

**Test 4 2015**

**Solutions**

**Question/Answer Booklet**

**CHEMISTRY**

**Stage 2**

|  |  |
| --- | --- |
| **Student Name** |  |

|  |  |
| --- | --- |
| **Section** | **Mark** |
| One | /20 |
| Two | /30 |
| Total | /50 |
| % | |

**Time allowed for this paper**

Working time for paper:

**Material required/recommended for this paper**

***To be provided by the supervisor***

This Question/Answer booklet

Multiple-choice Answer sheet

Chemistry Data sheet

***To be provided by the candidate***

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

Special items: 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.

**Section One: Multiple-choice (20 marks)**

This section has **10** questions. Answer **all** questions on the separate Multiple-choice Answer Sheet provided.

1. Increasing the temperature of the solvent
   1. Increases the solubility of solid, liquid and gaseous solutes
   2. Decreases the solubility of gaseous solute
   3. Affects the solubility of solid solutes only.
   4. Decreases the solubility of solid solutes.
2. What mass of NaCl is needed to prepare 500 mL of a 4 M NaCl solution?
   1. 117 g
   2. 2.00 g
   3. 58.5 g
   4. 4.00 g
3. A student adds 6.00 g of a solid to 30.0 mL of water. What is the concentration of this solution expressed as mass/mass percent? (Assume the density of water to be 1 g/mL-l).
   1. 0.167 % (m/m)
   2. 0.200 % (m/m)
   3. 16.7 % (m/m)
   4. 20.0 % (m/m)
4. What are the concentrations of all species present in an aqueous solution of 0.15 M K3PO4? (square brackets mean ‘concentration’)
   1. [K+] = 0.45 M and [PO43-] = 0.15 M
   2. [K+] = 0.15 M and [PO43-] = 0.45 M
   3. [K+] = 0.15 M and [PO43-] = 0.15 M
   4. [K+] = 0.45 M and [PO43-] = 0.45 M
5. A bottle of white wine contains 12.5% alcohol by mass. What would be the mass of alcohol contained in a 150 mL glass of wine, assuming the density of the wine is 1.00 g/mL?
   1. 8.33 g
   2. 0.188 g
   3. 18.8 g
   4. 9.48 g
6. Which of the following has the greater number of moles of Na+
   1. 20mL of 0.105 mol L-1 NaCl
   2. 200mL of 0.010 mol L-1 Na2CO3
   3. 20mL of 1.050 mol L-1 Na3PO4
   4. 2 L of 0.010 mol L-1 NaCl
7. 15mL of 0.75M H2SO4 is transferred into a 125mL flask and then diluted with distilled water. The concentration in mol L-1 of the diluted solution is:
8. 0.125M
9. 0.500 M
10. 2.00 M
11. 0.090M
12. Lead sulfate can be described as:
13. strong electrolyte
14. weak electrolyte
15. strong conductor
16. weak conductor
17. I and III
18. I and IV
19. II and III
20. II and IV
21. 1.325g of sodium carbonate is dissolved in water and a 250mL solution is made. The concentration of the solution is:
    1. 0.55 mol L-1
    2. 0.50 mol L-1
    3. 5.00 mol L-1
    4. 0.05 mol L-1
22. Which of the following pairs of solutions would form a precipitate when mixed together?
23. Barium chloride and sodium nitrate
24. Copper chloride and sodium sulphate
25. Silver nitrate and Sodium chloride
26. Iron(II) sulphate and potassium nitrate

**PART B: EXTENDED ANSWER AND CALCULATIONS (30 MARKS)**

This section has **5** questions. Answer **all** questions. Write your answers in the spaces provided. When calculating numerical answers, show your working or reasoning clearly. Express numerical answers to the **appropriate number of significant figures** and **include appropriate units** where applicable.

Spare pages are included at the end of this booklet. They can be used for planning your responses and/or as additional space if required to continue an answer.

● Planning: If you use the spare pages for planning, indicate this clearly at the top of the page.

● Continuing an answer: If you need to use the space to continue an answer, indicate in the original answer space where the answer is continued, i.e. give the page number. Fill in the number of the question that you are continuing to answer at the top of the page.

**Question 1 (8 marks)**

The solubility curves below show the change in solubility of a number of ionic compounds in water with a rise in temperature.

Use the graph to answer the following questions.

Potassium nitrate

Potassium chloride

Solute per 100g of H2O (g)

50

Sodium chloride

Copper (II) sulfate

Potassium chlorate

10

0

100

50

Temperature (oC)

1. What can you infer about the relationship between temperature and solubility of ionic compounds in water? (1)

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1. Which of the compounds shown is the most soluble at 10.0°C? ………….. (1)
2. Which compound is the most soluble at 40.0°C? ………………………. (1)
3. Estimate the extra mass of copper sulfate that could be dissolved in 100 mL water at 80.0°C, if 15g of copper sulfate has already been dissolved. (2)

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1. Would an aqueous solution of 45g potassium nitrate in 100 mL water be saturated at 40.0C? Justify your answer. (3)

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**Question 2 (6 marks)**

Using sodium chloride and hydrogen chloride as examples, explain the similarities and differences between ‘ionisation’ and ‘dissociation’.

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**Question 3 (8 marks)**

For the following determine:

1. The concentration of the resulting solution when 60.50 grams of CuSO4 is dissolved in 250mL of water. (3)

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1. The final concentration when 25.0 mL of 12 mol L-1 HCL is diluted with water

to give a final volume of 100.0 mL. (2)

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1. The mass of potassium carbonate required to prepare 150.0 mL of

0.250 mol L-1 solution. (3)

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**Question 4 (4 marks)**

A student tested the conductivity of solutions of:

1. sodium hydroxide
2. acetic acid
3. sugar.

Draw a labelled diagram of the apparatus you would use to test the conductivity of the solutions.

**Question 5 (4 marks)**

0.200 moles of solid MgCl2 are added to a 1.20 L of 1.40 mol L–1 NaCl solution.

Calculate the concentration, in mol L–1, of Cl– ions in the new solution after both the solutions are combined.

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