

ELECTROPLATING

5.1.1

One of the methods used to prevent iron or steel from rusting is to electroplate it with another metal, such as tin. Complete the following.

The anode is made of

The cathode is made of

The electrolyte is a solution of

[3]

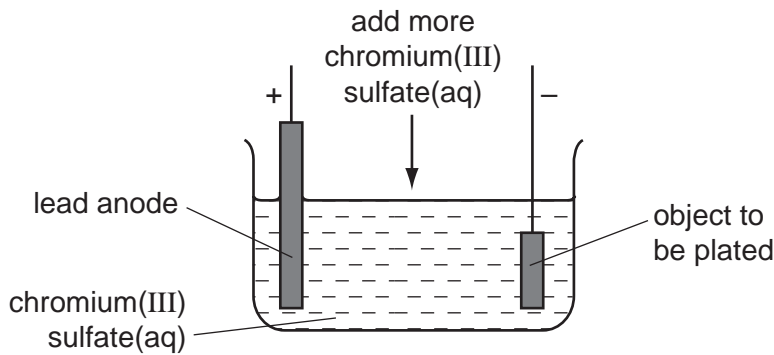
-----Marking Scheme-----

anode	tin	NOT impure time	[1]
cathode	iron or steel		[1]
tin salt	or tin ions as electrolyte		[1]
NOT oxide or hydroxide or carbonate			

5.1.2

Chromium is a transition element.

Chromium is used to electroplate steel objects. The diagram shows how this could be done



(i) Give **two** reasons why steel objects are plated with chromium.

.....
..... [2]

(ii) The formula of the chromium(III) ion is Cr^{3+} and of the sulfate ion is SO_4^{2-} . Give the formula of chromium(III) sulfate.

..... [1]

(iii) Write the equation for the reaction at the negative electrode (cathode).

..... [2]

(iv) A colourless gas, which relights a glowing splint, is formed at the positive electrode (anode). Name this gas.

.....
.....
..... [1]

(v) During electrolysis, it is necessary to add more chromium(III) sulfate but during copper-plating using a copper anode, it is not necessary to add more copper(II) sulfate. Explain.

.....
.....

-----**Marking Scheme**-----

- (i) appearance/shiny/more attractive/decoration
resist corrosion / rusting
hard surface
any **TWO** [2]
NOT becomes harder / stronger
- (ii) $\text{Cr}_2(\text{SO}_4)_3$ [1]
ignore correct charges on ions
- (iii) $\text{Cr}^{3+} + 3\text{e} \rightarrow \text{Cr}$ [2]
 Cr^{3+} to Cr only [1]
ignore comments about sulfate ion
- (iv) oxygen / O_2 [1]
- (v) to replace chromium ions (used to plate steel) [1]
/ chromium sulfate used up
- copper ions replaced from copper anode [1]
/ solution of copper sulfate does not change
not just that anode is not made of chromium