and the bridge separating the two compartments
further improvements should be possible. The
other advantages of the heterogeneous cells are:
(i) the dark compartment need only be formally
dark; it need not be protected from light since
there is no photoactive material therein; (ii) whereas
the homogeneous cell does not permit use of higher
[Fe(II)[Fe(III) ratios than the one chosen in the above
experiments (Table 1), at higher Fe(II) concentra-
tion the open circuit cell voltage itself decreases,
there is no limitation on the composition of the
dark compartment; and (iii) with the heterogeneous
cell it should also be possible to store the light energy
in the form of chemical free energy and then release
it by discharging through an external load.

We are grateful to Dr K. N. Rao of this Division
for helpful discussion and comments.

References
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Effect of Temperature & Concentration on
Dissolution Potentials of Sodium Chloride,
Bromide & Iodide
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Dissolution potential and diffusion potential of NaCl, NaBr and NaI have been measured at different
temperatures and at different concentrations at 25'.
True dissolution potential decreases and diffusion potential increases linearly with increasing tem-
perature. The concentration dependence of diffusion potential has been discussed on the basis of Planck
equation and an empirical relation for the variation of true dissolution potential with concentration is
given.

Despite a good amount of experimental data
on the dissolution potential of electrolytes, there is still no generalized mechanism for the
origin of such an effect because of the complexity of
the phenomenon. Recently the sign and magnitude
of dissolution potential have been explained on the basis of the formation of electrical double
layer at the solid/liquid interface. The dissolution
potential has also been found to be influenced
by the temperature of solvent and the concentration
of the dissolved electrolyte. The purpose of
the present study is to explain quantitatively the temperature and concentration dependence of true
dissolution potential and diffusion potential of sodium halides.

Analytical reagent grade chemicals were used.
All the measurements were made in deionized water
prepared by using Elgastat B105 deionizer. As
reported earlier, the main contributions towards
the observed dissolution potential are (i) true dis-
solution potential and (ii) diffusion potential that
develops due to the formation of concentration
gradient when electrode loaded with wet crystals
is dipped into the cell. In order to find out the
contribution of the diffusion potential to the over-
al observed dissolution potential it was also
measured separately. The details of the experimen-
tal technique for measuring the observed dis-
solution potential and the diffusion potential have
already been described. The potentials were meas-
ured within an accuracy of ±2 mV with respect
to the clean platinum electrode dipping in the cell.
The desired temperature was controlled with an
accuracy of ±0.1°C. The concentration dependence
was studied at 25 ± 0.1°C by measuring the potential
in electrolytic solutions of different concentrations.

The potentials measured at different concentra-
tions are given in Table 1 and their variation with
temperature is shown in Figs. 1 and 2.

For the same electrolyte solutions at two different
concentrations (C₁ and C₂) the diffusion potential is
given by Planck equation:

\[
\text{Diff. pot.} = \frac{RT}{F} \left( \frac{u_+ - u_-}{u_+ + u_-} \right) \ln \frac{C_1}{C_2} \quad \ldots(1)
\]

where \( u_+ \) and \( u_- \) are the ionic mobilities. At a
particular temperature, the concentration \( C_1 \) of
the saturated diffusing solution is constant which
is the condition of our experimental measurement
of diffusion potential, Eq. (1) reduces to

\[
\text{Diff. pot.} = A - B \ln C_2 \quad \ldots(2)
\]

<table>
<thead>
<tr>
<th>Concentration (g eq/lit)</th>
<th>Sodium chloride</th>
<th>Sodium bromide</th>
<th>Sodium iodide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Obs. dissol. pot. (mV)</td>
<td>Diff. pot. (mV)</td>
<td>True dissol. pot. (mV)</td>
</tr>
<tr>
<td>0.0000</td>
<td>-120</td>
<td>-40</td>
<td>-80</td>
</tr>
<tr>
<td>0.0001</td>
<td>-110</td>
<td>-38</td>
<td>-72</td>
</tr>
<tr>
<td>0.001</td>
<td>-92</td>
<td>-36</td>
<td>-56</td>
</tr>
<tr>
<td>0.005</td>
<td>-82</td>
<td>-34</td>
<td>-48</td>
</tr>
<tr>
<td>0.01</td>
<td>-74</td>
<td>-30</td>
<td>-44</td>
</tr>
<tr>
<td>0.05</td>
<td>-64</td>
<td>-22</td>
<td>-42</td>
</tr>
<tr>
<td>1</td>
<td>-60</td>
<td>-20</td>
<td>-40</td>
</tr>
<tr>
<td>2</td>
<td>-50</td>
<td>-14</td>
<td>-36</td>
</tr>
</tbody>
</table>
not decrease exponentially with concentration (Fig. 3) but the data fit the following empirical relations:

\[
\text{(True dissoln pot.)}_{\text{NaCl}} = 3e^{46C} - 40C + 44 \\
\text{(True dissoln pot.)}_{\text{NaBr}} = 22e^{127C} - 40C + 142 \\
\text{(True dissoln pot.)}_{\text{NaI}} = 104e^{3326C} - 18C + 164
\]

It can be seen from Figs. 1 and 2 that true dissolution potential decreases and the diffusion potential increases linearly with increasing temperature. The linearity of diffusion potential is in accordance with Eq. (1)

One of us (R.P.M.) is thankful to the CSIR, New Delhi, for the award of a JRF.

References

\[\text{pH Effect on Acridine Orange Dye}\]

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The basic and the acid forms of acridine orange dye interchange in the pH range 10.0-11.5 yielding an equilibrium constant \((3.19 \pm 0.21) \times 10^4 \text{ mole}^{-1} \text{ litre} \) at 25°. The dye base is very unstable, and unlike methylene blue, it undergoes no demethylation in basic environment.

**Detailed** physico-chemical properties of acridine orange dye have been presented recently. It has been reported that in a close pH range 10.0-11.5 the basic and acid forms of the dye undergo a remarkable visible spectral interchange through a sharp isosbestic point at 445 nm. Although physico-chemical properties of dyes in acidic and basic environments reveal interesting features, such a conspicuous acid-base conversion phenomenon together with some other effects of pH are reported. No systematic study of acridine orange dye (AO) at higher pH was made in the past.

The equilibrium constant of the acid-base conversion (represented by Eq. 1) process has been

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