

We keep on posting NEWER business opportunities for INDIA. In the series there is one more this time. This one is relatively high investment proportion and higher returns for the elite entrepreneurs.

### **CPVC making.**

Chlorinated Poly Vinyl chloride is used courtesy the following:

- Relatively low cost
- High glass transition temperature
- High heat distortion temperature
- Chemical inertness
- Outstanding mechanical, dielectric, and flame and smoke properties

It can have applications almost everywhere:

- Industrial
- Fire and safety
- Commercial & Residential Plumbing

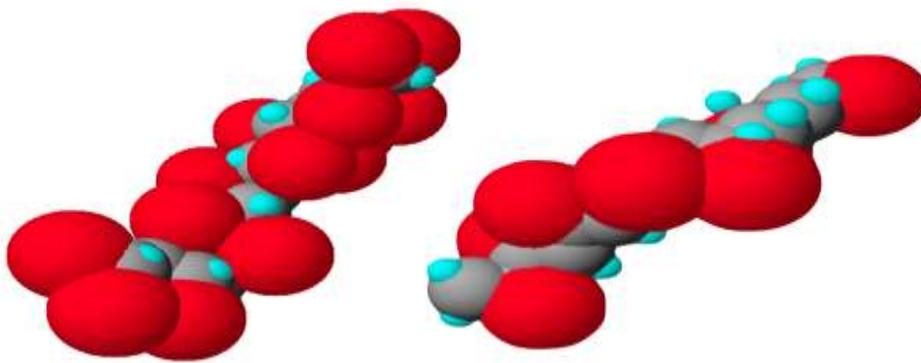
CPVC is a PVC homopolymer that has been subjected to a chlorination reaction.

### **What Is the Difference Between CPVC and PVC?**

In PVC, **chlorine atom occupies 25 percent** of the bonding sites on the carbon backbone, and the remaining sites are filled by hydrogen.

CPVC differs from PVC in that approximately **40 percent of the bonding sites** on the backbone are filled with **chlorine atoms**. The chlorine atoms surrounding the carbon backbone of CPVC are large atoms that protect the chain from attack.

The chlorine content of base PVC can be increased from 56.7 percent to as high as 74 percent, though typically most commercial CPVC resins contain 63 to 69 percent chlorine.



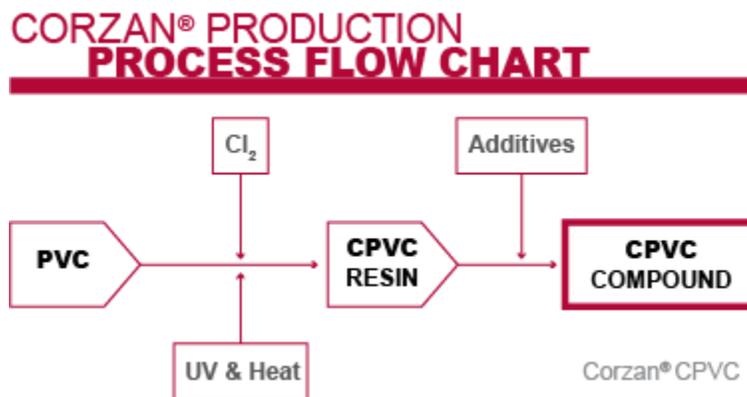
**Diagram of CPVC (left) at a molecular level compared to PVC (right). The red spheres represent chlorine elements.**

As the chlorine content in CPVC is increased, the glass transition temperature (T<sub>g</sub>) increases significantly. It's the additional chlorine molecules that protect the polymer's carbon backbone, which in turn protects its structural integrity against heat.

The increased heat resistance allows CPVC to perform at higher operating pressures

### **CPVC Additives:**

CPVC resin is then infused with additives to enhance many of the CPVC resin's inherent properties, while easing its processability.



It's this process that really starts to set CPVC apart from other thermoplastic and metal piping systems and fortifies it against the demanding environments of industrial plants.

Properties such as Specific Gravity, Modulus elasticity, Tensile strength, Compressive strength, Poisson's ratio, Co-efficient of linear expansion, Thermal conductivity improve drastically.

### **Common Applications of CPVC**

The inherent chemical resistance of CPVC, coupled with its temperature and pressure resistance, enable its use in a variety of industrial and commercial applications.

CPVC is commonly specified in applications ranging from chemical processing plants and mineral processing plants to residential homes and hotel plumbing.

### **Industrial Applications**

CPVC is a problem-free, long-lasting solution for the harshest industrial environments, and is often specified in the following industries:

- **Chemical Processing**: Reliably transport aggressive chemicals at high temperatures, under pressure, without corrosion concerns.
- **Chlor Alkali**: Transport chemicals through some of the most corrosive environments imaginable without corrosion concerns.
- **Commercial Plumbing**: Eliminate corrosion, reduce maintenance costs and improve overall reliability.
- **Mineral Processing**: Withstand the demands of precious and raw material processing operations.
- **Power Generation**: Stand up long term to the high pressures and corrosive chemicals commonly used by power plants.
- **Semiconductor**: Meet the high purity standards for cleanrooms and eliminate corrosion concerns caused by aggressive chemicals.
- **Wastewater Treatment**: Put an end to corrosion, even when transporting the most aggressive disinfection chemicals.

## Residential and Commercial Plumbing

The corrosion resistance of CPVC eliminates the possibility of pitting and scaling, regardless of water pH or chlorine levels. In addition, when the proper additives are used, CPVC is resistance to attack from both fungi and bacteria.

This equates to longer, more reliable performance than metals (such as copper), which are prone to leaching that contaminates drinking water.

CPVC provides a safe, efficient and flexible system to the following applications:

- **Hospitality**: Including restaurants and low-rise office buildings.
- **Retail**: Think mid-rise office buildings and shopping malls.
- **Education**: Covers K-12 schools, as well as colleges and universities.
- **Healthcare**: Includes hospitals, medical clinics and medical complexes.
- **Multi-Family**: Such as structures six stories or less, including apartments, condos, hotels and motels.
- **High-Rise**: Those apartments, condos and hotels that span seven stories or more.

## Residential and Commercial Fire Sprinklers

Whether a single home or a demanding high-rise, CPVC offers competitive flame and smoke properties and a simpler joining method than many alternatives. Use cases include:

- **Single family (NFPA 13D)**: Standalone housing, mobile homes.
- **Residential (NFPA 13R)**: Structures of four stories and less, including condos, hotels or motels, and multi-unit apartment buildings.

- **Commercial Residential (NFPA 13):** Structures of five stories and more, including high-rises, condos, hotels, and multi-unit buildings.

### CPVC Installation Joining Methods:

The recommended joining method for CPVC installation will depend on the product type, but across-the-board, CPVC offers the following installation advantages:

- **Lightweight:** CPVC is approximately 1/8th the weight of comparably sized steel, which helps to reduce worker strain and injuries, and eliminates the need for heavy equipment.
- **Easy to cut:** Compound properties make CPVC easier to cut than metals, allowing for more efficient on-site fabrication.
- **Simple to install and maintain:** CPVC installation requires no complex tools, electricity or highly skilled (and expensive) labor.
- **Safer:** No open flame or ignition sources are required to join the material.

There are a variety of seam welding options designed to effectively seal components together while maintaining the structural integrity of the material. Recommended installation methods will vary by product type:

- **Pipe and fittings:** Solvent cementing, hot-air welding, hot-plate welding, threading, and flanging.
- **Ducting:** Solvent cementing, hot air welding, thermoforming, extrusion welding and hot-plate welding.
- **Sheet and Lining:** High speed hot air welding and hot plate butt welding.

For the technical and processing people, important information is as below.

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Chlorinated polyvinyl chloride (CPVC) is PVC that has been chlorinated via a free radical chlorination reaction. This reaction is typically initiated by application of thermal or UV energy utilizing various approaches. In the process, chlorine gas is decomposed into free radical chlorine which is then reacted with PVC in a post-production step, essentially replacing a portion of the hydrogen in the PVC with chlorine.

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Depending on the method, a varying amount of chlorine is introduced into the polymer allowing for a measured way to fine-tune the final properties. The chlorine content may vary from manufacturer to manufacturer; the base can be as low as PVC 56.7% to as high as 74% by mass, although most commercial resins have chlorine content from 63% to 69%. As the chlorine content in CPVC is increased, its glass transition temperature ( $T_g$ ) increases significantly. Under normal operating conditions, CPVC becomes unstable at 70% mass of chlorine.

Various additives are also introduced into the resin in order to make the material more receptive to processing. These additives may consist of stabilizers, impact modifiers, pigments and lubricants.

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CPVC shares most of the features and properties of PVC, but also has some key differences. CPVC is readily workable, including machining, welding, and forming. Because of its excellent corrosion resistance at elevated temperatures, CPVC is ideally suited for self-supporting constructions where temperatures up to

200 °F (93 °C) are present. The ability to bend, shape, and weld CPVC enables its use in a wide variety of processes and applications. It exhibits fire-retardant properties.

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Important most Data for entrepreneurs: **Data is** as made available. Readers' discretion is sought for.

To go in to this project we need Rs. 65 Cr, to start to install capacity of about 20000 TPA. The investment covers Land + Building + fabrication of plant and technical know-how fees.

Please note the following, which is still encouraging.

Company	Kem One France in JV with Chemplast Sanmar At Puducherry.	Lubrizol Corporation, US Based company's plant At Dahej, Gujarat
Rs. Cr.	325	500
TPA Capacities installed	22000	55000

As per Data as organized by a big polymer manufacturing group, the demand of CPVC in India is at about 125,000 TPA. The CAGR is at about 40% since 2016. And still the two above do not make 77000 TPA so far.

The Indian CPVC pipe market is estimated to be Rs 3,200 crore and is expected to touch Rs 8,600 crore in size by 2022, simple growth at a rate of 28%.

CPVC is a problem-free, long-lasting solution for the harshest industrial environments.

This business can be with nice monopoly and in fact monopolistic competition type of business. Can think of this sir.

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The Writer, Mr. Kamal Shah, is Ahmedabad based consultats for technical textiles, Plastics processing and machniery assiting to set up new projects.