

# Learning Activity 2

An Inquiry Based Science Teaching and Learning Framework

Discover  
SENSORS

## Topic/Learning Activity

### Investigating conductivity – ionic and covalent substances. OC 44

#### Stimulus to Engage:

Would you dry your hair in the bathroom with a hairdryer? If not, why?  
Why are there no plug sockets and light switches in the bathroom?

#### Student Cohort:

##### Student Level

Group of 3rd years mixed ability

##### Prior Knowledge

- electrical conductivity, bonding

#### Science Questions:

- Do all substances conduct electricity?
- Can you name any substance that conducts electricity?
- Can you name any substance that does not conduct electricity?
- Can you name two types of bonding and name substances for each type?
- In which type of bonding do the substances conduct electricity?
- How can we show that these substances do or do not conduct electricity?



#### Learning Outcomes:

##### Content Knowledge

- Identify a substance which has ionic bonding
- Identify a substance which has covalent bonding
- Understand that ionic substances conduct electricity and covalent substances do not.

##### Process

- Using a conductivity probe in various solutions with the data logger. Use appropriate software to show the results in the form of a bar chart or graph

##### Skills

- How to make a conductivity measurements using a conductivity sensor and data logger
- Working in groups as a team
- Identify a fair comparison
- Identify the fixed variables
- Identify the variable which changes
- Identify sources of error



## Questions during Activity:

*Drive student learning (directing them to the learning outcomes) and to probe Understanding*

- Taking a substance which has covalent bonding e.g. sugar, predict what will happen to the electrical conductivity when it is added to water.
- Taking a substance which has ionic bonding e.g. salt predict what will happen to the electrical conductivity when it is added to water.
- Describe what is on each axis, what is on the x-axis, what is on the y-axis of the graphs/charts obtained.
- What are the units for each axis
- How does your prediction compare with what actually happens?
- Is it a fair comparison?
- Relate to everyday examples, does electricity flow through tap water?
- Does pure water conduct electricity?



## Developing the Activity:

*How do you stimulate students to ask even more questions and think further*

- Deeper questioning

*Possible supporting Activities*

- Investigate how much the conductivity is affected by adding more of the ionic/covalent substance. An exemplar for this activity can be found when you log into [www.discoverensors.ie](http://www.discoverensors.ie) under Useful Downloads
- Other variations of this investigation: comparison of conductivity of different types of water – tap water, sea water, well water, deionised water.
- What other household substances could we use?
- Explore other ionic / covalent bonded substances?
- Does not explain the bonding but would be good to explore the concept of ions in water and the concept of deionised water and how the ions effect the properties of water.
- Investigate if conductivity is effected by temperature.

*Questions for supporting activities*

- Looking at the different types of water, predict whether they will conduct electricity.
- What is causing the conduction of electricity?
- What ions do they think are in the water and how do the ions get there?
- How does temperature effect the conductivity?
- What happens to the solution when it is heated ?

## Developing the Activity:

*Reflecting Back to Learning Outcomes*

- Do we have a better understanding of the conductivity of electricity with regard to ionic bonded substances, with regard to covalent bonded substances?
- Do we have a better understanding of reading/predicting data?
- Do we have a better understanding of the concept of ions?

## Additional Resources:

*Stimulus materials, websites, etc.*

[http://en.wikipedia.org/wiki/Covalent\\_bond](http://en.wikipedia.org/wiki/Covalent_bond)

<http://dspace.dial.pipex.com/town/parade/rbd41/rb.htm>

[http://en.wikipedia.org/wiki/Ionic\\_bond](http://en.wikipedia.org/wiki/Ionic_bond)

[http://www.scasd.org/24971251595610/lib/24971251595610/CHM1-6.1\\_Types\\_of\\_Bonding.pdf](http://www.scasd.org/24971251595610/lib/24971251595610/CHM1-6.1_Types_of_Bonding.pdf)



## How has the use of ICT enhanced the learning?

*Evidence of enhancement*

The sensor technology gives a very accurate measurement of the level of conductivity. This would be very difficult to measure using the traditional method of a light bulb circuit.

The software facilitates the data to be shown as a bar chart to allow for easy comparison of results.

The student can draw a prediction of how they think the conductivity will be affected by the addition of the salt/ sugar to the water. They can then observe how their prediction compares to the actual. This will stimulate discussion, 'what if' type questions, and 'why is this happening' type questions.