

## DAFTAR PUSTAKA

- Abdelhamed, S., Yokoyama, S., Refaat, A., Ogura, K., Yagita, H., Awale, S., & Saiki, I. (2014). Piperine enhances the efficacy of TRAIL-based therapy for triple-negative breast cancer cells. *Anticancer Research*, 34(4), 1893-1899.
- Al-Jasass, F. M., & Al-Jasser, M. S. (2012). Chemical composition and fatty acid content of some spices and herbs under Saudi Arabia conditions. *The scientific world journal*.
- Badan POM, 2005. Kriteria dan Tata Laksana Pendaftaran Obat Tradisional, Obat Herbal Terstandar dan Fitofarmaka. Jakarta: BPOM.
- Badan POM, 2008. Pedoman Cara Pembuatan Obat Yang Baik. Jakarta: BPOM.
- Badan POM, 2019. Persyaratan Keamanan dan Mutu Obat Tradisional. Jakarta: BPOM.
- Bae, G. S., Kim, M. S., Jung, W. S., Seo, S. W., Yun, S. W., Kim, S. G., & Park, S. J. (2010). Inhibition of lipopolysaccharide-induced inflammatory responses by piperine. *European journal of pharmacology*, 642(1-3), 154-162.
- Bagheri, H., Manap, M. Y. B. A., & Solati, Z. (2014). Antioxidant activity of Piper nigrum L. essential oil extracted by supercritical CO<sub>2</sub> extraction and hydro-distillation. *Talanta*, 121, 220-228.
- Cai, L. (2014). Thin layer chromatography. *Current Protocols Essential Laboratory Techniques*, 8(1), 6-3.
- Correa, E. A., Högestätt, E. D., Sterner, O., Echeverri, F., & Zygmunt, P. M. (2010). In vitro TRPV1 activity of piperine derived amides. *Bioorganic & medicinal chemistry*, 18(9), 3299-3306.
- Costa, R., Machado, J., & Abreu, C. (2016). Evaluation of analgesic properties of piper nigrum essential oil: a randomized, double-blind, placebo-controlled study. *World Journal of Traditional Chinese Medicine*, 2(2), 60.
- Do, M. T., Kim, H. G., Choi, J. H., Khanal, T., Park, B. H., Tran, T. P., Jeong, T.C., & Jeong, H. G. (2013). Antitumor efficacy of piperine in the

treatment of human HER2-overexpressing breast cancer cells. *Food chemistry*, 141(3), 2591-2599.

- Dong, Y., Huihui, Z., & Li, C. (2015). Piperine inhibit inflammation, alveolar bone loss and collagen fibers breakdown in a rat periodontitis model. *Journal of periodontal research*, 50(6), 758-765.
- Dosoky, N. S., Satyal, P., Barata, L. M., da Silva, J. K. R., & Setzer, W. N. (2019). Volatiles of black pepper fruits (*Piper nigrum* L.). *Molecules*, 24(23), 4244.
- Gorgani, L., Mohammadi, M., Najafpour, G. D., & Nikzad, M. (2017). Piperine—the bioactive compound of black pepper: from isolation to medicinal formulations. *Comprehensive Reviews in Food Science and Food Safety*, 16(1), 124-140.
- Greenshields, A. L., Doucette, C. D., Sutton, K. M., Madera, L., Annan, H., Yaffe, P. B., Knickle, A.F., Dong, Z., & Hoskin, D. W. (2015). Piperine inhibits the growth and motility of triple-negative breast cancer cells. *Cancer letters*, 357(1), 129-140.
- Hlavačková, L., Janegová, A., Uličná, O., Janega, P., Černá, A., & Babál, P. (2011). Spice up the hypertension diet-curcumin and piperine prevent remodeling of aorta in experimental L-NAME induced hypertension. *Nutrition & metabolism*, 8(1), 1-10.
- Harmita, H. (2004). Petunjuk pelaksanaan validasi metode dan Cara Perhitungannya. *Majalah Ilmu Kefarmasian*, 1(3), 1.
- Haq, I. U., Imran, M., Nadeem, M., Tufail, T., Gondal, T. A., & Mubarak, M. S. (2021). Piperine: A review of its biological effects. *Phytotherapy Research*, 35(2), 680-700.
- Jeena, K., Liju, V. B., Umadevi, N. P., & Kuttan, R. (2014). Antioxidant, anti-inflammatory and antinociceptive properties of black pepper essential oil (*Piper nigrum* Linn). *Journal of Essential Oil Bearing Plants*, 17(1), 1-12.
- Jeleń, H. H., & Gracka, A. (2015). Analysis of black pepper volatiles by solid phase microextraction–gas chromatography: A comparison of terpenes profiles with hydrodistillation. *Journal of Chromatography A*, 1418, 200-209.
- Kar, A., Winny, R. S., & Jojor, S. (2014). Farmakognosi dan

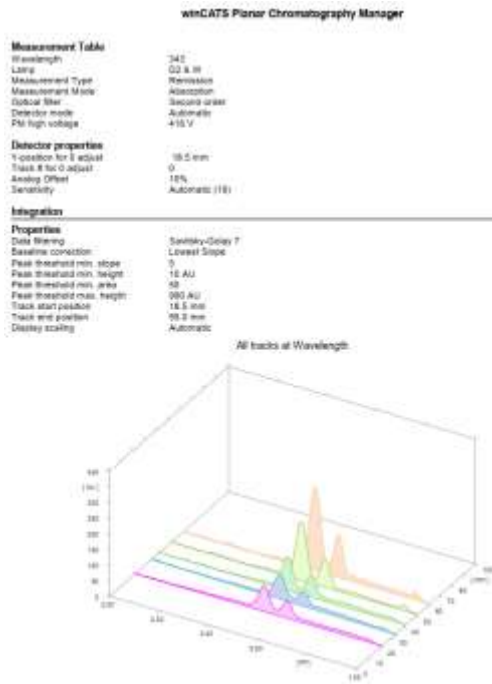
farmakobioteknologi. *Terjemahan: July Manurung dkk., Penerbit Buku Kedokteran EGC, Jakarta, 2(2), 503-504.*

- Kristiniak, S., Harpel, J., Breckenridge, D. M., & Buckle, J. (2012). Black pepper essential oil to enhance intravenous catheter insertion in patients with poor vein visibility: a controlled study. *The Journal of Alternative and Complementary Medicine, 18(11), 1003-1007.*
- Kurniawan, S., Windasari, P. P., & Septianingrum, N. M. A. N. (2022). Pencegahan Obat Ilegal dengan Mengenal Logo Obat Tradisional dan Pembuatan Simplisia. *Aksiologi: Jurnal Pengabdian Kepada Masyarakat, 6(3), 362-369.*
- Kemenkes, R. I. (2017). Farmakope Herbal Indonesia. *Edisi II, Hal, 209.*
- Lee, J. G., Chae, Y., Shin, Y., & Kim, Y. J. (2020). Chemical composition and antioxidant capacity of black pepper pericarp. *Applied Biological Chemistry, 63(1), 1-9.*
- Lee, K., Lee, J. H., Kim, S. I., Cho, M. H., & Lee, J. (2014). Anti-biofilm, anti-hemolysis, and anti-virulence activities of black pepper, cananga, myrrh oils, and nerolidol against *Staphylococcus aureus*. *Applied microbiology and biotechnology, 98(22), 9447-9457.*
- Li, S., Lei, Y., Jia, Y., Li, N., Wink, M., & Ma, Y. (2011). Piperine, a piperidine alkaloid from *Piper nigrum* re-sensitizes P-gp, MRP1 and BCRP dependent multidrug resistant cancer cells. *Phytomedicine, 19(1), 83- 87.*
- Meghwal, M., & Goswami, T. K. (2013). *Piper nigrum* and piperine: an update. *Phytotherapy Research, 27(8), 1121-1130.*
- Menkes, R. I. (2010). *Peraturan Menteri Kesehatan RI No. 003/MENKES/PER/II/2010 Tentang Saintifikasi Jamu Dalam Penelitian Berbasis Pelayanan Kesehatan.*
- Najib, A. (2018). *Ekstraksi senyawa bahan alam.* Deepublish.
- Nurhayati, R. (2020). *Pengembangan Dan Validasi Metode Klt-Densitometri Untuk Penetapan Kadar Filantin Dalam Ekstrak Phyllanthus Niruri Menggunakan Desain Plackett-Burman Untuk Uji Robustness* (Doctoral dissertation, UNIVERSITAS AIRLANGGA).
- Park, J. R., Kang, H. H., Cho, J. K., Moon, K. D., & Kim, Y. J. (2020). Application of non-destructive rapid determination of Piperine in *Piper nigrum* L.(black pepper) using NIR and multivariate statistical

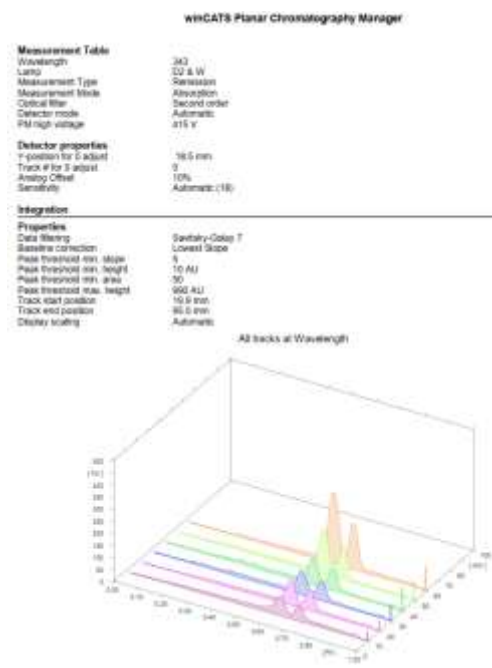
- analysis: a promising quality control tool. *Foods*, 9(10), 1437.
- Permenkes RI., 2012, Peraturan Nomor 007 Tahun 2012 tentang Registrasi Obat Tradisional, Menkes RI; Jakarta.
- Rajopadhye, A. A., Upadhye, A. S., & Mujumdar, A. M. (2011). HPTLC method for analysis of piperine in fruits of Piper species. *JPC–Journal of Planar Chromatography–Modern TLC*, 24(1), 57-59.
- Ravindran, P. N., & Kallapurackal, J. A. (2012). Black pepper. In *Handbook of herbs and spices* (pp. 86-115). Woodhead Publishing.
- Rohman, A. 2012. *Analysis of Curcuminoids in Food and Pharmaceutical Products*. International Food Research Journal.
- Shrestha, S., Chaudhary, N., Sah, R., & Malakar, N. (2020). Analysis of Piperine in Black Pepper by High Performance Liquid Chromatography. *Journal of Nepal Chemical Society*, 41(1), 80-86.
- Stojanović-Radić, Z., Pejčić, M., Dimitrijević, M., Aleksić, A., V. Anil Kumar, N., Salehi, B., Co, W.C., & Sharifi-Rad, J. (2019). Piperine-a major principle of black pepper: a review of its bioactivity and studies. *Applied Sciences*, 9(20), 4270.
- Tiwari, A., Mahadik, K. R., & Gabhe, S. Y. (2020). Piperine: A comprehensive review of methods of isolation, purification, and biological properties. *Medicine in Drug Discovery*, 7, 100027.
- Vinay, S., Renuka, K., Palak, V., Harisha, C. R., & Prajapati, P. K. (2012). Pharmacognostical and phytochemical study of Piper longum L. and Piper retrofractum Vahl. *Journal of Pharmaceutical and Scientific Innovation (JPSI)*, 1(1).
- Wulandari, R. A., & Azrianingsih, R. (2014). Etnobotani jamu gendong berdasarkan persepsi produsen jamu gendong di Desa Karangrejo, Kecamatan Kromengan, Kabupaten Malang. *Biotropika: Journal of Tropical Biology*, 2(4), 198-202.
- Yuslianti, E. R., Bachtiar, B. M., Suniarti, D. F., & Sudjiatmo, A. B. (2016). Standardisasi farmasitikal bahan alam menuju fitofarmaka untuk pengembangan obat tradisional indonesia. *Dentika Dent J*, 19(2), 179-185.

# DAFTAR LAMPIRAN

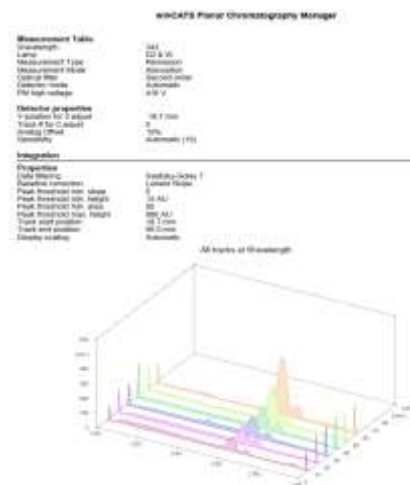
## Lampiran 1. Hasil Pengukuran HPLC Piperin



Gambar 10. Pengukuran Piperin R1

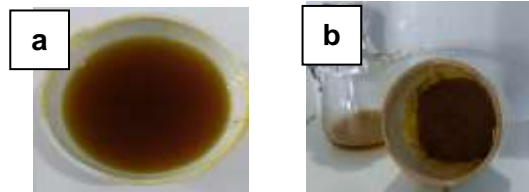


Gambar 11. Pengukuran Piperin R2

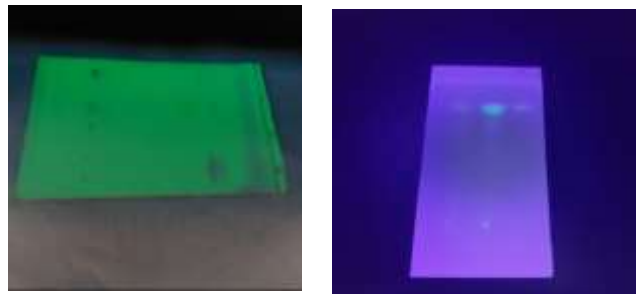


Gambar 12. Pengukuran Piperin

## Lampiran 2. Hasil dokumentasi pengerjaan

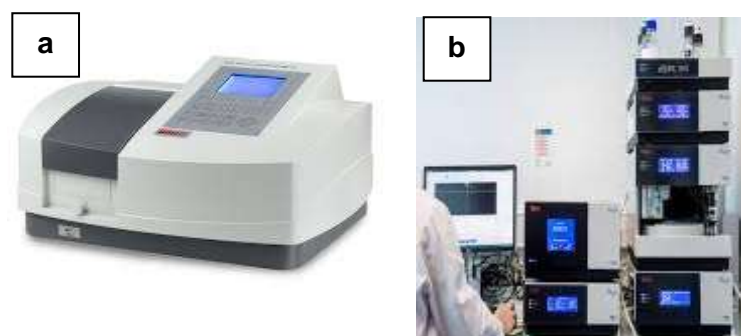


**Gambar 13.** Proses Ekstraksi Piperin  
(a) Ekstrak cair (b) Ekstrak kering



**Gambar 14.** Proses KLT Senyawa Piperin

## Lampiran 3. Instrumen



**Gambar 15.** Alat instrumen (a) Spektrofotometer Uv-vis (b) HPLC