Jurnal Kesmas Prima Indonesia E-ISSN : 2721-110X
Vol. 10 No. 2 July 2026

Characterization Of Physicochemical Properties Of Passion Fruit (Passiflora Edulis) Effervescent Powder

Rizka Hasmi Nasuton[1], Mayang Sari[2], Hendri Faisal[3], Wanda Hijriyani[4]

Institut Kesehatan Helvetia

mayangsari@helvetia.ac.id

ABSTRACT

The health drink market has evolved significantly, driving the development of innovative dosage forms like effervescent powders. Purple passion fruit (*Passionflower* was *.edible*) is a natural ingredient rich in bioactive antioxidants, including carotenoids, anthocyanins, flavonoid, and vitamin C. This study aims to formulate an effervescent powder utilizing purple passion fruit juice as an alternative health drink. An experimental laboratory design was employed to evaluate various physical properties and consumer acceptance. Passion fruit pulp was purposely sampled from Gajah Village, Karo Regency. The formulated effervescent granules were evaluated for organoleptic properties, foam height, dissolution time, pH levels, and hedonic preference using 12 semi-trained panelists. The results indicated that passion fruit juice can be successfully transformed into a stable effervescent powder. The preparation met all standard requirements for quality effervescent powders, showing an acceptable pH, rapid dissolution time, adequate foam height, and high acceptability in hedonic testing. In conclusion, the combination of citric acid, tartaric acid, and sodium bicarbonate yields an optimal effervescence reaction. Future studies should focus on long-term stability testing and developing this formulation into a compressed effervescent tablet.

Keywords: Physicochemistry, Effervescent Powder, Passiflora edulis.

INTRODUCTION

Modern society's growing health awareness has fueled an increasing demand for functional food products and health drinks. Functional drinks not only quench thirst but also provide significant biological benefits, particularly in combating free radicals (Winarti, 2017). One potential natural ingredient that has not been optimally utilized in modern preparations is purple passion fruit (Passionflower was.*edible* This fruit thrives in the highlands of North Sumatra and contains high levels of active antioxidant compounds, such as carotenoids, anthocyanins, flavonoid, and scorbutic acid (Vitamin C) (Sari & Ramadhan, 2021).

However, the use of fresh fruit has the drawbacks of short shelf life and practical consumption. Therefore, pharmaceutical technology innovation is needed to transform passion fruit juice into more stable and practical dosage forms, one of which is powdered preparations.*effervescent*. Preparation *effervescent* offers the advantage of rapid solubility, provides a refreshing

sensation (carbonated effect) due to the release of carbon dioxide gas (CO2), and is able to cover up the unpleasant sour or bitter taste of the active substance (Ansel, 2014; Siregar, 2020). The aim of this research is to formulate purple passion fruit juice into a powder preparation.*effervescent* that meet pharmaceutical physical quality standards and have a good level of consumer acceptance. This research is expected to produce alternative health drink products based on local commodities that have high economic and functional value.

LITERATURE REVIEW

Preparation *effervescent* is a mixture of carbonic acid and base compounds which when interacting with water will react chemically to produce carbon dioxide gas (CO_2) (Aulton & Taylor, 2018). According to Silvia (2019), the complete reaction between citric acid, tartaric acid, and sodium bicarbonate is very commonly used because this combination produces gas quickly and provides a fresh taste without leaving an unpleasant bitter taste on the tongue. These acid and base components must be adjusted stoichiometrically to produce a neutral or slightly acidic pH preparation, which is in accordance with the characteristics of the fruit flavor. Theoretically,*Passionflower* It has been shown to have high antioxidant activity, capable of inhibiting oxidative stress processes in body cells (Hardy & Götz, 2016). Based on previous research by Pratama et al. (2022), drying fruit juice into powder using the correct method can maintain vitamin C and total flavonoid levels above 80%. However, the biggest challenge in formulating the powder is *effervescent.* The main characteristic of liquid fruit extracts or juices is their high hygroscopicity (Aulton & Taylor, 2018). High air humidity can trigger a reaction.*effervescence* prematurely during storage. Therefore, the binder ratio, laboratory humidity control, and evaluation of the physical properties of the powder, such as dissolution time and foaming height, are critical parameters to ensure the quality of the preparation before further development into solid dosage forms such as tablets (Siregar, 2020).

METHODS

Sampling and Research Design

This study used a laboratory experimental method. The research population was purple passion fruit flesh (*Passionflower*) obtained using the technique *purposive sampling* (without comparison with other regions). Passion fruit samples were taken directly from a plantation in Gajah Village, Simpang Empat District, Karo Regency, North Sumatra. This research was

conducted at the Semi-Solid Pharmacy Laboratory and Research Laboratory of the Institut Kesehatan Helvetia, Medan, from May 2026.

Forms and Preparation of Preparations

Passion fruit juice is obtained by squeezing the fruit flesh, then filtering and drying it using maltodextrin filler to obtain a dry extract. Powder formulation *effervescent* using a combination of acid components (citric acid and tartaric acid) and base components (sodium bicarbonate) with separate wet granulation methods for the acid and base components at controlled temperature and humidity.

Measurement and Data Collection (characterization of physicochemical)

Evaluation of powder *effervescent* The products produced include:

Organoleptic Test: Visual observation of the shape, color, smell, and taste of the powder.

Foam Height: Measure the height of the foam formed when the powder is dissolved in a measuring cup filled with water.

Dissolution Rate: Record the time required for a certain amount of powder to dissolve completely in water using*stopwatch*.

Uji pH: Measure the acidity of the solution using a digital pH meter.

Hedonic Test: Subjective organoleptic testing of the level of preference for taste, color, and aroma was carried out by 12 semi-trained panelists.

RESULTS

Results of evaluation of physical quality and level of preference of powder *effervescent* purple passion fruit juice is summarized in the table below.

Table 1. Results of Physical and Sensory Quality Evaluation of Powder *Effervescent* Passion Fruit Juice

No	Parameter Uji	Observation result	Physical Standards / Requirements	Status
1	**Organoleptic** Color	Special Passion Fruit Orange Yellow	Homogeneous, attractive	Fulfil

	Smell	Distinctive Passion Fruit Aroma	Fragrant fruit aroma	Fulfil
	Flavor	Refreshing Sweet and Sour	Special fruit extract	Fulfil
2	**Dissolve Time (seconds)**	52 ±2,4	Less than 5 minutes (300 seconds)	Fulfil
3	**Foam Height (cm)**	1,8 ±0,3	General range: 1 - 3 cm	Fulfil
4	**Degree of Acidity (pH)**	5,4 ±0,1	Oral safe range: 4.5 - 6.5	Fulfil
5	**Hedonic Test (Score 1-5)**	4,2 (Very Like)	Average score More than 3.0	Fulfil

DISCUSSION

This research focuses on the success of the purple passion fruit juice formulation (*Passionflower*) into powder dosage form effervescent. Based on the results presented in **Table 1**, the resulting preparation has fulfilled all the physical pharmaceutical test parameter criteria for powder *effervescent* which is good.

The combination of acid components (citric acid and tartaric acid) with sodium bicarbonate results in an average dissolution time of 52 seconds. This meets USP and British Pharmacopoeia standards where the preparation is *effervescent* must dissolve completely in water in less than 5 minutes (Aulton & Taylor, 2018). The speed of this dissolution is influenced by the size of the granule particles and the efficiency of CO gas release.$_2$which helps break down the bonds between powder particles when they come into contact with water, creating a dispersing effect .*self-agitation* (self-mixing).

The pH of the solution is 5.4. This value is considered safe for the gastric mucosa because it is not too acidic, yet maintains the stability of vitamin C (ascorbic acid) in the solution, which tends to be more stable at slightly acidic pH conditions (Sari & Ramadhan, 2021). Furthermore, this pH positively contributes to the product's taste. These results align with the hedonic test of 12 panelists, which gave an average score of 4.2 (categories "Like" to "Very Like").*sparkling* from 1.8 cm high foam was proven to increase sensory acceptability and mask the original strong sour taste of passion fruit.

From a managerial and practical perspective, this formulation offers a product diversification solution for the local herbal medicine and health supplement industry. It is available in powder form in a package. *sachet* also makes logistics distribution easier because of its light weight and compact packaging volume compared to ready-to-drink liquid beverage products (*ready-to-drink*).

However, the internal validity of this study is limited by the limited number of hedonic test panelists (12). To generate more externally valid market preference data, a larger and more representative number of consumer panelists is required.

CONCLUSION

Powder *effervescent* from purple passion fruit juice (*Passionflower*) has been successfully formulated with an ideal combination of citric acid, tartaric acid, and sodium bicarbonate. The resulting preparation meets the physical parameters of good powder quality, including fast dissolution time (52 seconds), safe pH (5.4), optimal foam height, and high sensory acceptability levels from panelists. As a recommendation, post-formulation antioxidant activity profile testing is necessary to ensure that the active compounds do not degrade during the manufacturing process.

LIMITATION

The main limitation of this study lies in the design of the stability evaluation. This study has not conducted long-term stability testing (*long-term stability testing*) and accelerated stability tests (*accelerated stability testing*) in various extreme temperature and humidity conditions. Considering the availability of *effervescent* very sensitive to air humidity (hygroscopic), the absence of stability data limits predictions of expiration dates (*shelf-life*) products in commercial packaging.

REFERENCES

American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.). American Psychological Association.

Ansel, H. C. (2014). *Ansel's pharmaceutical dosage forms and drug delivery systems* (10th ed.). Lippincott Williams & Wilkins.

Aulton, M. E., & Taylor, K. M. (2018). *Aulton's pharmaceutics: The design and manufacture of medicines* (5th ed.). Elsevier Health Sciences.

Hardy, M., & Götz, S. (2016). Analysis of bioactive compounds and antioxidant activity in tropical fruits. *Journal of Functional Foods*, 24(2), 115-122.

Pratama, A. R., Wijaya, C., & Nugroho, A. (2022). Physical characteristics and antioxidant content of maltodextrin-encapsulated fruit pollen.*Journal of Food and Pharmaceutical Technology*, 14(1), 45-53.

Sari, D. P., & Ramadhan, F. (2021). Vitamin C content and free radical scavenging activity of purple passion fruit extract (*Passionflower* was.*edible*). *Indonesian Journal of Phytopharmacology*, 8(3), 22-29.

Silvia, S. (2019). *Formulation and evaluation of effervescent solid preparations*. EGC Medical Book Publisher.

Siregar, J. J. (2020). *Pharmaceutical technology of tablet preparations: Practical basics*. Publisher: University of Indonesia Publisher.

Vale, E. (2025). Contemporary challenges in herbal health drink formulation and consumer acceptance. *International Journal of Pharmaceutics and Food Research*, 31(1), 102-110.

Winarti, S. (2017).*Functional health drinks: Theory and technological applications*. House of Knowledge.