International Journal of Chemistry Studies
ISSN: 2581-348X
Impact Factor: RJIF 5.44
www.chemistryjournal.in
Volume 2; Issue 5; September 2018; Page No. 05-06

Confirmation of alkali soluble seeds polysaccharide structure from *Quercus incana* Roxb: Plant by periodate oxidation method

RB Singh
Scientist 'C' UGC, Department of Zoology, School of Life Sciences, Dr. Bhimrao University, Khandari Campus, Agra, Uttar Pradesh, India

Abstract
Quercus incana Roxb. seeds yielded a alkali soluble polysaccharide on acid hydrolysis as D-galactose and D-mannose in 1:5 molar ratio. Upon periodate oxidation with sodium metaperiodate, the seeds polysaccharide consumed 1.24 moles of periodate with simultaneous liberation of 0.102 moles of formic acid per mole of anhydroglucose unit. On the basis of methylation results the proposed polysaccharide structure has been confirmed by periodate oxidation method.

Keywords: periodate oxidation, periodate consumption and formic acid liberation of *Quercus incana* seeds polysaccharide

Introduction

Quercus incana Roxb. plant [1] (Fagacee) commonly called as *Phalat, Banj*, is a large tree upto 25m in height and occurs in Himalayan region of Northern India and Nepal. Plant is medically used in indigenous system of medicine for diarrhoea, asthma and other human diseases. Seeds contain an alkali soluble polysaccharide on acid hydrolysis and yielded D-galactose and D-mannose in 1:5 molar ratio. The nature of the constituent sugar, methylation [2], Smith degradation and oligosaccharides [3] have already been studied. Present manuscript mainly deals with the periodat4e oxidation studies for the confirmation of seeds polysaccharide structure. The periodate oxidation reaction is used in the carbohydrate chemistry and it also applicable in the seeds polysaccharide structure. It was first discovered by the Scientist Malaprade [4] and Fluery & Lange [5], have given a better method for more extensive used of periodic acid for the oxidation of glycol group. Periodate oxidation reaction is considered to be a dialdehyde type of oxidation. Perlin [6] observed that the periodic acid and lead tetra acetate showed that the glycol groups undergoes cyclic ester formation with oxidants. Recently the investigation have already been studies the periodate oxidation studies on some medicinal plant as *Madhuca longifolia* Linn. [7], *Moringa oleifera* Lam. [8], *Cassia alata* [9], etc.

Materials and Methods

Periodate oxidation of seeds polysaccharide

Seeds polysaccharide (300mg) was oxidised [10] with water (50ml) and sodium metaperiodate (0.125M, 100ml) and volume made upto 250ml with water at 4-8^{0}C in refrigerator for 7 days. Reaction mixture (5ml) was taken in a conical flask and added sodium bicarbonate solution (0.1N, 5ml), sodium arsenite solution (0.01N, 25ml) and potassium iodide solution (0.01N, 5ml). Reaction mixture was left for 2 hrs and added iodine solution (0.01N, 5 ml). It was titrated against sodium thiosulphate solution (0.01N, 5ml) using starch as an indicator. A blank reading was also carried out in a similar way. The difference between blank and experimental values gives of periodate consumption [5] of 1.24 moles of anhydroglucose sugars unit after 100hrs. Formic acid liberation was determined by taken the reaction mixture (5ml) in a conical flask and added ethylene glycol (100ml) to destroy the excess of periodate ions present in the reaction mixture for 2hrs. Formic acid liberation [11, 12] was titrated against sodium hydroxide solution (0.01N) using methyl red dye as an indicator. A blank titration was also carried out in a similar way for the estimation of formic acid. It liberated 0.102 moles of formic acid per mole of anhydroglucose sugar units after 100hrs and results are given in Table-1.

Table 1: Periodate oxidation of *Quercus incana* Roxb. seeds polysaccharide.

S. No.	Sugar Unit	Time (hrs)									
		10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
1.	Periodate consumption per anhydroglucose sugar unit (moles/mole)	0.17	0.32	0.50	0.70	0.84	1.02	1.10	1.18	1.24	1.24
2.	Formic acid liberation per anhydroglucose sugar unit (moles/mole)	0.012	0.025	0.035	0.045	0.062	0.074	0.086	0.098	0.102	0.102

Periodate oxidised compound was again oxidised in a separate lot under condition similar to the above experiments was hydrolysed with sulphuric acid (1N) and worked upto a syrup. This hydrolysed sugar syrup on paper chromatographic examination [13] with solvent mixture (v/v), (A) *n*-butanol : ethanol : water (4:1:5) [14] using (R) *p*-anisidine phosphate [15] as spray reagent gave sugar spots as D-galactose and D-mannose in 1:5 molar ratio.

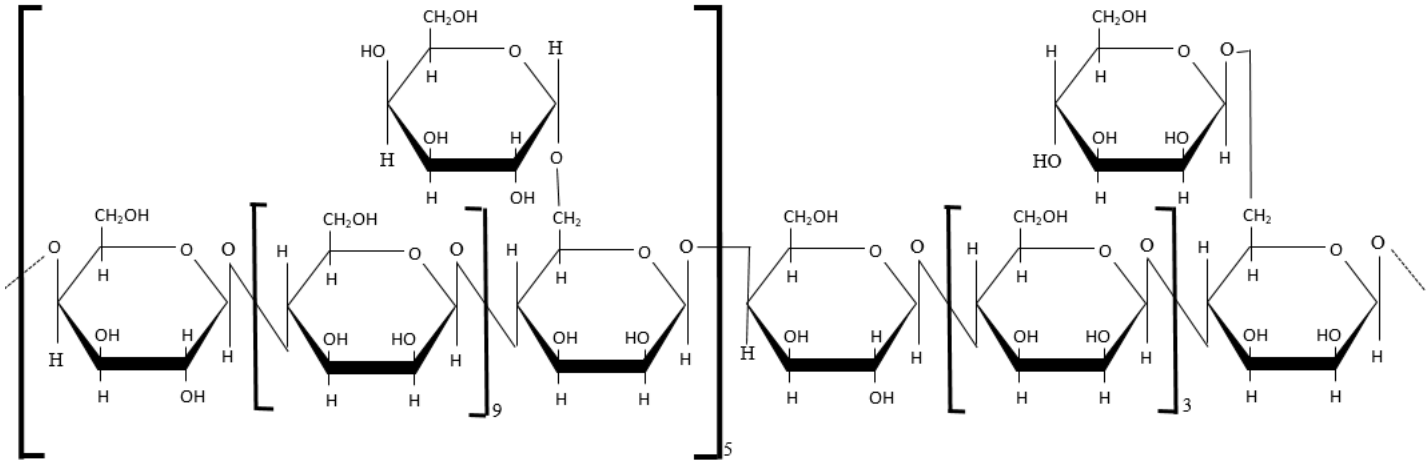

Fig 1: Alkali soluble seeds polysaccharide structure of *Quercus incana* Roxb. Plant

Results and Discussion

Quercus incana Roxb. alkali soluble seeds polysaccharide was oxidised with sodium metaperidoate (0.125M) by usual manner. It liberated 0.102 moles of formic acid per mole equivalent of polysaccharide with simultaneous consumption of 1.24 moles of periodate for anhydroglucose sugar units of the polymer chain after 100 hrs. Presence of (1→6)-α-type and (1→4)-β-type linkages are also confirmed by the periodate oxidation results. The glycol groups undergoes to the cyclic ester formation with oxidant and reaction is considered to be dialdehyde type of oxidation. Polysaccharide containing free hydroxyl groups resulted in the consumption of periodate ions during periodate oxidation reaction. It is concluded from the above facts that the probably there is two branching point from the repeating unit of the polysaccharide structure. Formic acid appears is to be originating from reducing as well as non-reducing terminal point of seed polysaccharide structure. Probable reaction by which the periodate oxidation of polysaccharide occurs. The periodate oxidation reaction showed that the D-galactose and D-mannose units were containing adjacent free hydroxyl groups resulting in the consumption of periodate ions. It is concluded from the above facts that probably two branching point occurs sixty six repeating units of the polysaccharide structure constituting the non-ionic polysaccharide. Alkali soluble seeds polysaccharide structure of *Quercus incana* Roxb. was obtained from methylation studies was also confirmed by the periodate oxidation results (Figure-1).

References

1. Fluery P, Lange J. J. Pharma. Chem. 1933; 17:107-110.
2. Perlin AS. Advances in Carbohydr. Chem, 1959, 14-B, 98-100.
3. Singh RB. International Journal of Scientific Research and Communications. 2018; 3(1):35-42.
4. Singh RB, J. Chemtracks. 2017; 19(1):93-94.
5. Singh RB. International Journal of Global Science Research. 2015; 2(3):179-182.
6. Abdel AM, Smith F. J. Amer. Chem. Soc. 1951; 73:994-996.
7. Halsall TG, Hirst EL, Jones JKN. J. Chem. Soc, 1947, 1427-1430.
8. Brown F. J. Chem. Soc, 1948, 27-30.
9. Partridge SM. Nature (London). 1946; 158:270-271.
10. Partridge SM, Westall RG. Biochem. J. 1948; 42:238-241.
11. Mukherjee S, Srivastava HC. Nature (London). 1952; 169:320-322.