



North Sydney Boys High School
Science Faculty
Year 12 Chemistry 2022
Assessment 1

Reading time – 5 minutes

Writing time – 50 minutes

Total Marks -

- 6 questions
- 30 marks

General Instructions:

- Attempt all questions
- Write using black or blue pen
- Draw diagrams using pencil
- NESA approved calculators may be used
- Write your student number at the **top** of this page

Assessment has two parts:

- Part A Knowledge and Understanding: Q1-Q3
- Part B Working Scientifically: Q4 -Q6

Weighting - 25%

- 10% Knowledge & Understanding
- 15% Working Scientifically skills

Section	Mark	Out of
Part A: Knowledge & Understanding	10	
Part B: Working Scientifically skills	20	
Total	30	

This paper MUST NOT BE REMOVED from the examination room.

Part A: Knowledge and Understanding (10 marks)

Question 1 (3 marks)

Why is it important that the chemical industry carefully monitors the chemical processes they use with respect to the environment?

Question 2 (4 marks)

A solution was known to contain either Ba^{2+} or Ca^{2+} . Two students carried out a series of tests to identify the cation present in the solution. Student 1 accidentally added water to their sample only. The students each obtained the following results.

Student 1

Anion added	SO_4^{2-}	OH^-
Result	White ppt	No ppt

Student 2

Anion added	SO_4^{2-}	OH^-
Result	White ppt	White ppt

a) Account for the differences in the students' results.

(2)

- b) Identify the cation present in the solution and outline a confirmation test (not a flame test) that can be carried out to determine the cation in the solution. (2)

Question 3 (3 marks)

Compare the analytical techniques of AAS and precipitation titrations.

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Part B: Working Scientifically (20 marks)

Question 4 (6 marks)

A solution is suspected to have all of the following anions: carbonate, chloride, bromide and sulfate ions present in a sample. Describe a sequence of steps that can be used to identify the anions present in the solution. In your response you are to include chemical equations and justifications for the reagents and separation techniques used.

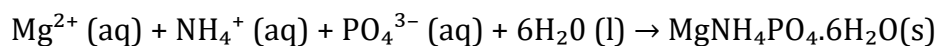
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Question 5 (6 marks)

The phosphate content of a detergent is to be determined gravimetrically. The phosphate ions are precipitated as magnesium ammonium phosphate hexahydrate. 3.55 ml of the detergent (density 1.40 kg/L) was dissolved in 100 ml of acidified water. Magnesium chloride solution, ammonium chloride and concentrated ammonium were added and the mixture stirred. Magnesium ammonium phosphate hexahydrate formed slowly as a precipitate. The crystals were filtered and washed and the filter paper and crystals placed in a Petri dish in a dessicator.

The equation for the precipitation reaction is:



a) Explain the purpose of the dessicator in the experiment.

(1)

b) The following results were collected on weighing the crystalline precipitate:

Mass of dry filter paper/Petri dish	23.362 g
Mass of filter paper/Petri dish + dried crystals	23.682 g

Determine the percentage by mass of phosphate in the detergent.

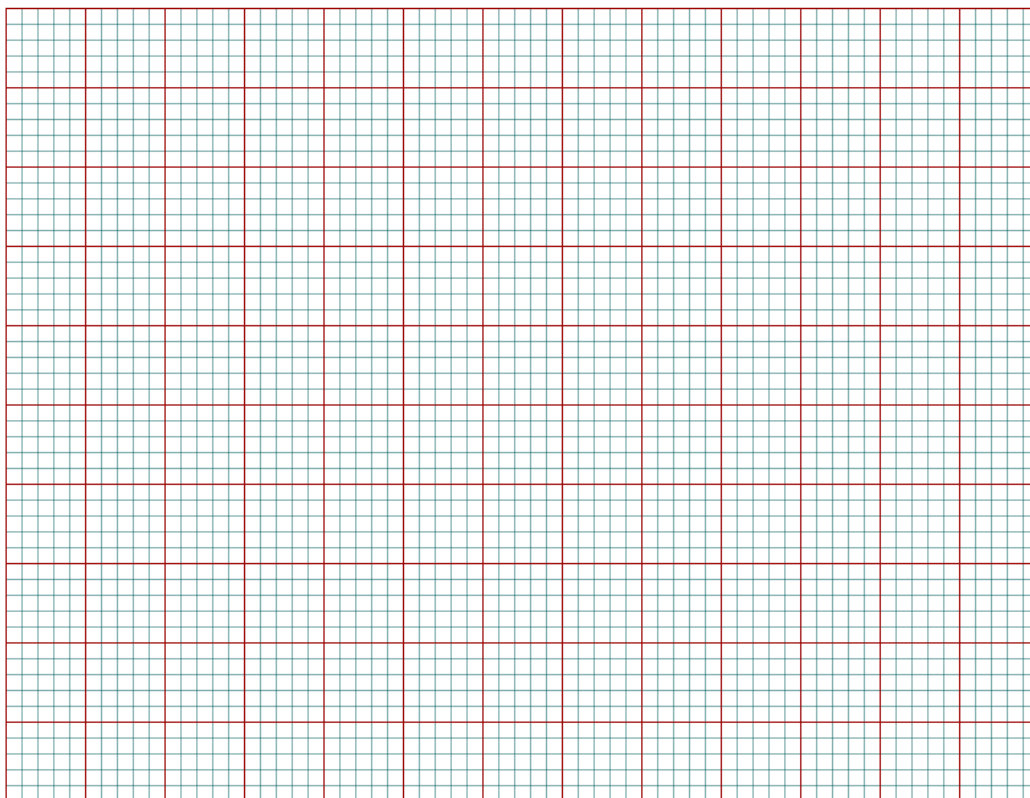
(5)

Question 6 (8 marks)

A pond near a school was suspected to be contaminated with cadmium by the runoff from a battery factory. To confirm their suspicions, scientists performed an analysis of pond water using AAS. The following AAS data shows the absorbance measured for 4 standard Cadmium solutions and samples taken from various parts of a pond. Two were taken from a similar location and a third sample from another part of the pond.

Sample	Concentration (ppm)	Absorbance
Control	0.0	0.000
Standard 1	5.0	0.151
Standard 2	10.0	0.372
Standard 3	15.0	0.581
Standard 4	20.0	0.749
Sample 1		0.431
Sample 2		0.764
Sample 3		0.432

- a) Graph the standard curve of the AAS on the following grid (3)



- b) The scientist confirmed that sample 2 was a valid sample, however, he could not use it. Explain why sample 2 could not be used and outline a possible method that can be performed to include sample 2 as part of the result. (3)

- c) Determine the concentration of cadmium in the pond water. (2)

End of Test