

proportions oxygen, hydrogen, and carbon dioxide. Besides these, chemistry has produced turpentine, musk, the perfumes of all common flowers, so that it is difficult to tell the artificial perfume from that extracted from the flowers. It has also produced a substitute for cloth that may yet be a blessing to the poor. It is claimed that it has demonstrated its ability to produce silk as good as that made by the silkworm, whose occupation may soon be gone. It has produced for the richer genuine rubies large enough to set, and also small diamonds.

Celluloid, put to so many and such beautiful uses, is a product of chemical processes. Applied chemistry has produced new kinds of paper for multifarious uses, such as car wheels, better than steel ones; water buckets; water mains; window panes, quite translucent and not fragile; and clothing, especially waterproofs, that invention of a twenty-year-old boy chemist. A paper perfectly fireproof has been produced, that can be made into beautiful patterns, and is soon to take the place of wood in the interior of passenger coaches, and doubtless in houses also. Artificial leather also has been produced, and valises made of it are said to be more durable than if made of leather itself. Pantasote is said to be every whit as handsome as the leather for fine couches and chair bottoms, and not subject to cracking or rapid deterioration. It is now used in place of the fine leather in great hotels and ocean steamers, being much cheaper. It is a product of recent science. The beautiful coloured glass such as that in our church windows, has resulted from the chemist's experiments.

Chemistry, obeying the injunction of the Master, "Gather up the fragments, that nothing be lost," has shown a marvellous capacity for

utilizing waste products; and this is destined to be more and more the case in the coming century. Acetylene is made from a by-product in the production of aluminum. Waste straw or waste of all kinds has been used to make paper, and doubtless the waste fibre of our sugarcane, the juice being pressed out, could be so used. But the most striking instance of this utilization is in the matter of coal tar, a waste product in the manufacture of coal gas. The aniline colours, every colour of the rainbow, with numerous variations, have resulted from the chemical treatment of coal tar. And, wonderful to relate, the numerous antipyretics, antipyrine, antifebrin, antikamnia, etc., used in reducing fever, are from the same source, which also furnishes us with our most powerful antiseptic, carbolic acid. The sewage of our large cities, heretofore worse than waste, is beginning to be treated, chemically and electrically, the result being pure water, pure ammonia, and one of the best fertilizers. Cotton seed, formerly a waste, now furnishes an excellent fertilizer or a cow food.

If synthetic chemistry has accomplished something and promised more in the way of imitating man's food, analytic chemistry stands ready to detect any imposition on him in the adulteration of his food, or to detect any poison designedly put in it. Moreover, analytic chemistry has proved a friend to the farmer, has analyzed his soils, and has handed over to applied chemistry the formula for the food needed by the particular soil for the production of any specified crop. Thus agriculture during the century has been raised by the dignity of a science.

The last century was hardly half gone when Daguerre, following on the mainly unsuccessful attempts of others, made his first successful pic-