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 Unika Soegijapranata1

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# Q<sub>10</sub> Values & Shelf Life Prediction of Seasoning Flour and Coffee Powder Using ASLT

Probo Y. Nugrahedi, Hayuningtyas W. Hestu, Wulan A. Dewi, Inneke Hantoro

-SPD 02-

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## Aims

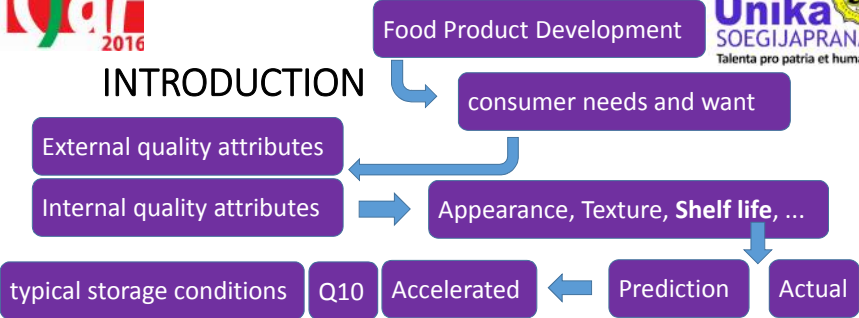
- to study the Q<sub>10</sub> of three commercial brands of seasoned flour and coffee powder stored in three different storage temperature (25 °C, 35 °C and 45 °C) and
- to investigate the shelf life of these products using accelerated shelf life testing method.



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## INTRODUCTION



```

graph TD
    A[Food Product Development] --> B[consumer needs and want]
    B --> C[External quality attributes]
    B --> D[Internal quality attributes]
    C --> E[Appearance, Texture, Shelf life, ...]
    D --> E
    E --> F[Prediction]
    F --> G[Actual]
    F --> H[Accelerated]
    H --> I[Q10]
    I --> J[typical storage conditions]
  
```

- No definitive Q<sub>10</sub> for a specific type of food.
- Examples: 1.1 to 4 for canned products, 3 to 40 for frozen products and 1.5 to 10 for dehydrated products (Labuza, 1982).

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## MATERIALS AND METHODS

### Sample Preparation

- Commercial brands of seasoned flour (mainly made from wheat flour, tapioca flour, salt, and other spices), coded as Ms, Ss, and Sk
- Commercial brands of coffee powder, coded as K, T, and S
- The samples have similar expired date in each brand and the expired date is close between brands.
- All samples were kept at 25 °C, 35 °C, and 45 °C at RH 75% for 8 weeks
- Measurements: Moisture Content; Water Activity; Wettability

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### Data Analysis



- Linear regression
- Reaction order (0 or 1)
- Activation energy.
- Arrhenius equation  $k = k_0 e^{-E_a/RT}$
- The product shelf life was estimated using  $Q_{10}$

$$\ln Q_{10} = \frac{10 E_a}{RT^2}$$

$$t_s = \frac{|Q_0 - Q_c|}{k}$$

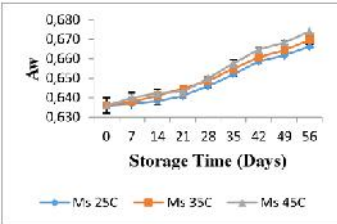
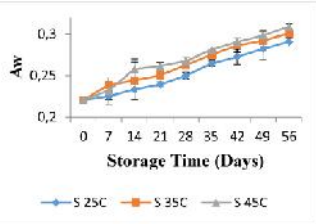
$E_a$  = activation energy (J mol<sup>-1</sup>)  
 $R$  = gas constant (8.314 J K<sup>-1</sup> mol<sup>-1</sup>)  
 $T$  = absolute temperature (K)



$Q_0$  = initial quality sample  
 $Q_c$  = critical quality sample  
 $t_s$  = time (days) → shelf life  
 $k$  = rate constant for deteriorative reaction

### Water Activity

- of seasoning flour (Ms-left) and coffee powder (S-right) during storage (n=3)

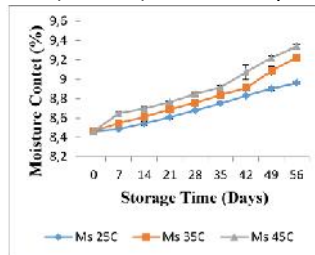
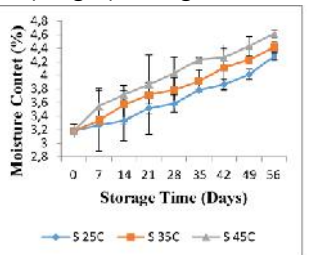








### RESULTS AND DISCUSSION

#### Moisture Content

- of seasoning flour (Ms-left) and coffee powder (S-right) during storage (n=3)

### Wettability

- of seasoning flour (Ms-left) and coffee powder (S-right) during storage (n=3)

