evaporating the aqueous solution it gradually decomposes into silicon fluoride and hydrofluoric acid.

*Silicon chloride,* SiCl4, was prepared by J. J. Berzelius *(Jahresb.,* 1825, 4, p. 91) by the action of chlorine on silicon, and is also ob­tained when an intimate mixture of silica and carbon is heated in a stream of chlorine and the products of reaction fractionated. It is a very stable colourless liquid which boils at 58° C. Oxygen only attacks it at very high temperatures. When heated with the alkali and alkaline earth metals it yields silicon and the corresponding metallic chlorides. Water decomposes it into hydrochloric and silicic acids. It combines directly with ammonia gas to form SiCl4∙6NH3, and it also serves as the starting point for the prepara­tion of. numerous organic derivatives of silicon. The hexachloride, Si2Cl6, is formed when silicon chloride vapour is passed over strongly heated silicon ; by the action of chlorine on the corresponding iodo­compound, or by heating the iodo-compound with mercuric chloride (C. Friedel, *Comptes rendus,* 1871, 73, p. 497). It is a colourless fuming liquid which boils at 146-148° C. It is decomposed by water, and also when heated between 350° and 1000° C., but it is stable both below and above these temperatures. The *octochloride,* Si3Cl8, is formed to the extent of about ½ to 1 % in the action of chlorine on silicon (L. Gattermann, *Ber.,* 1899, 32, p. 1114). It is a colourless liquid which boils at 210° C. Water decomposes it with the forma­tion of silico-mesoxalic acid, HOOSi∙Si(OH)2∙SiOOH. *Silicon chloro­form,* SiHCl3, first prepared by H. Buff and F. Wöhler *(Ann.,* 1857, 104, p. 94), is formed by heating crystallized silicon in hydrochloric acid gas at a temperature below red heat, or by the action of hydro­chloric acid gas on copper silicide, the products being condensed by liquid air and afterwards fractionated (O. Ruff and Curt Albert, *Ber.,* 1905, 38, p. 2222). It is a colourless liquid which boils at 33° C. It fumes in air and burns with a green flame. It is decomposed by cold water with the formation of silicoformic anhydride, H2Si2O3. It unites directly with ammonia gas yielding a compound of variable composition. It is decomposed by chlorine.

Similar bromo-compounds of composition SiBr4, Si2Br6 and SiHBr3 are known. *Silicon tetraiodide*,. SiI4, is formed by passing iodine vapour mixed with carbon dioxide over strongly-heated silicon (C. Friedel, *Comptes rendus,* 1868, 67, p. 98); the iodo-compound con­denses in the colder portion of the apparatus and is purified by shaking with carbon bisulphide and with mercury. It crystallizes in octahedra which melt at 120∙5° C. and boil at 290° C. Its vapour burns with a red flame. It is decomposed by alcohol and also by ether when heated to 100° C. : SiI4+2C2H5OH =SiO2+2C2H5I+ 2HI; SiI4÷4(C2H5)2O=Si(OC2H5)4÷4C2H5I. The *hexaiodide,* Si2I5, is obtained by heating the tetraiodide with finely divided silver to 300° C. It crystallizes in hexagonal prisms which exhibit double refraction. It is soluble in carbon bisulphide, and is decomposed by water and also by heat, in the latter case yielding the. tetraiodide and the di-iodide, Si2I4, an orange-coloured solid which is not soluble in carbon bisulphide. *Silicon iodoform,* SiHI3, is formed by the action of hydriodic acid on silicon, the product, which contains silicon tetraiodide, being separated by fractionation. It is also obtained by the action of hydriodic acid on silicon nitrogen hydride suspended in carbon bisulphide, or by the action of a benzene solution of hydri­odic acid on trianilino-silicon hydride (O. Ruff, *Ber.,* 1907, 41, p. 3738). It is a colourless, strongly refracting liquid, which boils at about 220° C., slight decomposition setting in above 150° C. Water decomposes it with production of leucone. Numerous chloro-iodides and bromoiodides of silicon have been described.

*Silicon nitrogen hydride,* SiNH, is a white powder formed with silicon amide when ammonia gas (diluted with hydrogen) is brought into contact with the vapour of silicon chloroform at -10° C. *Trianilino silicon hydride,* SiH(NHC5H5)3, is obtained by the action of aniline on a benzene solution of silicon chloroform. It crystallizes in needles which decompose at 114° C. *Silicon amide,* Si(NH2)4, is obtained as a white amorphous unstable solid by the action of dry ammonia on silicon chloride at -50° C. (E. Vigouroux and C. Hugot, *Comptes rendus,* 1903, 136, p. 1670). It is readily decomposed by water: Si(NH2)4+2H2O=4NH3+SiO2. Above 0° C. it decom­poses thus: Si(NH2)4=2HN5+Si(NH)2.

*Silicon sulphide,* SiS2, is formed by the direct union of silicon with sulphur; by the action of sulphuretted hydrogen on crystallized silicon at red heat (P. Sabatier, *Comptes rendus,* 1880, 90, p. 819); or by passing the vapour of carbon bisulphide over a heated mixture of silica and carbon. It crystallizes in needles which rapidly de­compose when exposed to moist air. By heating crystallized silicon with boron in the electric furnace H. Moissan and A. Stock *(Comptes rendus,* 1900, 131, p. 139) obtained two. borides, SiB3 and SiB5. They are both very stable crystalline solids. The former is com­pletely decomposed when fused with caustic potash and the latter by a prolonged boiling with nitric acid. For silicon carbide see carborundum. Numerous methods have been given for the prepara­tion of *magnesium silicide,* Mg2Si, in a more or less pure state, but the pure substance appears to have been obtained by P. Lebeau *(Comptes rendus,* 1908, 146, p. 282) in the following manner. Alloys of magnesium and silicon are prepared by heating fragments of mag­nesium with magnesium filings and potassium silico-fluoride. From the alloy containing 25% of silicon, the excess of magnesium is removed by a mixture of ethyl iodide and ether and a residue con­sisting of slate-blue octahedral crystals of magnesium silicide is left.

It decomposes water at ordinary temperature with evolution of hydrogen but without production of silicon hydride, whilst cold hydrochloric acid attacks it vigorously with evolution of hydrogen and spontaneously inflammable silicon hydride.

*Organic Derivatives of Silicon.*

The organic derivatives of silicon resemble the corresponding carbon compounds except in so far that the silicon atom is not capable of combining with itself to form a complex chain in the same manner as the carbon atom, the limit at present being a chain of three silicon atoms. Many of the earlier-known silicon alkyl compounds were isolated by Friedel and Crafts and by Ladenburg, the method adopted consisting in the interaction of the zinc alkyl compounds with silicon halides or esters of silicic acids. SiCl4+2Zn(C2H5)2=2ZnCl2+Si(C2H5)4. This method has been modified by F. S. Kipping *(Jour. Chem. Soc.,* 1901, 79, p. 449) and F. Taurke *(Ber.,* 1905, 38, p. 1663) by condensing silicon halides with alkyl chlorides in the presence of sodium: SiCl4+4R∙Cl+8Na= SiR4+8NaCl;SiHCl3+3R∙Cl+6Na=SiHR3+6NaCl; whilst Kipping *(Proc. Chem. Soc.,* 1904, 20, p. 15) has used silicon halides with the Grignard reagent: C2H5MgBr(+SiC14)→C2H6SiCl3(+MgBrPh)→ Ph∙C2H5∙SiCl2(÷MgBrC3H7)→Ph∙C2H5∙C8HrSiCl.

*Silicon Tetramethyl,* Si(CH3)4 (tetramethyl silicane), and silicon tetraethyl, Si(C2H5)4, are both liquids. The latter reacts with chlorine to give silicon nonyl-chloride Si(C2H5)3∙C2H4Cl, which condenses with potassium acetate to give the acetic ester of silicon nonyl alcohol from which the alcohol (a camphor-smelling liquid) may be obtained by hydrolysis. *Triethyl silicol,* (C2H5)3Si∙OH, is a true alcohol, obtained by condensing zinc ethyl with silicic ester, the resulting substance of composition, (C2H5)3∙SiOC2H5, with acetyl chloride yielding a chloro-compound (C2H5)3SiCl, which with aqueous ammonia yields the alcohol. *Silicon tetraphenyl,* Si(C5H5)4, a solid melting at 231° C., is obtained by the action of chlorobenzene on silicon tetrachloride in the presence of sodium. *Silico-oxalic acid,* (SiO·OH)2, obtained by decomposing silicon hexachloride with ice- cold water, is an unstable solid which is readily decomposed by the inorganic bases, with evolution of hydrogen and production of a silicate. *Silicomesoxalic acid,* HO∙OSiSi(OH)2∙SiO∙OH, formed by the action of moist air on silicon octochloride at 0° C., is very unstable, and hot water decomposes it with evolution of hydrogen and forma­tion of silicic acid (L. Gattermann, *Ber.,* 1899, 32, p. 1114). *Silica- benzoic acid,* C5H5∙SiO·OH, results from the action of dilute aqueous ammonia on phenyl silicon chloride (obtained from mercury diphenyl and silicon tetrachloride). It is a colourless solid which melts at 92° C. For silicon derivatives of the amines see Michaelis, *Ber.,* 1896, 29, p. 710; on asymmetric silicon and the resolution of *dl*-benzyl-ethyl-propyl-silicol see F. S. Kipping, *Jour. Chem. Soc.,* 1907, 91, pp. 209 et seq.

The atomic weight of silicon has been determined usually by analysis of the halide compounds or by conversion of the halides into silica. The determination of W. Becker and G. Meyer *(Zeit. anorg. Chem.,* 1905, 43, p. 251) gives the value 28∙21, and the Inter­national Commission in 1910 has adopted the value 28∙3.

SILISTRIA (Bulgarian *Silislra),* the chief town of a department in Bulgaria and the see of an archbishop, situated on a low-lying peninsula projecting into the Danube, 81 m. below Rustchuk and close to the frontier of the Rumanian Dobrudja. Pop. (1892) 11,718; (1900) 12,133; (1908) 12,055, of whom 6142 were Bulgarians and 4126 Turks. The town was formerly a fortress of great strength, occupying the N.E. corner of the famous quadrilateral (Rustchuk, Silistra, Shumla, Varna), but its fortifications were demolished in accordance with the Berlin Treaty (1877). In the town is a large subterranean cavern, the *Houmbata,* which served as a refuge for its inhabitants during frequent bombardments. The principal trade is in cereals; wine and wood are also exported. The town is surrounded by fine vineyards, some 30 kinds of grapes being cultivated, and tobacco is grown. Sericulture, formerly a flourishing industry, has declined owing to a disease of the silk-worms, but efforts have been made to revive it. Apiculture is extensively practised and there are large market-gardens in the neighbourhood. The soil of the department is fertile, but lacking in water; the inhabitants have excavated large receptacles in which rain-water is stored. A considerable area is still covered with forest, to which the region owes its name of Deli Orman (“the wild wood”) ; there are extensive tracts of pasturage, but cattle-rearing declined in 1880-1910. A large cattle-fair, lasting three days, is held in May. The town possessed in 1910 one steam flour-mill and some cloth factories and tanneries.

Silistria was the Durostorum of the Romans (Bulgarian *Drstr)* ; the ancient name remains in the title of the archbishop, who is styled metropolitan of Dorostol, and whose diocese is now