

White (C. B.)

REMARKS BY

C. B. WHITE, M. D., Sanitary Director,

Upon "DISINFECTATION,"

As found on pages 81 and 82 of a pamphlet prepared by Dr. Joseph Jones and published by the Board of Health—a pamphlet entitled, "Acts of the Legislature of Louisiana, establishing and regulating quarantine, etc.;" also,

DISCUSSION OF ANALYSES OF DR. JONES,

Appearing in the same article.

By JOS. ALBRECHT, Chemist.

NEW ORLEANS, November 20, 1880.

A valuable and much needed pamphlet has been lately prepared by Joseph Jones, M. D., of Louisiana, and officially published by order of the board—a pamphlet entitled, "Acts of the Legislature of Louisiana, etc." Under the head of disinfectants occurs a table of analyses, entitled, "Results of the Chemical Analyses, by Joseph Jones, M. D., President of the Board of Health of the State of Louisiana, of zinc iron disinfectant, as offered in the market of New Orleans in 1879 and 1880."

This is accompanied by remarks to the discredit of the disinfectant used by this association. Mr. C. M. Soria, president of a chemical manufacturing establishment, as contractor with the Sanitary Association, being necessarily included in the censure, the following note was addressed to Mr. Soria, who referred the same to Dr. Joseph Albrecht, consulting chemist to the works, at present and for some time past assayer at the U. S. Mint.

NEW ORLEANS, November, 1880.

C. M. Soria, Esq., President Stern's Fertilizer and Chemical Manufacturing Company, 14 Union street:

DEAR SIR—I call your attention to "results," etc., lately published by the Board of Health. As the manufacturing company of which



you are president furnished nearly the whole of the zinc iron disinfectant used by this association during the past and present year, I shall be pleased if you will furnish to the association such explanation as the statement of the results of the analyses seem to require.

Very respectfully, your obedient servant,

C. B. WHITE, M. D., Sanitary Director.

Dr. Albrecht's discussion of the analyses has been forwarded to me by Mr. Soria, and appears later as a part of this paper.

There is a serious omission in the analysis of the zinc iron, as the chloride of zinc is not mentioned, though forming, on an average, 20 per cent of the metals of the solution, and the value of the chloride of zinc as a disinfectant, ignored. There is in the range of chemical agents of such cheapness as can be used freely, probably no one so deadly to low forms of life.

Putrefaction is the work of bacteria of various forms.

The destruction of the human body is to a great degree, if not wholly, so accomplished, and as all are aware this putrefaction proceeds in this climate with great speed yet such a body can be for many months protected from putrefaction if injected with chloride of zinc, which instantly kills all forms of low life, and as long as it remains prevents their reappearance. A body so prepared was preserved in an open coffin in the Charity Hospital for more than ten years, perfectly free from decay. Its action is similar on any masses of matter with a tendency to putrefaction.

In all this discussion it must not be forgotten that deodorization and disinfection of vaults are only make-shifts of limited benefit, immediate removal of excreta being sound principle.

The zinc iron disinfectant is a compound originated by Dr. A. W. Perry, after careful laboratory experiments and tests of its value on the matter of vaults. He discovered by actual trial that chloride of iron and zinc and copperas had no action on free sulphuretted hydrogen, the most offensive and noxious gas that vaults emit, and acted upon it only when in alkaline combination.

It follows, therefore, that the very presence of those proto salts mentioned in a vault, by giving an acid reaction to its contents, entirely prevents the destruction of the sulphuretted hydrogen. Dr. Perry found, however, that perchloride of iron acted on sulphuretted hydrogen whether free or combined, and this led to the adoption of

the disinfectant composed of chloride of zinc and perchloride of iron, at the same time a deodorant and disinfectant. This chemical fact referred to above was not mentioned in many works on chemistry in vogue at that date, and many well informed chemists are not aware of it.

The zinc iron disinfectant, made by A. K. Finlay, was prepared only as a sample, and was never in the market of New Orleans at all.

With reference to the specimen of I. L. Lyons & Co., that establishment offered a sample of the proper specific gravity, and guaranteed to furnish a liquid in which the metals should be eighty per cent iron, twenty per cent zinc; the iron in the form of perchloride, and at a low figure. A considerable quantity was contracted for, and as soon as delivered a sample was analyzed with as little loss of time as practicable by Mr. Walton Clark, chemist to the gas works; and reported by him to be not at all up to the contract.

Its use was immediately discontinued. It seems the representative of the house, during the absence of his regular manufacturing chemist, had employed one well recommended but an incompetent substitute, and that in his hands the errors had been made. Mr. Walton Clark's analysis being confirmed by that of Mr. John Johnson, the well known chemist of the Charity Hospital, the house of Lyons & Co., at once accepted pay for the amount used, at the actual value placed upon it by Mr. Clark, as the result of his analysis. The letter of Mr. Clark is preserved in the office, the bill with deduction and receipt is in the hands of the treasurer of the association. Four other specimens might be considered, but as the dates ysi are not given I can say nothing about them.

Last summer, during the preparation of one of the lots of the disinfectant at Stern's chemical works, the supply of hydrochloric acid ran short, and the person practically manipulating its manufacture, having no particular chemical knowledge, used sulphuric acid in its stead. All new batches of disinfectant were always analyzed by Mr. Clark, and he found so very large an amount of sulphuric acid in this sample that it could not have been accidentally introduced.

Mr. Soria being informed of the result of this analysis, was greatly surprised, and referred a sample to Dr. Albrecht. His results agreeing with those of Mr. Clark, Mr Soria accepted the deduction deemed

proper, and the receipted bills showing such reduction are in the treasurer's hands. Mr Clark's analysis and opinion are of record.

A small quantity of zinc iron was made later on by Stern's works at a much reduced price. In this form the sulphuric acid which generated the muriatic acid remained in the disinfectant, but in the combination of sulphate of sodium, a strong combination not likely to be broken up, and so render possible the evolution of ill-smelling sulphides. On standing, however, basic chlorides of difficult solubility were thrown down. This form has therefore not since been used.

The zinc iron used this year was from Stern's Manufacturing Company. When reported ready for use, Mr. Mumford went to the factory, took the sample from the tanks, saw it drawn off into barrels, loaded into wagons and driven off. The objects of taking from the tanks was that the sample might represent the contents of all the barrels, and thus only a single analysis be required.

Mr. Walton Clark found less than two per cent of sulphuric acid present and the disinfectant was accepted.

For easy comparison the four remaining analyses of the zinc iron, by Dr Jones, have been reserved to this part of the paper. Mr. Johnson, of the Charity Hospital, has furnished an analysis of a specimen procured by himself from the warehouse where it had been stored unopened up to the date of the analysis.

RESULTS OF CHEMICAL ANALYSES, ETC.

Results of Chemical Analyses, by Joseph Jones, M.D., President of Board of Health, State of Louisiana, of Zinc Iron Disinfectant, as offered in the market of New Orleans in 1879 and 1880:

SAMPLES—WHENCE OBTAINED.	Specific Gravity.	Solid Matter to 1 gallon, grains.	Oxide of Iron in 1 gallon, grains.	Sulphuric Acid in 1 gallon, grs.	Chlorine in 1 gallon, grains.	Oxide Zinc in 1 gallon, grains.
A. K. Finlay	1.330	21,056	12,800	5,383.68	8,053.36	.....
Stern's Fertilizing Company	1.358	24,832	10,240	10,659.68	4,623.41	.....
I. L. Lyons	1.310	20,672	10,496	13,997.56	3,166.72	.....
Erich Brand	1.295	10,352	8,448	10,090.38	2,660.04	.....
First District Sanitary office						
Free distribution A. S. Ass'n						

Analysis of Stern's Fertilizing Company's zinc iron disinfectant of 1880, by Jos. Albrecht, chemist, November 11, 1880.

WHENCE OBTAINED.	Specific Gravity,	Solid Matter in 1 Gallon, grains.	Oxide Iron in 1 gallon, grains.	Sulphuric Acid in 1 gallon, grs.	Chlorine in 1 gallon, grains.	Oxide Zinc in 1 gallon, grains.
Stern's Fertilizing Co. . . .	1,310	26,906.68	11,018.7	1,139.6	16,122.8	2,625.7

Analysis of sample of zinc iron disinfectant by J. Johnson, chemist at Charity Hospital, obtained from New Orleans Gas Works.

WHENCE OBTAINED.	Specific Gravity.	Solid Matter in 1 gallon, grains.	Oxide Iron in 1 gallon, grains.	Sulphuric Acid in 1 gallon, grs.	Chlorine in 1 gallon, grains.	Oxide Zinc in 1 gallon, grains.
N. O. Gas Works	1,333.8	25,294.5	10,995.6	1,358.35	13,943.69	1,963.5

The specimen of zinc iron of Dr Albrecht, was from an illy closed barrel found at the works. A comparison of the specimens makes it evident that the analyses of both Dr Albrecht and Mr Johnson show more solid matter in the gallon than any of the four of Dr. Jones' list. That the oxide of iron is greater than of any, save in the Stern's works specimen. That the sulphuric acid is 1,139.6 and 1,135.8 grains in the analyses of Mr. Johnson and Dr. Albrecht, while that of the four of Dr. Jones amounts to about 9500 grains each. The chlorine appears in these four analyses of Dr. Jones as very nearly 3100 grains to the gallon, the analysis of Dr. Albrecht, however shows 16,100 grains to the gallon, and that of Mr. Johnson very nearly 14,000 to the gallon. This shows that none of the analyses of this year correspond at all to those of Dr. Jones, and that when he asserts his analyses to have been of 1879 and 1880, he has merely made a twelve months' pen slip.

Dr. Albrecht has kindly presented an analysis of zinc iron in the modern form: Specific gravity 35 Baume; per chloride of iron, 27.31 percent; persulphate of iron, 2.47 percent; chloride of zinc 5.68 percent, solid matter 35.46 per cent. It will be seen therefore that of a gallon slightly over one-third of its weight consists of effective chemical

agents held in solution. In estimating the relative value of copperas it is well enough to remember that of ten pounds purchased, about four pounds and a half is water—water of crystallization and valueless.

Copperas is especially a deodorant. It is not better than zinc-iron, but as a disinfectant to destroy noxious germs it is incomparably inferior. What is wanted from a disinfectant is work. The chlorine of the zinc-iron is its expense and its value. When used properly, chlorine is steadily given off and in the form termed nascent, its most energetic shape.

One object of these remarks is to inform the association as to the general policy which has governed the Sanitary Director's Department in the selection and use of disinfectants. Another object is, that it was announced as part of the proceedings of the Board of Health at a late meeting that the pamphlet of Dr. Jones was to be republished in the Annual Report of the Board of Health.

I therefore recommend that a resolution be passed by the association respectfully asking such modification of the article on disinfectants as shall on its republication do away with its seeming censure of the association, its officers and contractors.

CHEMICAL DISCUSSION OF DR. JONES' ANALYSES BY DR. ALBRECHT.

NEW ORLEANS, November 12, 1880.

SIR—Mr. C. M. Soria, President of "Stern's Fertilizer and Chemical Manufacturing Company," referred to me for answer your communication requesting him to explain the disparity of the composition of the zinc iron disinfectant furnished by his company to the Auxiliary Sanitary Association of this city, in 1879 and 1880, and the analyses of Dr. Joseph Jones, President of the Board of Health of the State of Louisiana, and published by him in a pamphlet entitled, "Acts of the Legislature of Louisiana, establishing and regulating quarantine etc."

In answer, I beg leave to state, that Stern's Fertilizer Company furnished your honorable association no other zinc iron chloride than

the one of the following composition, except a small quantity, in the beginning of 1879, whose composition was known to you:

COMPOSITION OF ZINC IRON CHLORIDE.

{ 120 parts of zinc.	
{ 408 " muriatic acid, 21 degrees Baumé.	
{ 480 parts of iron.	
{ 1878 " muriatic acid, 21 degrees Baumé.	
{ 936 parts of muriatic acid, 21 degrees Baumé.	
{ 636 " nitric acid, 40 degrees Baumé.	

with a sufficient quantity of water to make a solution marking 35 degrees Baumé.

A recent analysis of a sample taken out of a barrel in Stern's factory proved to be composed as follows, in 100 grammes of solution:

Perchloride of iron	27.31
Persulphate "	2.47
Chloride of zinc	5.68

Solid matter in 100 grammes 35.46 grammes, or 35.46 %.

or,

Sesquioxide of iron	14.31 "
Chlorine	20.94 "
Sulphuric acid	1.48 "

All iron was found to exist as perchloride or persulphate.

It is very disagreeable to me to be compelled to defend my own reputation and that of Stern's company, and to expose the seriously erroneous analyses of Dr. J. Jones.

I am at loss to understand why Dr. Jones, who courts the public opinion as marching with the progress of the age, comes forward with the now obsolete quotation of *troy grains and gallons*, whilst now-a-days the metrical system is universally adopted in chemistry, as it conveys a far more easy comprehension of the results of chemical analyses.

The parties here interested are not willing to acquiesce in this quasi accusation of ignorance or cupidity, but will prove unpardonable errors in his analyses.

I have carefully prepared a systematic table showing all possible combinations with Dr. Jones' weights of oxide of iron, chlorine and sulphuric acid, to prove how incorrect, nay, impossible, his analyses are. I was obliged to assume all combinations possible as Dr. Jones did not state, if the chlorine and iron were combined as *proto* or *perchloride*, which makes a great difference.

If I had to answer your questions to a competent body of professional chemists, this table alone would be deemed quite sufficient, because every one of them would be able to verify at once their correctness; but, as this is intended for the public at large, i. e., for people not thoroughly conversant with chemical equivalents, the objection may possibly be raised, that these tables, after all, oppose only figures to figures, and, therefore, it is necessary to comment upon them and to show, by close reasoning, that Dr. Jones' analyses cannot hold their ground.

TABLE

Showing the chemical composition of divers combinations of iron, zinc, sulphuric acid and chlorine, and the solid anhydrous matter resulting therefrom, calculated from figures given as the result of analyses of Dr. Joseph Jones:

Specific Gravity	IRON - EQUAL TO			Sulph'ric Acid.	Chlorine.	Solid Matter.
	Peroxide.	Protoxide	Met. Iron			
A. K. Finlay, by Dr. Jos. Jones.						
1.35	16,640	.....	.....	323.02	4,306.73	19,392
Chemical composition assuming the weight of sulphuric acid and chlorine as perchloride be as stated by Dr. Jones.						
.....	322.8	290.6	.....	323.02	.....	613.62
.....	3,243.47	.....	2,270.83	.....	4,306.73	6,576.56
.....	3,566.27	290.6	2,270.83	323.02	4,306.73	7,190.18
Chemical composition assuming the chlorine as protochloride of iron.						
.....	322.8	290.6	.....	323.02	.....	613.62
.....	4,864.63	.....	3,405.88	.....	4,306.73	7,712.61
.....	5,187.49	290.6	3,405.88	323.02	4,306.73	8,326.23
Chemical composition assuming 16,640 grains of oxide of iron as perchloride.						
.....	322.8	290.6	.....	323.02	.....	613.62
.....	16,317.2	.....	11,426	.....	21,673.81	33,099.81
.....	16,640	290.6	11,426	323.02	21,673.81	33,713.43
Chemical composition assuming 16,640 grains of oxide of iron as protochloride.						
.....	322.8	290.6	.....	323.02	.....	613.62
.....	16,317.2	.....	11,426	.....	14,449	25,875
.....	16,640	290.6	11,426	323.02	14,449	26,488.62

Stern's Fertilizing Company, by Dr. Jos. Jones.

1.33	12,800	.....	.....	5,383.68	8,053.36	21,056
Chemical composition assuming the sulphuric acid and the chlorine as stated by Dr. Jones; the chlorine combined as perchloride of iron.						
.....	5,380.88	4,824.77	.....	5,383.68	.....	10,208.45
.....	6,065.14	.....	4,245.60	.....	8,053.36	12,298.96
.....	11,446.02	4,824.77	4,245.60	5,383.68	8,053.36	22,507.41

Chemical composition assuming the sulphuric acid and the chlorine correct and the chlorine combined as protochloride of iron.

.....	5,380.88	4,824.77	.....	5,383.68	.....	10,208.45
.....	9,096.72	.....	6,368.84	.....	8,053.36	14,422.20
.....	14,477.60	4,824.77	6,368.84	5,383.68	8,053.36	21,630.63

Chemical composition assuming the weight of the oxide of iron and sulphuric acid as stated by Dr. Jones and the necessary chlorine as perchloride of iron.

.....	5,380.88	4,824.77	.....	5,383.68	.....	10,208.45
.....	7,419.12	.....	5,494.30	.....	10,421.98	15,916.23
.....	12,800	4,824.77	5,494.30	5,383.68	10,421.98	26,124.73

Let us admit that in the A. K. Finlay preparation, the weight of one or two substances to be correct, we find that the others are far out of Dr. Jones' analysis—nay, straightway impossible—as in the cases in which the oxide of iron is 300 % and even nearly 500 % larger than there is sulphuric acid and chlorine to dissolve it.

As it is obvious that only 4306.73 grains of chlorine were intended, as printed, let us see what the result would be of its combination. Two cases are possible, the chlorine was combined either as *proto* chloride or as *per*-chloride of iron.

In the first case, we know that 4306.73 grains of chlorine would require 3405.88 grains of metallic iron, and produce 7712.61 grains of *proto*-chloride of iron; and that 323.02 grains of sulphuric acid unite with 290.6 grains of protoxide of iron to form 613.62 grains of sulphate of iron.

But 3405.88 grains of metallic iron correspond with 4864.69 grains of sesqui-oxide of iron, and 290.6 grains of protoxide with 322.8 grains of sesqui-oxide, therefore, we have as result 5187.49 grains of sesqui-oxide of iron and 8326.23 grains of solid anhydrous mass.

Dr. Jones says he found 16,640 grains of oxide of iron, or more than *three hundred per cent* than the sulphuric acid and chlorine

together can dissolve; he found also, 19,392 grains of solid matter, or 230 % more than could exist in a clear liquid.

Assuming that the 4306.74 grains of chlorine were combined with iron as *per*-chloride, it would require 2270.83 grains of metallic iron, to form 6576.56 grains of perchloride of iron; but 2270.83 grains of metallic iron correspond with 3243.47 grains of sesqui-oxide, add to this 322.8 grains of ferric oxide necessary for the sulphuric acid, and we have 3560.27 grains of oxide of iron and 6576.56 grains of perchloride, with 613.62 of copperas as above, making a total of 7190.18 grains of solid matter.

Dr. Jones found 16,640 grains of oxide of iron or 13,073.73 grains more (say 500 %) than the chlorine and sulphuric acid, stated by the Doctor, can make soluble or combine with. He also states, that he found 19,392 grains of solid anhydrous matter, whilst only 7190.18 grains of solid matter can exist in a clear solution containing 323.02 of sulphuric acid and 4306.73 grains of chlorine.

Let Dr. Jones explain in what state or combination he found his excess of 13,073.73 grains of oxide of iron, or the 11,452.51 excess in the case of protochloride in his analysis.

It is utterly impossible, that this enormous excess of ferric oxide can be made soluble with the quantity of sulphuric acid and chlorine, as stated by Dr. Jones. If this excess of oxide (nearly two pounds) was in its natural state and suspended in the solution, then the zinc iron chloride would not be a clear preparation, but a muddy slop.

Assuming that the announced weight of oxide of iron be correct, in Dr. Jones' analysis, we see, by looking over the table, that in the case of *per*-chloride it would require 21,673.81 grains of chlorine, and result in a total of 33,713.43 grains (anhydrous) dry matter.

It would carry me too far to explain similar errors in Dr. Jones' analyses of the Stern's Fertilizer Company's preparation, therefore, I refer you to my table. The errors are very grave, but not so excessive as in the analysis just discussed.

As there is a great similarity amongst the samples of Erich Brand, First District Sanitary Office, and Auxiliary Sanitary Association with that of I. L. Lyons, I presume that Dr. Jones had all samples from the same source, but certainly not from Stern's Manufacturing Company. Therefore it seems to me very strange that Dr. Jones should have obtained a sample from the Auxiliary Sanitary Associa-

tion in 1880, which had nothing in common with that which they bought from Stern's Factory. It also seems that Dr. Jones never understood the true nature of this zinc iron disinfectant.

Having shown and proven the fallacy of Dr. Jones's analysis, it is worthy of mention that he seems to ignore, studiously, the presence of *chloride of zinc*, which is one of the most energetic antiseptics we possess; it arrests putrefaction instantaneously whenever it comes in contact with decomposable matter; it absorbs sulphuretted hydrogen and sulphide of ammonium, under the same conditions (alkaline) as copperas, etc., etc.

ORIGIN OF THE ZINC IRON CHLORIDE.

Twelve or fifteen years ago Dr. A. W. Perry was connected with the Board Health existing at the time, of which Dr. C. B. White was president; he told me that he was experimenting with a disinfectant, which should not only act by immediate contact, but within a certain area through the air, and destroy low organisms to a certainty.

He found that chloride of zinc in combination with perchloride of iron, answered most satisfactorily all the requirements of a perfect disinfectant.

When a solution of perchloride* is exposed to contact of air, its oxygen takes possession of the iron of the perchloride and forms oxide of iron, and an equivalent of *chlorine in its free state* is disengaged. Free chlorine is *sure death* to organisms.

At that time, the high price of this preparation prevented its use, and carbolic acid and copperas were used as disinfectants. In latter years it was demonstrated that those two substances did not destroy the germs of low organisms, unless they be employed in such concentration, that their use becomes impracticable, besides many persons had objections to the strong odor of carbolic acid. Two years ago the use of carbolic acid and copperas did not visibly arrest the progress of yellow fever; it was then when the Sanitary Director of the Auxiliary Sanitary Association inquired of Mr. Soria and myself if we were willing to manufacture the zinc iron chloride.

I composed several samples, one with two parts of iron and one of zinc, one with three parts of perchloride of iron and one of sulphate of zinc, and one with four parts of iron and one of zinc, the iron as perchloride, the zinc as chloride, and as free from sulphuric acid as was commercially possible; this latter one was adopted by your honorable

association, and a contract entered into with Mr. Soria for its preparation under my superintendency, but before the contract was concluded, your association advertised for sealed proposals. You had all the samples of competing firms analyzed and compared prices, and found Stern's the best and the cheapest.

If the object is only to deodorize privies and not to destroy organisms, then copperas is the cheapest.

On page 81 of the pamphlet Dr. Jones speaks of "the disinfectant recommended by the Board of Health" as containing one pound of copperas to the gallon of water, but as one pound of copperas is nearly half water of crystallization, it represents not quite nine ounces of dry anhydrous sulphate of iron, while the zinc iron disinfectant contains fifty-nine ounces of solid, active anhydrous matter.

In the zinc iron disinfectant the iron *must* exist as a *per*-chloride, since the *proto*-chloride would not release its chlorine in contact with air.

On the property of the *per*-chloride giving off its chlorine, the value of the disinfectant largely depends.

Very respectfully,

JOSEPH ALBRECHT.

To Dr. C. B. White, Sanitary Director,
New Orleans Auxiliary Sanitary Association.