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GB/T 39560.702-2021 / IEC 62321-7-2:2017

**Determination of certain substances in electrical and
electronic products - Part 7-2: Hexavalent chrome -
Determination of hexavalent chrome [Cr (VI)] in polymers
and electronics by the colorimetric method**

电子电气产品中某些物质的测定 第 7-2 部分:六价铬 比色法测定 聚
合物和电子件中的六价铬[Cr (VI)]

(IEC 62321-7-2:2017, Determination of certain substances in electrotechnical
products - Part 7-2: Hexavalent chrome - Determination of hexavalent
chrome[Cr (VI)] in polymers and electronics by the colorimetric method, IDT)

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Foreword

GB/T 39560 “Determination of certain substances in electrical and electronic products” consists of the following parts:

- Part 1: Introduction and overview;
- Part 2: Disassembly, disjointment and mechanical sample preparation;
- Part 3-1: Screening lead, mercury, cadmium, total chromium and total bromine by X-ray fluorescence spectrometry;
- Part 4: Mercury in polymers, metals and electronics by CV-AAS, CV-AFS, ICP-OES and ICP-MS;
- Part 5: Cadmium, lead and chromium in polymers and electronics and cadmium and lead in metals by AAS, AFS, ICP-OES and ICP-MS;
- Part 6: Polybrominated biphenyls and polybrominated diphenyl ethers in polymers by gas chromatography-mass spectrometry(GC-MS);
- Part 7-1: Hexavalent chromium—Presence of hexavalent chromium Cr (VI) in colorless and colored corrosion-protected coatings on metals by the colorimetric method;
- Part 7-2: Hexavalent chrome - Determination of hexavalent chrome [Cr (VI)] in polymers and electronics by the colorimetric method;
- Part 8: Phthalates in polymers by gas chromatography-mass spectrometry (GC-MS),gas chromatography-mass spectrometry using a pyrolyzer/thermal desorption accessory (Py/TD-GC-MS).

This Part is Part 7-2 of GB/T 39560.

This Part was drafted in accordance with the rules given in GB/T 1.1-2009.

This Part uses translation method to identically adopt IEC 62321-7-2:2017 “Determination of certain substances in electrotechnical products - Part 7-2: Hexavalent chrome - Determination of hexavalent chrome[Cr (VI)] in polymers and electronics by the colorimetric method”.

The Chinese documents which have consistency with the international normative references in this Part are as follows:

- GB/T 6682-2008, Water for analytical laboratory use - Specification and test methods (ISO3696:1987, MOD)
- GB/T 39560.1-2020, Determination of certain substances in electrical and

Determination of certain substances in electrical and electronic products - Part 7-2: Hexavalent chrome -

Determination of hexavalent chrome [Cr (VI)] in polymers and electronics by the colorimetric method

WARNING -- Persons using this Part shall have practical experience in formal laboratory work. This Part does not address all possible security issues. It is the user's responsibility to take appropriate safety and health measures, and to ensure compliance with the conditions stipulated by relevant national regulations.

1 Scope

This Part of GB/T 39560 specifies the method for quantitative detection of hexavalent chromium [Cr (VI)] in polymer and electronic samples. The determination method in this Part uses an organic solvent to dissolve or swell the sample matrix, and then uses an alkaline digestion procedure to extract hexavalent chromium from the sample. Studies have shown that for the extraction of hexavalent chromium from soluble and insoluble samples, organic/alkaline solutions are more effective than acidic solutions. Under the condition of alkaline solution, the reduction of hexavalent chromium to trivalent chromium or the oxidation of trivalent chromium to hexavalent chromium is the least.

For soluble polymer samples composed of ABS (acrylonitrile-butadiene-styrene), PC (polycarbonate) and PVC (polyvinyl chloride), first dissolve the sample in an appropriate organic solvent. The hexavalent chromium is then extracted with alkaline extraction solution.

For insoluble or unknown polymers or electronic materials that do not contain antimony (Sb), first put the sample into a toluene/alkaline solution at 150°C to 160°C for digestion. The organic phase in the extract is then separated and discarded. Retain the inorganic phase for hexavalent chromium analysis.

The hexavalent chromium concentration in the extract is determined by reacting the extract with 1,5-diphenylcarbazine under acidic conditions. During the reaction with diphenylcarbazine, hexavalent chromium is reduced to trivalent chromium. Diphenylcarbazine is oxidized to diphenylcarbazone. The trivalent chromium and diphenylcarbazone then react further to form a purple-red compound. Then use a colorimeter or spectrophotometer to quantitatively determine the purple compound solution at 540nm.

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