



- KOBAYASHI ZEIN DP -

DATA SHEET

Zein is a major component of corn proteins, called a prolamine soluble in aqueous ethanol.

Zein is extracted from gluten meal separated under corn starch production. The acquisition of deodorized and decolourised zein is attained by Kobayashi's method. It is called "KOBAYASHI ZEIN DP".

We supply "KOBAYASHI ZEIN DP" to be used for food processing, cosmetics use, pharmaceutical applications and other various purposes with confidence because it is a natural protein of corn.

APPEARANCE AND CHARACTERISTICS

White to pale yellow powder.

Insoluble in water, Hexane, Diethylether, Benzene, Toluene and Xylene.
soluble in aqueous ethanol (60-90% by weight), aqueous methanol (90% by weight), aqueous IPA (60-90% by weight) and aqueous acetone (60-90% by weight).

SPECIFICATIONS

| ITEMS | SPECIFICATION | ANALYTICAL METHOD |
|----------|-------------------|------------------------------|
| Moisture | Not less than 7% | Karl Fischer |
| Protein | Not less than 85% | Semi-micro kjeldahl (N×6.25) |

ADVANTAGES

- FILM** Aqueous Ethanol solution of Zein is sprayed or spread in on materials, then dried. Zein film is formed on them. It is edible and resistant to water, acid and oil.
- ADHESIVE** Zein adheres tightly. For example, spread or sprayed Zein solution on timbers, etc. (dry surface) adheres them firmly.
- ENTERIC** Zein is highly resistant to gastric acid and is digested by intestinal enzymes.
- SLOW RELEASE** Zein is combined and make tablet as matrix, then slow release tablet is obtained. By changing volume of Zein content, release time can be controlled.
- ANTI-OXYDATION** Zein has great anti-oxidation effect when Zein is in contact with oil.



CBC (EUROPE) Ltd.
Chemical Division

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|-------|-------------|
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GENERAL APPLICATIONS

EDIBLE COATING

1. prevention of oxidation of nuts
2. prevention of stickiness of chocolate
3. blocking of odor and taste
4. prevention of tablet from crumbling

ENTERIC TABLET

MIXED FERTILIZER FOR FISH

OTHER YOUR OWN PURPOSE



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SPECIAL APPLICATIONS

FILM

1. For spray coating: 8-15gr of "KOBAYASHI ZEIN DP" is dissolved into 100ml of aqueous ethanol (86% by weight). This solution is sprayed on materials and dried.

Formulation of coating solution

| FORMULATION | % BY WEIGHT |
|-------------------|-------------|
| Kobayashi Zein DP | 8-15 |
| 99% Ethanol | 86 |
| Water | 14 |
| Plasticizer | 0.8-2 |

How to dissolve of "KOBAYASHI ZEIN DP"

Zein is dissolve in aqueous ethanol (86% by weight) about 20%. Stir for 1 hour and reduce it with same aqueous ethanol to the concentration from 8 to 15%

"KOBAYASHI ZEIN DP" should be added bit by bit into aqueous ethanol stirring vehemently. When a part of "KOBAYASHI ZEIN DP" forms a clod, it should be stirred for 1 hour. White precipitate may still appear in this solution after a few days. It would not avoid forming zein membrane but you may get rid of it filtering, etc. as you want.

Coating condition

| Apparatus | Hi-Coater HCT-48 Freund Industrial |
|-----------------------|---------------------------------------|
| Rotation Speed | 10-20 rpm |
| Inlet Air Temperature | 40-50°C |
| Spray Speed | 50g/min |

2. For pan work coating: 15-20gr of "KOBAYASHI ZEIN DP" is dissolved into 100ml of aqueous ethanol (86% by weight). This solution is sprayed on materials and dried. Addition of medium chain triglyceride etc. makes coating easy.



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Formulation of coating solution

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Procedure of pan work coating

Cover tablet in a rotation pan with Zein solution.

After covering Zein solution, quickly spread it uniformly and stop rotation of the pan right away.

Stationary drying should be performed in 5-10 minutes under cool wind condition (less than 10°C). If the pan is rotating in drying process, it may cause crumbing on the surface of tablet.

PLASTICIZER

MCT (Medium Chain Triglycerides) help to protect table from gathering together during coating and give resistance to water. Free fatty acids (oleic acids etc.) give softness and transparency to the film. Glycerols give adhesiveness to surface of wax and solid fat.

ADHESIVE

- 10-25gr of "KOBAYASHI ZEIN DP" is dissolved into 100ml of aqueous ethanol (60-90% by weight). This solution is spread or sprayed on the surface you want to adhere. Addition of plasticizer improves adhesion.
- "KOBAYASHI ZEIN DP" is mixed into powder material and aqueous ethanol (60-90% by weight) is added to this mixed powder. The mixture is kneaded and dried. Addition of plasticizer improves adhesion.



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ENTRIC

Formulation of coating solution

Placebo tablet : acid-red 52 in lactose (150mg/tablet)

| FORMULATION | % BY WEIGHT |
|----------------------------|-------------|
| Kobayashi Zein DP | 8 |
| Ethanol | 67.7 |
| Water | 24.3 |
| Free fatty acid of soybean | 1.2 |

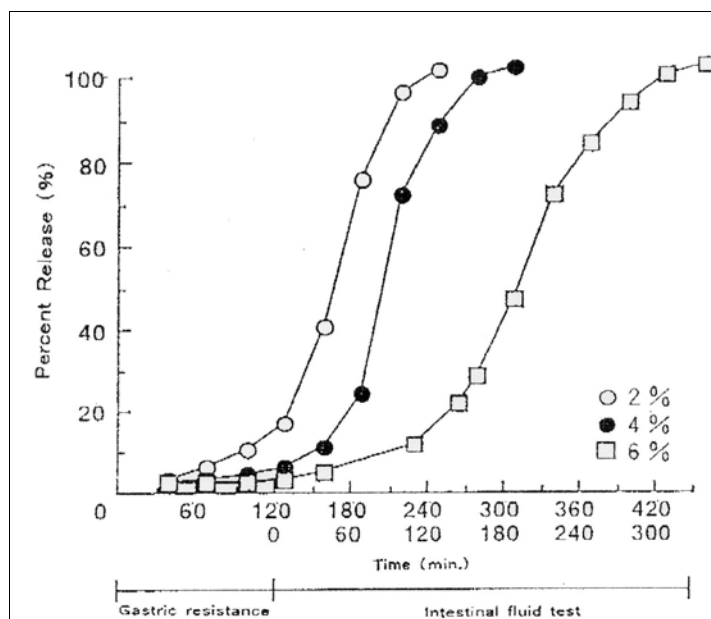
Coating condition

| APPARATUS | Hi-Coater HCT-48 Freund Industrial |
|-----------------------|---------------------------------------|
| Rotation Speed | 11 rpm |
| Inlet Air Temperature | 50°C |
| Spray Speed | 50g/min |

Entric test (According to JP method)

| TEST ITEM | pH | TEMPERATURE |
|-----------------------|--|-------------|
| Gastric resistance | JP1 soln. + pepsin(2mg/ml) 1.2-1.3 | 36-37°C |
| Intestinal fluid test | JP2 soln. + chymotrypsin(0.2 mg/ml) 6.7-6.8 | 36-37°C |

Test result





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SLOW RELEASE

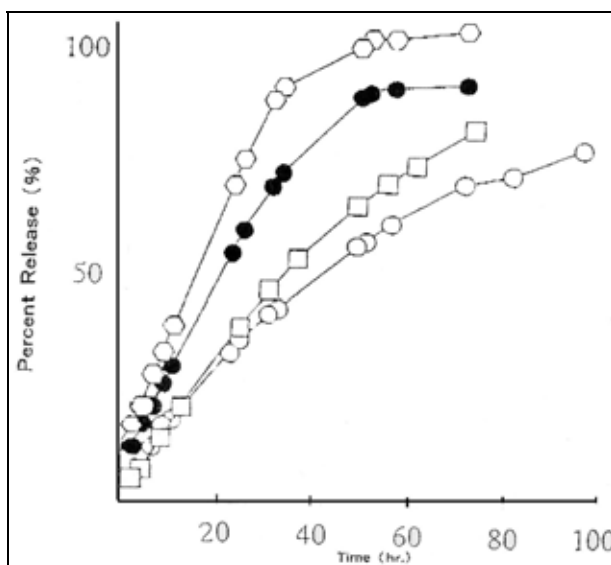
Preparation (direct tableting)

| FORMULATION OF POWDER | % |
|-----------------------|-------|
| Aspirin | 20 |
| Kobayashi Zein DP | 20-80 |
| Lactose | 60-0 |

Release test (according to JP method)

| | |
|----------------------|--------------------------------|
| Test solution | JP1 soln. + pepsin(1.2) |
| Test solution volume | 900mL |
| Sample dose | 1 tablet(200mg eq. as Aspirin) |
| Rotation speed | 100rpm |
| Method | Absorptiometry 315nm |

Test result



Legend:

| Content of ZEIN DP in tablets | Symbol |
|-------------------------------|--------|
| 80% | ○ |
| 60% | □ |
| 50% | ● |
| 40% | ◑ |

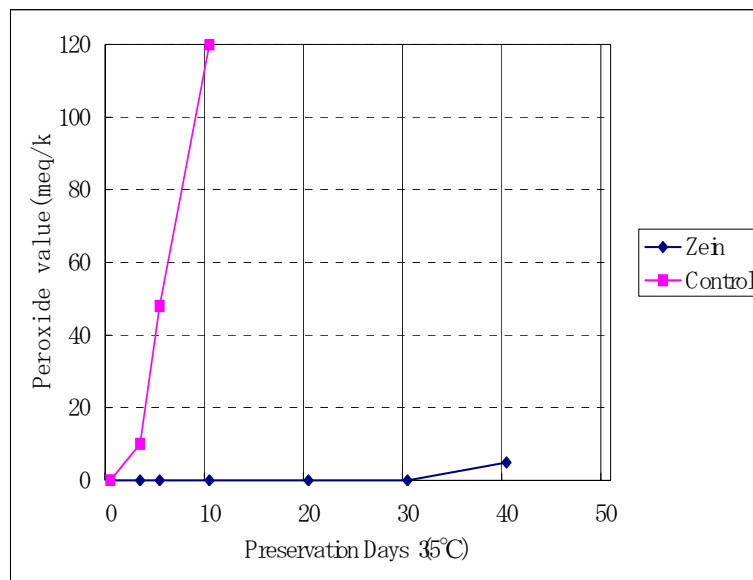


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ANTI-OXYDATION

Example of higher unsaturated fatty acid of fish oil



Control corn starch : fatty acid of fish oil = 4 : 1 (Impregnate into corn starch)
Zein Zein : fatty acid of fish oil = 2 : 1 (Drying after dissolve in ethanol)