Charcoal, activated (Carbo activatus)

Description. Fine, black powder, free from grittiness; odourless.

Solubility. Practically insoluble in water and in all usual solvents.

Category. General-purpose antidote; pharmaceutic aid.

Storage. Activated Charcoal should be kept in a well-closed container.

Additional information. Activated Charcoal is a tasteless powder.

Requirements

Identity test. Heat a small quantity of the test substance to redness; it burns slowly without a flame.

Heavy metals. Boil 1 g with a mixture of 20 mL of hydrochloric acid (~70 g/l) TS and 5 mL of bromine TS1 for 5 minutes, filter, and wash with 50 mL of boiling water. Evaporate the combined filtrates to dryness on a water-bath and add to the residue 1 mL of hydrochloric acid (1 mol/l) VS, 20 mL of water, and 5 mL of sulfurous acid TS. Boil the solution until all the sulfur dioxide has been expelled, filter if necessary, and dilute with water to 50 mL. Use 10 mL as the test solution and determine the content of heavy metals as described under 2.2.3 Limit test for heavy metals, according to Method A; not more than 100 µg/g.

Cyanides. In a distillation apparatus, heat 5 g carefully with 50 mL of water and 2 g of tartaric acid R. Collect about 25 mL of distillate in a mixture of 10 mL of water and 2 mL of sodium hydroxide (1 mol/l) VS and dilute to 50 mL with water. To 25 mL add 0.05 g of ferrous sulfate R and heat until boiling starts. Cool in a water-bath at 70°C and acidify with 10 mL of hydrochloric acid (~250 g/l) TS; no green or blue colour develops.

Sulfides. To 1 g in a small conical flask, add 20 mL of water and 5 mL of hydrochloric acid (~250 g/l) TS; the escaping vapours do not darken a strip of filter paper moistened with lead acetate (80 g/l) TS.

Zinc. To 1 g add 25 mL of nitric acid (~130 g/l) TS and heat to boiling for 5 minutes; filter through sintered glass and wash with 10 mL of hot water. Determine the content of zinc either by a dithizone method (A) or by atomic absorption spectrophotometry (B):

A. To 10 mL of the clear solution obtained as described above add successively 3.0 mL of water, 3.0 mL of sodium acetate (60 g/l) TS, 5.0 mL of cyanide/oxalate/thiosulfate TS, and 5.0 mL of a freshly prepared 30 mg/mL solution of dithizone R in carbon tetrachloride R, Mix thoroughly for 2-3 minutes. Separate the dithizone-layer and place in a suitable comparison tube. To 0.5 mL of zinc standard (20 µg/mL Zn) TS add 9.5 mL of water and treat it in the same manner as above. The solution of the test substance shows by reflection a more intense violet colour and, by transmitted light, a not more intense violet colour than the reference solution.

B. Dilute appropriately the solution obtained as described above and proceed as described under 1.8 Atomic spectrometry: emission and absorption.

Fluorescent substances. In an apparatus for intermittent extraction, treat 10 g with 100 mL of cyclohexane R1 for 2 hours. Collect the cyclohexane extract, adjust the volume to 100 mL, and examine in ultraviolet light (365 nm). The fluorescence of the solution is not more intense than that of a solution containing 0.083 mg of quinine R in 1000 mL of sulfuric acid (0.005 mol/l) VS.

Ethanol-soluble substances. In a flask fitted with a reflux condenser, heat 2 g with 50 mL of ethanol (~750 g/l) TS. Boil for 10 minutes, filter immediately, cool, and readjust the volume to 50 mL with ethanol (~750 g/l) TS; the filtrate is not more intensely coloured than reference solution Yw1. Evaporate 40 mL of the filtrate, dry the residue at 105°C, and weigh; not more than 8 mg (5 mg/g).

Acid-soluble substances. Boil 1 g with a mixture of 20 mL of water and 5 mL of hydrochloric acid (~420 g/l) TS for 5 minutes, filter into a tared porcelain crucible, and wash the residue with 10 mL of hot water, adding the washings to the filtrate. To the combined filtrate and washings add 1 mL of sulfuric acid (~1760 g/l) TS, evaporate to dryness, and ignite to constant weight; not more than 35 mg/g.

Alkali-soluble coloured matter. Heat 0.25 g with 10 mL of sodium hydroxide (~80 g/l) TS for 1 minute, cool and filter. Dilute the filtrate to 10 mL with water; the colour is not more intense than reference solution Gn2.

Sulfated ash. Not more than 50 mg/g.

Loss on drying. Dry for 4 hours at 120°C; it loses not more than 150 mg/g.

Acidity or alkalinity. To 2 g add 40 mL of water and heat to boiling for 5 minutes. Cool, restore to the original volume with freshly boiled and cooled water and filter. Reject the first 20 mL of filtrate. The filtrate does not induce any colour change in red or blue litmus paper R. To 10 mL of the filtrate add 0.25 mL of bromothymol blue/ethanol TS and 0.25 mL of sodium hydroxide (0.02 mol/l) VS; the solution is blue. Add 0.75 mL of hydrochloric acid (0.02 mol/l) VS; the solution turns yellow.

Adsorbing power

A. Place 1 g, previously dried at 120°C for 4 hours, in a solution of 100 mg of strychnine sulfate R in 50 mL of water and shake for 5 minutes; filter, rejecting the first 10 mL of filtrate. To a 10-mL portion of the filtrate add 1 drop of hydrochloric acid (~420 g/l) TS and 5 drops of potassio-mercuric iodide TS; no turbidity is produced.

B. To each of two glass-stoppered 100-mL flasks transfer 50 mL of methylthioninium chloride (1 g/l) TS. To one of the flasks add 0.25 g, accurately weighed, of the test substance, insert the stopper in the flask and shake for 5 minutes. Filter the contents of each flask, rejecting the first 20 mL of each filtrate. Transfer 25-mL portions of the filtrates to two 250-mL volumetric flasks. Add to each flask 50 mL of sodium acetate (60 g/l) TS, mix, and add from a burette 35.0 mL of iodine (0.05 mol/l) VS, swirling the mixture during the addition. Stopper the flasks and allow them to stand for 50 minutes, shaking them vigorously at 10-minute intervals. Dilute each mixture with water to volume, mix, allow to stand for 10 minutes, and filter, rejecting the first 30 mL of each filtrate. Titrate the excess iodine in a 100-mL aliquot of each filtrate with sodium thiosulfate (0.1 mol/l) VS, adding 3 mL of starch TS towards the end of the titration. Calculate the number of mL of iodine (0.05 mol/l) VS consumed in each titration; the difference between the two volumes is not less than 0.7 mL.