

1 H Hydrogen																	2 He Helium	
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon	
11 Na Sodium	12 Mg Magnesium											13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon	
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton	
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon	
55 Cs Cesium	56 Ba Barium											81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon	
87 Fr Francium	88 Ra Radium											114 Uuq Ununquadium			116 Uuh Ununhexium			
		Lanthanides																
		57 La Lanthanum	58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium		
		Actinides																
		89 Ac Actinium	90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium		

Metals in blue represent "Shepherd Specialties" utilized in industrial quantities.



The Shepherd Chemical Company

Plastic Additives

Since 1916 The Shepherd Chemical Company has been manufacturing high quality metal based chemicals. Our focus is on the development and manufacture of unique value added compounds which enhance the value of our customer's technology. We offer both a line of standard products and development services for custom chemicals. Over the years we have found that a collaborative approach with our customers yields the type of outcome that allows our customers to succeed in today's competitive landscape. We maintain an R&D team, characterization lab, and engineering staff focused on the development and rapid scale-up of our customer's target compounds. Today, a significant portion of business is made up of custom products or customized versions of our standard products.



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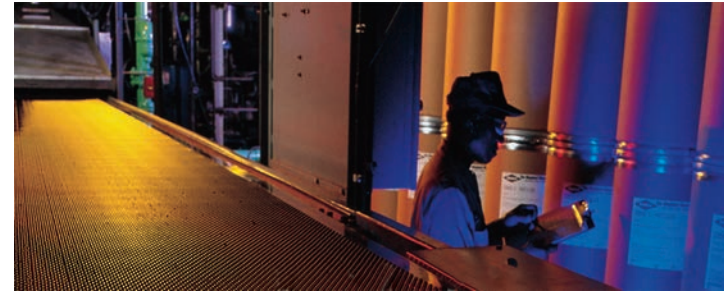


Plastic Additives

Shepherd Chemical offers development services for new products and standard products as plastic additives. Our metal organics division offers metal soaps as standard and customized products. Our precipitated products division offers metal salts which can be customized for the desired application.

Metal Organics

We are able to develop customized metal soaps for applications based on our core set of metals indicated in the periodic table and organic acids ranging from C2 to C22. We seek to tailor the form of our product to the customer's needs including metal content and physical form. We are able to manufacture powders, flakes, and pastilles based on the customer's requirement.



Cobalt Stearate

Cobalt	9.0–10.0%
Moisture	2.0% max.
Ball & Ring Softening Point (1°C/min. heatng rate)	82.0–98.0°C

Cobalt Neodecanoate

Cobalt	20.0–21.0%
Coalescence Point	40° C min.
Nonvolatiles (3 hrs @ 105° C)	98% min

Manganese Stearate

Manganese	8.5%–8.9%
Volatiles	1.0% max.
Mettler Softening Point (1° C/min heat rate)	100°C min.

Ferric Stearate

Iron	5.5–6.5%
Meltng Point	80° C min (176°F)
Nonvolatiles (3 hrs @ 105° C)	98% min

Precipitated Products

Shepherd Chemical has developed customized, proprietary metal acetates, carbonates, hydroxides, and phosphates for our customers. Our development and manufacturing capability allows us to control properties such as: Morphology/shape, Particle size, Surface area/porosity, Crystallinity, Surface functionalization.

Cobalt Acetate

Cobalt	23.5% min
Iron	0.005% max
Copper	0.005% max
Chloride	0.01% max
Sulfate	0.05% max
Acetic Acid Insolubles	0.03% max

Cuprous Iodide

Copper	32.6% min
Water	1.0% max
Sulfate	0.1% max
Iron	0.02% max
NH4OH Insolubles	0.1% max

Copper Acetate

Copper	31.2% min
Iron	0.005% max
Chloride	0.005% max
Sulfate	0.01% max
Acetic Acid insolubles	0.1% max

Zinc Acetylacetonate

Zinc	23.0 – 26.0%
Water	10.0% max
Insolubles in methanol: 2,4 Pentanedione (9:1)	1.0% max

Bismuth Subcarbonate

Bismuth	81.0% min
Sulfate	0.005% max
Chloride	0.005% max
Copper	0.01% max
Iron	0.01% max
Lead	0.005% max

