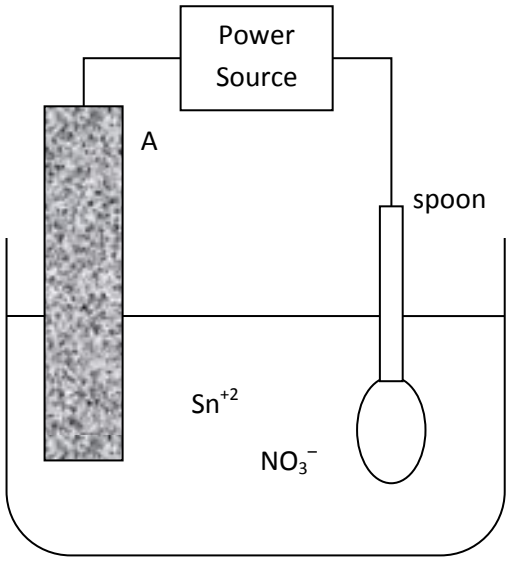
Friday Worksheet **Name: …….**

Electrolytic cells worksheet 9

1) An electroplating factory uses a solution of tin (II) nitrate $Sn(NO_3)_2$ and a block of pure tin metal to plate tin metal onto spoons made of steel. A simplified diagram of such an electroplating cell is shown below.



a) What is the polarity of the electrode the spoon is attached to and give the equation to the half reaction taking place there?

b) If the total surface area of the spoon is 18.0 cm^2 and a coating that has a thickness of 0.130 mm is required, calculate the mass of tin metal, in cubic centimetres, that must be deposited onto the spoon if the density of tin is 7.31 g/cm^3

c) What material should electrode "A" be made from?

d) How does the $[Sn^{2+}]$ change over time? Explain using oxidation and reduction reactions.

e) Determine the time, in seconds, for which the electroplating cell must operate to deposit the required layer of silver onto the spoon at a current of 4.50 amps and a voltage of 3.00V.