

On the Spectra of Krypton. By C. RUNGE. *Astro-phys. J.*, 10, 73.—The krypton was prepared as described by Ramsay and Travers from liquid air, and contained some argon. The gas emitted two spectra, one with Leyden jar or spark gap in the secondary circuit, the other without Leyden jar and spark gap, as is the case with argon. The lines due to krypton were measured, argon lines being eliminated by comparison with a photograph of an argon spectrum. It is interesting to note that the author identifies the lines of Ramsay's metargon with the carbon lines, as was first pointed out by Schuster. He suggests that they may be due to a compound of argon and carbon which is not decomposed by sparking in an atmosphere of oxygen.

INORGANIC CHEMISTRY.

HENRY FAY, REVIEWER.

A Contribution to Our Knowledge of Dicarboxyl Cuprous Chloride. By WILLIAM APP JONES. *Am. Chem. J.*, 22, 287-311.—Dicarboxyl cuprous chloride, prepared by passing carbon monoxide into cuprous chloride moistened with hydrochloric acid, was obtained in white crystalline plates which decomposed rapidly on drying. The compound was analyzed by decomposing it by heat, measuring the carbon monoxide liberated, and weighing the water; also, by determining the increase in weight of cuprous chloride when carbon monoxide is passed over it. The analyses show that the compound has the composition represented by the formula $\text{Cu}_2\text{Cl}_2 \cdot 2\text{CO} \cdot 4\text{H}_2\text{O}$. The compound is decomposed by diminished pressure and by increase of temperature. The gas given off does not show any marked increase in chemical activity. Oxygen and chlorine cause only very slight decomposition, and hydrogen and nitrogen are without action. The general properties of dicarboxyl cuprous chloride are similar to those of other inorganic compounds containing carbon monoxide. It is to be considered as a true chemical compound.

The Occlusion of Hydrogen by Metallic Cobalt and Other Metals. By GREGORY PAUL BAXTER. *Am. Chem. J.*, 22, 351-364.—The amounts of hydrogen occluded by metallic cobalt, nickel, copper, and silver were determined by igniting the reduced metals in a current of air and weighing the water formed. The volume of occluded hydrogen depends upon the amount of surface presented, the purity of the metal, and the temperature of reduction. With cobalt the metal in the form of ingots occludes less hydrogen than that deposited in the form of foil by the electric current. The fine powder obtained from the reduction of the oxide occludes hydrogen in amounts varying with the purity

and the method of preparation. Perfectly pure oxide reduced in hydrogen at 400° – 500° occludes about half as much gas as the impure oxide, containing small amounts of alkali and silica, the increased amounts in the latter case being due to the more porous material. The property of spontaneous oxidation was shown to be due not to the amount of hydrogen occluded but to the large amount of surface exposed to the air. Occlusion proceeds slowly at ordinary temperatures and is dependent upon the time of contact of the metal with hydrogen. Nickel is subject to the same influences as cobalt, the pure metal occluding only traces of hydrogen. The extent of occlusion varies with the fusion-points of the metals,—the higher the melting-point the greater is the occlusion. Silver and copper, whose melting-points are close to the temperature of reduction, consequently occlude smaller amounts of gas, because the sintering together of the metal is greater, thus diminishing the extent of the surface. Pure silver and copper occlude only small amounts of hydrogen.

The Electrolysis of Metallic Phosphate Solutions. BY HARVEY M. FERNBERGER AND EDGAR F. SMITH. *J. Am. Chem. Soc.*, 21, 1001–1007.—The current density, voltage, dilution, and temperature are given for the quantitative separation of copper from iron, aluminum, chromium, cobalt, nickel, zinc, and manganese using solutions of their phosphates. Mercury and nickel may also be precipitated quantitatively from phosphate solutions.

Observations upon Tungsten. BY EDGAR F. SMITH. **I. The Action of Sulphur Monochloride upon Tungsten Trioxide.** BY HERMANN FLECK. **II. Tungsten Alkyls.** BY E. A. BARNETT. **III. Tungsten Alkyls.** BY CLARENCE HALL. **IV. Esters of Tungstic Acid.** BY CLAUDE DUGAN. **V. The Atomic Mass of Tungsten.** BY WILLETT L. HARDIN. *J. Am. Chem. Soc.*, 21, 1007–1027.—

I. By heating finely divided wolframite, scheelite, tungsten trioxide, or tungsten dioxide, with sulphur monochloride to 145° tungsten oxytetrachloride, $WOCl_4$, was formed in scarlet-red crystals which decomposed readily in the air. This compound is soluble in carbon disulphide and sulphur monochloride, and may be purified by sublimation. It has been shown that there is a crystalline form of tungsten trioxide which is insoluble in sulphur monochloride at 145° . Pure sulphur monochloride does not attack metallic tungsten.

II. It was impossible to obtain tungsten alkyls either by heating metallic tungsten with methyl iodide, or by the action of mercury ethide upon tungsten hexachloride.

III. An unsuccessful attempt was made to prepare tungsten alkyls from zinc methide and tungsten hexachloride.

IV. Esters could not be obtained by treating tungsten oxytetrachloride with alcohols. The products indicated that the reaction was incomplete.

V. The author has shown that the usual methods of determining the atomic weight of tungsten are not trustworthy. Tungsten trioxide prepared from tungsten oxychloride cannot be obtained pure and its reduction to metal in a current of hydrogen consequently gives varying results for the atomic weight. The metal does not occlude hydrogen to any extent. By oxidation of the metal to tungsten trioxide results were obtained which varied from 184.1 to 184.8 because of the volatility of the oxide. Analyses of tungsten oxychloride, and of barium metatungstate, were likewise untrustworthy. The most probable value the author considers to be 184, until more accurate methods can be devised.

Note on the Color of Chlorine Solutions. BY E. H. SARLES.
J. Am. Chem. Soc., 21, 1038.—A preliminary note.