

CHEMICAL

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to paper for the small shell

— wanted to be entered

Fire

Effects of heat

Expands solids proved by the
Pyrometer - Fluids, by the Thermometer -
Copper and Whitworth employ this pro-
perty to advantage. Iron hoops put on red
hot and cool'd with water contract - In
hot weather the iron hoops of casks ex-
pand, the same cause makes the wood
shrink, hence the cask leaks - Vege-
table substances contract by heat the
moisture being expelled, but in breads
only, there is very little alteration in
length - Brittle bodies by the sudden
application of heat, break, unless they
are very thin, water may be boiled
in an oil flask tho' not in a Linnæus
tea-pot, China-bowl, ~~or~~ ~~if~~ broken
by pouring cooling water in, ^{to} them -
Altho' heat enlarges the dimensions

it does not increase the weight of Bodies
— That by removing the particles of Bodies
to a greater distance from each other renders
them ^{more} fluid that is therefore the cause
of fluidity in all Bodies—
—

Water

A fluid - presses in proportion to its perpendicular height - The pressure on the lower parts of a butt of wine will be greater when placed on its end than on its side. This may possibly affect the ^{quality of} wine -

Hydrostatic paradox, the smaller quantity of water will balance the greatest when the bases and perpendicular heights are the same -

Water rises in the common pump to about 33 feet perpendicular. This is equal to the whole pressure of the atmosphere - In the forcing pump the water may be thrown to a great height -

The Siphon or Crane, will act when the end which discharges the fluid is below the level of the surface of

of the fluid receives
which it ~~discharges~~ and also when
the distance ~~of the~~ perpendicular height
of the bend of the Siphon ~~is~~ above
that of the surface of the fluid to be dis-
charged does not exceed 33 feet — Different
methods of exhausting the Syringe of air
1st with the mouth applied to the lower
end 2, The mouth applied to a small
tube connected with the lower end
reaching to near the upper part —
3^d by a Syringe — 4th by filling the
Siphon with the fluid to be exhausted
then by means of two stopcocks or
valves put the Siphon into its po-
sition open the valves or stopcocks &
it will immediately run — Copper
Siphons should not be used in extracting
wines, the acid of the wine will produce
verdigrise — A ball with a number
of small holes fitted to the end of the

Syphon would probably improve the
wine — The leg of the Syphon inserted
in the cask may be so divided as to
readily point out the quantity remaining
in the cask either in Gallons, arroves,
or any other measure —

— Calculation —

Solvent power of water

Water is a general menstruum
or solvent for bodies - Salts ^{are} dissolved
in water in considerable quantities
without sensibly augmenting the bulk
of water - Water will dissolve only
a certain given quantity of salt, when
more is added it falls unchanged to the
bottom. Hot water dissolves the same
quantity of common ^{salt}, that cold water does,
but almost all the other salts are
dissolved in greater quantities in ^{hot} water
than in cold water - When water
has dissolved as much salt as it possi-
bly can it is said to be saturated.
after this however it will take up
a considerable quantity of a different
salt -

Hard and Soft Water —

Properties of Hard water

1. It will not make a lather with soap — It is therefore a great hinder to the blacker —
2. It does not extract ~~out~~ the juice from vegetable in such quantities as soft water — Therefore a great prejudice to the Brewer, ^{and} house keeper.
3. Vegetables boiled in hard water retain their green colour and are never softened —
4. Heavier than soft water
5. In the opinion of some Physicians occasions Rheumatism, Gravel &c —
6. Improper for watering delicate plants

Hardness in water is occasioned by an
acid— Therefore to render ^{hard} water soft
Add an alkali— Pour a few drops
of oil of tartar, solution of pot ash or
~~pot ash~~, or any other alkaline salt
into a glass of hard water, a white foam
is instantly formed. The alkali has
a stronger attraction to the acid than the
acid to the water, the acid and alkali
therefore unite together forming the
white foam which in a few minutes
falls to the bottom, and leaves the w.
soft, to render the effect perfect the
acid and alkali should just saturate
each other— Whether hard water will
improve putrescent grapes?

Air

Surrounds the earth - extends to the height of about 50 miles - perfectly transparent, therefore always invisible - water & salt &c united with the air - these can be separated both by natural and artificial processes - sulphuric acid, salt of tartar and other substances when exposed to the air attract moisture from it - diminish heat and water is separated hence snow, hail, rain, dew.

Air presses with a force equal to 15 lbs on every square, or 12 lbs on every circular inch.

The pressure of the atmosphere causes water to rise in pumps, supports the mercury in the barometer, occasions the action of the syphon

and in short produces all those
 phenomena formerly attributed to
^{vacuities} friction - Cupping - Sucking -
 - Spring of the air equal to its
 pressure -
 + Pressure on a middle sized man

$$\begin{array}{r}
 \text{Surface of his body} = 14 \text{ Sq. in.} \\
 \text{square inches in a foot} = 144 \\
 \hline
 \text{Pressure on one inch} \quad 15 \times 14 \\
 \hline
 210 \\
 \hline
 15 \times 144 \\
 \hline
 2160
 \end{array}$$

$$\begin{array}{r}
 144 \text{ Sq. In. in one foot} \\
 \text{Surface of the body } 14 \text{ of a middle sized man} \\
 \hline
 576 \\
 144 \\
 \hline
 2016 \\
 15 \text{ pressure on 1 inch} \\
 \hline
 10080 \\
 2016 \\
 \hline
 \text{Total } 30240 \text{ pressure}
 \end{array}$$

This pressure is not felt because it
 is equal on all sides and because

^{of the air}
The spring in the inside of all bodies
is equal to the pressure —

— Air is contained in all bodies —
extracted from wood, fruit, water, beer
an egg &c. — A certain portion of
air is necessary to preserve liquors
fresh — Water becomes rancid when
air is extracted from it — The pump
can extract only common air the
fixed air ~~is said to~~ remains entirely
behind —

— Pressure of the air varies about
 $\frac{1}{10}$ part of the whole. — The barometer
measures this and becomes an accurate
measure of this pressure —

— Dry — cold — wet, warm — The
two first raise, the two last depress
the mercury —

— Variations in the pressure of the air affect ^{very} health and spirits— affect also the winged tribe— When the pressure increases birds fly with more ease—

— Air necessary to the support of animal life and flame— The eggs of animals and seeds of vegetables will not propagate in Vacuum—

— Air which has once passed thro the lungs is noxious—

— Air in which a candle has burnt out is noxious— Expt: Put a mouse into a jar when another mouse has died as when a candle has burnt out, the mouse will instantly expire—

— At mountain an ~~altitude~~ carriage of about $\frac{1}{4}$ pure and $\frac{3}{4}$ noxious air—

Fixed air —

Exists in chalk, marble, limestone and in all that class of bodies called calcareous, or such as can by fire be converted into quick lime properties.

1. Heavier than common air in the proportion of 3 to 2, proved by pouring it from one jar to another —
2. Extinguishes flame
3. Kills animals
4. Is a powerfull antiseptic with putrefaction both in the living and dead body —
5. Unites with water — Soluble in water — Evolves even Chalybeate —

6. Forms the choke Damp in mines - *Grosse del cane* -
7. Produced from calcareous substances by the vitriolic acid - or by heat -
8. Produced from the burning of most ~~vegets~~ inflamm. ^{ble} substances
9. - From Fermentation -
10. When united with calcareous substances it renders them acid when deprived of it they become caustic - Chalk is acid when burnt in the fire it becomes quick lime -
12. Vegetable juices contain great quantities of fixed air which renders them acid - sweet &c when deprived of fixed air they

become pungent - acid -

- The alcoholic motion entirely
owing to the escape of fixed air.
- A candle held near the surface
of fermenting liquor is extinguished.
- Water poured from one glass into
another several times near the
surface of fermenting liquor be-
comes impregnated - Seltzer water

+
give what effect will fixed air
have on wine - with the sweet
wines -

- To compress the fixed air a little
on the surface of the fermenting
liquor - by phos. tower and in
water - tiffin and in the bung
of the cask -
- To remove the fixed air farther
of wood -

Pure Air

Exists in Nitre, and the calces
of all the metals - such as lead
&c. - the precipitate &c. -

It is extracted from Nitre by expos-
ing the nitre in a retort or other
vessel for a while heat -

It is prepared from red lead by
the vegetable acid highly con-
centrated - Equal bubbles of lead
and acid are put into a retort
and heat applied - That of a
candle is sufficient -

Properties -

1. It is nearly of the same wt.
as with Atmospheric air -
2. Supports animals life much
longer than common air
- an animal will live from
four to six times longer in

more than in common air —

3. Combustion $\frac{1}{2}$ part of the atmosphere
5. With inflamm^{pt} air in about
equal proportions produces a violent
explosion —
6. Vegetables in the light produce
pure air — whereas ^{air} in the dark —

7.

Hydrogen ^{is} air

- Produced from iron, Zinc &c by the *Wet* ~~Wet~~ and *Wet* acids - Vit. acid must be diluted with five or six times its quantity of water -
- Produced in the burning of all combustible substances -

- Properties -

1. It is ten times lighter than common air -
2. With ammonia
3. Extinguishes flame
4. With Ammoniacal air :: 1:2 explodes -
5. With Air in equal proportions a more violent explosion -

Nitrous Air —

Produced from iron or Copper by
the Nitrous acid —

Properties

1. Density of the same weight as
Atmospheric air —
2. Heats animals
3. Extinguishes flame
4. Remembers the bulk of At-
mospheric air in proportion to
its purity — Some becomes even
excellent test of the ^{purity} of
air or its fitness for respira-
tion and combustion. —
5. Is a powerful antiseptic

Acids

Three mineral acids.

Vitruolic, Nitrous Marine
of the Vitruolic

This acid is obtained from Copper
or Sulphur. The $\frac{1}{2}$ of sulphur of burning
sulphur condensed becomes Vitruolic
acid. This is concentrated or distilled
in vessels, the water comes over in
vapour and the strong acid is left
behind.

Properties -

1. Thicker than water in the
proportion when highly concen-
trated, of ²⁰ 5 to 10. some times more
2. Perfectly transparent - has no smell
3. Absorb moisture from the air equal
to ^{gray} half its own bulk -

4. It unites violently with water
causes a heat equal to that of boiling
water — in equal parts it is called
spirit of Vitriol.
5. Turns the blue vegetable suspensions
red, such as Symplic of Crocus, Tincture
of Tursole, Litmus, &c. —
6. It is much more fluid than water
requires 600 gr
7. Any animal or vegetable substance
turns clear vitriolic acid black
Exists in the Atmosphere
since most of metals
with vegetable alkalis form
vitriolated Salts
- 8.
9. With fixed spirit alkali forms
vitriolated Salts
10. With fixed spirit alkali forms
Salt
11. With Iron it forms ^{green} Vitriol or
Copper —

12. With Copper blue Vitruol
13. With Zomb white Vitruol

Nitrous Acid

Obtained from Nitric by Dilution with the vesivole acid &

Properties

1. It is heavier ^{than water} the proportion of about 3 to 2.
2. One sort emits red fumes the other is nearly transparent — when let down with water it is called "aqua fortis"
3. From the infusion of Vegetables
4. with fixed veg: alkalis it forms Nitre
5. Vol: alkalis it forms Nitrous Ammoniac
6. with the marine acid it

forms aquaria the only men-
struum which will dissolve gold

Muriatic or Marine acid
or Spirit of sea salt
obtained from common sea
salt by Distillation with the Vitri-
olic acid

Properties

1. Somewhat heavier than water
2. when pure is perfectly clear
- but generally of an orange or yet-
lowerish colour - is easily known
by its smell
3. Turns veg. infusions red -
- 4.

Alkalis

Three Sorts

Fixed

1. Fixed Vegetable
2. Fixed and Volatile alk.

Fixed Veg: alkali

Salt of Tartar - Pot ash, Soda ash, is formed in the burning of Veg: substances and found in their ashes

Properties

1. Contains a great quantity of fixed air which renders it mild when deprived of it the alkali becomes caustic
2. In both cases it unites with Vet. acid forming vegetable Tartar, with Nitrous acid forming common Niter with the marine

and forming digressive salt of Saliva

3. When caustic it unites with oil forming soap
4. Has a strong attraction to acids
3. Absorbs water from the air so much as to double it - out of Taste & Deliquescent
6. Turns the Syrup of Violet green

2. Fixed Sapon Alkali

Is found in the earth, in mineral waters, and in the ashes of such vegetables as contain sea salt

Properties

1. Is either mild or caustic
In both cases it unites with
2. Vitriolic acid forming Glauber's salt - with Marine acid forming common sea salt -
3. When caustic, forms with oils, Castile soap -
4. When dissolved in hot water and the Evaporated, it crystallizes -
5. Turns the Symp of Vitriol green

Volatili Alkali.

Sol ammoniac - Spirit of Sal:
Am: Spirit of North horn &c -
obtained from animal substance
by Distillation - From soot
from Sol - in the last stage
of Putrefaction -
Properties -

Fermentation

The sweet juices of vegetables when exposed to the air ferment. By fermentation the juices are ^{partly} decomposed

Requisites

1. A proper degree of thickness or viscosity — This may be ascertained by a hydrometer constructed for the purpose — Dry substances will not ferment
2. A proper degree of heat, the limits are 55° and 90° ; — but from 70 to 75 — Ascertained by the thermometer — For this purpose two thermometers should be used one should hang in the air near the fermenting liquor, the other serve to try heat of the liquor, it

Shall by plunging it 'till the surface
stand a little above the bell, it
must remain 'till the mercury becomes
stationary two minutes or so.

3. Exposure to air — When an
animal or vegetable substance
is enclosed in vacuo, it can be
preserved a long time —

Fermentation distinguished into
three kinds —

1. Vinous or Spirituous fermentation
2. Acetous
3. The putrid.

The first produces ardour spirit the
second vinegar and the third Acids
Alkali —

Vinous Fermentations

The expressed juice of the Grape when exposed to the air begins to ferment. The liquor loses its transparency, a number of air bubbles escape occasioning a commotion more or less violent according to circumstances to be taken notice of afterwards —

The juices of all vegetable matters are not equally capable of ferment.

It is proved by experiment that the sweet or saccharine matter of a Vegetable only is fermentable —

— The capability of Saccharine matter depends on the Nature of the Grape is increased by a dry season and soil, old Vineyard &c —