Studies on modified starch and its products

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5 — SUMMARYThe obtained results of this investigation could be summarized in the following points :-A - Chemical characteristics of isolated starches :-1-The moisture content of native starch ranged from 12.20 % (corn starch) to 15.72 % (potato starch) .2-Corn starch had a higher levels of protein (0.17 %) and ash (0.2 %) compared with mung bean (0.02) and potato(0.03) starches.3 - Carbohydrates were represented the major component in the starch. It ranged from 99.6 % (in corn starch) to 99.90 %(in potato starch) .B - Effect of heat — moisture treatment on the physicochemical characteristics of starch :-1- Heat — moisture treatment caused a slight increases in pH values of starch as the moisture content in crease .A significant increases was noticed in acid number during the heat — moisture treatment among all the treated starch samples. Potato starch had the highest increases (by 71.2 %), followed by mung bean starch (by 56.5), then corn starch (by 41 %). On the other hand, heat -moisture treatment caused a significant reduction in alkali number of mung beanSUMMAR201increases in reducing power with different observed as the moisture content increased comparing to all treated starches, and with theirlevels was p to 27 %, native ones.2-Water binding capacity increased significantly as affected by heat — moisture treatment . Mung bean starch had thehighest value compared with corn and potato sta ches .3-Swelling power,generally increased by in• reasing the gelatinizati temperature ranged from 50 to 90° C. Swelling power of corn starc increased with differe t levels as affected by heat-moisture reatment . The highe swelling of corn starch was found at 80 — 90° C. On the o her hand , a significant reduction in solubility was obse ed as the moisture content increase .Heat moisture treat ent caused a significant decreases in swelling power of mung bean starch. However , starch solubility decrease gr. dually up to 80 — 90°C as the moisture content increase . Sw lling powerof potato starch decreased gradually as the moisture contentincrease during modification at 50 , 60 arid 70°I , while , at 80 — 90°C a significant increase was observe . However starch solubility decreased significantly during m dification.4-Relatvie , specific and intrinsic viscosities decre sed by heat-moisture treatment with different levels wit all tested samples5-Heat — moisture treatment did not change th crystalline structure of corn and mung bean starch, i.e., the crystallinity patterns still in ”A” type. While, the crystalline structure of potato starch changed into a mixed crystalline s ape of (A) and (B).SUMMARY2026-Scanning Electron Micrograph showed that, there is no changes in shape and the surface characteristics of starch granules of all tested samples as affected by heat — moisture treatment. On the other side, heat moisture treatment caused an increase in starch granule size being 0.47 % (in corn), 40.47 % (in mung bean) and 48.69 % (in potato), compared to their native one.7-A strong correlation coefficient was found between the time of acid hydrolysis and reducing sugars as well as the moisture content during modification.C— Effect of microwave treatment on the physicochemical characteristics of starch :1 — Microwave treatment reduced the pH values of all starch samples with different levels by increasing the treatment time up to 15 min. On the contrary, acid, alkali and reducing power of treated samples increased gradually with low levels compared with their native ones.2— Water binding capacity of corn, mung bean and potato starches increased with low level as the treatment time increase up to 15 min.3- Swelling power and solubility of starch changed with different levels as affected by microwave treatment. Swelling power and solubility of corn starch decreased gradually as the treatment time increase. A higher significant reduction levels in solubility of corn starch was noticed after 10 min treatment time compared to all tested swelling temperature (50 - 90°C). Swelling power of mung bean starch increased by 15.5 to

22.5 % (at 50°C) and by 55.8SUMMARY203to 77.3 % (at 60°C) as affected by treatme t. While, it reduced by 8.6 to 16.6 % (at 70°C), 7.9 to 13.7 % (at 80°C) and 17.2 to 23.1 % (at 90°C). On the other side, a higher reduction in mung bean solubility was obsery d at 70, 80 and 90°C. Swelling power of potato star• h increased gradually at 60°C with increasing the treatment time. On the contrary, a gradual reduction in swelling was oticed at 70, 80 and 90°C. However, the solubility of potat starch was reduced by different levels as affected b microwave treatment.4 — The changes in relative, specific, reduced viscosity was lower in mung bean starch during treatment ti e (15min), followed by corn and potato starch. The red ction rate in intrinsic viscosity after 15 min treatment was 9.2, 8.6 and 43.6 % for corn, mung bean and potato starch, r spectively.5 - X — ray diffraction patterns of treated corn st rch changed from ”A” to ”C B” shape, while, mung bea and potato starch did not exhibited any changed in th ir crystalline patterns as affected by microwave treated.6 —Microscopic examination revealed that, II eatment by microwave caused an increase in the size of st rch granules by 13.27, 23.27 and 58.73 % for corn, mung be n, and potato starch, respectively.7— Acid hydrolysis of corn, mung bean and ,lotato starch increased with different levels as affected b microwave treatment. The higher hydrolysis rate of cor starch was noticed after 5 min treated compared to the 11 hydrolysis time. While, mung bean starch showed a hig er hydrolysisSUMMARY204rate (42.64%) after 5 min treatment and 60 min hydrolysis time. Potato starch exhibited a higher hydrolysis rate after treatment for 5 min at 50 and 60 min hydrolysis time by 41.31 and 48.40 %, respectively. On the other hand, a higher significant correlation between the time of hydrolysis and reducing sugars in all samples was observed.D— Effect of acetylation on the physicochemicalcharacteristics of starch :1 — Acetylation reduced pH and alkali number of starch. The higher reduction levels in pH was found with potato followed by mung bean and corn starch. On the contrary, acid number and reducing power were increased as affected by acetylation. Acetylated potato starch showed a higher increase in acid number followed by mung bean then corn starch. The degree of substitution was found to be 0.017, 0.013 and 0.019, for corn, mung bean and potato strarch,respectively.2 — Water binding capacity increased by 41.1%, 35.63 % and 9.37 %, for corn, mung bean and potato starch, respectively.3 — Modification by acetylation reduced the swelling power andsolubility of tested starch samples.4 — Relative, specific and intrinsic viscosity decreased by acetylation. Acetylated potato starch had a higher reduction rate in intrinsic viscosity being 90.45 %, followed by 64.91 (mung bean) and 54.51 % (corn).SUMMARY2055 — X — ray diffraction pattern of mung bean and otato starches did not changed as affected by acetylation, wh le, corn starch exhibited mainly A type and C type.6 — Microscopic examination revealed tha increased the size of starch granules by 3. 43.93 % for corn, mung bean and potato starch7 Hydrolysis rate of acetylated at bean starcamong all the hydrolysis time, followed by a starch. While, acetylated potato starch sho hydrolysis rate. On the other hand, a stro coefficient was observed between the time of reducing sugars.Cakes made from modified starches with different levels of substitution up to about 75 %, had a higher organolyptic characteristics than those made from 100 % substitution level.acetylation 2, 46.54 and respectively.was higher etylated corn ed a lower g correlation ydrolysis andSUMMAR206