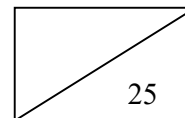


Name: _____ () Class: _____ Date: _____

TEST
Chapter 3: Separation and Purification



Multiple-Choice Questions (10 marks)

1. Which of the following is a pure substance and not a mixture?

A Common salt	B Milk
C Petrol	D Soap

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2. Distillation involves _____.

A condensation, then evaporation	B evaporation, then condensation
C filtration, then evaporation	D filtration, then condensation

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3. Doctors need to detect the presence of amino acids in the urine when diagnosing illnesses. Which of the following experimental techniques is suitable for detecting amino acids in urine?

A Chromatography	B Crystallisation
C Distillation	D Filtration

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4. Pure solids _____.

A are colourless in appearance	B are crystalline in appearance
C melt at an exact temperature	D dissolve completely in water

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5. Solder is a mixture of two metals, lead and tin. These two metals can be separated by distillation as they have different _____.

A boiling points	B densities
C reactivities	D solubilities

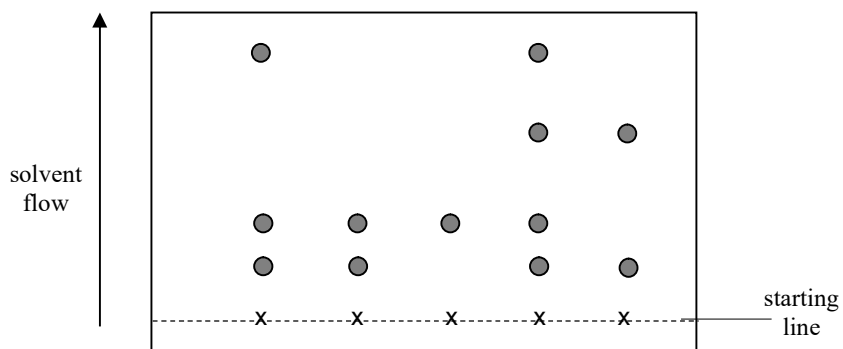
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6. From which mixture can the underlined substance be obtained by adding water, stirring and then filtering?

A Alcohol and vinegar
 B Chalk and sugar
 C Iron and steel
 D Salt and sand

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7. The diagram shows a chromatogram prepared using spots of five different inks. How many different dyes were used to make the five inks?



A 3
 C 5

B 4
 D 12

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8. Which of the following substances may be condensed using a water-cooled condenser?

	Melting point/ $^{\circ}\text{C}$	Boiling point/ $^{\circ}\text{C}$
A	-76	-32
B	-115	-85
C	-130	36
D	-143	-80

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9. The table gives information about the solubility of three solids.

Solid	Solubility in water	Solubility in alcohol
L	insoluble	soluble
M	insoluble	insoluble
N	soluble	insoluble

The following shows the possible steps in obtaining a pure substance:

1. Add water.
2. Add alcohol.
3. Filter.
4. Evaporate filtrate to dryness.

Which of the following shows the correct order of steps to obtain pure **L** from a mixture of **L**, **M** and **N**?

- | | | | | |
|----------|---------|----------|------------|-----|
| A | 1, 3, 4 | B | 2, 1, 3, 4 | |
| C | 2, 3, 4 | D | 1, 2, 3, 4 | () |

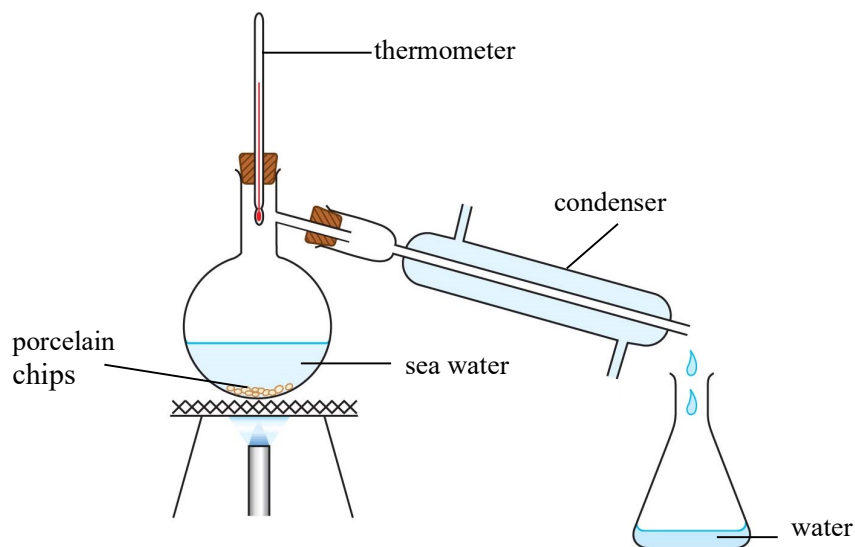
10. The filter tip of a cigarette acts as both a condenser and a filter. Which of the following substances **cannot** be removed by the filter tip?

	Substance	Boiling point/°C
A	nicotine	248
B	tar	between 350–400
C	carbon monoxide	–192
D	water	100

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Structured Questions (15 marks)

11. The apparatus shown below is used to produce pure water from a sample of sea water.



(a) Suggest the purpose of the porcelain chips. [1]

(b) Draw arrows to show how water enters and leaves the condenser. [1]

(c) What would be the reading on the thermometer during the purification? [1]

(d) Draw a cross (X) on the diagram to show where salt from sea water would be left after purification is complete. [1]

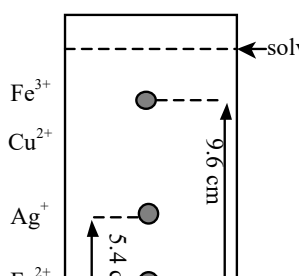
12. The observations made from some tests on two chemicals are shown below. One chemical is a pure substance and the other an impure substance.

- A. It melts over a range of temperatures.
- B. Its composition is always the same.
- C. During a chromatography experiment, its separation produced several spots.
- D. Its boiling point is higher than expected.
- E. It has an exact melting point.
- F. It exists as crystals.
- G. Its composition varies.
- H. It has an exact boiling point.

(a) Which of these results applies to the pure chemical? [2]

(b) Which of these results applies to the impure chemical? [2]

13. Chromatography was used to compare the impurities in the electrodes of two lead-acid type batteries. Samples of electrode from each battery were dissolved in a suitable acid and separated by chromatography, along with solutions of known metal ions. The chromatogram was sprayed with a locating agent and the results are shown below:



(a) Which metal impurity is common to both electrodes? _____ [1]

(b) $R_f \text{ value} = \frac{\text{distance moved by spot of ion}}{\text{distance moved by solvent}}$

(i) Which ion has an R_f value of 0.80? _____ [1]

(ii) What is the R_f value of Fe²⁺? _____ [1]

14. Wenli is a very keen gardener and is very proud of his lawn. He buys some 'lawn sand', from his local garden centre. The garden centre says the 'lawn sand' is a 50/50 mixture of equal amounts (masses) of sand and fertiliser. When his mother used the lawn sand, she felt that she had been cheated, as the 'lawn sand' looked like it was nearly all sand with little fertiliser. Wenli decides to carry out an experiment to find out the amounts of sand and fertiliser present. Outline the steps of his experiment. [4]
