**Year 11 ATAR Chemistry**

Task 13: Neutralisation and Chemical Kinetics Test

Weighting: 5% of Year Grade

NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

TEACHER’S NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Required Resources:**

Blue or Black pen, Ruler, Calculator, Chemistry Data Book

**Not Allowed:**

Notes, Personal Periodic Tables

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| **SECTION** | **NUMBER OF QUESTIONS** | **AVAILABLE MARKS** | **MARK** |
| Multiple Choice | 10 | 10 |  |
| Short Answer | 11 | 44 |  |

**SECTION A: MULTIPLE CHOICE SECTION (10 marks)**

INSTRUCTIONS

For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. For example, is b is your answer:

If you make a mistake, place a cross through the square and shade your new answer, for example d:

If you then want to use your first answer b, cross out d and circle b:

Text

Description automatically generated with low confidenceText

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Description automatically generated with medium confidence

1. Of the following solutions, which would be best classified as a concentrated solution of a weak electrolyte?
   1. 0.10 molL–1 nitric acid
   2. 6.0 molL–1 potassium hydroxide
   3. 5.0 molL–1 acetic acid
   4. 1.0 molL–1 sugar
2. If 10g of potassium carbonate was dissolved in 220mL of distilled water, the molarity of the solution would be?
   1. 0.10 molL-1
   2. 0.33 molL-1
   3. 0.46 molL-1
   4. 10.0 molL-1
3. The following reaction below depicts the reaction of iron sulphate with potassium permanganate:

2KMnO4(aq) + 8H2SO4(aq) + 10FeSO4(aq) 🡪 K2SO4(aq) + 5Fe2(SO4)3(aq) + 2MnSO4(aq) + 8H2O(l)

If 2.8 mol of KMnO4 is used in the chemical reaction, how many moles of Fe2(SO4)3 will be produced?

1. 1.12 mol
2. 14 mol
3. 7 mol
4. 2.8 mol
5. Which of the following solutions will have the lowest pH at room temperature?
   1. NH3
   2. CH3COOH
   3. Na2CO3
   4. HNO3
6. What volume of a 500ppm solution of iron (III) chloride needs to be diluted to produce a 100 mL solution that has a concentration of 2.5ppm?
   1. 0.5 mL
   2. 2 mL
   3. 12.5 mL
   4. 2.5 mL
7. What is the molarity of a 200ppm solution of potassium chloride?
   1. 2682.8 molL-1
   2. 0.0027 molL-1
   3. 2.68 molL-1
   4. 14.91 molL-1
8. If a few drops of universal indicator was added to hydrochloric acid, the colour of the solution would most likely be…
   1. Purple
   2. Green
   3. Blue
   4. Red
9. What is the best explanation for why ammonia has a lower pH than sodium hydroxide?
   1. Ammonia is a weak acid.
   2. Sodium hydroxide is a weaker base than ammonia.
   3. Sodium hydroxide liberates more hydroxide ions into solution than ammonia.
   4. Ammonia ionizes to a greater extent than sodium hydroxide.
10. *‘Volume is inversely proportional to pressure’* is referenced in which law?
    1. Charles’ Law
    2. Boyle’s Law
    3. The Combined Gas Law
    4. Dalton’s Law
11. Increasing the temperature of a solution will cause the solubility of a gas to:
    1. Decrease
    2. Increase
    3. Remain constant
    4. Randomly fluctuate

**SECTION B: SHORT ANSWER SECTION (44 marks)**

1. For the following reactants:
   1. Produce a balanced chemical equation.
   2. Determine whether or not there will be a precipitate. (6 marks)

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| **Ammonium bromide reacting with silver nitrate.** | |
|  | |
| Will there be a precipitate? |  |
| **Chromium (III) chloride reacting with sodium sulphate.** | |
|  | |
| Will there be a precipitate? |  |

1. Explain the reason why glaciers are able to float in liquid water. (3 marks)

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1. Complete the following table: (4 marks)

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|  | What is an acid? | What is a base? |
| Arrhenius Theory: |  |  |
| Bronsted-Lowry Theory: |  |  |

1. Predict the products of the following chemical reactions: (3 marks)

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| sulfuric acid + iron(III) hydroxide 🡪 |  |
| calcium hydrogencarbonate + nitric acid 🡪 |  |
| ammonium nitrate + sodium hydroxide 🡪 |  |

1. Define the following terms: (3 marks)
   1. Strong electrolyte:

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* 1. Weak electrolyte:

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* 1. Non-electrolyte:

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1. Use a diagram to show how sodium fluoride (NaF) interacts with water molecules when in solution.

(2 marks)

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1. Briefly outline the five postulates of the kinetic gas theory. (5 marks)

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1. Calculate the pH of a solution of magnesium hydroxide that has a molarity of 3.5 x 10-4 molL-1.

(3 marks)

1. An experiment to determine the percentage composition of Na2CO3 in a brand of washing powder involved decomposing a 3.312g sample of the washing powder, according to the reaction shown below. This resulted in the formation of 0.4959g of carbon dioxide:

Na2CO3(s) + 2HCl(aq) → CO2(g) + H2O(l) + 2NaCl(aq)

* 1. From the mass of carbon dioxide formed, find the mass of Na2CO3 present in the sample of washing powder. (3 marks)
  2. Determine the percentage composition by mass of Na2CO3. (2 marks)

1. A 250 mL solution of 1.5 molL-1 nitric acid is reacted with 4.65 grams of aluminium foil. Calculate the volume of hydrogen gas collected if the temperature is 22oC and the pressure is 123 kPa.

(6 marks)

6HNO3(aq) + 2Al(s) 🡪 2Al(NO3)3(aq) + 3H2(g)

1. An enclosed chemical system which had a volume of 4.75 litres was operating at a temperature of 25oC and had a pressure of 105 kPa. Calculate the following values based on changes to the system.
   1. If the temperature was kept constant but the volume was reduced to 2 litres, what would the new pressure be? (2 marks)
   2. With the volume now at 2 litres, the temperature was then increased to 37oC. What would the pressure be now? (2 marks)

**END OF TEST**

Extra working space: