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The all-the-chemical processes of azo dyes are done using water. And it is easy and cheap, since tail water, even cleaning and disposing of it is simple. Due to all these reasons, azo dyes are cheap, easily produced, and widely used. Azo dyes are consistent compared to other natural food colorants. They are steady and firm when compared to the pH series of foods. Yet they do not fade when exposed to light and oxygen and are also heat resistant. This is the reason azo dyes are used in almost all kind of food. One drawback of this dye is that it does not dissolve in oil or fat. Oil can be colored, only when azo dyes are joined with fast soluble molecule, or they are dissolved as very fine elements. Moreover, some azo dyes have been restricted for food usage due to their toxic side effects. The use of azo dyes in food products has been a matter of concern. Firstly it has been noticed that the body goes through a reaction when it absorbs certain azo dyes. This reaction produces certain cancer causing amines. The dye itself is not harmful. However, when it breaks down, the amine that is produced is dangerous. Therefore, stringent rules have been implemented to ban the dyes which have cancer-causing amines. Currently, one cannot say with certainty whether the azo dyes used in cosmetics and products that are also safe have harmful elements when broken down. It has also not been determined whether the levels of these materials are large enough to pose health hazards. Moreover, majority of the azo dye stuffs are considerably safe to use. It is also seen that highly industrialized countries have increased number of intestinal cancer cases. There are chances that they have some connection with azo dyes. The second reason for concern is the recent finding wherein banned azo coloring is used in food products like chili powder and ready-to-eat meals. This azo coloring agent is known as Sudan I[†] and is used as red colorant. Sudan dyes are used mainly for oil, waxes, petrol or floor polish. Some corrupt food suppliers use cheap industrial dye to produce red color and add in spices and other food products. In such cases, the dyes have been used illegally which has polluted the food products. Fortunately, it has been noticed that the probability of having cancer by people who have eaten such food products is very low. The level of toxins in azo dye is rather low. For example food products are usually colored with dyes. The level of dyes is in ratio of ppm i.e., hundred millionths. So there is no harm to humans if they eat those contaminated foods. But still, we need to take care while eating. We must avoid eating too much of them. As far as our daily life is concerned, most of us are aware of the fact that many synthetic colors are present in our surroundings. These colors are in very small quantity to pose any direct health issues to the human immune system. However, some azo dyes like tartrazine have indicated to trigger the symptoms of asthma in people who have this disease. Moreover, the usage of azo dyes in food colors has claimed to cause hyperactivity in some children. Many studies have been conducted on this topic but no proper indicator has been obtained to prove the fact. Till now it has not been proven that azo dyes or synthetic colors can cause hyperactivity in children. At the same time there have been no proofs to say that there are no effects. However, this matter cannot be ignored as it is a sensitive issue regarding the health of children. Lastly, it has been detected that many degraded products of this dye are carcinogenic and therefore, some dyes have been permanently banned, while some have been restricted from being used in the food processing units due to their side effects. The dye itself does not cause any danger to health, but degradation of its elements creates health risks. References: 1. Dyes-pigments.standard.com; 2. Food-info.net; 3. Csrchem2005.bootsglobal.com Table of Contents Azo dye is produced by the combination of the Naphtha or coupling component and the Diazo component. The production procedure of Azoic Color is different from other dyes production procedures. Azoic color is different from other dyes, and its application process is also different. Azoic color is called Ice Color or Magic Color because it needs a low temperature, and after coupling, color is produced within a few seconds. Color fastness properties are good to excellent. Azoic Dyes Cotton fibers are dyed using azo compounds, which are converted into azoic colors. Azoic dyes are insoluble in water and must undergo a chemical reaction on the surface of the fiber to produce color. Typical azoic dye types include the following: Diazo Azo Dyes: These colors belong to a class of azoic dyes that also contain diazonium ions. Excellent colorfastness results from this type. However, cotton, silk, and wool fibers are frequently dyed with azoic pigments. The azoic pigment reacts with the hydroxyl groups of the textile material to form a covalent bond. This makes the color more permanent than ordinary azo dyes. Light exposure: Ice Azo Dyestuffs dyes are a particular type of azoic dye in which the coupling component is printed on the cloth and the diazonium salt is added separately. Following that, the cloth is submerged in cold water to develop its color. Salt-free Azoic Dyes: When dying, this kind of azoic dye doesn't call for the inclusion of salt. The azoic dyes listed above are only a few examples. A variety of azoic dye variants and formulas are available. Every azoic dye has a unique set of properties and uses in the textile industry. The azoic color has some characteristics. The following are the characteristics of azoic color: Firstly, azoic dye is a water-insoluble dye. Secondly, azoic color consists of two components; such as the Azoic coupling component and the Azoic Diazo compound Thirdly, coupling is necessary for color production. Therefore, coupling is done in alkaline condition. After that, textile dyeing operation is completed by both bath arrangement such as developing bath and impregnating bath. Basically, applicable for cellulose fibers. Also, the time of application is lengthy. Moreover, very bright shade produce by Azoic Color. Additionally, a fastest response of the textile material which is dyed by Azoic Color is good to excellent. However, azoic color is comparatively cheaper in price. Furthermore, wash fastness of azoic dye is very good. Dyeing process is run by three processes such as Naphthalenation, Diazotization and Coupling. Final color produce within few seconds after immersing the textile materials in the dye solution. Lastly, it is used for lighter shade dyeing. There are some benefits of azoic color. The following are the advantages of azoic color. They are: Firstly, the color fastness of the azoic color is good. Secondly, it has a wide color range. Therefore, it has a versatile application area. Moreover, it is cost-effective than other dyes. It is compatible to use with different dyeing, printing techniques. Also, it has the ability to absorb light. Lastly, the environmental impact is low. Azoic dye is a widely used synthetic dye. Although there are some advantages of azoic dye, there are also disadvantages associated with azo dyes. The first disadvantage is related to the release of aromatic amines during the dyeing process. The environment and water body will be affected if the colors are not adequately removed or handled while washing. Use Restriction: Because of the possible health and environmental dangers associated with azoic dyes that include aromatic amines in their chemical makeup, there may be certain restrictions on how these colors are used. Issues with Color Fastness: This dye occasionally exhibits poor color fastness and may fade or bleed when exposed to light or other environmental factors. Application Complexity: Applying azoic dye is more difficult than applying other dyes. It must accurately regulate every dyeing parameter or the dyeing will be flawed. Limited color spectrum: They may not be able to obtain the complete gamut of colors that other forms of dye may offer, but they can generate a vivid and powerful color. The makers are restricted from using azoic colors within this color spectrum. In conclusion, its critical to be mindful of both the health danger and the environmental safety while using azoic dyes. The firm has to put ETP to treat the colored water. The ecosystem will be secure if the manufacturer becomes aware and takes the necessary action to regulate environmental safety. It is used in different manufacturing industries to produce different color. The following is the application area of azoic dyes. They are: Textile Industry Leather Industry Paper Industry Ink and Printing Industries Paints and Coatings Industry Plastic and Polymer Industry Above all, azoic color uses for coloring small amounts of textile environments dyeing. Therefore, it is suitable for small-scale industries. Besides, the azoic color dyeing process is not popular as reactive dye or disperse dye dyeing. So, select your dyes as you need.I'm a textile engineer who is passionate about writing about the textile industry. With a B.Sc. in Textile Engineering, I've gained extensive knowledge about textile manufacturing and sustainable practices. My focus revolves around refining manufacturing processes, maintaining product quality, and staying updated on the latest trends in the textile world. I believe that sharing my expertise can help others navigate the complexities of the textile sector. They are known to be potential carcinogens. They were first regulated in the EU by Germany and the list is commonly called the "German banned dye list". If a product has not been made containing these compounds, it is sometimes called "azo free." That's misleading because the number of dyes on the list is very small compared to the total number of azo dyes which are still used. And with a few exceptions, the banned dyes on the list have not been used in the past 20 years, so the bans didn't change manufacturing much.Studies have found that the dyes are resistant to municipal waste treatment facilities and pass into the environment relatively unchanged.1)Textile mill effluent contains 5% of original dyestuff, plus salt and dye fixing agents.Some azo dyes break down during use and release chemicals known as aromatic amines, some of which can cause cancer typically bladder and liver cancers.2)Studies also link them to breast cancer.3)They also cause damage to human DNA.They are easily absorbed by skin via exposure.5)The European Union has banned the use of these azo dyes that release cancer-causing amines in any textiles that come in contact with human skin.6)Ferraz, Elisa R.A. et al.: "The azo dye Disperse Orange 1 induces DNA damage and cytotoxic effects but does not cause ecotoxic effects in Daphnia similis and vibrio fischeri," Journal of Hazardous Materials, Aug. 30, 2011, Vol. 192, Issue 2, pp. 628-633Dom N, Klepac D, Benoit D, Nobels I & Blust R (2010). Aquatic multi-species acute toxicity of chlorinated anilines: Experimental versus predicted data. Chemosphere 81(2): 177-13 F.M.D. et al.; "Azo dyes and their metabolites: Does the discharge of the azo dye into water bodies represent human and ecological risks?"; 1991, all PFC-containing products sold and used in the EU have been imported (EU production was banned under Directive 76/769/EEC). Now entry number 22 of Annex 17 of the EU Chemical law REACH prohibits the marketing and use in the EU of PFC and its salts and esters in products in a concentration exceeding 0.1%. Despite the REACH regulation, PFC-containing products continue to enter the market. PFC-containing substances are commercially important family of azo compounds, i.e. compounds containing the CN=NC linkage.[1]Azo dyes are synthetic dyes and do not occur naturally.[2][3]Most azo dyes contain only one azo group but there are some that contain two or three azo groups, called "diazo dyes" and "triazo dyes" respectively. Azo dyes comprise ~60% of all dyes used in food and textile industries.[3]Azo dyes are widely used to treat textiles, leather articles, and some foods. Chemically reduced derivatives of azo dyes include azo pigments, which are insoluble in water and other solvents.[4][5]Many kinds of azo dyes are known, and several classification systems exist. Some classes include disperse dyes, metal-complex dyes, reactive dyes, and substantive dyes. Also called direct dyes, substantive dyes are employed for cellulose-based textiles, which includes cotton. The dyes bind to the textile by non-electrostatic forces. In another classification, azo dyes can be classified according to the number of azo groups.Tryan blue is an example of a direct dye, used for cotton.As a consequence of delocalization, aryl azo compounds have vivid colors, especially reds, oranges, and yellows. An example is Disperse Orange 1. Some azo compounds, e.g., methyl orange, are used as acid-base indicators. Most DVD-R/R+ and some CD-R discs use blue azo as the recording layer.Many phenolic diazo dyes participate in tautomeric equilibria shown here in simplified form ($\text{Ar} = \text{aryl}$).[6]Azo dyes are solids. Most are salts, the colored component being the anion usually, although some cationic azo dyes are known. The anionic character of most dyes arises from the presence of 1-3 sulfonic acid groups, which are fully ionized at the pH of the dyer's aqueous medium.RSOS + RSOS' + H^+ \rightleftharpoons RSO^- + S'^-\text{H}^+ + Most proteins are zwitterions, thus dyeing of leather and wool corresponds to an ion exchange reaction. The anionic dye adheres to these articles through electrostatic forces. Monoazo dyes typically contain quaternary ammonium centers.Trans-cis isomerization of azo-PSSs, leading to the folding of the dendritic alkyl tails on the PSS chains, allows the formation of micellar-like structures [Fig. 3(a)]. The reversible trans/cis interconversion of the PSS chain segments leads to changes in the size of the aggregates. Such conformational transitions are induced by UV irradiation, resulting in the typical azo effect observed experimentally, namely the increase/decrease of turbidity upon illumination with UV light. Typically at 365 nm, the photo molecules absorb energy and converts to the cis isomer, where the substituents are on the same side of the N=N bond, leading to a bent or kinked structure.This process is reversible; the cis form can thermally relax back to the trans form over time, or be actively reverted using visible light irradiation (commonly around 450nm), depending on the substituents and molecular environment.Most azo dyes are prepared by azo coupling reactions involving the electrophilic substitution reaction of an aryl diazonium cation with another compound, the coupling partner. Generally, coupling partners are other aromatic compounds with electron-donating groups:[8] $\text{ArN}_2^{+} + \text{Ar}'\text{R} \rightarrow \text{Ar}-\text{N}=\text{N}-\text{Ar}' + \text{H}^{+}$ In practice, acetoacetanilides are widely used as coupling partners: $\text{ArN}_2^{+} + \text{ArNHCO(CH}_2\text{CH}_3)_2 \rightarrow \text{Ar-N=NCH(COCH}_3\text{(Me))CH(OHNAr)} + \text{H}^{+}$ Azoo dyes are also prepared by the condensation of nitrated aromatic compounds with anilines followed by reduction of the resulting azoxy intermediate: $\text{ArNO}_2 + \text{ArNH}_2(\text{NaOH}) \rightarrow \text{ArHO(Na)} + \text{H}^{+}$ $\text{C}_6\text{H}_{12}\text{O}_6 \text{ ArN}=\text{NAr} + \text{C}_6\text{H}_{12}\text{O}_6 + \text{H}_2\text{OPor textile dyeing, a typical nitro coupling partner would be disodium 4,4'-dinitrosulfate-2,2-disulfonate}. Typical aniline partners are shown below. Since anilines are prepared from nitro compounds, some azo dyes are produced by partial reduction of aromatic nitro compounds.[5]Many azo dyes are produced by reacting benzene rings with pre-existing azo compounds. Typical reactions include metal complexation and acylation.Illustrative azo dyes or their precursorsDirect Brown 78Direct Blue 1Basic Red 18, a cationic azo dyeAzO pigments are similar in chemical structure to azo dyes, but they lack solubilizing groups.[9] Many so-called azo pigments are strictly based on azo compounds since they exist as keto hydrazone tautomers, which lack the -N=N- linkage.C.I. Pigment Yellow 12, an azo pigment (also classified as a diimide pigment).Azo pigments are important in a variety of plastics, rubbers, and paints (including artists' paints). They have excellent coloring properties, mainly in the yellow to red range, though some extend beyond this range. Their stability towards fading is generally better than that of organic pigments. Unlike azo dyes, azo pigments are chemically stable and do not degrade rapidly under aerobic conditions. Under anaerobic conditions, however, discoloration may be observed as a consequence of biodegradation.[10]Many azo pigments are non-toxic, although some, such as dimethylaniline orange, ortho-nitraniline orange, or pigment orange 1, 2, and 5 are mutagenic and carcinogenic.[11][12]Azo dyes derived from benidine are carcinogens; exposure to them has historically been associated with bladder cancer.[13] Accordingly, the production of benidine azo dyes was discontinued in the 1980s in many western countries.[5]Certain azo dyes degrade under reductive conditions to release any of a group of defined aromatic amines. Since September 2003, the European Union has banned the manufacture or sale of consumer goods which contain the listed amines. Since only a small number of dyes produced those amines$

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Are azo dyes still used. Azo dyes history. List of azo dyes used in textile industry. Azo dyes in textiles. Azo dyes in textile industry.