



Determination of polyhydroxy compound (Sorbitol) by using pyridinium fluorochromate (PFC) reagent

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Abstract

In present paper determination of polyhydroxy compound sorbitol by using simple titrimetric method with pyridinium fluorochromate PFC reagent, polyhydroxy compounds act as a key chemical intermediate for the production of a variety of fine or special chemicals such as pharmaceutical drugs, sorbitol is a type of alcohol which is also used as a medication. It is a drug that is mostly used as a laxative, It helps to treat problems of constipation and other related problems that make the process of relieving bowels uncomfortable and painful. It may be administered rectally or taken orally. Due to simplicity and convenience the titrimetric method has widely been used for determination of many organic as well as medicinal compound, Polyhydroxy compound. Sorbitol is a type of polyhydroxy alcohol. Generally used for medication. Sorbitol can be used as a laxative when orally or as an enema.

Keywords: quantitative oxidation, titrimetric method, sorbitol, pyridinium fluorochromate PFC Reagent, CV, SD, recovery %

Introduction

Titration is a common laboratory method of Quantitative chemical analysis that is used to determine the unknown concentration of a known reagent. Because volume measurement play a key role in Titration, It is also known as volumetric analysis. Titrimetric analysis consist in determining the number of mole of reagent (titrant) required to react quantitatively with the substance (given). In PFC chromium (VI) behave as a good oxidizing agent PFC reactive species in the reaction process. It's react with Polyhydroxy compounds and diuretics and Observed that lower concentration and volume give less recovery because of insufficient reagent higher concentration and volume give in accurate result. Due to simplicity and convenience the titrimetric-method has widely been used for determination of many organic as well as medicinal compound, Polyhydroxy compound. Sorbitol is a type of polyhydroxy alcohol. Generally used for medication.

Sorbitol can be used as a laxative when taken orally or as an enema. Sorbitol works as a laxative by drawing water into the large intestine stimulating bowel movements. It is a sugar alcohol found in fruits and plants with diuretics, laxative and cathartic property. Unabsorbed sorbitol retains water in the large intestine through osmotic pressure thereby stimulating peristalsis of the intestine and exerting its diuretic, laxative and cathartic effect.

Sorbitol is a drug that is mostly used as a laxative. It helps to treat problems of constipation and other related problems that make the process of relieving bowels uncomfortable and painful. It may be administered rectally or taken orally. Sorbitol is able to produce a laxative effect because so its ability to draw water into the large intestine which stimulates bowel movement. It is widely used in the food industry as a sweetener, humectants and texturizing agent.

Requirements to chemical reaction used in titrimetric method of analysis

1. Reaction between reagent and analyte must be specific. Titrant cannot react with impurities or addition of the analytical solution.
2. Reaction must be stoichiometric.
3. Titrant must react rapidly with the analyte so that the time required between additions of reagent is minimised.
4. Titrant must react more or less completely with analyte so that satisfactory end point are realised.
5. Undergo a selective reaction with the analyte that can be describe by simple balanced reaction.
6. In this method the amount of a titrant used to reach the end point correspond to the weight of species to be determined.

Experimental: preparation of reagent and solution

Pyridinium fluorochromate: solution 0.03N: 495 mg of pyridinium fluorochromate was dissolved in 150 ml of glacial acetic acid and made up to the volume with 250 ml distilled water in volumetric flask. The solution was standardised idiomatically.

Sodium thiosulphate solution (0.01) N: solution of prepare thiosulphate was prepared by Dissolving 2.4819gm in 1000ml distilled water and standardization by 0,01N potassium dichromatic Solution iodometrically.

Potassium dichromate solution (0.01)N: Standardisation of sodium thiosulphate against Potassium dichromate solution calculate precision normality (molarity) of sodium thiosulphate standard solution accordance to equivalents law.

Potassium iodide solution: 10% W/V aqueous Solution was prepared in distilled water.

Starch solution: 1% W/V aqueous solution of starch was prepared in distilled water.

Sample solution: tablet solution the powder equivalent to 100

mg of sample was taken in 100ml.

Calibrated volumetric flask and dissolved in minimum amount of distilled water.

Injection solution: 1mg/ml

General procedure: aliquot containing 1mg of the sample were taken in 100ml in conical flask and 5 ml of 0.03 N (PFC) and 10 ml of 5N H₂SO₄ was added to it. The reaction mixture shaken and allowed to react required reaction time at room temp. For 15 minute. After reaction was over 5ml of 10% K I (sol) was added to it and shaken and Stand for 1 min. Liberated iodine was titrated with 0.01N sodium thiosulphate using starch as indicator. A blank experiment was also run under identical condition using all the reagents except sample. The amount of the sample recovered was calculated by the

difference in titre value of sodium Thiosulphate solution for blank and actual experiment.

Calculation

mg of sample = $M * N (B-S)/n$ Molecular weight of sample (M), Normality (N) Volume of thiosulphate sol for blank.(B), volume of thiosulphate sol with sample. Stoichiometry of Reaction (n). Standard deviation (SD), coefficient of variation and recovery%, experiment were carried out by Standard drug addition method.

Result

Determination of stoichiometry of Sorbitol by using pyridinium fluorochromate (PFC)

Table 1

s.no.	sample	Aliquote taken (ml)	Amount taken (mg)	Reaction Time (minute)	Molarity	Amount obtained	Error%	SD	CV
1	(Sorbitol)	1	0.997	50	2	0.980	-1.70	0.0019	0.2010
		2	1.990	50	2	1.960	-1.50	0.0018	0.930
		3	2.980	50	2	2.950	-1.00	0.0035	0.1200
		4	3.960	50	2	3.930	-0.75	0.0043	0.1100
		5	4.895	50	2	4.870	-0.51	0.0058	0.1200

Average of nine determination

Table 2: Recovery studies of Sorbitol by standard drug addition method

S.N	Number of observations (N)	Amount present (pure) (mg)	Amount of drug added (mg) X	Total amount of drug obtained by calculation (mg)	Amount of drug obtained by calculation (mg) Y	XY	X ²	Recovery %
1	3	0.997	0.970	1.970	0.960	0.931	0.940	99.32%
2	3	0.997	1.961	2.930	1.935	3.794	3.845	
3	3	0.997	2.940	3.950	2.930	8.614	8.643	
4	3	0.997	3.950	4.970	3.985	15.661	15.740	
	ΣN=12		ΣX=9.821		ΣY=9.810	ΣXY=29.000	ΣX ² = 29.168	

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