ABSTRACTS FROM THE ORIGINAL PAPERS.

THE CATALYTIC OXIDATION OF HYDROCYANIC ACID.

1. OXIDATION INTO NO.

By Ryōsaburō Hara, Kogakushi and Heima Sinozaki, Kogakushi.

(Received Sept. 6, 1924.)

(1) The oxidation of H CN to NO, using a platinum net as a catalyser, has been studied in the range of gas velocities 20~1120 cc., °, 760 mm. /sq. cm./min., between temperatures 400~1000°C, and with H CN concentrations in an air mixture of about 2~40%.

Under the proper reacting conditions, 90~95% of H CN has been easily oxidized into NO.

(2) Yield-temperature curves of constant gas velocities have been drawn. The oxidation into NO begins fairly abruptly at about 450~500°C, almost independently of the gas velocities; and generally at temperatures of about 600~800°C the yield of NO is high and little influenced by the change of temperature. At higher temperatures than 800°C, there is a certain temperature point where the yield of NO begins to drop, and this point of temperature greatly depends on the gas velocities, i.e. with the increase of the latter the range of the preferable temperatures is greatly widened.

(3) Isothermal yield-gas velocity curves have been drawn. Between the temperature of 500°C and 800°C, these curves are nearly straight lines which gradually ascend with the increase of gas velocity in a certain limit of the latter. Therefore a high velocity is generally preferable in order to obtain a good yield of NO. The curves of the higher temperatures than about 850°C are not straight lines, but the yield of NO is much influenced by the change of gas velocity.
(4) Isothermal yield-HCN concentration curves have been drawn. With HCN concentration of 4~8%, the yield of NO is high and little influenced by the change of HCN concentration. With the higher concentrations the yield of NO decreases quickly, and with a concentration of about 15% there is only a very small percentage production of NO. With a high HCN concentration, such as for example 30%, HCN is chiefly oxidized into a solid product but not into NO. About this solid product we will report later in a separate paper.

(5) The reactions of the oxidation and its mechanism have been discussed, and the main reaction is thought to be as follows.

\[ 2\text{HCN} + 5\text{O} = 2\text{NO} + 2\text{CO} + \text{H}_2\text{O} + 138,100 \]

The other secondary reactions have been discussed.

THE EFFECT OF THE DEVELOPMENT OF THE CRYSTAL ON THE STABILITY OF BLEACHING POWDER.

By Shuichiro Ochi, Kogakuhakushi.

(Received Sept. 24, 1924)

The author has cleared that the stability of bleaching powder is influenced not only by water or other impurities contained, but also by the degree of development of the crystal Ca(OCI)Cl.H_2O.

He made six samples of bleaching powder, of which three were so made as to contain well developed crystal, and the other three as to contain chiefly of amorphous nature. Their stability were tested in a thermostat, regulated at 45°C.

The result of the experiment proved that the bleaching powder of amorphous nature was decomposed quickly while that of well crystallized stable.

The development of the crystal was controlled by the temperature of preparation, and was observed under a microscope with nicol prism.
HEAT DISTRIBUTION OF ROUND DRAFT PORCELAIN KILN WITH UPPER CHAMBER.

By J. Isagawa, Kogakushi.

(Received Sept. 26, 1924.)

In making a heat balance of a kiln we must determine the following factors.

A....Heat introduced as fuel
B....Heat lost by the unburnt fuel in the ashes
C....Heat lost by the waste gases
D....Heat used in the burning of ware &
    Heat used in the burning of sagger & others
E....Heat taken up by the kiln & lost by radiation

Last factor, important though it is, can’t be estimated by any direct means available, since the difficulties opposed to the determination are too great. Then we must satisfy the difference, since the 4 factors are measurable, the fifth is arrived at by the evident relation.

\[ E = A - (B + C + D) \]

<table>
<thead>
<tr>
<th>Factor</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100.00%</td>
</tr>
<tr>
<td>B</td>
<td>4.86%</td>
</tr>
<tr>
<td>C</td>
<td>14.89%</td>
</tr>
<tr>
<td>D</td>
<td>0.95%</td>
</tr>
<tr>
<td>E</td>
<td>3.31%</td>
</tr>
<tr>
<td>D</td>
<td>0.95%</td>
</tr>
<tr>
<td>Heat used for wares</td>
<td>8.95%</td>
</tr>
<tr>
<td>Heat used for saggers</td>
<td>1.66%</td>
</tr>
<tr>
<td>Heat lost due to others</td>
<td>0.73%</td>
</tr>
<tr>
<td>Heat used for wares</td>
<td>0.98%</td>
</tr>
<tr>
<td>Heat used for saggers</td>
<td>3.71%</td>
</tr>
<tr>
<td>Heat lost due to others</td>
<td>3.38%</td>
</tr>
<tr>
<td>Heat taken up at flues</td>
<td>17.30%</td>
</tr>
</tbody>
</table>

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ON THE SALTS OF 1-NAPHTHOL-5-SULPHONIC ACID.

By Takuro Watanabe, Rigakuhakyushi.

(Received Oct. 1, 1924.)

The author proposes here a new method of preparation of 1-naphthol-5-sulphonic acid, as follows;

One part of sodium naphthalene-1:5-disulphonate was mixed with one part of sodium hydroxide, one part of kalium hydroxide, and 2 parts of water in an autoclave, and heated to 210-215° for 6 hours. The fused liquid being cooled, di-alkali salt of 1-naphthol-5-sulphonic acid separated out in crystals, which was then filtered through a metallic gauze. The filtrate could be readily used in the next fusion. The filter cake was dissolved in five parts of hot water and neutralized with hydrochloric acid and mixed with some kalium chloride. On filtering and cooling, the double salt of sodium and kalium 1-naphthol-5-sulphonate was obtained in tabular crystals.

The double salt, above mentioned, was found for the first time by the author and its constitution was determined to be

\[
\left( \text{NaO}_5 \text{S} \cdot \text{OH} \right) \cdot \left( \text{KO}_5 \text{S} \cdot \text{OH} \cdot 6\text{H}_2\text{O} \right)
\]

Monoclinic system (x.p. = px. = p.x. = p.)

Sodium salt, kalium salt, and calcium salt were respectively obtained in crystal forms and their crystal water was also determined, as follows,

a, \((\text{NaO}_5 \text{S} \cdot \text{OH} \cdot 8\text{H}_2\text{O})\)  

b, \((\text{KO}_5 \text{S} \cdot \text{OH} \cdot 3\text{H}_2\text{O})\)

c, \((\text{KO}_5 \text{S} \cdot \text{long tabular})\)  

d, \((\text{SO}_5^\text{Ca} \cdot \text{O}_5^\text{S} \cdot \text{tabular} \cdot 10\text{H}_2\text{O})\)

(The Laboratory of Japan Dyestuff mfg. Co.)
STUDIES ON BEATING.

By Michimaro Nakano, Kōgakushi.

(Received Oct. 30, 1924)

The author has studied the wetness of stock obtained by beating in a laboratory beater by means of a type of Klemm's tester greatly modified by the author. The conclusions are as follows:

1. The wetness of stock decreases by boiling, freezing and drying.
2. By a short boiling, say 5 minutes, the wetness attains to almost a constant value, but it still gradually decreases by continuing boiling.
3. On standing, the stock both before and after boiling gradually increases to a maximum, then decreases and at last becomes constant.
4. Under a definite boiling, the wetness $W$ can be expressed as follows: $W = W_m + W_a$, where $W_m$ is the wetness after boiling which is constant characteristic to each stock, and $W_a$ is the wetness lost by boiling which is variable when time is taken into factor.
5. By alcoholic beating the wetness also increases.
6. At a comparatively high temperature (50°C), the low wetness pulp tends to give a higher wetness stock than at ordinary temperature, and the high wetness pulp a lower one.
7. No definite relation is found between copper number and wetness.

(Remark Laboratory, Mitsubishi Paper Mills, Ltd.)

SHŌTŌ OIL.

By S. Boku.

(Received Dec. 9, 1924)

Shōtō oil is obtained from the seeds of *Evodia Danielli Hemsley* (Japanese; Shōtō, Shōtombyaku or Soto), a shrub growing wild or in culture all over the Corean-peninsula.

The proportion of the oil in the seeds is 38.55%. By extraction it produces 25.61% of the oil in the cold process and 9.45% more in the hot.

The following characteristics are ascertained in the oils (I. extracted with ether, II. pressed in cold, III. refined oil of II.):
ÜBER DIE HYDRIERUNG DES PHENOLS
MIT NICKELKATALYSATOR UNTER ATOMOSPHÄRISCHM DRUCK.

Von Tetsuro Mazume, Kögakushi
und Shin-ichiro Iwasaki, Kögakushi.

(Eingegangen am 17. Dezember 1924.)

Die Verfasser haben Versuche angestellt, um die Bedingungen der Hydrierung des Phenols näher festzustellen, da die in der Literatur darüber vorhandenen Angaben weit auseinander gehen.

Die Hydrierung wurde in der üblichen Weise in der Gasphase ausgeführt.

Reines Phenol wurde durch Destillation pharmazeutischen Phenols mit 10% Bleiglatte gewonnen.


Auf die Bestimmung der Reaktionstemperatur wurde besondere Aufmerksamkeit verwendet und die Temperatur im Reaktionsraum innerhalb der Fehlertoleranz von 5°C gehalten.

Der Gehalt des Cyclohexanons im Reaktionsprodukt wurde nach Nelson bestimmt.

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<table>
<thead>
<tr>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spec. grav. (15°C)</td>
<td>0.799</td>
<td>0.795</td>
<td>0.799</td>
</tr>
<tr>
<td>Viscosity (Engler 20°C)</td>
<td>7.32</td>
<td>7.10</td>
<td>7.07</td>
</tr>
<tr>
<td>Refractive index (19.5°C)</td>
<td>1.476</td>
<td>1.475</td>
<td>1.475</td>
</tr>
<tr>
<td>Solidifying point</td>
<td>-17.5°C</td>
<td>-17.5°C</td>
<td>-17.5°C</td>
</tr>
<tr>
<td>Acid value</td>
<td>5.78</td>
<td>5.51</td>
<td>5.35</td>
</tr>
<tr>
<td>Saponification value</td>
<td>193.47</td>
<td>205.1</td>
<td>193.95</td>
</tr>
<tr>
<td>Iodine value</td>
<td>160.69</td>
<td>156.53</td>
<td>157.91</td>
</tr>
<tr>
<td>Reichert-Meissl value</td>
<td>0.335</td>
<td>0.575</td>
<td>0.462</td>
</tr>
<tr>
<td>Hehner's value</td>
<td>93.27</td>
<td>93.46</td>
<td>93.35</td>
</tr>
<tr>
<td>Unsaponifiable sub. %</td>
<td>0.45</td>
<td>0.39</td>
<td>0.37</td>
</tr>
<tr>
<td>Acetyl value</td>
<td>5.27</td>
<td>5.496</td>
<td>5.325</td>
</tr>
<tr>
<td>Neutralization value of fatty acid</td>
<td>200.88</td>
<td>201.44</td>
<td>201.56</td>
</tr>
<tr>
<td>Mean molecular weight</td>
<td>279.27</td>
<td>278.49</td>
<td>278.33</td>
</tr>
</tbody>
</table>
Nach den Resultaten, die von denen Sabatiers und Senderens verschieden sind, wird bei 180-210°C eine grosse Menge Cyklohexanons gebildet und bei 150-170°C letzteres vollständig zu Cyklohexanol reduziert.

Zwischen 180-210°C wird die Bildung des Cyklohexanons um so mehr gefördert, je höher die Temperatur ist.

THE STUDY ON THE RECOVERY OF SUCROSE FROM EXHAUSTED MOLASSES BY SACCHARATE PROCESS FROM THE STANDPOINT OF THE PHASE RULE. (FIRST REPORT).

THE SYSTEM SUCROSE-BARIUMOXIDE-WATER.

By Yoshikazu Hachihama, Kogakushi.

(Received Dec. 20, 1924.)

(A) As the first step of this study, the equilibrium among the system Sucrose-Bariumoxide-Water has been studied at 25°C and 45°C.
The results are represented in Fig. I (at 25°C) and Fig. II (at 45°C).

(B) The compound of sucrose and barium oxide, existing at these temperatures as a solid phase was $\text{C}_{12}\text{H}_{22}\text{O}_{11}\cdot\text{BaO}$ and other compounds such as $2(\text{C}_{12}\text{H}_{22}\text{O}_{11})\cdot\text{BaO}$, and $\text{C}_{12}\text{H}_{22}\text{O}_{11}\cdot2\text{BaO}$ were not found.

(C) The results of Pelt and Ismalum (*Journal des fabricants de sucre*, 18, 2; Lippmann, *Chemie der Zuckerarten* Bd. II, s. 1146) were not those of true saturation curve but a super saturation curve.

(D) Further studies on the four component systems Sucrose-MO-Glucose-H$_2$O, (where M denotes Sr, Ca or Ba) will be continued.

Department of Chemical Engineering, College of Engineering,
Tohoku Imp. University, Sendai, Japan.
The author has succeeded in purifying the bleached sulphite pulp by using the mixed reagents of lime and sodium sulphite as follows:

Slaked lime 40 g. (10–80 g.) and anhydrous sodium sulphite 25 g. (6–25 g.) are mixed in 1500 ccm. of water, in which the bleached sulphite pulp is digested for 4 hr. (2–8 hr.) under 3 kg. pressure per square cm.

After washing the digested pulp, add dil. hydrochloric acid to dissolve the insoluble saltes and then wash with water repeatedly.

Calcium hydroxide, calcium sulphite and caustic soda will be formed by mixing excess of lime with a little of sodium sulphite.

Calcium sulphite is mostly serviceable to decrease the reducing property of pulp, while sulphite remove the furfural yielding constituents and prevent, moreover, the hydrating reactions of soda hydroxide.

Caustic soda is mostly preferable to remove the resinous and gummy substances.

The chemical constants are as follows,

<table>
<thead>
<tr>
<th></th>
<th>bleached sulphite pulp</th>
<th>ditto (purified)</th>
<th>cotton cellulose (filter paper)</th>
</tr>
</thead>
<tbody>
<tr>
<td>moisture</td>
<td>7.89</td>
<td>6.77</td>
<td>6.55</td>
</tr>
<tr>
<td>copper no.</td>
<td>2.21</td>
<td>0.33</td>
<td>0.54</td>
</tr>
<tr>
<td>hydrolysis no.</td>
<td>5.44</td>
<td>2.92</td>
<td>3.38</td>
</tr>
<tr>
<td>hydrolysis difference</td>
<td>3.23</td>
<td>2.59</td>
<td>2.84</td>
</tr>
<tr>
<td>α cellulose</td>
<td>85.15</td>
<td>96.80</td>
<td>96.99</td>
</tr>
<tr>
<td>β cellulose</td>
<td>9.57</td>
<td>1.94</td>
<td>1.67</td>
</tr>
<tr>
<td>γ cellulose</td>
<td>5.24</td>
<td>1.26</td>
<td>1.34</td>
</tr>
<tr>
<td>furfural yield</td>
<td>2.27</td>
<td>0.50</td>
<td>0.39</td>
</tr>
<tr>
<td>dissociation value</td>
<td>2.79</td>
<td>1.58</td>
<td>1.62</td>
</tr>
</tbody>
</table>

Thus the purified pulp is almost undistinguishable from cotton cellulose by comparing their chemical constants.

(Tokyo Imperial Industrial Laboratory.)
APPLICATION OF NAPHTHENIC ACID GLYCERIDES
AS LUBRICATING OILS.

By Yoshio Tanaka, Kagakuhakushi &,
Shoichiro Nagai, Kagakushi.

(Received Dec. 21, 1924.)

The glycerides of naphthenic acids or their mixtures with mineral oils may be used as lubricating oils. The authors prepared lubricating oils to be used for the precision machines, such as watches, clocks, typewriters, sewing machines, gyroscopes, etc., by compounding the naphthenic acid glycerides with purified mineral oils. These new precision machine oils were most satisfactory for these purposes, as they were very stable and limpid at even very low temperatures. They are characterised by their exceptionally low temperatures of solidification, such as temperatures from -30°C to -48°C, whereas those of commercial oils are from -7°C to -13°C. (Department of Applied Chemistry, Faculty of Engineering, Tokyo Imperial University, Tokyo, Japan.)

ON THE CHAMBER PROCESS. (PART 4).

By Mototaro Matsui, Kagakuhakushi.

(Received September 30, 1924.)

The heat balance on the chamber system. (Amendment).

The author and his collaborators have estimated again the bases of the calculation on the heat balance more accurately than before made. The rates of acid formation were calculated from the results of gas analyses, mean temperatures of the chambers were estimated from concentration of acids deposited in bottles hung in the chambers and heat of decomposition of HNSO₃ in sulphuric acid was added.

Summary.

1. Heat radiation factors in calorie per 1 hour 1 sq. m. of surface and temperature difference of 1°C were as follows:

   — 42 —
<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herreshoff burner</td>
<td>1.575</td>
</tr>
<tr>
<td>Wedge burner</td>
<td>1.612</td>
</tr>
<tr>
<td>Chamber average</td>
<td>4.36</td>
</tr>
<tr>
<td>Gay Lussac tower</td>
<td>3.04</td>
</tr>
</tbody>
</table>

2. Heat removed by surface radiation of the chambers was estimated as 37100 calories per 100 Kg. of acid as 50°Be.

3. Relation between acid formation and removal of reaction heat by surface radiation could be also fairly reviewed in the case of other systems.

[September, 1924, Technical Chemical Laboratory,
Waseda University.]