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E: ISSN NO.: 2349-980X **Shrinkhla Ek Shodhparak Vaicharik Patrika**

Spectrophotometeric Determination of Molybdenum after Adsorptiojn of Its Schiff Base Complex Derived From Pyridine-2 Carboxaldehyde and 2-Aminobenzothiazole on Polyurethane Foam

Abstract

Spectrophotometer determination of Molybdenum (Mo) after adsorption of its complex with carboxaldehyde and 2-aminobenzothiazole on discussed Beer's law is obeyed in the concentration range 150 Hg of from pyridine-2-Schiff base (SB) derived polyurethane foam has been Molybdenum. The molar absorptive and sensitivity to be 2.93 x 10^4/mole^{-1} cm^{-1} and 2.07x 10^{-2} ug cm^{-2} of absorption of 0.001 at 485 nm was found. The above method has also been applied for determination of Molybdenum (Mo) in alloy samples.

Keywords: Schiff Base, Spectrophotmeteric Determination, Molybdenum (Mo) Polymethane.

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Introduction

Schiff bases and their metal complexes have been a subject of intensive research due to their noval structural features (Kumar et al., 2001), chelating behavior (Mahapatra et al., 2002 and Arora et al., 2002), industrial and biological importance (Aswar et al., 2002 and Srivastava et al., 2002). They have gained importance as specific analytical organic reagent in photometric determination of trace amount of metal due to their high sensitivity and selectivity towards metal ions.

Aim of the Study

The present investigation describes the use of newly synthesized Schiff base (SB) in a sensitive and selective technique of photometric determination of Molybdenum (Mo) after adsorption of polyurethane foam as an absorbent. The forum pieces can be reused.

The new method of extraction is based on solid liquid extraction. The use of polyurethane foam in extraction studies offers low solubility, easy separation of phase, easy use of large phase ratios and synergistic extraction effect. The proposed method easy use of large phase ratios and synergistic extraction effect. The proposed method (sensitivity 0.014µg cm^{-2}) is more sensitive than liquid-liquid extraction (sensitivity 0.019 µg cm^{-2}). It is very convenient, less time consuming and can also be used for determination of Molybdenum (Mo) in alloy samples.

Materials and Methods

Schiff base (SB) was prepared by taking 1:1 molar solution of pyridine-2-carboxaldehyde dissolved in minimum quantity of ethanol and 2-aminobenzothiazole. The contents were refluxed in a round bottom flask fitted with an air condenser5 for 7 hours and called, resulting light brown crystal of schiff base were filtered, washed, dried in air and recrystallised. A standard stock solution of Molybdenum (Mo) (1000ppm) was prepared by dissolving requisite quantity of ammonium Molybdenum (Mo) in distilled water. Solution of different concentration were prepared from stock solution after dilution. All chemicals used were of A.R. grade. Buffer solution of different pH were also prepared.

Polyurethane foam pieces of 1 cm^3 size were soaked in 1 M hydrochloric acid for 24 hours with occasional squeezing to remove all possible inorganic containments and air dried.

The foam pieces should be uniform for better results and their polymeric properties were found to remain intact as result of these treatment. An eg-5701 spectrophotometer and Systronics (model No. 335) pH meter were used for absorbance and pH metric measurements respectively.

An aliquot (1 ml) of standard solution containing 150 ug of Molybdenum (Mo) was taken and to it 2.5 ml of 0.1% Schiff base (SB) solution was added. The ph was adjusted to 5.0 by the addition of buffer solution. Distilled water was added and volume was made to 10 ml.chloroform. Traces of water were removed by the addition of 0.2 g of anhydrous sodium sulphate. The absorbance of solution was measured against reagent blank solution.

Results and Discussion

The absorption spectra of complex containing 150µg of Molybdenum (Mo) and 0.1 % reagent solution was investigated in the wavelength region of 400-650 nm against reagent blank. Maximum absorbance was observed at 485 nm whereas, reagent blank showed negligible absorbance at this wavelength. Hence, all absorbance measurements are carried out at 485 nm.

A maximum and almost constant absorbance of complex containing 150 µg of Molybdenum (Mo) at 465 nm was observed in the plH range of 3.5-6.5, beyond which it decreased. There fore, plH of solution was fixed to 5.0 for all absorbance measurements.

The reagent concentration (0.1 %) in different quantity was added to 150 µg of Molybdenum (Mo) at pH 5.0, maximum and almost which it decreased. Hence, 2.5 ml of reagent solution was used for all absorbance studies.

The studies also whowed a maximum and constant absorbance at 485 nm when 3-8 foam pieces were added to 2.5 ml reagent sample containing 150 µg of Molybdenum (Mo) at pH 5.0 Hence, 5 foam pieces were taken in all extraction studies. The optimum shaking time for complete adsorption of metal complex was found to be 300 seconds, since shaking time remains unchanged during 60 to 550 seconds.

Calibration Curve

Under the optimum condition of the recommended procedure the calibration curve of Molybdenum (Mo) was constructed at wavelength 485 nm. Beer's law is obeyed over the concentration range 10ug- 180µg of Molybdenum (Mo). The molar absorptive and sensitivity was found to be 2.93 x 10*1 mol^{-1} cm^{-1} and 2.07 x 10^{-2} of µg cm^{-2} of Molybdenum (Mo) for the absorbance of 0.001 respectively.

Effect of Diverse Metal Ions

Tolerance of diverse metal ions of Molybdenum (Mo) complexwas examined. The results are shown in Table 1.

Table 1 ; Effect of diverse metal Ions of the determination of Molybdenum (Mo) (150ug)

S. No.	Metal ions	Amount of ions added in (mg)	Found in (ug)
1.	Ag (I)	25-52	150.2-150.6
2.	Pd (II)	50-143	150.4-150.6
3.	Co (II)	50-136	149.3-150.3
4.	Ni (II)	80-128	148.6-148.9
5.	Mn (II)	50-104	159.3-150.7
6.	Cu (II)	25-70	148.3-148.6
7.	Zn (II)	60-134	150.4-150.8
8.	Fe (III)	25-65	151.4-150.3
9.	U (VI)	40-60	148.6-150.8

Determination of Molybdenum (Mo) In B.C.S. Alloy Samples

A suitable alloy of steel containing Molybdenum (Mo) was selected and it was dissolved in an acid mixture. The solution was fumed appropriate aliqust of above was taken and Molybdenum (Mo) was determined spectrophotometrically by the reported method. The results have been calibrated in Table 2. The above technique when applied produces reproducible results and Beer's law was found to be obeyed upto12 ppm.

Table 2; Determination of Molybdenum (Mo) from B.C.S. Alloy Samples

S. No.	Name of Alloy	B.C.S. Numbers	Composition of % of V found	Certified Composition of % of V
1.	Steel alloy	65 a	1.545	1.57
2.	High Speed Steel	242	1.543	1.57
3.	Alloy Steel	262	0.450 -0.550	0.460

B.C.S. - British Chemical Standard

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