15

Annual consumption of
Sulphur. (one Burner)   62 tons.
Nitre, ---— do.   68 cwt.
Salt.... { One furnace } 187 tons.
         { working by day. }
Vitriol $165\frac{1}{2}$ tons.
S.S. { double work. } $204\frac{1}{2}$ tons.
     { 4800 tabs. per week. }

Sulp^t. Burnt : Vit^l. made :: 19:56
Nitre used, : Vit^l., made :: 1:56
Salt used, : S.S. made :: 32:37
Vit^l. used, : S.S. made :: 1:1.31
Average of salt used : S.S. made, :: 32:37
Hence 187 tons Salt = 217 S.S.

16

Solution of S.S. saturate
boils @ 216° to 218° Fah^t.
Density, 1.255
Imp^l. Gal. conts. 3.68 lbs. S.S.
                                        C.T.C.
Solution of C.S. saturated
boils at 222°, to 226° F.
density 1.255 to 1.290
(varying according to its
purity)   C.T.C
Imp^l. Gal^n. cont^s. 4 lbs. C.S.

17

(Vide p.22)
Estimated.......
Cost of Vitriol and of.....
Sulphur @ 120/- per ton   ⎫
Nitre @ 560/- per do.   ⎪
Wear and tear of Chambr. @   ⎪
10 per cent per an. on £1200   ⎪
Produce, 2.928 lbs. Ol. Vit per ⎬
1 lb. Sulph^r. consumed.   ⎪
Consumption, 2677 lbs. Sulp^r. ⎪
and 147 lbs. Nitre. per week.   ⎪
Wages 38/9 per week   ⎪
Coal, $4/4\frac{1}{2}$ per do   ⎭
Total cost = 72/3 per Ton Vit^l.

18

from Six Months.
Sulphate of Soda (Oct. 1837)
Salt @ 28/- per ton = $24/2\frac{1}{4}$ per T. S.S.
            Cwt qrs lbs
Produce 4.. 2..14 per cwt. Salt.
Consumption, 72 cwt. Salt.
per week, and 7128 lbs. Ol. Vit^l.
Wages 18/- per week ⎫ $4/3\frac{3}{4}$ per Ton
Coal.   17/6 per week ⎬ 4/3 per Ton.
"Wear and Tear" of Tools &c. 2/- per T.
Total cost £4..10.. per ton.

Cost in Vit^l. £2.15.3. per ton.

19

Atomic Equivalents.
Carbon   6
Chlorine   36   Oxalic Acid
Sulphur   16   Silica
Lime   28   Iron
Carb^{te}. Lime. 50   Acetic Acid
Soda   32   Sulp^{ous}. Acid
Carb^{te}. do. 54   Nit^c. Acid
do Crystals.153
Sulph^{te}. Soda 72   Nit^c. Acid @ 1.50
do Crystals.162
Chloride of sodium 60.

20

Potassa   48
Sulp^c. Acid.   40   Potassium
do. @ 1.845.   49

Sulph^{te}. Ba[*or* 'u']rita   118
Sulph^{te}. Lead   152
Oxalate of Lime.   64
Silver   110

[C.T.C. seems to be mixing 'Atomic Weights' and
'Atomic Numbers', and figures are not all in line
with current usage, as defined in Hicks, 1982.]

21

Atomically.

1 Sulp^r. = 2 Soda = $4\frac{1}{2}$ S. Soda
1 Soda = $1\frac{1}{2}$ Potassa. = $2\frac{1}{4}$ S. Soda
1 Carb^{te}. Soda, = $1\frac{1}{3}$ S. Soda.
100 Sulp^r. = 307 Sulp^c. Ac^d. @ 1.843
375 dry Chloride of Sodium,
450 dry Sulp^{te}. of Soda.
200 pure Soda,
300 pure Potassa,
336 pure Carb^{te}. of Soda ($337\frac{1}{2}$)
$956\frac{1}{4}$ crystals of do.
1013 crystals of S. Soda ($1012\frac{1}{2}$)

22

Practical Constants.
*760 lbs. Sulp^r. ⎫ = 1 Ton Vitriol.
  42 lbs. Nitre.   ⎭
Wages, 11/-; Coal, 1/3;
Interest on Capital, &c. 13/1
1 Ton S.S. =
   581 lbs. Sulpr. ⎫ =1712 lbs. Vitriol
   31 lbs. Nitre   ⎭
         17.29 cwt. Salt.
Wages, $4/3\frac{3}{4}$; Coal, 4/3;
Interest and Wear and Tear = 2/-.
* Cr. By Sulph^{te}. Potass. 37.8 lbs.
 per Ton Vit^l. made.

23

Specific Gravities.
Sp. Gr. I. of W. Sand 2.644 (64º)
  do S. S. Glass, 2.532
  do Rock crystal 2.6536 (60º)
  do do (perfect) 2.6577 (64º)

24

Glass House Mem^{da}.
S.S. Standard Mixture.

Sand.	16 [qrs =]	448 [lbs]
dry. S.S.	6	*168
Hyd. Lime.	5	140
Cullet	12	336
Charcoal lbs. to every 14 lbs. S.S.		12
Arsenic		2
Sp. gr. 2.53 .Mang^{se}.		1

* Or 46 gal^s. S.S. Solution
   (Vide p.16)

25

Carb^{te}. Glass mixture.
Sand, I. of W. 448
Dry S.S.   42
Dry Chalk 126
Alkaline Liqr. 28 gals.
     = 11 lbs. Alkali
———————————————
Cullet.   336
& Coloring, composed of
Sand, Manganese, &c.

26

The actual produce of Glass
from this mixt^{re}.
(deducting the wt. of cullet
used) was 48 cwt. 2 qrs. 24 lbs.
from Sand, 37.. 3.. 0⌉
 Chalk,. 10.. 1.. 12⌡ 48..0..12 of
sand and chalk used; or
about the amount of these two
ingredients, when employed
perfectly dry. (C.T.C.)

27

Sand.
Isle of Wight Sand at
Nailsea, 28/ per ton.
Dried and fit for use, 30/ per ton.
Loss in <u>drying, barely</u> 5 per cent.

Easton Sand, at Nailsea
16/6 per ton.
Dried, and fit for use, 18/ per ton
Sp. gr. @ 64º 2.644
————————————
Carb^{te}. of Lime in I. of W.
Sand, not 0.5 per cent. C.T.C

28

Lime.
<u>Price</u> 3d. per Bushel (Quick)
or $4\frac{1}{4}$ d per cwt. when prep^d.
<u>as Hydrate.</u>
————————————
A Bushel of Good Quick
Lime, fresh from the Kiln
weighs 77 lbs. C.T.C.
————————————
Hydrate of Lime, as used
for Glass Making, contains
from 30 to 40 per cent of water
(Say 35 per cent).
    (Turn over)

29

Lime, contd.
The extreme limit for the use
of Lime in Glass mixture,
is 36 lbs. of Hydrate (Ham's)
to 112 lbs. Sand. (C.T.C.)

In using dried Chalk
for Hydrate of Lime (Ham's)
we take 7 Chalk, for 8
Hydrate.
    (C.T.C.)

30

Analysis of' Lime.

[No entries]

31

[No entry]

32

Charcoal
    cwt. qr. lbs.
6/6 per Bag, wt 1.. 0.. 14.
Value, when ground, 6/10 per cwt.
Limits for S.S. mixture
1 lb. to 14 lbs. S.S.; and
for Carbonate mixture,
there should not be any.

33

Coal

Price of Brush Coal,　　　　2/8
　　　per quarter, of 8 Bushels.
　do of Small Coal.　　　1/4 per do.
Hauling from the Pit ⎫
1/- for 9 Quarters.　　 ⎬

A Bushel of Brush Coal
　　　　weighs 82 lbs.
do. of Small Coal, 84 lbs.

34

Coal used for founding our
S.S. metal, 62 Quarters
Value,　　　　~~£4.. 1..4~~　+ 1/4
Hauling do.　　　~~6..9~~
　　　　　　　~~£4.. 8..1~~　+ 1/5 (£4..9..7)

Coal used for Working
12 Quarters of Brush.
Value,　　　£1..12.. 0
Hauling do.　　　1..4
　　　　　£1..13.. 4
Working double, for 6 hours
or, about 5/6 per hour.　　　C.T.C.

35

Coal used for annealing
a New Furnace,
about 45 to 48 Quarters of Small
and　　　25　　　do of Brush.
Value £XXXXXXX
　[Heavily deleted items follow.]

36

Coal used for annealing
6 Pots, Feb. 12th to 19th
24 Quarters Small　　　£1..12..0
　6　do　Brush　　　　0..16..0
　　Hauling from pit.　　0.. 3..6
　　　　　　　　£2..11..6

Wages to Founders,　　　1..0..0
Drinking allowances ⎫
to the workmen　　　 ⎬　1..l..0

37

Coal used at Alkali W^ks.
Pans and Calcars (double work)
26 Quarters of small per week

Salt Cake Furnace, and Boiler
15 Quarters small, per week
　　　(working single)

*Crazling Cullet, per week,
$3\frac{2}{3}$ rds Quarter small
　　　(for one Glass House)

Coal used for Chamb^r. Boiler
alone, 3 Quarters per week.
Averaged from 6 weeks.
　　　July. 1837　　　C.T.C.

[*Alternatively, 'Cr..' might possibly be 'Br..' or 'br..']

38

Coal allowances

8 loads of Brush coal per an.
to 3 Managers, 2 Flashers,
2 Pilers, 8 Blowers, 1 Spare
Blower, R^d. & Thos. Sims,
W^m. & Saml. Baldwell;
6 loads of Brush coal per an.
to 2 Carriers off, 3 assistants
2 Skimmers, 8 Gatherers;
5 Loads of Brush Coal per an.
to Edwd. Thomson, & 2 head
Founders. (Total 795 Quarters)

39

Coal &c.
The Glass Makers allowance
for Coal and House Rent.
amount to £4..15..4 per week.
or 11/11 per Journey.
This makes their Bare
Week's work amount to
£7..8..9 per Journey.
Overwork, is £5..10.. per do.

The Coal allowance to
the Founders is 50/ each,
per annum. (Perry & Culver)

40

Cullet &c.
Mixture allowance of
Cullet is 3/4ths of the
wt. of the sand used.

Cullet used for Topping
about 1 cwt. per pot.

Cullet used for Glazing
a New Pot, is about
$3\frac{3}{4}$ cwt. and for 12 inches
of Bottoms. $7\frac{1}{4}$ cwt.
(turn over)

[No entries : pages 41 to 49inclusive]

50

Cullet made in the shape
of Skimmings,
Moils & Pontys per found

	cwt.	qrs.	lbs.
Skimmings.	8..	0..	0
Moils	12..	0..	14
Pontys,	0..	3..	14
Breakage	1..	1..	6
cwt	22 ..	1 ..	6

Wt. of moil, 1.845 lbs.
Wt. of a Ponty, 2.13 oz.
*Wt. Of Skim^{gs}. per pot 1.333 cwt.
(average of 736 Tab^s. made.)
*vide p.52.

51

Value of Cullet
Thin, picked and washed   5/- per cwt.
Ladlings & Skimmings   3/- per cwt.
_____
Cullet produced from
cutting up a good Crate
of Glass into Export sizes,
is 28 lbs. small sizes included.
Cullet produced from
cutting up every
description of Glass, i.e. "starved"
Bad work &c. is 29 lbs. per crate
(Small sizes not included).

52

Skimmings, since the adoption of Rings
in the Pots, appear to coincide very
generally with the average of 1 cwt. for
every 100 Tab^s. of Glass
made.
              C.T.C.. Aug. 1837.

Total waste of Metal in the manufacturing
= 3/6ths. of the Wt. of the
Tables drawn --- Aug. 1837
                    C.T.C.

53

[No entry]

54

              Founding
Patent S.S. mixture
Melt^g. Bottoms   2 to 3
hours
Charging until ⌐   10 to 11 do
the Pots are full ⌡
From Pots full ⌐   7 to 8 do.
'til metal plain ⌡
Melting Toppings. 2 to 3 do.
H.D. til Working.   7 to 9 do.
Total ---------------28 to 33 hrs.
N.B. 30 hours is a very
fair average. (Aug. 1837)

55

      Patent Carbte. Mixture.
------------2 hours
----------⌐
          ⎬ 17$\frac{1}{2}$ hours.
----------⌡

------------3 hours
------------8$\frac{3}{4}$ hours.
          31$\frac{1}{4}$ hours.
                      (Novr. 1836)
(Coal used, 61, to 62$\frac{1}{2}$ Quarters.)
                          C.T.C.

56

              Furnaces.
Dimensions of a 6 Pot furnace.
Length of Sieges,   13 feet
Width of do.   4 ft. 3 in.
do. of Grate room.   3 ft.
Bearing Bars, to the top
of the Sieges,   2 ft. 2$\frac{3}{4}$ in.
Height of Square work
from top of Siege,   3 ft 4 in.
Height of Pots from do. 3 ft. 1in.
Pitch of the Crown above
the working holes   2 ft. 7$\frac{3}{4}$ in.

57

Pitch of the Crown above ⌐
the working holes, in the ⎬
centre, or highest part, 2 ft. 11$\frac{1}{8}$ in⌡
Diam. of the Teaze Holes
              4 ft. 11$\frac{1}{4}$ in.
Working Holes,   12 in. wide
      & 12$\frac{5}{8}$ in. high (inside)
Foot holes, 15 in. wide   and
              23 in. high
Pnty. holes, 5 in. x 5 in.
Inclination of Restings, 3 in.
(Set Pots in 11 days, Furnace
"turned" in 7 days).

58

Furnaces   Contd.
From top of grate bars
to top of sieges. 2 ft. $0\frac{1}{4}$ ins,
Dead Mug. 3 feet at bottom
varying to 2 ft. 10 in.
<u>N.B.</u> The Height of the
Crown of This Furnace
above the working holes
is 8 inches less than those
we have used previously;
and 4 inches less than the
old standard height.

59

A Furnace may be
very safely "turned" in
108 hours; and Pots may be
set in 96 hours afterwards.
<u>(Total, $8\frac{1}{2}$ days)</u>. Feby. 1836.
The capacity of the grate
room (allowing for the
"dead mug") is 69 Cubc. Ft.
or about $2\frac{1}{2}$ Cubc. yards.

60

Pots.
7 parts new clay ⎤
1 do. old Potsherd ⎦
———————
Analysis of Pot Clay.
                    100 grs.
Silex.   64.3
Alumina   27.6
Red Ox. Iron.   5.9
Lime.   3.3
                     101.1

Wm. Herapath.

61

Dimensions when made
Inside top diameter $52\frac{1}{2}$ inches ⎤
Outside   do. do.   56   do. ⎥
Inside bottom, do.   32   do. ⎥
Outside   do. do.   40   do. ⎥
Inside slant height $37\frac{1}{4}$ do. ⎥
Outside   do do   42   do ⎦

If very carefully dried,
they may be used in from
5, to 6 months.
                                C.T.C.

62

Pots contd.
Pots of the usual dimensions viz.
56 inches external diam.
and 42 inches extl. slant height
when new, become after
they are annealed,
$52\frac{1}{4}$ in. extl. diam. at top,
and 40 in. extl. slant height,
and after one found,
$50\frac{1}{4}$ in. extl. diam. at top,
and $38\frac{1}{4}$ in. extl. slant height,
$34\frac{1}{4}$ in. intl. -------- do.

                    C.T.C.

63

Pots, if carefully watched
may be "turned" in the
annealing Arch in 60 hours,
and set in 36 hours afterwards.
    They may be glazed
from an adjacent pot, in
$5\frac{1}{2}$ hours, and charged upon
12 inch Bottoms.   C.T.C.
———————
Six Pots may be set in
a New Furnace in $1\frac{1}{2}$ hours
and glazed in [*blank*] hours.
                    (turn over).

64

Pots continued.
A new Pot will require
about $6\frac{3}{4}$ cwt. of thin
Cullet for Glazing, &c.

Two Pots, No. 1 and No. 2.
after $11\frac{1}{2}$ week's wear,
measured when cold, as
follows, viz.
No. 1. $37\frac{1}{2}$ in. extl. slant. ⎤
              34 in.   intl. do. ⎦
No. 2.   37 in.   extl. slant. ⎤
              $33\frac{1}{2}$ in.   intl. do. ⎦

65

A pot that has remained in
the Furnace during 40 Founds,
without having been once turned
upon the Siege, measured at
the Jowl, next to the fire
$1\frac{3}{4}$ inches; but on the
opposite side, $3\frac{1}{2}$ inches.
                    C.T.C.

3 - 50