Properties of ionic and covalent compounds

Aims

To investigate the conduction of electricity by a number of compounds in aqueous solution (dissolved in water). Some of these compounds are ionic and some are covalent.

Apparatus

Goggles
Bench mat
100cm^3 beaker
Stirring rod
Two carbon electrodes
Battery, bulb and wires
De-ionised water

Reagents to test:
- copper(II) sulphate
- ethanol solution
- magnesium sulphate
- potassium iodide
- sodium chloride
- sugar solution

Methods

1. Connect the battery, bulb and wires to the two carbon electrodes.
   Check that the everything works before carrying on.

2. Put two spatulas of potassium iodide in the beaker, and add about 15cm^3 of de-ionised water.
   Stir carefully to dissolve the potassium iodide.

3. Lower the carbon electrodes into the potassium iodide solution. Observe whether the bulb lights. Also check for the production (evolution) of gas (make a note of which electrode), or any colour change. Carefully note down your observations in a suitable table (suggested headings below).

4. Carefully rinse out the beaker and electrodes.
   Repeat steps 2 and 3 with each of the remaining substances (the ethanol and sugar are already in aqueous solution, and can be used without diluting). Try de-ionised water or tap water on their own.

Results

Record your results in a suitable table, such as the one below.

Substance	Does the solution conduct electricity?	Observations (e.g. ease of dissolving, gas production, colour change)	Ionic or covalent?
Potassium iodide solution			

Analysis and Evaluation

1. What do your results show?

2. Why is gas evolved by some solutions (showing that they conduct electricity) but the bulb does not light?

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Technicians' notes

Per class:

250cm^3 of approximately 5% ethanol in distilled water (**care: harmful)**
Label it "Ethanol solution: Harmful ☒"

250cm^3 of approximately 1% sugar solution
Label it "Sugar solution: Harmful ☒"

sodium chloride
magnesium sulphate
potassium iodide
copper(II) sulphate
de-ionised water (wash bottles etc.)
4 x spatulas

Per pair:

2 x goggles
1 x bench mat
1 x 100cm^3 beaker
1 x stirring rod
1 x pair of carbon rods in bung
1 x battery, bulb and two wires