



General Certificate of Education
Advanced Level Examination
June 2011

Chemistry

CHM6T/Q11/task

Unit 6T A2 Investigative Skills Assignment

Task Sheet

Some reactions of iron(II) and iron(III) compounds

A sample of a blue dye, *Prussian Blue*, has been isolated from an old military uniform. This dye has been chemically analysed and its structure has been determined. *Prussian Blue* is an insoluble complex containing iron(III) ions and hexacyanoferrate(II) ions, $[\text{Fe}(\text{CN})_6]^{4-}$

You will synthesise a sample of this dye and investigate other reactions of iron(II) and iron(III) solutions.

You will carry out the investigation in the following sequence.

Part 1

- Dissolve a sample of an iron(III) salt in water.
- Mix this solution with potassium hexacyanoferrate(II) solution.
- Filter the products of the reaction to obtain a crude sample of *Prussian Blue*.

Part 2

- Observe the reactions of iron(II) ions and of iron(III) ions with several reagents.

Part 3

- Open out the filter paper and leave on a suitable labelled surface as instructed by your teacher.

Wear eye protection at all times.

Assume that all reagents are toxic and irritant.

Procedure – Part 1

***Prussian Blue* stains skin. Use disposable gloves throughout the Task.**

- 1 Use a measuring cylinder to transfer 10 cm^3 of distilled or deionised water to a small beaker. Add the sample of the iron(III) salt supplied and stir with a rod until all the solid has dissolved.
- 2 Measure out 10.0 cm^3 of potassium hexacyanoferrate(II) solution in a measuring cylinder.
- 3 Add the potassium hexacyanoferrate(II) solution from the measuring cylinder to the solution in the beaker while stirring with the glass rod. A dark blue-black precipitate of *Prussian Blue* will form.
- 4 Filter off this precipitate using the method directed by your teacher. Do not add any washings to the filter funnel. Leave the product to filter and start doing **Part 2**.

Procedure – Part 2

Perform the tests described below. Record what you observe in a table of your own design on the Candidate Results Sheet.

Use a clean test tube for each part of each test.

Test 1 – Test with sodium hydroxide solution

Place about 10 drops of iron(II) sulfate solution in a test tube.
Add about 10 drops of sodium hydroxide solution and shake the mixture.
Continue shaking the mixture for a minute.

Repeat the test using 10 drops of iron(III) nitrate solution.

Test 2 – Test with sodium carbonate solution

Place about 10 drops of iron(II) sulfate solution in a test tube.
Add about 10 drops of sodium carbonate solution and shake the mixture.

Repeat the test using 10 drops of iron(III) nitrate solution.

Test 3 – Test with potassium hexacyanoferrate(II) solution

Place about 10 drops of iron(II) sulfate solution in a test tube.
Add about 10 drops of potassium hexacyanoferrate(II) solution and shake the mixture.

Repeat the test using 10 drops of iron(III) nitrate solution.

Procedure – Part 3

***Prussian Blue* stains skin. Use disposable gloves throughout the Task.**

When you have completed your observations from **Part 2**, remove your filter paper containing the crude *Prussian Blue* from the funnel.

Open out the filter paper and leave on a suitable labelled surface as instructed by your teacher.

ISA CHM6T/Q11 Candidate Results SheetCentre Number

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Teacher Group

Candidate Name Candidate Number

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ResultsRecord your observations from **Part 2** in a suitable form in the space below.

For Teacher's use only							
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