

QUALITATIVE ANALYSIS.

(PART 2.)

(1) See Art. 1.

(2) (a) A compound of tin, aluminum, zinc, barium, strontium, calcium, magnesium, silica, or possibly a silicate.

(b) A drop or two of cobalt nitrate should be added, and the mass should be again heated in the oxidizing blowpipe flame to the highest temperature obtainable. See also Art. 18.

(3) Magnesium oxide, or a compound of magnesium that has been reduced to the oxide on the charcoal. See also Art. 18.

(4) (a) and (b) See Art. 75.

(5) (a) The pungent odor of acetic acid.

(b) A little of the substance should next be heated with concentrate sulphuric acid and alcohol, when an acetate if present will be recognized by the agreeable odor of acetic ether. See also Art. 24.

(6) The alkaloids are first divided into volatile and non-volatile alkaloids. The non-volatile alkaloids are divided into three groups, as follows:

Group I consists of those alkaloids that are precipitated from solutions of their salts by sodium hydrate, and dissolve in an excess of the reagent. The common ones are morphine and cocaine.

Group II consists of those alkaloids that are precipitated by sodium hydrate, and are insoluble in an excess of the reagent; and are also precipitated by sodium bicarbonate, even from acid solutions. The common ones are quinine, cinchonine, and narcotine.

Group III consists of those alkaloids that are precipitated by sodium hydrate, and are insoluble in an excess of the reagent, but are not precipitated from acid solutions by sodium bicarbonate. The most common ones are strychnine, brucine, and atropine.

(7) In the form of powder or small crystals.

(8) (a) and (b) See Art. 13.

(9) A salt of one of the acids of sulphur.

(10) See Art. 29.

(11) Earthy and alkaline phosphates. See also Art. 82.

(12) Nicotine and conine.

(13) See Art. 2.

(14) (a) A nitrate or chlorate.

(b) A chlorate. See also Art. 12.

(15) If the substance decrepitates, deflagrates, fuses, or volatilizes; if a metallic globule forms with an incrustation, if a metallic globule forms without an incrustation, if an incrustation is formed without a metallic globule, if a white luminous mass is formed, if a colored mass is formed.

(16) Manganese and chromium. See also Art. 23.

(17) (a) A carbonate.

(b) The gas should be tested at the mouth of the tube with a drop of barium hydrate, and then a fresh sample should be treated with hydrochloric acid, and the escaping gas again tested with barium hydrate. See also Art. 24.

(18) Its oxide, thoria, is the chief constituent used in the mantle of the Welsbach light.

(19) (a) and (b) See Arts. 60 and 61.

- (20) A cyanide that is decomposed by heat.
- (21) An ammonium compound, or possibly a nitrogenous organic compound or a cyanide containing water. See also Art. 4.
- (22) (a) A compound of arsenic.
(b) Sulphide of arsenic is indicated.
- (23) The substance is an oxalate, and is decomposed by the sulphuric acid, with the evolution of carbon monoxide and carbon dioxide.
- (24) See Art. 25.
- (25) Lithium, caesium, and rubidium.
- (26) See Art. 72.
- (27) (a) It should be slightly acid.
(b) By means of two pieces of litmus paper, one of which is faintly red, and the other faintly blue. See also Art. 76.
- (28) See Art. 108.
- (29) (a) Some organic compounds and ferrocyanides.
(b) It may be recognized by the blue flame with which it burns, when ignited at the mouth of the tube.
- (30) Gold, platinum, iridium, molybdenum, selenium, and tellurium.
- (31) Lead, copper, and zinc. See also Art. 72.
- (32) See Art. 65.
- (33) Quinine, cinchonine, and narcotine.
- (34) Zinc oxide, or a compound which is reduced to zinc oxide by heat. See also Art. 5.
- (35) A compound of lead.
- (36) A compound of barium, copper, thallium, molybdenum, or possibly a borate or phosphate. See also Art. 21.
- (37) See Art. 40, 6.

(38) By evaporating a sample of the water to dryness, and igniting the residue; when, if organic matter is present, it will char, and generally give off a burnt odor. See also Art. 69.

(39) See Art. 107. Probably heating with sulphuric acid and potassium dichromate, or with chromic acid, is the most characteristic test.

(40) See Art. 77.

(41) (a) By rendering turbid a drop of barium hydrate.
(b) A carbonate or oxalate.

(42) It readily fuses to a metallic globule, and white fumes of the oxide are given off, which form a white incrustation on the charcoal.

(43) The colors imparted to the flame by metals are due to highly heated luminous vapors; hence, the substance must be volatilized before the flame is colored.

(44) See Art. 100.

(45) To determine the acid of the compound.

(46) This shows that the substance contains arsenic, probably in the form of oxide As_2O_3 .

(47) (a) Green.
(b) Bright red.
(c) Brick red.

(48) That the substance is iodine or an iodide.

(49) Volatile compounds must be used; and, as chlorides are usually the most volatile, they are most suitable for this purpose.

(50) (a) and (b) See Art. 67.

(51) The substance should be heated with concentrate nitric acid, which decomposes all bromides except silver bromide, setting free reddish-brown vapors of bromine, which condense in the upper part of the tube, forming red globules.

- (52) (a) An organic substance.
(b) Tartaric acid or a tartrate.
- (53) See Art. 22.
- (54) (a) See Art. 47.
(b) Distinctive reactions may be obtained with the borax bead, and by adding zinc to an acid solution of vanadium.
- (55) See Art. 68.
- (56) Upon the fact that sugar is a reducing agent, and reduces the cupric solution, forming red cuprous oxide Cu_2O .
- (57) (a) and (b) See Art. 60.
- (58) Tartaric acid or a tartrate.
- (59) See Art. 79.
- (60) See Art. 57.
- (61) See Arts. 88, 89, and 90.
- (62) Morphine, cocaine, quinine, cinchonine, narcotine, strychnine, brucine, and atropine.
- (63) (a) and (b) See Art. 81.
- (64) (a) and (b) See Art. 106.
- (65) Thallium and tungsten.
- (66) (a) and (b) See Art. 77.
- (67) (a) and (b) See Art. 46.
- (68) The oxidizing agent would convert the phosphorus into phosphoric acid; but, as phosphoric acid is a normal constituent of nearly all animal and vegetable bodies, it would be impossible to say whether the phosphoric acid thus found had come from oxidizing free phosphorus or not.

NOTE.—The substances given for analysis are omitted from the Key, but the student will be told whether his analyses are correct or not.