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SHOKOLADNING KIMYOVIY TARKIBINI ANALITIK TAHLIL QILISH

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Annotatsiya. *Maqolada ushbu sohadagi ba'zi tadqiqotlar keltirilgan (oziq-ovqat mahsulotlari va ularning tarkibi) va inson salomatligi uchun kamroq zararli bo'lgan oziq-ovqat mahsulotlarini aniqlash. Tadqiqotning asosi shokolad kabi keng iste'mol qilinadigan oziq-ovqat mahsulotlariga qaratilgan.*

Kalit so'zlar: *shokolad, tarkibi, tahlili, sifati, sotsiologik, so'rovnoma.*

XIX asrning 1842 yilllarida sanoat sharoitida ishlab chiqarilgan birinchi shokolad bari bilan nozik muomalaning ajoyib tarixi boshlandi. Ushbu maqolada biz mashhur shirinliklarni ishlab chiqarishning texnologik zanjirini, har bir shokolad turining xususiyatlarini, shuningdek ishlab chiqaruvchilar xarajatlarni kamaytirish va tovarlarning ko'rinishini yaxshilash uchun qanday fokuslardan foydalanishlari mumkinligini batafsil ko'rib chiqamiz va bilib olamiz [1].

To'q rangli shokolad (70-85% kakao) 100 g mahsulotda 45,9 g uglevodni o'z ichiga oladi, bu porsiya yoki 184 kkaldagi barcha energiyaning taxminan 31% ni tashkil qiladi. Kaloriya tarkibi-598 kkal. Qora shokolad tarkibi (70-85% kakao): yog'lar-42,63 g, oqsillar — 7,79 g, uglevodlar — 45,90 g, suv — 1,37 g, kul — 2,32 g [1,2,3,4,5,6].

Shokolad juda murakkab kimyoviy tarkibga ega bo'lgan mazali, sog'lom va g'ayrioddiy to'yimli mahsulotdir. Qo'lingizda qanday shokolad borligini aniqlash uchun paketdagi ma'lumotlarni diqqat bilan o'rganib chiqing. Mashg‘ulotning maqsadi: turli markadagi shokolad namunalarining kimyoviy tarkibi va sifatini o'rganish. Tadqiqot usullari: eksperimental usul va sotsiologik so'rov. O'rganilayotgan ob'ekt sifatida biz quyidagi shokolad namunalaridan foydalandik:

Namuna № 1-achchiq klassik shokolad. Namuna № 2-sutli shokolad. Namuna № 3-oq shokolad.

Keyin biz eksperimental qismga o'tdik. 1. Yorliqlardan shokolad sifatini o'rganish. Biz tanlangan shokolad namunalarining yorliqlaridagi ma'lumotlarni ko'rib chiqdik. Oq va sutli shokolad tarkibiga soya emulsifikatori lesitin-E476 kiradi. U arzon shokolad navlarini tayyorlash uchun

ishlatiladi. Bundan tashqari, faqat achchiq shokolad tarkibida ko'proq kakao mahsulotlari mavjud. 2. Shokolad sifatini o'rganish. 3 ta naychada biz 5 g shokolad namunalarini joylashtiramiz va eritish tugaguncha suv hammomida isitamiz. Termometr har bir namunaning erish nuqtasini belgilaydi.

O'lchov natijalari erish nuqtasi, 0C . Namuna № 1-achchiq klassik shokolad - 40. Namuna № 2-sutli shokolad - 59. Namuna raqami 3-oq shokolad - 50. Ma'lumki, shokoladning erish nuqtasi qanchalik past bo'lsa, unda o'simlik yog'lari shunchalik ko'p bo'ladi.

Shokolad muhitining pH ni o'rganish. Namuna eritmasi bilan 3 ta naychada biz muhitning pH qiymatini aniqlash uchun indikator chiziqlarini tushiramiz, keyin ularni tortib olamiz va universal indikator qog'ozidagi shkala bilan taqqoslaymiz.

Natijalar shokolad muhitining pH tadqiqotidir. Namuna № 1-achchiq klassik shokolad - 8. Namuna raqami 2-sutli shokolad - 7. Namuna raqami 3-oq shokolad - 6.

Tadqiqot natijasida sut shokolad namunasida neytral muhit aniqlanganligini ta'kidlaymiz.

To'yinmagan yog' kislotalarini o'rganish. Biz o'rganilayotgan namunalardan bir bo'lak shokolad olamiz, qog'oz filtr bilan o'rab, ustiga bosamiz. Natijada filtrda yog' dog'lari paydo bo'ladi. Ularga tomchilab kaliy permanganat eritmasini qo'shing, har xil intensivlikdagi jigarrang dog'lar paydo bo'lishini kuzating (MnO_2). Buni oksidlovchi qayta tiklash reaktsiyasining borishi bilan izohlash mumkin, shuning uchun tekshirilayotgan namunalarda to'yinmagan yog' kislotalari mavjud va achchiq shokoladga qaraganda sut va oq shokoladda ko'proq.

Uglevodlarni o'rganish. 3 ta naychaga 1 g maydalangan shokolad quyiladi va har biriga 2 ml distillangan suv qo'shiladi. Har bir naycha bir necha marta silkitildi va filtrlandi. Filtratga 1 ml NaOH eritmasi va 2-3 tomchi 10% CuSO4 eritmasi qo'shildi. Va yana silkitildi. Namuna № 1 - achchiq klassik shokolad-yo'q. Namuna № 2 - sutli shokolad-yorqin ko'k. Namuna № 3 - oq shokolad-kuchli yorqin ko'k hosil bo‘ldi. 2 naychada yorqin ko'k rang paydo bo'ldi. Bu reaktsiyani ko'p atomli spirt bo'lgan saxaroza beradi. U oq shokoladda eng ko'p uchraydi.

Oqsillarni o'rganish. Probirkaga 1 g maydalangan shokolad quyiladi va 2 ml distillangan suv qo'shiladi. Sinov naychasi bir necha marta silkitildi va filtrlandi. Keyin 0,5 ml HNO_3 qo'shildi. Olingan aralashmani qizdiring. Aralashmaning sariq ranglanishi paydo bo'ldi, 25% ammiak eritmasi qo'shilsa, rang to'q sariq-sariq rangga aylanadi. Bunday reaktsiya shokolad oqsillarini tashkil etuvchi aromatik aminokislotalarning qoldiqlari tomonidan beriladi.

Shuning uchun tekshirilayotgan barcha namunalarda oqsillar mavjud. Shokolad bilan qoplangan taninni o'rganish. 2 ml filtrlangan shokolad eritmasiga tomchilab temir(III) xlorid eritmasini qo'shing. Tanin mavjud bo'lganda, eritmaning quyuq binafsha rangi paydo bo'ladi.

Namuna № 1 - achchiq klassik shokolad-quyuq binafsha rang.

Namuna № 2 - sutli shokolad-och binafsha rang.

Namuna № 3 - oq shokolad-yo'q.

Shokolad tarkibidagi taninni aniqlash. 1 ml shokolad eritmasiga (filtratga) 1-2 tomchi temir (III) xlorid qo'shdim. Agar tanin bo'lsa, biz quyuq binafsha rangni kuzatamiz. Xulosa: achchiq shokoladda tanin etarli, sutda juda oz va oq rangda emas.

Amalga oshirilgan tajribaga asoslanib, tanin oq shokoladda yo'q, achchiq shokoladda ko'proq kuzatiladi va sutda tanin izlari sezilarli bo'ladi degan xulosaga kelishimiz mumkin.

Shunday qilib, amalga oshirilgan ishlar davomida biz shokoladning tarkibi va xususiyatlarini, uning inson tanasiga ta'sirini o'rganib chiqdik, shokolad namunalaridagi moddalarning tarkibini eksperimental ravishda sinab ko'rdik. Shokoladda oqsillar, yog'lar, uglevodlar, tanin, kofein mavjudligi isbotlangan. Oq shokoladning shokolad bilan hech qanday aloqasi yo'q, bu shunchaki shirin desert. Tadqiqot boshida ilgari surilgan gipoteza qisman tasdiqlandi. Shokoladni haddan tashqari iste'mol qilish inson salomatligiga salbiy ta'sir ko'rsatishi mumkin.

Ko'pchiligimiz shokolad iste'molchilari ekanligimizni hisobga olib, uni iste'mol qilish bo'yicha quyidagi tavsiyalarni taklif qilamiz: 1. Shokolad sotib olayotganda kakao mahsulotlarining tarkibiga e'tibor bering: kakao moyi va maydalangan kakao. Kakao kukuni kekdan tayyorlanadi, yuqori sifatli shokoladda bunday qo'shimcha bo'lmasligi kerak; 2. Shokolad yurak va qon tomirlari uchun foydalidir, dorivor maqsadlarda faqat yuqori sifatli qora shokolad navlaridan foydalanish yaxshiroqdir (kakao mahsulotlarining tarkibi kamida 55%); 3. Kechasi shokolad iste'mol qilmang,

chunki u asab tizimiga hayajonli ta'sir ko'rsatadi. 4. Kuniga shokolad miqdori 30 gramm, barning uchdan bir qismi va 50 grammdan oshmaydi (barning yarmi). Va agar shokolad achchiq bo'lsa, tarkibida kakao ko'p bo'lsa, unda kuniga atigi bitta bo'lak bo'lishi mumkin. Agar siz me'yorga rioya qilmasangiz, kelajakda oshqozon osti bezi bilan bog'liq muammolar bo'lishi mumkin - pankreatit, diabet.

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STUDY OF OPTIMIZATION AND MATHEMATICAL MODELING OF HOT AIR DRYING PROCESS OF RED BEETROOT (BETA VULGARIS)

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Intruduction. Red beet root (Beta vulgaris) powder as a natural red food colorant offers applications in dry mixes (soups, Indian curry mixes), sweets, jams, jellies, etc the bright red color of beet root is owing to a group of red pigments known as betalains. Betalains are antioxidants having profound health benefits [1-3]. The colorant powder is conventionally produced by spray drying or tray/belt drying. Spray drying of beet extract is reported by some research groups [4]. Spray drying requires the addition of maltodextrin or other binders as prerequisites. Spray dried powder is less brightly colored due to maltodextrin and partly due to thermal degradation at high temperature. In addition, the powder’s hygroscopic nature is another limitation that may lead to operational inconvenience such as lump formation while mixing, blending, rehydration, etc. In this scenario, convective drying of whole beet (tray drying for small scale or belt drying at medium scale) is an attractive option to farmers from the developing countries. Much smaller investment and high yield-better quality product, resulting in more nutritious end products, are some of the advantages of convective drying of beet root. While farmers continue to look for improved profitability, processing of vegetables for possible value addition is almost negligible. One such option is dehydration of vegetables (for dry soup mixes, dry ready-to-cook food items) using simple convective tray drying. The main constrain is high power requirement and since vegetable flex/powder is a low value commodity, commercial feasibility is largely dependent on energy consumption. Hence there is a need to optimize the process for reduction in time and energy, achieving quality retention in terms of color, nutrients, and rehydration ratio.

This work was undertaken in 10 kg/batch laboratory tray dryer with the objective of reduction in batch time and lower power consumption by producing a good quality beet powder (in terms of color and rehydration ratio) as a model system. Whole beet pulp was dried in the form a slab and mathematical modeling of dehydration kinetics was done under different temperatures in the range of 50- 120ºC. Mathematical modeling using thin layer drying models has been studied for drying of fruits, vegetables, sea food, and other agricultural products [5]. Many of the semi-theoretical models were used to model the drying characteristics which offer a compromise between theory and ease of application (11). Nine of such reported semi-theoretical models and a new proposed model were compared and finally an optimum dehydration protocol was derived in order to maximize color retention and minimize batch time. Using pulp instead of grated vegetable resulted in a 20%