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NEW DISCOVERIES IN PHOTO-ELECTRICITY.

An article by Professor Minchin will be found upon another page, setting forth some of his new discoveries relating to photo-electricity laid before the Physical Society last Friday, as well as some information about their relation to photography. Last Monday we had the pleasure of inspecting his apparatus, and receiving from him information as to his earlier and later methods of preparing the sensitive plates.

He uses two kinds of cells. One of them consists of a glass tube three or four inches long, as represented in fig. 1 of his article, in which tube is some pure methyl alcohol from oil of wintergreen, covering the two plates; platinum wires, sealed into the tube by heat, pass through the glass to the plates. The smaller plate is of absolutely clean, pure tin, a quarter of an inch long, a sixteenth of an inch broad. The larger and sensitive plate is one inch long and one-eighth of an inch broad. This one also is of perfectly pure tin, for any impurity, especially any trace of copper, promotes failure in the results. The plate is first cleaned with sodic hydrate, and afterwards with dilute hydrochloric or hydrofluoric acid; then it is laid upon a horizontal arm of porcelain so bent at the other end that, on raising from below a dish containing liquid, the said liquid covers the plate. By this method the second plate, or the one which has to be covered with a sensitive film, is immersed in the following solution:—

Distilled water...	500 c.c.
Nitric acid	3 "
Nitrate of ammonia	15 grammes

The exact nature of the surface thus given to the tin plate is not known, but from the composition of the liquid it is probable that the effect is one of oxidation of some kind. The plate is left in the liquid about four minutes, and becomes covered uniformly with a whitish deposit. The solution is then removed by lowering the dish, and the under surface of the horizontal porcelain support is dried with blotting-paper. This dried under surface is then uniformly heated with a spirit flame moved about underneath until the liquid

above has evaporated; the surface of the tin plate will then present a dirty slate colour. As the heating is continued, a point is reached at which a dark shadow passes over the whole surface of the plate; if the heating be now stopped, a sensitive plate is produced, but not one of the maximum sensitiveness. Upon continuing the heat the surface will change into a perfectly white one, and the heating should be continued until the thin vapour or smoke which is given off ceases to appear, and until the smell of nitrous acid entirely disappears. Care must be taken not to melt the tin in this process, and when the treatment is complete, the plate should be plunged into methyl alcohol from pure oil of wintergreen. A fine platinum wire has first to be fixed to the top of the plate, either by means of a solder with a low melting point, or by passing the wire through a little hole at the top of the plate and then bending the end of the wire back over the top edge; the latter plan is found to give sufficiently good contact for practical purposes. The clean, plain tin plate is sealed to the bottom of the tube by means of its platinum wire; after the methyl alcohol and the other plate are inserted, the upper part of the tube, with the wire from the second plate passing through it, is sealed by heat. All this may be done in daylight. The complete cell has to be left from two to five hours in the dark before it will exhibit its maximum powers.

In much which has just been stated, it may be noticed what a strong analogy exists between this method of preparing a sensitive plate, and one of the methods which Becquerel employed to produce a surface on a silver plate to adapt it to the taking of a photograph in natural colours.

The tin plate thus rendered sensitive, and mounted in a cell as described, when exposed to good diffused daylight, will exert an electromotive force—E.M.F. in electricians' language—of half a volt or more, as exhibited by means of the quadrant electrometer, and it will yield a steady stream of electricity for three or four hours, after which the E.M.F. falls off.

Supposing an exposure not to have been too long, the cell will gradually recover itself in the dark; if