

**All questions are for both separate science and combined science students**

**Q1.**

This question is about water.

(a) Sewage is waste water.

Sewage contains organic matter.

Describe how sewage is treated to remove organic matter.

---

---

---

---

---

---

---

---

(4)

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

- (b) Sea water is desalinated during **Process 1**.

Which pair of concentrations could represent **X** in the table above? (**HT only**)

Tick (✓) **one** box.

Na<sup>+</sup> : 0.003 mol/dm<sup>3</sup>

Cl<sup>-</sup> : 0.003 mol/dm<sup>3</sup>

☐

Na<sup>+</sup> : 0.003 mol/dm<sup>3</sup>

Cl<sup>-</sup> : 0.5 mol/dm<sup>3</sup>

☐

Na<sup>+</sup> : 0.5 mol/dm<sup>3</sup>

Cl<sup>-</sup> : 0.003 mol/dm<sup>3</sup>

☐

Na<sup>+</sup> : 0.5 mol/dm<sup>3</sup>

Cl<sup>-</sup> : 0.5 mol/dm<sup>3</sup>

☐

- (c) Explain why the concentrations of sodium ions and of chloride ions in the ground water in the table above are unchanged by **Process 1**. (1)

---

---

---

---

(2)

- (d) Explain why the ground water in the table above requires **Process 2** before the water is safe to drink.

---

---

---

---

(2)

- (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.

Describe the test for chlorine gas.

Give the result of the test.

Test \_\_\_\_\_

\_\_\_\_\_

Result \_\_\_\_\_

\_\_\_\_\_

(2)

(Total 12 marks)