Teacher Resource Bank

GCE Chemistry

PSA8: AS Organic Chemistry

- Carry Out Some Organic Tests

AS Organic Chemistry

PSA8 Carry out some organic tests

Technical Sheet

To carry out tests for the presence of organic functional groups and to make accurate observations.

Whenever possible, students should work individually.
If it is essential to work in a pair or in a small group, because of the availability of apparatus, supervisors must be satisfied that they are able to assess the contribution from each student to the practical activity.

Requirements

- ethanol
- ethanal or propanal
- cyclohexene
- 1-bromobutane
- dilute ethanoic acid (2 mol dm^{-3})
- small pieces of metallic sodium under petroleum ether (a beaker of ethanol should be available on the front bench for safe disposal of any excess sodium)
- Fehling's solution A
- Fehling's solution B
- bromine water
- sodium carbonate solution
- sodium hydrogencarbonate solid
- sodium hydroxide solution
- silver nitrate solution
- dilute nitric acid
- 250 cm^3 beaker
- anti-bumping granules
- test tubes and a test tube holder
- thermometer (-10 ^oC to 110 ^oC)

Centres may choose to use Tollens' reagent rather than Fehling's solution to test for an aldehyde, whether or not they are planning to have the students undertake PSA7. Centres who choose to use Tollens' reagent MUST instruct students to prepare this reagent in situ as desctibed in PSA7

The concentrations of the aqueous solutions in these experiments need to be sufficient to ensure that obvious reactions take place. In practice, this is likely to mean 2 mol dm^{-3} for most solutions.

Centres are expected to carry out and be responsible for their own safety risk assessments.

AS Organic Chemistry

PSA8 Carry out some organic tests

Student Sheet

It is the responsibility of the student to carry out and be responsible for their own safety risk assessment before carrying out these experiments.
Wear safety glasses at all times. Assume that all of the reagents and liquids are toxic, corrosive and flammable.

This experiment is divided into five parts.
In every case, you should present all of your observations in a neat Table. The presentation of a clearly organised record of your observations is an important skill which you will be expected to demonstrate as part of this assessment.

Part 1 – A test for an alcohol.

a) To approximately 1 cm^3 of ethanol in a **dry** test tube, add a small piece of metallic sodium.
b) Record your observations.
c) Make sure that you dispose safely of any excess sodium using the beaker of ethanol provided.

Part 2 – A test for an aldehyde using Fehling's solution.

a) In a clean test tube mix together equal volumes of Fehling's solution A and Fehling's solution B. The resultant Fehling's test reagent should be a clear dark blue solution.
b) Add 5 drops of this test reagent to 1 cm^3 of sodium carbonate solution in a test tube containing a few anti-bumping granules and then add 1 cm^3 of ethanal (or propanal) to this same test tube.
c) Warm the test tube gently for approximately two minutes in a beaker half-filled with hot water and then gradually bring the beaker of water to boiling and maintain this temperature for a few minutes.
d) Using the test tube holder, carefully lift the test tube out of the boiling water and allow its contents to stand for several minutes.
e) Record your observations.

AS Organic Chemistry

PSA8 Carry out some organic tests

Part 3 – A test for an alkene (a test for unsaturation)

a) To approximately 1 cm^3 of cyclohexene in a test tube, add an equal volume of bromine water and shake the contents of the tube vigorously from side to side.
b) Record your observations.

Part 4 – A test for a carboxylic acid

a) Place one small spatula measure of solid sodium hydrogencarbonate in a test tube and add to it approximately 2 cm^3 of dilute ethanoic acid.
b) Record your observations.

Part 5 – A test for a haloalkane.

a) Using a teat pipette, add approximately 5 drops of 1-bromobutane to 1 cm^3 of sodium hydroxide solution in a test tube. Warm the contents of the test tube for a few minutes, by placing it into a beaker filled with hot water at approximately 60 ^oC.
b) Acidify the contents of the test tube by adding 2 cm^3 of dilute nitric acid and then add 1 cm^3 of silver nitrate solution.
c) Record your observations.

Teacher Notes and Marking Guidance

The specific marking guidance in the specification is as follows

2 marks: All areas of the task are carried out competently.
The quantities of reagents are appropriate.
The tests (heating, shaking etc.) are carried out safely and with due care.
Nearly all of the observations are correct.

1 mark: One of the areas of the task is performed poorly.
The quantities of reagents are inappropriate **OR**
The tests (heating, shaking etc.) are carried out in a careless manner **OR**
Only some of the observations are correct.

0 marks: At least two of the areas of the task are performed poorly.
The quantities of reagents are inappropriate.
The tests (addition, heating, shaking etc.) are carried out in a careless manner.
Few of the observations are correct.

Guidance for Teachers and Students

Teachers are expected to exercise professional judgement in assessing the competence of their candidates in following the instructions.

Candidates should have been given guidance in the correct use of equipment and this guidance **can continue during the practical session** for which this PSA forms a part.

If, however, the guidance required is fundamental or frequent, then the student should **not** be awarded 2 marks.

Judgement of 2 marks, 1 mark or 0 marks will depend on whether the candidate

- collects sensible quantities of reagents for each test,
- carries out each test tube reaction with care and with due regard to safety,
- is able to make and record correct observations.

Students should not be judged on their ability to write balanced equations or to make deductions. They should be judged on their ability to follow the practical instructions and to carry out the practical task which leads to the production of a correct set of observations.

It is important to remember when marking these practical exercises that PSA is about student competence and that for a student to score full marks on this exercise **perfection is neither expected nor required**.