# ABSTRAK

## STUDI PENGGUNAAN *UV-VIS SPECTROSCOPY* DAN METODE SIMCA UNTUK MEMBEDAKAN KOPI BUBUK BERDASARKAN UMUR SIMPAN

**Oleh**

**KOMANG SUKARYE**

Selama penyimpanan kopi bubuk akan mengalami penurunan mutu yang disebabkan oleh faktor-faktor lingkungan. Sehingga produk tersebut dapat ditolak oleh konsumen atau dapat membahayakan orang yang mengkonsumsinya. Pemalsuan atau pengoplosan pada kopi dapat dilakukan dengan mencampurkan kopi segar yang baru disangrai dengan kopi yang telah lama disimpan (*expired*). Pengoplosan atau pencampuran kopi sangat sulit diidentifikasi apabila kopi sudah dalam bentuk bubuk. Maka penelitian ini dilakukan untuk mengetahui dan mengidentifikasi perbedaan kopi segar dengan kopi *expired* menggunakan *UV-Vis Spectrometer* dan metode *soft independent modelling of class analogy* (SIMCA).

Komposisi bahan yang digunakan dalam penelitian ini yaitu 1 gram dengan jumlah sampel sebanyak 100 sampel kopi segar dan 100 sampel kopi *expired*. Sampel kopi 1 gram diekstraksi menggunakan aquades sebanyak 50 ml dengan

suhu 90-98$^{o}$C. Kemudian dilakukan pengenceran dengan perbandingan 1 ml sampel ekstraksi kopi dengan 20 ml aquades. Sampel yang sudah diencerkan, dimasukkan ke dalam kuvet sebanyak 2 ml dan diambil data absorbansinya dengan 2 kali pengulangan menggunakan *UV-Vis Spectrometer* (*UV-Vis Genesys 10s, Thermo Scientific,* USA) pada panjang gelombang 190 – 1100 nm.

Hasil klasifikasi menunjukkan bahwa metode PCA dan SIMCA mampu membedakan kopi segar dan kopi *expired*. Hasil analisis PCA terbaik diperoleh untuk tipe spektra kombinasi *standard normal variate* (SNV) dan *moving average* 9 segmen pada panjang gelombang 190 – 1100 nm (panjang gelombang penuh). Pada pengembangan model spektra kombinasi *standard normal variate* (SNV) dan *moving average* 9 segmen menghasilkan nilai PC1 sebesar 99% dan PC2 sebesar 0%. Sedangkan untuk klasifikasi SIMCA diperoleh nilai akurasi (AC), nilai sensitivitas (S), dan nilai spesifisitas (SP) sebesar 100%.

**Kata kunci** : Kopi Bubuk, Diskriminasi, *UV-Vis Spectrometer*, *Principal Component Analysis* (PCA), *Soft Independent Modelling of Class Analogy* (SIMCA).

## ABSTRACT

### STUDY ON THE USE OF UV-VIS SPECTROSCOPY AND SIMCA METHOD TO DISCRIMINATE GROUND ROASTED COFFEE ACCORDING TO THE STORAGE TIME

During storage, ground roasted coffee will experience a quality degradation caused by environmental factors. Therefore, the product can be rejected by the consumer or can harm the person who consumes it. Counterfeiting or mixing coffee can be done by mixing fresh coffee that has just been roasted with coffee that has long been stored (expired). Coffee adulteration is very difficult to identify if the coffee beans have been roasted or already in powder form. Thus, this research was conducted to find out and identify the difference between the fresh coffee and expired one using UV-Vis Spectrometer and soft independent modeling of class analogy (SIMCA) method.

The composition of the materials used in this research was 1 gram for each samples with a total number of 100 samples of fresh coffee and 100 samples of expired coffee. 1 gram of coffee sample was extracted by using 50 ml of aquades with a temperature of 90 – 98 $^{o}$C. Then it was diluted with 1 ml sample of coffee extraction samples with 20 ml of aquades. The 2 ml of diluted sample was pipeted into cuvet and the absorbance data were measured twice by using UV-Vis

Spectrometer (UV-Vis Genesys 10s, Thermo Scientific, USA) at wavelengths from 190 – 1100 nm.

Classification results show that PCA and SIMCA methods were able to discriminate fresh coffee and expired one. The best PCA analysis results were obtained for combination spectra type of standard normal variate (SNV) and 9-segment of moving average at wavelengths from 190 – 1100 nm (full wavelength). In the development of the combination spectra model of standard normal variate (SNV) and 9-segment of moving average, resulted in PC1 value of 99% and PC2 value of 0%. While, for SIMCA classification, 100% of accuracy (AC), sensitivity (S), and specificity (SP) were obtained.

**Keywords**: *Ground Roasted Coffee, Discrimination, UV-Vis Spectrometer, Principal Component Analysis (PCA), Soft Independent Modelling of Class Analogy (SIMCA).*