



Conserve O Gram

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Cobalt Indicating Silica Gel Health And Safety Update

Standard indicating silica gel is often used within microclimates to control Relative Humidity (see *Conserve O Gram* 1/8). Cobalt is present in small concentrations (0.5 to 1.0% by weight) in indicating silica gel. As of July 1, 2000, British Chemical Regulations have required that indicating silica gel be labeled and disposed of as a hazardous material. While cobalt chloride has not yet been listed on any U.S.-based hazardous materials registries, its change in status suggests that this material should be treated with the same level of protection as is required elsewhere.

Health and Safety Issues

Cobalt is a skin and respiratory system sensitizer. It is a European Economic Community (EEC) List II substance for control of dangerous substances in the aquatic environment and must not be allowed to contaminate soil and water.

The cancer status varies on Material Safety Data Sheet (MSDS) reports provided by manufacturers and suppliers from “no reports” to “Cobalt and its compounds have been shown to cause cancer in laboratory animals.” The threshold limit value (TLV) is 0.01 mg/m³.

Although the concentration of cobalt is small in indicating silica gel, concerns revolve around the possible contamination of silica gel dust with cobalt chloride. There also are hazards stemming from the inhalation of silica dust.

Small RH indicating cards and test papers that turn from blue to pink also contain cobalt chloride. Since the danger is potential inhalation of cobalt dust, the use of these cards

should not be a problem. However, if the card gets wet, there is the possibility that the cobalt chloride could migrate and recrystallize where it could conceivably become airborne.

Disposal of Silica Gel

All silica gel is listed as “hazardous waste” by the EPA (Resource Conservation Recovery Act) and must be disposed of appropriately. Cobalt from indicating gel could pose a greater hazard than standard silica gel as cobalt can leach into runoff or groundwater and poison aquatic life. Contact your park or regional HAZMAT coordinator to obtain information on appropriate storage containers and disposal instructions.

Alternative Materials

Sorbead Orange desiccant features a biodegradable, organic indicator (available from Engelhard Chemicals). The amount of indicator used in Sorbead Orange is five to ten times lower than the amount of cobalt chloride found in cobalt chloride indicating desiccants. It changes from bright orange to translucent in color when it has adsorbed approximately 6% of water by weight. This desiccant can be regenerated (returned to its original orange color and adsorption capacity) by heating to a temperature of 270-320°F.

Another choice, manufactured by Kaltron Pettibone, is Silica Gel Yellow, an indicator gel with phenolphthalein (0.01% by weight concentration). It is distributed by Art Preservation Services. This indicator changes from yellow when dry to green, and finally to deep blue when the gel has adsorbed

approximately 5% of water by weight. Heating temperatures for regeneration are the same as for most non-indicating gels, with a recommended range of approximately 300-350°F.

Indicating silica gels will alert you when standard gel is nearing its saturation point, but they won't reveal the exact RH. Use a hygrometer to evaluate your micro-environment's climate.

Answers to Frequently Asked Questions

Has indicating silica gel (blue) changed?

No. Indicating silica gel (blue) is the same as it has been for the past 60 years. There has been no change in its formulation.

Is indicating silica gel a hazardous substance?

Indicating silica gel with cobalt chloride as the indicator is listed as a hazardous substance for disposal by the European Economic Community. Cobalt chloride has **not** been listed on any U.S.-based hazardous materials registries.

Has cobalt impregnated silica gel been banned from use?

No. Cobalt impregnated silica gel has not been banned from use.

Why should I take additional precautions with silica gel?

The dust from all types of silica gel is an irritant, and appropriate ventilation (fume hood or appropriate respirator) should always be used when working with the gel. Cobalt chloride could be a component of silica gel dust when you are working with indicating gel.

Are there special instructions for shipping silica gel?

Contact your park or regional HAZMAT coordinator for information on shipping containers for disposal. Silica gel is still classified as non-hazardous for transportation.

Recommendations

1. Substitute Silica Gel Yellow or Sorbead Orange desiccant for future purchases of indicating silica gel (see supplier list).
2. Begin phasing out and replacing cobalt impregnated silica gel.
3. In handling all silica gel take the following precautions:
 - Wear gloves, lab coat and safety glasses.
 - Work in a fume hood or wear an appropriate respirator with a HEPA filter (see *Conserve O Gram 2/13*).
 - Place silica gel in appropriate, well-marked containers and contact your park or regional HAZMAT Coordinator for disposal.
4. Work toward replacing humidity indicator strips with dial hygrometers, thermo-hygrometers, or dataloggers.

Further Information

Material Safety Data Sheets for Cobalt Chloride can be obtained at: <www.htbaker.com/msds/c4928.htm>

The International Chemical Safety Card for Cobalt (II) Chloride can be found at: <www.cdc.gov/niosh/ipcs/ipcs0783.htm>

Safe handling procedures for indicating silica gel can be found at: <www.geejaychemicals.co.uk/cobaltchloride.htm>

Alternative Sources of Indicating Silica Gel

Sorbead Orange
Engelhard Chemicals
120 Pine Street, P.O. Box 4017
Elyria, OH 44036
(440) 329-2586

Silica Gel Yellow
Art Preservation Services
315 East 89th Street
New York, NY 10028
(212) 722-6300

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