gr. 4·5 (isomorphous with monoclinic sulphur), which retain their solubility in bisulphide of carbon up to 100° C. At 110° C. or higher temperatures they pass into the metallic modification (see below) with evolution of heat. With the amorphous kind a similar change sets in at or above 80° C. and attains its maximum of rapidity at a point be­tween 125° and 180° C. Fused selenium when cooled down suddenly hardens into a very dark-coloured glass of 4·28 sp. gr., soluble in bisulphide of carbon ; on gradual cool­ing it becomes more or less completely “metallic.” (2) *Metallic selenium* is a dark grey or black solid of 4·8 sp. gr. ; it exhibits metallic lustre, stretches perceptibly under the hammer, and its fracture is similar to that of grey cast iron. It is insoluble in bisulphide of carbon. Its fusing point is sharply defined and lies at 217° C. At the ordi­nary temperature it conducts electricity, while the non- metallic modification does not ; at higher temperatures, or after temporary exposure to higher temperatures, the con­ductivity on either side becomes an eminently variable quantity. According to Draper and Moss, glassy selenium begins to conduct electricity at 165° to 175° C., and the conductivity increases regularly as the temperature rises to near the boiling-point. With metallic selenium, which behaves similarly, the increase of conductivity is propor­tional to the increase of temperature to near the fusing point (217° C.) ; but from this point upwards it decreases rapidly and attains its minimum at 250° C. According to W. Siemens, however, selenium by long exposure to 200° C. becomes what one may call electrically metallic ; the conductivity then decreases when the temperature rises, just as it does with ordinary metals. But this electro- metallicity is not permanent ; on continued exposure to a lower temperature it vanishes gradually, until the propor­tion of quasi-metal has fallen to a limit-value depending on that temperature. Very surprising is the observation of Sale that the electric conductivity of metallic selenium increases on exposure to the light ; the red and ultra-red rays, as he found, act most powerfully. The effect of insolation is almost instantaneous, but on re-exposure to darkness the original condition is re-established only very gradually. W. Siemens found that his electro-metallic selenium (as produced at 200° C.) is more sensitive to light than any other kind. The conductivity of such selenium starting from darkness is raised twofold by dif­fuse and tenfold by direct sunlight. The specific heat of selenium, according to Regnault, is 0.0746 both in the glassy and in the metallic modification. Selenium (of any kind) boils at 700° C. (Mitscherlich). The vapour has an intense colour intermediate between that of chlorine and that of sulphur. According to Deville and Troost, at 880° C. it is 7·67 times, and at 1420° is 5·68 times, as heavy as air; theory, for Se2=l molecule, demands 5·47.

*Elementary Tellurium.—*This, the compact form, is a silver-white resplendent metal of markedly crystalline structure ; the crystals are rhombohedra, and the ingot consequently is very brittle. Specific gravity 6·2. The metal fuses at about 500° C., and is distillable at very high temperatures. Its vapour is golden yellow and has a very brilliant absorption-spectrum. The vapour density, accord­ing to Deville and Troost, is 9Ό8 at 1439° C. (air=l), corresponding to Te2 = 1 molecule. A bar of tellurium be­comes feebly electrical when rubbed with a woollen cloth. The electric conductivity, like that of selenium, is largely influenced by the temperature and previous exposure to heat, and it increases after exposure to light, though not to the same extent as selenium does. Starting from the ordinary temperature the conductivity decreases up to some point between 90° and 145° C. ; it then increases up to 200° C. (the highest temperature tried) ; on cooling it de­creases steadily, and finally is only one-fifth or one-sixth of

what it was at 200°. The numerical value at 200° (silver = 100) was found equal to 0·0035 to 0.0031 (F. Exner).

*Extraction of the Elementary Substances.—*If seleniferous sulphur or pyrites is used for the manufacture of oil of vitriol by the chamber process, most of the selenium accumulates as such in the “chamber mud,” from which it may be extracted by the following method of Wohler’s. The mud, after having been thoroughly washed and dried, is fused with alkaline nitrate and carbonate, to convert the selenium into selenate (SeO4K2 or Na2), which is ex­tracted by means of water. The filtered solution is boiled with hydrochloric acid to convert the selenic into selenium acid (SeO3 + 2HCl = Cl2 + H2O + SeO2), and this last is then reduced by addi­tion of sulphurous acid and heating, when the selenium comes down as a red precipitate (SeO2 + 2SO2 = 2SO3 + Se*). A* richer material than chamber mud is seleniferous ore-smoke as produced in Mansfeld, which likewise contains free selenium. Its extraction, according to O. Pettersen and F. Nilson, is best effected by digestion with con­centrated solution of cyanide of potassium at 80°C., which converts the selenium into selenocyanide (SeNCK), easily extractable by water. The filtered solution is acidified with hydrochloric acid and allowed to stand, when the selenium (through the spontaneous decomposi­tion of the SeNC. H into NCH and Se) comes down as a precipitate.

Tellurium is generally prepared from Transylvanian gold ore. The powdered ore is oxidized by means of hot nitric acid and the least sufficiency of hydrochloric acid, the excess of nitric acid being chased away by evaporation, and the residue mixed with sulphuric acid (to convert the lead into insoluble sulphate), and with some tartaric acid to prevent precipitation of tellurious acid (TeO2) in the subsequent treatment with water. From the filtered aqueous solution the gold is removed by addition of ferrous sulphate and by filtration. The filtrate is treated with sulphurous acid to reduce the tellurious acid to tellurium, which separates out as a black precipitate. The precipitated metal is fused down and then sublimed at a very high temperature, in a porcelain tube, in a current of hydrogen, to remove non-volatile impurities and eliminate the last trace of selenium (SeH2).

*Chemical Relalions.—*Selenium and tellurium are similar in their chemical character to sulphur ; the gradation of properties within the triad is in the order of the atomic weights, which are S = 32·06, Se = 79·07, Te = 128 (O = 16). In oxygen or air the elementary sub­stances burn readily into (solid) dioxides (SeO2, TeO2), in the case of selenium with production of a characteristic stench of putrid radish, owing probably to the formation of a trace of hydride, SeH2· Nitric acid, in the heat, converts sulphur directly into sulphuric acid. In the case of the two rare elements the oxidation stops at the stage corresponding to sulphurous acid. The acids SeO3H2 and TeO3H2 are not liable to further oxidation by any of the wet-way reagents (HNO3, H2O and Cl2, Br2, I2, &c. ) which convert sulphur­ous into sulphuric acid.

By fusion with nitre and alkaline carbonate the three elements, in their elementary or less oxygenated forms, are readily converted into salts, R2ΣO4 (sulphates, &c., Σ = S, Se, or Te). Selenic and telluric acids (H2ΣO4), unlike sulphuric, when boiled with aqueous hydrochloric acid, are gradually reduced to the lower acids (Se or Te)O3H2, with evolution of chlorine ; and the lower acids are readily reduced to (precipitates of) elementary selenium and tellurium re­spectively by the action of sulphurous acid in the heat. Chlorine combines readily with elementary selenium and tellurium into dichlorides (Se or Te)Cl2, which, however, on continued chlorina­tion are at last completely converted into the tetrachlorides (Se or Te)Cl4. These last, unlike the corresponding sulphur compound, are distillable without decomposition. Metals capable of uniting directly with sulphur as a rule unite also with selenium and tellurium into corresponding compounds. Hydrogen unites with elementary selenium and tellurium in the heat into gaseous hydrides (Se or Te)H2 closely similar to sulphuretted hydrogen. But, as these hydrides are liable to dissociation, the pure compounds must be prepared by the decomposition of the zinc compounds Zn∑ with hydrochloric acid. For the description of individual compounds reference must be made to the handbooks of chemistry. (W. D. )

SELEUCIA, or Seleuceia (∑cλcυκctα). Of the numer­ous ancient towns of this name the most famous are—(1) the great city on the Tigris founded by Seleucus I. Nicator (see vol. xviii. p. 587), of the greatness and decay of which an account has been given in vol. xviii. p. 601 ; (2) a city on the northern frontier of Syria towards Cilicia, some miles north of the mouth of the Orontes, also founded by Seleucus I., and forming with Antioch, Apamea, and Laodicea the Syrian Tetrapolis. It served as the port of Antioch (Acts xiii. 4). Considerable ruins are still visible, especially a great cutting through solid rock, about two- thirds of a mile long, which Polybius speaks of as the road from the city to the sea.