

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.
C.C.	254	797					

No.

[Revised up to 31st May 1895.]

Government of Madras Technical Examinations.

ORGANIC CHEMISTRY.

(Special for the Diploma in Agriculture.)

INTERMEDIATE EXAMINATION.

THEORETICAL.

1. Natural origin and artificial production of organic compounds.

Reasons for defining organic chemistry as 'chemistry of the hydrocarbons and their derivatives' and 'chemistry of compound radicals.'

Symbolic notation of organic compounds, percentage composition, empirical formulæ, molecular formulæ, graphic or constitutional formulæ, isomerism.

Doctrine of substitution. Theory of compound radicals.

Evidence of the tetrad nature of carbon. Single and multiple linking of carbon atoms. Saturated and non-saturated hydrocarbons and their simpler derivatives.

Constitution of the aromatic group. Homologous and heterologous series. Nomenclature of hydrocarbons.

2. Monovalent and polyvalent alcohol radicals.

Hydrides.—Methyl hydride. Ethyl hydride. General properties of the paraffins.

Haloid ethers of the methane and ethane series.

Amines.—Their constitution and properties, ethylamines.

Alcohols.—General constitution, methyl and ethyl alcohols. Ethene alcohol or glycol, propenyl alcohol or glycerine.

Phenol and other simple benzene derivatives.

Ethers.—Methyl and ethyl ethers.

3 pies.

...course of study... that the practical test in Organic Chemistry Intermediate is sufficient for

Aldehydes.—Formaldehyde, acetaldehyde. *Organic Acids.*—Constitution of formic, acetic, carbonic, lactic, oxalic acids. Derivatives of oxidized organic radicals: etherial salts, and amides. Synthetic production of urea. Cyanogen, hydrocyanic acid.

APPLIED.

- Hydrocarbons.*
Fixed and volatile oils, their properties and uses.
Outlines of soap manufacture.
- Carbohydrates.*
Sucroses, glucoses, amyloses. Sucrose, lactose, dextrose, levulose.
Starch; its natural sources and microscopic and chemical characters, and its uses. Dextrin. Cellulose.
Fermentation. Yeast. Alcoholic fermentation.
Outlines of spirit distilling.
Malting of grain, outlines of beer brewing.
Preparation of vinegar from alcohol.
Glucosides. Tannin; its sources, properties, and uses.
Indigo, white indigo. Preparation from the plant.
Vegetable alkaloids, general composition and properties.
Conia, morphia, strychnia, brucia, quinia.
- Albuminoids.*—i. General composition and properties, albumin, casein, gluten, gelatin.

The examination shall comprise—

- (1) A written examination.
One paper of three hours' duration.
- (2) An oral examination.
- (3) A practical examination of five hours' duration.

The candidates must show by their note-books that they have completed the list of experiments indicated. In the practical examination, each candidate will be required to show his

knowledge of these operations and the reasons for them. For example, an oily substance may be given to one candidate and he will be required to say whether it is a fixed oil or a mineral oil or a mixture of both, giving full reasons for his answer. Another candidate may be given a sugar and will be required to say which of the sugars it is. A third may be required to dye some cotton fabric with indigo and explain fully how the operation is performed.

The distribution of marks and the minima required for passing shall be as follows:—

	Max.	Min. for passing.	
		1st class.	2nd class.
Written examination	60	...	...
Oral examination	15	...	...
Practical examination	25	20	12
Total	100	60	40

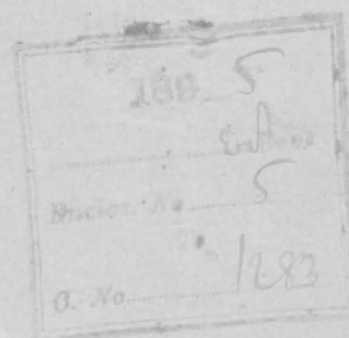
Note.—Two-thirds of the marks in the written examination shall be allotted to questions on Applied Chemistry.

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

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G.O.	No.	Department.
C.C.	254	997



No.

FROM

THE AGRICULTURAL CHEMIST
TO THE GOVERNMENT OF INDIA.



TO

The Hon'ble Mr. A. Monro, M.A., B.C.L.,

Acting Director of Public Instruction,

Madras.

Dated Dehra Dun 17 Oct. 1894.

Sir,

I have the honour to acknowledge the receipt of your No. 8991 dated 21st. September 1894 with enclosures, in which you submit the question whether the existing syllabus in Organic Chemistry is or is not of a sufficiently high standard for the purposes for which it is intended.

- I have read very carefully the enclosures with your letter, and since in my opinion any curriculum should be framed on a basis of what is really required of any class of students, it follows that the question is really whether the existing curriculum in Organic Chemistry is of a sufficiently advanced description to enable the students to study the Principles of Agriculture and of Veterinary Science.

This is a view which I consider to be particularly important in the matter of Agricultural education, for it is impossible for a student to obtain a high proficiency in all of the several natural sciences which take a place in the proper study of the Principles of Agriculture.

- I consider that Mr. Keess puts the case in a very proper light, when, in para 2 of his letter he says (after pointing out the main object of the course of study) "that the practical test in Organic Chemistry Intermediate is sufficient for

"the purposes of this College".

I notice that the examiners would recommend the "Standard" of the Organic Chemistry to be raised, because it "is unfair to good candidates and gives an advantage to bad ones" and this, despite the fact that in the previous para they have to report that 12 out of 17 candidates failed in the examination.

I do not fail to notice that the remark above quoted had special reference to the practical examination, but the examiners must be perfectly aware that no system of "examination" in practical Organic Chemistry has ever been invented which was satisfactory in the sense of showing a student's real knowledge of this subject. The processes involved in practical Organic Chemistry require far too much time (as a whole) to be admissible for the purpose of a three hours examination, and remark of the examiners must be fully as applicable to the "advanced" course examination.

But this matter is entirely beside the mark. It is not a question to my mind, to provide a course of Chemistry which will show which of several candidates is the best, but to teach Chemistry in such a manner as will give the students an understanding of the Principles of Agriculture. I agree with the opinion expressed by Mr. Keess, that the present course ^{as a whole} is sufficient for the purpose. Indeed I should feel inclined to reduce it.

4 I have enquired of Mr. Keess particularly with reference to the practical work done by the Saidapet Students in the Chemical Laboratory and I find that it is confined to the qualitative analysis mentioned in the syllabus, to which is added in the third year a little quantitative analysis. It occurs to me that it would be an advantage if they made experiments illustrative of the properties of the substances mentioned in the 2nd. half of the syllabus under "Applied Organic Chemistry" and their notes on such work might be submitted to the examiners, if this

were thought desirable.

On the other hand I think the syllabus on theoretical Organic Chemistry might be simplified.

I know well the value of a proper understanding of the theory of Organic Chemistry, but I know also that its study requires more time than "Agricultural" Students can, as a rule, devote to it, and the report of the examiners which you forward to me shows that the Saidapet Students form no exception to the general rule. It would be an advantage if this part of the subject were simplified somewhat.

I make these suggestions with considerable hesitation, for I feel that already the Students must be devoting quite sufficient time to the study of pure science.

I have the honour to be,

Sir,

Your most obedient servant,

J. Walter Sutherland

Agricultural Chemist to the
Government of India.

P. No. 13,325/94.

Experiments which might be made by the
Students at Saidapet, in exemplification
of the "Applied" part of the Organic Chemistry
"Intermediate Syllabus."

I. Hydrocarbons.

1) Volatile oils, Mineral oils.

- 1) Distil petroleum or vaseline or mixture of the two and show that it does not decompose, but that they consist of a mixture of hydrocarbons of different boiling points and that consequently the temperature of the vapour constantly rises during the distillation.
- 2) Boil these same substances with alcoholic potash and show that they do not saponify.
- 3) Test them with Phenolphthalein and show that they are neutral. (N.B. Petroleum contains a little Sulphuric acid sometimes).
- 4) Demonstrate their solubility in alcohol and ether and their insolubility in water.

Recd. to P. No. 13,325/94
11/7/95

2) Fixed Oils and Fats.

- 1) Heat one or two in a small retort and show that they do not distil but decompose
- 2) Heat with alcoholic and also with aqueous solutions of Potassium Hydrate and thus show formation of Soap. Acidify, filter the precipitated acid, wash in cold water until washings are neutral and then show that it is an acid by means of Phenolphthalein
- 3) Show by Phenolphthalein that many of these oils & fats are acid. The amount of this may be determined volumetrically by Standard alkali. The oil or fat should be dissolved in alcohol first.
N.B. On account of this acidity these oils are generally not good for lubricating purposes.
- 4) Demonstrate the drying properties of linseed oil, hempseed oil, and note its value for paints on this account.

Show also the non-drying properties of Olive, rape, Castor oils.

5) Show Solubility of these oils and fats in alcohol and ether and insolubility in water.

Soaps 6) Show that the "hard" Soaps are Sodium oleates whilst the "Soft" Soaps are Potassium oleates. Decompose each sort with hydrochloric acid, filter off the precipitated acid and test the filtrate for Potassium and Sodium respectively.

2. Carbohydrates.

1) Cane Sugar.

- 1) Prepare Some from Sugar cane
- 2) Show its dextro-rotatory action on polarised light
- 3) Heat it with Fehling's Solution and show that it doesn't reduce it
- 4) With cold concentrated Sulphuric acid it forms a black liquid and decomposes.
- 5) Boiled with dilute mineral acids i.e. dilute hydrochloric and Sulphuric acid, it becomes inverted and the

the change may be demonstrated by the altered action on polarised light also (after neutralising the solution) by its reducing action on Fehling Solution.

b). Show that it does not ferment with yeast.

2) Milk Sugar

1). Prepare from milk.

2). Show its action on polarised light.

3). Show that it reduces Fehling Solution.

4). Heated with dilute mineral acids forms galactose and dextrose and hence the resulting liquid will be dextro-rotatory and this solution will ferment with yeast.

5). Show that it does not ferment with yeast, but that it ferments with putrefying casein.

6). With cold concentrated Sulphuric acid, it becomes charred.

3) Glucose — Prepare dextrose from starch and from honey.

1). Show its action on polarised light.

2). Boil it with Fehling Solution and show that it is reduced.

3). With cold concentrated Sulphuric acid it does not char but forms a

a definite compound.

- 4). It is only slowly changed on heating with dilute mineral acids.
- 5). Show that it ferments readily with yeast.

4). Starch -

- 1). Prepare it from wheat and other grain.
- 2). Examine these different starches under the microscope.
- 3). Show its insolubility in water by mixing starch with cold water, then filtering and testing filtrate with iodine.
- 4). Show that it forms a blue compound with iodine.
- 5). Boil with water and show that it hardly dissolves; filter and test both the insoluble part as also the soluble part with iodine.
- 6). Boil it with dilute Sulphuric acid and show formation of dextrose.

5). Cellulose.

- 1). Prepare from hemp or other plant. Also use cotton.
- 2). Insolubility in water and alcohol even after boiling.
- 3). Show that dilute acids and alkalis have no action upon it.

4) Wet cotton with dilute Sulphuric acid, allow to dry in the Sun and show how it is damaged by the con-
centrated acid.

3. Indigo.

- 1) Prepare the dye from the plant.
- 2) Reduce it with Ferrous Sulphate and Potash and oxidise again.
- 3) Dye a piece of cotton cloth with indigo.

4. Albuminoids.

1) Albumin from egg.

Show solubility in alkalis, insolubility in water and dilute acids.

2) Casein from milk.

Soluble in alkalis

Insoluble in water & dilute acids.

3) Glutin from wheat by washing dough.

4) Gelatin from bones by standing in dilute acid for some weeks. Show that it is soluble in water.

True copy.

W. Keen

2/4/05

No 504

Office of the Agricultural Chemist
to the Government of India,

Dehra Dun, 27th March 1895.

My dear Keess.

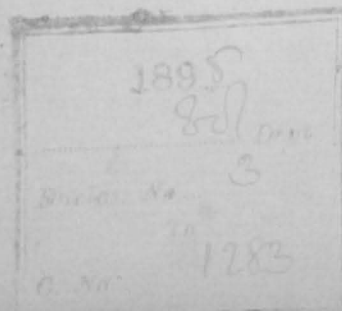
I enclose herewith the syllabus (Organic Chemistry) Intermediate with such alterations as I think might be made with advantage.

In my D.O. of February 20th I explained generally the direction in which I thought the theoretical part might be simplified. I have also sketched out a list of experiments which should be made in the Laboratory. It may look rather a lot, but I fail to see the use of their studying a whole lot from books only. With one afternoon per week, this list might, I think, be got through in a year. If this allowance of time is incompatible with other work, the difficulty might be got over perhaps by one half of them doing one half of the work and the other half the remainder. They would thus see done what they did not do themselves.

I am afraid that such qualitative analysis as your present syllabus imposes, is of no real benefit at all. I would not let them spend their time in testing for alkaloids. This is likewise of no value to them.

The practical Examination would require to be altered materially. But still their knowledge of much of the experimental work indicated could be put to the test. For example one student might be given an oil and he must say whether it is a fixed oil, or a mineral oil or both, and state reasons. Another might have one of the sugars given him and he must likewise state what it is and so on.

I do not think it altogether practicable or even desirable to state in the syllabus exactly what may be required in the practical



examination and what not. The outcome of that would be that they would only work for those things indicated and leave the remainder alone.

I think therefore that under

"(2) A practical Examination."

might be inserted

"of 5 hours duration:"

"The candidates must show by their note books, that they have completed (Insert, if you think necessary "at least one half") the

"list of experiments indicated.

"In the examination each candidate will be required to show his

"knowledge of these operations and the reasons for them.

"For example an oily substance may be given to one candidate and

"he will be required to say whether it is a fixed oil or a mineral

"oil, or a mixture of both, giving full reasons for his answer.

"Another candidate may be given a sugar and will be required to say

"which of the three sugars named in list of experiments it is,

"giving full reasons for his answer. A third may be asked to dye

"some cotton fabric with indigo and explain fully how the operation

"is performed."

"Of course I conclude that the subjects dealt with in the "applied"

part will be thoroughly explained in the course of lectures?

Yours Sincerely

J. Walter Lather

2
Ant. 8.8.25
letter No 11750/95

1283

No. 7464.

PROCEEDINGS OF THE DIRECTOR OF PUBLIC INSTRUCTION, dated 11th August 1894.
Government Technical Examinations.

Read the following papers:—

From the President of the Board of Examiners in Physical Science, to the Secretary to the Commissioner for Government Examinations, dated Madras, 30th June 1894.

With reference to your letter, No. 1618, dated 27th June 1894, I have the honour to state that the results in Elementary Inorganic Chemistry were fairly good.

Number examined.	Number passed.		Number failed.
	First class.	Second class.	
9	1	3	5

Of the failures, 2 failed through poor paper work and the remaining 3 failed badly both in the paper and in the oral. These candidates seemed to be very deficient in general education.

In the Intermediate Inorganic Chemistry examination, only 15 out of the 18 registered candidates appeared; of these, 2 absented themselves from further examination after doing very poor written papers, leaving 13 who appeared for the whole examination. Of these, 3 passed in the first class and 3 in the second class. Of the 7 failures, one obtained sufficient total marks to pass but failed to obtain passing marks in the practical examination. His written paper was better than any other candidate's paper and he passed a good oral examination, so that I think he might be permitted to appear only for the practical portion of the examination next time. This candidate's number is 326. The remaining 6 failed in the written paper, in the oral, and in the practical examinations and were found to be very deficient in their knowledge of the subject.

For examination in Intermediate Organic Chemistry, 17 out of 18 registered candidates appeared. Of these, 2 candidates (Nos. 324 and 328) who passed in the first class in Intermediate Inorganic Chemistry secured a first class here also, another (No. 333) who obtained a first class in Intermediate Inorganic Chemistry just secured a pass in Intermediate Organic Chemistry; two others (Nos. 338 and 344) who appeared only for Organic Chemistry passed, i.e.—

Number examined.	Number passed.		Number failed.	Number absent.
	First class.	Second class.		
17	2	3	12	1

Seventy per cent. of failures cannot be considered a satisfactory result. Four failed in the practical portion of the examination and should with the rest appear for the whole examination again as their paper and oral work was also deficient. What struck the Examiner very forcibly was a want of correct knowledge of the subjects included under the "Theoretical" part of the syllabus. The candidates'

knowledge here seemed to us to consist simply of definitions and formulæ learnt up by heart; they showed no evidence whatever of the principles and theory involved being understood at all. Unless a candidate learns this part of the syllabus carefully and has all the theoretical matter involved carefully explained, he cannot avoid taxing his memory with a number of formulæ, &c., which have to him no meaning whatever. In the "Applied" portion of the syllabus, the candidates, as a class, showed no real knowledge of what they wrote or spoke to us. In the majority of instances, they repeated from memory descriptions of processes which they admitted they had learnt off from their notes of the lectures given them, and they repeated them with errors which had evidently been transcribed from one note book to another. This was a constantly recurring feature at the oral examination and one which was observed and remarked on independently by Mr. Krishnan and myself.

As regards the Practical Organic Chemistry examination, the Chemistry Examiners consider that it was no test whatever of a student's real knowledge; it was unfair to good candidates and gave an advantage to bad ones. There is nothing to be gained by such an examination as this which is distinctly inferior to that which these same candidates have already passed in Inorganic Chemistry. It was sufficiently inferior as it was without the modification which the Commissioner introduced at the last moment on Mr. Keess' proposal. Both the Examiners in Chemistry felt that they were hampered by restrictions which lowered the standard of the examination and practically made the test quite ineffectual for its purpose. They, however, loyally carried out their instructions, but they would urge upon the Commissioner the necessity for resetting this portion of the syllabus so as to make it equal with the rest of the syllabus. They will be prepared to offer suggestions for this purpose if required.

I am sorry that in replying to your *urgent* letter I have not had the opportunity of showing these remarks to Mr. Krishnan, the other Examiner in Chemistry, but I know that the views expressed in this report are also his.

There was only one candidate for examination in Elementary Physiography, but he showed absolutely no knowledge of the subject whatever.

I regret my inability to report on the results of the examinations in Intermediate Physiography and in Electricity and Magnetism as Mr. Jones (who is away on privilege leave) has the records of the marks. My general impression is that the results in Intermediate Physiography, on the whole, were satisfactory, while the results of the examination in Electricity and Magnetism were distinctly unsatisfactory. The Examiner who examined the candidates orally at Trichinopoly reported very unfavourably upon them.

From the late President of the Board of Examiners in Hygiene and Veterinary Science, to the Secretary to the Commissioner for Government Examinations, dated Adyar, 9th July 1894.

I have the honour, in accordance with instructions received through you, to furnish the following report for the information of the Commissioner for the U.C.S. Examinations.

I presided over the Board for the Hygiene and Veterinary examinations.

Four candidates appeared for the examination in Elementary Hygiene. Of these, one passed in the first class, 2 in the second class and one failed to pass.

Two candidates appeared for the Intermediate examination in Hygiene. Of these, one passed in the first class and one in second class.

Seventeen candidates appeared for the examination in Veterinary Science, Stage I. Of these, one passed in the first class, 9 in the second class and 7 failed to pass.

Thirteen candidates appeared for the Veterinary Science, Intermediate, Stage II, examination. Of these, 8 passed in the second class and 5 were rejected.

One candidate presented himself for the Veterinary Science, Advanced Grade examinations in Anatomy and in Materia Medica, &c. He failed to pass.

The Examiners have requested me to draw attention to the fact that the Veterinary students, both in the Advanced and also in the Intermediate stage, displayed a great want of familiarity with the appearance of the common bazaar drugs used in Veterinary Science.

I need hardly emphasise the great importance of this point.

Communicated to the Principal, College of Agriculture, with the remark that the reports are far from encouraging.

2. Mr. Keess is requested to report with reference to Dr. VanGeyzel's remark suggesting the necessity for revising the syllabus relating to the test in Practical Organic Chemistry.

3. Dr. VanGeyzel's suggestion that one of the candidates who failed in Intermediate Organic Chemistry for failure to secure the minimum in the practical test might be permitted to appear again for the test in which he has failed is not in consonance with the syllabus laid down and cannot, it is regretted, be given effect to.

4. It is clear from the reports that sufficient attention has not been paid to the practical side of instruction. This is not satisfactory. Mr. Keess' attention is also drawn to Surgeon-Lieutenant R. H. Elliot's remarks in the concluding paragraph of his report.

(True Extract.)

(Signed) A. MONRO,
Ag. Director of Public Instruction.

To the Principal, College of Agriculture.

Copy to the Secretary to the Commissioner for
Government Examinations, for information.

(True Copy.)

J. G. Guman
Ag. First Asst. to the Director of Public Instruction.

1894.
AUGUST.
PUBLIC INSTRUCTION,
MADRAS.

To
THE PRINCIPAL,
COLLEGE OF AGRICULTURE,
AND ANOTHER.

Dated August, 11th.

Despatched

Received

11TH AUGUST 1894, No. 7464.

Enclosures.

Communicating with remarks the reports of the
Boards of Examiners in Physical Science and in
Hygiene and Veterinary Science on the results of the
Government Technical Examinations held in April
last.

No. 11750

From

THE HONORABLE MR. D. DUNCAN, M.A., D.Sc.,

DIRECTOR OF PUBLIC INSTRUCTION,

Madras,

To

THE HONORABLE THE CHIEF SECRETARY TO GOVERNMENT,

FORT ST. GEORGE.

SIR,

In his report printed in this office as
Proceedings No. 7464, dated 11th August 1894, (Copy
enclosed) the President of the Board of Examiners
in Physical Science, remarked that the existing
syllabus in Organic Chemistry as prescribed
for the Intermediate grade is not of a suitable
standard and needed revision. Organic Chemistry
is taught at the College of Agriculture with
a view to assist the teaching of agriculture
and veterinary science, but the papers set
in the subject at the Government Technical
Examinations are of too general a character.
Students had thus to devote a good deal of
their private time to studying pure science
having little connection with the principles
and practice of agriculture, chiefly to suit
the public examinations. Dr. Leather who

was consulted as to the present standard of the existing syllabus, gave it as his opinion, that the study of organic chemistry required more time than Agricultural Students can, as a rule, devote to it, and that the existing syllabus had to be simplified. Vide, his letter no 346, dated 17th October 1894, enclosed.

2. It was, therefore, considered desirable to have the present syllabuses in Organic Chemistry as they are, to meet the case of Candidates who may wish to pass in Organic Chemistry irrespective of any of its special application to agriculture, and to have a special syllabus of the Intermediate standard drawn up with special reference to Agriculture. Dr. Leather in consultation with Mr. Keor, has kindly revised the syllabus, suitable for the Diploma in Agriculture and I have the honour to submit the revised syllabus for approval. It will be observed that Dr. Leather has altered materially the practical portion of the syllabus. His letter no: 504, dated 27th

March

March last is also submitted for reference.

I have the honour to be,

Sir,

Your most obedient servant,

L. G. M. M.

Director of Public Instruction.

CURRENT No. 1283
Educational Department

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395: 14-6-53

To
The Honble the Chief Secretary
to Government



No. 11750

Dated. 2nd Nov 1895

Despatched 80
Recd 3/11/95
Recd 5/11/95
Enc 10/11/95
5 L.S.S. of syllabus



Submitting for sanction
a special syllabus of the
intermediate grade in Organic
Chemistry suitable for the
Diploma in Agriculture

c 18/11
R 19/11

on given for copying
on copied
on examined
on signed

189

AGAIN G.O., No.
189

DATED

CURRENT No.

Order
18/11/95
M 892 d 20 Nov 95
Approved.
18/11/95

ENCLOSURES TO C. No

ORDER OF GOVERNMENT

LETTER OF GOVERNMENT

STATEMENT WITH DITTO.

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