The inhalation of a very small proportion of sulphur dioxide gas causes coughing, four volumes in 10,000 of air rendering it irrespirable, but if the sufferer escapes from the zone within a reasonable period the effects pass off, and the inhalation of dilute ammoniacal fumes rapidly affords relief. The gas can be easily liquefied by cold or pressure, and one pound of the liquid gives roughly 5 cub. ft. of the gas. The liquid sulphur dioxide is being used by the enemy in hand-grenades, which, broken by a small bursting charge, scatter the contents when thrown into the opposition trench, when they immediately volatilise, and often contain other volatile irritant bodies besides the sulphur dioxide.

Chlorine, which in all probability is the gas which has been used to the greatest extent, is of a yellowish-green colour. It can be liquefied under a pressure of six atmospheres, and has an insupportable odour. When inhaled even in minute quantities it causes great irritation of the mucous lining of the throat and lungs, air containing from 2 per cent. of it rapidly proving fatal. This gas can be made with the greatest ease by heating a mixture of hydrochloric acid and black oxide of manganese, but it is now produced in large quantities in certain electrolytic processes, from which it can be collected and liquefied, the liquid being stored in lead-lined steel cylinders closed by a valve.

In such a cylinder the gas above the liquid exercises a pressure of at least 90 lbs. on the square inch, so that if a cylinder containing it be fitted with a tube which passes down into the liquid and is provided at its exit from the cylinder with a valve, on opening the valve the liquid is blown out in the form of a spray, which at atmospheric pressure instantly assumes the gaseous form, and it is in this way that it has been chiefly used. It is reported, however, that where the German trenches are of a more or less permanent character, broad tubes with valves at intervals are laid a few feet in front of the trenches with the openings pointed towards the Allies, the trunk tubes being connected with a gasholder and chlorine plant situated in a sheltered spot some little distance away, so that the mere opening of the valves sets free a flood of gas without the disturbing influence of the cooling effect produced when gas is liberated from a cylinder of compressed liquid. The yellow colour of the gas employed has been a marked feature of all the more serious gas attacks, but it must be remembered that either chlorine or nitrogen tetroxide would give very much this effect, although the latter would be browner in colour.

Nitrogen tetroxide constitutes the fumes formed during the action of nitric acid on various substances in contact with air, and can be liquefied at temperatures below 26° C. to a liquid varying in colour with the temperature. Most observers from the front insist that this gas has been largely used, but this seems doubtful, as nitric acid and the oxides of nitrogen play so important a part in the manufacture of explosives that in spite of the large quantities of nitric acid made by electrical processes from atmospheric nitrogen, the enemy cannot spare much for this purpose, more especially as chlorine is more effective and wickedly cruel in its action, and can be obtained in any desired quantity without affecting the supply of any other munitions of war.

Only two liquid elements are known, mercury and bromine, and the latter, which is closely allied to chlorine in all its properties, becomes a vapour at atmospheric temperatures, and boils at 59° C. Germany produces practically the whole European supply from traces of magnesium bromide found in the great salt mines at Stassfurt. It is a reddish-brown liquid, and gives a vapour of the same colour, which violently attacks the eyes as well as the mucous lining of the nose, throat, and lungs. Its effect upon the system is the same as that of chlorine, and it is supposed to have been used by the Germans in asphyxiating shells, the bursting of which would scatter the liquid bromine and facilitate its conversion into vapour, which owing to its great weight would sink to the ground.

A form of poisoning used by the enemy has been the use of amorphous phosphorus in the shrapnel shells used partly for the marking of ranges. Amorphous phosphorus is a violet-brown powder, largely used in the composition on safety-match boxes, and differs widely from yellow phosphorus in that it is non-poisonous, and inflammable only at a temperature that converts it into the inflammable yellow form. A small cartridge of this included in the 18-pounder shell is converted by the heat of explosion into the ordinary variety, which burns, giving a dense white fume of phosphorus pentoxide, which marks the position of the bursting shell by day, and has conferred upon this type of shell the name of "woolly bear," and a flame which performs the same function of marking the position by night. When, however, a fragment of such a shell inflicts a wound the phosphorus poisons it, and very serious complications ensue.

Probably the phase of "frightfulness" that interests the British public as much as any is the bombs dropped by aeroplanes and Zeppelins, of which several distinct varieties are in use.

Besides these, incendiary bombs are used, which differ somewhat from those used by the enemy, and which for manifest reasons cannot be discussed. The incendiary bombs used by the Germans consist of an outer skin wound round with tarred rope, and containing a charge composed of a mixture of very finely divided aluminium and oxide of iron, which when ignited develops an enormous amount of heat owing to the combination of the oxygen of the oxide of iron with the aluminium.

This mixture is known in trade as "thermit," and was successfully introduced for practical use by Goldschmidt in 1898; it is now largely used for welding rails and other iron and steel structures, and also for repairing castings, indeed, for any purpose for which intense local heating is desired. In many of these bombs there is a layer of amorphous phosphorus at the base, which converted into phosphorus vapour by the heat of the thermit reaction burns with a rush of poisonous flame, igniting everything around, giving burns which, if not fatal, are poisoned and most difficult to get to heal, and also producing a cloud of fumes of phosphorus pentoxide.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

LIVERPOOL.—Prof. R. Robinson, of the University of Sydney, has been appointed to the newly constituted chair of organic chemistry. The University has recently received the sum of 10,000*l.* from Mr. Heath Harrison for the endowment of the chair. Prof. Robinson, who will fill the chair, was a student of the University of Manchester, where in 1909 he was appointed assistant lecturer. He is well known for his investigations in conjunction with Prof. W. H. Perkin on the constitution of brazilin and hæmatoxylin, the synthesis of narcotine, and the constitution of strychnine, brucine, harmine, harmaline, etc. He was appointed to the chair of organic chemistry at Sydney in 1912.

PROF. J. MASCART, director of the Lyons Observatory, informs us that the city of Lyons has commenced the formation of a War Library, to contain a collection of works and documents on the events of 1914–15.

The Mayor of Lyons hopes to secure as complete a collection as possible of papers relating to the war, so that students and investigators of diverse subjects—meteorologist or historian, hygienist or sociologist—will eventually regard it as the central bureau for their own particular studies of the times through which we are now passing. All branches of human activity having relation to war questions or problems will be embraced by the library, and no article or other publication will be considered too unimportant for inclusion. It is hoped that authors of all contributions upon these subjects will send copies of their works to the Bibliothèque de la Guerre of the city of Lyons, and will co-operate in other ways to make the collection complete.

UNTIL recent years the personal side of academic scientific history has not attracted with us the general attention that its human interest deserves. A notable exception is, however, afforded by the accounts given in the biographies of Lord Kelvin of the relations between Glasgow and Cambridge in his early days. A very interesting narrative of about ten years later has now appeared in the form of a notice of G. M. Slessor, of Queens' College, senior wrangler of 1858, and for a few years professor at Belfast, a mathematician of well-known achievement, whose high promise was cut off by early death at the age of twenty-eight. The biography, accompanied by a striking portrait, is in the *Aberdeen University Review* for June, 1915; it is written by the Master of Emmanuel, Dr. P. Giles, largely from material contributed by Sir James Stirling, F.R.S., who was a pupil and friend of Slessor, and was himself an Aberdonian senior wrangler a few years later. It may be commended to the notice of all concerned with the preservation of the scientific and academic personal records of the period.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, July 19.—M. Ed. Perrier in the chair.—J. **Boussinesq**: The existence in our physico-mathematical sciences of fundamental chapters still in the same rudimentary state as the dynamics of Aristotle.—Georges **Lemoine**: The catalysis of hydrogen peroxide in homogeneous media with acids and alkalis. Pure water acts as a catalyser on hydrogen peroxide. The addition of acids even in very small proportions, some ten-thousandths, reduces the rate of decomposition. Curves are given showing the relation between rate of decomposition and concentration of acid for sulphuric and hydrochloric acids. Alkalis accelerate the rate of decomposition, and the results of experiments with soda, potash, and lithia are given.—C. E. **Guye** and Ch. **Lavanchy**: The experimental verification of the Lorentz-Einstein formula by kathode rays of high velocity. Using the method of identical trajectories described in an earlier paper it was found that the Lorentz-Einstein formula on the variation of the inertia as a function of the velocity was verified with great precision by all the measurements.—E. **Fleurent**: Remarks on bread for prisoners of war. A method of preparing bread is described giving a product not liable to mould, and preserving its flavour intact even after keeping a month or longer in a moist, dark cupboard.—Louis **Roule**: Fish from the lower depths of the sea of the family of Brotulideæ in the North Atlantic.—E. **Vasticar**: The nuclear formation of the external auditive cells and of Deiters cells.

BOOKS RECEIVED.

Chemistry of Familiar Things. By S. S. Sadtler. Pp. xiii+320. (Philadelphia and London: J. B. Lippincott Co.) 7*s*. 6*d*. net.

A Text-Book on Practical Mathematics for Advanced Technical Students. By H. L. Mann. Pp. xii+487. (London: Longmans and Co.) 7*s*. 6*d*. net.

Metropolitan Water Board. Eleventh Report on Research Work, together with Index to Research Reports. Nos. i.–x., inclusive. By Dr. A. C. Houston Pp. 52+vii. (London.)

How Belgium is Fed. Pp. 28. (London: National Commission for Relief in Belgium.)

The National Physical Laboratory. Report for the Year 1914–15. Pp. 136. (Teddington.)

The National Physical Laboratory. Collected Researches. Vol. xii., 1915. Pp. iv+173+plates. (London: Harrison and Sons.) 12*s*.

An Introduction to Mining Science. By J. B. Coppock and G. A. Lodge. Pp. ix+230. (London: Longmans and Co.) 2*s*. net.

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