 28, 58, 81	0

All (150) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	101	GLN	23.5
1	A	31	LYS	21.0
1	A	101	GLN	19.3
1	D	32	ASP	18.9
1	F	11	SER	17.9
1	B	9	LEU	16.7
1	D	112	ASN	16.4
1	C	59	MET	15.5
1	E	9	LEU	13.7
1	F	155	THR	13.5
1	E	117	LEU	12.9
1	D	82	ASP	11.1
1	D	30	LEU	11.1
1	E	11	SER	11.0
1	B	98	CYS	10.5
1	A	26	LEU	10.5
1	D	140	TRP	10.3
1	C	117	LEU	10.2
1	E	97	ALA	10.2

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Mol	Chain	Res	Type	RSRZ
1	F	55	VAL	9.9
1	C	37	GLY	9.7
1	C	54	PRO	9.6
1	A	27	PHE	9.3
1	C	155	THR	9.2
1	C	44	GLY	9.0
1	B	100	ILE	8.9
1	F	117	LEU	8.5
1	D	74	ALA	8.3
1	C	34	HIS	8.1
1	D	73	SER	8.0
1	F	127	THR	8.0
1	E	41	GLU	7.9
1	E	32	ASP	7.8
1	E	28	SER	7.6
1	D	38	PHE	7.4
1	C	156	ASN	7.3
1	F	140	TRP	7.0
1	C	92	LEU	6.9
1	F	37	GLY	6.5
1	D	60	ILE	6.5
1	B	37	GLY	6.4
1	D	86	THR	6.2
1	F	39	PRO	6.2
1	E	150	SER	6.1
1	F	18	LEU	6.1
1	E	39	PRO	5.8
1	F	89	TYR	5.6
1	E	31	LYS	5.5
1	E	94	ASP	5.2
1	A	45	ASN	5.1
1	A	28	SER	5.0
1	F	32	ASP	4.9
1	F	16	MET	4.8
1	C	27	PHE	4.6
1	B	11	SER	4.6
1	B	137	PRO	4.5
1	C	113	GLU	4.5
1	E	16	MET	4.5
1	A	37	GLY	4.4
1	F	143	VAL	4.4
1	F	146	GLU	4.4

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Mol	Chain	Res	Type	RSRZ
1	A	34	HIS	4.3
1	A	30	LEU	4.2
1	E	37	GLY	4.2
1	B	146	GLU	4.1
1	F	147	ILE	4.1
1	F	151	PHE	4.0
1	D	34	HIS	4.0
1	D	96	GLU	4.0
1	C	19	ALA	3.8
1	F	90	GLN	3.8
1	B	97	ALA	3.8
1	F	72	SER	3.8
1	D	144	ARG	3.8
1	D	11	SER	3.8
1	E	113	GLU	3.8
1	A	138	CYS	3.7
1	A	48	GLN	3.7
1	C	127	THR	3.7
1	B	30	LEU	3.7
1	B	34	HIS	3.7
1	D	120	ARG	3.6
1	D	147	ILE	3.6
1	C	67	PHE	3.6
1	A	65	ASN	3.5
1	F	113	GLU	3.5
1	E	158	GLN	3.4
1	A	46	GLN	3.4
1	E	25	SER	3.3
1	A	47	PHE	3.3
1	C	28	SER	3.3
1	A	156	ASN	3.2
1	C	40	GLN	3.2
1	E	69	THR	3.1
1	F	115	SER	3.1
1	E	157	LEU	3.1
1	E	34	HIS	3.1
1	B	27	PHE	3.0
1	F	87	GLU	3.0
1	A	139	ALA	3.0
1	E	74	ALA	2.9
1	D	134	LYS	2.9
1	D	29	CYS	2.9

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Mol	Chain	Res	Type	RSRZ
1	D	59	MET	2.9
1	E	126	ILE	2.8
1	D	154	SER	2.8
1	D	126	ILE	2.8
1	F	60	ILE	2.8
1	D	88	LEU	2.8
1	B	31	LYS	2.8
1	E	56	LEU	2.8
1	F	153	LEU	2.7
1	F	112	ASN	2.7
1	A	72	SER	2.7
1	C	16	MET	2.7
1	F	67	PHE	2.7
1	C	146	GLU	2.7
1	D	56	LEU	2.6
1	B	156	ASN	2.6
1	F	29	CYS	2.6
1	B	136	SER	2.6
1	B	122	TYR	2.6
1	C	52	THR	2.6
1	A	102	GLY	2.5
1	A	18	LEU	2.5
1	D	27	PHE	2.5
1	F	53	ILE	2.5
1	E	51	GLU	2.4
1	E	114	ASP	2.4
1	F	77	ASP	2.4
1	A	154	SER	2.4
1	E	60	ILE	2.3
1	F	27	PHE	2.3
1	A	32	ASP	2.3
1	D	76	TRP	2.2
1	A	39	PRO	2.2
1	A	74	ALA	2.2
1	C	23	ARG	2.2
1	A	98	CYS	2.2
1	F	122	TYR	2.2
1	B	154	SER	2.1
1	C	154	SER	2.1
1	D	39	PRO	2.1
1	E	115	SER	2.1
1	F	136	SER	2.1

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Mol	Chain	Res	Type	RSRZ
1	F	34	HIS	2.1
1	A	10	GLY	2.0
1	C	90	GLN	2.0
1	E	154	SER	2.0
1	F	54	PRO	2.0

## 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
2	ZN	B	1201	1/1	0.99	0.04	-	5,5,5,5	0
2	ZN	C	1203	1/1	0.98	0.03	-	29,29,29,29	0
2	ZN	A	1204	1/1	0.98	0.05	-	29,29,29,29	0
2	ZN	E	1202	1/1	0.98	0.05	-	37,37,37,37	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.