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**Polymers - Insulators**

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**Acknowledgement**

Mr John Gibson is a highly regarded educator and engineer. John taught Industrial Arts at a number of high schools before taking a position at Sydney Teachers’ College, then University of Sydney. He had an engineering education consultancy and has extensive experiencing working with NESA on Engineering Studies syllabus development and the HSC examination committee. The STEM Industry School Partnerships (SISP) Program asked John for his responses to the iTeachSTEM topic discussion questions. SISP is grateful to John for submitting these example discussion responses.

# Describe the features of some polymers that make them suitable for insulation.

* They are structured atomically with covalent bonds that are resistive to electron flow.
* The polymer should be a good electrical resistance.
* High current wiring can develop significant heat, making it necessary to have good thermal properties in the insulator.

1. **Explain several functions of polymer insulation.**
* Polymer insulation is designed to resist electrical flow between the insulation and the wire in the circuit.
* Polymer insulation is designed to repel moisture which can aid the breakdown in the wire.
* Polymer insulation has a degree of flexibility to allow movement of cables.
1. **Discuss the process of coating copper wire with insulation.**

This is carried out using an injection moulding machine where the insulating material (polymer) is fed into the moulding machine and out a die the diameter of the cooled polymer. At the same time, a suitable electrical wire is fed into the centre of the die, thus coating the wire. The wire cools, and when the insulation cools, the combination is wound on spools.

1. **What might be the property difference between the outside cable coating and the inside copper strands?**

There can be a strength, ductility, composition, thermal, chemical and, stability difference between the outside cable coating and the inside copper strands