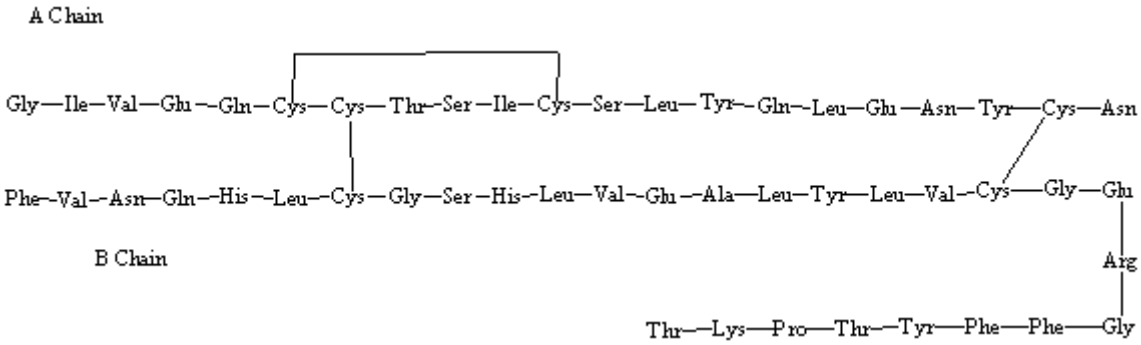
Catalog Number: 105707, 155044, 193900, 196063

Insulin

Structure:

Human Insulin:[1]



Bovine insulin differs from human insulin at the following positions: alanine for threonine at position A8 (8th position on A Chain), valine for isoleucine at A10, and alanine for threonine at the carboxyl terminal of the B-chain.[13]

Porcine insulin differs from human insulin at the following positions: alanine for threonine at the carboxy terminal of the B-chain.[13]

	Bovine	Human, recombinant	Porcine
Molecular Formula:	$C_{254}H_{377}N_{65}O_{75}S_6$	$C_{257}H_{383}N_{65}O_{77}S_6$	$C_{256}H_{381}N_{65}O_{76}S_6$
Molecular Weight:	5733.52	5807.69	5777.58
CAS #	9004-10-8 (11070-73-8)	11061-68-0	12584-58-6

Amino Acids: 51 amino acids (human).[1]

Physical Description: White to off-white powder

Activity: 1 unit corresponds to the efficiency of 0.04167 mg international standard substance. An HPLC method exists to test the potency.[2]

Zinc Content: Approximately 0.5%. If desired, the zinc can be removed by solubilizing the insulin in dilute acetic acid, adding excess EDTA to chelate the zinc, and then precipitating the insulin at its pI.[27]

Isoelectric Point: pI - ~5.3 (for the native protein).[1,9]

Sedimentation Coefficient ($D_{20,w}$): 1.95×10^{-13} (bovine and porcine).[3]

E^{M} (278 nm): 6080 (33 mM phosphate, pH 7.0, bovine and porcine).[29]

$M^{1\%}$ (278 nm): 10.6 (33 mM phosphate, pH 10.6, bovine and porcine).[29]

Solubility: Insulin is not soluble at neutral pH. It can be solubilized (1 - 10 mg/ml) in dilute acetic acid or dilute hydrochloric acid, pH 2-3. A stock solution can be aliquoted and stored at -20°C. Multiple freeze-thaw cycles should be avoided. Alternatively, it can be stored for up to 6 months at 2-8°C if it is sterile filtered through a low protein binding membrane or if it contains a suitable bacteriostat, such as 0.1% thimerosal or sodium azide. Insulin solutions cannot be autoclaved. Insulin can also be solubilized in 125 mM $NaHCO_3$.[23] However, alkaline stock solutions are not recommended since high pH increases the rate of deamidation and aggregation.[16] Brange, et al.[4] have reviewed insulin structure and stability.

Description: Insulin is the primary polypeptide hormone responsible for controlling the cellular uptake, utilization and storae of glucose, amino acids and fatty acids while inhibiting the breakdown of glycogen, protein and fat. It is produced

by pancreatic beta cells. The precursor protein (preproinsulin) contains a 23-30 amino acid signal peptide attached to the amino terminal of proinsulin. Proinsulin is composed of the insulin B-chain followed by a connecting peptide (C-Peptide) and the A-chain. The signal peptide assists in translocating preproinsulin into the lumen of the endoplasmic reticulum, after which it is rapidly cleaved. Proinsulin is then transported to the Golgi complex where it is packaged into granules and converted to insulin. On secretion, equimolar amounts of insulin and C-peptide are released into the blood.[12,26,28]

The insulin receptor is a tyrosine kinase that phosphorylates 185 kDa insulin receptor substrate (IRS-1) found in most cell types. IRS-1 activates phosphatidylinositol 3 kinase (IP3 Kinase).[8,10,21] The Kd for insulin at its receptor is approximately 0.5 nM (approximately 2.9 ng/ml).[21]

The comparison of solution structural flexibility and zinc binding domains for insulin, proinsulin and miniproinsulin has been reviewed by Kaarsholm, et al.[20]

Typical Usage: Typically used in cell cultures at a concentration of 1 to 10 ug/ml.[15,24] Methods for immobilizing insulin on polystyrene dishes have been reported for applications involving protein-free cell cultures.[18]

Availability:

Catalog Number	Description	Size
105707	Insulin, bovine pancreas, zinc stabilized; activity approximately 25 I.U./mg dry weight	1 KU 5 KU 15 KU 25 KU
196063	Insulin, bovine pancreas, zinc stabilized; activity approximately 25 I.U./mg dry weight; sterilized by γ–irradiation	100 mg
193900	Insulin, human, recombinant (typically expressed in *E. coli* or yeast), zinc stabilized; activity approximately 28 I.U./mg	10 mg 25 mg 100 mg
155044	Insulin, porcine pancreas, zinc stabilized; activity approximately 24 I.U./mg	1 mg 5 mg 10 mg 50 mg

References:

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Certificate of Analysis

Product Description: Insulin, Human recombinant
Catalog Number: 193900
Lot: 4959H

Formula: n/a
CAS #: 11061-68-0
Physical Description: white powder

Formula Weight: 5807.6
Storage: -0° C

Test	Specification	Result
Identity Test	Passes	Passes
Activity	~28 I.U./mg	29.1 u/mg
Zinc content	0.25 to 1.1%	0.38%
Expressed in	Report	Yeast

2004/09/13 – Joseph Dietz, Ph.D.
MP Biochemicals, Inc.
Technical Director

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