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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB 38400-2019

Limitation requirements of toxic and harmful substance in fertilizers

肥料中有毒有害物质的限量要求

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1 Scope

GB 38400-2019 is the Chinese national standard on limitation requirements of toxic and harmful substance in fertilizers, in the field of agriculture. It carries no /T suffix, which in the Chinese system means compliance is mandatory: a product or a practice within its scope has to meet it to be lawfully made, sold or carried out in China. It was issued on 17 December 2019 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 July 2020. Classification: ICS 65.080, CCS G20. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This standard specifies the limit requirements, test methods, inspection rules for toxic and harmful substances in fertilizers. This standard applies to commercial fertilizers produced by various processes.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 2441.2 Determination of urea - Part 2: Biuret content - Spectrophotometric method

GB 5085.1 Identification standards for hazardous wastes - Identification for corrosivity

GB 5085.2 Identification standards for hazardous wastes - Screening test for acute toxicity

GB 5085.3 Identification standards for hazardous wastes - Identification for extraction toxicity

GB 5085.4 Identification standards for hazardous wastes - Identification for ignitability

GB 5085.5 Identification standards for hazardous wastes - Identification for reactivity

GB 5085.6 Identification standards for hazardous wastes - Identification for toxic substance content

GB/T 8170-2008 Rules of rounding off for numerical values & expression and judgement of limiting values

GB/T 19524.1 Determination of fecal coliforms in fertilizers

5 Test method

5.1 Corrosion identification It is performed according to GB 5085.1.

5.2 Acute toxicity identification It is performed according to GB 5085.2.

5.3 Identification of leaching toxicity It is performed according to GB 5085.3.

5.4 Identification of flammability It is performed according to GB 5085.4.

5.5 Identification of reactivity It is performed according to GB 5085.5.

5.6 Identification of toxic substance content It is performed according to GB 5085.6.

5.7 Total cadmium, total mercury, total arsenic, total lead, total chromium It is performed according to GB/T 23349 or ISO 17318; GB/T 23349 is used as the arbitration method.

5.8 Total nickel, total cobalt, total vanadium, total antimony, total thallium It is performed according to Appendix B.

5.9 Biuret It is performed according to GB/T 22924 or GB/T 2441.2 or ISO 18643; GB/T 22924 is used as the arbitration method.

5.10 Benzo[a]pyrene It is performed according to GB/T 32952.

5.11 Total petroleum hydrocarbons It is performed according to GB 5085.6.

Appendix A

(Normative) Terrestrial plant growth test A.1 Test substance information The test substance information includes but is not limited to: water solubility, vapor pressure, structural formula, solubility in organic solvents, n- octanol/water partition coefficient, absorption behavior, purity, stability in water and light, results of biodegradation tests . A.2 Introduction to test A.2.1 Test purpose Used to evaluate the potential toxic effects of solid and liquid chemicals in the soil on plant seedlings and early growth after one-time application. A.2.2 Test

principle This Appendix is used to evaluate the effects of applying the test substance in the soil (or other suitable soil substrate) on the emergence of seedlings and the early growth of higher plants. The seeds are planted in the soil treated with the test product and evaluated within 14 d ~ 21 d after the emergence rate of the control group reaches 50%. The end-point measurement is the visible emergence rate, the dry weight of the seedling (or fresh weight), in some cases the height of the seedling; it shall also evaluate the harmful effects visible on different parts of the plant. These measurements and observations are compared with untreated controls. According to the possible exposure pathways, the test product is mixed into the soil (or possible artificial soil substrate) or sprayed on the soil surface. These pathways shall represent the potential exposure pathways of chemicals as accurately as possible. When the soil is mixed, a large amount of loose soil is mixed first, then it is put in a pot, the selected plant seeds are planted into the soil. When applying the pesticide on the surface, put the soil in the pot first, plant the seeds, then spray the pesticide. The test system (control and treated soil and seeds) is placed in an environment suitable for plant growth. This Appendix can determine the dose-response curve according to the purpose of the study, or a single dose/ratio as a limit test. If the single-dose/ratio test exceeds a certain level of toxicity (for example, the observed effect is higher than x%), a range screening test is required to determine the upper and lower toxicity limits; then a multiple-dose test is performed to generate a dose- response curve. Appropriate statistical analysis methods are used to analyze the test substance is not a plant protection product, the artificial substrate can be used to replace the natural soil for the test. The matrix used shall contain inert substances, to reduce interaction with the test product, solvent carrier or both. Quartz sand, mineral wire and glass beads (such as:

0.35 mm ~

0.85 mm in diameter) that have been washed with acid are suitable inert substances, which can reduce the absorption of the test product and ensure that the test product reaches the seedlings through the root absorption as much as possible. Unsuitable substrates include vermiculite, perlite or other highly absorbent materials. The nutrients needed for plant growth shall be provided, to ensure that the plants are not stressed by nutrient deficiency, which can be evaluated by chemical analysis or visible evaluation of control plants. A.4.2 Test plants The selection of plant species shall consider its taxonomic diversity in the plant kingdom, its distribution characteristics, the specific life history of the species, the regional differences in natural distribution, including the following characteristics: - Having uniform seeds, obtained from reliable standard seed sources, can produce continuous, reliable and consistent germination, as well as consistent seedling growth; - Plants shall be suitable for testing in the laboratory; it may obtain reliable and reproducible results in and between laboratories; - The sensitivity of the species used shall be consistent with the plant's response to environmental exposure; - The selected species have been used in some previous toxicity tests, meanwhile their use in such as herbicide bioassays, heavy metal screening, salinity or mineral stress tests or plant-related research shows that they are

sensitive to a wide variety of stimuli; - Be able to adapt to the growth conditions in the test method; - Meet the test validity standard. The number of species used in the test is determined according to the relevant management requirements. The species used in the plant test in Appendix C are for reference. A.4.3 Application of test article The test product shall be applied to an appropriate carrier (such as: water, acetone, ethanol, polyethylene glycol, gum Arabic, sand). It can also be tested with formulations containing active ingredients and various additives. A.4.6 Verification of the concentration/ratio of the test substance The concentration shall be verified by appropriate analytical methods. For soluble substances, verification of all concentrations can be confirmed by analyzing the highest concentration used for gradual dilution. Use calibration equipment (such as: calibration glassware for analysis, calibration spray equipment) for stepwise dilution. For substances that are insoluble in water, analyze the amount added to the soil. If it wants to prove the homogeneity of the test product in the soil, it is necessary to conduct a soil analysis. A.4.7 Test conditions The test conditions shall be similar to the normal growth conditions of the test species and varieties. The emergent plants shall be placed in a controlled climate incubator, artificial climate box or greenhouse for gardening operations to maintain normal growth. When using growth equipment, ensure that the plants grow normally and compare with the control group. It shall record such parameters as the temperature, relative humidity, carbon dioxide concentration, light (illuminance, wavelength, photosynthetically active radiation)/photoperiod, average irrigation volume and other parameters including condition control and sufficient frequency (e.g. daily); the greenhouse temperature is controlled through ventilation, heating and / or refrigeration system. The following conditions are generally recommended for greenhouse tests: - Temperature: (22 ± 10) °C; - Relative humidity: (70 ± 25)%; - Photoperiod: At least 16 h illumination; - Illuminance: (24850 ± 3550) lx. If the illuminance drops below 14200 lx and the wavelength is 400 nm ~ 700 nm, except for some species need to reduce the illuminance, additional illumination is required. During the test, the environmental conditions shall be monitored and recorded. The container used in the test shall be a non-porous plastic or glass container, a tray or dish shall be placed under the container. Containers shall be repositioned regularly to reduce plant growth differences (because the test conditions of the growth facilities are different). The container shall be large enough to ensure normal growth. In order to maintain good plant vitality, it can add soil nutrient solution. Judge the need and timing of adding nutrient solution by observing the control plants. It is recommended to water it from the bottom of the test container (for example, use glass fiber filament). For test plant species and test products, specific growth conditions are suitable whether general chemicals have phytotoxic properties, the 1000 mg/kg dry soil is usually used as the maximum dose. A.4.8.3 Pre-test Before conducting a formal multi-concentration dose-response study, it is necessary to conduct a preliminary test to determine the dose range. The concentration interval of the pre-test shall be wide (such as:

0.1 mg/kg,