## Questions are for both separate science and combined science students unless indicated in the question

|     | per is extracted from metal ores.  |   |
|-----|--|---|
| Cha | copyrite is a metal ore containing a compound with the formula CuFeS <sub>2</sub>            |   |
| (a) | CuFeS <sub>2</sub> reacts with oxygen to produce copper(II) sulfate and iron(II) sulfate.    |   |
|     | Complete the equation for this reaction.   |   |
|     | You should balance the equation.   |   |
|     | $CuFeS_2 + \underline{\hspace{1cm}} \rightarrow CuSO_4 + FeSO_4$                             |   |
| (b) | Calculate the percentage by mass of copper in CuFeS <sub>2</sub>                             |   |
|     | Relative atomic masses ( $A_r$ ): S = 32 Fe = 56 Cu = 63.5                                   |   |
|     | Percentage by mass =   | % |
| (c) | Describe a test to show the presence of copper(II) ions in a solution of copper(II) sulfate. |   |
|     | Give the result of the test. (chemistry only)  |   |
|     | Test   |   |
|     | Result   | _ |
|     |  |   |

(Total 9 marks)

(2)

(4)

|   | 2 |   |
|---|---|---|
| u | 4 | i |

This question is about water.

(a) Sewage is waste water.

Sewage contains organic matter.

| Describe how | sewage is | treated to | remove | organic | matter. |
|--------------|-----------|------------|--------|---------|---------|

Sea water and ground water are treated to make them potable.

The table below shows information about the composition and treatment of sea water and of ground water.

|  | Sea water  | Ground water   |
|--|--|--|
| Concentration of sodium ions and chloride ions before <b>Process 1</b> | Na <sup>+</sup> : 0.5 mol/dm <sup>3</sup><br>Cl <sup>-</sup> : 0.5 mol/dm <sup>3</sup> | Na+ : 0.001 mol/dm <sup>3</sup><br>Cl- : 0.001 mol/dm <sup>3</sup> |
| Process 1  | Reverse osmosis  | Filtration   |
| Concentration of sodium ions and chloride ions after <b>Process 1</b>  | X  | Na+ : 0.001 mol/dm <sup>3</sup><br>Cl- : 0.001 mol/dm <sup>3</sup> |
| Process 2  | Add ozone  | Expose to ultraviolet light  |

|     |  | d during <b>Process 1</b> .                 |                                      |
|-----|--|---|--------------------------------------|
|     | Which pair of concentra only) (HT only)        | ations could represent <b>X</b>             | in the table above? (chemistry       |
|     | Tick (✓) one box.                              |   |                                      |
|     | Na+ : 0.003 mol/dm³                            | Cl <sup>-</sup> : 0.003 mol/dm <sup>3</sup> |                                      |
|     | Na+ : 0.003 mol/dm³                            | Cl <sup>-</sup> : 0.5 mol/dm <sup>3</sup>   |                                      |
|     | Na⁺ : 0.5 mol/dm³                              | Cl <sup>-</sup> : 0.003 mol/dm <sup>3</sup> |                                      |
|     | Na+ : 0.5 mol/dm³                              | Cl <sup>-</sup> : 0.5 mol/dm <sup>3</sup>   |                                      |
|     | water in the table above                       | e are unchanged by <b>Pro</b> c             | cess 1.                              |
|     |  |   |                                      |
| (اد | Explain why the ground water is safe to drink. | water in the table above                    | requires <b>Process 2</b> before the |
| 1)  |  | l water in the table above                  | requires <b>Process 2</b> before the |
| 1)  |  | l water in the table above                  | requires <b>Process 2</b> before the |

| (e) | After treatment the ground water in the table above is sold by a company as pure water.                          |             |
|-----|--|-------------|
|     | The ground water in above table is not chemically pure because the water contains sodium ions and chloride ions. |             |
|     | Suggest what the company means by 'pure'.  |             |
|     |  | . (1)       |
| (f) | Chlorine is also used to treat some ground water.  | (1)         |
|     | Describe the test for chlorine gas.  |             |
|     | Give the result of the test.   |             |
|     | Test   | -           |
|     | Result   | -           |
|     | (Total 12  | (2)         |
|     | Test   | -<br>-<br>- |