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The use of enzymes in laundry detergents is a centuries-old concept. But just as the world is moving toward ethical and sustainable consumer choices, this idea is gaining more attention.You must have come across many detergent TV ads boasting the bio-enzymatic formula of their products, and for all the right reasons. Many of our daily-use laundry detergents are now created with a decent amount of enzymes along with other chemicals.What exactly are enzymes? How do they work in your detergent? And are they eco-friendly? This article will lay out everything you need to know about enzymes in laundry detergents.Enzymes are proteins that carry out many important processes in living organisms. Our bodies use different enzymes to perform tasks such as digesting foods and helping us build muscles. They are also found in animals and plants to support life.These molecules work wonders in household applications. Enzymes have been used in the dairy, brewing, and detergent industries for a long time and they are now a part of almost 400 household products that we use every day!Whenever we shop for detergents in a grocery store or online, we see many kinds of laundry detergents available with a variety of different ingredients. You must have noticed how some of the detergents are labeled green, but do you know how they work and affect our environment? It is important to understand what we are putting down the drains.While some detergents are labeled as eco-friendly, they may not entirely consist of enzymes. You may find detergents with a blended formulation of both biological and nonbiological ingredients. Always read the list of ingredients before buying a laundry detergent, as this will help you be sure youre making sustainable choices.What do enzymes do in a washer that makes them so special? Enzymes perform the same job in the washing machine as in our bodies! They break down proteins, fats, and oils and wash away these stains from our clothes. Their ability to turn organic stains into smaller molecules is important in many cleaning products.Moreover, enzymes clean our clothes deeply by targeting the fibers and preventing any dirt or soil particles from sticking to the threads. These naturally occurring substances are very gentle and dont damage the clothes in any way.All bio-detergents that contain enzymes can tackle many stains head on. Stains like ketchup, juices, and sauces are pretty easy targets for enzymes in your detergents. So the next time you soil your shirt while having a cheeseburger or french fries, sweat not!Biological detergents can contain a wide range of enzymes in their ingredient list. But there are mainly five types of enzymes used in detergents, each adding to the overall cleaning power of your product.Proteases break down proteins and are perfect for removing blood, sweat, egg, meat, gravy, and other protein stains from your clothes. So, whether you have to clean stains from your kids sports uniforms or a mess created by your pet, these enzymes can wash away all your worries. Theyre mainly extracted from bacteria found in marshy areas and are the most widely used enzymes in washing products.Oil and grease stains are pesky little devils that dont come off very easily. But an enzyme called lipase can easily wash away fat and oil stains, no matter how stubborn and old they are. Food stains such as chocolate, desserts, and ice creams are no big deal for lipases.These molecules show the best results after several wash cycles and remain active until the fabric dries out completely. Moreover, they are quite gentle on the skin.Amylases wash away starchy stains. Stains caused by grass, cereals, pasta, cherry pie, soft drinks, beans, sauces, vegetables, flour, and fruits are best washed with amylases. Such enzymes are sourced from foods like rice and barley and are 100% safe for the environment. Amylases do not cause any skin problems, either. In fact, they are also used in your sunscreens and conditioners.Not only do enzymes clean stains, but they also help bring out the original colors of your clothing. Cellulase, for example, targets the dullness and removes the fuzz of fibrils on surfaces. They act on the cotton fibers of your clothes and wash away all the dirt and dust particles. Due to these enzymes, your laundry turns out brighter, softer, and smoother than before. One of the many benefits of cellulases is that they help keep the strength of the fabric. In addition to that, they remove stains caused by vegetables, fruit juices, and legumes.Mannanase is yet another laundry enzyme widely used for its action against foods like tomato ketchup, ice creams, chocolates, and toothpaste. Such enzymes can easily wash away stains from skin care creams and lipsticks.Biological detergents contain small amounts of all of these enzymes working together as a team to fight stains.So, are detergent enzymes really eco-friendly? Absolutely yes! Using biological detergents will save you from hours of scrubbing to fight off stains. At the same time, you can reduce your carbon footprint and pat yourself on the back for making an eco-friendly choice.All enzymes are proteins in nature and are derived from living organisms found on the earth. This makes them biodegradable, which means they can easily dissolve in soil and water.Enzymes are the most eco-friendly solution in the detergent industry because the waste produced during the making of these products is safe for the environment.Biological detergents containing enzymes can clean your clothes the same way as any chemical detergent does. There is no huge difference in cleaning performance, which is why many laundry detergent brands are replacing harsh chemicals with enzymes. While cleaning power remains the same, there is indeed a huge difference in their environmental impacts.According to research, nonbiological detergents are responsible for reducing fishes ability to reproduce. Ingredients like phosphates, formaldehyde, dioxane, bleach, and synthetic fragrances are highly toxic and are commonly found in chemical detergents. So, if youre using such a detergent, its likely that youre contributing to the destruction of aquatic life!The next time you go to a store and see detergents with green, eco-friendly, and enzyme-based labels, they are all probably safe for you and our environment, but the most conscientious consumers read ingredients lists to make sure.The detergent footprint is as bad as the carbon footprint! Chemical detergents are made by petrochemicals that are obtained from mining the earths surface. Its a disastrous activity that harms our environment in many ways. Laundry detergents usually come in nonrecyclable and nonreusable plastic packages. Imagine how much plastic we are adding to the landfills, given the weekly purchase of chemical detergents.On the other hand, biological detergents containing enzymes are likely to last longer, as you only need a small amount of detergent in every wash. They come in forms like laundry detergent sheets, pods, and tablets that use little packaging material and can be easily shipped and stored.By adding enzyme-based products to your washing regime, you can cut down the release of a small amount of carbon dioxide with every wash cycle. As the saying goes, little drops of water make the mighty ocean, these little acts can help protect the earth for generations to come.Heres a fun fact: If we all swap just one bottle of regular detergent with a biological detergent, we could save 149,000 barrels of oil used for burning every year!Did you know that a large truck full of clothes is dumped in a landfill every second? For context, there are 86,400 seconds in a day! This is a result of fast fashiona term that describes companies making new clothes rapidly to meet the latest trends.The cycle of fast fashion can be broken if we use detergents that keep our clothes fresh and new. By using enzyme-containing detergent, people will keep their clothes for a longer period of time and wont feel the need to buy new articles every week or month.The best thing about enzymes in detergents is they dont need high water temperatures to wash off the stains. This way you can save about 70%90% of the energy used to warm up the water every time you do your laundry. Enzymes can help you save on time and huge electricity bills.Washing laundry in cold water also means you can throw in all types of fabrics, such as silk, cashmere, wool, and denim, without worrying about damaging them. You dont have to run the washing machine again and again for different fabric materials.The benefits enzymes offer us do not end here! Keep reading to see what else you can get from using enzyme-based laundry detergents.Enzymes are just as powerful as other stain removal products. They can quickly wash away any kind of organic stain in just a few cycles. This reduces wash time and the effort needed to rub off a tough stain. If youre a mom whos always washing baby and kids clothes, enzyme-based laundry detergent is the best choice for you. It can clean stains like chocolate milk and cereals in just a few minutes and save you a lot of effort!For stubborn stains, gently rub a small amount of detergent on the stained area and leave for a while, then rinse with water. However, make sure you read the washing instructions on your garment, as well as the instructions that come with your detergent because every product has different ingredients.Chemical detergents have a bad history of damaging clothes and making them dull, fuzzy, and out-of-shape after only a few washes. But enzyme detergents are gentle and powerful enough to fight off all the stains while keeping your clothes as good as new. Whats interesting is that while enzymes fight stains, they also make the clothes brighter and softer.Enzymes can make your clothes feel soft and smooth on the skin. Instead of using a fabric softener separately in washers, you can just stick to these 2-in-1 products and save time and money!The best thing about enzymes is that they dont get used up after one wash. Because of their high performance, enzymes in detergents continue to work for many wash cycles. This is the reason why detergents contain only a tiny portion of enzymes in their total formulation. You only need a few spoonfuls of the detergent to wash one load of laundry.Detergent manufacturers are now making products that can be shipped in small-sized packages, such as soap bars, pods, balls, and sheets. Small products save factories from using huge amounts of packaging materials and bearing high shipping expenses. This saves a lot of energy and resources used to produce detergents.There is a myth floating around that the use of enzymes harms your skin, as well as your clothes, but it is entirely false! Enzymes dont cause any skin disorders. In fact, its the use of fragrances and chemicals in the detergents that causes skin irritations.As you know by now, detergents are made up of different ingredients, along with enzymes. Some of these ingredients may irritate your sensitive skin, but enzymes are totally safe to use. Moreover, this is backed by the fact that enzymes only form a small portion of the total formulation. A small amount of such harmless molecules can cause no damage to your clothes or skin.Do you know that an average family does 50 pounds of laundry every week? Thats a lot of detergent waste added to drains and water sources every year. As a caring consumer, you should be aware of how your choices affect this planet. If you want to choose sustainable laundry detergents then go for enzyme-based products.Enzymes in detergent can significantly reduce environmental pollution. They are harmless to your skin and clothes, they fight tough stains, and they prevent your wardrobe from becoming baggy or worn out. This choice can save you money and time every time you do laundry.You can play your part in keeping the environment clean and healthy without compromising on cleaning action. This small switch can improve your familys health, along with the environments. So, what are you waiting for? Lets swap the nonbiological detergents with green products!,the free encyclopedia that anyone can edit.117,185 active editors 7,001,904 articles in EnglishThe English-language Wikipedia thanks its contributors for creating more than seven million articles! Learn how you can take part in the encyclopedia's continued improvement.Members of the victorious Blondie crewThe Boat Race 2018 took place on 24March. Held annually, The Boat Race is a side-by-side rowing race between crews from the universities of Oxford and Cambridge along a 4.2-mile (6.8km) tidal stretch of the River Thames in south-west London, England. For the third time in the history of the event, the men's, the women's and both reserves' races were all held on the Tideway on the same day. The women's race saw Cambridge lead from the start, eventually winning by a considerable margin to take the overall record to 4330 in their favour. In the women's reserve race, Cambridge's Blondie (crew pictured) defeated Oxford's Osiris by nine lengths. The men's reserve race was won by Cambridge's Goldie, who defeated Oxford's Isis by a margin of four lengths. The men's race was the final event of the day and completed a whitewash as Cambridge won, taking the overall record to 8380 in their favour. The races were watched by around 250,000 spectators live, and broadcast around the world. (Fullarticle...)Recently featured: Radar, Gun Laying, Mk.I and Mk.IIAndrea NavageroNosy KombaArchiveBy emailMore featured articlesAboutKitty Marion... that Kitty Marion (pictured) was force-fed over 200 times during a hunger strike?... that the North Korean destroyer Choe Hyon is the largest ship constructed for the Korean People's Navy?... that after the release of High and Low, director Akira Kurosawa received telephone calls imitating his film that threatened to kidnap his daughter?... that May Bradford Shockley is why Silicon Valley is where it is?... that the conservation of a goat might endanger the survival of Aquilegia paui?... that Joy Laking predicted in a school writing assignment that within ten years she would be making a living as an artist?... that the Taiwanese restaurant chain Formosa Chang drew inspiration from McDonald's for its non-greasy atmosphere and corporate practices?... that Haridas Mitra had his death sentence commuted after the intervention of Mahatma Gandhi?... that "Steve's Lava Chicken" recently became the shortest song to enter the UK Top 40? ArchiveStart a new articleNominate an articleNgg wa Thiong'oKenyan writer and activist Ngg wa Thiong'o (pictured) dies at the age of 87.In sumo, nosato Daiki is promoted to yokozuna.In association football, Liverpool win the Premier League title.In motor racing, lex Palou wins the Indianapolis 500.In basketball, the EuroLeague concludes with Fenerbahe winning the Final Four Playoff.Ongoing: Gaza warM23 campaignRussian invasion of UkrainetimelineSudanese civil wartimelineRecent deaths: Harrison Ruffin TylerPhil RobertsonMary K. GaillardPeter DavidAlan YentobGerry ConnollyNominate an articleMay 31: Dragon Boat Festival in China and Taiwan (2025); World No Tobacco DayBessarion455 Petronius Maximus, the ruler of the Western Roman Empire, was stoned to death by a mob as he fled Rome ahead of the arrival of a Vandal force that sacked the city.1223 Mongol invasion of Kievan Rus': Mongol forces defeated a Kievan Rus' army at the Battle of the Kalka River in present-day Ukraine.1468 Cardinal Bessarion (pictured) announced his donation of 746 Greek and Latin codices to the Republic of Venice, forming the Biblioteca Marciana.1935 A magnitude-7.7 earthquake struck Balochistan in British India, now part of Pakistan, killing between 30,000 and 60,000 people.2013 An extremely large, powerful, and erratic tornado struck Central Oklahoma, killing eight people and injuring more than 150 others.Albertino Mussato (d.1329)Joseph Grimaldi (d.1837)Dina Boluarte (b.1962)Mbaye Diagne (d.1994)More anniversaries: May 30May 31June 1ArchiveBy emailList of days of the yearAboutCucumis metuliferus, the African horned cucumber, is an annual vine in the cucumber and melon family, Cucurbitaceae. Its fruit has horn-like spines, hence the name "horned melon". The ripe fruit has orange skin and lime-green, jelly-like flesh. It is native to Southern Africa, where it is a traditional food. Along with the gemsbok cucumber and the citron melon, it is one of the few sources of water during the dry season in the Kalahari Desert. This photograph, which was focus-stacked from 25 separate images, shows two C.metuliferus fruits, one whole and the other in cross-section.Photograph credit: Ivar LeidusRecently featured: Ignace TonenAustralian white ibisHell Gate BridgeArchiveMore featured picturesCommunity portal The central hub for editors, with resources, links, tasks, and announcements.Village pump Forum for discussions about Wikipedia itself, including policies and technical issues.Site news Sources of news about Wikipedia and the broader Wikimedia movement.Teahouse Ask basic questions about using or editing Wikipedia.Help desk Ask questions about using or editing Wikipedia.Reference desk Ask research questions about encyclopedic topics.Content portals A unique way to navigate the encyclopedia.Wikipedia is written by volunteer editors and hosted by the Wikimedia Foundation, a non-profit organization that also hosts a range of other volunteer projects: CommonsFree media repository MediaWikiWiki software development Meta-WikiWikimedia project coordination WikibooksFree textbooks and manuals WikidataFree knowledge base WikinewsFree-content news WikiquoteCollection of quotations WikisourceFree-content library WikispeciesDirectory of species WikiversityFree learning tools WikivoyageFree travel guide WiktionaryDictionary and thesaurusThis Wikipedia is written in English. Many other Wikipedias are available; some of the largest are listed below. 1,000,000+ articles DeutschEspaolFranaisItalianoNederlandsPolskiPortugusSvenskaTing Vit 250,000+ articles Bahasa IndonesiaBahasa MelayuBn-lm-gCataletinaDanskEestiEsperantoEuskaraMagyarNorsk bokmlRomnSimple EnglishSloveninaSrpskiSrpskohrvatskiSuomiTrkeOzbekcha 50,000+ articles AsturianuAzrbaycancaBosanskiFryskGaeilgeGalegoHrvatskiKurdLatvieuLietuviNorsk nynorskShqipSlovenina Retrieved from " 2This article is about the year 455. For other uses, see 455 (disambiguation).This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.Find sources:"455"news newspapers books scholar JSTOR (April 2019) (Learn how and when to remove this message)Calendar yearYearsMillennium1stmillenniumCenturies4thcentury5thcentury 6thcenturyDecades430s440s450s 460s470sYears452453454455 456457458vte455 by topicLeadersPolitical entitiesState leadersReligious leadersCategoriesBirthsDeathsDisestablishmentsvte455 in various calendarsGregorian calendar455CDLVAb urbe condita1208Assyrian calendar5205Balinese saka calendar376377Bengali calendar139 138Berber calendar1405Buddhist calendar999Burmese calendar183Byzantine calendar59635964Chinese calendar (WoodHorse)3152 or 2945to (WoodGoat)3153 or 2946Coptic calendar171172Discordian calendar1621Ethiopian calendar447448Hebrew calendar42154216Hindu calendars- Vikram Samvat511512- Shaka Samvat376377- Kali Yuga35553556Holocene calendar10455Iranian calendar167 BP 166 BPIslamic calendar172 BH 171 BHJavanese calendar340341Julian calendar455CDLVKorean calendar2788Minguo calendar1457 before ROC1457Nanakshahi calendar1013Seleucid era766/767 AGThai solar calendar997998Tibetan calendar(male Wood-Horse)581 or 200 or 572to(female Wood-Goat)582 or 201 or 571King Genseric sacks Rome (455)Year 455 (CDLV) was a common year starting on Saturday of the Julian calendar. At the time, it was known as the Year of the Consulship of Valentinianus and Anthemius (or, less frequently, year 1208 Ab urbe condita). The denomination 455 for this year has been used since the early medieval period, when the Anno Domini calendar era became the prevalent method in Europe for naming years.March 16 Emperor Valentinian III, age 35, is assassinated by two Hunnic retainers of the late Flavius Aetius, while training with the bow on the Campus Martius (Rome), ending the Theodosian dynasty. His primicerius sacri cubiculi, Heraclius, is also murdered.March 17 Petronius Maximus, former domesticus ("elite bodyguard") of Aetius, becomes (with support of the Roman Senate) emperor of the Western Roman Empire. He secures the throne by bribing officials of the imperial palace. Maximus consolidates his power by a forced marriage with Licinia Eudoxia, widow of Valentinian III.Maximus appoints Avitus, most trusted general, to the rank of magister militum and sends him on an embassy to Toulouse, to gain the support of the Visigoths. He elevates his son Palladius to Caesar and has him marry Eudocia, eldest daughter of Valentinian III.May 31 Maximus is stoned to death by an angry mob while fleeing Rome. A widespread panic occurs when many citizens hear the news that the Vandals are plundering the Italian mainland.June 2 Sack of Rome: King Genseric leads the Vandals into Rome, after he has promised Pope Leo I not to burn and plunder the city. Genseric sacks the city for a period of two weeks. Eudoxia and her daughters, Eudocia and Placidia, are taken hostage. The loot is sent to the harbour of Ostia and loaded into ships, from whence the Vandals depart and return to Carthage.July 9 Avitus is proclaimed Roman emperor at Toulouse, and later recognised by the Gallic chiefs in Viernum (near Arles).September 21 Avitus enters Rome with a Gallic army. He restores the imperial authority in Noricum (modern Austria) and leaves a Gothic force under Remistus, Visigoth general (magister militum), at Ravenna.The Ostrogoths conquer Pannonia and Dalmatia.Battle of Aylesford: Prince Vortimer rebels against the pro-Anglo-Saxon policies of his father, Vortigern. He is defeated in the battle at Aylesford (Kent). Hengist and his son Oisc become king of Kent. Horsa and Catigern, brother of Vortimer, are killed. The Britons withdraw to London (according to the Anglo-Saxon Chronicle).Skandagupta succeeds Kumaragupta I as ruler of the Gupta Empire (India). During his reign he crushes the Hun invasion; however, the expense of the wars drains the empire's resources and contributes to its decline.Gaero becomes king of the Korean kingdom of Baekje.[1]Earliest recorded date at Chichen Itza on the Yucatn Peninsula (Mexico) (approximate date).Barter economy replaces organized trade as Romans and other citizens desert their towns for the countryside, where they will be less vulnerable to barbarian raids (approximate date).The city of Vindobona (Vienna) is struck by an epidemic that spreads through the Roman provinces. The disease is probably streptococcus or a form of scarlet fever with streptococcus pneumoniae (approximate date).Rusticus, archbishop of Lyon (approximate date)Wang Baoming, empress of the Southern Qi (d. 512)March 16Valentinian III, emperor of the Western Roman Empire (b. 419)Heraclius, Roman courtier (primicerius sacri cubiculi )May 31 Petronius Maximus, emperor of the Western Roman EmpireBiyu of Baekje, king of Baekje[1]Catigern, prince and son of Vortigern (approximate date)Horsa, leader of the Anglo-Saxons (approximate date)Kumaragupta I, ruler of the Gupta Empire (India)Niall Noigiallach, High King of Ireland (approximate date)Palladius, son of Petronius Maximus (approximate date)Prosper of Aquitaine, disciple and Christian writer (approximate date)^ a b "List of Rulers of Korea". www.metmuseum.org. Retrieved April 20, 2019.Retrieved from " 3One hundred years, from 301 to 400Millennia1stmillenniumCenturies3rdcentury4thcentury5thcenturyTimelines3rdcentury4thcentury5thcenturyState leaders3rdcentury4thcentury5thcenturyDecades300s310s320s330s340s350s360s370s380s390sCategories:Births Deaths Establishments DisestablishmentsvteEastern Hemisphere at the beginning of the 4th century CE.Eastern Hemisphere at the end of the 4th century CE.The 4th century was the time period from 301 CE (represented by the Roman numerals CCCI) to 400 CE (CD) in accordance with the Julian calendar. In the West, the early part of the century was shaped by Constantine the Great, who became the first Roman emperor to adopt Christianity. Gaining sole reign of the empire, he is also noted for re-establishing a single imperial capital, choosing the site of ancient Byzantium in 330 (over the current capitals, which had effectively been changed by Diocletian's reforms to Milan in the West, and Nicomedeia in the East) to build the city soon called Nova Roma (New Rome); it was later renamed Constantinople in his honor.The last emperor to control both the eastern and western halves of the empire was Theodosius I. As the century progressed after his death, it became increasingly apparent that the empire had changed in many ways since the time of Augustus. The two-emperor system originally established by Diocletian in the previous century fell into regular practice, and the east continued to grow in importance as a centre of trade and imperial power, while Rome itself diminished greatly in importance due to its location far from potential trouble spots, like Central Europe and the East. Late in the century Christianity became the official state religion, and the empire's old pagan culture began to disappear.[citation needed] General prosperity was felt throughout this period, but recurring invasions by Germanic tribes plagued the empire from 376[1][2] CE onward. These early invasions marked the beginning of the end for the Western Roman Empire.In China, the Jin dynasty, which had united the nation prior in 280, began rapidly facing trouble by the start of the century due to political infighting, which led to the insurrections of the northern barbarian tribes (starting the Sixteen Kingdoms period), which quickly overwhelmed the empire, forcing the Jin court to retreat and entrench itself in the south past the Yangtze river, starting what is known as the Eastern Jin dynasty around 317. Towards the end of the century, Emperor of the Former Qin, Fu Jin, united the north under his banner, and planned to conquer the Jin dynasty in the south, so as to finally reunite the land, but was decisively defeated at the Battle of Fei River in 383, causing massive unrest and civil war in his empire, thereby leading to the fall of the Former Qin, and the continued existence of the Eastern Jin dynasty.According to archaeologists, sufficient archaeological evidence correlates of state-level societies coalesced in the 4th century to show the existence in Korea of the Three Kingdoms (300/400668 CE) of Baekje, Goguryeo, and Silla.Historians of the Roman Empire refer to the "Long Fourth Century" to the period spanning the fourth century proper but starting earlier with the accession of the Emperor Diocletian in 284 and ending later with the death of Honorius in 423 or of Theodosius II in 450.[3]See also: Christianity in the 4th centuryGregory the Illuminator mosaic, converted Armenia from Zoroastrianism to ChristianityContemporary bronze head of Constantine I (r. 306337 AD)Early 4th century Former audience hall now known as the Basilica, Trier, Germany, is built.Early 4th century The Gupta Empire is established.301: Armenia first to adopt Christianity as state religion.304439: The Sixteen Kingdoms in China begins.306337: Constantine the Great, ends persecution of Christians in the Roman Empire (see also Constantinian shift) and Constantinople becomes new seat of government (New Rome).Tikal had a population of about 100,000 when it was conquered by Teotihuacan, less than a fourth of its peak population[4]320: Butuan Boat One, the oldest known Balangay, a multi-purpose ship native to the Philippines is built.325328: The Kingdom of Aksum adopts Christianity.325: Constantine the Great calls the First Council of Nicaea to pacify Christianity in the grip of the Arian controversy.335380: Samudragupta expands the Gupta Empire.337: Constantine the Great is baptized a Christian on his death bed.350: About this time the Kingdom of Aksum conquers the Kingdom of Kush.350400: At some time during this period, the Huns began to attack the Sassanid Empire.[2]350: The Kutai Martadipura kingdom in eastern Borneo produced the earliest known stone inscriptions in Indonesia known as the Mulavarman inscription written in the Sanskrit language using Pallava scripture.[5]Mid-4th century Dish, from Mildenhall, England, is made. It is now kept at the British Museum, London.Mid-4th century Wang Xizhi makes a portion of a letter from the Feng Ju album. Six Dynasties period. It is now kept at National Palace Museum, Taipei, Taiwan, Republic of China.365: An earthquake with a magnitude of at least eight strikes the Eastern Mediterranean. The following tsunami causes widespread destruction in Crete, Greece, Libya, Egypt, Cyprus, and Sicily.376: Visigoths appear on the Danube and are allowed entry into the Roman Empire in their flight from the Huns.378: Battle of Adrianople: Roman army is defeated by the Visigoth cavalry. Emperor Valens is killed.378395: Theodosius I, Roman emperor, bans pagan worship, Christianity is made the official religion of the Empire.378: Siyaj K'ak' conquers Waka on (January 8), Tikal (January 16) and Uaxactun.Wall painting of the Council of Constantinople (381) in the Stavropoleos monastery, Romania381: First Council of Constantinople reaffirms the Christian doctrine of the Trinity by adding to the creed of Nicaea.383: Battle of Fei River in China.395: The Battle of Canhe Slope occurs.395: Roman emperor Theodosius I dies, causing the Roman Empire to split permanently.Late 4th century: Cubiculum of Leonis, Catacomb of Commodilla, near Rome, is made.Late 4th century: Atrium added in the Old St. Peter's Basilica, Rome.For a more comprehensive list, see Timeline of historic inventions 4th century.The Stirrup was invented in China, no later than 322.[6][1]Kama Sutra, dated between c.400 BC to c. 300 AD.[7][8]Iron pillar of Delhi, India is the world's first Iron Pillar.[citation needed]Trigonometric functions: The trigonometric functions sine and versine originated in Indian astronomy.[9]Codex Sinaiticus and the Codex Vaticanus Graecus 1209, are the earliest Christian bibles.[10][11]Book of Steps, Syriac religious discourses.[citation needed]^ a b "The invention and influences of stirrup". Archived from the original on December 3, 2008.^ a b Roberts, J: "History of the World". Penguin, 1994.^ The Long Fourth Century 284450: Continuity and Change in the Later Roman Empire ed. S. McGill, C. Sogno and E. Watts (Cambridge 2008).^ "The Maya: Glory and Ruin". National Geographic Magazine. Archived from the original on April 9, 2008.^ "The Austronesians: Historical and Comparative Perspectives". ANU Press. Archived from the original on 2013-12-25. Retrieved 2013-04-29.^ Lee, Adela C.Y. "The stirrup and its effect on chinese military history". Silkroad Foundation.^ Sengupta, J. (2006). Refractions of Desire, Feminist Perspectives in the Novels of Toni Morrison, Michle Roberts, and Anita Desai. Atlantic Publishers & Distributors. p.21. ISBN978-81-269-0629-1. Archived from the original on 4 May 2016. Retrieved 7 December 2014.^ Kakar, Sudhir; Doniger, Wendy (2003). Kamasutra. Oxford; Toronto: Oxford University Press. pp.xi. ISBN978-0-19-283982-4.^ Bag, A.K. (1979). 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Retrieved 16 March 2013.Retrieved from " 4The following pages link to 4th century External tools(link counttransclusion countsorted list) See help page for transcluding these entriesShowing 50 items.View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)List of decades, centuries, and millennia (links | edit)Religion in pre-Islamic Arabia (links | edit)Rosetta Stone (links | edit)20th century (links | edit)15th century (links | edit)16th century (links | edit)17th century (links | edit)18th century (links | edit)14th century (links | edit)1st century (links | edit)13th century (links | edit)397 (links | edit)12th century (links | edit)11th century (links | edit)7th century (links | edit)10th century (links | edit)9th century (links | edit)8th century (links | edit)6th century (links | edit)5th century (links | edit)3rd century (links | edit)2nd century (links | edit)405 (links | edit)4th century BC (links | edit)432 (links | edit)200s (decade) (links | edit)300s (decade) (links | edit)1st century BC (links | edit)2nd century BC (links | edit)3rd century BC (links | edit)5th century BC (links | edit)6th century BC (links | edit)400s (decade) (links | edit)310s (links | edit)320s (links | edit)321 (links | edit)21st century BC (links | edit)11th century BC (links | edit)286 (links | edit)476 (links | edit)385 (links | edit)7th century BC (links | edit)410 (links | edit)325 (links | edit)380s (links | edit)381 (links | edit)470s (links | edit)430s (links | edit)430 (links | edit)510s (links | edit)View (previous 50 | next 50) (20 | 50 | 100 | 250 | 500)Retrieved from " WhatLinksHere/4th_century" Welcome to a new world of cleanNovozymes Pristine is a ground-breaking technology that liberates trapped body grime from laundry and offers a new baseline of cleaning. By Peter Dybdahl Hede, M.Sc. (Chem. Eng.), Ph.D.May 7, 2020Although the detailed ingredient lists for detergents vary considerably across geographies and categories, the main detergency mechanisms are similar. Stains are removed by mechanical action assisted by enzymes, surfactants, polymers, and builders.Surfactants of various kinds help wash liquor to wet fabrics, and they assist in removing various stains by lowering the surface tension at the interface between the wash liquor and the fabric. Anionic surfactants and polymers further increase the repulsive force between the original soil, the enzymatically degradedsoil, and the fabric, which prevents the soil from redepositing on the fabric.Builders act to chelate, precipitate calcium and magnesium components, to provide alkalinity and buffering capacity, and to inhibit corrosion. Enzymes in (heavy-duty) detergents degrade and thereby help solubilize substrate soils attached to fabrics or hard surfaces (e.g., dishes). Cellulases clean indirectly by gently hydrolyzingcertain glycosidic bonds in cotton fibers. In this way, particulate soils attached to microfibrils are removed. A further desirable effect of cellulases is to impart greater softness and improved color brightness of worn cotton surfaces.By helping to remove fuzz and pills on cotton fabrics, cellulases keep them looking new. Many detergent brands are based on a blend of two or more enzymes - sometimes as much as eight different enzymes. One of the driving forces behind the development of new enzymes and the modification of existing ones for detergents is to make enzymes more tolerant of other ingredients, such as builders, surfactants, and bleaching chemicals, as well as of alkaline. The trend toward lower wash temperatures, in particular in Europe, has also increased the need for additional and more efficient enzymes. Starch and fat stains are relatively easy to remove in hot water, but the additional cleaning power provided by enzymes is required in cooler water.Most widely used enzymesThe most widely used detergent enzymes are hydrolases, which remove protein, lipid, and polysaccharide soils. Research is currently being carried out with a view to extending the types of enzymes used in detergents. Many complex, stubborn stains come from a range of modern food products such as chocolate ice cream, baby food, desserts, dressings, and sauces. To help remove these stains as well as classic stains such as blood, grass,egg, and animal and vegetable fat, a number of different hydrolases are added to detergents.The major classes are proteases, lipases, amylases, mannanases, cellulases, and pectinases. Historically, proteases were the first of these to be used extensively to increase the effectiveness of laundry detergents. Cellulases contribute to cleaning and overall fabric care by maintaining, or even rejuvenating, the appearance of washed cotton-based garments through selective reactions not previously available when washing clothes with surfactants unamended with enzymes.Some lipases can act as alternatives to current surfactant technology by targeting greasy lipid-based stains.Recent investigations show that multi-enzyme systems may replace up to 25% of a laundry detergents surfactantsystem without compromising the cleaning effect. This leads to a more sustainable detergent that allows cleaning at a low wash temperature.Mannanases and pectinases are used for hard-to-remove stains of salad dressing, ketchup, mayonnaise, ice cream, frozen desserts, milkshakes, body lotions, and toothpaste as well as banana, tangerines, tomatoes, and fruit-containing products such as marmalades, juices, drinkable yoghurts, and low-fat dairy products.The obvious advantages of enzymes make them acceptable for meeting consumer demands. Due to their catalytic nature, they are ingredients requiring only a small space in the formulation of the overall product. This is of particular value at a time where detergent manufacturers are trying to make their productsmore compact.Washing with laundry bars.In many parts of the world, strongly colored and stubborn stains from blood, sebum, food soils, cocoa, and grass are removed with the help of laundry detergent bars.Such stain removal and washing by hand are one of the more time-consuming and physically demanding domestic tasks which can be made easier with the use of enzymes. After decades of very little performance enhancement for laundry bars, a specially formulated protease that empowers the producer to create products that stand out from non-enzymatic laundry detergent bars is now available, offering effective and effortless washing.With the protease product Easyzymein laundry bars, washing is shortened by at least one rinse and requires much less scrubbing. In addition to obtaining a superior result, laundry bars containing the enzyme may be formulated to be milder to the hands than old-type bars without enzymes.Washing cold.Most of the energy spent during a household machine wash is used to heat the water. Thus, the most efficient way to save energy and thereby reduce carbon dioxide emissions is to lower washing temperatures.The wide spectrum of enzymes that are available today, combined with a choice of appropriate other ingredients such as surfactants and bleaching systems specifically selected to work at low temperatures, has enabled manufacturers to produce cold water detergents.Enzymes in dishwashingModern dishwashing detergents face increasing consumer demands for efficient cleaning of tableware. Enzymes are key ingredients for effectively removing difficult and dried-on soils from dishes and leaving glassware shiny. Enzymes clean well under mild conditions and thereby assist to reduce clouding of glassware.In addition, enzymes also enable environmentally friendly detergents. Phosphates have been used in the past in dishwashing detergents to get dishes clean, but they harm the aquatic environment and are increasingly being banned in detergents around the world. The combination of modifying detergent compositions and using multi-enzyme solutions enables detergent manufacturers to replace phosphates without compromising the cleaning performance. For removal of protein soils, proteases are used; and amylases are used to remove starch soils.Proteases for cleaning dishes and cutlery.Some of the more difficult soils on dishes and cutlery are blends of egg yolk/milk, egg yolk, whole egg, and egg white as well as minced meat and oatmeal. The reason for this is the content of protease inhibitors in these foods. The protease Blaze Evityby Novozymes has been specifically engineered to overcome high levels of protease inhibitors from eggs. These inhibitors effectively inactivate detergent proteases, resulting in reduced cleaning performance not just on the egg stain itself, but on all protein-containing soils in the same dishwasher load.Amylases for cleaning starch-containing soils from dishes.In automatic dishwashing, most of the soil is physically washed off by the water jets. However, foods usually leave behind thin films of starch-/protein-containing soils. If they are not removed, these films will build up over time. Larger lumps of burnt-on andcaked-on soils may also remain. These soils are the main target for enzymes.Enzymes target thin films of starch-/protein-containing soils that can build up over time. The first enzyme-containing detergent was introduced to the household market as early as 1913. Rhm & Haas inGermany added trypsin extracted from pig pancreas to their detergent Burnus, utilizing a patent of Dr. Otto Rhm.As the protease trypsin had insufficient activity and poor stability in detergents, the enzyme concept did not catch on until 1963 when Novo launched a more alkali- and builder-stable bacterial protease called Alcalase. Small detergent producers in Switzerland and the Netherlands were pioneers in the commercial use of Alcalase, which was initially considered useful only for washing blood-stained laundry from hospitals and slaughterhouses.For almost 20 years, bacterial proteases from different suppliers were the only class of enzymes of real commercialimportance. Then the use of amylases, lipases, and cellulases as detergent ingredients started to take off during the 1980s and grew steadily in importance during the 1990s. Just after the turn of the century, two new enzyme classes entered the detergent market: mannanases and pectate lyases.The application of enzymes in detergents makes up the largest single segment of the world market for industrial enzymes. In 2003, the potential market for detergent enzymes was approximately US$700 million, of which Novozymes had a share of more than 56%. Enzymes on average constitute about 3-5 % of the total raw material costs of detergentsbut very different from region to region. By far the largest volume of detergent enzymes is used inheavy-dutylaundry detergents for household use (powders, liquids, and also tablets). There is also some penetration intolight-dutylaundry products for the washing of delicate fabrics although some enzymes are too aggressive for wool and silk. The main task of enzymes in laundry detergents is to remove stains of animal or plant origin. Another important task is to prevent soils from spreading throughout the laundry by redeposition.This benefit is often referred to asgeneral cleaningorwhiteness maintenance.Enzymes also provide care effects by acting directly on cotton surfaces, helping garments look newlonger. Repeatedly worn and washed laundry items are often contaminated with invisible residues, especially if they have been washed with detergents containing few enzymes. The residues make textile fibers sticky, attracting soil from the wash water, which results in incomplete cleaning. Multi-enzyme systems efficientlyprevent this buildup of soil deposits. Automatic dishwashing detergents for household use are another increasingly important market segment. The enzyme penetration is highest in Europe, followed by the United States,where the market is growing. In industrialized countries the leading detergent brands typically contain more than one class of enzymes. Food stains are complex substrates containing protein, starch, and fat all mixedtogether. By combining different enzymes, soils are removed more efficiently, utilizing synergies between each enzymes cleaning abilities.Trends driving enzyme usageThe importance of enzymatic detergency is expected to continue to increase, based on the following trends:Reduction of washing temperatures (mainly Europe)More detergents without bleach (e.g., color detergents and liquid detergents)More compact detergent formulationsMore cost-effective enzymesThanks to modern genetic engineering technology, enzymes are becoming increasingly cost efficient and offer higher yields. There are also possibilities to commercializecustom-madeenzymes with improved economy and application properties.On the other hand, detergents in most developed markets are facing price erosion, and consequently manufacturers are increasing their efforts to reduce ingredient costs. Competition between leading brands and cut-price supermarket-owned private label detergents may therefore limit the scope for further developmentin enzyme usage.To some extent enzymes compete with surfactants; and considerable efforts are made by, for example, Novozymes to demonstrate that reducing enzymes in favor of surfactants typically doesnot pay off for customers. There are still sizable potential markets in developing countries where the penetration of enzymes is low