Beatty Secondary School
Science Department (Chemistry Unit)
Chemistry 6092

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Name: _____ ( ) Date: _____

Class: 4E___

Practical 12: QA4 – 5074 Nov 2015

You are provided with solution **R** and solid **S**. Carry out the following tests and record your observations in the table. You should test and name any gas evolved.

test no.	test	observations
1	**(a)** To 1 cm depth of **R** in a test-tube, add a few drops of aqueous silver nitrate. **(b)** Add dilute nitric acid to the mixture from **(a)**.	**Pale yellow ppt formed.** **Pale yellow ppt remained insoluble in nitric acid.** [2]
2	To 1 cm depth of aqueous iron(III) chloride in a test-tube, add an equal volume of **R**.	**Yellow solution turns brown.** [1]
3	**(a)** To 1 cm depth of **R** in a test-tube, add an equal volume of dilute sulfuric acid and then one or two drops of **S**. **(b)** To the mixture from **(a)**, add an equal volume of **S** and allow to stand for a few minutes.	**Yellow solution is formed.** **Yellow solution turns dark brown.** **On standing, black ppt is formed.** [2]
4	**(a)** To 1 cm depth of iron(II) sulfate in a boiling tube, add an equal volume of **S**. **(b)** Add aqueous sodium hydroxide to the mixture from **(a)** until no further change occurs.	**Pale green solution turns brown.** **Effervescence is observed.** **Reddish-brown ppt formed; insoluble in excess aqueous sodium hydroxide.** [2]
5	To 1 cm depth of aqueous acidified potassium manganate(VII) in a test-tube, add an equal volume of **S**.	**Purple acidified $KMnO_4$ turns colourless.** [1]
6	**(a)** To 1 cm depth of **S** in a test-tube, add a small amount of copper powder. **(b)** Add an equal volume of aqueous ammonia to the mixture from **(a)**.	**Reddish-brown solid is insoluble in S.** **Some reddish-brown solid dissolves to form a blue solution.** **Effervescence is observed.** **Gas produced relights a glowing splint.** **Gas produced is oxygen.** [4]

Conclusion:

Consider the results of the experiments you have performed from tests **1** to **6**.

(a) Identify the **anion** present in **R**. Give evidence from your observations to support your conclusion.

anion **iodide ion / I^-**

evidence **Based on test 1, a yellow precipitate was formed when aqueous acidified silver nitrate was added.**

(b) State the role of **S** in test **4(a)** and in test **5**. Explain your answer.

role of S in test **4(a)** **oxidising agent**

explanation **Pale green Fe^{2+} ions in $FeSO_4$ has been oxidised by S to form brown Fe^{3+} ions.**

role of **S** in test **5** **reducing agent**

explanation **oxidising agent purple acidified $KMnO_4$ has been reduced to form a colourless solution**

Planning:

(c) An aqueous solution contains the following cations – Pb^{2+}, Ca^{2+}, Fe^{2+}. In the space below, briefly describe the steps to prove that all the cations are present in the mixture.

To the aqueous solution, add excess dilute hydrochloric acid. If a white precipitate is formed, this would indicate the presence of Pb^{2+} ions in lead(II) chloride. Filter the mixture to obtain lead(II) chloride as the residue. The filtrate would contain a mixture of excess hydrochloric acid, calcium ions and iron(II) ions.

To the remaining filtrate, add excess dilute sulfuric acid. If a white precipitate is formed, this would indicate the presence of Ca^{2+} ions in calcium sulfate. Filter the mixture to obtain calcium sulfate as the residue. The filtrate would then contain a mixture of excess hydrochloric acid, excess sulfuric acid and iron(II) ions.

To the remaining mixture, add excess aqueous sodium hydroxide / aqueous ammonia. If a dirty-green precipitate is formed, this would indicate the presence of Fe^{2+} ions in iron(II) hydroxide.

……[5]

Revision Exercise:

The following table shows the conclusions that a student made after carrying out tests with a white crystalline salt T. Fill in the observations for each test.

test	observations	conclusions
Dissolve a portion of T in distilled water. Add a few drops of aqueous sodium hydroxide to the solution of T. Continue adding aqueous sodium hydroxide until it is in excess.		Zn^{2+} or Pb^{2+} ions may be present. Zn^{2+} or Pb^{2+} ions may be present.
Dissolve a portion of T in distilled water. Add a few drops of aqueous ammonia to the solution of T. Continue adding aqueous ammonia until it is in excess.		Zn^{2+} or Pb^{2+} ions maybe present. Zn^{2+} ions are present.