



# CENTURY MULTECH INC.

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Global provider of halogen-free flame retardants, specialty additives, and more. Complete expertise in international trade, since 1976.

# CORE AND NEW PRODUCTS

## ○ Halogen-Free Flame Retardants

- Melamine Cyanurate (MCA) – CAS No. 37640-57-6
- Melamine Polyphosphate (MCA-PP) – CAS No. 218768-84-4
- Melamine Pyrophosphate (CM-Pyro) – CAS No. 15541-60-3
- Melamine Phosphate (CM-MP) – CAS No. 20208-95-1
- Melamine (CM-Melamine)
- Melem (CM-JMA-101)
- Piperazine Pyrophosphate (JNP-2)
- Piperazine Pyrophosphate modified with P/N elements (JNP-2-3)
- Zinc Borate (CM-ZB)
- Aluminum Hydroxide (CM-ATH)
- DOPO (CM-DOPO)
- Red phosphorus paste (CM-RPP)
- Ammonium Polyphosphate water-soluble (CM-APP-W 111)
- Ammonium Polyphosphate phase II (CM-APP-201)
- Ammonium Polyphosphate phase II with melamine treatment (CM-APP-202)
- Ammonium Polyphosphate phase II with silane treatment (CM-APP-203)
- Ammonium Polyphosphate phase II with epoxy treatment (CM-APP-226)
- Expandable graphite

- For more info on our products, please visit [www.century-multech.com](http://www.century-multech.com)



# HALOGEN-FREE FLAME RETARDANTS

# MELAMINE CYANURATE (CM-MCA)

- Applications
  - primarily used for nylon
  - primarily for electrical & electronic applications (connectors, switches, etc.) made from polyamide or thermoplastic urethanes (TPU)
  - suitable for synthetic resins (i.e. PA, PVC, PS)
- Benefits
  - Halogen-free, low smoke density, low toxicity and less corrosion
  - High sublimation temperature (440°C) with high thermal resistance and thermal processing stability
  - Good economics and mechanical properties, compared to compounds containing halogen/antimony flame retardant systems
  - Lower corrosion offers advantages in the processing stage or fire hazard
  - UL94V-0 rating for unfilled or mineral filled compounds
  - UL94V-2 rating for glass filled compounds
- Packing
  - 20 kg per multi-ply paper bag (10-11 MTs per 20' container or 20-22 MTs per 40' container)
  - 25 kg per composite woven bag with inner PE lining
  - 600 kg per jumbo bag available upon request
- Additional Info
  - Can provide over 10+ grades of MCA – based on particle size and surface treatment material
  - Formulate a new MCA grade (MCA-S) – specifically for fiber and fabric applications

# MELAMINE CYANURATE - AVAILABILITY

- Our main available grades

- Granular form

Grade	Avg Particle Size
MCA-12	1 - 2 mm
MCA-30	2 - 4 mm

- Powder form

Grade	Avg Particle Size
MCA-22 <sup>1</sup>	1.1 - 1.4 $\mu\text{m}$
MCA-25	1.4 - 1.8 $\mu\text{m}$
MCA-50	$\geq 1.8 \mu\text{m}$
MCA-01	0.05 - 0.6 mm

- Surface treatment form: MCA-610 and MCA-610-2

- MCA-33 custom form<sup>2</sup>

<sup>1</sup>comparable to Ciba's MCA-15

<sup>2</sup>similar to MCA-22, except with better whiteness and an CTI index of over 600V

# MELAMINE CYANURATE - GRADES



## Century Multech Melamine Cyanurate Grades

MCA Grade	MCA022, MCA033*	MCA025	MCA050	MCA01	MCA12	MCA30	MCA610
<b>Form</b>	<b>Powder</b>	<b>Powder</b>	<b>Powder</b>	<b>Granular</b>	<b>Granular</b>	<b>Granular</b>	<b>Surface Treatment**</b>
<b>Appearance</b>	White crystal powder	White crystal powder	White crystal powder	White granules	White granules	White granules	White crystal powder
<b>MCA %</b>	≥ 99.5	≥ 99.5	≥ 97.5	≥ 99.5	≥ 99.5	≥ 99.5	97 to 99.5
<b>Water Content %</b>	≤ 0.2	≤ 0.2	≤ 0.30	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2
<b>Excess Melamine %</b>	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3	≤ 0.3
<b>Excess Cyanuric Acid %</b>	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2	≤ 0.2
<b>Average particle size</b>	≤ 1.8 μm	1.4 μm to 1.8 μm	≥ 1.8 μm	0.05 mm ≤ 90% ≤ 0.6 mm	1.0 mm ≤ 90% ≤ 2.0 mm	2.0 mm ≤ 90% ≤ 4.0 mm	≤ 3 μm
<b>pH Value, 1% aqueous</b>	5.0 – 7.0	5.0 – 7.0	5.0 – 8.0	5.0 – 7.0	5.0 – 7.0	5.0 – 7.0	5.0 – 7.0
<b>Whiteness, F457</b>	≥ 95.0	≥ 95.0	≥ 95.0	≥ 95.0	≥ 95.0	≥ 95.0	≥ 95.0

\*MCA033 properties are similar to that of MCA-022, but uniquely produced to achieve higher whiteness and a CTI Index of over 600V

\*\*MCA610 is coated with a layer of PVA (polyvinylalcohol) to improve its dispersion quality and further improve its fire retardant properties

# MELAMINE CYANURATE - PROPERTIES

<b>Appearance</b>	<b>=</b>	<b>White Crystal Powder</b>
<b>Melamine Cyanurate (%)</b>	<b>≥</b>	<b>99.5</b>
<b>Residual melamine (%)</b>	<b>≤</b>	<b>0.3</b>
<b>Residual cyanuric acid (%)</b>	<b>≤</b>	<b>0.2</b>
<b>Whiteness (%)</b>	<b>≥</b>	<b>95</b>
<b>pH value (10g/L)</b>	<b>=</b>	<b>5.0 - 7.0</b>
<b>Moisture (%)</b>	<b>≤</b>	<b>0.15</b>
<b>Water solubility (g/100ml)</b>	<b>&lt;</b>	<b>0.01</b>
<b>Thermal decomposition</b>	<b>=</b>	<b>350°C</b>
<b>Chemical Formula</b>	<b>=</b>	<b>C<sub>6</sub>H<sub>9</sub>N<sub>9</sub>O<sub>3</sub></b>
<b>Molecular weight</b>	<b>=</b>	<b>255.2</b>
<b>Melting point</b>	<b>=</b>	<b>350°C</b>
<b>Density (g/cm<sup>3</sup>) at 25°C</b>	<b>=</b>	<b>1.35 to 1.85</b>
<b>Sublimation temperature</b>	<b>=</b>	<b>440°C</b>

# MELAMINE POLYPHOSPHATE (MCA-PP)

- Applications
  - Specially used for glass-fiber reinforced nylon
  - Widely applied to thermoplastics, thermosetting plastics, rubber, and fiber
- Benefits
  - Halogen-free and very high thermal stability
  - UL94V-0 rating for nylon 66
  - UL94V-1 rating for nylon 6
  - UL94V-0 rating for nylon 6 by adding other flame retardants (i.e. pentaerythritol & ammonium polyphosphate)
- Packing
  - 25 kg per paper bag (plastic liner/paper bag)
  - 12 MTs per 20' container
- Additional Info
  - Can customize based on particle size with A, B, and C grades
  - Formulated a new MCA-PP-6A-S grade specifically for polyester applications



# MELAMINE POLYPHOSPHATE - PROPERTIES

<b>Appearance</b>	=	<b>White powder</b>
<b>Chemical Formula</b>	=	<b><math>\text{HO}(\text{C}_3\text{H}_7\text{N}_6\text{PO}_3)_n\text{H}</math></b>
<b>N content (%)</b>	=	<b>42 to 44</b>
<b>P content (%)</b>	=	<b>12 to 14</b>
<b>pH value (10g/L)</b>	=	<b>4 to 6</b>
<b>Particle size <math>\mu\text{m}</math></b>	<b>MPP-A</b>	<b><math>\text{D}_{50} \leq 2.5, \text{D}_{98} \leq 30</math></b>
<b>Particle size <math>\mu\text{m}</math></b>	<b>MPP-B</b>	<b><math>\text{D}_{50} \leq 1.7, \text{D}_{98} \leq 18</math></b>
<b>Bulk density <math>\text{kg}/\text{m}^3</math></b>	=	<b>300 to 500</b>
<b>Solubility (20°C) g/L</b>	$\leq$	<b>0.05</b>
<b>Decomposition temperature</b>	<b>MPP-A</b>	<b><math>\geq 375^\circ\text{C}</math></b>
<b>Decomposition temperature</b>	<b>MPP-B</b>	<b><math>\geq 360^\circ\text{C}</math></b>

# MELAMINE PYROPHOSPHATE (CM-PYRO)

## ○ Applications

- Useful in fabrics, nylons, paint, paper and plastics as flame retardant.
- Compatible with melamine-urea formaldehyde systems.
- Shown uses in the electronic industry when incorporated in the manufacturing of circuit boards and other equipment.

## ○ Benefits

- Can be partially used instead of ammonium polyphosphate (as a spumescent and a catalyst) in some intumescent applications.
- Can be used with epoxy and other adhesive compositions to achieve fire retardant barriers in gluelines in wood and plastic laminates.
- Useable with di-pentaerythritol as well as polyolefins.
- Useable in SMC process (unsaturated polyester resins).

## ○ Packing

- 25 kg WPP/PE bag
- 12 MT per 20' full container load

# MELAMINE PYROPHOSPHATE - PROPERTIES

<b>Appearance</b>	<b>=</b>	<b>White powder</b>
<b>N content (%)</b>	<b>≥</b>	<b>38.3</b>
<b>P content (%)</b>	<b>≥</b>	<b>14.1</b>
<b>Moisture (%)</b>	<b>&lt;</b>	<b>0.2</b>
<b>Solubility, g/100ml H<sub>2</sub>O</b>	<b>&lt;</b>	<b>0.06</b>
<b>pH value (1% aqueous)</b>	<b>=</b>	<b>3.8 ± 4</b>
<b>Conductivity, μs/cm</b>	<b>&lt;</b>	<b>500</b>

# MELAMINE PHOSPHATE (CM-MP)

## ○ Applications

- Can be applied to polyolefins, linear polyester, polyamide, some thermosetting resins, rubber, paint, latex, paper, and textiles.

## ○ Benefits

- Excellent intumescent flame retardant

## ○ Packing

- 25 kg/paper bag (plastic liner/paper bag)
- 12 MT per 20' container

# MELAMINE PHOSPHATE - PROPERTIES

<b>Appearance</b>	=	<b>White powder</b>
<b>Chemical Formula</b>	=	<b><math>C_3H_9N_6PO_4</math></b>
<b>N content (%)</b>	=	<b>42 to 44</b>
<b>P content (%)</b>	=	<b>12 to 14</b>
<b>Water content (%)</b>	≤	<b>0.3</b>
<b>pH value (10g/L)</b>	=	<b>2 to 4</b>
<b>Particle size μm</b>	=	<b>D50 ≤ 2.5</b>
<b>Solubility (20°C) g/L</b>	≤	<b>3</b>

# MELAMINE (CM-MELAMINE)

## ○ Applications

- Combined with formaldehyde to produce melamine resin. Its uses include whiteboards, floor tiles, kitchenware, fire retardant fabrics, and commercial filters.
- Can also be used in decorative and protective laminates used to manufacture furniture, flooring, and fiberboard.
- Other uses include the production of particleboards, medium density fibreboards, surface coatings, enamels, paint additives, upholstery fabrics, flame-retardant clothing, heat resistant glove and aprons, and thermal liners.

## ○ Benefits

- Available in low-pressure or high-pressure form
- Melamine contains 67% nitrogen by mass and, if mixed with resins, has fire retardant properties due to its release of nitrogen gas when burned or charred.
- Melamine resin is a synthetic polymer that is fire resistant and heat tolerant. It is a versatile material that has a highly stable structure.
- Can be easily molded while warm, but will set into a fixed form, which makes it suitable for certain industrial applications.

## ○ Packing

- 25 kg PP woven bag with PE inner bag
- 500 kg/1000kg PP/PE woven bag

# MELAMINE - PROPERTIES

<b>Molecular Formula</b>	=	<b>C<sub>3</sub>H<sub>6</sub>N<sub>6</sub></b>
<b>Molecular Weight</b>	=	<b>126.12</b>
<b>Standard Purity</b>	≥	<b>99.8%</b>
<b>Moisture</b>	≤	<b>0.10%</b>
<b>Ash</b>	≤	<b>0.03%</b>
<b>pH Value</b>	=	<b>7.5 to 9.5</b>
<b>Turbidity</b>	≤	<b>20</b>
<b>Color (Pt-Co)</b>	≤	<b>20</b>

\*available in low-pressure or high-pressure form

# MELEM (CM-JMA-101)

## ○ Description

- JMA-101 is a new product, which is part of the environmental-friendly halogen-free nitrogen-series flame retardant for high-temperature engineering plastics.
- It has high nitrogen content and good liquidity.
- It has compatibility and excellent flame retardancy with high polymer materials such as high temperature nylon.

## ○ Packing

- 20 KG per bag (composite paper bag) or 25 KG per bag (composite woven bag)

## ○ Storage

- Store in a dry and well-ventilated place to prevent dampening.

## ○ Application

- Used in engineering plastics as a flame retardant. The processing temperature can reach 350°C.



# MELEM - PROPERTIES

Appearance	=	white crystal powder
N Content %	$\geq$	55
Water Content %	$\leq$	0.3
pH Value (10 g/L)	=	4.0 to 7.0
Particle Size D [50] $\mu\text{m}$	$\leq$	25
Decomposition Temperature, -1%, $^{\circ}\text{C}$ )	$\geq$	400

# PIPERAZINE PYROPHOSPHATE (JNP-2)

## ○ USES

- JNP-2 is an environmentally friendly, halogen-free, nitrogen-phosphorus, high-efficiency flame retardant, with excellent properties. It is a white, odorless, tasteless powder. It is used as a flame retardant additive, in polyethylene and polypropylene resin, EDPM, and TPE elastomer materials.

## ○ STORAGE

- Store in a cool and dry area at room temperature. Keep away from moisture and sunlight.

## ○ PACKING

- 25 kg or 20 kg per bag (composite paper bag). 12 Metric Tons per 20' full container load.

# PIPERAZINE PYROPHOSPHATE (JNP-2)

<b>Sample Application Advice</b>			
Base Material	Suggested Dosage %	Exam Standard	FR Rating
Polypropylene (PP)	19.0 - 22.0	UL94	V-0 (1.6 mm)
<b>Application Note</b>			
<b>Formula</b>			
No.	PP %	JNP-2 compound %	Antioxidant, white oil, etc.
1	76	19	5
2	72	23	5
<b>Flame Retardant and Mechanical Properties</b>			
No.	UL94 (1.6 mm)	Tensile strength/Mpa	Flexural Modulus/Mpa
1	V-0	21.6	1920
2	V-0	22.1	1806

# PIPERAZINE PYROPHOSPHATE (JNP-2) - PROPERTIES

<b>Appearance</b>	=	<b>White crystal powder</b>
<b>N Content %</b>	$\geq$	<b>10.4</b>
<b>P Content %</b>	$\geq$	<b>23.4</b>
<b>Water Content %</b>	$\leq$	<b>0.2</b>
<b>Whiteness (F457)</b>	$\geq$	<b>92.0</b>
<b>Average Particle Size (<math>\mu\text{m}</math>)</b>	$\leq$	<b>10.0</b>

# PIPERAZINE PYROPHOSPHATE – MODIFIED WITH P/N ELEMENTS (JNP-2-3)

## ○ USES

- JNP-2-3 is an environmentally-friendly, halogen-free, nitrogen-phosphorus, high-efficiency flame retardant, with excellent properties. It is a white, odorless, tasteless, powder. It is used as a flame retardant additive, in polyethylene and polypropylene resin, EDPM, and TPE elastomer materials.

## ○ STORAGE

- Store in a cool and dry area at room temperature.

## ○ PACKING

- 25 kg or 20 kg per bag (composite paper bag). 12 metric tons per 20' full container.

## ○ APPLICATION EXAMPLE

- Suggested dosage level is between 20% and 30% to achieve a UL94V-0 rating in PP compounds (1.6 mm).

## ○ ADDITIONAL INFO

- CM-JNP-2-3 is a complete flame retardant system, so you do not need to add other flame retardant materials to the formulation.
- CM-JNP-2-3 is comparable in specification and quality to FP2200S, but it is more cost-efficient.

# PIPERAZINE PYROPHOSPHATE – MODIFIED WITH P/N ELEMENTS (JNP-2-3) - PROPERTIES

<b>Appearance</b>	=	<b>White crystal powder</b>
<b>N Content %</b>	$\geq$	<b>19.0</b>
<b>P Content %</b>	$\geq$	<b>17.0</b>
<b>Water Content %</b>	$\leq$	<b>0.2</b>
<b>Whiteness (F457)</b>	$\geq$	<b>92.0</b>

# ZINC BORATE (CM-ZB)

## ○ Application

- Can be applied to a wide range of plastics and rubber processing, such as PVC, PP, PE, Nylon, PVC Resin, polyphenylene ethylene, epoxy resin, polyester resin, acid ethylene and natural rubber, styrene butadiene rubber, and chloroprene rubber.
- Can be applied to the production of paper, fiber fabric, decorative panels, floor leather, wallpaper, carpet, ceramic glaze, fungicides, and paint production to improve flame retardant performance.
- In halogen-containing systems, can be used together with antimony trioxide and alumina trihydrate.
- In halogen-free systems, can be used together with alumina trihydrate, magnesium hydroxide, red phosphorus, and ammonium polyphosphate.
- Also used for conveyor belts, wires and cables, intumescent coatings and paints, and anti-corrosive pigments.

## ○ Benefits

- Multi-functional synergistic flame retardant with antimony oxide
- Can replace antimony trioxide as a synergist in both halogen-based and halogen-free systems
- Anti-dripping and char-promoting agent, and suppresses afterglow.
- Suppresses arcing and tracking in electrical insulator plastics.

## ○ Packing

- 25 kg bags, 500 kgs bags, or 1000 kg bags available
- Store in a cool and dry place

# ZINC BORATE - PROPERTIES

<b>Grade</b>	=	<b>Top</b>	<b>Regular</b>
<b>Whiteness</b>	≥	<b>99</b>	<b>95</b>
<b>Surface Water %</b>	≤	<b>0.5</b>	<b>1</b>
<b>Particle Size*, μm</b>	=	<b>3 to 5</b>	<b>3 to 5</b>
<b>Pb, PPM</b>	<	<b>10</b>	<b>20</b>
<b>Cd, PPM</b>	<	<b>5</b>	<b>10</b>
<b>ZnO, %</b>	=	<b>37.0 to 40.0</b>	
<b>B<sub>2</sub>O<sub>3</sub>, %</b>	≥	<b>46.0 to 48.0</b>	
<b>H<sub>2</sub>O (hydrate), %</b>	≤	<b>13.0 to 15.5</b>	
<b>Fineness (Residue on 45 μm sieve)</b>	≤	<b>0.1</b>	
<b>Specific Gravity g/cm<sup>3</sup></b>	=	<b>2.67</b>	
<b>Melting Point °C</b>	=	<b>980</b>	
<b>Temperature of dehydration °C</b>	=	<b>290</b>	
<b>Refractive index</b>	=	<b>1.58</b>	
<b>Product Standard</b>	=	<b>Q/ZWW003-2009</b>	
<b>Chemical Formula*</b>	=	<b>(2ZnO·3B<sub>2</sub>O<sub>3</sub>·3.5H<sub>2</sub>O)</b>	

\*Other normal formulations we can offer include:

- 2ZnO · 3B<sub>2</sub>O<sub>3</sub> · 3H<sub>2</sub>O
- 4ZnO · B<sub>2</sub>O<sub>3</sub> · H<sub>2</sub>O
- 2ZnO · 2B<sub>2</sub>O<sub>3</sub> · 3H<sub>2</sub>O
- 2ZnO · 3B<sub>2</sub>O<sub>3</sub>

\*We can also offer particle size:

- 2 μm
- 8 μm
- 12 μm

But our 3 to 5 μm standard size can meet most application requirements for zinc borate.



# ALUMINUM HYDROXIDE (CM-ATH)

## ○ Application

- Fire retardant with good performance to reduce smoke and toxic gases.
- Widely and very commonly used in plastics – including PP, PE, EVA, ABS, HIPS, PVC, etc. – and rubber.

## ○ Benefits

- Can be composited with other fire retardants – such as Zinc Borate, Phosphorus, PBDE – to achieve good synergy and improved performance.
- Can be surface treated by non-polar polymer of Stearic acid or Silicon oil - to facilitate dispersion across plastic materials and improve mechanical properties for fire retardant performance.

## ○ Packing

- 25 kg bags, 500 kgs bags, or 1000 kg bags available
- Store in a cool and dry place
- Custom packaging available upon your request

# ALUMINUM HYDROXIDE - PROPERTIES

<b>Surface Water %</b>	<b>≤</b>	<b>0.4</b>
<b>Whiteness</b>	<b>=</b>	<b>95</b>
<b>Purity %</b>	<b>=</b>	<b>99.5</b>
<b>Fineness (residue on 45 um sieve) %</b>	<b>≤</b>	<b>0.1</b>
<b>Specific gravity, g/cm<sup>3</sup></b>	<b>=</b>	<b>2.42</b>
<b>pH</b>	<b>=</b>	<b>7.5 – 9.8</b>
<b>Absorption of oil, ml/100g</b>	<b>=</b>	<b>35 – 40</b>
<b>SiO<sub>2</sub> %</b>	<b>=</b>	<b>0.06</b>
<b>Fe<sub>2</sub>O<sub>3</sub> %</b>	<b>=</b>	<b>0.03</b>
<b>Na<sub>2</sub>O soluble %</b>	<b>=</b>	<b>0.04</b>

# CM-DOPO (9,10-DIHYDRO-9-OXA-PHOSPHAPHENANTHRENE-10-OXIDE)

## ○ Application

- Can be used in liner polyester, polyamide, epoxy resin, widely used in plastic circuit board for electronic equipment

## ○ Benefits

- White crystals or powder, easily soluble in methanol, ethanol, chloroform, etc. Soluble in benzene, toluene, methoxychlor, etc.; insoluble in water.
- Excellence in heat stability, water resistance, oxidation resistance, it is a kind of reactive and additive flame retardant.
- Performance is better than general phosphate ester in flame retarding due to inclusion of P-C bond.

## ○ Packing

- Packed in 25 kg compound bag; outer layer for plastic weaving bag lined with PVC bag

## ○ Additional Info

- CAS # 35948-25-5
- Molecular Formula: C<sub>12</sub>H<sub>9</sub>O<sub>2</sub>P
- Molecular Weight: 216.17
- Could be a breakthrough halogen-free technology applied towards the treatment of PU foam – particularly within furniture.

# CM-DOPO (9,10-DIHYDRO-9-OXA- PHOSPHAPHENANTHRENE-10-OXIDE) - PROPERTIES

Appearance	=	white powder or flake
DOPO Content %	=	99.5 min.
OPP Content (ppm)	=	1000 max.
Melting Point, C	=	117-120
Water Absorption Rate %	=	0.30 max.
Acid Value (mg KOH/Kg)	=	300 max.
Color of Melt (APHA)	=	100 max.

# RED PHOSPHORUS PASTE (CM-RPP)

## ○ Uses

- Surface-coated red phosphorus flame retardant, light red to dark red paste, is an efficient red phosphorus flame retardant. We use proprietary technology to modify red phosphorus, into red phosphorus paste. This product can be mainly applied to coatings, textiles, and the like.

## ○ Packing

- Packed in 1250 KG IBC drums

## ○ Storage

- Store in a cool and dry area

## ○ Additional Info

- Can be safer and less dangerous to handle compared to red phosphorus powder form

# RED PHOSPHORUS PASTE (CM-RPP) - PROPERTIES

<b>Appearance</b>	=	<b>Light red to dark red fluid</b>
<b>P Content %</b>	>	<b>20/30/40/50</b>
<b>pH (10g/L)</b>	=	<b>6.0 to 8.0</b>
<b>Particle Size [D97], um</b>	≤	<b>150</b>
<b>Viscosity (20 C), mpas</b>	=	<b>Negotiation</b>

# AMMONIUM POLYPHOSPHATE WATER-SOLUBLE (CM-APP-W 111)

## ○ PROPERTIES

- White powder, 100% soluble in water and easily dissolved to get a neutral solution. Typical solubility is 150g/100ml, and pH value is 6-8.

## ○ CHARACTERISTICS

- Powder solid, stable properties, convenient for transport, storage, and use.
- pH value is neutral, safe, and stable during production and usage, good compatibilities, not reactive with other substances

## ○ USAGE

- To be used in formulating liquid fertilizer (NPK 11-37-0 or NPK 10-34-0)
- As a flame retardant. Used solely or together with other materials in the flameproof treatment for textiles, papers, fibers, wood, and more.

## ○ PACKING

- 25 kg woven bag with plastic liner.

# AMMONIUM POLYPHOSPHATE WATER-SOLUBLE (CM-APP-W 111) - PROPERTIES

Appearance	=	white granular powder
P <sub>2</sub> O <sub>5</sub> (%) w/w	≥	59
N (%) w/w	≥	17
pH value (1% aqueous solution)	=	6 to 8
Solubility g/100ml H <sub>2</sub> O, 25°C	≥	40

**Remark:** P<sub>2</sub>O<sub>5</sub> + N ≥ 78%



# AMMONIUM POLYPHOSPHATE PHASE II (CM-APP-201)

## ○ USAGE

- APP-201 is a non-halogenated flame retardant. It acts as a fire retardant by intumescent mechanism.
- When APP-II is exposed to fire and heat, it decomposes to polymeric phosphate acid and ammonia.
- The polyphosphoric acid reacts with hydroxyl groups to form a nonstable phosphate ester.
- Following dehydration of the phosphate ester, a carbon foam is built up on the surface and acts as an insulation layer.

## ○ APPLICATION

- In plastics (PP, PVC, PE, etc.), polyester, rubber, PU foam, and expandable fireproof coatings.

## ○ PACKING

- 25 kg woven bag with plastic liner, 25 kg paper bag.

# AMMONIUM POLYPHOSPHATE PHASE II (CM-APP-201) - PROPERTIES

		Target Value	Typical Value
Appearance	=	white powder	white powder
P Content % (w/w)	≥	31	31.5
N Content % (w/w)	≥	14	14.5
Average Polymerization Degree, n	≥	1000	1500
Viscosity (10% aqueous, 25°C) mPa.s	≤	100	30
pH Value (10% aqueous)	=	5.5 to 7.5	6.2
Acid number mg KOH/g	≤	1	0.3
Average particle size (D50) μm	=	15 to 20	18
Particle size <50 μm % (w/w)	≥	99	99.5
Particle size >100 μm % (w/w)	=	0	0
Moisture Content % (w/w)	≤	0.25	0.1
Solubility g/100ml H <sub>2</sub> O, 25°C	≤	0.5	0.3
Decomposition Temperature, °C	≥	270	280

# AMMONIUM POLYPHOSPHATE PHASE II WITH MELAMINE TREATMENT (CM-APP-202)

## ○ USAGE

- APP-202 is a flame retardant based on phosphorus/nitrogen synergism, free of formaldehyde, manufactured from APP-201 with melamine modification based on proprietary method.
- APP-202 is different from APP-201 based on the following properties
  - Reduced solubility in water
  - Reduced viscosity in water
  - Improved dispersibility and compatibility with polymers and resins
  - Increased fluidity in powder
  - Improved thermal expansion efficiency during flame retardant process and insulation performance

## ○ APPLICATION

- APP-202 is finer than APP-201, and so is more dispersive in plastics and rubber. Usages include for:
  - Fiber materials (paper, wood, fireproof textiles)
  - All kinds of polymers (sunproof, waterproof, or fireproof)
  - Fire-refractory building board, coiled material
  - Epoxy resin and unsaturated resin
  - Cable and rubber
  - Plastic material of electron device
  - Textile

## ○ PACKING

- 25 kg woven bag with plastic liner, 25 kg paper bag

# AMMONIUM POLYPHOSPHATE PHASE II WITH MELAMINE TREATMENT (CM-APP-202) - PROPERTIES

		Target Value	Typical Value
Appearance	=	white powder	white powder
P Content % (w/w)	≥	29	30.5
N Content % (w/w)	=	16 to 18	17
Average Polymerization Degree, n	≥	1000	1500
Viscosity (10% aqueous, 25°C) mPa.s	≤	50	20
pH Value (10% aqueous)	=	7 to 9	8
Acid number mg KOH/g	≤	1	0.5
Average particle size (D50) μm	=	18 to 22	20
Particle size <50 μm % (w/w)	≥	99	99.5
Particle size >100 μm % (w/w)	=	0	0
Moisture Content % (w/w)	≤	0.25	0.1
Solubility g/100ml H <sub>2</sub> O, 25°C	≤	0.3	0.2
Decomposition Temperature, °C	≥	260	270

# AMMONIUM POLYPHOSPHATE PHASE II WITH SILANE TREATMENT (CM-APP-203)

## ○ USAGE

- APP-203 is a non-halogen flame retardant based on phosphorus/nitrogen synergism. It is treated/coated by silane via specialized method. It is different from APP-201 by the following:
  - Reduced solubility in water
  - Reduced viscosity in water
  - Improved dispersibility and compatibility with polymers and resins
  - Increased fluidity in powder
  - Improved thermal expansion efficiency during flame retardant process and insulation performance

## ○ APPLICATION

- It can be used for all applications that our standard APP-201 is suitable for. It can be used in plastics (PP, PVC, PE, etc.), polyester, rubber, PU foam, and expandable fireproof coatings. It has lower viscosity and lower solubility (compared to the standard grade APP-201) in water, which could make it suitable for water-fast intumescent systems in polymers (such as PU, PBT, etc.) and paints.
  - Fiber materials (paper, wood, fireproof textiles)
  - All kinds of polymers (sunproof, waterproof, or fireproof)
  - Fire-refractory building board, coiled material
  - Epoxy resin and unsaturated resin
  - Cable and rubber
  - Plastic material of electron device
  - Textile

## ○ PACKING

- 25 kg woven bag with plastic liner, 500/1000 kg super sacks

# AMMONIUM POLYPHOSPHATE PHASE II WITH SILANE TREATMENT (CM-APP-203) - PROPERTIES

		Target Value	Typical Value
Appearance	=	white powder	white powder
P Content % (w/w)	≥	30	31
N Content % (w/w)	=	14 to 16	15
Viscosity (10% aqueous, 25°C) mPa.s	≤	20	10
pH Value (10% aqueous)	=	6 to 8	7
Average particle size (D50) μm	=	18 to 22	20
Particle size <50 μm % (w/w)	≥	95	98
Particle size >100 μm % (w/w)	=	0.1	0
Moisture Content % (w/w)	≤	0.25	0.1
Solubility g/100ml H <sub>2</sub> O, 25°C	≤	0.3	0.15

# AMMONIUM POLYPHOSPHATE PHASE II WITH EPOXY TREATMENT (CM-APP-226)

## ○ Application

- APP-226 is a non-halogen flame retardant based on phosphorus/nitrogen synergism. It is treated/coated by epoxy resin via a specialized method, and is free of formaldehyde.
- Its solubility in water is very low and has less influence on polymers. APP-226 is very suitable in epoxy resin, polyurethane, and textile coating systems.

## ○ Packing

- 25 kg woven bag with plastic liner; 500/1000 kg super sacks.

# AMMONIUM POLYPHOSPHATE PHASE II WITH EPOXY TREATMENT (CM-APP-226) - PROPERTIES

		Target Value	Typical Value
Appearance	=	white powder	white powder
P Content % (w/w)	≥	29	30
N Content % (w/w)	≥	13 to 15	14
Viscosity (10% aqueous, 25°C) mPa.s	≤	20	10
pH Value (10% aqueous)	=	6 to 8	7
Average particle size (D50) μm	=	20 to 24	22
Particle size <50 μm % (w/w)	≥	95	98
Particle size >100 μm % (w/w)	=	0.1	0
Moisture Content % (w/w)	≤	0.25	0.1
Solubility g/100ml H <sub>2</sub> O, 25°C	≤	0.15	0.1
Solubility g/100ml H <sub>2</sub> O, 60°C, 24h	≤	1	0.7



# EXPANDABLE GRAPHITE (CM-GRAPHITE)

## ○ USES

- Can be used in PU foams. This foam can be used as a seating material in aircrafts and other traffic tools.
- Can be used as a heat and sound insulation sheet for cars after special treatment.
- Sealing tape in windows and doors for the building insulation industry.
- EVA and EPS foams
- Intumescent FR coatings, specifically for steel structural FR coatings
- FR in polyethylene, polypropylene, and other polyolefins, when halogenated flame retardants are prohibited.
- Plastics/metal (aluminum) composite boards
- Other applications include plastic pipes, fire-stop putties, and fire-stop pillows

## ○ PACKING

- Packing is in 25 kg bags, or 500 kg big bags. 18 Metric Tons per 20' full container load.

# EXPANDABLE GRAPHITE (CM-GRAPHITE) PROPERTIES

<b>Original Expansion Temperature ( C )</b>	=	<b>170 C</b>
<b>Expansion Volume (ml/g)</b>	=	<b>350</b>
<b>pH</b>	=	<b>4 to 6</b>
<b>Conductivity (ms/cm)</b>	≤	<b>0.3</b>
<b>Moisture (%)</b>	≤	<b>0.4</b>
<b>Ash (%)</b>	≤	<b>1.0</b>
<b>Volatile %</b>	≤	<b>12</b>
<b>Carbon %</b>	≤	<b>99</b>
<b>Particle size (50 mesh)</b>	≥	<b>80%</b>

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