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# Peptide Impurity Standards



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**DAICEL CHIRAL TECHNOLOGIES (INDIA) PRIVATE LIMITED**  
SUBSIDIARY OF DAICEL CORPORATION

**Daicel Chiral Technologies (India) Pvt. Ltd.**

Survey No.542/2, IKP Knowledge Park, Turkapally, Shamirpet Mandal, Medchal-Malkajgiri District Hyderabad-500101. Telangana, India.

T: +91 84186 60700 & 703, E: [chiral@chiral.daicel.com](mailto:chiral@chiral.daicel.com)

[www.daicelpharmaservices.com](http://www.daicelpharmaservices.com)

## Calcitonin

Asp-26-Calcitonin  
Glu-14-Calcitonin  
Glu-20-Calcitonin  
Asp (3)-Calcitonin  
Des (32,31) Thr, Pro-Calcitonin  
Calcitonin Parallel Dimer  
Calcitoninyl glycine  
Ser(Ac)5-Calcitonin  
Des-(32,31) Thr-Pro Calcitonin Acid  
Truncated (32-27)- Calcitonin  
Trisulfide-Calcitonin  
1-2 Hydrolysis Calcitonin  
Calcitonin Salmon D10 Impurity  
1,7 bis(3-sulfo-L-Ala)-  
Calcitonin salmon  
1,7 bis(3-sulfo-L-Ala)-  
Calcitoninyl glycine  
Truncated (32-20)-Calcitonin  
Truncated (32-29)-Calcitonin  
Truncated (32-28)-Calcitonin  
Fragment (27-32)-Calcitonin salmon  
Fragment (28-32)-Calcitonin salmon  
Cyclo-Asn(3)-Calcitonin  
Cyclo-Asn(26)-Calcitonin  
Ala(CN)3-Calcitonin  
Des-Thr(6)-Calcitonin  
Des-Thr(21)-Calcitonin  
Asp(3)-Truncated[32-29]-Calcitonin  
Asp(26)-Truncated[32-29]-Calcitonin  
Glu(14)-Truncated[32-29]-Calcitonin  
Glu(20)-Truncated[32-29]-Calcitonin

## Cetrorelix

Cetrorelix D10  
Des-Amido-Cetrorelix  
L-Ala(10)-Cetrorelix  
Des-Acetyl-Cetrorelix  
Des-D-Ala-Cetrorelix  
Endo-3-D-Pal-Cetrorelix  
Ser(Ac)4-Cetrorelix  
L-Phe(4-Cl)-Cetrorelix  
L-Cit-Cetrorelix  
D-Ser-Cetrorelix  
Endo-D-Cit-Cetrorelix  
Cetrorelix Dimer

## Daptomycin

Daptomycin  $\beta$ -Isomer  
Anhydro-Daptomycin  
Daptomycin (RS-1)  
Daptomycin Lactone Hydrolysis  
Daptomycin impurity-1  
Daptomycin Impurity-B1/II  
Daptomycin Impurity-B2  
Daptomycin impurity-5  
Daptomycin Impurity-6  
Daptomycin Impurity-7  
Daptomycin Impurity-8  
Daptomycin Impurity-3  
Daptomycin Impurity-4  
Isodecyl acyl isomer  
Impurity RS-7b  
Impurity RS-2

## Ganirelix

L-Ala(10)-Ganirelix  
D-Ser(4)-Ganirelix

## Icatibant

Des-D-Arg(1)-Icatibant  
Des-L-Arg(2)-Icatibant  
L-Arg(1)-Icatibant  
(1-6)-Icatibant  
(7-10)-Icatibant  
Ac-Icatibant

## Lanreotide

Lanreotide D8 TFA salt  
Des-Thr(8)-Lanreotide  
N-Ac-Lanreotide  
L-Nal-Lanreotide  
Lanreotide Acid

## Leuprolide

Leuprolide- Impurity-12  
D-Trp-Leuprolide  
Leuprolide- Impurity-6  
Leuprolide- Impurity-8  
D-Ser-Leuprolide  
D-His-Leuprolide  
Leuprolide-Metabolite(pentapeptide)  
(O-Acetyl-L-Ser)-Leuprolide  
L-Leu (6)-Leuprolide  
D-Leu-Leuprolide  
Ac(2-9) Leuprolide  
D-Tyr-Leuprolide  
Leuprolide D10 (labelled)  
Leuprolide impurity(1-5)  
Leuprolide impurity(1-8)  
Des-Ser(4)-Leuprolid  
[1-(5-Oxo-D-proline)]Leuprorelin  
[2-D-histidine,4-D-serine]leuprorelin  
D-Arg(8)-Leuprolide  
D-Pro(9)-Leuprolide  
Leuprolide Dimer  
Leuprolide Trimer  
DehydroAlanine-Leuprolide (EP Imp-K)  
Pyrazole impurity (EP Imp-J)

## Linaclotide

Asp(7)-Linaclotide  
Ac-Linaclotide  
Des-Tyr(14)-Linaclotide  
Cys(1)-IMD-Linaclotide

## Liraglutide

D-His(1)-Liraglutide  
D-Glu(3)-Liraglutide  
D-Ser(8)-Liraglutide  
Des-Gly(4)-Liraglutide  
Des-Ser(8)-Liraglutide  
Des-Gly(29)-Liraglutide  
Des-Gly(31)-Liraglutide  
D-Arg(28)-Liraglutide  
Trp(0)-Liraglutide  
Glu(17)-Liraglutide  
[3-31]-Liraglutide  
[4-31]-Liraglutide  
[5-31]-Liraglutide  
[6-31]-Liraglutide  
[7-31]-Liraglutide  
[9-31]-Liraglutide  
[10-31]-Liraglutide  
Des-Ala(2)-Liraglutide  
Des-Thr(5)-Liraglutide  
D-allo-Thr(11)-Liraglutide  
D-allo-Thr(13)-Liraglutide  
D-Val(16)-Liraglutide

D-Ser(17)-Liraglutide  
D-Ser(18)-Liraglutide  
Imp-J (Formaldehyde-Adduct)  
Trp(Ac)-Liraglutide  
Iso-Asp-Liraglutide  
D-Glu(side chain)-Liraglutide  
[1-28]-Liraglutide  
Iso-Asp(9)-Liraglutide  
Des-Thr(7)-Liraglutide  
Endo-Thr(7)-Liraglutide  
Cyclic-His-Liraglutide  
Trp(4-hydroxybenzyl)25-Liraglutide  
Kyn(25)-Liraglutide  
Liraglutide D8

## Oxytocin

Ac-Oxytocin  
Asp 5- Oxytocin  
Glu 4-Oxytocin  
Leu 3-Oxytocin  
Oxytocic Acid  
D-Asn 5-Oxytocin  
Ala (3-CN) 5-Oxytocin  
Parallel Dimer- Oxytocin  
Antiparallel Dimer Oxytocin  
D-Asp(5)-Oxytocin

## Octreotide

D-Thr(6)-Octreotide  
D-Cys(2)-Octreotide  
Ac-Octreotide  
Trp(4)-Octreotide  
Lys(Ac)-Octreotide  
Des-Threoninol-Octreotide  
D-Cys(7)-Octreotide  
Threoninol(Ac)  
8-Octreotide  
Linear octreotide  
L-Phe(1)-Octreotide  
Des-D-Phe(1)-Octreotide  
Des-D-Trp(4)-Octreotide  
Des-Lys(5)-Octreotide  
Octreotide Acid  
D-Phe(3)-Octreotide  
D-allo-Thr(6)-Octreotide  
(N-O) acyl isomer of Octreotide  
Trisulfide Octreotide  
Octreotide D8(labelled)  
OCA Thr-O-Glycolic ester  
Lys-Glycolyl-Octreotide  
[8-THR-OL-2GA]-Octreotide

## Polymyxin

Polymyxin-B1  
Polymyxin-B2  
Polymyxin-B3  
Polymyxin-B1-1

## Semaglutide

Semaglutide WRS  
Semaglutide D5  
Des-Glu(3)-Semaglutide  
Endo-Gly(4)-Semaglutide  
D-His(7)-Semaglutide  
Des-His(7)-Semaglutide  
Des-Gly(10)-Semaglutide  
Des-Thr(11)-Semaglutide  
Endo-Gly(10)-Semaglutide  
iso-Asp-Semaglutide  
Trp(4-hydroxybenzyl)25-Semaglutide

Semaglutide+ 14 impurity  
Des-Glu(3)-Semaglutide  
Endo-Glu(3)-Semaglutide  
D-Asp(9)-Semaglutide  
D-Val(10)-Semaglutide  
D-Phe(6)-Semaglutide  
[3-31]-Semaglutide  
[5-31]-Semaglutide  
[9-31]-Semaglutide  
Linear Semaglutide  
Semaglutide D8  
[4-31]-Semaglutide  
[12-31]-Semaglutide  
[14-31]-Semaglutide  
[1-29]-Semaglutide(Des-RG-  
Semaglutide)  
D-Thr(5)-Semaglutide  
Des-Gly(31)-Semaglutide  
D-Iso-Asp-Semaglutide  
Trp(tBu)-Semaglutide  
Cyclic-His-Semaglutide  
D-Ala(19)-Semaglutide  
D-Ala(24)-Semaglutide  
D-gamma-Glu(3)-Semaglutide  
D-Ser(11)-Semaglutide

## Somatostatin

D-Ala(1)-Somatostatin  
D-Asn(5)-Somatostatin  
D-Cys(3)-Somatostatin  
D-Lys(4)-Somatostatin  
D-Phe(6)-Somatostatin  
D-Cys(14)-Somatostatin  
D-Lys(9)-Somatostatin  
D-Phe(7)-Somatostatin  
D-Phe(11)-Somatostatin  
D-Ser(13)-Somatostatin  
D-allo-Thr(10)-Somatostatin  
D-allo-Thr(12)-Somatostatin  
D-Trp(8)-Somatostatin  
[3-14]-Somatostatin  
Ac-[3-14]-Somatostatin  
Des-Ala(1)-Somatostatin  
Ac-Des-Ala(1)-Somatostatin  
Asp(5)-Somatostatin  
Des-Asn(5)-Somatostatin  
Des-Gly(2)-Somatostatin  
Des-Ser(13)-Somatostatin  
Des-Thr(12)-Somatostatin  
Di-Ala(1)-Somatostatin  
Di-Gly(2)-Somatostatin  
Di-Thr(12)-Somatostatin  
Di-Trp(8)-Somatostatin  
Endo [Ser-Cys(Acm)]-Somatostatin  
DICU (7-14)-Somatostatin  
Somatostatin Dimer

## Teduglutide

Met(0)10- impurity  
Iso-Asp3 -impurity  
Di-Gly4-impurity  
D-His1-impurity  
Des-His1-impurity  
Des-Gly2- impurity  
[3-33]- impurity

## Teriparatide

Met(0)-8,18-Teriparatide  
Teriparatide Dimer  
PTH(31-34)-Acid Impurity  
PTH(31-34)-Teriparatide  
Met(0)-8 Teriparatide  
Met(0)-18 Teriparatide  
Asu(30)-Teriparatide  
below are under development  
Glu(6)-Teriparatide  
Asp(10)-Teriparatide  
Asp(16)-Teriparatide  
Glu(29)-Teriparatide  
Asp(33)-Teriparatide  
D-Glu(4)-Teriparatide  
D-Glu(6)-Teriparatide  
D-His(9)-Teriparatide

## Tirzepatide

[D-Phe6]- Tirzepatide  
[D-Leu26]- Tirzepatide  
[D-Asp9]- Tirzepatide  
[D-Phe22]- Tirzepatide  
[D-Gln24]- Tirzepatide  
[D-Glu3]- Tirzepatide  
[D-Gamma Glu2]- Tirzepatide  
[D-Gln19]- Tirzepatide  
[ $\beta$ -Ala21]- Tirzepatide  
[D-Leu14]- Tirzepatide  
[D-Asp15]- Tirzepatide  
[ $\beta$ -Ala35]- Tirzepatide  
[ $\beta$ -Asp15]- Tirzepatide  
[ $\beta$ -Asp9]- Tirzepatide  
[ $\beta$ -Ala28]-Tirzepatide  
[ $\beta$ -Ala18]-Tirzepatide  
Des-Ile12 Tirzepatide  
Des- $\gamma$ -Glu(2)-Tirzepatide  
Des-Tyr(1),Aib(2)-Tirzepatide  
Des-Gly(4)-Tirzepatide  
Glu(24)-Tirzepatide  
Glu(19)-Tirzepatide  
D-Tyr(1)-Tirzepatide  
Tirzepatide Acid  
D-Ser(11)-Tirzepatide  
Des-Aib(13)-Tirzepatide  
Des-Aib(2)-Tirzepatide  
[Des-AEEA4]-Tirzepatide

## Triptorelin

D-Arg(8)-Triptorelin  
D-pGlu(1)-Triptorelin  
D-Pro(9)-Triptorelin

D-Trp(3)-Triptorelin  
L-Trp(6)-Triptorelin  
Endo-Ser(4a)-Triptorelin  
Endo-Tyr(5a)-Triptorelin

## Vasopressin

Gly 9-Vasopressin  
Glu (4)-Vasopressin  
Asp(5)-Vasopressin  
Di-sulfonic acid- AVP  
Des-Gly-Vasopressin  
Endo-Gly-Vasopressin  
Ac-Vasopressin  
Vasopressin D5 (labelled)  
Trisulfide AVP  
D-Asn-Vasopressin  
Des-Pro-Vasopressin  
Gln(Acm)-Vasopressin  
His(2)-Vasopressin  
D-Tyr-Vasopressin  
D-Arg(8)-Vasopressin  
D-Cys(1)-Vasopressin  
D-Cys(6)-Vasopressin  
D-Pro(7)-Vasopressin  
Des-Gly-OH-Vasopressin  
D-Phe(3)-Vasopressin  
Parallel Dimer  
Antiparallel Dimer  
 $\beta$ -Asp(5)-Vasopressin  
Ac-Asp(5)-Vasopressin  
Leu(7)-Vasopressin  
Glu(4)-Gly-OH-Vasopressin  
Lysine-Vasopressin

## Miscellaneous

Des-Asn(1)-Plecanatide  
N,N'-dimethyl-Gly-Desmopressin  
UD: Gln(Acm)-Desmopressin  
Asn(Acm)-Desmopressin  
Met(0)-Tetracosactide  
Triptorelin Dimer  
Triptorelin Trimer

## Under development

### Glucagon

Ac-Glucagon  
Des-Thr<sup>7</sup>-Glucagon  
Des-Thr<sup>5</sup>-Glucagon  
Met(0)<sup>27</sup>-Glucagon  
D-His-Glucagon  
D-Ser<sup>2</sup>-Glucagon  
D-Ser<sup>3</sup>-Glucagon  
Dehydrated-Glucagon (Ser<sup>2</sup>)  
Dehydrated-Glucagon (Ser<sup>3</sup>)

### Somatostatin

Somatostatin Trimer

