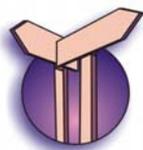


# Should we do more to save Cultural Monuments from Corrosion ?



## Student Activities

### The Scenario

Many beautiful bronze sculptures exist and decorate many towns and villages especially in Eastern Europe. Bronze is a very good metal for creating sculptures, because it is not as soft as copper, nor as hard as iron. Intricate artwork can be developed both by carving and the use of light and dark, the dark being the oxide of copper (copper(II) oxide is black).

Many excellent bronze sculptures can be seen in St. Petersburg, a city of 4 million people and a major trading centre in North-East Europe. St. Petersburg has a strong cultural history and the city's sculptures are a reminder of its grandeur in past ages.

But problems occur with bronze sculptures which are exposed to the atmosphere. These problems are very prevalent in St. Petersburg. The sculptures are pitted with small holes, particularly near the bottom. You can also notice that many sculptures are covered in an uneven green/white film hiding the original bronze colour and much of the intricate artwork.

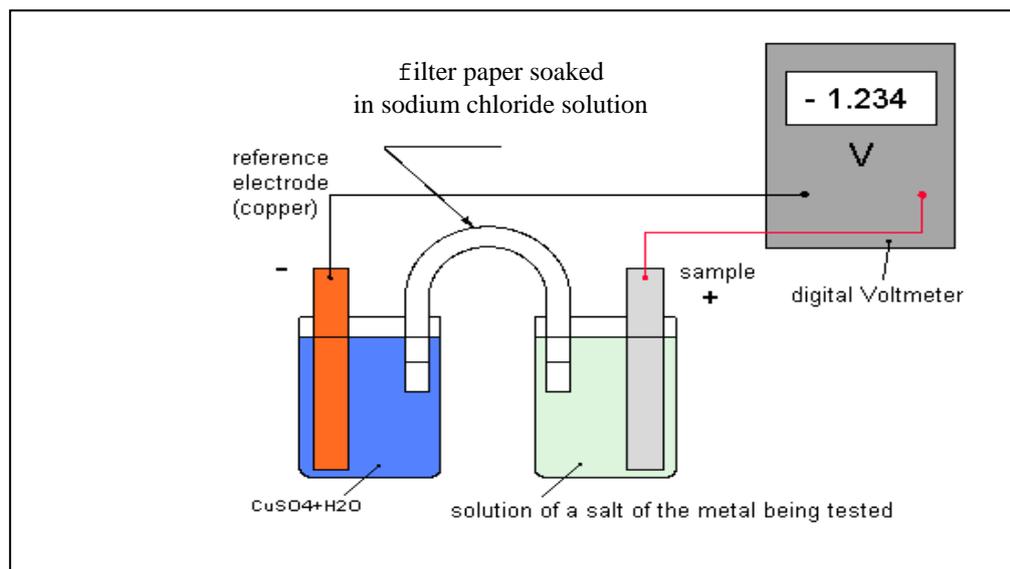


## Your Tasks

In groups of 3-4,

1. Brainstorm the possible reasons for sculptures showing signs of decay. Make a list of the reasons that seem feasible.
2. Discuss how this situation can be investigated in the laboratory and possible solutions illustrated. Develop a plan of action of reach investigation and suggest the laboratory equipment you will need.

3. When the teacher has approved your plans, carry out experiments to investigate the effects of (a) iron and (b) acid on copper (bronze).
4. Undertake similar experiments using other metals (these will be suggested by your teacher)
5. Interpret the results of the experiments and from this deduce a sequence for the relative reactivity of the various metals.
6. Consider possible solutions to the problem of decaying monuments. Record your solution(s).
- 7.. Undertake a presentation of the results and your solution for decaying monuments.
8. Answer the following questions:
  - \* What changes of the environment are the most dangerous for metal monuments?
  - \* Why is the problem of the protection of monuments very important for everyone?
  - \* It has been suggested that carbon dioxide in the air is a major cause of corrosion of bronze sculptures. Do you agree and if so why?
9. Using a multimeter (or milliammeter or voltmeter) in an external circuit connected to two dissimilar metals, establish the effect when the two metals are in contact through an electrolyte (use filter paper soaked in saturated salt solution). Establish a series illustrating the reactivity of the metals. Compare this with your earlier series and try to establish the place of copper and hydrogen in the series.



10. Discuss the issue of whether more should be done to protect bronze sculptures and if so, what. Carefully record the reasons of the decision of the groups so that these can be considered against the reasons put forward by other groups.
11. As a class, try to reach a consensus view on whether we should be doing more to save cultural monuments from corrosion. Should we do more to save Cultural Monuments from corrosion ?