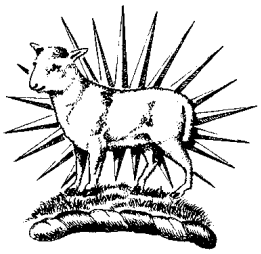
SURNAME _____ FIRST NAME _____ SCHOOL _____

Merchant Taylors' School



13+ Science Entrance Examination

Specimen Paper

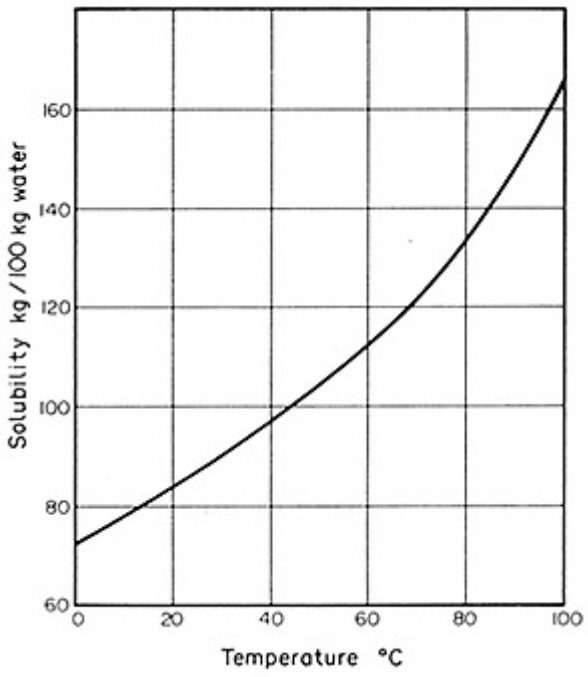
Chemistry Exam

Time Allowed: 20 minutes Total Marks: 25

Instructions:

1. **The Science paper is divided into three sections (Biology, Chemistry and Physics). The time for the Science paper is 1 hour. You should spend no more than 20 minutes on each section. You will be told when to start the next section.**
2. Write your surname, first name and school at the top of the page.
3. Attempt all the questions.

1. This question is about the solubility of potassium nitrate in water. The following graph shows how the solubility of potassium nitrate changes with temperature.



a) What is a saturated solution?

……...

(1)

b) Use the graph to estimate the solubility of potassium nitrate in water at a temperature of 40˚C.

……...

(1)

c) You are given a saturated solution of potassium nitrate in water at a temperature of exactly 20˚C. Your solution contains 100g of water. Use the graph to calculate the approximate mass of potassium nitrate that you would need to add to the solution if you wanted to make a saturated solution after heating your solution to 80˚C.

……..

…….....

……

(2)

(Total 4 marks)

2. a) Complete the following definitions:

i) An atom is

……

……

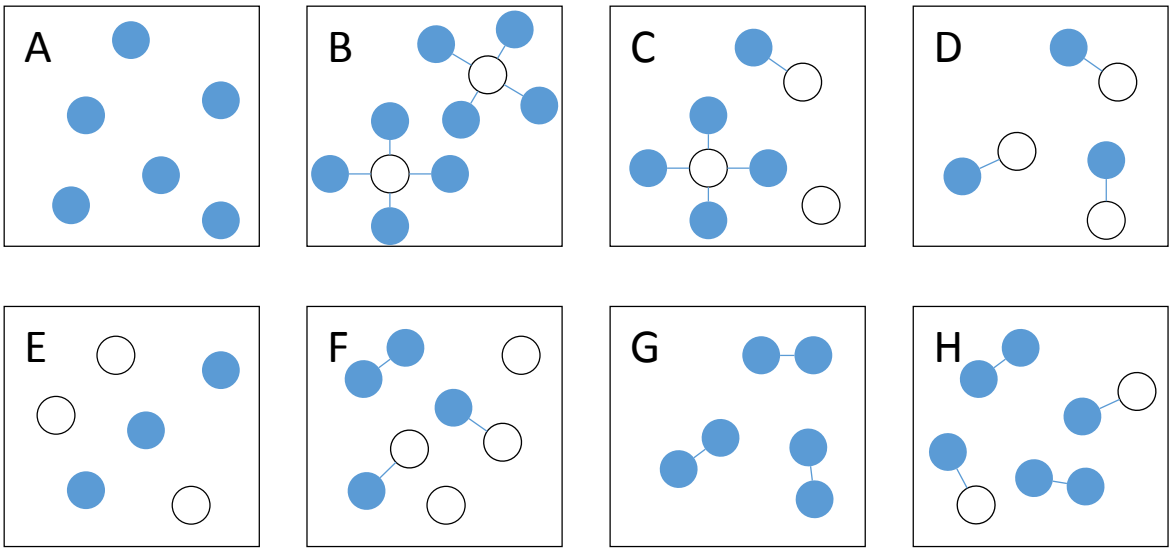
ii) A compound is

……

……

(3)

b) Look at the diagrams below. Each circle represents an atom; circles of the same colour are atoms of the same element. A line between two atoms represents a chemical bond.



i) Which diagrams represent pure substances (i.e. <u>not</u> mixtures)?

……

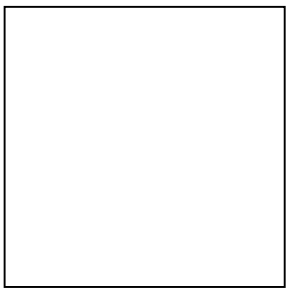
ii) Which diagram represents a mixture of one compound and two elements?

……

iii) Which diagram represents an element made from molecules?

……

iv) In the box below, draw a diagram to represent a mixture of two compounds.



(4)
(Total 7 marks)

3. a) **Draw** a neat diagram to show the apparatus you would use to obtain pure water from a sample of salty water. **Label** the different parts of the diagram, and show where the pure water would be collected.

(4)

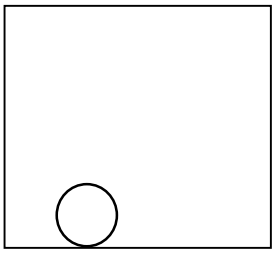
b) What is the name of this method of separation?

……

(1)
(Total 5 marks)

4. This question is about water and the changes in state it undergoes.

a) Using circles to represent water molecules, complete the diagram to show how the molecules are **arranged** in water at 20^{o}C



(2)

b) Describe the **movement** of molecules in water at -20^{o}C

……....

(1)

c) Ice floats on water. What does this tell us about the arrangement of molecules in ice at 0^{o}C compared with water at 0^{o}C?

.....

(1)

d) State the main difference, and the main similarity, between evaporation and boiling.

Difference:

…….....

…….....

Similarity:

…….....

…….....

(2)

e) White anhydrous copper sulphate is placed on a watch glass in the laboratory. Explain why it slowly turns blue.

.....

(1)

f) Describe a test, and its positive result, to show that water is pure.

.....

.....

.....

(2)

(Total 9 marks)

END OF CHEMISTRY QUESTIONS

25 MARKS AVAILABLE FOR THIS SECTION