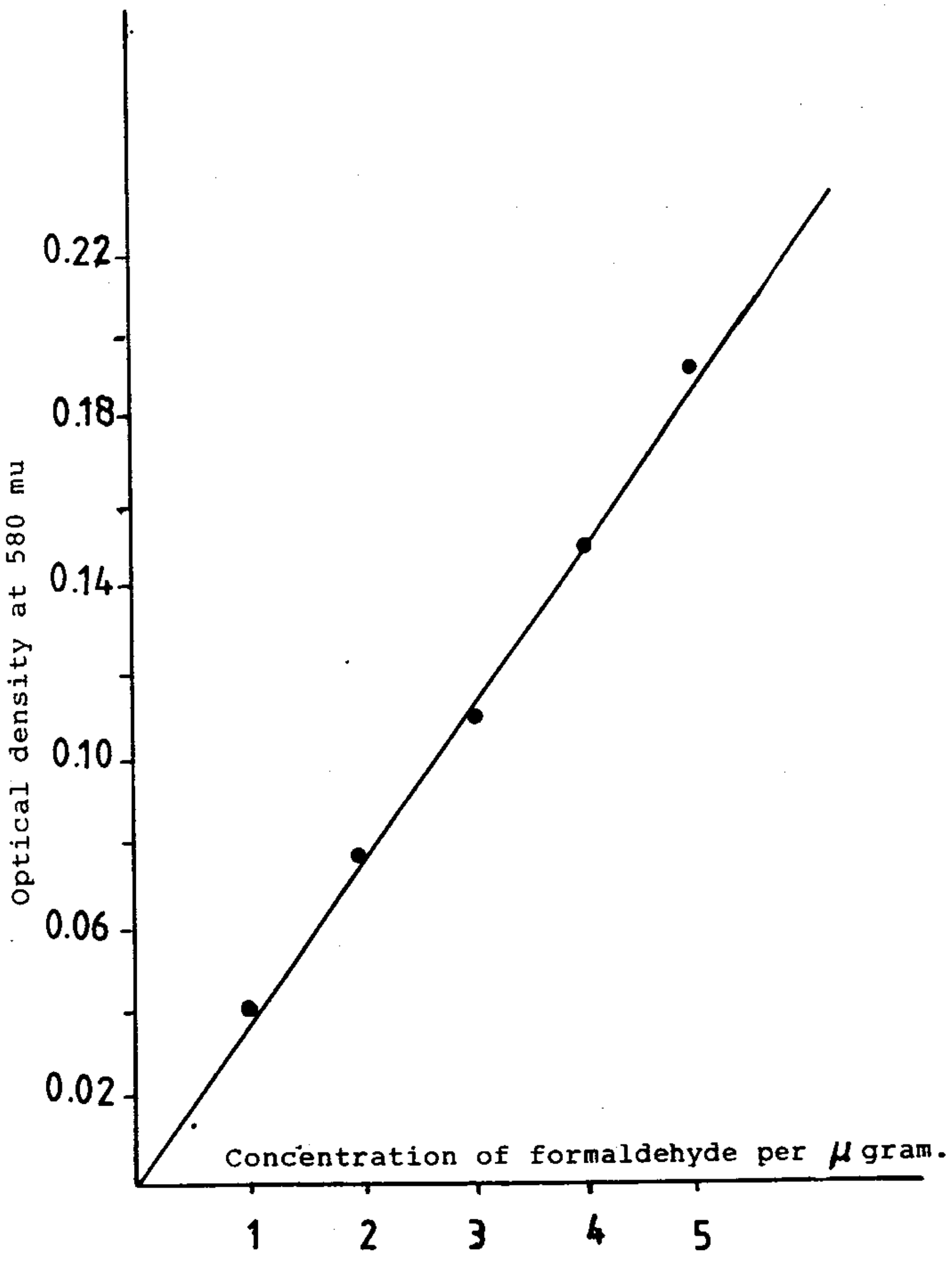
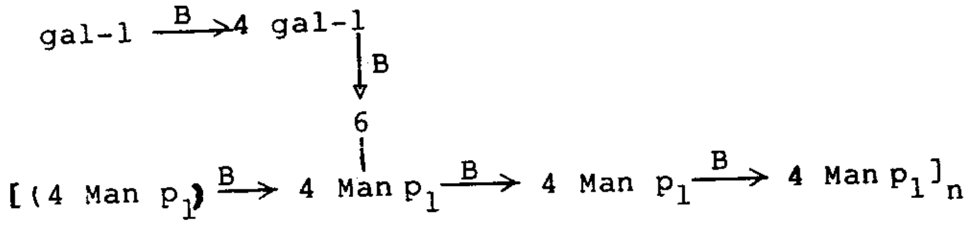


Fig. (8): Standard curve for determinaton of liberated formaldehyde.

given by the physical method (viscosity method) was higher than that determined by chemical method (periodate oxidation) the ratio of molecular weight for both methods was 1.33:1.0 respectively. Such results were obtained by Tawfik (1978) who found that the ratio of molecular weight determined by the physical method (viscosity method) to that determined by chemical nethod (periodate oxidation)was 7.2:1 in native potato starch while was 13.6:1 in case of corn starch. As it is well known, the amount of formaldehyde released is proportional to the number of reducing end, while the molecular weight determined by the physical method (intrinsic viscosity-molecular weight relation) is an indication of molecular size of the whole polysaccharide. This difference in the value of the molecular weight given by physical and chemical methods could be interpreted on the fact that the polysaccharide molecule consists ofa mixture of a wide range of different fragments of different molecular weights. Each fragment contains a reducing end which released a molecule of formaldehyde by periodate oxidation to lower the molecular weight.

The amount of formic acid per anhydroglycose unit ($\frac{0.05}{162}$) which was liberated from periodate of the polysaccharide were determined by titration method with solution of NaOH (0.01N). This amount was 0.167 M. per anhydro-unit. Since the determined molecular weight was 166,650, the total amount of formic acid which liberates from a molecular of guaran polysaccharide equals about 172 moles $(\frac{166.650}{162} \times 0.167)$ Also, the consumed moles of periodate per an anhydroglycose unit $(\frac{0.05}{162})$ was calculated. This result indicated that each mole of anhydroglycosyl unit consumed 1.168 mole of sodium metaperiodate. Furthermore, galactose and mannose units were not detected after periodate oxidation and sulphuric acid (1N), Since, it is well known that formic acid molecules are liberated from terminal units, in addition, each mole of formic acid is produced per non reducing terminal unit in case of $(1 \longrightarrow 4)$ glycosidic linkages. The results obtained indicate that the guar polysaccharide has a branched structure with Ca 16.7% of the units in terminal positions. Besides, the ratio of consumed periodate to an anhydroglycosyl unit was 1.168:1 shows that the majority of the mannopyranose or galactopyranose were linked through C_1 and C_4. . The excess of ratio consumed periodate than one (0.168) was applied to produce formic acid from terminal units.

According to the results obtained from acid hydrolysis infrared spectroscopy, cupperammonium and periodate oxidation, the polysaccharide probably consists of repeating segments, as shown in structure (10).



Structure (10): Proposed repeating formula of guar polysaccharide.

It is worthy to note that the proposed repeating formula is in agreement with the general structure element in all galactomannan which was confirmed by Smith and Montogomery (1959), McCleary et al.,(1976) and Dey (1978). Since the molecular weight, of guar gum was equivalent to 1028 anhydroglycosyl units, therefore, this polysaccharide contains about 171 repeating segments. Fig. (9) illustrates the proposed structure formula for the guar polysaccharide which fit well with the molar ratio of galactose and mannose (1:2) and the results of periodate oxidation and other analysis.

For further investigation, to obtain the definte structural formula for this polysaccharide, it is necessary to carry out the methylation, and enzymatic hydrolysis on the sample under investigation.

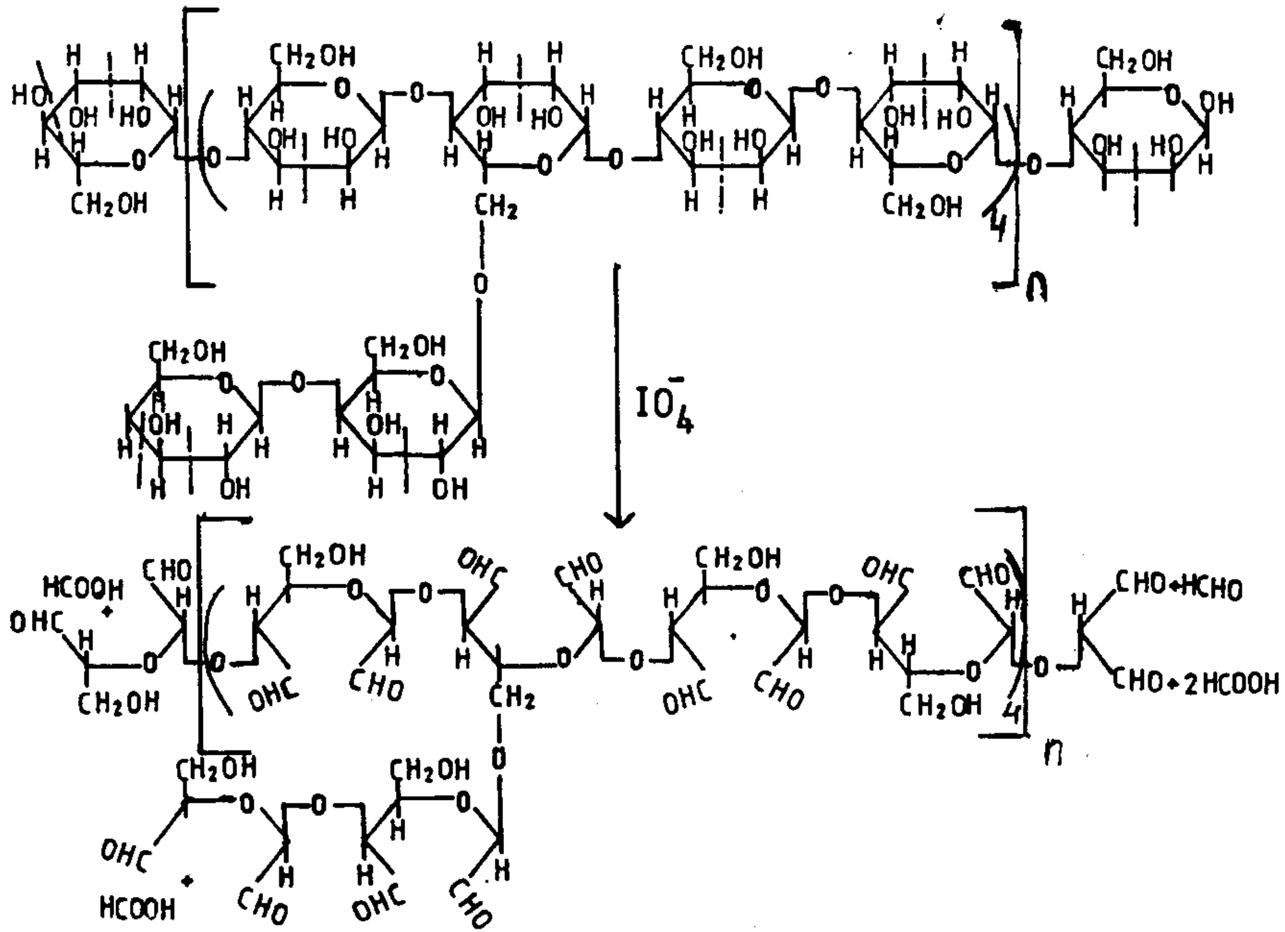


Fig. (9): Proposed structure of guar seed polysaccharide.