per, that the fragments, while they preserve their original form, increase materially in volume, and they crush under the slightest pressure. If we wish to collect and use the sulphurous acid gas for the manufacture of sulphuric acid, it is only necessary to establish a communication between the apparatus and the leaden chambers; then a proper ventilation may be established by means of the draft of chimneys, which it is easy to regulate. By these means it is possible to render useful either as ores of sulphur, or as oxides, on the one hand, the pyrites which abound so in certain localities, and upon the other, which is of much greater importance, the ores poor in metal, but rich in sulphur, such as certain sulphurets of copper, the too difficult roasting of which prevents their employment.

The preceding remarks will account for the preference which M. de Ruolz has given to this method, for obtaining the oxide of antimony from the raw sulphuret. In fact, the antimony obtained by this process is of a most beautiful white, and an impalpable powder: thus it may be employed immediately in painting, without the necessity of undergoing pulverization, or grinding. This substance, thus produced under the influence of the vapor of water, is reduced naturally to a degree of tenuity, which it is impossible to obtain by any other means.

Finally, this mode of preparation prevents the greater part of the chances of unhealthiness, if the emanations of the oxide of antimony should possess this quality, a supposition, however, which a long and well attested experience repels.—*Comptes Rendus*, Nov. 20, 1843.

Note upon the Influence of Jackets upon Steam Engines. By M. COMBES.

A steam engine built by Farcot, was provided with an envelope to the cylinder, into which the steam was freely admitted from the boiler, and from which it passed as required into the cylinder. It having become necessary to repair this jacket, it was found that the expenditure of fuel was increased in the ratio of 6 to 10. A similar fact has also been observed in an engine of the same builder, erected near Sedan. A series of experiments was instituted by M. Combes, and conducted as follows:—

First, the machine was worked as usual, the steam being admitted to the jacket, and from the jacket to the cylinder; these experiments were continued for four days, the quantity of water pumped into the boiler being accurately measured, and the quantity of coal weighed; the amount of water condensed in the jacket was also ascertained, and every half hour the tension of the steam in the cylinder was measured by an indicator, and at the same time the pressure in the boiler, and in the condenser, were taken by gauges, and the number of strokes per minute of the piston counted.

Second, for three days the machine was worked by conducting the steam directly into the cylinder from the boiler, the jacket containing air only. The same observations as before were carefully made.

Third, for three days the steam was conducted directly to the cyl-

inder, but the jacket was kept in communication with the boiler, and was, consequently, filled with steam. The same observations were made as before.

The following are the results of the table:—

Exp'ts.	Duration.	Total Consumption.		Mean Pressures.			Consumpt'n per hour.		Water Evaporated by lb. of Coal.
		Coal.	Water.	Boiler.	Cylinder.	Conds'r.	Coal.	Wat'r.	
1	43h. 15m.	1482.7	8387.1	3.82	2.57	0.26	34.28	193.9	5.66
2	33h. 30m.	1982.12	11111.59	3.5	2.55	0.28	58.16	331.7	5.61
3	32h. 30m.	1469.5	7822.23	3.5	2.73	0.24	45.22	240.7	5.32

M. Combes attributes the increased quantity of fuel necessary when the jacket is not used, to the formation of water by condensation of the steam during its admission into the cylinder, and the consequent necessity of furnishing more steam to supply this loss by an additional evaporation from the boiler.—*Comptes Rendus*, Nov. 26, 1843.

Examination of Aqua Regia, and of a peculiar product to which it owes its principal properties. By M. A. BAUDIMONT.

When a mixture is made of two parts by weight of nitric, and three parts of the hydrochloric acid of commerce, a red gas begins to be disengaged at about the temperature of 187° Fahrenheit. If this gas be passed into an U tube, which is externally in contact with pounded ice, the condensible matters which it brings with it are deposited. Experiment has shown that the first portions are mixed with hydrochloric acid, and that the last alone are sufficiently pure. This gas does not redden well dried litmus paper; but discolors it after some hours: it reddens it when moist. At 32° water dissolves .3928 of its weight, or 121 times its volume of it. This liquor is light red, and has a density of 1.1611. Enclosed in a hermetically sealed tube, it is not discolored by the long continued action of the solar rays; it possesses all the known properties of aqua regia. It may be liquified by passing it into narrow tubes plunged into a mixture of snow and salt. The liquid is dark red, but much less so than hypochlorous acid; it boils at 19° Fahrenheit. Its density at 46.6° Fahrenheit, is 1.3677. Its coefficient of dilatation measured above its boiling point in closed tubes increases very rapidly.

The density of the red gas, determined by two different methods, is 2.49. The liquid attacks all metals placed in contact with it; with the finely divided silver, obtained by the reduction of the chloride, it explodes and disappears instantly. It evaporates without attacking phosphorous.

Analysis shows its composition to be $\text{AzO}_3 \text{Cl}_2$; that is, nitric acid, in which two atoms of oxygen are replaced by chlorine.