

EXPERIMENT 21: ELECTRICAL CONDUCTIVITY OF COMPOUNDS

Equipment: 2 electrodes, 110V circuit, bulb, 150mL beaker
Materials: distilled water, 100g NaOH_(aq), 100g NaCl_(aq), 100g Cu₂SO₄

In our electrolysis of water experiment we learned that Na₂SO₄ was added to make a conductor of electricity. Yet many people have been electrocuted by water coming in contact with electrical circuits. This apparent discrepancy will be clarified in this experiment.

Conductivity Results

ACIDS	GOOD	POOR	NONE
0.5M HCl			
0.5M HNO ₃			
0.5M H ₂ SO ₄			
0.5M HC ₂ H ₃ O ₂			
100% "			
SALTS	GOOD	POOR	NONE
NaCl _(s)			
5% NaCl			
CuSO _{4(aq)}			
5% CuSO ₄			
BASES	GOOD	POOR	NONE
NaOH _(aq)			
3M NaOH			
Sat'd Ca(OH) ₂			
Conc. NH ₃			
3M NH ₃			
OTHERS	GOOD	POOR	NONE
distilled water			
5% sugar			
5% alcohol			

- Connect two electrodes with a 110 volt circuit. Have an electric lamp connected in series with the electrodes. The lamp will not light unless the gap in the circuit is completed by a conductor of some kind. Test the conductivity of 2-3mL of distilled water. Record the result in the table below.
- Test the conductivity of each of the compounds indicated in the table below. Record the results of each test as indicated by the glowing of the lamp. Place a check in the proper column opposite each compound tested.

CONCLUSIONS

Examine the data in the table and use the information to complete the following statements:

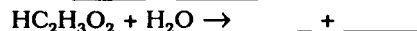
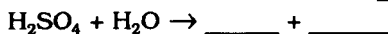
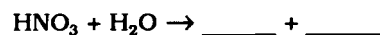
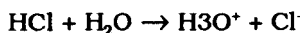
- Compounds that conduct electricity when

dissolved in water are called those that do not conduct are called

- Three types of compounds that are electrolytes are,, and
- Strong acids are conductors than weak acids; strong bases are conductors than weak bases.
- Electricity will flow through a solution if electrically charged atoms or groups of atoms called ions are present. Solid salts and bases are composed of ions which are not to move. When water is added the bonds between the ions weakened, freeing the ions so that they may conduct the electric current. Using the dissociation equation for CaCl₂ given below as an illustration, write dissociation equations for the following salts and bases:



- How do the ionic charges compare with their (valence) oxidation states given in the reference tables?
- Acids are covalent compounds and therefore contain no ions. However, water will react with acid molecules to form hydronium ions (H₃O⁺) and negative ions. Using the illustration for HCl + H₂O given below as an illustration, write ionization equations for the following acids:



- Using the above equations as a guide, write an equation to explain the fact that NH₃ (aq) is basic (OH⁻ ions are present) and the solution conducts electricity.
- The electric current is conducted in solutions by electrically charged atoms or groups of atoms called All acids in aqueous solution contain ions while aqueous bases contain ions.
- Differentiate between ionization and dissociation.
- Why does 100% acetic show no electrical conductivity?
- Why do the solid salts show no electricity conductivity?
- If time permits, test the conductivity of distilled water with the apparatus using a neon or argon bulb. How do you explain the results obtained?