

EFFECT OF LIGHT EXPOSURE ON CHEMICAL PROPERTIES OF MUSTARD OIL**GEETHA KARTHIKEYAN^a, NOOPUR GOYAL^b, RAKSHIT AMETA^c AND SURESH C. AMETA^{d1}**^{acd}Department of Chemistry, Paher University, Udaipur, Rajasthan, India^bDepartment of Microbiology, M. G. Institute of Science, Ahmedabad, Gujraat, India**ABSTRACT**

The chemical properties of mustard oil were determined on exposure to different colors of light. The oil was exposed to light of different colors violet, indigo, blue, green, yellow, orange and red. The chemical parameters like free fatty acid, saponification value, iodine value, moisture and insoluble impurities, peroxide value etc. were observed. The chemical parameters of mustard oil were compared with the oil before and after exposure.

KEYWORDS: Mustard oil, Color of light, Chemical Parameters

Seven colours of Sun rays have different therapeutic effects. These colours are-violet, indigo, blue, green, yellow, orange and red. These colours work effectively for keeping us healthy and in treatment of different diseases. Water and oil exposed to Sun for specified time in coloured bottles or under coloured glasses, are used in chromo therapy (Agarwal et al., 2000) for treating different disorders. The simple methods of colour therapy help in the process of recovery in a very effective manner. Colors show biological and psychological effects on all living beings, it may be human, animal or plants. All of them require light and they cannot live without light. Plants need Sun to grow by the process of photosynthesis. Human beings also require light for maintaining their bodily function. The mustard oil is used commonly for the body massage. Therefore, it was treated with different colors of light and thereafter its chemical parameters were studied. Exposed mustard oil with different colors of light was compared with the unexposed oil stored at room temperature.

MATERIALS AND METHODS

Pure mustard oil for the present study was obtained from cold pressing by traditional method (Simon et al., 1980). In this process, seeds are crushed at low temperature so that natural properties, antioxidants and essential oils are retained in the oil. The mustard oil is then filtered through a filter paper to remove any impurities and the last traces of moisture just to ensure that the sample is completely dry.

Mustard oil was then filled in nine colorless transparent clean and dried glass bottles of same size and shape (250 ml capacity). Each

individual bottle was fully wrapped and covered from outside with gelatin paper having different colors i. e. Violet, indigo, blue, green, yellow, orange and red (VIBGYOR), respectively so that it allows only a particular color to pass through it. In all, there are seven bottles. The eighth and ninth bottle was kept unwrapped. All these eight bottles (Seven with colors and one without colorless) were exposed to sunlight while the ninth bottle was kept at room temperature without exposing to sunlight (kept in dark). These bottles were exposed to sunlight for one hundred sixty hours in sixteen days i. e. from 8.00 am in morning to 6.00 pm in evening.

The chemical parameters of the all the seven bottles of mustard oil exposed to different colors of rays were compared with the eighth bottle, which was exposed to direct sunlight and the ninth bottle oil, which was kept in dark. The chemical parameters like saponification value, free fatty acid, iodine value, moisture and volatile content, peroxide value and allyl isothiocyanate contents were observed.

RESULTS AND DISCUSSION

The chemical parameters were studied for all the nine bottles of mustard oil out of which seven bottles of oils were exposed to different color of rays, eighth bottle was exposed to direct sunlight and the ninth bottle of oil was unexposed to sunlight and stored at room temperature. The saponification value, free fatty acid content as oleic acid, iodine value, moisture and volatile content, peroxide value and allyl isothiocyanate content were determined in all the nine bottles and results are reported in table 1.

Table 1: Effect of colors on mustard oil

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Parameters ³ (2012)	Saponification Value (mg KOH/g)	Free fatty acid content, (% oleic acid)	Iodine value	Moisture and volatile content (%)	Peroxide value (Meq/kg)	Allyl isothiocyanate (%)
Specification limit ⁴	168-177	NMT 1.5	98-110	Not more than 0.25	Less than 10	0.25 - 0.60% mass
Colors						
Violet	177	0.32	109.9	0.12	3.8	0.32
Indigo	174.2	0.36	109.9	0.16	3.9	0.36
Blue	174.3	0.38	109.4	0.18	4.0	0.36
Green	170.2	0.42	109.2	0.19	4.2	0.39
Yellow	169.6	0.46	108.4	0.19	4.8	0.4
Orange	169.2	0.49	107.6	0.22	4.8	0.42
Red	168.9	0.52	107.2	0.22	5.2	0.48
Sunlight	169.9	0.46	108.2	0.19	4.9	0.4
In dark	174.1	0.48	109.2	0.24	5.8	0.39

The saponification value of mustard oil is 174.1 mg KOH/g and it changes to 168.9-177.0 mg KOH/gm on exposure to direct sunlight and its components, separately. There was a slight decrease in this value by exposing mustard oil to sunlight as well as green, yellow, orange and red colors, while it increases with colors in lower wavelength region like blue, indigo and violet.

The free fatty acids content of the oil is 0.48 (% Of oleic acid), which increases on exposure to orange and red colors while it shows a declining trend in the order yellow, green, blue, indigo and violet colors.

The iodine value for this oil is 109.2. It shows higher values, when exposed to green, blue, indigo and violet colors whereas lower values were obtained on exposure to higher wavelength region i. e. yellow, orange and red.

Moisture and volatile content was within the limit. It was interesting to note that there was a regular decrease in the value as the wavelength of light was lowered and it reaches to minimum value of 0.12 %, that is almost half of the original value 0.24%.

The peroxide value of mustard oil is 5.8 meq/kg. It also decreases from 5.2 meq/kg for red

color to 3.8 meq/kg for violet color in a regular decreasing trend.

Allyl isothiocyanate shows an increasing trend for green, yellow, orange and red colors while a reverse trend was observed for blue, indigo and violet colors.

ACKNOWLEDGEMENT

The authors are thankful to the Thermo Fisher Scientific Laboratories for providing necessary laboratory facilities for testing.

REFERENCES

- Agarwal K. N., Gupta A., Pushkarna R., Bhargava S. K., Faridi M. M., and Prabhu M. K., 2000. Effects of massage & use of oil on growth, blood flow & sleep pattern in infants. , Indian J. Med. Res., **112**:212-217.
- Simon J. E., Chadwick A. F. and Craker L. E., Herbs: An Indexed Bibliography. 1971-1980. The Scientific Literature on Selected Herbs, and Aromatic and Medicinal Plants of the Temperate Zone. Archon Books (1984):770.