

**A. Purity, Formulations and Chromatography**

1. What is a pure substance?
2. How could you distinguish between a pure substance and a mixture?
3. What is a formulation?
4. How are formulations made?
5. Give two examples of formulations.
6. What is chromatograph?
7. What happens in the stationary and mobile phases?
8. State the equation used to find the  $R_f$  value.
9. A solvent travels 8cm up the stationary phase, two spots separate out. A travels 6cm up the mobile phase, B travels 4.5cm up the mobile phase. Give the  $R_f$  value for both to two decimal places.

**B. Identification of Common Gases**

1. How would you test for oxygen gas?
2. An unknown gas gives out a squeaky pop when a burning splint is put into it. What is the gas?
3. Describe how you would test for carbon dioxide gas.
4. A student wrote down the following description for testing chlorine:

‘Use litmus paper it turns from red to blue.’

Where has he gone wrong?

**C. Identification of Ions– part 1 – by Chemical Means Flame Tests, Metal Hydroxides – CHEMISTRY ONLY**

1. What is a flame test?
2. What colour flame would the following metal ions have in a flame test?
  - a. Lithium
  - b. Sodium
  - c. Potassium
  - d. Calcium
  - e. Copper
3. What might cause some flame colours to be masked?
4. What is a precipitate?
5. Sodium hydroxide is used to identify some metal ions. What colour precipitate do aluminium, calcium and magnesium ions form?
6. How are aluminium ions distinguished from calcium and magnesium ions in the reaction with sodium hydroxide?
7. What colour precipitate do the following ions make with sodium hydroxide?
  - a. Copper (II)
  - b. Iron (II)
  - c. Iron (III)
8. Write the word equation for the reaction between calcium chloride and sodium hydroxide.
9. Write the balanced symbol equation for the reaction between aluminium chloride and sodium hydroxide.
10. What colour would the precipitates be in the above reactions?
11. How could you distinguish between them?

## D. Identification of Ions – part 2 – by Chemical Means Carbonates, Halides, Sulfates – CHEMISTRY ONLY

1. How would you test for a carbonate?
2. How would you test the gas produced by the above reaction?
3. How would you test for halide ions?
4. How could you use the above test to distinguish between halide ions?
5. Silver nitrate is added to an unknown chemical in solution. A cream precipitate is produced. What is the halide ion present?
6. How would you test for sulfate ions?
7. Write the word and balanced symbol equation for the reaction between sodium sulfate and barium chloride.

## E. Identification of Ions – part 3 – by Instrumental Methods – CHEMISTRY ONLY

1. Give three advantages of instrumental methods for detecting ions compared with chemical methods.
2. What is flame emission spectroscopy used for?
3. How is flame emission spectroscopy carried out?
4. Five different samples were analysed using flame emission spectroscopy, the results are shown below. Which of the two results show the same metal?

|   |  |  |  |
|---|--|--|--|
| A |  |  |  |
| B |  |  |  |
| C |  |  |  |
| D |  |  |  |
| E |  |  |  |