In gas manufacture very little improvement had been made in these ten years. Sulphur was still found in it in considerable and, perhaps undiminished quantity. It was present in the form of bisulphide of carbon, which was irremovable by the ordinary modes of purification. A method, however, had been devised by the Rev. Bowditch, the Vicar of Wakefield, by which almost all could be easily got rid of. It consisted in passing the gas over hydrate of lime heated to 400°: by this means the sulphur of the bisulphide of carbon was brought into the form of sulphuretted hydrogen, which was removed by the ordinary oxide of iron purifier. On the small scale, this process was found to take away nearly all the sulphur, and it might, perhaps, answer as well on the large. The lecturer stated that he had never found more than nine or ten grains of sulphur in 100 cubic feet of gas, but he was aware that others had found as much as 40 or 50, and he believed the quantity commonly present was about 20 grains in the hundred cubic feet. Recently, a new illuminating constitutent, acetylene, had been discovered in coal gas, and the discovery may, perhaps, entirely revolutionise the manufacture. At present a comparatively low temperature is employed in the manufacture of gas; but an intense heat is favourable to the production of acetylene. It is produced when carbonic oxide and carburetted hydrogen are stongly heated together. It would be necessary, the lecturer said, to investigate how this body could be produced on a large scale to increase the illuminating-power of gas; but the subject was still *in embryo*. Acetylene may be obtained from gas by passing it through a solution of subchloride of copper, by which means, what might be called an acetylide of copper was produced, in the form of a brick-red precipitate. The lecturer showed that this acetylide of copper was decomposed on the addition of dilute hydrochloric acid, and that the acetylene envolved burnt with a brilliant flame. The acetylide of copper is an explosive compound, which has been the cause of several accidents where gas has been passed continuously through copper tubes. It is exploded by friction, percussion, and by heat.

The use of animal and vegetable oils for illuminating purposes had received no new development in the past ten years; but a new source of light of the greatest importance has been discovered in the oils obtained by the distillation of coals and shales at low temperatures. This oil, however, has recently found a formidable rival in the oil distilled by nature herself. The native oil of the United States and Canada is obtained in immense quantities: from the latter country alone as much as 20,000,000 of gallons have been procured, which, it has been calculated, would give as much light at 180,000,000 lbs. of sperm candles. The importance of these oils could not be overrated. Some accidents had resulted from their use, apparently from careless manufacture, it being necessary to remove the lighter constituent oils before they could be used with perfect safety. The lecturer explained that it was necessary to burn these oils, as well as Young's paraffin oil, in lamps made of some badly-conducting material like glass, so that the oil in the reservoir might not become heated; and he showed the explosiveness of some oils and non-explosiveness of others when heated to 120°.

The following diagram exhibits the illuminating equivalents of various materials, showing the quantities of other substances required to give the same amount of light as would be obtained from one gallon of Young's paraffin oil:—

Young's paraffin oil.....	1·00	gallon.
American rock oil (1).....	1·26	"
" " (2).....	1·30	"
Paraffin candles.....	18·6	pounds.
Sperm "	22·9	"
Wax "	26·4	"
Stearic "	27·6	"
Composite "	29·5	"
Tallow "	39·0	"

The comparative cost of light was shown in a diagram exhibiting the comparative cost of the light of twenty sperm candles, each burning ten hours, at the rate of 120 grains per hour:—

	s.	d.
Wax	7	2½
Spermacceti	6	8
Tallow	2	8
Sperm oil.....	1	10
Coal gas.....	0	4¼
Cannel gas.....	0	3
Paraffin candles.....	3	10
" oil.....	0	6
Rock oil	0	7⅜

It was thus shown that paraffin and rock oils are the best sources of light for domestic purposes, inasmuch as they give the largest amount of light with the least development of heat.

Amount of carbonic acid generated, and heat evelved, per hour, in obtaining a light equal to twenty Sperm candles, each burning 120 grains an hour:—

	Carbonic acid in cubic feet.	Units of heat.
Tallow	10·1	100
Wax..... } Spermaceti..... }	8·3	82
Paraffin	6·7	66
Coal gas.....	5·0	47
Cannel gas..... ..	4·0	32
Paraffin oil ..... } Rock " ..... }	3·0	29

The lecturer then entered upon the chemical and physical principles concerned in the production of light, explaining that it was produced by the incandescence of certain solids or vapours. The incandescence of liquids is never used, and in one case only—the mercurial light—is a vapour employed. In all other cases it is the incandescence of solid carbon. He explained, too, how the light was affected by the pressure of the atmosphere and temperature; a greater pressure of the atmosphere brought more solid particles to incandescence, and a fall of one inch in the barometer involved a reduction in illuminating power of 5 per cent. When the air supplied to the burner, or the gas itself is heated, an increased illumination is obtained with the same consumption of gas amounting to 62 per cent.; or, for an equal amount of light, the saving of gas would amount to 33 per cent.

Dr. Frankland then explained the conditions of a good light, and showed that it was necessary that light for ordinary purposes should contain all the colours of the spectrum, as the light obtained in