Fourthly, the slow-burning fuze naturally demands a stronger *initial-ignition*. This principle was first established by the researches of the K. u. K. Technical Military Committee, since several fuzes were rejected by them as unignitable, which ignited without delay at the powder factory; so a remedy was grasped at, and the beginning of the powder column of such a fuze was supplied with a quicker burning mixture. Particularly the powder containing graphite was treated in that manner, which seemed best to suit that powder.

The old method of assuring the *retention and transmission of fire* by a complicated arrangement of quick-matches has fortunately been dropped and replaced by cylinders of compressed powder. But in order to offer still fewer sources of error, the orifices through which the fire is propagated should be filled with the finest grained powder. At any rate the elimination of quick-matches, and their replacement by loosely poured in powder, which is held in place by tin foil, seems to best meet the requirements, according to the investigations of the K. u. K. Powder Factory.

True Melting Points of Metals. M. VON PIRANI (*Ber. Phys. Ges.*, cccx, 48.)—The equivalent in black-body temperatures of metal surfaces is ascertained by optical pyrometry. To obtain the true temperature, Pirani uses the electrical resistance as an intermediate check, since this is not affected by surface conditions. The chief work was done on tungsten and tantalum. Taking the melting point of platinum as 1788° C., that of tantalum is 3100° and tungsten 335° C.

Ferro-Molybdenum Made by the Thermit Process. (*Eng. and Min. Jrnal.*, xc, 6.)—Ferro-molybdenum is now produced by the Thermit process and is coming into general use as a valuable alloy in high grade steels. Until lately pure molybdenum only was produced by this process, but to supply a demand, ferro-molybdenum is now being manufactured. The advantage of ferro-molybdenum over metallic molybdenum is that it does not oxidize, and that it can be more easily alloyed with steel, owing to its lower melting-point.

Tensile Strength of Aluminum Zinc Alloys. W. D. BANCROFT. (*Mech. Eng.*, xxv, 329.)—The alloys were made by melting 99.9 per cent. pure aluminum with "Bertha Pure Zinc" which had

less than 0.2 per cent. of impurities. When a thermocouple introduced in the melt indicated that the temperature had fallen to 50°C . above the freezing point, as indicated on Shepherd's diagram, the alloy was cast into an ice-cooled graphite mould, and quenched in ice-water immediately after solidification. Test pieces prepared in this way showed very high tensile strengths (25,000 to 35,000 lbs. per sq. in.). The 60 per cent. aluminum alloy having the maximum tensile strength of about 41,000 lbs. per sq. inch. The ductility of these alloys is very low, on 3-in. lengths below 5 per cent. elongation, but was considerably increased by annealing, with a corresponding diminution in the tenacity.

Action of Hydrogen on Carbon Monoxide. A. GAUTIER. (*Comptes rend.*, cl, 1564.)—When a mixture of hydrogen and carbon monoxide in the proportion $\text{CO} + 3\text{H}_2$ is passed through a heated porcelain tube the CO is reduced, even at 400°C . The production of steam attains a maximum at 1220°C . The maximum amount of carbon dioxide is found at 900°C . In most cases no carbon is deposited, but methane is produced. Further experiments of heating CO with steam at 550° to 800°C produced formaldehyde. The author applies these results to explain the composition of volcanic gasses.

Estimation of Radium. S. J. LLOYD. (*Jour. Phys. Chem.*, xiv, 476.)—Radium is estimated by the emanation produced in a solution of the radium salt in a known time. The effect of the presence of various reagents and precipitates in the solution of the radium salt is also investigated. For the accurate determination of radium by this method the presence of HCl or HNO_3 is necessary. If BaSO_4 or BaSO_3 is present in the solution, prolonged boiling or repeated determinations are requisite. In the case of freshly precipitated BaSO_4 the retention of the emanation is mechanical only, due to the entanglement of radium chloride or sulphate within the fine precipitate, the effect of heat being to release the radium and permit the removal of the emanation.

A New Resistance Furnace. F. A. J. FITZGERALD. (*Metal-lurg. and Chem. Eng.*, viii, 317.)—In this furnace the charge in the crucible is heated by radiation from resistance; in some forms it may be described as a furnace with a sealed reaction or heating chamber. Zinc has been experimentally produced in this type of furnace; and the efficiency of these furnaces has been determined at about 78 per cent. It is pointed out that in certain forms of electric furnace, the loss of electrically generated heat can be nearly eliminated by surrounding it with an envelope of burning gas. Experiments on large furnaces have shown that this arrangement is very economical.