

Vol. 1

Notes

W. D. Dwyer Lectures
Syracuse Institution

17th Dec 1888

Royal Institution

Saturday 17 Dec. 1800

At 2 o'clock Mr. Davy deli-
vered his Introductory Lecture
to his course of Experimental
Chemistry - Reads

- Plan of the course. General
view of Chemical Science and its
late progress. Comparison of
different theories. Prospects of future
discoveries. Useful applications.
Necessity of public Institutions
to promote the progress of ex-
perimental Science, on a national
subject

Royal Inst. 26 Dec, 1809

Experiments Chem: Sect 2 -

Chemical attractions. General facts
of this power illustrated by Experi-
ments

Large and expensive apparatus
not necessary, a few phials, glass
flasks and glass tubes ~~are~~ will
serve for the most useful experiments.
- Becher, Priestly School and many
other eminent chemists had no
laboratory. Doctor Priestly says
he began the study without either
an apparatus or the least know-
ledge of Chemistry. Two of the
most eminent Chemists in the
Kingdom have no other labora-
tory than common oil cloths with
Jenplam in them.

Chemical Attractions
Experiments

1. Salt in water. Glass beam Solution
2. Sulphuric acid into Solⁿ of Pot ash
colored form - Sulphuric acid of Pot ash
3. Sulphuric acid on solution. Alabaster
4. Muscular fibre on solution of potash
formed a solid
5. Solⁿ of Pot. a. on Sulphuric acid
Sulphate of Potash
6. Sulphur burned in Oxygen gas
Sulphurous Acid
7. Chemical on Dissolved and Solⁿ
8. Nitrous Gas into Oxygen gas
in atmosphere air a Nitric Acid
9. Muscular dead gas into Am-
moniacal gas - solid. Stru-
vite of ammonia
- 10 To experiment seventh
Potassium was added to

Decompose the Carbonic acid
which could not be done till the
decomposition of the Alkalies. This
experiment failed by the breaking
of the retort. —

Small glass retorts with
brass stop cocks were used
for experiments on the gas.

— In their attraction an ultimate
quality or property of
bodies? — Electricity Positive.
Negative. — Common Et. ma-
chine. Not to be considered
as a fluid or ⁱⁿ ^{the} state of combina-
tion.

— All bodies possessed of the
same attraction are in op-
posite states of Electricity, and
their attraction is dependent on
their state of Electricity.
This was illustrated by various

Experiments, which prove that bodies
which have their states of Elec.ⁿ al-
tered by means of the Voltaic app.ⁿ
have, at the same time their Chem.ⁿ
affinities altered. Thus a body which
is naturally positive, but in a low
degree, will have a very weak aff.ⁿ
for Oxygen, which is naturally
negative, but exalts this naturally
low positive state by means of the
apparatus, and its attraction for
Oxygen will be strong in proportion.
For Ex: Silver which is naturally
positive, in a low degree, is in-
capable of acting on water; but
if you exalt this state by the V.ⁿ
apparatus, the Silver will become
capable of extracting the Oxygen
from the water.

— Mr Davy also stated, that as
a further illustration of this thing,
that if the states of bodies which
naturally possess strong chemical

affinities, were, by means of the apparatus, entirely reversed, the consequence would be a disunion and destruction of the compound formed by their Nat^l affinities. To prove which the following Exp^t was performed - Moistened Sulphur of foot ash was placed in the Voltaic circle, and it was in a short time decomposed, foot ash appearing at the Negative and Sulph^r acid at the positive pole. Their effect, according to Mr Davy, is produced by the action of the galvanic apparatus which induces on the Sulph^r acid, a state of Edⁿ the reverse of what is natural to it, and the same on the foot ash: and in consequence these two substances, instead of combining actually repel each other, and are found on opposite sides of the vessel in which they were placed in combination, the Acid at the positive and the foot ash at the negative + A water in the Plat^l Vess^l.

Under the Signature of Avicenna, since his time was delivered, objects to the theory just mentioned. He says that if the Plat^l on both sides be changed, and the acid become positive and the Alkali negative, then from the theory, they being in contrary states, should unite as before.

Saturday 7th Jan^y 1809.

Exer: Chemistry Lect 3

Agencies of Oxygen as opposed to
the other Bodies in Natural Com-
bustion

Atmosphere air - importance
of the subject - Life - heat - sound.

Ancients supposed it an element
Some thought it derived from

Water. Invention of the Air-pump
Tuppin and Spalton of the air.

Part only of the air employed on
breathing, discovered by

= $\frac{1}{5}$ of the whole by measure

21 parts Oxygen and 79 Nitrogen

The variations from these are but
trifling seldom exceed 1 part of Ox.

Methods of preparing Oxygen
Gas. Red Lead - Manganese

Niter and Oxymuriatic of Potash
The last is the best - purest Gas
from it.

Experiments -

1. Taper in Oxygen Gas.
2. Cay. M. of Potash and phosphorus in a glass of water. Pour Sulph. acid through a glass tube - Fire in bot.
3. Iron burnt in Oxygen Gas.
4. Mix Ox. M. Potash and loaf sugar on a plate. Pour on concentr. Sulph. acid - fire
5. Potassium burnt in Carbonic acid gas, decomposed it, Pure Potash and Carbon were produced.
6. Copper and another metal burnt in Cay. M. acid Gas
7. Nitrogen gas extinguished a taper.
8. Nitrogen and Oxygen Gas mixed in the proportion of 79 to 21 by measure, found Atmospheric air, proved by a taper burning in it with the same light as it did in air.

Supporters of Combustion as in Thomson's theory no unnecessary necessary. Potassium burns in Carbonic acid Gas, which is not a supporter of Combustion.

+ M. D. replied to the objections in the Phil. Magazine, He showed that the acid on the Sulphat of potash is attracted by the Positive pole and the Alkali by the Neg: pole of the battery, more powerfully than the acid and Alkali are attracted by each other, the current consequently separate from each other, and the salt be decomposed.

Saturday 14 Jan^r, 1809 —
Experimental Chem Lect 4
- Inflamm^{ble} Bodies; their Nature
Metals, their Elect^{ric} and Chemical
powers. General Distinctions of
inflamm^{ble} Bodies, as opposed to
Oxygen, illustrated by Expt^s

Atmospheric Air long known
to be necessary to combustion.
Oxygen Gas - Inflamm^{ble} Bodies.
Fire, by the Accounts derived
from Prometheus -
Principle of Inflamm^{ble} Bodies -
In Philosophy - Hydrogen Gas
is the most inflamm^{ble} substance
When Hydrogen Gas is burned
in a Glass jar, in water, Expt^s -
same when mixed with Oxygen,
Expt^s - Mr. Cavendish first showed
that water was the result of burning
Oxygen and Hydrogen Gas, mixed

Water decomposed, bonded from Carbon
Exp^t - Next to Hydrogen, carbon
is the most inflamm^{ble} substance,
It is not a simple substance,
contains Hydrogen Exp^t - Diamond
contains a small quantity of O₂^m
Hence its great difficulty in burning,
light and heavy Hydrocarburate
Hydrogen Gas. Exp^t - Gaseous
oxide of Carbon Exp^t - Olefiant
Gas. Exp^t - Potassium al-
terable Oxygen from every
other substance - Here several
Exp^t on Charcoal, Carbon
acid &c with Potassium which
is the most inflamm^{ble} substance
known.
- Coal is an inflamm^{ble} substance
When burning there may be
seen the Hydrocarburate of both
sorts, the Gaseous oxide of Carbon, the
olefiant Gas &c distinguished by the
colour of the flame

In burning certain substances of
the coal kind, the smoke paper of
without taking fire - well known
Exp^t of throwing a piece of burning
paper in the smoke to set the coals
on fire - Coal fire has been used in this
country about 200 years, was thought
prejudicial to health, and was so
as it produces more of the Pyroli-
gious Acid
- Gas lights - Invented first time
by J. Clayton - Afterwards by
W. Murdoch - Loko - Manchester
In cotton Mills and other works
where many lights are wanted,
the Gas lights prove a great saving
- One Distilling vessel to light the
whole town! as ridiculous as
the scheme for regulating the
weather by Electricity, lately pro-
posed - Propriety of the con-
sumption of all the coal in Britain
consumed. Strata of metal

perpendicular and rising in
various directions. The strata of coals
are horizontal or nearly so.

Calculation 40 Square Miles
consumption $\frac{1}{4}$ mile in 50 years
whole in 2000 years.

Detached Experiments -
Water decomposed by Conv. Eth^r
and Galvanism. The result found
by the "

- Galv. battery 4 troughs of 50 f
each, of 4 inch plates lead on the
floor, find channel and potage
in the upper part of a barom:
tube in vacuum

- All gaseous substances contain
water vap^r ^{fill of 3 in} through the outside
of a retort with Eth^r, there will
soon appear ⁱⁿ moisture on the
inside, occasioned by the cold
produced by the evaporation of
the Eth^r

- The Phlogiston System may
with certain modifications be

maintained - M^r D gave a specimen
of the manner of reasoning on this
day, which however is not so satis-
factory as the Anti-phlogiston -

Saturday 21st Jan 1809

Exp. Chemistry Lecture 5th

- Inflammth substances continued.
Formation of acids. Properties of
acids. New Exp^s on this subject.
Views respecting Acidity. Water
essential to this property

In this lecture Sulphur and
Phosphorus were considered.

Sulphur known to the Ancients
and applied to the same uses as
at present - Found in many
parts of the world - Volcanos -
Prepared separately in England,
from Pyrites, and at Paris
Mountains in North Wales it
is sublimed from ^{the} Copper ore.
A report shows in which the
production of Sulphur from
Pyrites had been effected. The

Sulphur was sublimed in the
neck of the retort. In burning
Sulphur, some degree of acidity
was observed on the Subjects with
which the smoke came in contact,
particularly if wetted. Many
unsuccessful attempts were made
to condense ^{the} acid which is the
Sulphurous. At length it was
found that Sulphur burned with
a low heat produced Sulphurous,
and with a greater heat Sulphur-
ic acid, the former being vo-
latile, the other fixed. Scheele's
Theory. Lavoisier's Theory.
Sulphur hitherto considered
as a simple substance. The
present state of Chemistry
seems to point it to be a
compound, a triple compound,
consisting of Oxygen, Hydrogen
and an unknown base,
probably an inflamm. substance

- Characters of acids - Sour taste.
This not always the case, some
acids have nothing sour in the taste
- Convert the blue vegetable colours
into red - Test paper - If the acid be
strong and the paper be dry, no change
of colour takes place. Expt. 1. sulphuric
acid and test paper. - Hence water
is necessary to this effect of acids.
- Some very attention has been
paid to the chemical properties of
colours. When these shall be better
known, it will perhaps be not very
difficult to explain the effects of
acids and Alkalis on colours.

+ Phosphorus - Fable of the
man who on his death bed told
his sons that he had buried a large
treasure in one of his fields, and it
was near the surface. On his
death the sons set to work in turning
up the field again and again. They
did not find the Treasure, but they

had much better crops than their
neighbours. — Here the history and
progress of the discovery of Phospho-
rus — well known. — Exp^t. Phosphorus
made in a small stone retort.
The neck of the retort was broken
to take out the Phosphorus.

Purified third breath in hot water

— If Phosphorus be burnt slowly
it produces phosphorous acid,
if rapidly phosphoric acid.

— If Phosphorus be burnt with
potassium in vacuo, both
oxygen and Hydrogen are pro-
duced. This experiment was
performed in a small ^{glass} retort fur-
nished with a stop cock and ex-
hausted on a small air-pump.

The same Experiment and re-
sults on Sulphur — These
Sulphur and Phosphorus
instead of being simple
substances as is commonly

supposed, are triple compounds
consisting of Oxygen, Hydrogen
and an unknown base, which
most probably is inflamm^{le}.

Sulphuric and Phosphoric
Hydrogen gas prepared. The Exp^t.
on the latter are said, by Mr. D. to be
the most curious and interesting
in Chemistry. Several of the
common Ex^ps. shown. The gas
when making from Phosphorus
and pure Alkali, in a small
retort, escaped in vivid combustion
into the Atmosphere. In prepar^{ing}
Phosph^{ic} Hydrogen gas, the retort
should be fast to prevent
inflammation on the retort. This
is effectually done by pressure by
filling the retort with hydrogen
gas.

— Mr. D. thinks that the common
appearance of fish rotter wood,
well with the turf and other fish^{er}
of the pond are all Phosphorus, and
thinks the objection to the fish op-

penicillin in water,
may be observed by supposing
the phosphoric matter very much
diffused in the body of the fish.

Jan. 28th — 1809 —

Experimental Chemistry Sect. 4th.

Continuation of the subject of in-
flam^{ed} bodies and their compounds.
Nitric acid. Compounds of Nitro-
gene. Experiments on their properties.
Decomposition of fluoric Acid —

Nitric Acid — Process of
preparing it. Composed of
Oxygen and Nitrogen. Nitro-
gen made. Mercuric ful-
min and Nitric acid in a retort,
or by burning sulphur in
any other way inflame.

Substances in above vessels
filled with Atmospheric air
— Properties of Nitrogen — Little
known at present, called Azotic
Gas. This not proper, for some
other gases are more noxious. —

- A compound of Nitrogen and Oxygen from Atmospheric air, Nitrous oxide, Nitrous Gas and Nitric acid, by only varying the proportions of the constituent parts. Nitrous oxide made by exposing Nitrate of Am^o to the moderate heat of a patent Lamp (not above 400 F^o) with a metal chimney, inserted in the water cistern, in the usual manner. Properties of Nitrous Oxide. Taper burns brighter than in Atm^o air. When burnt very extraordinary effects. Different in different persons. Dr. Mitchell thought it contagious to be the very contagion of the yellow fever. Mr. D. breathed a bag of it without much effect. Inaction rather pleasant when it produces violent

effect. Mr. D. thinks the gas is not pure

- A bit of sulphur burning very feebly, was taken under a Nitrous oxide; but when burning more strongly, an immersion into the Gas it burnt with great brilliancy

- Exp. Nitrous acid poured gently into a phial containing a small quantity of Alcohol, a metal tube passed thro' it, commoner took in the phial lighted, a stream or column of flame 10 or 12 Inches in height continued to burn for several minutes. Toward the end a noise and sparkles - a beautiful experiment

- Fluor acid decomposed by potassium - Præpar. A small bit of potassium was put into one of the retorts with a trap

stopcock. This retort was
first filled with Hydrogen gas
to expel all the Air or phos-
phor. It was then exhausted
by the small table air pump.
The retort was now filled with
fluoric acid gas from a
jar with a stopcock on the
top. The retort with the pot of
silver was held over a lamp,
when the potassium took fire,
and produced pot ash and a
black matter, the base of the
acid. The fluoric Acid was
therefore composed of Oxygen by
a particular base, the pro-
perties of which have not been
ascertained.

+ Platinum oxide with Hy-
drogen gas in a ball tube
inflamed by the discharge
of an Electric Jar. —

Feb 4th 1809

Experimental Chem^y Dec 7th

Muriatic acid - its combination with water - with Oxygen.

New Experiments on this subject
Decomposition of Boracic Acid
and its recombination

Discovery of the muriatic acid
Glauber the first who understood
this substance, and who first
produced it by decomposing com-
mon salt by sulphuric acid.
Name Glauber Salt. This process
is still the best

- Muriatic Acid is pure only in a
state of gas. Water absorbs the
acid very rapidly, it must therefore
be preserved over Mercury.

M. A. Gas is capable of com-
bining with Oxygen in two

proportions. Oxygenated
Hyper oxygenated Merc. a. Gas
Mode of preparing Ox. m. a.
Gas - Common process -

Applied to bleaching. At first
it injured the cloth, was pre-
vented by passing the gas
through lime water. Injurious
to the lungs of the workmen.
M. D. - recommended Am^a
to be mixed with the Gas in
the room where paper is bleached
by this Gas at a paper mill.
The Am^a prevents the pernicious
effects of the acid by combining
and precipitating with it
in white fumes, which are
in solids of Am^a. The paper
maker has informed him that
this answers the purpose.

Mercureous acid gas extra-

quishes flame; but Oxygen
Gas promotes combustion.
Many inflamm^{ble} substances
take fire in this gas even
at the temperature of the at-
mosphere. As this gas is very
hurtful to the lungs, M. D.
has contrived a new app^s
for burning bodies in it. He
puts the metal &c. Gold leaf
into one of the small glass
retorts with a stop cock on the
extremity. He exhausts the
retort by a small table pump
and then screws it on the
top of a large jar containing
the oxy. Gas. By opening the
communication between the
retort and the jar, the former
is filled with the gas which
inflames the Gold leaf. Several
metals were burnt in this way

but not with so brilliant a flame as when the metal is dropped into the gas, as in the common experiment.

— Muscular and Gas contain a great quantity of water, perhaps a third of its weight. M. D. has not been able to produce it free from water in the uncombined state, but by uniting them with phosphorus, and phosphorus and Sulphuric acid and Phosphoric acid, he obtained compounds free from moisture. These compounds, even when fused, the compound of Muscular is supposed to be insoluble and, do not act on Nitrous or Droste Alkali, and are non-conductors of Electricity; but a very small quantity of water developed from their oxygen, renders

them conductors, and makes them capable of acting brightly on Lichen paper and Alkali substances.

— Potassium ^{metal} decomposes readily with these compounds of Muscular acid, even at common temperatures. Exp. a small bit of potassium was dropped ~~into~~ from the hand into one of these compounds, the report was as loud as fulminating Silver. M. D. informs us that on in other the only experiment he had had, before the lecture, the report was broken with such violence that he would not venture to perform the exp. in the same manner again. The result of this Exp. M.

may possibly show that the
arsenic acid has been decom-
posed.
Boric acid was decomposed
in a manner similar to that
of the fluoric acid in last lecture

Saturday 11 Feb. 1809

Exper: Chemistry Lect: 8th

Metals — Acidifiable metals.

Experiments on their combustion and solution. Views respecting the elementary matter of Metals,

Properties of the metals would require a course, or many courses of lectures to discuss.

— Properties — Great weight. This, since the discovery of the new metals seems to be a characteristic property of metals, for Potassium is a very light body. It is to water as 6 to 10.

— Inflamⁿ a property of all metals
Exp^t: Showing the softnessⁿ of several. Iron burnt in a furnace before on charcoal with a stream of

of Oxygen Gas. Blow-pipe pass
the a gazometer. Gold and Silver
leaf burnt by the Lyallian's battery
10 troughs each, 25 pair of 6 inch
plates, arranged in three rows of
3 troughs each, with one trough
across the end -

- Inflameⁿ of pot-potassium shewer by
throwing it into water. After two
or three showers it exploded with
a concert crack. - Iron wire burnt
in Oxygen Gas.

- Metals soluble in acids. Oxygen
Iron unites with the Oxygen of
the water, and the Hydrogen is
set free in Hydrogen Gas.

Metals precipitated various ways
Copper by iron, Expt a little
sulphat of Copper poured on a
plate of iron, the iron becomes
black^{ened} & attached with copper. - ^{Sulphuric} ~~transmutate~~
Sulphat of iron precipitates Gold
from the solution in the solution
form, red. alkalis in iron Oxide of Gold

Some water precipitates Silver on
iron bars. Fulminating Gold and
Silver exploded ~~on~~ on paper over
a lamp, In an exhausted retort
the fulminating Silver was also
burnt

- Principles of refining Gold and
Silver chiefly explained - Cupellation
- Cupels shewer. History of the
metals - Gold and Silver first known
in the early ages of the world.

Used first for ornament, on account
of their brilliancy. Copper - Tin.
First account of Iron mines in
Britain - Shales - Square blocks
as described by Strabo, still seen

- Many new metals lately dis-
covered. Last of all, Potassium and
Sodium by Mr Davy. -

- The detection of fulminating Gold
has been the instrument of much de-
ceit with the Alchemists. When he
found that no more mercury is to be
squeezed out from the pockets of his

Employer, he contrives to capture
the rest and the ^{by} particles of Gold
scattered about, after this terrible ac-
cident.

- The idea of the Philosophers Stone
was absurd, that of the sensible che-
mists was far otherwise. According
to the latter, every metal proceeds
from a kind of acid. That of Gold
requires a long time to be matured.
The natural process may be assisted
and accelerated by art &c.

The contrary to this ~~has been~~ can-
not be proved. Should Gold be con-
sidered to be a compound ^{substance} body
from that account, the possibility
of smelting Gold will be fully es-
tablished.

The Ancient Romans were ac-
quainted with Bismuth - They used
a preparation of it, as a cosmetic
- ⁱⁿ Jewels - Powdered Alimony was
used to ^{be} laid on the inner part of the eye to
make the pupil and iris look
more brilliant. Never used in Britain
The Arabs have have no account of it

Saturday 10th Feb^r 1809th
Experimental Chem^y Lect 9th

- Metalic substances continued.

Commencement of the investigation
respecting the details of the Alka-
lies - Potassium

Description of Alkaline bodies. -
Principal properties. Fixed - Volat-
ile. Vegetably mineral. This division
improper. Method of preparing
the Alkalies pot ash and Soda
pure. Former attempts to decom-
pose the Alkalies. What first
induced Mr D - to attempt the
decomposition by Galvanism.

- Pot ash decomposed. Expt.

11 brought of 25 grains of 6 inch
plates. Conductors, copper wire
with two short pieces of pla-
tina hooked to the copper wire
The pot ash was decomposed
in a minute or so. The pot ash

The pot ash was decomposed by heating a bit of Potash in a small retort filled with oxygen gas. It was shown by test paper that it was pure alkali potash. Pot ash and Soda articles of great importance in Manufactures.

Bleaching - Glass making described. Pliny's account of the origin of Glass. Tyne Merchants - Nation or Soda to cook their Wool.

Tobacco's glass cup with a handle cost £50,000 English pounds.

Great utility of Glass - Discovery in Chemistry, Chemistry &c.

The great demand for the alkali has given rise to different methods of decomposing sea salt to obtain the soda. Two processes described. Mr. D. thinks that the new discovery on the glass of the Kalmia bodies may probably lead to a more Economical mode of effecting this decomposition.

Saturday 25 Feb. 1809
Experimental Chem. Lect. 10th

- Potassium continued. Preparation by Chevreul's process. Sodium, its properties. General views connected with the decomposition of the fixed Alkalies

- Lomberg's Pyrophorus. Different modes of preparing it. Ancient methods of accounting for its origin. imperfect. M. D. thinks that in the process of preparing it, potassium is produced. A compound of potassium Sulphur and produced a substance of the same kind as pyrophorus.

- A large quantity of potassium prepared by the French or Chevreul's mode (See Phil. Mag. Vol 32)

Experiments on potassium and sodium mixed together in diff. proportions several very curious.

+ M. D. concluded the lecture with a philippic against those who are

^{asking.}
perpetually ^{such} inquiring what
use of these discoveries. He ac-
knowledged that such questions
produced at first some irritation
but now &c. &c.

— Suppose a person should ask
what is the use of painting
theology &c. He would be con-
sidered as a Goth and Carba-
ron. He, Mr. D. did not mean
to create experimental Phil^o
to the ^{level} rank of the fine arts.

It is, however, of great utility
to society. Even the Pale dis-
coveries seem to point to
improvements in some
manufactures &c.

— Tenures of Bacon and
Newton.

Saturday 2nd March 1809

Experimental Chem: Lect 11

- Decomposition of the earths.
Metals of the Earths.

The decomposition of the Alkaline earths requires a greater Galv. voltage power than that of the Alkalis.

- A battery of 20 troughs, each 25 series of 6 inch plates = 10000 square inches was employed.
- How the known Alkaline earths enumerated.
- Barytes decomposed. Several experiments - Mercury forming an Amalgam with the Barytes as in the Swedish manner, greatly facilitates the decomposition.
- Strontites and Magnesia decomposed.
- + These new discoveries promise many improvements in Arts and Manufactures. Potassium will probably be employed

to produce decompositions of a
great use in the arts and Manuf.
Many phenomena of Nature will be more
satisfactorily explained - Volcanos -
G. Washburne found the Gravity
or mean Gravity of the Earth, much
greater than the gravity at the
surface. Hence it is probable that
the interior parts consist of more
dense substances. When through
cracks and fissures, air and
water have access to those, infla-
tion takes place. Hence lava and
all the products of an eruption
- Moleculer Stones may enter
our Atmosphere in a tritulation
state. They will by the Oxy-
gen of the atmosphere become
inflamed - Earths - Phenom:
That attend the Stones which
fell in N. America described.

Sunday 11 March 1809
Capt. Chemistry Lect: 12th

Metallization of Ammonia.
Experiments on Amⁿ. New
views concerning its elementary
matter decomposition of Nitro-
gen. General Ideas flowing
from the new facts. Conclusion

History of Amⁿ. Priest and
Priestley's discovery of pure am-
moniacal gas. Decomposition
of Amⁿ often attempted.

History of these attempts, first
by Berthollet, result, Amⁿ is
composed of Hydrogen and Nitro-
gen. Objection to this. At-
tends Oxygen and a metallic
base in Amⁿ. Several Expts
on Amⁿ. Potash soon used.
Three different modes of attempts by
the decomposition of Amⁿ - all
shown in the Lecture.

Mr. D - decomposed Amⁿ by pro-
sulfur - decomposed - used
the same small glass retorts with
stop cocks as formerly.

- Observations on the probable
utility of three discourses to arts
and manufactures -

- It has been supposed that there
was only one original kind
of matter, and that the great
variety of bodies arises from
the different combinations of
three particles. If this be a
dream, it was the dream of New-
ton - Conclusion of this course

Saturday, 29th April 1809

Electro-Chem. Series Lect. 1

Introduction. — Elementary facts of Electricity. Experiments of Galvani. Illustrations and Discoveries of Volta. General views and observations concerning this branch of Science —

— New discoveries, treated of in last lecture, appeared of great importance. Mr. D. wishes them to rest only on facts and experiments. He has had the honour of submitting them to the first judges in this assembly, and on their opinion he rests &c.

— In the preceding course frequent references were made to Electricity. In this course he will explain the principles of the Science more particularly.

Amb - jet - D. Gilbert in
1600 published his work on the
Magnet, which also contains a
number of Electrical Experiments.
This is a valuable work and has
not been attended to so much
as it deserves.

- Positive - negative Electricity.
Du Fay - Vitreous, resinous,
two different Electrics.

D. Franklin's System simple
and beautiful - In the following
lectures, the terms Positive and
Negative will be made use
of merely ^{as a reference to} to express the facts
without inquiring whether there
be one or two distinct fluids.

- Construction of the Elect. Seraph
Large Leyden Jar & Glass
Jelly -

- Expt. Attraction and repulsion
two Cans of Gold leaf hung by
the upper ends of wires placed

Sometimes on one, sometimes
on both conductors. In the former
case, repulsion in the latter attract.

- When connecting the positive and
negative conductors, no spark.

- Alternate positive and negative
action shown by two small Croft
conductors, with several pith
& balls at each of the four ends.

- Leyden Jar charged and Disch.
- Electrometer, Gold leaf large size.

Pith balls covered with gold -
(When Gold balls only of Gold leaf within
the pith).

- Two metals brought into con-
tact produce Elect. plates of
Copper and Zinc with sur-
rounding handles - Copper Negative
Zinc positive.

- History of Galvani's discoveries
Dry - Common Exp. - A fluid
Solution of Sulphuric of Arsenic
and a metal produced the same

Conventions in the Proj. —

— Galvanic explanation, animal
Electricity. Volta's great discovery
Pile — Couronne de Laves. This
in 1790 — Voltaic Electricity, and
Voltaic Battery ought to be the
names employed, Galvani has
no share in the discovery of
the battery

— Principle of the Voltaic Battery
shown by pieces of Copper and Zinc
in small vessels, (Couronne de
Laves)

— M. D. concluded with a de-
clamation on the great advan-
tages likely to be derived from the
new discoveries — Necessity of
public encouragement — ^{prohibitive}
Better had there been but one
— Subscription to the Royal Inst
not more than what a single ^{Prof}
Jepson in ^{Inst.} has given his
class &c &c —

Saturday 4 May 1809,
Eukro. Chem. Surv. Sect. 2
- Voltaic Battery, different modes
of construction. The new Voltaic
Apparatus. Experiments on its
Agency

- Pile Disrupted, inconvenient.
Cloths soon dry, plates difficult
to clean -
- Couronne de Tapes, requires a great
space and many tapes.
- Crankhank's trough, troublesome
to clean, difficult to insulate the
plates, cells often leak -
- Withinsson's improvement. Troughs
have glass partitions, plates lifted
out of the trough all at once by
a wire - Troublesome to put in
to the troughs
- G. Babington suggested troughs of
Portland Cement 15" in a non cond.

— Mr Dany fixes his plates to a pair
of lathed wood. Each formation trough
contains ten pieces of plates, and
there were employed at the Custom
100 troughs. Effects in water greater
than the same number on the for-
mer combustions. The plates of
every trough, when not in use are
lifted up out of the trough and sup-
ported on the bent lips of three iron
bars on side of each trough, rising
2 or 3 inches above the trough,
By this contrivance the plates
and will cover for a long time
without being changed, and the
plates are more easily cleared.
Exp? Metals burnt, lower God Vol
&c.

Saturday 13th May 1809
Eli: Chemical Science Lect. 3
— Great and small surfaces compar^c
Electric spark is diminished in
the inverse proportion of the
surface. Two insulated conductors,
a spark from one is double the
length of a spark from both.
The same takes place in charges
of different sized jars. —

Great and small voltaic plates
A wooden chest or box, containing
20 plates of Copper and Zinc, let
into the box, like the common de
taps, compared with the same 20,
of 4 small plates. Surface of the former
576 square inches, of the latter
16, or as 36 to 1. The shock which

was scarcely perceptible, was
the same in both. The former
gave a long piece of ^{thin} wire. The
small plates did not produce
even light.

- New Voltaic Battery was charged
and the Positive and neg. poles shown
by the Gold Leaf Electrometer.

This Electrometer is on a much
larger scale than Benard's.

- A large Electrostatic jar and Battery
were charged by the Voltaic
Battery.

- The Electric and Voltaic Sparks
and shock are much weakened
thru' bad conductors & by
this sulphur acid, stronger
than through water. -

11
Saturday 20 May 1809

14
Elet. Chemical Science Lect 4

- Chemical attraction. Experiments on its similarity to Electrical attraction. (Decomposition by the Voltaic Battery. Mutual relation of the Elementary Substances.

- Chemical attraction illustrated by a number of experiments on solution, precipitation &c. Common Effects of Electrical attraction on Chemical attraction. shown by the decomposition of various substances, such as Minerals of Lime, Sulphate of Lime. Effect shown on test paper.

- Application to the arts. Sheet coated with gold to prevent rust. Dip it in a solution of Gold in

Nitro-muriatic Acid, it is
covered with Gold, but part
of the steel is dissolved. The
Voltaic apparatus effects the
same without dissolving the
steel. Process

Common salt decomposed by
the battery and the Alkali
obtained Exp. — Mr D. thinks
that the process may be
carried on in the large way
with advantage. —

— What heat be a body or
only a property, Exp. in Va-
cua to show that heat is a
matter sui generis. The
exp. was not seen to half
the company. Mr D. showed
and explained it with his back
to the audience.

— The atmosphere is 99 times

out of a 100 in a positive state,
consequently the earth is nega-
tive. Home Alkalies —

Saturday 27 May 1809
Elect: Chemu. Science Lect 5
Decomposition of acids and
Alkalies by Electricity. Energies
and properties of the new sub-
stances obtained. General laws
of Electrical decomposition.

Short history of the principal
Discoveries in Galvanism.
Nicholson and Carlisle first
observed the decomposition of water,
in fact: air was produced ^{at} small
-Platinum, negative pole. Cuck-
shank observed that the positive
pole produced acids; he thought
the Nitric, the Pyrogen. Alkali
Ammoniac. Muriatic Acid
and Soda were said to be pro-
duced from water by Pothiere
Pict, inventor.

Mr. K. Aet was a fictitious
name and his paper contained
conjectures not real experi-
ments. Mr. D. in his "Bak"
Lectures 1807, proved that when
the Exp^t was properly conducted
nothing used was alkali was
produced in water by the
Volcanic Machine. These
sources in former Experiments
were pointed out by Mr. D.
In prosecuting these experi-
ments, Mr. D. made the
important discovery that
alkaline matter ranged
round the negative pole of
the battery, and acids round
the positive pole. This led
him to the ~~real~~ decomposition
of the Alkali, and Alkali

earth. Then he showed the
decomposition of pot ash
by the Volcanic battery. It
was performed in a very
short time, a minute or two.
Potash's properties. Spec^{ie}
Gravely to water as
Explodes in water or on ice
Decomposes Carbonic Acid
Gas. See the Bakone
Lectures —

Alkali's Combustion conducted
Pot ash decomposed, the pot
ashes acts on the platinum
Pyrophorus of Alkali and
Charcoal. The Alkali con-
tains pot ash, which is decom-
posed in the process, and po-
tassium formed, which takes
fire in the Atmosphere.

100³
1007

Saturday 3 June
Eleet. Chem. Secm. Lec. 4
Decomposition of the fluoric
Boracic and Muriatic acids
Decomposition of Nitrogen,
Phosphorus and Sulphur
New arrangements arising
from the new facts. Pro-
bable future advancement
of Electro chemical Science
Conclusion of the Lecture
— For the particulars of this
Lecture Mr D. refers to a
paper in the Phil. Transactions
which will soon be published
