TYPES OF THICKENERS AND THEIR ROLE IN PRINTING PASTE

The printing paste usually contains 40-70% of the concentrate solution, of which 2.5 - 10%, up to a maximum of 16% (constituting the concentrating agent). The pastes were used on the basis of dyeing materials, nowadays replaced with suitable materials, the advantage of which is the adhesion of cold water. Water-based oil emulsions have also been used in the past as concentrators in pigment-based pastes. At this concentration of up to 70% petroleum solvents, aliphatic hydrocarbon mixtures of C50 - C12 chain length were used, with volatile organic matter entering the air during dyeing and drying in the furnaces. Up to 10% of mineral oils can be present in new concentrations, which will eventually get into the air, so the next generation of tetanus concentrates has developed into species that contain no volatile solvents. Donor e They are marketed in the form of dust-free granules. Concentrators for the textile printing industry The long-term concentrators used in the textile printing industry were natural extracts such as guar, alginate, starch wilt and cellulose derivatives. Characteristics of these thickeners include long coating time, poor thermal stability and low purity. Therefore, efforts were made to improve the properties of these materials as concentrators by chemical or physical mixing, but these had limitations such as shortening and so on. Due to the natural highs used in pigment printing in terms of color depth, luster Shades, durability of the washings and under the fibers do not work well and this is what causes this. The market for synthetic concentrators was introduced. With the high concentration of emulsion powders, pigment printing was performed for years by this method. To produce such concentrators, oil or oil and water mixtures were mixed at high speed in the mixer in the presence of emulsifier. One liquid (internal) (the other) external phase (in the form of fine particles whose mobility is restricted due to very close contact), which eventually results in a higher viscosity. In oil-based emulsion, water quality improves. Excellent due to good coloring, luminosity and good undercoat, high solvent consumption of 80-50%).Becomes: 1. Petroleum and petroleum products can form highly volatile mixtures in the presence of air. Therefore, their transportation is hazardous. 2. The use of volatile compounds by the introduction of vapors into the air or liquids containing them into the rivers can cause environmental pollution. Governments have recently enacted strict rules on the use of compounds containing large amounts of solvents. 3. Increasing the price of all petrochemical products, including petroleum, has made the finished price of pigment printing very expensive. Due to the limited use of emulsion concentrators such as petroleum, the need for safer alternative concentrators with cheaper and more cost-effective use was gradually felt. To this end, extensive research was carried out on synthetic concentrators and eventually commercial synthetic concentrators were introduced to the market with very good features. Types of fabric printing thickeners Consumption Concentrator Non-ionic unmodified polysaccharides It is rarely used today Wheat starch, corn and rice It is rarely used today Arabic gum It is rarely used today Tragacanth gum Carpet printing Guar flour (very fine) Modification (hydrolysis) by acids, alkalis, oxidizing agents, enzymes or by high temperatures. Nonionic modified polysaccharides Available in concentrations between 30-50% and are highly resistant to alkalis. Starch Products: English gum Swollen starches In hybrid formulas, they are used as adhesives for cellulose wool textiles. Nonionic starch ethers and nonionic starch esters Used because of its high price in combination with other materials or in cases where a high quality concentrator is required Resin Resin: Crystal

Gum Industrial gum (like cordofan) Today, it is rarely used unmodified. Used by the reaction of ethylene oxide or propylene oxide. Galactomannans (polysaccharides): Lilac flour Guar Derivatives The use of these substances is highly recommended but rarely used alone. It has previously been used as a stabilizer for emulsion concentrators including petroleum solvents (such as white spirit). Cellulose Derivatives: Methyl derivatives Ethyl derivatives Hydroxyl derivatives Hydroxypropyl derivatives Anionic polysaccharides Due to its use in the printing of active dyes, this material has become increasingly popular and widely used. It is a good alternative to sodium alginate. Suitable alternative to sodium alginate in cases of active dyes, which are stabilized under acidic conditions. Alginates: Sodium alginate Magnesium alginate Ammonium alginate These are extremely important. Used alone or in combination with other materials in African print. It is essentially guar based and used alone or in combination with other substances. Methylated carboxy polysaccharides: Anionic starch ethers Ether anionized seed flours Carboxymethyl cellulose and their sodium salts It is produced by controlled fermentation of glucose. Used in thick carpets. By adding auxiliaries especially to the printing paste, compatibility between xanthan and cationic dyes can be achieved in combination with other materials such as seed flour products. Xanthan (natural polysaccharide) Synthetic polymer agents The only important synthetic concentrator used today Polyacrylic Acids These materials are of little importance. Maleic anhydride copolymer products (ethylene, styrene, or vinyl methyl ether with multifunctional monomers such as divinyl benzene) These materials matter. 20-40% copolymer aqueous emulsions Methacrylic acid, olefinic compounds (Such as ethylacrylate) and 2% of multifunctional monomers Types of concentrators: Natural concentrators Flour Acacia Seed The flour of acacia seeds derived from the carob tree consists of primary chains of D-mannose and galactose branch chains and has a molecular weight of about 1. Acacia seed flour is not easily soluble in cold water and requires heat to be completely dissolved. This concentrator is an anionic polysaccharide and pH 4-5 has little effect on its concentration only by the use of 5% solids of its appropriate viscosity. Sodium salts have little effect on its viscosity. The acacia seed flour also complexes with borates to form a gel that is used in two-step printing with pale dyes (by adding acid, the concentrator returns to its original state). Plant gums These concentrates, which are extracted from tree trunks or bushes, are complex polysaccharides that each have different Uronic acid groups. Katira Actira is a polysaccharide composed of galactose, fructose, xylose, arabinose, rhamnose, and glucuronic acid, which has good solubility in water and produces aqueous solutions. Trathea in water creates solutions with pH 1-2: 1. These solutions are stable in acidic environments up to 1: pH, but their viscosity decreases as heat is added and salt is added. Tragacanth is found in southwestern Europe, Greece, Turkey, Syria and its most desirable species (for food consumption) in Iran. The caterpillar swells in warm water after 4 hours. The 3 to 5 percent solution of tragacanth is suitable as a viscosity concentrator. Arabic gum Arab gum is derived from the Senegalese acacia tree found in Sudan, Nigeria and West Africa. This concentrator is a mixture of calcium salt, potassium and magnesium arabin. Arabine is a complex polysaccharide composed of units of glucuronic acid, arabinose, rhamnose, and galactose and is well soluble in water. Crystal Gum This concentrator is a purer form of Karaya gum and is easily soluble in water. The karaya gum is extracted twice a year from the "Sterculia Urens" tree and India is its main producer. Gum bag produced in early summer is better than gum bag for the second time in the year. Karaya gum is marketed as a powder after drying. Karaya gum is a high molecular weight polysaccharide (1.5%) that is partially acetylated. It contains L-

Rhamnose as well as D-Galactose and D-Galacturonic Acid and is less soluble in water (not soluble in water) than other gums but It swells well in water. The viscosity of this thickener decreases with increasing heat and pH changes. Heat-efficient karaoke solution (4-5%) is used as a concentrator in the printing industry. This gum has many uses in the food industry. Alginate Alginate concentrates are sodium salts, potassium or calcium alginic acid, itself a linear polysaccharide composed of beta units. January . Mannuronic acid (B-D-Mannuronic Acid) and L-Guluronic Acid (L-Guluronic Acid) are derived from seaweed. This concentrate dissolves in hot and cold water and produces concentrated solutions that gel with calcium salt. Alginate salts are capable of absorbing water up to 5 times their own weight and even after high temperature stabilization, they are soluble in water. Reactive dyes are very suitable. The concentration of alginate solution decreases with increasing temperature and, if not maintained at high temperature for a long time, returns to its original state after cooling (at high temperature and for a long time, the chain molecule length is shortened). Concentrations of alginate solution at pH 1–2 do not change but increase at pH below 0.5. At 7: pH, the alginate concentrator is precipitated and converted to gel at pH greater than 1. Propylene Glycol Alginate at 4-5: pH stable but losing more than 0.5 at pH. The viscosity of the alginate salts is affected by their molecular mass. Solutions of 5% alginate salts with high molecular mass and 5% alginate salts with low molecular mass have sufficient viscosity. Synthetic half-thickeners The main source of synthetic semi-concentrated wood is cellulose, which is recycled and produced after the necessary chemical reactions, such as methyl cellulose, ethyl cellulose and carboxy methyl cellulose (C.M.C). These materials are mostly used as a sieve in the textile industry and in some cases used as a thickener. Synthetic concentrators The uncertainty of the availability of sufficient natural concentrators as well as environmental issues regarding the use of emulsions as concentrators has led to improvements in the use of synthetic polymers as substitutes for natural concentrators and emulsifiers. One of the synthetic concentrators is Poly vinyl Alcohol, which is used in limited quantities to produce concentrators for printing nylon fabrics. Up to 5% of the required viscosity is required. Acrylic acid, methacrylic acid, and methacrylate copolymers provide an appropriate viscosity of 2 to 5 percent. Since a small amount of synthetic dry concentrators produces good viscosity. These types of thickeners are very suitable when the fabric is not washed after printing (pigment printing). Emulsion Concentrator The stable suspension of two or more immiscible liquids is called emulsion, which is prepared by the use of strong mixers. Emulsion stability is guaranteed by the Emulsifier (Emulsator). One of the liquids that make up the emulsion is water or aqueous solution, the other liquid is oil or another immiscible liquid with water. If the oil is suspended in water, the oil is internal phase (dispersed) and external phase water (continuous) and the resulting emulsion is called oil in water (o / w). In the printing industry, most oil (oil) emulsions are used in water, which can be diluted with water. The emulsifier, which reduces the surface tension between water and oil, is usually a long chain molecule that has a hydrophilic and lipophilic part that allows for the merging of both. Usually, the liquid with the most solubility in the emulsifier forms the external phase. For example, alkali metal soaps, oil-in-water emulsions, and oil-soluble resins produce water-in-oil emulsions. Emulsifiers may act as an oil coating to prevent oil particles from collapsing and resulting in emulsion breakdown (proteins). The relative solubility of an emulsifier in water or oil by hydrophilic equilibrium. Lipophilus (B.S.) B.H. L is shown to depend on the chemical structure and amount of ionization. B.H. L varies between 1 and 2. Strong friendlier water emulsifiers with B.H. L is high. Emulsifiers with B.H. Low L (1 to 2)

for the production of water emulsions in oils and types with B.H. High L (1 to 2) is suitable for the production of oil-in-water emulsions. In the emulsion the particle size of the inner phase varies from 1 to 2 nm. As the particle size decreases, the emulsion viscosity increases. The color of the emulsion depends on the size of the particles. Usually as the particle size decreases and the emulsion thickens, its creamy white color changes to white to blue. In addition, the emulsion viscosity also depends on the amount and type of emulsifier. Anionic emulsifiers are capable of producing more viscosity than non-ionic types. In drying the printed fabric, the oil and water evaporate and there is no concentrator left on the fabric. Emulsion concentrators contaminate the air and are at high risk of fire, despite their ease of preparation and no need to remain on the fabric as well as the need for washing. Therefore, in some countries, the use of emulsions (all emulsions) is banned and the emulsion should be mixed with another concentrator such as alginate at a ratio of 1: 1. This mixture is called half emulsion. It is important to note that the effective removal of oil and water vapor from the dryer is necessary to prevent contamination of the workplace and fires. With an all-emulsion concentrator, the boundary lines are usually not smooth because the oil drives off a small portion of the dye out of the printing range. Adding 2 to 5 grams of alginate or about 2% trathea to the emulsion concentrator greatly inhibits the movement of dye molecules out of the boundaries. Floor thickener Although foam formation (air suspension in liquid) is unsuitable for washing, dyeing and finishing, causing discomfort and decreasing efficiency and is usually prevented by antifoam material, but to reduce the amount of water associated with the product during supplementary operation and thus reducing consumption Fuel and drying time can be used as a thickener in cases such as back cover or even in printing. The foam, like the emulsion, leaves the lowest amount of solids on the product. Since pigment printing usually does not wash after printing, the emulsion concentrator or synthetic concentrator is preferably used. The emulsion evaporates rapidly in the desiccator and leaves a small amount of solids on the fabric if the synthetic concentrator is used. Synthetic concentrators are relatively expensive and emulsifiers in addition to the risk of fire have an adverse effect on the environment, so it has been attempted to use foam as a concentrator. However, unstable flooring makes it difficult to use in practice, and the floor should be enclosed in air before reaching the goods and clothing, with auxiliary materials such as floor stabilizers added to ensure minimum floor stability. Store for a moment after reaching the goods. Special machines are used to produce the floor. Paint and auxiliaries for printing, foam detergents and floor stabilizers are given to the machine and then the floor containing the dyes and auxiliaries is fed to the printing machine. It should be noted that the boundary lines of the printed design with this type of concentrator are not of a high quality. Concentrator selection according to the color ۱. Reactive Alginate Concentrators, Emulsions ۲. Disperse Crystal gum, flour derivatives of vegetable seeds, alginate mixture and starch ether ۳. Bent A. Potash-Rongalite Method Starch, starch ether and vegetable flour mixtures of tragacanth and starch B. Two-step method Alginate, Starch - Starch ether and vegetable flour ۴. Acidic and Metal Complex Crystal gum and flour of vegetable seeds ۵. Worms Creamy Concentrators Resistant to Vegetable Flour and Half Emulsion Concentrate Mix with the same Concentrators ۶. Oilfield Alginates, vegetable flour and tropical starch mixture ۷. Bent soluble A mixture of tragacanth starch and vegetable flour ۸. Cationic Crystal gum, English glue and vegetable flour ۹. Pigment Emulsion and synthetic concentrator ۱۰. Impression printing English glue, crystal gum, mixture of tragacanth starch and vegetable flour The trade names of the concentrators and their types are listed in the Appendix. Concentrate preparation

Concentrators are usually prepared a few hours before they are used. In this way, their swelling is complete when applied. After adding the auxiliaries and dyes to the paste concentrator, transfer to the printing machine. Concentration preparation is one of the important factors in its selection. Preparation of starch concentrators requires pre-swelling and then baking in double-walled boilers. During baking, the thickener is stirred continuously and gently. Slowly stirring the concentrator prevents air from being trapped in it. After preparation, the concentrator needs to be smoothed to remove impurities as well as starch that remains in the form of pellets. (Impurities can damage templates and rollers). The starch concentration required to produce the appropriate viscosity is 1.5%. In order to prepare a concentrate of tragacanth, it is necessary for the tragacant to be immersed in water (stirring) for 4-5 hours. After complete swelling, the caterpillar is usually boiled for 4-5 hours and then smoothed. In some cases, such as the preparation of a concentrate for printing with aqueous dyes, potassium carbonate (potash) may be added during the preparation of the concentrator, and the potassium will be better dissolved and dispersed. Preparation of other natural concentrates and their derivatives, such as starch ethers, is a much easier process for planting grains, and it is sufficient that the powder is slowly applied to the water in which the high-speed mixer (1 to 2 rpm) works. Added. After thorough mixing, the concentrator is left for several hours to produce the necessary swelling. To prepare the oil emulsion in water, the emulsifier is first dissolved in the amount of 1–2 g / L in water. So that the emulsifier is added to the water where the mixer works and after a short period of about 2 g per liter of oil slowly add to the water, the emulsion is prepared after a few minutes. For the preparation of water-in-oil emulsion (w / o), it is necessary to dissolve the oil-soluble emulsion in oil (oil) and then gradually add water after stirring. The oil emulsion in water is diluted with water, while the water emulsion in oil is concentrated with water. In the printing industry, water-based oil emulsions are used more frequently.

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