SOLUTION CHEMISTRY IN METHANESULPHURIC ACID
Substituted sulphuric acids viz. fluoro-and chloro-sulphuric acids have been explored as reaction media to some extent. But very little work has been carried out to investigate methanesulphuric acid as a solvent. This may be attributed to its high viscosity, low acid strength and ill physiological effects (loc. cit.) on the human system which require its careful handling.

Literature lacks information about any conductimetric measurements in methanesulphuric acid. However, some cryoscopic investigations have been done by Newman and coworkers (107). They have shown that strong bases such as triethylamine and piperidine are completely ionised and that most of the compounds which behave as strong bases in sulphuric acid are not completely ionised in this medium.

For cryoscopic and conductimetric investigations sulphuric acid is a better solvent as compared to methanesulphuric acid but sometimes the information is limited as the high acidity of the solvent leads to a levelling effect. Therefore, most of the compounds which differ in intrinsic basicity e.g. ether, acetic acid, benzoic acid, dimethyl sulphoxide etc. are levelled to the strength of
HSO₄⁻ ions. In order to understand more about the relative basicities of various compounds, investigations have been carried out in methanesulphuric acid, a solvent of lower acid strength. It has an added advantage that unlike acetic, formic and trichloro acetic acids, it has a very high dielectric (221) constant and the ion pairs are completely dissociated in it. In the present investigations, we have studied the behaviour of various solutes conductimetrically and the acids and the bases of the system have been established. A comparative study of the behaviour of various compounds in protonic acids has also been made to determine the relative acid strength of methanesulphuric acid.

Pure methanesulphuric acid has a fairly high conductance 0.00413 ohm⁻¹cm⁻¹ (cf. H₂SO₄. 0.00124 ohm⁻¹cm⁻¹). This value is being reported for the first time; and suggests that methanesulphuric acid like sulphuric acid is a highly self ionised solvent. By analogy with the mode of ionisation of other protonic acids, it may be safely assumed that the auto-protolysis takes place as follows:

\[
2\text{H}_3\text{SO}_3\text{CH}_3 \rightleftharpoons \text{H}_2^+\text{SO}_2\text{CH}_3 + \text{O}^-\text{SO}_2\text{CH}_3
\]

According to the solvent theory, the solutes which increase
the concentration of methanesulphuric acidium ions \( \text{H}_2\text{OSO}_2\text{CH}_3 \) shall act as acids and those which increase the concentration of the methanesulphonate ions \( \text{O}^-\text{SO}_2\text{CH}_3 \) shall behave as bases of the system.

Nitrogen bases such as pyridine, quinoline, piperidine, triethyl amine and morpholine form stable and highly conducting solutions. From the Figure 32 it is evident that all these bases have very similar conductivities up to a molal concentration of 0.12. However, at higher concentrations they show measurable differences. The great similarity in the conductance values of various solutes at low concentrations implies that the cations i.e. the conjugated acids do not contribute much to the conductance of the solution and the current is mainly carried by the anion. This is also supported by the transport measurements in the pure acid (222) where it has been shown that cations of various methanesulphonates carry only a minute fraction of the total current. Since all the above mentioned bases have similar conductance curves, it is not unreasonable to believe that all of them produce one methanesulphonate ion \( \text{O}^-\text{SO}_2\text{CH}_3 \) per mole of the solute:

\[
\text{B} + \text{HOSO}_2\text{CH}_3 \rightarrow \text{BH}^+ + \text{O}^-\text{SO}_2\text{CH}_3
\]
FIG. 32. SP. COND. VALUES OF BASES IN METHANE-
SULPHURIC ACID AT 25°C.

Nitromethane
Nitrobenzene
Monochloroacetic acid
m-Dinitrobenzene
Acetic acid
Dimethyl sulfoxide
Water
Triethylamine
Quinoline
Morpholine
Pyridine
Sodium salt
Piperidine

$10^2 K$ (ohm$^{-1}$ cm$^{-1}$)

MOLALITY
Methanesulphuric acid has a high viscosity and the ionic mobilities are rather small but, the $\text{H}_2^+\text{OSO}_2\text{CH}_3$ and $\text{O}^-\text{SO}_2\text{CH}_3$ ions have abnormally high mobilities and are unaffected by the high viscosity of the medium. From the conductance data and the transport measurements of various cations (222) it can be concluded that methanesulphuric acid conducts by a proton transfer mechanism. It is evident from Fig. 33 that the successive transfer of proton along the hydrogen bonds results in effective movement of the $\text{H}_2^+\text{OSO}_2\text{CH}_3$ ion through the solution without the actual movement of the individual ions. Similar type of proton transfer mechanism has been proposed in sulphuric and selenic acids in order to explain the high conductance of various solutes in these media.

Molar conductance values for various solutes in methanesulphuric acid have been determined by using the relation $\lambda_m = 10^3K/m\Omega$, and this has been found to be $\lambda_m = 75$, for a fully ionised base. This value seems to be fairly high when we consider the viscosity of the solvent ($\eta = 10.52$). But it is not very high as the values for the characteristic anions in sulphuric and fluorosulphuric acids have been found to be 93 and 135 respectively (loc.cit.). However, this is still
FIG. 33 CHAIN CONDUCTION MECHANISM IN CH₃SO₃H.
quite high when compared with the anion of disulphuric acid (31). Furthermore, that the $H_2^+\text{OSO}_2\text{CH}_3$ ion has an abnormally high mobility is evident from the conductimetric acid-base titrations in methanesulphuric acid. Addition of a base ($\text{NaOSO}_2\text{CH}_3$) to an acid causes a marked decrease in the conductance of the solution as the highly mobile $H_2^+\text{OSO}_2\text{CH}_3$ ion is replaced by poorly conducting $\text{Na}^+$ ions.

In the curves, there is an initial convex to the concentration axis, which is due to the repression of the $\text{O}^-\text{SO}_2\text{CH}_3$ ions due to the self-ionisation of the solvent. However, at higher concentrations, the conductance of the solutes does not increase linearly with concentration. In fact the conductance curves, at higher concentrations become concave to the concentration axis which shows that the mobility of methanesulphonate ion decreases at higher concentrations and does so to different extent in case of different solutes. As in case of sulphuric and selenic acids, here also the difference in the conductances of various solutes cannot be simply due to the differences in the mobilities of the cations. It may be due to the solvation of the cations. Cations are solvated to different extent and the solvent molecules that are
involved in solvation, do not take part in the proton transfer
process with the same ease as the free solvent molecules,
therefore, the mobility of the methanesulphonate ion decreases
with increasing concentration of the solute.

WEAK ELECTROLYTES: Cryoscopic investigations by Newman
and coworkers (loc.cit.) show that all the solutes do not
produce a cryoscopic factor of 2. In the present conductimetric
studies, it has been observed that all the solutes do not
have the same conductance as sodium methanesulphonate. This
may be either due to incomplete proton transfer from the solvent
to the solute or due to the incomplete dissociation of the ions
formed by such proton transfer. Since the solutes which have
the same conductance as sodium methanesulphonate are supposed
to be completely ionised, therefore, the second reason for
low conductance values of some of the solutes does not hold
good. The conductance- composition curves for all such
solutes are also given in Fig. 32. These behave as weak
electrolytes in this solvent.

Acetic acid and benzoic acid, strong bases of sulphuric
acid and fluorosulphuric acid, behave as weak electrolytes in
methanesulphuric acid. It is interesting to note that monochloro acetic acid, m-nitrobenzoic and m-chlorobenzoic acids also behave as weak bases of this system. However, the extent of the ionisation is very much decreased. But dichloro- and trichloroacetic acids are not at all protonated. Water forms hydronium ions in fluorosulphuric acid, but in sulphuric acid this is not fully ionised due to the formation of ion pairs $\text{H}_3\text{O}^+.\text{HSO}_4^-$ and behaves as a weak base. In case of methanesulphuric acid also it behaves as a very weak base. This observation is in agreement with those of Gillespie and coworkers but contests those of Wasif and coworkers (loc.cit.), who have shown that water is fully ionised in selenic acid. Dimethyl sulfoxide, tetrahydrofuran, acetamide and dioxane also behave as weak electrolytes as their conductances are lower than those of fully ionised bases. Behaviour of some of the nitro group containing organic molecules has also been investigated in methanesulphuric acid. Nitromethane, nitrobenzene, m-dinitrobenzene and m-nitrotoluene, they all behave as weak electrolytes and their dissociation constants have been calculated according to the method described in case of fluorosulphuric acid. This is applicable here also as the
mobilities of $H_2^+OSO_2CH_3$ and $O^-SO_2CH_3$ are very much higher than those of other ions in this solvent. Therefore, the conductivity of solutions of acids and bases are determined almost entirely by the concentration of $H_2^+OSO_2CH_3$ and/or $O^-SO_2CH_3$ ions respectively. Therefore, the degree of dissociation of various weak electrolytes in methanesulphuric acid can be found out by comparing the concentration of sodium methanesulphonate needed to produce a given conductance with the concentration of any other electrolyte producing the same conductance. The dissociation constants for weak bases can be determined from $\alpha$. This method has been described in detail in fluorosulphuric acid section and has been successfully used in sulphuric and disulphuric acids also. In these studies, it has been assumed that the mobilities of the protonated bases are equal and that the unionised portion of the weak base has no effect on the conductance of the solution. The dissociation constants for various weak electrolytes are reported in Table XI.

In order to compare the relative acid strength of methanesulphuric acid with that of other protonic acids, the degree of ionisation of weak bases in other strong
### TABLE XI

Dissociation constants of various weak bases at 25°C

<table>
<thead>
<tr>
<th>Compound</th>
<th>$10^2K_b$ in CH₃SO₂H</th>
<th>$10^2K_b$ in H₂SO₄</th>
<th>$10^2K_b$ in HSO₂F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitromethane</td>
<td>very feebly ionised</td>
<td>0.25</td>
<td>2.70</td>
</tr>
<tr>
<td>Nitrobenzene</td>
<td>0.03</td>
<td>1.00</td>
<td>fully ionised</td>
</tr>
<tr>
<td>m-Dinitrobenzene</td>
<td>0.021</td>
<td>0.03</td>
<td>0.26</td>
</tr>
<tr>
<td>Monochloracetic acid</td>
<td>0.02</td>
<td>--</td>
<td>0.29</td>
</tr>
<tr>
<td>Acetic acid</td>
<td>0.42</td>
<td>fully ionised</td>
<td>fully ionised</td>
</tr>
<tr>
<td>Dimethyl sulfoxide</td>
<td>0.49</td>
<td>fully ionised</td>
<td>fully ionised</td>
</tr>
</tbody>
</table>
protonic acids has also been included. It is noteworthy that methanesulphuric acid is a weaker acid than sulphuric acid which finds support from the already established facts. The order of the dissociation of various bases is not the same in indifferent solvents. This may be attributed to certain intrinsic properties of the solvent. From the dissociation constants of various bases the order of strength may be established as follows:

$$(\text{CH}_3)_{2}\text{SO} \succ \text{AcOH} \succ \text{C}_6\text{H}_5\text{NO}_2 \succ \text{C}_6\text{H}_4(\text{NO}_2)_{2} \succ \text{CH}_2\text{ClCOOH}$$

Nitric acid is known to behave as a strong electrolyte in various strong acids and it has been shown to give rise to nitronium and hydronium ions.

$$\text{HNO}_3 + 2\text{H}_2\text{SeO}_4 \rightarrow \text{NO}_2^+ + \text{H}_3^+\text{O} + 2\text{HSeO}_4^-$$

These are formed as a result of dehydration and are quite stable in these solvents. However, when nitric acid is added to methanesulphuric acid, there is no substantial change in the conductance of the solution. In fact it behaves as a very weak electrolyte. There is no indication of its behaviour as represented by the above equation. It may be pointed out here that though selenic acid is almost
of the same strength as methanesulphuric acid and dehydrates
nitric acid to form nitronium ions, yet, it behaves as a
weak electrolyte in methanesulphuric acid indicating the
difference between the two acids. In case of butyl
alcohols in methanesulphuric acid, the solutions develop
some red colours but the conductance of the solution goes on
changing with time. The conductance of the solution is not
stable even after 24 hours. From the conductance data only,
it is very difficult to postulate any mechanism of the
reaction but dehydration of alcohol must have taken place
which is very slow process.

Triphenyl carbinol forms triphenyl carbonium ion in
highly acidic media. Cryoscopic investigations in
methanesulphuric acid also show the formation of triphenyl
carbonium ion. The conductance of the solutions is very high
when triphenylcarbinol is dissolved in methanesulphuric acid.
It does not change with time indicating that the reaction is
instantaneous. The conductance of the solution is less than
two $\text{SO}_2\text{CH}_3^-$ ions as required by the equation:

$$\text{(C}_6\text{H}_5)_3\text{COH} + 2\text{HOSO}_2\text{CH}_3 \rightarrow \text{(C}_6\text{H}_5)_3\text{C}^+ + \text{H}_3\text{O}^+ + 2\text{SO}_2\text{CH}_3^-$$

It may be partly due to the incomplete dehydration of the
solute and partly due to incomplete protonation of water.
Molar extinction coefficient for 410 nm peak supports the complete ionisation of triphenyl carbinol. The lower value of $\gamma$ is due to the behaviour of water as a weak electrolyte.

In order to determine the relative reactivity of methanesulphuric acid, behaviour of triphenyl chloromethane has been investigated in it. The solution develops brown colour but the conductance of the solution is quite low. The reaction may be visualised as:

$$\text{(C}_6\text{H}_5\text{)}_3\text{CCl} + \text{HO}_2\text{SO}_2\text{CH}_3 \rightarrow \text{(C}_6\text{H}_5\text{)}_3\text{C}^+ + \text{HCl} + \text{O}^-\text{SO}_2\text{CH}_3$$

U.V. spectrum of the solution shows the presence of triphenyl carbonium ion. From the molar extinction coefficient, it is evident that only 15-20% of triphenyl chloromethane is solvolysed in it. Hydrogen chloride gas is known to behave as a complex base in sulphuric acid as:

$$\text{HCl} + 2\text{H}_2\text{SO}_4 \rightarrow \text{HSO}_3\text{Cl} + \text{H}_3^+\text{O} + \text{HSO}_4^-$$

but in fluorosulphur acid it behaves as a non-electrolyte.

In methanesulphuric acid, which is not very strong proton donor and where sulphurtrioxide reactivity is quite low, it is not unreasonable to believe that it behaves as a non-electrolyte. From the above investigations, it may be
concluded that methanesulphuric acid is a weak proton donor and because of low sulphur trioxide reactivity, it has very poor dehydrating properties.

NON-ELECTROLYTES: When solutes like selenic acid, benzene sulphonic acid, p-toluene sulphonic acid, trichloro acetic acid and trifluoroacetic acid are added to methanesulphuric acid there is no change in the conductance of the solution. But in case of trinitrobenzene, trinitro toluene, m-nitrochloro benzene, sulphuryl chloride, thionyl chloride, disulphuryl difluoride, instead of any increase there is a slight decrease in the conductance of the solution. Such solutes are termed as non-electrolytes. A decrease in the conductance of the solution in case of non-electrolytes may be attributed to a decrease in the mobilities of the \( \text{H}_2^+\text{OSO}_2\text{CH}_3 \) and \( \text{O}^-\text{SO}_2\text{CH}_3 \) ions caused by the dissolution of the particular compound. It may also be due to the decrease in the extent of the autoprotolysis of the solvent. The decrease in the mobilities of the characteristic solvent ions may be due to strong hydrogen bond interaction between the solvent molecules and the solute, which would hinder the
orientation of the solvent molecules and hence decrease their effectiveness in the proton transfer mechanism. However, with a limited knowledge of the solution chemistry in this solvent, it is very difficult to assign any specific reason for the decrease in the conductance. A slight decrease in the conductance of the solution of some of organic compounds which behave as non-electrolytes has already been reported in sulphuric, fluorosulphuric and disulphuric acids.

In case of those non-electrolytes, which do not cause any substantial change in the conductance of the solution, it is believed that they are just sufficiently basic to form a weak hydrogen bond and go into solution without much effecting the extent of autoprotolysis. It may also be true that they are slightly ionised and a slight increase in the conductance of the solution is compensated by the decrease in the conductance of the solution caused by the unionised portion. However, cryoscopic investigation is a better tool for investigating the behaviour of these non-electrolytes, which is in progress in the laboratory. It seems quite strange that most of the solutes dissolve in methanesulphuric acid but still behave as non-electrolytes. It may be due to
the fact that these compounds are just sufficiently basic to form a hydrogen bond and thereby dissolve in it but not enough basic to be protonated.

**ACIDS OF THE SYSTEM METHANESULPHURIC ACID:** According to the solvent theory, the substances which increase the concentration of the methanesulphuric acidium ions \( (\text{H}_2^+\text{OSO}_2\text{CH}_3) \) will act as acids of the system. In order to ascertain whether a solute behaves as an acid or a base, sodium methanesulphonate (a strong base) is added to the solution of the solute in it, if there is a gradual increase in the conductance of the solution, the solute behaves as a base but if there is a gradual decrease in the conductance of the solution (due to the removal of \( \text{H}_2^+\text{OSO}_2\text{CH}_3 \) ion) then the solute behaves as an acid.

In an attempt to search for acids of solvo system, methanesulphuric acid, conductivities of some of the protonic acids have been studied. It is seen that disulphuric, fluorosulphuric, chlorosulphuric and sulphuric acids behave as acids of the system as when sodium methanesulphonate is added to their solutions, there is a slight decrease in the
con ductance of the solution. Difluorophosphoric acid which behaves as a weak base in sulphuric acid (loc. cit.) behaves as a weak acid of this system. Selenic acid behaves as a very weak base. Phosphoric acid forms ions of the type \( P(OH)^+ \) when dissolved in highly acidic media (loc. cit.). Potassium dihydrogen phosphate when dissolved in methanesulphuric acid increases the conductance of the solution. From the conductance data only, it has been very difficult to conclude that either the salt has been completely solvolysed and phosphoric acid so formed behaves as a non-electrolyte or there is a partial solvolysis of the salt and the incomplete protonation of phosphoric acid. The second reason seems to hold good as phosphoric acid may behave as a non-electrolyte. In Fig. 34, are given the conductance curves for various acids in methanesulphuric acid.

Since \( H_2^+OSO_2CH_3 \) and \( O^-SO_2CH_3 \) ions exclusively conduct by proton transfer mechanism, the conductance of the solutions in methanesulphuric acid can, to a reasonable approximation be assumed to be due only to \( H_2^+OSO_2CH_3 \) and \( O^-SO_2CH_3 \) respectively. Hence, the extent of ionisation of particular acid is given by its conductance.
FIG. 34 SP. COND. VALUES OF VARIOUS ACIDS IN METHANE-SULPHURIC ACID AT 25°C.
therefore, a measure of its relative acid strength. From the conductance of their solutions in methanesulphuric acid, the order of their strength may be formed as $\text{H}_2\text{S}_2\text{O}_7 > \text{HSO}_3\text{F} > \text{HSO}_3\text{Cl} > \text{H}_2\text{SO}_4 > \text{F}_2\text{O}_2\text{POH} > \text{H}_2\text{SeO}_4$. It is further noted that these solutes are the acid of this solvent because the conductance of their solution decreases when the solution of a strong base is added because of the neutralisation reaction.

$$\text{H}_2^+\text{SO}_2\text{CH}_3 + \text{O}^-\text{SO}_2\text{CH}_3 \rightarrow 2\text{HOSO}_2\text{CH}_3$$

Addition of the base causes the conductance of the solution to pass through a minima and then further increase. Acid-base titrations curves are given in Fig. 35. The present limited knowledge about the modes of the dissociation and the ionisation of the solvent, and the limited data on conductance does not permit to actually calculate the position of the minimum in these acid-base titrations. However, from the shapes and the position of the minima in the experimental conductance-composition curves, the relative strength of various acids has been compared. The position of these breaks in the conductance-composition curves supports the conductance data. In case of disulphuric and
FIG. 35 CONDUCTOMETRIC TITRATIONS BETWEEN PROTONIC ACID AND SODIUM METHANE SULPHONATE IN METHANE-SULPHURIC ACID.

- $\text{H}_2\text{SO}_4$
- $\text{HSO}_3\text{F}$
fluorosulphuric acids only, sharp breaks in the conductance-composition curves are obtained suggesting that they are strong acids of the system.

In case of highly acidic solvents like fluorosulphuric and disulphuric acids it is very difficult to find an acid of the system. Antimony pentafluoride and arsenic pentafluoride have been shown to behave as weak acids of fluorosulphuric acid solvent system (67,68). Similarly boron trichloride has been found to be a very strong acid of solvo system chlorosulphuric acid (96). The reaction may be represented as:

$$\text{BCl}_3 + 5\text{HSO}_3\text{Cl} \rightarrow \text{B(HSO}_3\text{Cl}_4^- + \text{H}_2\text{SO}_3\text{Cl} + 3\text{HCl}$$

Therefore, the behaviour of various Lewis acids in methanesulphuric acid has been investigated in order to find a very strong acid of the solvent system methanesulphuric acid.

Antimony pentachloride and tetrachlorides of tin and titanium form solids when mixed with methanesulphuric acid, but these slowly dissolve to form clear solutions. However, after a molality of 0.1, the precipitate so formed does not dissolve and the conductance measurements had to be abandoned.
It is seen from the figure that they form low conducting solutions. That these solutions behave as acids is evident because when a strong base of the system is added, there is a continuous decrease in the conductance of the system. However, acid-base reactions could not be carried out because of very low concentrations of these acids in the solution. From the conductance data only, it is very difficult to determine the nature of the ions present in these solutions. Antimony pentafluoride dissolves readily in methanesulphuric acid without evolution of any gas and forms highly conducting solutions (Fig. 36). The conductance of the solution continues to increase with concentration of antimony pentafluoride. Since the conductance of the solution should decrease with the addition of a base, therefore, it may be safely concluded that antimony pentafluoride acts as an acid of the system. Moreover, as the conductance of the solution is a measure of $H_2^+OSO_2CH_3$ and $O^-SO_2CH_3$ ions, therefore, from the figure, it may be concluded that antimony pentafluoride is the strongest of all the acids. Because of very low reactivity of this medium, no gas is evolved when antimony pentafluoride is dissolved in methanesulphuric acid,
FIG. 36 SP. CONDUCTANCE OF LEWIS ACIDS IN METHANE-SULPHURIC ACID.
it goes into solution without undergoing any solvolytic reaction.

\[ \text{SbF}_5 + 2\text{HSO}_2\text{CH}_3 \rightarrow \text{H}_2\text{SO}_2\text{CH}^+ + \text{SbF}_5\text{OSO}_2\text{CH}_3^- \]

By analogy with the behaviour of antimony pentafluoride in fluorosulphuric acid (loc.cit.), the possible ions in this solvent may be postulated as above. From F-n.m.r. studies the structure of \( \text{SbF}_5\cdot\text{OSO}_2\text{F}^- \) has also been proposed. Here also a similar structure could be assigned to \( \text{(SbF}_5\cdot\text{OSO}_2\text{CH}_3^-) \) ions where antimony acquires a hexa coordination i.e.

\[
\begin{array}{c}
F \\
\text{Sb} \\
F \\
\text{OSO}_2\text{CH}_3 \\
F \\
F
\end{array}
\]

In order to further understand the nature of the solutions of antimony pentafluoride in methanesulphuric acid, acid-base titrations between antimony pentafluoride and strong and weak bases have been carried out. It is seen from the Fig. 37 that in case of pyridine and triethylamine, the curves are very sharp and the breaks in the conductance-composition curve is at the molar ratio \( \text{B/SbF}_5 \) of 1:1, suggesting that antimony pentafluoride behaves as a strong base of the system. But
FIG. 37 CONDUCTOMETRIC TITRATION BETWEEN SbF$_5$ AND BASES IN METHANE-SULPHURIC ACID AT 25°C.
in case of the weak bases such as acetic acid, dimethyl sulfoxide and tetrahydrofuran, the break in the conductance-composition curve is observed at the different molar ratios (depending upon the strength of the base). The titration curves confirm the behaviour of weak bases. The overall reaction may be postulated as:

\[
BH^+ + O^–S\text{O}_2\text{CH}_3 + H_2^+O^\text{SO}_2\text{CH}_3 + (\text{SbF}_5\text{OSO}_2\text{CH}_3)^– \rightarrow BH^+ + (\text{SbF}_5\text{OSO}_2\text{CH}_3)^– + 2H\text{SO}_2\text{CH}_3
\]

Since \(BH^+\) and \((\text{SbF}_5\text{OSO}_2\text{CH}_3)^–\) ions are not the specific ions of the autoionisation of the solvent, therefore, the conductance of the solutions at the end point is very near to that of the pure solvent. No compound separated out during the course of these titrations. No attempt has been made to isolate any compound.

From all these investigations it may be concluded that like other strong protonic acids, methanesulphuric acid is a highly self-ionised solvent. Most of the compounds behave as bases in it whereas strong protonic acids and Lewis acids behave as acids of the system.