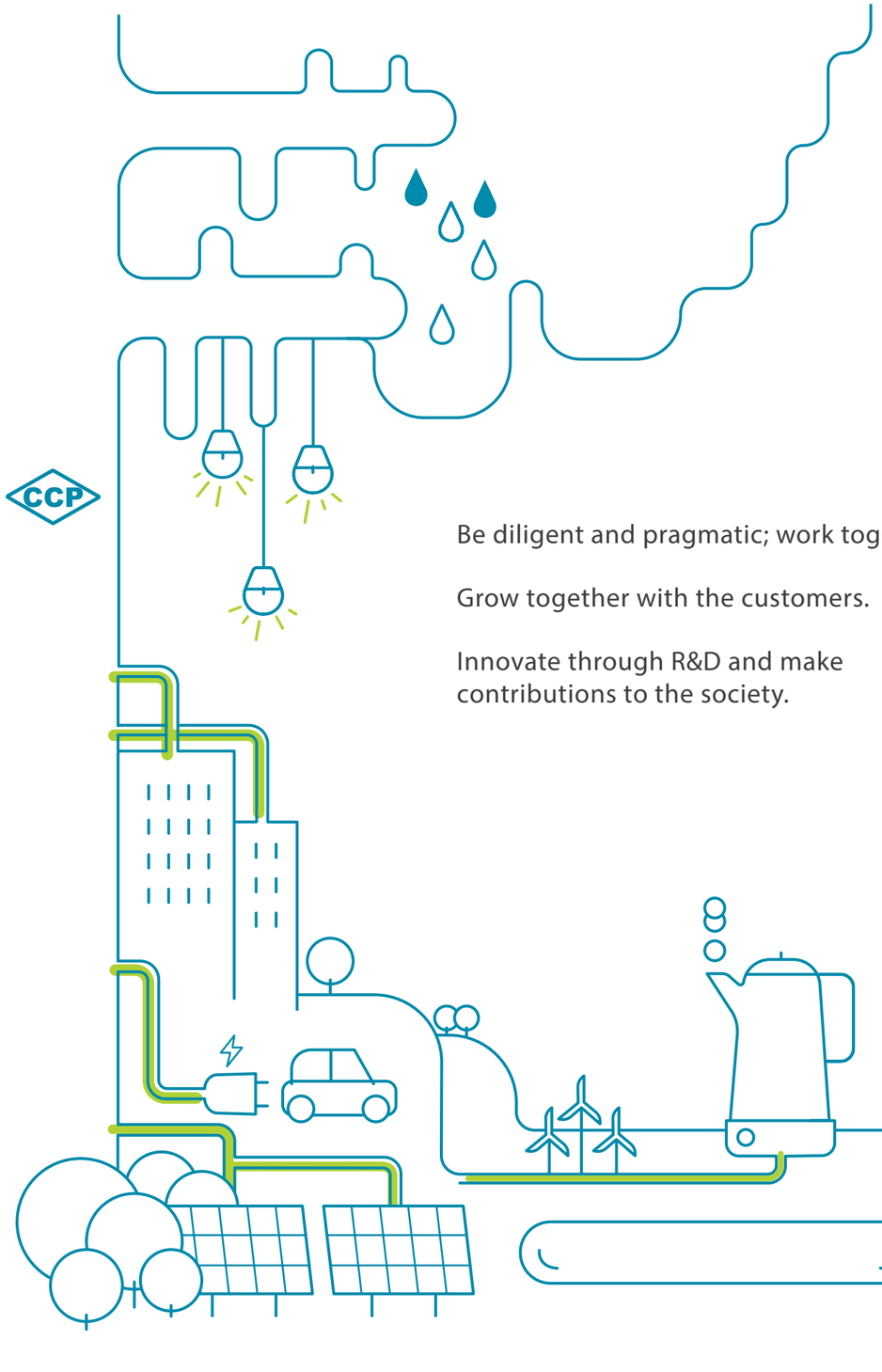
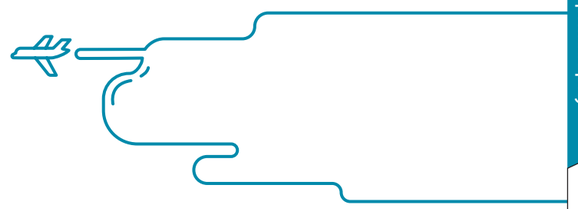
CHANG CHUN GROUP



Be diligent and pragmatic; work together.

Grow together with the customers.

Innovate through R&D and make contributions to the society.



Business philosophy

Integrity is the essence of Chang Chun Group's business philosophies.

We always treat it as a mission to fulfill our commitments to customers on quality, price, and delivery. It is our responsibility to offer the best quality, stable prices, and to be a long-term supplier for our customers. This explains how we gained long-term customer loyalty among our customers.

Delivering products on time and meeting customers' quality requirements is our basic service requirement. We introduced ISO9000 international quality management system into our operations. Nowadays, the ISO quality assurance has become deeply rooted into every employee's awareness and is an integral part of each employee's routines.

Integrity

Customer First

Creative Innovations

Milestones

Started a business in a diligent and selfless manner

- Research and innovation-- the driving force of growth
- Assuring customers through integrity
- Determined to transform in order to manage efficiently
- Being responsible to the environment and society
- Respecting life through promoting safe operations
- Toward a sustainable operations

1949
Messrs Liao Ming-Kun, Lin Shu-Hong, and Tseng Shin-Yi founded Chang Chun Plastics Factory.

1956
Urea resin adhesive was successfully developed and put into production.

1957
Chang Chun Plastics Co., Ltd. was founded.

1961
The first formaldehyde plant was built.

1964
Chang Chun Petrochemical Co., Ltd. was established.

1971
Chang Chun Plastics Co., Ltd. constructed Kaohsiung Factory to produce formaldehyde, urea molding compounds, and urea resin adhesive.

1973
Polyvinyl alcohol manufacturing process was successfully developed by Chang Chun Petrochemical Co., Ltd. After first PVA plant was constructed, second PVA plant employing continuous process was built in 1976.

1979
Dairen Chemical Corporation was founded.

1980
Chang Chun Plastics Co., Ltd. completed its Hsinchu Factory.

1982
Chang Chun Plastics Co., Ltd. commissioned epoxy resin plant at Hsinchu Factory with own developed technologies.

1983
The paraformaldehyde plant was constructed at Hsinchu Factory, and its commercial operation was commenced.

1986
Dairen Chemical Corp.'s VAE Emulsion plant no. 1 & no. 2 were commenced at Ta-She Factory.

1988
Chang Chun Petrochemical Co., Ltd. independently developed copper foil manufacturing technologies and built a copper foil plant at Miaoli Factory.

1994
Chang Chun Petrochemical Co., Ltd. completed the plant construction at its Miaoli Factory for producing high-purity electronic grade hydrogen peroxide used in semiconductors industry and commenced its production.

Dairen Chemical's VAE Powder plant at Kaohsiung Factory was commenced for production.

1997
Dairen Chemical Corporation successfully developed the manufacturing technologies for 1,4-butanediol.
In Dairen's Dafa Factory, the BDO plant was commenced.

1998
Chang Chun Plastics Co., Ltd. started adopting continuous process to produce PBT resins at its Kaohsiung Factory.

Dairen Chemical (M) Sdn. Bhd. was established. Production of VAE emulsion was commenced.

2000
Polytetramethylene ether glycol (PTMEG) plant was completed and production was commenced at Dairen Chemical's Dafa plant.

2002
Chang Chun Chemical (Jiangsu) Co., Ltd. was established. Its product portfolios include electronic chemicals and materials, engineering plastics, resins, and speciality chemicals.

2003
Chang Chun Chemical (Zhangzhou) Co., Ltd. was established to produce phenolic molding powders, PBT compounds, and copper clad laminates.

Dairen Chemical (Jiangsu) Co., Ltd. was established to manufacture VAE emulsion, BDO, PTMEG, and related products.

2005
The plants for phenol, acetone, and BPA were built at Chun Chang Plastics Co., Ltd.'s Dafa Factory and productions were commenced.

2006
Chang Chun Plastics Co., Ltd. successfully developed thermoplastic polyester elastomer (TPEE) in-house and started commercial production at its Kaohsiung Factory.

2007
Chang Chun Chemical (Jiangsu) Co., Ltd. commenced the commercial operations of PVA, acetic acid, and PBT resins plants after their construction were completed.

2010
CCD (Singapore) Pte. Ltd. and Chang Chun (Singapore) Pte. Ltd. were established successively to produce vinyl acetate, allyl alcohol, and cumene.

2011
Chang Chun Chemical (Panjin) Co., Ltd. and Chang Chun Dairen Chemical (Panjin) Co., Ltd. were established and commenced to produce epoxy resins, epichlorohydrin, chlor-alkali, isopropyl alcohol, 1,4-BDO, PTMEG, and other products.

Chang Chun Petrochemical Co., Ltd. commenced its acetic acid plant in Mailiao Factory.

2013
Chang Chun Chemical (Zhangzhou) Co., Ltd. finished the construction of flexible copper clad laminates plant and commenced its production.

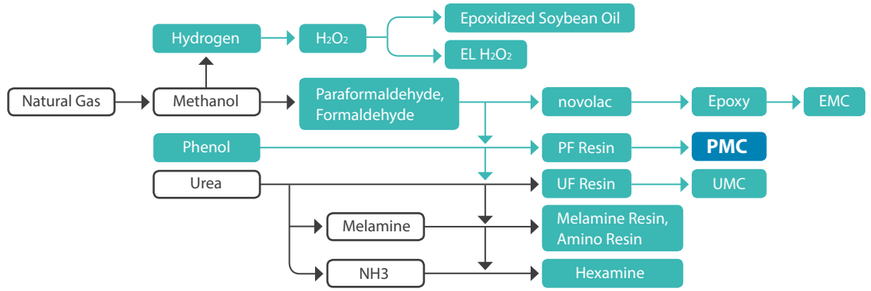
2015
Chang Chun Plastics Co., Ltd. completed the construction of Zhangbin Factory. The factory started producing formaldehyde, paraformaldehyde, and antioxidant raw materials, 2,4/2,6 DTBP.

1949 › 1956 › 1964 › 1979 › 1986 › 1997 › 2003 › 2010

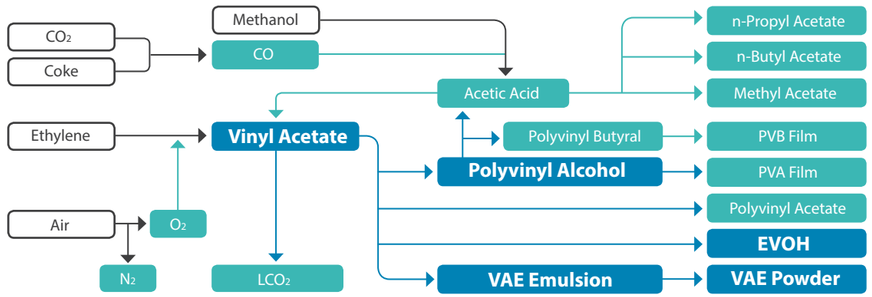
Core business

Raw Materials · CCP Products · CCP Products, Global top 3

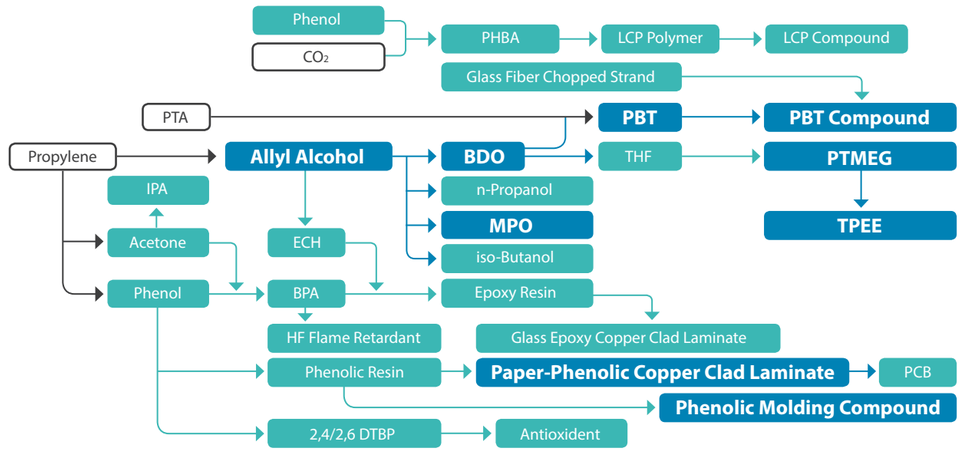
1 Methanol Derivatives & Supply Chain



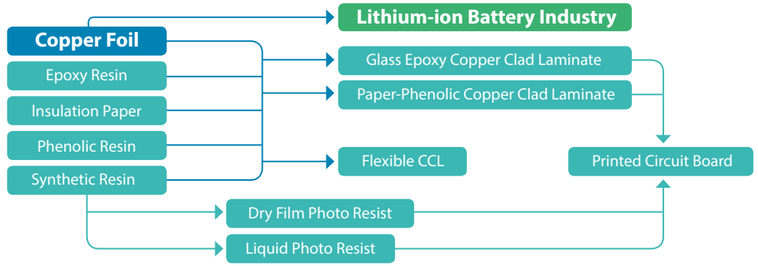
2 Ethylene Derivatives & Supply Chain



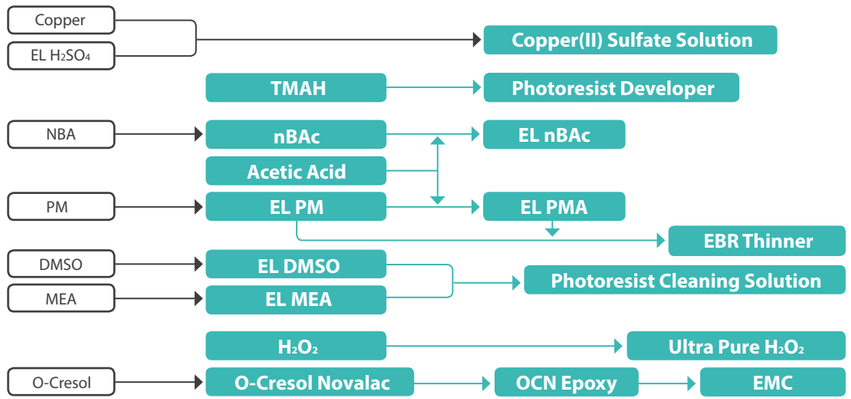
3 Propylene Derivatives & Supply Chain



4 PCB related materials



5 Electronic Chemicals for IC & TFT-LCD Processing



6 CCP Products-Specialty Chemicals

- α-Cyanoacrylate
- 2,4/2,6 DTBP
- Plastic Additives
  - **Antioxidant**
  - Stabilizer
  - Plasticizer
  - Flame Retardant
- Coating Resins
  - Acrylic Resin & Emulsion
  - PVB
  - PVAc
  - **Butylated/Methylated Melamine Resin**
  - Epoxy Resin
- Paper Chemicals
  - PVA
  - Acrylamide
  - Strength Resin
  - Flocculant

Construction

1 Vinyl acetate-ethylene redispersible powder

After spray drying, VAE emulsion is turned into a white powder which is a copolymer of ethyl and vinyl acetate. It is free-flowing and is easy to emulsify. When dispersed in water, it forms a stable emulsion. Possessing the typical characteristics of VAE emulsion, this free-flowing powder offers greater convenience in handling and storage. It can be used by mixing with other powder-like materials, such as cement, sand and other lightweight aggregate, and it can also be used as a binder in building materials and adhesives.

Product applications

- Gypsum slurry
- Repair mortar
- Joint grouts
- Self-leveling cement compound/concrete
- External wall insulation system
- Ceramic tile adhesive

2 Vinyl acetate-ethylene copolymer emulsion

Vinyl acetate-ethylene copolymer emulsion (VAE Emulsion) is a copolymer of vinyl acetate and ethylene. It has been developed as a powerful base adhesive, offering the following unique characteristics: strong initial adhesion, high wet tack, good creep resistance, water/alkali-resistance, improved thickening response, and safe operation.

Product applications

- Adhesive (furniture & decoration)
- Construction
- Paint & coating (VAE emulsion for coating)
- Paint & coating (waterproofing concrete)
- Textile & non-woven fabric
- Packaging & paper adhesive

3 Phosphorus flame retardants

Our phosphorus flame retardants are halogen-free phosphate-based flame retardants. They are mainly used as flame retardant for various types of engineering plastics, rubber, and printed circuit boards that require to be more eco-friendly (i.e. green products).

Product applications

- Plastics
- Electronics industry
- PVC

4 Urea resin adhesive

Chang Chun's urea resin adhesive is a liquid adhesive which is produced by reacting urea with formaldehyde using a special catalyst and denaturant under strictly controlled conditions. It is suitable as plywood adhesive with excellent water resistance when a catalyst and appropriate amount of extender are added.

Product applications

- Adhesive

5 α-Cyanoacrylate adhesive

Our α-Cyanoacrylate adhesive (or commonly known as instant/quick glue) is a single-component, fast reacting, and solvent-free adhesive developed with our own research. It can be used to bind marble, plastic, wood, metal, rubber and ceramic within very short period of time at room temperature. It is a multi-purpose adhesive with excellent storability. Our product conforms to Japanese JIS K 6861 testing method.

Product applications

- Instant/quick glue

6 Melamine resin adhesive

Our melamine resin adhesives are bonding agents that were specifically designed for manufacturing water-resistant plywood, allowing plywood's veneers to have more relaxed/higher moisture content. These adhesives are manufactured via reaction of melamine and formaldehyde using a special catalyst and denaturant under strictly controlled conditions. With specially added catalyst and suitable amount of extender, the shearing strength can be improved and can be compliant with Taiwan's CNS 1349/1350 national standards for plywood.

Product applications

- Adhesives

7 Acrylic emulsion

Acrylic emulsion is a milky white polymeric emulsion, mainly produced with acrylic monomer undergoing polymerization, using an initiator in presence of emulsifier with water as a solvent. Acrylic emulsion possesses excellent adhesive and waterproofing properties, which can be used in the textile industry, such as for non-woven fabrics, flannelette blankets and lamination. Selected products can be used in civil engineering such as cement mortar, caulking and elastic cement, while other products can be used for coating material,
such as indoor and outdoor water-based paint.

Product applications

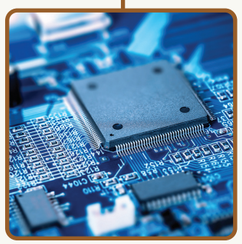
- Civil construction
- Coating
- Textile processing

8 Phenolic resin

Phenolic resin is the reaction product of phenol and formaldehyde. It offers good mechanical strength, dimensional/thermal stability, and good resistance to electricity, solvent, and acid. It is widely used in molding materials (including electronic packaging materials), laminating materials, polishing materials, bonding, impregnation, casting and other applications.

Product applications

- Decorative laminate
- Thermal insulation
- Molding material
- Friction material
- Abrasive tools
- Refractories
- Casting



9 Insulation paper

Chang Chun's insulation paper is used mainly in phenolic resin copper clad laminate (CCL), CEM-1 composite CCL, PCB back up boards, laminated sheets, and decorative boards. Our insulation paper offers high level of cleanliness and excellent resin impregnation rate. Its size and properties can be tailored to meet the specific needs of each customer.

Product applications

- Printed circuit board/phenolic laminates

10 Epoxy resins

Chang Chun's epoxy resins are multi-purpose and high performance products developed using our own technologies. We offers broad portfolio of epoxy resins. For Bisphenol-A (BPA)-based epoxy resins (BE-series), we have solid, liquid, and solvent types, all of which are suitable for coating and composite material. We also offer brominated novolac epoxy resins (BNE-series), phenol novlac epoxy resins (PNE-series), UV masking epoxy resins (TNE-series), and other speciality novolac epoxy resins, which are tailored for special needs (i.e. high heat resistance, low absorbent, low Df, NCO modified, etc.) Our cresol novolac epoxy resins (CNE-series) are designed for semiconductors/printing ink applications.

Product applications

- Electronic components
- Copper clad laminate
- Composite material
- Anti-corrosion
- Civil construction
- Flame retardant
- Moulding
- Coating
- Resin

11 Polyvinyl butyral interlayer (PVB film)

Polyvinyl butyral interlayer is a thin film of uniform thickness that has been processed and extruded from PVB resin mixed with plasticizer and additives. Its unique characteristics are: impact resistance, penetration resistance, sound insulating, and UV-proof. Moreover, PVB film can holds the debris from shattered glasses to protect the end users. Currently, most automotive windshields are required to adopt PVB laminated glass. PVB films are also used for the glass on high-rises and landmark architectures.

Product applications

- Architectural film
- Automotive film
- Solar cell module film

12 Polyvinyl alcohol

Polyvinyl alcohol (PVA), a white/yellowish granule or powder, is a stable, non-toxic, and water-soluble polymer. PVA possesses good film-forming property, and the film formed from it has excellent adhesion, solvent-resistance, abrasion-resistance, high tensile strength, and great oxygen barrier property. Due to PVA possesses both hydrophilic and hydrophobic functional groups, it can act as surfactant, and can be used as a protective colloid in polymer emulsification and suspension polymerization.

Product applications

- Warp sizing agent
- Screen printing
- Paper industry
- Packaging material
- Printing industry
- Construction industry
- Textile/Fabric finishing chemicals
- Plywood, woodworking industry
- PVAc, PVC, PS
- Raw material for PVA sponge & grinding discs sanding paper

13 Sodium formate

As a byproduct of trimethylolpropane, sodium formate is a white crystalline powder that is highly hygroscopic and water soluble.

Product applications

- Formic acid
- Oxalate acid
- Concrete superplasticizer
- Sodium dithionite
- Eco-friendly de-icer

Chemicals & synthetic resins

1 Allyl alcohol

Allyl alcohol is an irritating, colorless liquid that is produced by gas phase reaction of propene and acetic acid in presence of a catalyst. It can be used as a raw material or a precursor for many chemical substances.

Product applications

- Raw material for chemical synthesis

2 Isobutanol

Isobutanol (IBA) is a byproduct obtained by hydroformylation of allyl alcohol with carbon monoxide and hydrogen, which is then followed by hydrogenation. It is a colorless liquid which is soluble in water, alcohols, and ethers. IBA can be used as a solvent for coating and as a chemical intermediates in organic synthesis. As the chemical property of IBA is similar with that of n-butanol, it can complement or replace n-butanol in many applications.

Product applications

- Plasticizer
- Organic synthesis
- Solvent
- Paint remover
- Liquid chromatography

3 Vinyl acetate

Vinyl acetate monomer (VAM) is a reactive colorless liquid chemical that is produced by gaseous reaction of ethylene, acetic acid, and oxygen in the presence of a catalyst. Hydroquinone is added as a stabilizer to inhibit polymerization during storage.

Product applications

- Polyvinyl butyral
- Ethylene-vinyl chloride copolymer
- EVA resin
- Polyvinyl alcohol
- Vinyl chloride copolymer
- Polyvinyl acetate
- Ethylene copolymer

4 Alkoxylated 2-methyl-1,3-propanediol

Alkoxylated 2-methyl-1,3-propanediol is produced by alkoxylation of 2-methyl-1,3-propanediol and alkoxide. It is a colorless liquid with two primary hydroxyls groups. Our current products include both ethoxylated and propoxylated 2-methyl-1,3-propanediols.

Product applications

- Coating
- Polyurethane

5 1,4-Butanediol

1,4-Butanediol (BDO) is produced by hydroformylation of allyl alcohol with carbon monoxide and hydrogen, which is then followed by hydrogenation. It is a colorless liquid with high boiling point and low toxicity.

Product applications

- Tetrahydrofuran
- Polytetramethylene ether glycol
- γ-Butyrolactone
- Polyester plasticizer
- Thermoplastic polyester

6 Ethyl acetate

Ethyl acetate is produced by hydrogenation of vinyl acetate. This ester is a colorless liquid with a special aromatic odor.

Product applications

- Coating
- Chemical synthesis

7 2-Methyl-1,3-propanediol

2-Methyl-1,3-propanediol is a product produced through hydroformylation of allyl alcohol with carbon monoxide and hydrogen, which is then followed by hydrogenation. It is a colorless low viscosity liquid with low toxicity. It is a non-linear diol with a unique methyl branch.

Product applications

- Unsaturated polyester
- Cosmetic
- Polyester resin
- PET fiber treatment
- Coating

8 n-Propanol

n-Propanol is a byproduct obtained by hydroformylation of allyl alcohol with carbon monoxide and hydrogen, which is then followed by hydrogenation. It is a colorless liquid with alcohol odor. It is moderate volatilite and is soluble in water, alcohols, and ether.

Product applications

- Coating
- Medicine

9 n-Propyl acetate

Acetic acid propyl ester, also known as "propyl acetate" or "n-propyl acetate", naturally exists in strawberries, bananas and tomatoes. It is synthetically produced by having acetic acid and 1-propanol undergoing esterification reaction. It is a colorless transparent liquid at room temperature with typical ester properties. It has a special fruity odor and can be dissolved in both ethanol and ethyl ether.

Product applications

- Paint
- Printing ink
- Resin solvent

10 Polytetramethylene ether glycol

Polytetramethylene ether glycol (PTMEG/PTG) is produced by the acid catalyzed polymerization of tetrahydrofuran (THF). It is a straight-chain diol with repeated tetramethylene ether units.

Product applications

- Spandex production
- Elastic silk stockings
- Swimming suits
- Synthetic leather
- Thermoplastic film
- Auto-material-seat covers
- Auto-material-gear shift knobs
- Breathable, waterproof jackets

11 Tetrahydrofuran

Tetrahydrofuran (THF) is produced by dehydration of 1,4-butanediol. It is a neutral, colorless, volatile cycloaliphatic ether. It is highly polar and miscible with water, and is an excellent solvent for many organic substances.

Product applications

- Chemical raw materials
- Reaction solvent
- Solvent
- Treatment agent

12 Paraformaldehyde

Due to our paraformaldehyde is mainly in a granular format with consistent quality, it is easy to handle and transport. Because of excellent solubility and broad applicability, it is used in products such as amino resin, ion exchange resin, etc.

Product applications

- Synthetic resin
- Coating resin
- Organic synthesis of pharmaceuticals
- Adhesive
- Agriculture

13 Sodium formate

As a byproduct of trimethylolpropane, sodium formate is a white crystalline powder that is highly hygroscopic and water soluble.

Product applications

- Formic acid
- Sodium dithionite
- Concrete superplasticizer
- Oxalate acid
- Eco-friendly de-icer

14 Glacial acetic acid

Acetic acid is a colorless transparent liquid with pungent sour odor. It is also known as glacial acetic acid whenever the purity is 99.5% or more. Acetic acid is soluble in water, alcohols, and ethers and is used in man-made fibers, rubber, plastics, agriculture, herbicides and leather.

Product applications

- Vinyl acetate monomer
- n-Butyl acetate
- Textile industry
- Pure terephthalic acid

15 Methyl acetate

Methyl acetate is a colorless transparent liquid with a fruit-like fragrance. It's flammable, and is usually used to replace acetone, butanone, ethyl acetate and cyclopentane. Due to its low toxicity, methyl acetate can fufill the environmental requirements of coating, ink, resin and adhesive industries.

Product applications

- Coating
- Organic solvent

16 n-Butyl acetate

As a flammable colorless liquid, n-Butyl acetate can well dissolve cellulose acetate butyrate, ethyl cellulose, chlorinated rubber, polystyrene, and many natural gums and resins. Therefore, it is widely used for nitrocellulose cleaning and as a solvent for processing synthetic leather, fabric, and plastic. It is also used as extractant for all kinds of petroleum processing and pharmaceutical chemistry.

Product applications

- Artificial leather
- Artificial flavors
- Coatings

17 Bisphenol A

Bisphenol A (BPA) is produced through the reaction of phenol and acetone. It's white granule. It is soluble in acetone but insoluble in water. Under normal pressure, it will decompose at 180℃. It is mainly used as the raw material to produce polycarbonate and epoxy resin products. The products made with BPA possess extremely good performance, including lightweight, transparency, and resistance to impact and heat.

Product applications

- Polycarbonate
- Antioxidants for PVC
- Tetrabromobisphenol A
- Thermal paper
- Epoxy resin

18 Brominated epoxy flame retardant

Brominated epoxy flame retardant is an epoxy resin-based flame retardant with high bromine content. It can be added to variety of engineering plastics, such as PP, PA, PE, PS, ABS, PET, and PBT. Compared to traditional TBBA-based flame retardant, products treated with brominated flame retardant will have better thermal/dimensional stability and chemical resistance.

Product applications

- Fire-retardant for plastic

19 Phenol

With technical cooperation with Honeywell UOP (formerly known as UOP LLC) of the USA, we produce high-purity phenol via the cumene process. Phenol is white crystals under normal temperature, with melting point at 40.7℃. It's soluble in ethanol, acetic acid, glycerol, chloroform, carbon disulfide and benzene. Its main downstream applications include production of bisphenol A, phenolic resin, epoxy resin, caprolactam, cyclohexanone, and alkyl phenol.

Product applications

- Production of bisphenol A
- Production of phenolic resin
- Production of epoxy resin
- Production of caprolactam
- Production of cyclohexanone
- Production of alkylphenol

20 Acetone

In technical cooperation with Honeywell UOP of the USA (formerly known as UOP LLC), Chang Chun Group produces high-purity acetone via the cumene process. At room temperature, acetone is a colorless, highly volatile, flammable liquid with fragrant smell. It is also dangerous as it can react violently with strong oxidizer. It's soluble in water, methanol, ethanol, ether, chloroform and pyridine, and it can also dissolve oil, fat, resin, rubber, cellulose acetate and cellulose nitrate. It's an important volatile organic solvent.

Product applications

- Production of bisphenol A
- Production of methyl methacrylate
- Production of isopropanol
- Production of methyl isobutyl ketone
- Production of diacetone alcohol (solvent)

21 Phenolic resin

Phenolic resin is the reaction product of phenol and formaldehyde. It offers good mechanical strength, dimensional/thermal stability, and good resistance to electricity, solvent, and acid. It is widely used in molding materials (including electronic packaging materials), laminating materials, polishing materials, bonding, impregnation, casting and other applications.

Product applications

- Decorative laminate
- Refractories
- Casting
- Thermal insulation
- Friction material
- Molding material
- Abrasive tools

22 Formaldehyde (Formalin)

Our formaldehyde is produced by oxidation process. During the production, fresh air is mixed with recycled gases, and the chemical reaction occurs within the fixed bed reactor. Through metal oxides catalysis, formaldehyde gas is produced and then absorbed by water in the absorption tower. This semi-finished product is then sent to the formaldehyde barrel area to formulate the finished products with concentration ranging from 14-44%.

Product applications

- Thermosetting resin
- Adhesive
- Amine resin for coating
- Molding material
- Disinfectant

23 Furan no-bake resins

Our furan no-bake resins are self-hardening resins developed independently by Chang Chun. They are used as binders for mechanical casting with the advantages of low formaldehyde content, hardening at room temperature, and faster curing. All of which translates to increased productivity.

Product applications

- Molding & casting for CF7451
- Molding & casting for CF7421
- Molding & casting for CF7432

24 Trimethylolpropane

Chang Chun's trimethylolpropane (TMP) is a widely functional intermediate in the organic chemical industry. TMP can improve various resins' toughness, corrosion-resistance, and sealing strength. It is very stable against oxidation, hydrolysis, and pyrolysis. It's mainly used as the raw material for alkyd resin paint, polyurethane coating, and high-end oil coatings/paints. It can also be used for the production of plasticizers, surfactants, lubricants, synthetic leather, heat insulator, etc.

Product applications

- Used for alkyd resin production
- Used for high-quality lubricant production
- Used for plasticizer production
- Used for emulsifier production
- Production of Trimethylolpropane triacrylate (TMPTA)
- Production of Trimethylolpropane tirmethacrylate (TMPTM)
- Production of Trimethylolpropane triesters (TMPTE)
- Used as fuel additives

Energy

1 Copper foil

Since 1987, Chang Chun has been conducting independent R&D on manufacturing technologies for copper foil. Mass production of copper foil began in 1988, and production plants were setup in both Miaoli, Taiwan and in Changshu, Jiangsu province, China. Full range of specifications and sizes were developed for high-tech industries. Our copper foil are widely used in various types of fiberglass epoxy resin copper clad laminate, multilayer printed circuit board, flexible circuit board, IC-substrate, lithium-ion battery, and paper-phenolic resin copper clad laminate.

Product applications

- Printed circuit boards industry
- Lithium-ion battery industry

2 Polybutylene terephthalate resins (compounding)

Polybutylene Terephthalate, PBT for short, is a thermoplastic polyester resin derived from copolymerization of 1,4-butanediol and terepthalic acid (PTA). Fiber glass can be added in the later stage of production to strengthen the product. Other additives can also be added to give PBT resins various electrical or mechanical advantages or to improve other attributes, such as fire retardation. It is high performance engineering plastic with the widest uses.

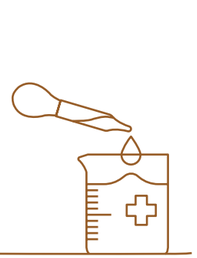
Product applications

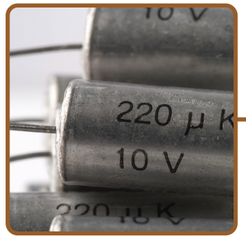
- Electronic connectors
- Automobile parts: connectors, motors, lights
- Cooling fans
- Lighting parts
- Home appliances

Semiconductor

1 gamma-Butyrolactone

gamma-Butyrolactone (GBL) is a solvent with high-boiling point. Its advantages of good solubility, dielectric property, and stability make it suitable as an extractant, dispersant, and dyeing auxiliaries. GBL is also an important intermediate for organic synthesis and can be used in fields such as biomedical, pharmaceuticals, and agrochemical/pesticide.



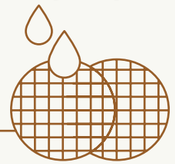


Product applications

- Solvent
- Heterocyclic compounds
- electronic industry

2 Copper (II) sulfate solution

Chang Chun has developed its own manufacturing technology for copper sulfate solution. High-purity copper is procured to produce copper sulfate solutions using the highest standards. Our copper sulfate solutions can be customized according to the specifications of the customers. At the present, our products have been supplied to a number of domestic IC manufacturers and have passed product qualification for high-end processes.

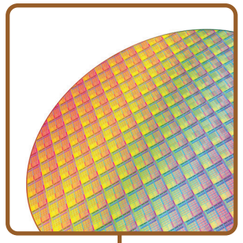


Product applications

- Electroplating solutions

3 Hydrogen peroxide

Hydrogen peroxide is a colorless transparent liquid with a slight odor of ozone and can be mixed with water in any proportion. It is used in bleaching of textiles and pulp, treatment of waste water, manufacture of organic peroxide, medicine, cosmetics and purification and electroplating of metal.



Product applications

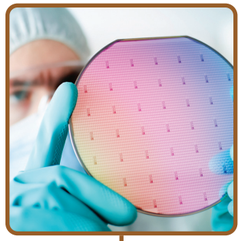
- Pulp & paper industry
- Semiconductor manufacturing
- Textile industry

4 Wafer dicing/cleaning solution

A water-soluble cleaning solution designed for cleaning wafers during dicing in semiconductors packaging plants. It has low-surface tension with both hydrophilic and lipophilic characteristics, resulting in excellent adsorption to wafers.

Product applications

- Wafer dicing & packaging



5 Electronic grade n-butyl acetate

N-butyl acetate is a colorless transparent liquid with a pleasant fruity odor. Unlike lower molecular weight homologues, it is insoluble in water, but is miscible with organic solvents, such as alcohol, ether and ketone. It is flammable, and its toxicity is low. Moreover, inhaling n-butyl acetate in high concentration can have anesthetic effects. It can well dissolve ethyl cellulose, cellulose acetate butyrate, polystyrene, methacrylic resin, chlorinated rubber and a variety of natural gums.

Product applications

- Cleanser
- Negative-type developer

6 High purity hydrogen peroxide for semiconductor

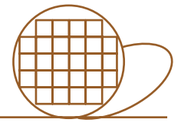
Chang Chun is the largest manufacturer of hydrogen peroxide in Taiwan. Hydrogen peroxide is an important chemical for cleaning wafer in semiconductor plants. Our hydrogen peroxide has the largest market share in Taiwan.

Product applications

- Semiconductor cleaning

7 Developer

Our developer is produced by diluting our 25% TMAH to 2.38% with ultra-pure water. This product is actually commissioned by Tokyo Ohka Kogyo Co., Ltd. (TOK), using TOK's specially formulated emulsifier.



Product applications

- Semiconductor developers

8 Electronic grade propylene glycol monomethyl ether acetate

Propylene glycol monomethyl ether acetate (PGMEA/PMA), also known as propylene glycol methyl ether acetate, is a colorless hygroscopic liquid with a special odor. It is a non-polluting solvent with multi-functional groups. Its molecular formula is $C_6H_{12}O_3$. It is mainly used as a solvent for printing ink, paint, textile dyes, and textile oil. The electronic grade, which is further purified, can be used as the photoresist solvent and cleaning agent in the production of semiconductor and liquid crystal displays. PGMEA/PMA is flammable, and when the temperature is above 42°C, it may form explosive vapor/air mixture.

Product applications

- Semiconductor production
- LCD production

9 Electronic grade propylene glycol monomethyl ether

Propylene glycol monomethyl ether (PGME) and ethylene glycol ether are both glycol ether solvent. From human toxicity's perspective, toxicity of propylene glycol ether is lower than that of ethylene glycol ether, thereby making PGME as low toxicity ether. PGME has a slight glycol odor but is not strongly irritating, making its usage wider and safer. As there are both ether group and hydroxyl group in its molecular structure, it has excellent solubility and possesses ideal rate of evaporation and reactivity, leading to a wide range of applications.

Product applications

- Cleanser & diluent for semiconductor
- Cleanser & diluent for LCD

10 Electronic grade stripper

The primary function of the stripper is to remove the excess photoresist after etching. Our electronic grade stripper is designed for TFT-LCD applications. During TFT-LCD manufacturing, stripper will be heated and then the glass substrate will be immersed. Water is then removed by rinsing with a solvent.

Product applications

- TFT-LCD photoresist stripper

11 Tetramethyl ammonium hydroxide (electronic grade developer for semiconductor & LCD)

Chang Chun is the earliest and also the largest manufacturer of tetramethyl ammonium hydroxide (TMAH) in Taiwan. Our 25% TMAH is mainly used by well-known TFT-LCD manufacturers in Taiwan. In addition, our 25% TMAH is also the raw material for 2.38% TMAH, which is mainly used as a developer by Taiwanese semiconductor manufacturers.

Product applications

- Developer
- Stripper
- Cleanser

12 Phenolic resin for CCL & packaging

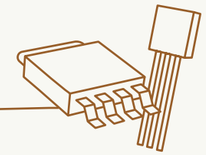
We also offer phenolic resins as a hardening agent for the electronic industry. They offer good mechanical strength, dimensional/thermal stability, and resistance to electricity, solvent, and acid. They are widely used in molding materials (including electronic packaging materials), laminate materials, and impregnation.

Product applications

- Electronic packaging
- Copper clad laminate

13 Epoxy molding compounds

EME (epoxy molding compounds) possess excellent moldability, good mechanical and electrical properties, and high reliability. It is mainly used for semiconductor component packaging, especially for IC (integrated circuits), diodes, transistors, photocouplers, and coils.



Product applications

- IC packaging
- Diode packaging
- Transistor packaging
- Photocoupler packaging

14 Mold cleaner for semiconductor

Semiconductor mold cleaners MC-261 and MC-701 are thermosetting resins formed by mixing melamine resin with organic and inorganic fillers. Our mold cleaners yield good results in removing residuals left on the mold after molding with epoxy resin materials. Due to the molding conditions are the same as epoxy resin, they are easy to operate and can save time and effort.

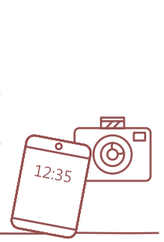
Product applications

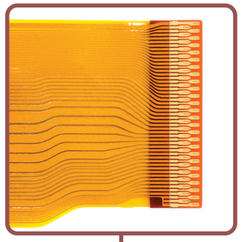
- Cleaning of die

Printed circuit board

1 Flexible copper clad laminates

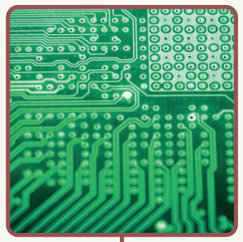
Our flexible copper clad laminates are manufactured using the technologies of Rogers Corporation and supported by Chang Chun's strong production capability. We have accumulated a rich and practical experience in the manufacturing of flexible boards. Our flexible copper clad laminates, through its quality and technology, have gained the support and trust of our customers.





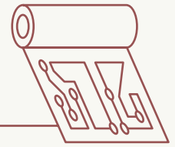
Product applications

- Smartphones
- Auto pilot
- Digital cameras
- Other portable electronics



2 Dry film photoresist

Our LONGLITE® dry film photoresist is a negative and water-soluble type with good resolution and adhesion. It is suitable for various processes, such as acid etching of fine lines, tenting, electroplating copper, and other PCB manufacturing processes.



Product applications

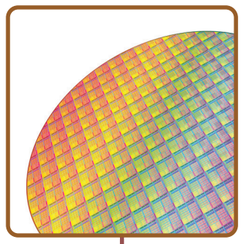
- Manufacturing of printing circuit board

3 Paper-phenolic copper clad laminate

Paper-phenolic copper clad laminate, made from bleached kraft paper impregnated with phenolic resin, offers advantages of low-cost and suitable for punching process.

Product applications

- Home appliance
- Computers & consumer electronics
- Lighting

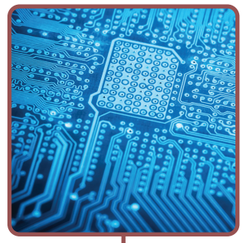


4 Hydrogen peroxide

Hydrogen peroxide is a colorless transparent liquid with a slight odor of ozone and can be mixed with water in any proportion. It is an economical chemical that is widely used in various industries, such as: bleaching of textiles and pulp, treatment of waste water, manufacture of organic peroxide, medicine, cosmetics and purification and electroplating of metal.

Product applications

- Pulp & paper industry
- Semiconductor manufacturing
- Textile industry



5 Copper foil

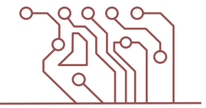
Since 1987, Chang Chun has been conducting independent R&D on manufacturing technologies for copper foil. Mass production of copper foil began in 1988, and production plants were setup in both Miaoli, Taiwan and in Changshu, Jiangsu province, China. Full range of specifications and sizes were developed for high-tech industries. Our copper foil are widely used in various types of fiberglass epoxy resin copper clad laminate, multilayer printed circuit board, flexible circuit board, IC-substrate, lithium-ion battery, and paper-phenolic resin copper clad laminate.

Product applications

- Printed circuit boards industry
- Lithium-ion battery industry

6 Liquid photoresist

Our LONGLITE® liquid photoresist is a negative and water-soluble type. It is designed for roller coating machines (horizontal or vertical) with excellent resolution and adhesion, which is suitable for acid etching printed circuit boards.



Product applications

- Etching inner layer of Multi Layer Boards (MLB)

7 Glass epoxy copper clad laminate

Composite epoxy copper clad laminate is made by pressing fiber glass with different base materials (insulation paper or fiber glass mat) that are impregnated with epoxy resin. It offers the advantages of low price and is suitable for punching processing.

Product applications

- Home appliance
- Computers & consumer electronics
- Vehicle board
- LED

8 Insulation paper

Chang Chun's insulation paper is used mainly in phenolic resin copper clad laminate (CCL), CEM-1 composite CCL, PCB back up boards, laminated sheets, and decorative boards. Our insulation paper offers high level of cleanliness and excellent resin impregnation rate. Its size and properties can be tailored to meet the specific needs of each customer.

Product applications

- Printed circuit board/phenolic laminates

9 Epoxy resins

Chang Chun's epoxy resins are multi-purpose and high performance products developed using our own technologies. We offers broad portfolio of epoxy resins. For Bisphenol-A (BPA)-based epoxy resins (BE-series), we have solid, liquid, and solvent types, all of which are suitable for coating and composite material. We also offer brominated novolac epoxy resins (BNE-series), phenol novlac epoxy resins (PNE-series), UV masking epoxy resins (TNE-series), and other speciality novolac epoxy resins, which are tailored for special needs (i.e. high heat resistance, low absorbent, low Df, NCO modified, etc.) Our cresol novolac epoxy resins (CNE-series) are designed for semiconductors/printing ink applications.

Product applications

- Electronic components
- Civil construction
- Moulding
- Copper clad laminate
- Flame retardant
- Coating
- Composite material
- Anti-corrosion
- Resin

10 Phenolic resin for CCL & packaging

We also offer phenolic resins as a hardening agent for the electronic industry. They offer good mechanical strength, dimensional/thermal stability, and resistance to electricity, solvent, and acid. They are widely used in molding materials (including electronic packaging materials), laminate materials, and impregnation.

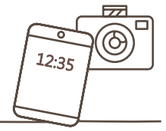
Product applications

- Electronic packaging
- Copper clad laminate

Automotive

1 Flexible copper clad laminates

Our flexible copper clad laminates are sold by RCCT Technology Co., Ltd., an affiliate of Chang Chung Group. They are manufactured using the technologies of Rogers Corporation, an advanced American industrial technology company and supported by Chang Chun's strong production capability. We have accumulated a rich and practical experience in the manufacturing of flexible boards. Our flexible copper clad laminates, through its quality and technology, have gained the support and trust of our customers.



Product applications

- Smartphones
- Auto pilot
- Digital cameras
- Other portable electronics

2 Ethylene vinyl alcohol copolymer

Trade named under EVASIN, our ethylene vinyl alcohol copolymer is a special thermoplastic polymer without any plastic additive. It can be used to produce high oxygen barrier films, sheets and other various food packaging materials. Because of its superior gas barrier function, its application has been widened in recent years. Due to water absorption will impact its barrier property, it is usually used with multi-layer co-extrusion production equipments.

Product applications

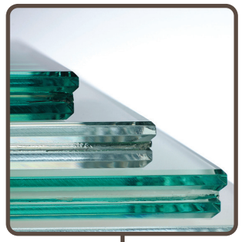
- Fuel tanks
- Food packaging

3 Polybutylene terephthalate resin (neat resin)

Polybutylene terephthalate (PBT) is a thermoplastic polyester resin produced by having 1,4-butanediol (BDO) and purified terephthalic acid (PTA) going through polycondensation and kneading process. Because it possesses a number of excellent features, it is widely used in the electronics, home appliance, IT, communication, and automotive industries. It is the material that is gaining the most attention among wide range of engineering plastics.

Product applications

- PBT fiber
- Fiber-optic cable coating
- PBT film
- PBT masterbatch
- Glass fiber reinforced composite
- Flame-retardant composite
- Industrial spare parts



4 Polyvinyl alcohol

Polyvinyl alcohol (PVA), a white/yellowish granule or powder, is a stable, non-toxic, and water-soluble polymer. PVA possesses good film-forming property, and the film formed from it has excellent adhesion, solvent-resistance, abrasion-resistance, high tensile strength, and great oxygen barrier property. Due to PVA possesses both hydrophilic and hydrophobic functional groups, it can act as surfactant, and can be used as a protective colloid in polymer emulsification and suspension polymerization.

Product applications

- Warp sizing agent
- Textile/Fabric finishing chemicals
- PVAc, PVC, PS
- Screen printing
- Plywood, woodworking industry
- Packaging material
- Paper industry
- Construction industry
- Printing industry
- Raw material for PVA sponge & grinding discs sanding paper

5 Thermoplastic polyester elastomer (TPEE)

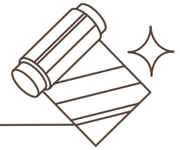
TPEE is produced by 1,4-butanediol, polytetra-methylene glycol, and DMT or PTA going through copolymerization condensation. It also can be made into thermoplastic polyester elastomer composites through kneading procedure. TPEE possesses a number of excellent features and is widely used in electrical appliances, IT, and automotive industries.

Product applications

- Industrial spare parts
- Glass fiber reinforced composite
- TPEE fiber
- Flame-retardant composite

6 Copper foil

Since 1987, Chang Chun has been conducting independent R&D on manufacturing technologies for copper foil. Mass production of copper foil began in 1988, and production plants were setup in both Miaoli, Taiwan and in Changshu, Jiangsu province, China. Full range of specifications and sizes were developed for high-tech industries. Our copper foil are widely used in various types of fiberglass epoxy resin copper clad laminate, multilayer printed circuit board, flexible circuit board, IC-substrate, lithium-ion battery, and paper-phenolic resin copper clad laminate.



Product applications

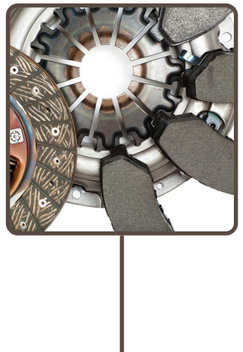
- Printed circuit boards industry
- Lithium-ion battery industry

7 Phenolic molding compounds

Chang Chun phenolic molding compounds (under trade name of LONGLITE) are heat-hardening resins. Formulated based on the needs and usages of our customers, our phenolic molding compounds are produced by mixing different materials and pigments to the base phenolic resin which we also manufacture. Employing integrated operations (from raw materials introduction, reaction process, to finally packaging), our products are manufactured with the strictest quality management. As result, our phenolic molding compounds offer consistent quality and good performance, and they have gained recognition from all sectors over the years.

Product applications

- Cookware handles
- Electrical parts
- Frames/Holders for various products
- Motor parts
- Auto parts



8 Phenolic resin

Phenolic resin is the reaction product of phenol and formaldehyde. It offers good mechanical strength, dimensional/thermal stability, and good resistance to electricity, solvent, and acid. It is widely used in molding materials (including electronic packaging materials), laminating materials, polishing materials, bonding, impregnation, casting and other applications.

Product applications

- Decorative laminate
- Casting
- Abrasive tools
- Thermal insulation
- Refractories
- Friction material
- Molding material

9 Polyvinyl butyral interlayer (PVB film)

Polyvinyl butyral interlayer is a thin film of uniform thickness that has been processed and extruded from PVB resin mixed with plasticizer and additives. Its unique characteristics are: impact resistance, penetration resistance, sound insulating, and UV-proof. Moreover, PVB film can holds the debris from shattered glasses to protect the end users. Currently, most automotive windshields are required to adopt PVB laminated glass. PVB films are also used for the glass on high-rises and landmark architectures.

Product applications

- Architectural film
- Automotive film
- Solar cell module film

10 Liquid crystal polymer resins

Liquid crystal polymer (LCP) resins are made with polymerization of monomers that have high temperature resistance. Due to LCP's structural arrangement at high temperature, they possess excellent flow properties and can act as a halogen-free flame retardant, which can be rated up to UL94V0.

Product applications

- Composite material
- Thin-film

11 Liquid crystal polymers

Liquid crystal polymer (LCP) is a polymer made with high temperature resistance monomers. Due to its structural arrangement at high temperature, liquid crystal polymers possess excellent flow properties and can act as a halogen-free flame retardant. They are mainly used in the precision electronic parts or plastic products that require high heat resistance and dimensional stability.

Product applications

- Electronic connector
- Automobile parts: connectors, motors, lights
- Cooling fan

12 Polybutylene terephthalate resins (compounding)

Polybutylene Terephthalate, PBT for short, is a thermoplastic polyester resin derived from copolymerization of 1,4-butanediol and terepthalic acid (PTA). Fiber glass can be added in the later stage of production to strengthen the product. Other additives can also be added to give PBT resins various electrical or mechanical advantages or to improve other attributes, such as fire retardation. It is high performance engineering plastic with the widest uses.

Product applications

- Electronic connectors
- Cooling fans
- Lighting parts
- Home appliances
- Automobile parts: connectors, motors, lights

Home appliances

1 Antioxidants

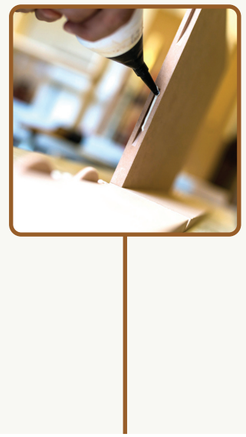
Our hindered phenol antioxidants and phosphites antioxidants are produced with highly automated production equipment and utilizing advanced technologies from Adeka Corporation (formerly Asahi Denka Co., Ltd) of Japan. Antioxidants are indispensable and important additives for various products, such as plastics, resins, and rubbers, in order to prevent or delay physical properties or color changes caused by oxidation and to extend the processability and service life of these plastic products. Applications include ABS, PS, PVC, PE, PP, engineering plastics, PU resin, adhesive, rubbers, etc.

Product applications

- Plastic
- PVC stabilizers
- Polyether polyol, polyurethane
- Rubber
- Lube oil
- Plasticizer

2 Vinyl acetate-ethylene copolymer emulsion

Vinyl acetate-ethylene copolymer emulsion (VAE Emulsion) is a copolymer of vinyl acetate and ethylene. It has been developed as a powerful base adhesive, offering the following unique characteristics: strong initial adhesion, high wet tack, good creep resistance, water/alkali-resistance, improved thickening response, and safe operation.



Product applications

- Adhesive (furniture & decoration)
- Paint & coating (VAE emulsion for coating)
- Paint & coating (waterproofing concrete)
- Packaging & paper adhesive
- Textile & non-woven fabric
- Construction

3 Polybutylene terephthalate resin (neat resin)

Polybutylene terephthalate (PBT) is a thermoplastic polyester resin produced by having 1,4-butanediol (BDO) and purified terephthalic acid (PTA) going through polycondensation and kneading process. Because it possesses a number of excellent features, it is widely used in the electronics, home appliance, IT, communication, and automotive industries. It is the material that is gaining the most attention among wide range of engineering plastics.

Product applications

- PBT fiber
- Fiber-optic cable coating
- Glass fiber reinforced composite
- PBT film
- Flame-retardant composite
- Industrial spare parts
- PBT masterbatch

4 Glass epoxy copper clad laminate

Composite epoxy copper clad laminate is made by pressing fiber glass with different base materials (insulation paper or fiber glass mat) that are impregnated with epoxy resin. It offers the advantages of low price and is suitable for punching processing.

Product applications

- Home appliance
- Computers & consumer electronics
- LED
- Vehicle board

5 Paper-phenolic copper clad laminate

Paper-phenolic copper clad laminate, made from bleached kraft paper impregnated with phenolic resin, offers advantages of low-cost and suitable for punching process.

Product applications

- Home appliance
- Computers & consumer electronics
- Lighting

6 Phenolic molding compounds

Chang Chun phenolic molding compounds (under trade name of LONGLITE) are heat-hardening resins. Formulated based on the needs and usages of our customers, our phenolic molding compounds are produced by mixing different materials and pigments to the base phenolic resin which we also manufacture.

Product applications

- Cookware handles
- Electrical parts
- Motor parts
- Frames/Holders for various products
- Auto parts

7 Insulation paper

Chang Chun's insulation paper is used mainly in phenolic resin copper clad laminate (CCL), CEM-1 composite CCL, PCB back up boards, laminated sheets, and decorative boards. Our insulation paper offers high level of cleanliness and excellent resin impregnation rate. Its size and properties can be tailored to meet the specific needs of each customer.

Product applications

- Printed circuit board/phenolic laminates

8 Liquid crystal polymers

Liquid crystal polymer (LCP) is a polymer made with high temperature resistance monomers. Due to its structural arrangement at high temperature, liquid crystal polymers possess excellent flow properties and can act as a halogen-free flame retardant.

Product applications

- Electronic connector
- Automobile parts: connectors, motors, lights
- Cooling fan

9 Polybutylene terephthalate resins (compounding)

Polybutylene Terephthalate, PBT for short, is a thermoplastic polyester resin derived from copolymerization of 1,4-butanediol and terepthalic acid (PTA). Fiber glass can be added in the later stage of production to strengthen the product. Other additives can also be added to give PBT resins various electrical or mechanical advantages or to improve other attributes, such as fire retardation.

Product applications

- Electronic connectors
- Automobile parts: connectors, motors, lights
- Cooling fans
- Home appliances
- Lighting parts

10 Melamine resin adhesive

Our melamine resin adhesives are bonding agents that were designed for manufacturing water-resistant plywood, allowing plywood's veneers to have more relaxed/higher moisture content. These adhesives are manufactured via reaction of melamine and formaldehyde using a special catalyst and denaturant. With specially added catalyst and suitable amount of extender, the shearing strength can be improved and can be compliant with Taiwan's CNS 1349/1350 national standards for plywood.

Product applications

- Adhesives

11 Urea resin adhesive

Chang Chun's urea resin adhesive is a liquid adhesive which is produced by reacting urea with formaldehyde using a special catalyst and denaturant. It offers excellent water resistance when a catalyst and appropriate amount of extender are added.

Product applications

- Adhesive

Textiles

1 Phosphorus flame retardants

Our phosphorus flame retardants are halogen-free phosphate-based flame retardants. They are mainly used as flame retardant for various types of engineering plastics, rubber, and printed circuit boards that require to be more eco-friendly (i.e. green products).

Product applications

- Plastics
- PVC
- Electronics industry

2 Ethylene-vinyl acetate-vinyl chloride emulsion

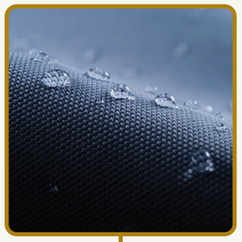
Due to EVA-VC emulsion possesses water and fire resistance, and crosslinking and bridging properties, it is used for adjoining all kinds of base materials, particularly glass fiber, metal, plastic film, porous substrate, wood and wallpaper. It forms a clear film with low surface tackiness and good resistance to alkali, lights, and aging.

Product applications

- Adhesive
- Non-woven fabric binder
- Carpet adhesive
- Textiles
- Paper impregnation binder

3 Ethylene-vinyl chloride emulsion

Ethylene-vinyl chloride (EVCL) emulsion is the copolymer of ethylene and vinyl chloride with amide functional group. As there is vinyl chloride in the polymer's backbone, the emulsion possesses excellent characteristics, such as excellent flame retardancy and water/alkaline resistance.



Product applications

- Adhesive
- Non-woven fabric binder
- Carpet adhesive
- Textiles
- Paper impregnation binder

4 Isobutanol

Isobutanol (IBA) is a byproduct obtained by hydroformylation of allyl alcohol with carbon monoxide and hydrogen, which is then followed by hydrogenation. It is a colorless liquid which is soluble in water, alcohols, and ethers.

Product applications

- Plasticizer
- Organic synthesis
- Liquid chromatography
- Solvent
- Paint remover

5 1,4-Butanediol

1,4-Butanediol (BDO) is produced by hydroformylation of allyl alcohol with carbon monoxide and hydrogen, which is then followed by hydrogenation. It is a colorless liquid with high boiling point and low toxicity.

Product applications

- Tetrahydrofuran
- Polytetramethylene ether glycol
- Polyester plasticizer
- γ-Butyrolactone
- Thermoplastic polyester

6 Alkoxylated 2-methyl-1,3-propanediol

Alkoxylated 2-methyl-1,3-propanediol is produced by alkoxylation of 2-methyl-1,3-propanediol and alkoxide. It is a colorless liquid with two primary hydroxyls groups.

Product applications

- Coating
- Polyurethane

7 2-Methyl-1,3-propanediol

2-Methyl-1,3-propanediol is a product produced through hydroformylation of allyl alcohol with carbon monoxide and hydrogen, which is then followed by hydrogenation. It is a colorless low viscosity liquid with low toxicity. It is a non-linear diol with a unique methyl branch.

Product applications

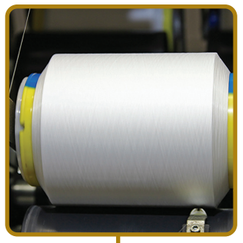
- Unsaturated polyester
- Cosmetic
- Polyester resin
- PET fiber treatment
- Coating

8 Polytetramethylene ether glycol

Polytetramethylene ether glycol (PTMEG/PTG) is produced by the acid catalyzed polymerization of tetrahydrofuran (THF). It is a straight-chain diol with repeated tetramethylene ether units.

Product applications

- Spandex production
- Synthetic leather
- Auto-material-gear shift knobs
- Elastic silk stockings
- Thermoplastic film
- Breathable, waterproof jackets
- Swimming suits
- Auto-material-seat covers



9 Polybutylene terephthalate resin (neat resin)

Polybutylene terephthalate (PBT) is a thermoplastic polyester resin produced by having 1, 4-butanediol and purified terephthalic acid (PTA) going through polycondensation and kneading process.

Product applications

- PBT fiber
- Fiber-optic cable coating
- PBT masterbatch
- PBT film
- Flame-retardant composite
- Industrial spare parts
- Glass fiber reinforced composite

10 Thermoplastic polyester elastomer (TPEE)

TPEE is produced by 1,4-butanediol, polytetra-methylene glycol, and DMT or PTA going through copolymerization condensation. It also can be made into thermoplastic polyester elastomer composites through kneading procedure.

Product applications

- Industrial spare parts
- Glass fiber reinforced composite
- TPEE fiber
- Flame-retardant composite

11 Polyvinyl alcohol

Polyvinyl alcohol (PVA), a white/yellowish granule or powder, is a stable, non-toxic, and water-soluble polymer. PVA possesses good film-forming property, and the film formed from it has excellent adhesion, solvent-resistance, abrasion-resistance, high tensile strength, and great oxygen barrier property.

Product applications

- Warp sizing agent
- Raw material for PVA sponge & grinding discs sanding paper
- Paper industry
- Plywood, woodworking industry
- Screen printing
- Textile/Fabric finishing chemicals
- PVAc, PVC, PS
- Construction industry
- Packaging material
- Printing industry

12 Polyvinyl acetate emulsion

Polyvinyl acetate emulsion is a thermoplastic polymer. Because of its excellent adhesion and convenience, it is widely used as adhesive for paper and woodwork.

Product applications

- Textile stiffener
- Woodware adhesive
- Coating resin
- Paper tubes adhesive

13 Glacial acetic acid

Acetic acid is a colorless transparent liquid with pungent sour odor. It is also known as glacial acetic acid whenever the purity is 99.5% or more. Acetic acid is soluble in water, alcohols, and ethers and is used in man-made fibers, rubber, plastics, agriculture, herbicides and leather.

Product applications

- Vinyl acetate monomer
- Pure terephthalic acid
- n-Butyl acetate
- Textile industry

14 Hydrogen peroxide

Hydrogen peroxide is a colorless transparent liquid with a slight odor of ozone and can be mixed with water in any proportion. It is used in various industries, such as: treatment of waste water, manufacture of organic peroxide, medicine, cosmetics and purification and electroplating of metal.

Product applications

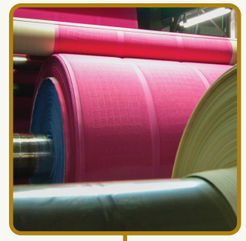
- Pulp and paper industry
- Semiconductor manufacturing
- Textile industry

15 Acrylic emulsion

Acrylic emulsion is a milky white polymeric emulsion, mainly produced with acrylic monomer undergoing polymerization, using an initiator in presence of emulsifier with water as a solvent. It possesses excellent adhesive and waterproofing properties.

Product applications

- Civil construction
- Coating
- Textile processing



16 Textile resin

Our textile resin:

1. Creates anti-shrinking and anti-wrinkle properties for artificial fibers, rayon, cotton and other cellulose fiber fabric with good durability.
2. Possesses excellent stiffening with good washing fastness for nylon, polyester, acrylic and other synthetic fibers.
3. Can be used as an adhesive for non-woven, flocking and dying when used in conjunction with thermoplastic resin, such as acrylic and rubber emulsion.

Product applications

- Textile
- Water-borne latex additives

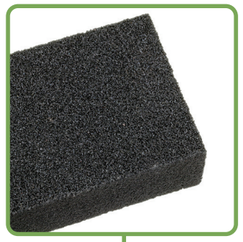
Paper & pulp

1 Paraformaldehyde

Due to our paraformaldehyde is mainly in a granular format with consistent quality, it is easy to handle and transport. Because of excellent solubility and broad applicability, it is used in products such as amino resin, ion exchange resin, etc.

Product applications

- Synthetic resin
- Coating resin
- Adhesive
- Agriculture
- Organic synthesis of pharmaceuticals



2 Polyvinyl alcohol

Polyvinyl alcohol (PVA), a white/yellowish granule or powder, is a stable, non-toxic, and water-soluble polymer. PVA possesses good film-forming property, and the film formed from it has excellent adhesion, solvent-resistance, abrasion-resistance, high tensile strength, and great oxygen barrier property.

Product applications

- Warp sizing agent
- Textile/Fabric finishing chemicals
- PVAc, PVC, PS
- Screen printing
- Plywood, woodworking industry
- Packaging material
- Paper industry
- Construction industry
- Printing industry
- Raw material for PVA sponge & grinding discs sanding paper

3 Polyvinyl acetate emulsion

Polyvinyl acetate emulsion is a thermoplastic polymer. Because of its excellent adhesion and convenience, it is widely used as adhesive for paper and woodwork. It is even used as a household adhesive/glue after re-packaged into smaller containers.

Product applications

- Woodware adhesive
- Paper tubes adhesive
- Textile stiffener
- Coating resin

4 Hydrogen peroxide

Hydrogen peroxide is a colorless transparent liquid with a slight odor of ozone and can be mixed with water in any proportion. Its molecular formula is H_2O_2 (with molecular weight of 34). Hydrogen peroxide is an economical chemical that is widely used in various industries, such as: bleaching of textiles and pulp, treatment of waste water, manufacture of organic peroxide, medicine, cosmetics and purification and electroplating of metal.

Product applications

- Pulp & paper industry
- Semiconductor manufacturing
- Textile industry

5 HDPE drum

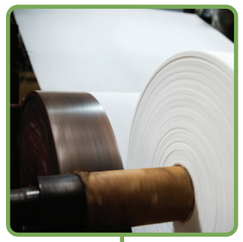
The unique characteristics of Chang Chun's HDPE drums are that they are approved by the UN, MIPI (International Packaging Association), and is also ISO 9002 certified. Our drums are corrosion-resistance, which means that the goods contained in them will not be subject to the risk of contamination as result of erosion caused by harsh weather or by storing outdoors. Employing one-piece molding, the thickness of the barrel wall has been optimized during design, and the radial and axial strength have been enhanced to pass a variety of tests. Our HDPE drums are produced using equipments from Germany's MAUSER Group. Our drums offer advantages of stable quality and high safety, and they are widely used around the world.

Product applications

- Chemical containers

6 Acrylamide

Our acrylamide aqueous solutions are produced by having acrylonitrile undergoing through hydration reaction. Our acrylamide solutions are extremely stable and have excellent quality. Polymeric and copolymeric products made from acrylamide are widely used for paper chemicals, coagulants, adhesives, petroleum engineering, agricultural engineering, civil construction, processing of leather, and metal coating.



Product applications

- Paper chemicals
- Coagulants
- Adhesive

7 Flocculants

Our flocculants are specially designed for the treatment of various types of industrial wastewater, such as municipal or paper industry wastewater. When added into turbid water suspended with particles, flocculants neutralize the electric charges of polymeric particles suspended in the water and promote adsorption and bridging of these polymers. As result, rapid agglomeration and the sedimentation will occur, leading to faster separation and clarification of the wastewater, and thereby improve operating efficiency and reduce costs.

Product applications

- Wastewater treatment in the pulp & paper industry

8 Dry paper strength resins

Polyacrylamide resins are suitable for near-neutral papermaking conditions. The resins can be set only with a small amount of alum complex. Dry paper strength resins can improve selected paper properties, including the bursting strength and ring crush strength.

Product applications

- Paper industry

9 Wet paper strength resins

Wet paper strength resins can improve the binding strength between fibers and reduce paper surface's electrical charge. At the same time, they can improve absorption of the long fibers and thereby enhancing paper's wet strength and drainage. Wet paper strength resins also prevent pilling or the generation of fine particles on the paper surface. They are widely used in household paper products, such as napkin, make-up remover wipes, paper towel, and special paper.

Product applications

- Paper industry

Plastics & molding materials

1 Antioxidants

Our hindered phenol antioxidants and phosphites antioxidants are produced in order to prevent or delay physical properties or color changes caused by oxidation and to extend the processability and service life of plastic products.

Product applications

- Plastic
- Rubber
- PVC stabilizers
- Lube oil
- Plasticizer
- Polyether polyol, polyurethane

2 Phosphorus flame retardants

Our phosphorus flame retardants are halogen-free phosphate-based flame retardants. They are mainly used as flame retardant for various types of engineering plastics, rubber, and printed circuit boards that require to be more eco-friendly (i.e. green products).

Product applications

- Plastics
- PVC
- Electronics industry

3 Polyester plasticizers

Polyester plasticizers are plasticizers for PVC plastics. Because of good resistance to oil and great migration-resistance to PS and ABS plastic, they are used in non-migrating wire jackets/insulation, adhesive tapes, gaskets, tapes or oil-resistant pipes or gloves. When treated with polyester plasticizer, rubber products' resistance to oil/cold/heat are greatly improved compared to other plasticizers.

Product applications

- Plastics
- Rubber & elastomer
- Adhesive

4 Stabilizers

Our stabilizers can be divided into non-toxic calcium/zinc type, foaming type, and other liquid type. Because of consistent quality, thermal stability and excellent processability, they are suitable for PVC products that are required to be non-toxic or free of heavy metal, such as toys, gloves, medical supplies, water pipes, plastic wraps, wiring jackets/insulations, rods, artificial leather, electrical tapes, and wallpapers.

Product applications

- PVC stabilizers
- PVC stabilizers Intermediate

5 1,4-Butanediol

1,4-Butanediol (BDO) is produced by hydroformylation of allyl alcohol with carbon monoxide and hydrogen, which is then followed by hydrogenation. It is a colorless liquid with high boiling point and low toxicity.

Product applications

- Tetrahydrofuran
- Polytetramethylene ether glycol
- Polyester plasticizer
- γ-Butyrolactone
- Thermoplastic polyester

6 Polytetramethylene ether glycol

Polytetramethylene ether glycol (PTMEG/PTG) is produced by the acid catalyzed polymerization of tetrahydrofuran (THF). It is a straight-chain diol with repeated tetramethylene ether units.

Product applications

- Spandex production
- Synthetic leather
- Auto-material-gear shift knobs
- Elastic silk stockings
- Thermoplastic film
- Breathable, waterproof jackets
- Swimming suits
- Auto-material-seat covers

7 Ethylene vinyl alcohol copolymer

Our ethylene vinyl alcohol copolymer is a thermoplastic polymer without any plastic additive. It can be used to produce high oxygen barrier films and sheets. Due to water absorption will impact its barrier property, it is usually used with multi-layer co-extrusion production equipments.

Product applications

- Fuel tanks
- Food packaging

8 Melamine resin glazing powder

Melamine resin glazing powder is a product that is independently developed by Chang Chun Group. It performs well in molding, based on the advantages of good flow properties, high gloss, and low free formaldehyde content. It can be used as paper coating after water is added.

Product applications

- Melamine resin glazing powder

9 Melamine resin molding compound

Our melamine resin molding compound is developed independently. Our melamine resin molding compound has excellent molding capability, good flow properties, high gloss, and low free formaldehyde. It is manufactured in accordance with ASTM D-704-62 Type I, JIS K-6917, JIS S-2029 and CNS 2985 standards. Colors customization is available to meet each customer's specific needs.

Product applications

- Melamine resin molding compound

10 Polybutylene terephthalate resin (neat resin)

Polybutylene terephthalate (PBT) is a thermoplastic polyester resin produced by having 1,4-butanediol and purified terephthalic acid (PTA) going through polycondensation and kneading process.

Product applications

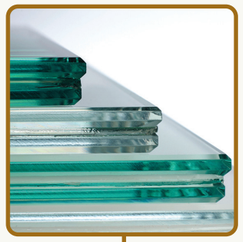
- PBT fiber
- Industrial spare parts
- Glass fiber reinforced composite
- PBT film
- PBT masterbatch
- Flame-retardant composite
- Fiber-optic cable coating

11 Polyvinyl alcohol

Polyvinyl alcohol (PVA), a white/yellowish granule or powder, is a stable, non-toxic, and water-soluble polymer. PVA possesses good film-forming property, and the film formed from it has excellent adhesion, solvent-resistance, abrasion-resistance, high tensile strength, and great oxygen barrier property.

Product applications

- Warp sizing agent
- Textile/Fabric finishing chemicals
- PVAc, PVC, PS
- Screen printing
- Plywood, woodworking industry
- Packaging material
- Paper industry
- Construction industry
- Printing industry
- Raw material for PVA sponge & grinding discs sanding paper



12 Thermoplastic polyester elastomer (TPEE)

TPEE is produced by 1,4-butanediol, polytetra-methylene glycol, and DMT or PTA going through copolymerization condensation. It also can be made into thermoplastic polyester elastomer composites through kneading procedure.

Product applications

- Industrial spare parts
- Glass fiber reinforced composite
- TPEE fiber
- Flame-retardant composite

13 HDPE drum

Chang Chun's HDPE drums are approved by the UN, MIPI (International Packaging Association), and is also ISO 9002 certified. Our drums are corrosion-resistance, which means that the goods contained in them will not be subject to the risk of contamination as result of erosion caused by harsh weather or by storing outdoors. Employing one-piece molding, the thickness of the barrel wall has been optimized during design, and the radial and axial strength have been enhanced.

Product applications

- Chemical containers

14 Bisphenol A

Bisphenol A (BPA) is produced through the reaction of phenol and acetone. It's white granule. It is soluble in acetone but insoluble in water. Under normal pressure, it will decompose at 180℃. It is mainly used as the raw material to produce polycarbonate and epoxy resin products. The products made with BPA possess extremely good performance, including lightweight, transparency, and resistance to impact and heat.

Product applications

- Polycarbonate
- Epoxy resin
- Tetrabromobisphenol A
- Thermal paper
- Antioxidants for PVC

15 Brominated epoxy flame retardant

Brominated epoxy flame retardant is an epoxy resin-based flame retardant with high bromine content. It can be added to variety of engineering plastics, such as PP, PA, PE, PS, ABS, PET, and PBT. Compared to traditional TBBA-based flame retardant, products treated with brominated flame retardant will have better thermal/ dimensional stability and chemical resistance.

Product applications

- Fire-retardant for plastic

16 E-glass fiber chopped strand

Used together with engineering plastics, nylon, phenolic molding compound, or polypropylene, glass fiber can strengthen the plastics materials.

Product applications

- Plastic strengthening

17 Phenolic resin

Phenolic resin is the reaction product of phenol and formaldehyde. It offers good mechanical strength, dimensional/thermal stability, and good resistance to electricity, solvent, and acid.

Product applications

- Decorative laminate
- Thermal insulation
- Molding material
- Refractories
- Abrasive tools
- Friction material
- Casting

18 Epoxidized soybean oil

Our CP Cizer B-22 is an epoxidized soybean oil utilizing technologies from Adeka Corporation of Japan as part of technological cooperation. Due to its non-toxicity, our CP Cizer B-22 can be used as a stabilizer/plasticizer for PVC products. Our B-22D is specially developed to tailor the needs of our customers who require low odor for their PVC stabilizer/plasticizer.

Product applications

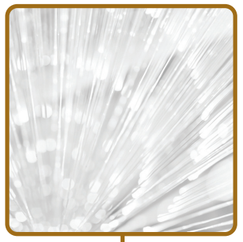
- PVC rubber & regular plastic
- Coating

19 Liquid crystal polymers

Liquid crystal polymers (LCP) is a polymer made with high temperature resistance monomers. Due to its structural arrangement at high temperature, liquid crystal polymers possess excellent flow properties and can act as a halogen-free flame retardant.

Product applications

- Electronic connector
- Automobile parts: connectors, motors, lights
- Cooling fan



20 Liquid crystal polymer resins

Liquid crystal polymer (LCP) resins are made with polymerization of monomers that have high temperature resistance. Due to LCP's structural arrangement at high temperature, they possess excellent flow properties and can act as a halogen-free flame retardant, which can be rated up to UL94V0.

Product applications

- Composite material
- Thin-film

21 Polybutylene terephthalate resins (compounding)

Polybutylene Terephthalate, PBT for short, is a thermoplastic polyester resin derived from copolymerization of 1,4-butanediol and terepthalic acid (PTA). Fiber glass can be added in the later stage of production to strengthen the product. Other additives can also be added to give PBT resins various electrical or mechanical advantages or to improve other attributes, such as fire retardation. It is high performance engineering plastic with the widest uses.

Product applications

- Cooling fans
- Home appliances
- Electronic connectors
- Lighting parts
- Automobile parts: connectors, motors, lights

22 α-Cyanoacrylate adhesive

Our α-Cyanoacrylate adhesive (or commonly known as instant/quick glue) is a single-component, fast reacting, and solvent-free adhesive developed with our own research. It can be used to bind marble, plastic, wood, metal, rubber and ceramic within very short period of time at room temperature. It is a multi-purpose adhesive with excellent storability. Our product conforms to Japanese JIS K 6861 testing method.

Product applications

- Instant/quick glue

Coatings & adhesives

1 Antioxidants

Our hindered phenol antioxidants and phosphites antioxidants are produced with highly automated production equipment and utilizing advanced technologies from Adeka Corporation (formerly Asahi Denka Co., Ltd) of Japan. Antioxidants are indispensable and important additives for various products, such as plastics, resins, and rubbers, in order to prevent or delay physical properties or color changes caused by oxidation and to extend the processability and service life of these plastic products. Applications include ABS, PS, PVC, PE, PP, engineering plastics, PU resin, adhesive, rubbers, etc.

Product applications

- Plastic
- Rubber
- PVC stabilizers
- Lube oil
- Plasticizer
- Polyether polyol, polyurethane

2 Polyester plasticizers

Polyester plasticizers are plasticizers for PVC plastics. Because of good resistance to oil and great migration-resistance to PS and ABS plastic, they are often used in non-migrating wire jackets/insulation, adhesive tapes, gaskets, tapes or oil-resistant pipes or gloves. In addition, they can be used for rubber. When treated with polyester plasticizer, rubber products' resistance to oil/cold/heat are greatly improved compared to other plasticizers.

Product applications

- Plastics
- Rubber & elastomer
- Adhesive

3 Ethyl acetate

Ethyl acetate is produced by hydrogenation of vinyl acetate. This ester is a colorless liquid with a special aromatic odor.

Product applications

- Coating
- Chemical synthesis

4 Ethylene-vinyl chloride emulsion

Ethylene-vinyl chloride (EVCL) emulsion is the copolymer of ethylene and vinyl chloride with amide functional group. As there is vinyl chloride in the polymer's backbone, the emulsion possesses excellent characteristics, such as excellent flame retardancy and water/alkaline resistance.

Product applications

- Adhesive
- Non-woven fabric binder
- Carpet adhesive
- Textiles
- Paper impregnation binder

5 Ethylene-vinyl acetate-vinyl chloride emulsion

The main ingredient in ethylene-vinyl acetate-vinyl chloride emulsion (EVA-VC emulsion) is vinyl chloride, which offers excellent water and fire resistance. Due to EVA-VC emulsion possesses both crosslinking and bridging properties, it is widely used for adjoining all kinds of base materials, particularly glass fiber, metal, plastic film, porous substrate, wood and wallpaper. It forms a clear film with low surface tackiness and good resistance to alkali, lights, and aging.

Product applications

- Adhesive
- Non-woven fabric binder
- Paper impregnation binder
- Textiles
- Carpet adhesive

6 Vinyl acetate-ethylene copolymer emulsion

Vinyl acetate-ethylene copolymer emulsion (VAE Emulsion) is a copolymer of vinyl acetate and ethylene. It has been developed as a powerful base adhesive, offering the following unique characteristics: strong initial adhesion, high wet tack, good creep resistance, water/alkali-resistance, improved thickening response, and safe operation.

Product applications

- Adhesive (furniture & decoration)
- Construction
- Packaging & paper adhesive
- Textile & non-woven fabric
- Paint & coating (waterproofing concrete)
- Paint & coating (VAE emulsion for coating)

7 Vinyl acetate-ethylene redispersible powder

After spray drying, VAE emulsion is turned into a white powder which is a copolymer of ethyl and vinyl acetate. It is free-flowing and is easy to emulsify. When dispersed in water, it forms a stable emulsion. Possessing the typical characteristics of VAE emulsion, this free-flowing powder offers greater convenience in handling and storage. It can be used by mixing with other powder-like materials, such as cement, sand and other lightweight aggregate, and it can also be used as a binder in building materials and adhesives.

Product applications

- Gypsum slurry
- External wall insulation system
- Ceramic tile adhesive
- Repair mortar
- Self-leveling cement compound/concrete
- Joint grouts

8 Vinyl acetate

Vinyl acetate monomer (VAM) is a reactive colorless liquid chemical that is produced by gaseous reaction of ethylene, acetic acid, and oxygen in the presence of a catalyst. Hydroquinone is added as a stabilizer to inhibit polymerization during storage.

Product applications

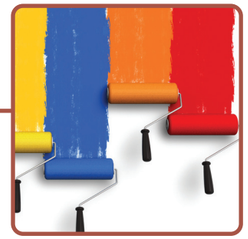
- Polyvinyl butyral
- Ethylene copolymer
- Ethylene-vinyl chloride copolymer
- Polyvinyl alcohol
- Vinyl chloride copolymer
- EVA resin
- Polyvinyl acetate

9 Alkoxylated 2-methyl-1,3-propanediol

Alkoxylated 2-methyl-1,3-propanediol is produced by alkoxylation of 2-methyl-1,3-propanediol and alkoxide. It is a colorless liquid with two primary hydroxyls groups. Our current products include both ethoxylated and propoxylated 2-methyl-1,3-propanediols.

Product applications

- Coating
- Polyurethane



10 Isobutanol

Isobutanol (IBA) is a byproduct obtained by hydroformylation of allyl alcohol with carbon monoxide and hydrogen, which is then followed by hydrogenation. It is a colorless liquid which is soluble in water, alcohols, and ethers.

Product applications

- Plasticizer
- Organic synthesis
- Paint remover
- Solvent
- Liquid chromatography

11 2-Methyl-1,3-propanediol

2-Methyl-1,3-propanediol is a product produced through hydroformylation of allyl alcohol with carbon monoxide and hydrogen, which is then followed by hydrogenation. It is a colorless low viscosity liquid with low toxicity. It is a non-linear diol with a unique methyl branch.

Product applications

- Unsaturated polyester
- Cosmetic
- Polyester resin
- PET fiber treatment
- Coating

12 n-Propanol

n-Propanol is a byproduct obtained by hydroformylation of allyl alcohol with carbon monoxide and hydrogen, which is then followed by hydrogenation. It is a colorless liquid with alcohol odor. It is moderate volatilite and is soluble in water, alcohols, and ether.

Product applications

- Coating
- Medicine

13 n-Propyl acetate

n-Propyl acetate is synthetically produced by having acetic acid and 1-propanol undergoing esterification reaction. It is a colorless transparent liquid at room temperature with typical ester properties. It has a special fruity odor and can be dissolved in both ethanol and ethyl ether.

Product applications

- Paint
- Printing ink
- Resin solvent

14 Tetrahydrofuran

Tetrahydrofuran (THF) is produced by dehydration of 1,4-butanediol. It is a neutral, colorless, volatile cycloaliphatic ether. It is highly polar and miscible with water. As an aprotic and medium polarity solvent, tetrahydrofuran is an excellent solvent for many organic substances. The chemical formula of this cyclic ether is $(CH2)_4O$.

Product applications

- Chemical raw materials
- Reaction solvent
- Solvent
- Treatment agent

15 Ethylene vinyl alcohol copolymer

Trade named under EVASIN, our ethylene vinyl alcohol copolymer is a special thermoplastic polymer without any plastic additive. It can be used to produce high oxygen barrier films, sheets and other various food packaging materials. Because of its superior gas barrier function, its application has been widened in recent years. Due to water absorption will impact its barrier property, it is usually used with multi-layer co-extrusion production equipments.

Product applications

- Fuel tanks
- Food packaging

16 Paraformaldehyde

Chang Chun Group has been producing paraformaldehyde since Oct. 1983. Due to our paraformaldehyde is mainly in a granular format with consistent quality, it is easy to handle and transport. Because of excellent solubility and broad applicability, it is used in products such as synthetic resin, phenolic resin, urea resin, amino resin, melamine resin, coating resin, ion exchange resin, organic synthesis, etc.

Product applications

- Synthetic resin
- Coating resin
- Organic synthesis of pharmaceuticals
- Adhesive
- Agriculture

17 Polyvinyl alcohol

Polyvinyl alcohol (PVA), a white/yellowish granule or powder, is a stable, non-toxic, and water-soluble polymer. PVA possesses good film-forming property, and the film formed from it has excellent adhesion, solvent-resistance, abrasion-resistance, high tensile strength, and great oxygen barrier property. Due to PVA possesses both hydrophilic and hydrophobic functional groups, it can act as surfactant, and can be used as a protective colloid in polymer emulsification and suspension polymerization.

Product applications

- Warp sizing agent
- Paper industry
- Textile/Fabric finishing chemicals
- Screen printing
- PVAc, PVC, PS
- Plywood, woodworking industry
- Printing industry
- Packaging material
- Construction industry
- Raw material for PVA sponge & grinding discs sanding paper

18 Polyvinyl acetate emulsion

Polyvinyl acetate emulsion is a thermoplastic polymer. Because of its excellent adhesion and convenience, it is widely used as adhesive for paper and woodwork. It is even used as a household adhesive/glue after re-packaged into smaller containers.

Product applications

- Woodware adhesive
- Textile stiffener
- Paper tubes adhesive
- Coating resin

19 Polyvinyl alcohol solution

Our PVA solution is produced by dissolving our own PVA with water. In consideration that some customers do not have their own dissolution equipment, these aqueous solutions are typically formulated according to the specifications of our customers, and thereby adding values and further improving the business image.

Product applications

- Stationery & paper adhesive
- Label adhesive

20 Glacial acetic acid

Acetic acid is a colorless transparent liquid with pungent sour odor. It is also known as glacial acetic acid whenever the purity is 99.5% or more. Acetic acid is soluble in water, alcohols, and ethers and is widely used in man-made fibers, rubber, plastics, agriculture, herbicides, leather, organic salts, dyes and textiles.

Product applications

- Vinyl acetate monomer
- n-Butyl acetate
- Pure terephthalic acid
- Textile industry

21 Methyl acetate

Methyl acetate is a colorless transparent liquid with a fruit-like fragrance. It's low-toxic, but it's flammable with the boiling point at 57℃, melting point at -98.05℃ and density of 0.93. It's usually used to replace acetone, butanone, ethyl acetate and cyclopentane. Due to its low toxicity, methyl acetate can fufill the environmental requirements of coating, ink, resin and adhesive industries.

Product applications

- Coating
- Organic solvent

22 n-Butyl acetate

With the density of 0.88, boiling point at 124-128℃ and melting point at -76℃, n-butyl acetate is an excellent organic solvent. As a flammable colorless liquid, it can well dissolve cellulose acetate butyrate, ethyl cellulose, chlorinated rubber, polystyrene, and many natural gums and resins. Therefore, it is widely used for nitrocellulose cleaning and as a solvent for processing synthetic leather, fabric, and plastic. It is also used as extractant for all kinds of petroleum processing and pharmaceutical chemistry.

Product applications

- Artificial leather
- Artificial flavors
- Coatings

23 Acrylic emulsion

Acrylic emulsion is a milky white polymeric emulsion, mainly produced with acrylic monomer undergoing polymerization, using an initiator in presence of emulsifier with water as a solvent. It possesses excellent adhesive and waterproofing properties.

Product applications

- Civil construction
- Coating
- Textile processing

24 Amino resin

Amino resin works well in conjunction with acrylic resin, alkyd resin, polyester resin or epoxy resin to make baking varnish. It is used as a primer for automotive, bicycles, computer shells, electrical appliances, lumps and metals.

Product applications

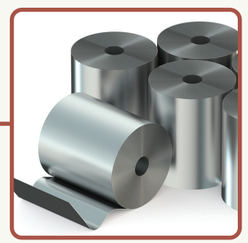
- Carpentry coating
- Auto enamel coating

25 Acrylic resins

Acrylic resins are polymers derived from the crosslinking reaction of acrylic acid and acrylate. They have fairly good resistance to weather/water/chemicals. They are used in the coating of electrical appliances, wood ware, metal, plastic and building materials.

Product applications

- Automotive touch-up paint
- PU oil cement coating for architecture
- Metal baked enamel coating



26 High solids amino crosslinking agents

High solids amino crosslinking agents are used in coating products as a bridging agent when mixed with other resins.

Product applications

- Can coating
- Automotive coating
- Steel coil coating

27 Acetone

In technical cooperation with Honeywell UOP of the USA (formerly known as UOP LLC), Chang Chun Group produces high-purity acetone via the cumene process. At room temperature, acetone is a colorless, highly volatile, flammable liquid with fragrant smell. It is also dangerous as it can react violently with strong oxidizer. It's soluble in water, methanol, ethanol, ether, chloroform and pyridine, and it can also dissolve oil, fat, resin, rubber, cellulose acetate and cellulose nitrate. It's an important volatile organic solvent.

Product applications

- Production of bisphenol A
- Production of methyl methacrylate
- Production of isopropanol
- Production of methyl isobutyl ketone
- Production of diacetone alcohol (solvent)

28 Phenol

With technical cooperation with Honeywell UOP (formerly known as UOP LLC) of the USA, we produce high-purity phenol via the cumene process. Phenol is white crystals under normal temperature, with melting point at 40.7℃. It's soluble in ethanol, acetic acid, glycerol, chloroform, carbon disulfide and benzene. Its main downstream applications include production of bisphenol A, phenolic resin, epoxy resin, caprolactam, cyclohexanone, and alkyl phenol.

Product applications

- Production of bisphenol A
- Production of phenolic resin
- Production of epoxy resin
- Production of caprolactam
- Production of cyclohexanone
- Production of alkylphenol

29 Phenolic resin

Phenolic resin is the reaction product of phenol and formaldehyde. It offers good mechanical strength, dimensional/thermal stability, and good resistance to electricity, solvent, and acid. It is widely used in molding materials (including electronic packaging materials), laminating materials, polishing materials, bonding, impregnation, casting and other applications.

Product applications

- Decorative laminate
- Refractories
- Casting
- Thermal insulation
- Abrasive tools
- Molding material
- Friction material

30 Propylene glycol monomethyl acetate

Propylene glycol monomethyl ether acetate (PGMEA/PMA), also known as propylene glycol methyl ether acetate, is a colorless hygroscopic liquid with a unique odor. It is a non-polluting solvent with multi-functional groups. Its molecular formula is $C_6H_{12}O_3$. Not only it is used as a solvent for printing ink, paint, ink, textile dyes and textile oil, it is also used as a cleaning agent in the production of liquid crystal displays. PGMEA/PMA is flammable, and when the temperature is above 42°C, it may form explosive vapor/air mixture.

Product applications

- Electronics industry
- Textile
- Printing ink & coating

31 Epoxy resins

Chang Chun's epoxy resins are multi-purpose and high performance products developed using our own technologies. We offers broad portfolio of epoxy resins. For Bisphenol-A (BPA)-based epoxy resins (BE-series), we have solid, liquid, and solvent types, all of which are suitable for coating and composite material. We also offer brominated novolac epoxy resins (BNE-series), phenol novlac epoxy resins (PNE-series), UV masking epoxy resins (TNE-series), and other speciality novolac epoxy resins, which are tailored for special needs (i.e. high heat resistance, low absorbent, low Df, NCO modified, etc.) Our cresol novolac epoxy resins (CNE-series) are designed for semiconductors/printing ink applications.

Product applications

- Electronic components
- Copper clad laminate
- Composite material
- Anti-corrosion
- Civil construction
- Flame retardant
- Coating
- Moulding
- Resin

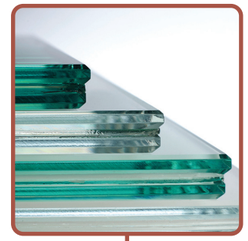
32 Acrylamide

Our acrylamide aqueous solutions are produced by having acrylonitrile undergoing through hydration reaction. Our acrylamide solutions are extremely stable and have excellent quality. Polymeric and copolymeric products made from acrylamide are widely used for paper chemicals, coagulants, adhesives, petroleum engineering, agricultural engineering, civil construction, processing of leather, and metal coating.

Product applications

- Paper chemicals
- Coagulants
- Adhesive

33 Polyvinyl butyral



Polyvinyl butyral (PVB) is a liquid-based resin produced via acetal reaction by having polyvinyl alcohol (PVA) reacting with aldehydes using acid catalyst. It shows good adhesion for glass and metal.

Product applications

- Laminated glass interlayer
- Printing ink
- Adhesive

34 Epoxidized soybean oil

Our CP Cizer B-22 is an epoxidized soybean oil utilizing technologies from Adeka Corporation of Japan as part of technological cooperation. Due to its non-toxicity, our CP Cizer B-22 can be used as a stabilizer/plasticizer for PVC products. Our B-22D is specially developed to tailor the needs of our customers who require low odor for their PVC stabilizer/plasticizer.

Product applications

- PVC rubber & regular plastic
- Coating

35 α-Cyanoacrylate adhesive

Our α-Cyanoacrylate adhesive (or commonly known as instant/quick glue) is a single-component, fast reacting, and solvent-free adhesive developed with our own research. It can be used to bind various materials within very short period of time at room temperature. It is a multi-purpose adhesive with excellent storability. Our product conforms to Japanese JIS K 6861 testing method.

Product applications

- Instant/quick glue

36 Melamine resin adhesive

Our melamine resin adhesives are bonding agents that were designed for manufacturing water-resistant plywood, allowing plywood's veneers to have more relaxed/higher moisture content. These adhesives are manufactured via reaction of melamine and formaldehyde using a special catalyst and denaturant. With specially added catalyst and suitable amount of extender, the shearing strength can be improved and can be compliant with Taiwan's CNS 1349/1350 national standards for plywood.

Product applications

- Adhesives

37 Formaldehyde (Formalin)

Our formaldehyde is produced by oxidation process. During the production, fresh air is mixed with recycled gases, and the chemical reaction occurs within the fixed bed reactor. Through metal oxides catalysis, formaldehyde gas is produced and then absorbed by water in the absorption tower. This semi-finished product is then sent to the formaldehyde barrel area to formulate the finished products with concentration ranging from 14-44%.

Product applications

- Thermosetting resin
- Adhesive
- Amine resin for coating
- Molding material
- Disinfectant

38 Trimethylolpropane

Chang Chun's trimethylolpropane (TMP) is a widely functional intermediate in the organic chemical industry. TMP can improve various resins' toughness, corrosion-resistance, and sealing strength. It is very stable against oxidation, hydrolysis, and pyrolysis. It's mainly used as the raw material for alkyd resin paint, polyurethane coating, and high-end oil coatings/paints. It can also be used for the production of plasticizers, surfactants, lubricants, synthetic leather, heat insulator, etc.

Product applications

- Used for alkyd resin production
- Used for plasticizer production
- Used for emulsifier production
- Used as fuel additives
- Used for high-quality lubricant production
- Production of Trimethylolpropane triacrylate (TMPTA)
- Production of Trimethylolpropane trimethacrylate (TMPTM)
- Production of Trimethylolpropane triesters (TMPTE)

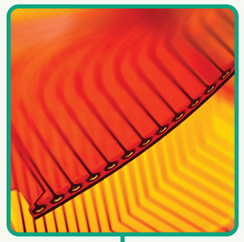
39 Urea resin adhesive

Chang Chun's urea resin adhesive is a liquid adhesive which is produced by reacting urea with formaldehyde using a special catalyst and denaturant under strictly controlled conditions. It is suitable as plywood adhesive with excellent water resistance when a catalyst and appropriate amount of extender are added.

Product applications

- Adhesive

Electronic materials



1 Phosphorus flame retardants

Our phosphorus flame retardants are halogen-free phosphate-based flame retardants. They are mainly used as flame retardant for various types of engineering plastics, rubber, and printed circuit boards that require to be more eco-friendly (i.e. green products).

Product applications

- Plastics
- Electronics industry
- PVC

2 Flexible copper clad laminates

Our flexible copper clad laminates are sold by RCCT Technology Co., Ltd., an affiliate of Chang Chung Group. They are manufactured using the technologies of Rogers Corporation, an advanced American industrial technology company and supported by Chang Chun's strong production capability. We have accumulated a rich and practical experience in the manufacturing of flexible boards. Our flexible copper clad laminates, through its quality and technology, have gained the support and trust of our customers.

Product applications

- Smartphones
- Auto pilot
- Digital cameras
- Other portable electronics

3 Polybutylene terephthalate resin (neat resin)

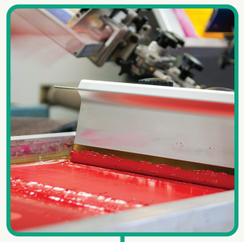
Polybutylene terephthalate (PBT) is a thermoplastic polyester resin produced by having 1,4-butanediol (BDO) and purified terephthalic acid (PTA) going through polycondensation and kneading process. Because it possesses a number of excellent features, it is widely used in the electronics, home appliance, IT, communication, and automotive industries. It is the material that is gaining the most attention among wide range of engineering plastics.

Product applications

- Fiber-optic cable coating
- PBT masterbatch
- Industrial spare parts
- PBT film
- PBT fiber
- Glass fiber reinforced composite
- Flame-retardant composite

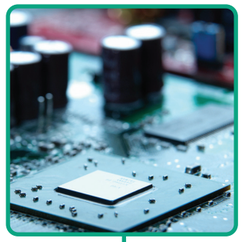
4 Polyvinyl alcohol

Polyvinyl alcohol (PVA), a white/yellowish granule or powder, is a stable, non-toxic, and water-soluble polymer. PVA possesses good film-forming property, and the film formed from it has excellent adhesion, solvent-resistance, abrasion-resistance, high tensile strength, and great oxygen barrier property. Due to PVA possesses both hydrophilic and hydrophobic functional groups, it can act as surfactant, and can be used as a protective colloid in polymer emulsification and suspension polymerization.



Product applications

- Warp sizing agent
- Textile/Fabric finishing chemicals
- Construction industry
- Screen printing
- Plywood, woodworking industry
- Packaging material
- Paper industry
- Printing industry
- PVAc, PVC, PS
- Raw material for PVA sponge and grinding discs sanding paper



5 gamma-Butyrolactone

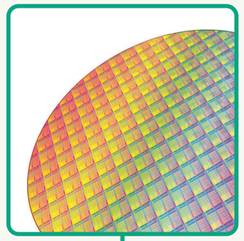
gamma-Butyrolactone (GBL) is a solvent with high-boiling point. Its advantages of good solubility, dielectric property, and stability make it suitable as an extractant, dispersant, and dyeing auxiliaries. GBL is also an important intermediate for organic synthesis and can be used in fields such as biomedical, pharmaceuticals, and agrochemical/pesticide.

Product applications

- Solvent
- Heterocyclic compounds
- Electronic industry

6 Hydrogen peroxide

Hydrogen peroxide is a colorless transparent liquid with a slight odor of ozone and can be mixed with water in any proportion. Its molecular formula is H_2O_2 (with molecular weight of 34). Hydrogen peroxide is an economical chemical that is widely used in various industries, such as: bleaching of textiles and pulp, treatment of waste water, manufacture of organic peroxide, medicine, cosmetics and purification and electroplating of metal.



Product applications

- Pulp & paper industry
- Semiconductor manufacturing
- Textile industry

7 Phenolic molding compounds

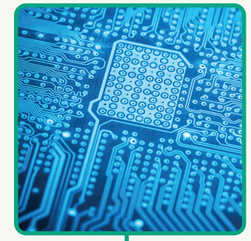
Chang Chun phenolic molding compounds (under trade name of LONGLITE) are heat-hardening resins. Formulated based on the needs and usages of our customers, our phenolic molding compounds are produced by mixing different materials and pigments to the base phenolic resin which we also manufacture.

Product applications

- Cookware handles
- Motor parts
- Auto parts
- Electrical parts
- Frames/Holders for various products

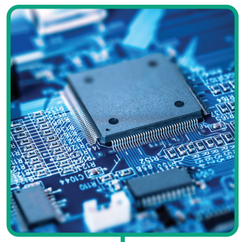
8 Copper foil

Since 1987, Chang Chun has been conducting independent R&D on manufacturing technologies for copper foil. Mass production of copper foil began in 1988, and production plants were setup in both Miaoli, Taiwan and in Changshu, Jiangsu province, China. Full range of specifications and sizes were developed for high-tech industries.



Product applications

- Printed circuit boards industry
- Lithium-ion battery industry



9 Insulation paper

Chang Chun's insulation paper is used mainly in phenolic resin copper clad laminate (CCL), CEM-1 composite CCL, PCB back up boards, laminated sheets, and decorative boards. Our insulation paper offers high level of cleanliness and excellent resin impregnation rate. Its size and properties can be tailored to meet the specific needs of each customer.

Product applications

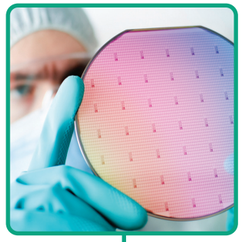
- Printed circuit board/phenolic laminates

10 Electronic grade n-butyl acetate

N-butyl acetate is a colorless transparent liquid with a pleasant fruity odor. Unlike lower molecular weight homologues, it is insoluble in water, but is miscible with organic solvents, such as alcohol, ether and ketone. It is flammable, and its toxicity is low. Moreover, inhaling n-butyl acetate in high concentration can have anesthetic effects. It can well dissolve ethyl cellulose, cellulose acetate butyrate, polystyrene, methacrylic resin, chlorinated rubber and a variety of natural gums.

Product applications

- Cleanser
- Negative-type developer



11 Wafer dicing/cleaning solution

A water-soluble cleaning solution designed for cleaning wafers during dicing in semiconductors packaging plants. It has low-surface tension with both hydrophilic and lipophilic characteristics, resulting in excellent adsorption to wafers.

Product applications

- Wafer dicing and packaging

12 High purity hydrogen peroxide for semiconductor

Chang Chun is the largest manufacturer of hydrogen peroxide in Taiwan. Hydrogen peroxide is an important chemical for cleaning wafer in semiconductor plants. Our hydrogen peroxide has the largest market share in Taiwan.

Product applications

- Semiconductor cleaning

13 Tetramethyl ammonium hydroxide (electronic grade developer for semiconductor & LCD)

Chang Chun is the earliest and also the largest manufacturer of tetramethyl ammonium hydroxide (TMAH) in Taiwan. Our 25% TMAH is mainly used by well-known TFT-LCD manufacturers in Taiwan. In addition, our 25% TMAH is also the raw material for 2.38% TMAH, which is mainly used as a developer by Taiwanese semiconductor manufacturers.

Product applications

- Developer
- Stripper
- Cleanser

14 Polyvinyl alcohol film

Chang Chun has mass produced polyvinyl alcohol (PVA) film using its own film-forming technology, combined with advantage of producing its raw material, PVA resin, on its own. Polyvinyl alcohol film is one of the important raw materials applied in packaging films.

Product applications

- Polarizers
- Sunglasses
- Artificial marble

15 Propylene glycol monomethyl acetate

Propylene glycol monomethyl ether acetate (PGMEA/PMA), also known as propylene glycol methyl ether acetate, is a colorless hygroscopic liquid with a unique odor. It is a non-polluting solvent with multi-functional groups. PGMEA/PMA is flammable, and when the temperature is above 42°C, it may form explosive vapor/air mixture.

Product applications

- Electronics industry
- Textile
- Printing ink and coating

16 Electronic grade propylene glycol monomethyl ether

Propylene glycol monomethyl ether (PGME) and ethylene glycol ether are both glycol ether solvent. From human toxicity's perspective, toxicity of propylene glycol ether is lower than that of ethylene glycol ether, thereby making PGME as low toxicity ether. PGME has a slight glycol odor but is not strongly irritating, making its usage wider and safer.

Product applications

- Cleanser & diluent for semiconductor
- Cleanser & diluent for LCD

17 Electronic grade stripper

The primary function of the stripper is to remove the excess photoresist after etching. Our electronic grade stripper is designed for TFT-LCD applications. During TFT-LCD manufacturing, stripper will be heated and then the glass substrate will be immersed. Water is then removed by rinsing with a solvent.

Product applications

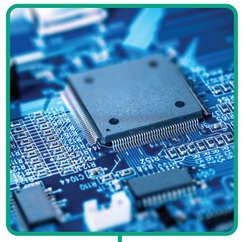
- TFT-LCD photoresist stripper

18 Electronic grade propylene glycol monomethyl ether acetate

Propylene glycol monomethyl ether acetate (PGMEA/PMA) is a colorless hygroscopic liquid with a special odor. It is a non-polluting solvent with multi-functional groups. The electronic grade, which is further purified, can be used as the photoresist solvent and cleaning agent in the production of semiconductor and liquid crystal displays.

Product applications

- Semiconductor production
- LCD production

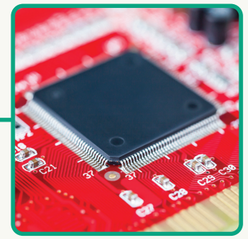


19 Epoxy resins

Chang Chun's epoxy resins are multi-purpose and high performance products developed using our own technologies. We offers broad portfolio of epoxy resins. For Bisphenol-A (BPA)-based epoxy resins (BE-series), we have solid, liquid, and solvent types, all of which are suitable for coating and composite material. We also offer brominated novolac epoxy resins (BNE-series), phenol novlac epoxy resins (PNE-series), UV masking epoxy resins (TNE-series), and other speciality novolac epoxy resins, which are tailored for special needs (i.e. high heat resistance, low absorbent, low Df, NCO modified, etc.) Our cresol novolac epoxy resins (CNE-series) are designed for semiconductors/printing ink applications.

Product applications

- Electronic components
- Copper clad laminate
- Moulding
- Coating
- Anti-corrosion
- Resin
- Civil construction
- Flame retardant
- Composite material



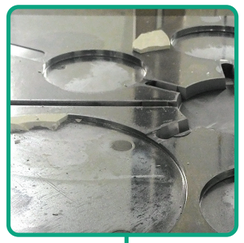
20 Epoxy molding compounds

Epoxy molding compounds possess excellent moldability and good mechanical and electrical properties. It is mainly used for semiconductor component packaging, especially for IC, diodes, transistors, photocouplers, and coils.

Product applications

- IC packaging
- Transistor packaging
- Diode packaging
- Photocoupler packaging

21 Mold cleaner for semiconductor



Semiconductor mold cleaners MC-261 and MC-701 are thermosetting resins formed by mixing melamine resin with organic and inorganic fillers. Our mold cleaners yield good results in removing residuals left on the mold after molding with epoxy resin materials. Due to the molding conditions are the same as epoxy resin, they are easy to operate.

Product applications

- Cleaning of die

22 Polyvinyl butyral

Polyvinyl butyral (PVB) is a liquid-based resin produced via acetal reaction by having polyvinyl alcohol (PVA) reacting with aldehydes using acid catalyst. It shows good adhesion for glass and metal.

Product applications

- Laminated glass interlayer
- Printing ink
- Adhesive

23 Liquid crystal polymers

Liquid crystal polymer (LCP) is a polymer made with high temperature resistance monomers. Due to its structural arrangement at high temperature, liquid crystal polymers possess excellent flow properties and can act as a halogen-free flame retardant.

Product applications

- Electronic connector
- Automobile parts: connectors, motors, lights
- Cooling fan

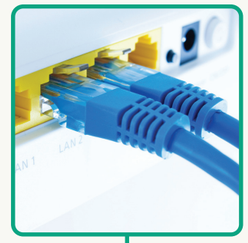
24 Liquid crystal polymer resins

Liquid crystal polymer (LCP) resins are made with polymerization of monomers that have high temperature resistance. Due to LCP's structural arrangement at high temperature, they possess excellent flow properties and can act as a halogen-free flame retardant, which can be rated up to UL94V0.

Product applications

- Composite material
- Thin-film

25 Polybutylene terephthalate resins (compounding)



Polybutylene Terephthalate, PBT for short, is a thermoplastic polyester resin derived from copolymerization of 1,4-butanediol and terepthalic acid (PTA). Fiber glass can be added in the later stage of production to strengthen the product. Other additives can also be added to give PBT resins various electrical or mechanical advantages or to improve other attributes, such as fire retardation.

Product applications

- Electronic connectors
- Automobile parts: connectors, motors, lights
- Cooling fans
- Lighting parts
- Home appliances
- Lighting parts

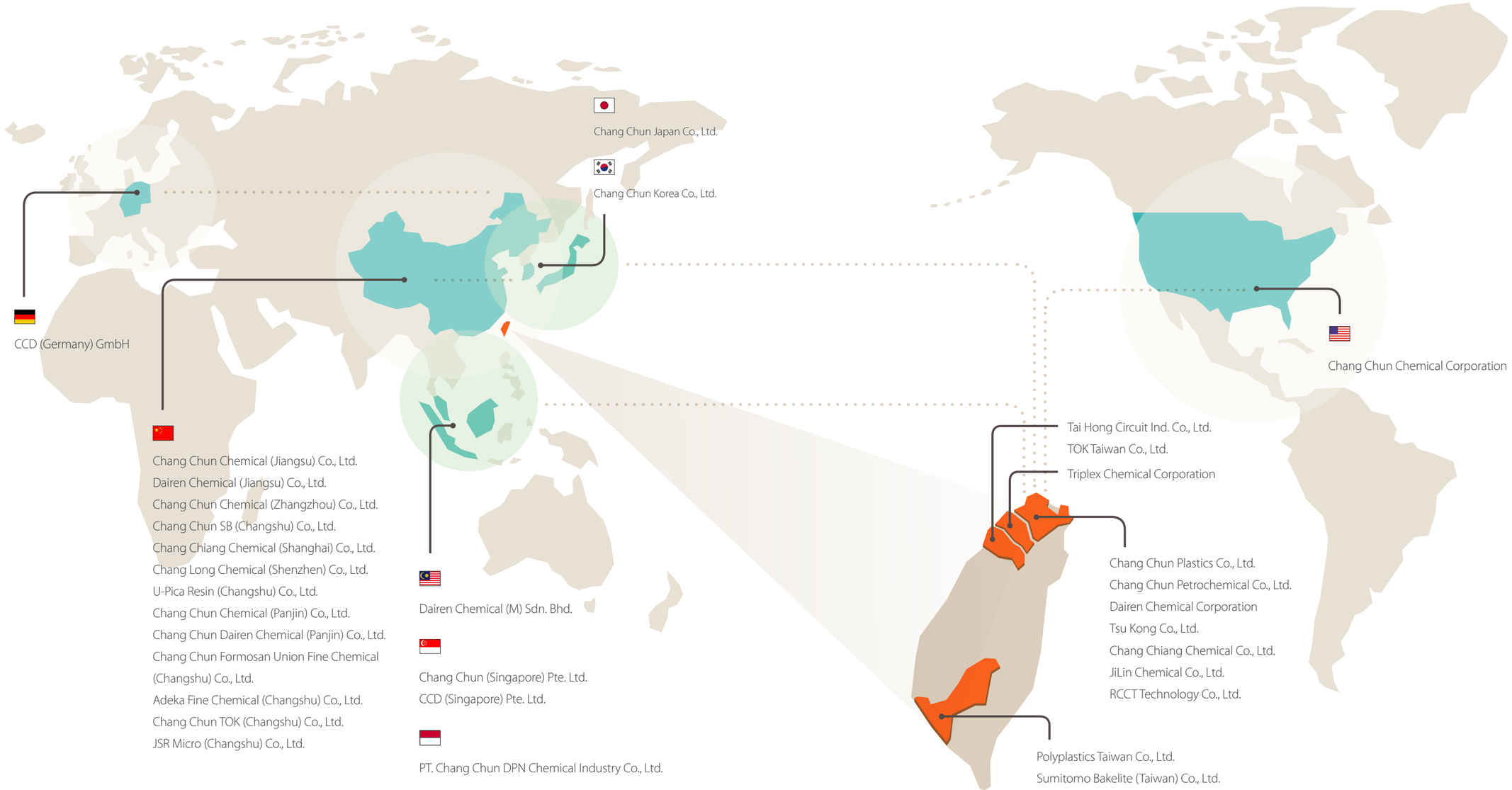
26 α-Cyanoacrylate adhesive

Our α-Cyanoacrylate adhesive (or commonly known as instant/quick glue) is a single-component, fast reacting, and solvent-free adhesive developed with our own research. It can be used to bind various materials within very short period of time at room temperature. It is a multi-purpose adhesive with excellent storability. Our product conforms to Japanese JIS K 6861 testing method.

Product applications

- Instant/quick glue

Global locations



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