SURNAME ..... FIRST NAME .....

JUNIOR SCHOOL ..... SENIOR SCHOOL .....

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

SCIENCE

CHEMISTRY

Tuesday 25 January 2011

Please read this information before the examination starts.

- This examination is 40 minutes long.
- The answers should be written on the question paper.
- Answer **all** the questions.
- Calculators may be required.

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1. Underline the option which best completes each of the following:

(a) The colours in a sample of ink could be separated by

chromatography **distillation**

filtration **fractional distillation**

(b) Petrol can be separated from crude oil by

chromatography **distillation**

filtration **fractional distillation**

(c) A non-metal which conducts electricity could be

calcium **carbon** **magnesium** **sulphur**

(d) The change of state which describes an ice cube changing to water is

condensing **evaporating** **freezing** **melting**

(e) The change of state which describes a puddle of water disappearing on a sunny day is

condensing **evaporating** **freezing** **melting**

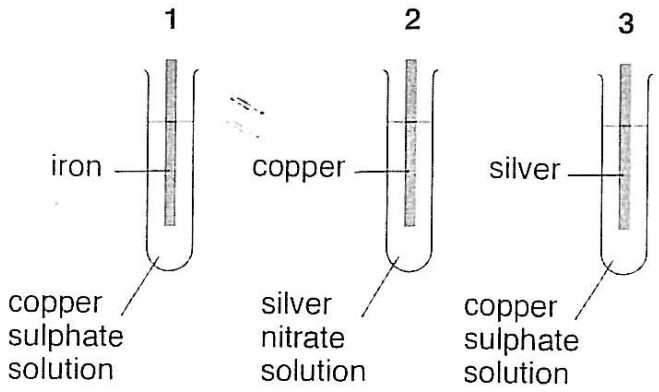
(5)

2. Draw four lines to match the following descriptions with the correct gas.

description	**gas**
most common in the Earth's atmosphere	oxygen
not present in the Earth's atmosphere	nitrogen
relights a glowing splint	hydrogen
we breathe out more than we breathe in	carbon dioxide

(3)

3. The following test tubes were set up:



test tube	observations
1	iron turned pink brown; the blue solution lost its colour
2	silvery crystals formed on the copper; the solution became light blue
3	

(a) Complete the word equation for the reaction in the first test tube.

iron+ copper sulphate → .....+ ..... (2)

(b) Put the three metals in order of reactivity *(most reactive first)*.

..... (1)

(c) Predict and explain what you would see happen, if anything, in test tube **3**.

.....

..... (2)

(d) Pieces of iron, copper and silver were placed in hydrochloric acid.
Only one of the metals reacted.

(i) Which metal reacted?

..... (1)

(ii) Describe what you would see when this metal reacted with hydrochloric acid.

..... (1)

4. Calamine lotion is a suspension of small particles of a solid in a liquid.



(a) Draw a labelled diagram of the apparatus you could use to separate the liquid from the particles of solid.

(3)

(b) One of the solids in calamine lotion is a compound containing zinc.

When dilute hydrochloric acid is added to some of this, it fizzes and produces a gas.

(i) How could you show that this gas is carbon dioxide?

test: .....

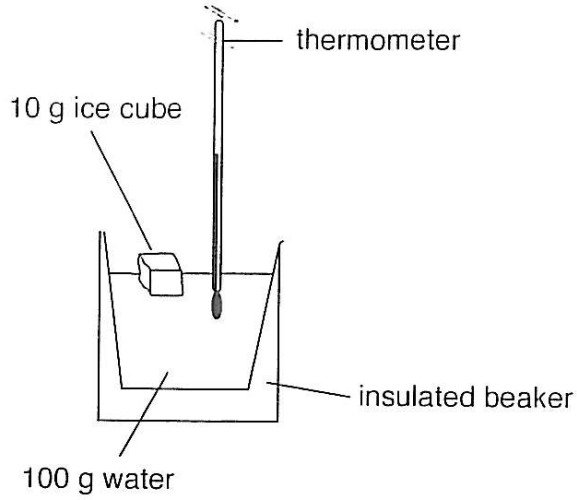
result: ..... (2)

(ii) Name the zinc compound present in calamine.

..... (1)

5. An ice cube at 0 °C and weighing 10 g was added to 100 g of water at 20 °C in the apparatus shown below.

The beaker was well insulated to stop heat being lost or gained from the surroundings.



The ice cube floated on top of the water and after a few minutes it had melted.

(a) Describe the arrangement of water molecules in

liquid water: .....

.....

ice: .....

..... (2)

(b) (i) What can you say about the density of ice compared to liquid water?

..... (1)

(ii) Suggest an explanation for your answer in terms of the arrangement of water molecules in ice and in liquid water.

.....

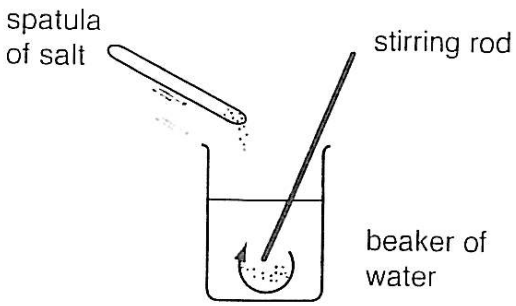
..... (1)

(c) After the ice had melted, suggest values for the following:

the total mass of water: ..... g

the temperature of the water: ..... °C (2)

6. Some salt was added to some water and stirred so that it dissolved to make salty water.



(a) Match the following substances with the term which describes them.

salt	solution
water	solute
salty water	solvent

(2)

Joe investigated how quickly the salt dissolved in relation to how fast he stirred it.

Here are his results:

amount of stirring, in stirs per minute	time to dissolve, in seconds
30	145
60	64
120	31
180	24

(b) State three things which he needed to keep the same in his investigation in order to make it a fair test.

1: .....

2: .....

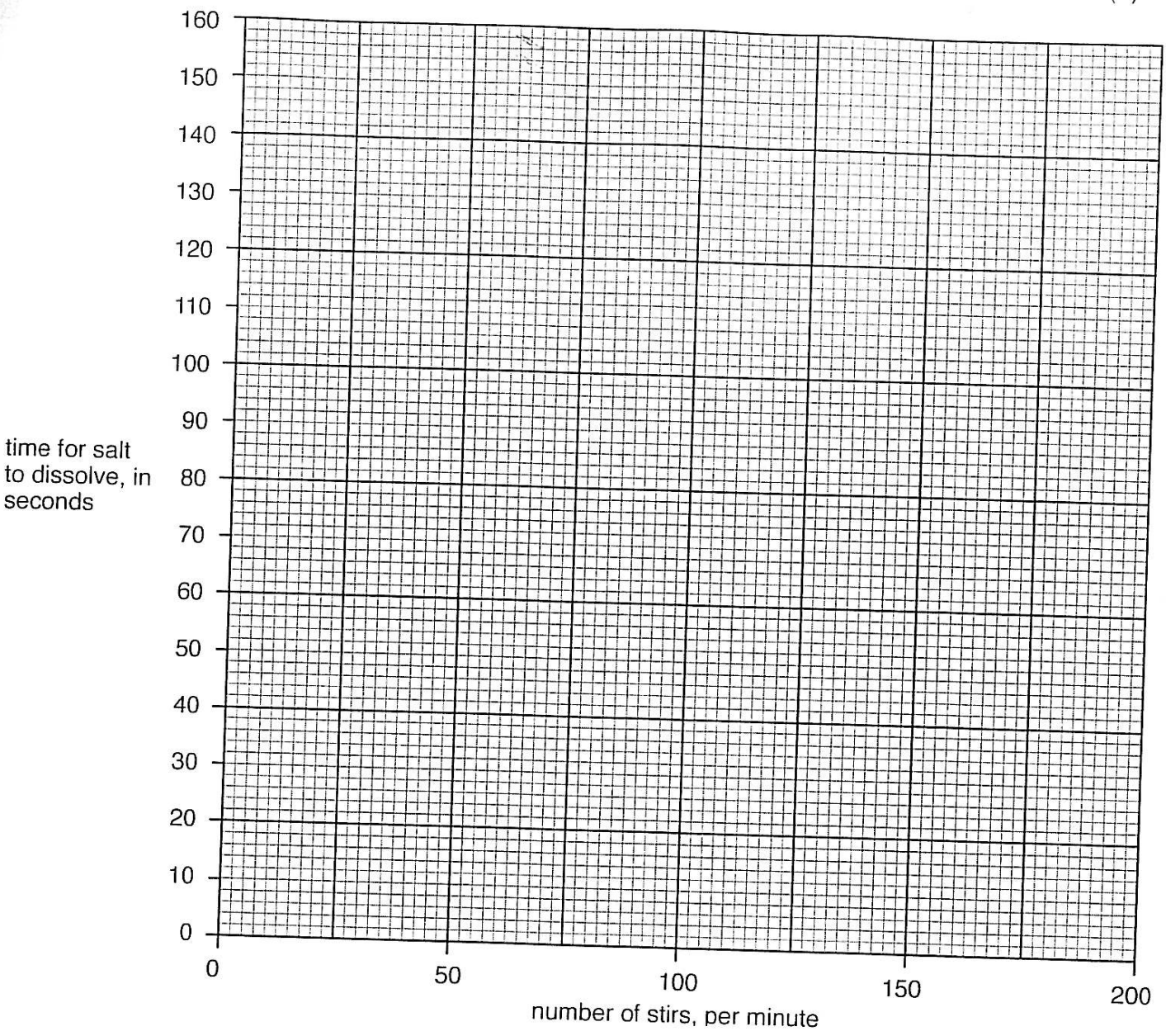
3: ..... (3)

(c) (i) Plot his results on the graph below.

(2)

(ii) Draw a line of best fit.

(1)



(d) Use your graph to predict how long the salt would take to dissolve with 90 stirs per minute.

..... seconds (1)

(e) Susie said that, as it was hard to be consistent with the stirring, she did not think that his results were very reliable.

Suggest what Joe could do to make his results more reliable.

..... (1)

(f) His prediction for his investigation was right.

What was his prediction?

.....

(1)

(g) At the end of his investigation he wanted to get the salt back.
Describe how he could do this.

.....

.....

.....

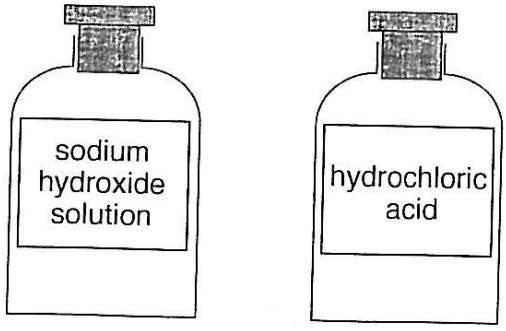
(2)

7. (a) Match the following solutions with their descriptions.

solution	description
limewater	neutral
distilled water	acidic
vinegar	alkaline

(2)

(b) The following volumes of solutions of hydrochloric acid and sodium hydroxide solution were mixed together and then tested with Universal Indicator.



volume of hydrochloric acid, in cm^3	volume of sodium hydroxide, in cm^3	Universal Indicator colour
20	10	
20	20	
20	30	

(i) Which piece of equipment would you use to measure accurately the volumes of liquid used?

..... (1)

The three colours obtained were red, purple and green.

(ii) Fill in the colours in the correct place in the table. (2)

(iii) Name the type of reaction which is taking place.

..... (1)

(iv) Complete the word equation for the reaction taking place:

hydrochloric acid + sodium hydroxide → ..... + ... (2)

It was noticed that the reaction gave out heat.

The temperature rise was recorded in each case.

volume of hydrochloric acid, in cm^3	volume of sodium hydroxide, in cm^3	temperature rise, in °C
20	10	5
20	20	11
20	30	8

(c) (i) Which piece of equipment would you use to measure this?

..... (1)

(ii) Explain why the 20/20 mixture gave out the most heat.

.....

..... (2)

(iii) Predict the temperature rise when 40 cm^3 of hydrochloric acid is added to 40 cm^3 of sodium hydroxide.

..... (1)

8. Galena is an ore of a compound of the elements lead and sulphur.



(a) What do you understand by the word *compound*?

.....

..... (2)

To extract the lead, first the ore is roasted in air.

This makes two products: lead oxide and an acidic gas.

(b) Suggest what the acidic gas might be.

..... (1)

This gas could cause damage to the environment if released into the atmosphere, so the gas is passed through a substance to remove it.

(c) (i) Describe one way in which the acidic gas could cause damage.

.....

..... (1)

(ii) What sort of substance could be used to get rid of the acidic gas?

..... (1)

Then the lead oxide is heated in a coke (carbon) furnace to produce the lead.

(d) (i) Complete the word equation for the second stage of the extraction:

lead oxide + carbon → lead + ... (1)

(ii) The lead oxide is said to have been *reduced* by this process.

What do you understand by this?

..... (1)

(iii) Explain how you could show that the lead formed at the end was a metal.

..... (1)

(Total marks: 60)