Asian Journal of Chemistry Vol. 4, No. 2 (1992), 397–399

NOTE

5-Metal-*s*-Triazolo-(3,4-*b*) Benzothiazole as an Antioxidant for Mustard Oil Stability

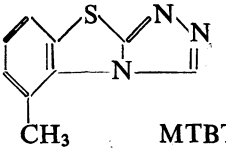
M. V. DESHMUKH, D. S. DESHPANDE* and N. G. VAIDYA†

Department of Chemistry, Science College, Nanded-431 602, India

Studies on antioxidant property of 5-methyl-*s*-triazolo(3,4-*b*) benzothiazole towards the mustard oil stability was undertaken. The protection factor was calculated and the findings are discussed. In this communication, the effect of this azaheterocycle on the rancidity of mustard oil was compared with *o*-phenylene diamine and reported.

INTRODUCTION

Rancidity[1] of oil is a major problem which presently oil industries are facing. Mustard oil is highly priced oil and its shortage became a national concern. Recently Deshmukh[2] has succeeded in preparing triazolo benzothiazole derivatives by simple route. Hence, it was thought worthwhile to undertake the project of studying the effect of 5-methyl-*s*-triazolo(3,4-*b*) benzothiazole (MTBT) which is a typical representative of this series on the rancidity of oil. Since no universally acceptable mechanism is available to explain the exact nature of antioxidant, we have attempted to compare the result with *o*-phenylenediamine, a known antioxidant in some of the organic reactions with newly synthesised compound.



MTBT

Mustard oil containing MTBT and *o*-phenylene diamine (50 ppm) each were kept at ambient temperature (25 ± 2°C) for 12 days with adequate aeration. Simultaneously blank experiment was kept. The saponification values of the samples during storage intervals were determined by standard method[3] while the rancidity in terms of peroxide percentage was estimated iodometrically[4]. The RI was determined by refractrometer.

The peroxide concentration in the oil treated with MTBT was nearly the same between second and eighth day while some variation was observed in *o*-phenylene diamine treatment. On second and fourth day, the peroxide concentration was less in both the treatment than control. The concentration was minimum on eighth day only in *o*-phenylene

†S. G. G. S. College of Engineering and Technology, Nanded–431 601, India.

diamine treatment, exhibiting it, more antioxidative behaviour than MTBT. On twelfth day, the percentages of peroxide in both the treatments were almost the same.

For interpretation, the results also can be expressed in terms of protection factor[5]. The protection factor was calculated using the following formula which is the ratio of the concentration of peroxide in the treated oil to the concentration of peroxide in the control of various intervals (Table 1).

TABLE 1

PROTECTION FACTOR AT VARIOUS INTERVAL

Sr. No.	Treatment	Days			
		2	4	8	12
1.	Mustard oil (control)	1.0	1.0	1.9	1.0
2.	Mustard oil+ *o*-Phenylene diamine	0.56	0.90	0.7	1.10
3.	Mustard oil+ MTBT	0.73	0.75	1.10	1.11

$$\text{Protection factor (P.F.)} = \frac{\text{Peroxide concentration in treated oil}}{\text{Peroxide concentration in control}}$$

In all the treated samples, the protection factor increased gradually during storage. When the comparison is made amongst the treatments, it was found that P.F. was less in *o*-phenylene diamine than MTBT treatment except fourth day. *o*-Phenylene diamine treated oil therefore exhibited antioxidative characteristics upto eighth day while MTBT acted as antioxidant upto fourth day only. After this period P.F. increased gradually to twelfth day and became almost equal in both the treatments. This indicates that oil remains unaffected on and after twelfth day.

As refractive index is related to rancidity the same was determined. The increase in the refractive index in the treated oils perhaps may be due to dehydrogenation or the compounds are responsible for increase in the length of carbon chain in the oil moiety. The results are given in Table 2.

Overall studies show that MTBT was not that much effective as *o*-phenylene diamine, but better than control. Both these compounds, MTBT and *o*-phenylene diamine were active as an antioxidant with

TABLE 2

REFRACTIVE INDICES OF MUSTARD OIL

Sr. No.	Treatment	Refractive indices	
		Initial	Final (12 days)
1.	Oil (control)	1.47	1.530
2.	Oil+*o*-phenylene diamine	1.47	1.696
3.	Oil+MTBT	1.47	1.669

reference to rancidity only in the initial stages, but beyond twelfth day oil appears to be stable as it does not undergo major chemical changes and also inhibit the action of MTBT and *o*-phenylene diamine.

ACKNOWLEDGEMENTS

One of the authors (MVD) is thankful to the University Grants Commission, New Delhi, for financial assistances, travel grant and to the Principal, Science College and Secretary, Nanded Education Society, Nanded for laboratory facilities and encouragement.

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(*Received*: 25 March 1991; *Accepted*: 25 April 1991) AJC-288

द्वि-दिवसीय वैज्ञानिक संगोष्ठी
"नाभिकीय ऊर्जा एवं पदार्थ"
जनवरी 24–25, 1992
साऊथ इंडियन कल्चरल हॉल, पटना (भारत)
आयोजक: हिन्दी विज्ञान साहित्य परिषद्
भाभा परमाणु अनुसंधान केन्द्र
बम्बई–400 085 (भारत)