

**Task 12: Aqueous Solutions Topic Test**

**Question/Answer Booklet**

**CHEMISTRY UNIT 2**

Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teacher’s Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# TIME ALLOWED FOR THIS PAPER

Reading time for the paper: 5 minutes

Working time for the paper: 45 minutes

# MATERIALS REQUIRED/RECOMMENDED FOR THIS PAPER

**To be provided by the supervisor:**

This Question/Answer Booklet

Chemistry Data Book

**To be provided by the candidate:**

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, eraser, correction tape/fluid, ruler, highlighters

Special items: up to three non-programmable calculators approved for use in the WACE examinations

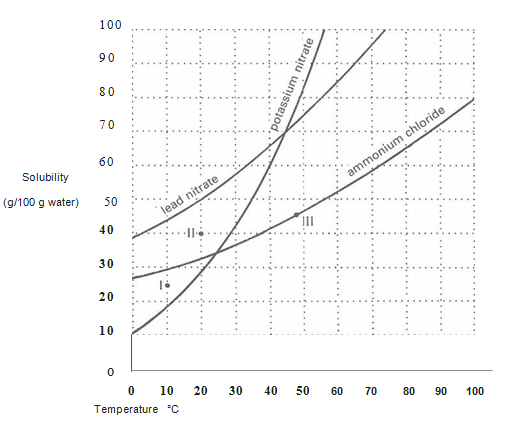
# IMPORTANT NOTE TO CANDIDATES

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further

**Multiple Choice Section 15 marks**

1. When hot brine is cooled down until crystals of salt appear, a liquid remains. Which term best describes the remaining liquid?
2. Solute
3. Solvent
4. Saturated solution
5. Unsaturated solution
6. A solid dissolved in a liquid to form a solution which conducts electricity. The only conclusion that can be drawn from this information is that the:
7. Solution contains free or mobile electrons
8. Original solid contained free or mobile electrons
9. Original solid contained free or mobile ions
10. Solution contains free or mobile ions
11. A small amount of salt when added to a salt solution dissolves. From this we can conclude that the original salt solution was:
12. Concentrated
13. Dilute
14. Saturated
15. Unsaturated
16. Which of the following contains only strong electrolytes (note: a strong electrolyte is any material that completely ionizes in solution)?
17. Sodium chloride, water, and sulfuric acid
18. Magnesium hydroxide, ammonia, and potassium chloride
19. Ethanoic acid, ammonia, and water
20. Magnesium hydroxide, sodium chloride, and potassium nitrate
21. Which of the following is the correct order of solutions in order of increasing electrical conductivity?
22. Methane < magnesium chloride < ethanoic acid < sulfuric acid
23. Sulfuric acid < methane < magnesium chloride < ethanoic acid
24. Methane < ethanoic acid < magnesium chloride < sulfuric acid
25. Ethanoic acid < methane < magnesium chloride < sulfuric acid
26. Solutions of the following were mixed. In which case would a precipitate be **least** likely to form?
27. CaCl2 and Na2CO3
28. AgNO3 and NaCl
29. AlCl3 and NaOH
30. MgCl2 and KNO3

**Questions 7, 8, and 9 all relate to the graph shown below.**

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1. To completely dissolve 15g of lead nitrate in 20g of water, the temperature would have to be at least:
2. 20°C
3. 30°C
4. 40°C
5. 50°C
6. Points I, II, and III on the graph represent three solutions of ammonium chloride. Which point represents a super-saturated solution?
7. I
8. II
9. III
10. None
11. 15g of potassium nitrate was dissolved in 25g of water. If the solution were slowly cooled, the first crystals of potassium nitrate would be expected to appear at:
12. 3°C
13. 40°C
14. 56°C
15. 68°C
16. Over the years, many different definitions of an acid have been proposed, some more complete than others. Which one of the following statements is in no way relevant or correct as a means of characterising an acid? Acids:
    1. are proton donors
    2. react with metals to give a salt and hydrogen gas
    3. react with bases to give a salt and water
    4. react with non-metals to give a salt and oxygen
17. Which one of the following is NOT a characteristic of solutions of acids?  
    Solutions of acids:  
    1. taste sour
    2. react with zinc to form hydrogen gas
    3. contain more H3O+ ions than OH- ions
    4. turn universal indicator blue
18. Sodium hydrogen sulphate is a weak acid. In a solution containing only sodium hydrogen sulphate in water, which of the following is true:
19. [NaHSO4] > [H3O+]
20. [NaHSO4] < [H3O+]
21. [NaHSO4] = [H3O+]
22. The concentration of both hydronium ions and sodium hydrogen sulphate varies with time
23. The pH of a solution is:
24. The negative logarithm of the hydrogen ion concentration
25. The negative logarithm of the hydroxide ion concentration
26. The negative logarithm of the Universal Indicator concentration
27. The negative logarithm of the pH scale from 1 to 14.
28. For polyprotic acids the following is true:  
    1. They are all strong acids
    2. They ionise partially
    3. They have one hydrogen ion in their formulae
    4. They have multiple hydrogen ions in their formulae
29. If you have 500 mL of 2M strong acid there will be:
    1. 2 molL-1 of H+
    2. 1 molL-1 of H+
    3. 0.5 molL-1 of H+
    4. 4 molL-1 of H+

**Short Answer Section30 marks**

**Question 1(4 marks)**To aid in the precipitation of different halides, a solution of silver sulphate is prepared using 0.5142g of solid and 500.0mL of water.

1. Calculate the amount of silver sulphate (in mol)

(1 mark)

1. Using this information, calculate the concentration of silver sulphate in the solution

(1 mark)

1. Using your answer from part b, would you expect all the silver sulphate to dissolve? Why/why not?

(2 marks)

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**Question 2(4 marks)**Write balanced chemical equations for each of the following reactions:

1. sodium hydroxide solution and ethanoic acid

(2 marks)

1. calcium carbonate in a flask of hydrochloric acid

(2 marks)

**Question 3(5 marks)**A brand of household mould cleaner contains 2.4g/L of sodium hydroxide (NaOH).

1. Determine the concentration in moles per litre:

(2 marks)

1. Determine how many moles of sodium hydroxide are present in a 250mL bottle:

(1 mark)

1. Calculate the new concentration (mol/L) if you took a half empty bottle and filled it with water.

(1 mark)

1. What is the concentration of this solution in ppm?

(1 mark)

**Question 4(6 marks)**A 125 mL, 0.4 M solution of barium nitrate is mixed with potassium sulphate solution to form a precipitate

1. Write a balanced net-ionic equation and clearly identify the precipitate formed.

(3 marks)

1. Calculate the mass of the resulting precipitate

(3 marks)

**Question 5(6 marks)**Explain the difference between a weak acid (CH3COOH) and a strong acid (H2SO4). Compare this to a concentrated and dilute acid.

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**Question 6(5 marks)**A sample of metallic iron is reacted with excess nitric acid. The reaction in question can produce one of two products depending on whether the iron is converted to iron (II) or iron (III).

1. Write two balanced equations – one where the product is an iron (II) salt, and one where the product is an iron (III) salt.

(3 marks)

1. After the reaction took place, it was observed that the leftover solution was pale green in colour. Giving a reason why, state which iron salt was formed.

(2 marks)