

Chemistry Simulation I: Qualitative Analysis

TEACHER BRIEFING

Background Information

Overview & Objectives

This is a simulation designed for year 12 students taking AS level chemistry.

The simulation tests the student's knowledge on the subject of qualitative analysis.

Essentially, this sim is a virtual version of the lab sessions. Students are faced with the same decisions as they would in a real life lab test. After being given an unknown solution of ions, students are expected to choose the correct test procedures to use in the simulation and deduce the identity of the cations and anions present based on the observations. Then students enter the correct answers to the questions found on the Q&A page.

There are currently six sets of questions stored in the questions bank of the model. One set is chosen randomly upon starting/resetting the simulation program.

Network version of the simulation can provide teachers with useful outputs such as the percentage of correct answers by each student and which ions student are having trouble identifying.

Main Learnings

Students will learn how to:

- Choose suitable reagents and procedures to carry out the test for ion identification
- Familiarize themselves with the test carried out and observations
- Identify the ions present based on the observations
- Provide answers to questions similar to the real practical test.

Components of the Sim

The simulation consists of the following components:

- The teacher briefing
- The student instruction sheet
- A video introduction
- The simulation
- Use of the SpreadSims platform at <http://server.spreaddsims.net>

Size of Groups

- The Simulation is designed for individual use, but can also be used by a team of no more than 4 students

Usage suggestions

- Each session could take up 15 to 30 minutes to run initially, but once students familiarize themselves with the controls, the session time could be reduced to 10 minutes.
- After teaching the unit of qualitative analysis, and actual lab practices, the faculty can introduce to the students this simulation as a scoring assignment/homework tool or a non-scoring practice device.
- The simulation can be used by students at home, school or wherever they can gain access to a computer running excel.

Measures of Learning

The key measures of learning are listed below:

- No. of correct answers
- Satisfaction rating of the activity
- Teacher using the data to improve teaching techniques

Screenshots of Sim:

Chemistry - Qualitative Analysis

Welcome to SpreadSim! This program functions as a virtual lab/lab test. You will be given a randomly chosen unknown solution containing both an anion and a cation. Using laboratory procedures, deduce the identity of both ions. Document on paper any actions you performed. Carefully read and follow the instructions below before executing any commands in the simulator.

Step 1:
During initialization, rollover once to generate a random solution of ions and begin the testing phase

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Step 2:
During testing, choose the laboratory procedures to be carried out in the decisions page; after rollover, the outcome is recorded in the reports page. Redo this step for as many times as needed

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Step 3:
When finished with the previous step; select the 'check answer' button in the decisions page to end this simulation

Status: Testing

Title Page

Chemistry - Qualitative Analysis

Questions and Answers

Question: FA6 and FA7 are solids each containing one cation and one anion from those listed on the reactive references page. Both solids are dissolved in dilute HNO₃ into aqueous solutions.

At each stage you are required to record the following: colour changes seen, the formation of any precipitate and the solubility of any precipitate in an excess of the reagent used

Part A. Use solution FA6 in reactions with aqueous NaOH and with NH₃, added until in excess. Record any observations made.

Answer:

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Part B. Use solution FA7 in reactions with aqueous NaOH and with NH₃, added until in excess. Record any observations made.

Answer:

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Part C. Identify both cations and anions in FA6 & FA7, write down the evidence below your answer.

Answer: The cation in FA6 is 

- Na+
- Fe²⁺
- Fe³⁺
- Mg²⁺**
- Mg²⁺
- Zn²⁺
- Pb²⁺
- Ag⁺
- Ca²⁺
- Al³⁺
- Ba²⁺

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The cation in FA7 is

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Questions Page

Chemistry - Qualitative Analysis

Decisions & Reports

Part I: Testing in FA6

- Option 1: Add dilute Na(OH) solution, then in excess
- Option 2: Add dilute NH₃ solution, then in excess
- Option 3: Add dilute H₂SO₄ solution
- Option 4: Add 2 drops of KSCN solution
- Option 5: Add red litmus
- Option 6: Add Ba(NO₃)₂ solution
- Option 7: Add AgNO₃ solution

Part I: Testing in FA7

- Option 1: Add dilute Na(OH) solution, then in excess
- Option 2: Add dilute NH₃ solution, then in excess
- Option 3: Add dilute H₂SO₄ solution
- Option 4: Add 2 drops of KSCN solution
- Option 5: Add red litmus
- Option 6: Add Ba(NO₃)₂ solution


Observations

Testing for:

Decision:

Observations:

Pictures or Videos?



Experiment Page