



ALEXANDER ROAD HIGH SCHOOL

MARCH 2016

1 HOUR

PHYSICAL SCIENCE CONTROL TEST

MH, CO, KB

TOTAL = 60

GRADE 11

Instructions

- The question paper consists of 4 questions.
 - Answer all the questions.
 - Answer section A on the answer sheet provided AND section B on folio sheets.
 - Rule off after each question in Section B.
 - A non-programmable calculator may be used.
 - Number the answers correctly according to the numbering system
 - Round off to two (2) decimal places where necessary.
 - A periodic table has been included on the back of the answer sheet
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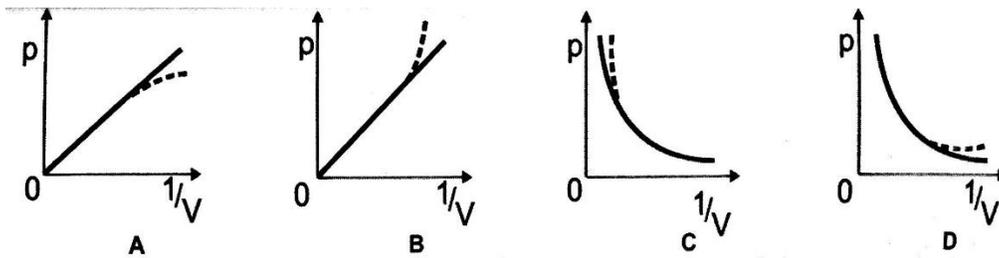
SECTION A

- Answer on the answer sheet -

QUESTION 1: Multiple choice

Four possible options are provided as answers to the following questions. Each question has only ONE correct answer. Choose the answer and make a cross (X) in the block (A–D) next to the question number (1.1 – 1.6) on the attached ANSWER SHEET.

- 1.1 Which one of the following is a NOT a property of an ideal gas?
- A The force of attraction between the molecules is zero
 - B The collisions between the molecules and the walls of the container are elastic
 - C The volume occupied by the gas is equal to the total volume of the molecules
 - D The product of pressure and volume of 1 mole of the gas is constant at constant temperature
- 1.2 The relation between the pressure and $1/v_{\text{volume}}$ for a specific mass of gas at a constant temperature is investigated. Which graph correctly shows the deviation of the behaviour of the real gas (dotted line) versus ideal gas (solid line), at very high pressures?



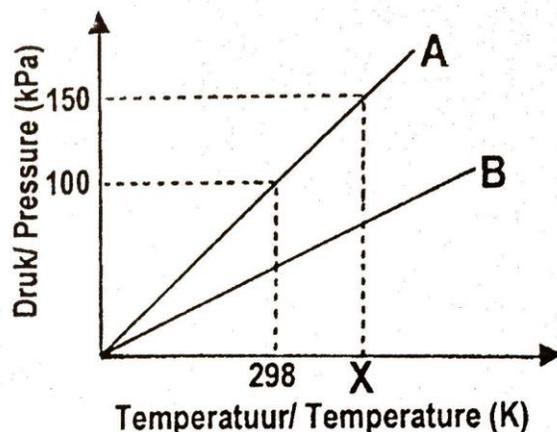
- 1.3 Which would be the most suitable indicator to use in a titration between a strong acid and a weak base?
- A Bromothymol Blue
 - B Phenolphthalein
 - C Litmus Paper
 - D Methyl Orange
- 1.4 Which one of the following is the conjugate acid of NH_3 ?
- A NH_2^-
 - B NH_4^+
 - C NH^{2-}
 - D NH_3
- 1.5 A man is sitting on a crate at the back of a truck that is traveling at constant velocity. The crate is in the middle of the bed of the truck. The truck accelerates. In terms of Newton's First Law, the man will
- A fall backwards
 - B fall to the left
 - C fall to the right
 - D fall forwards
- 1.6 The vector acceleration, a , is negative when ...
- A an object decelerates in a negative direction
 - B an object accelerates in a negative direction
 - C an object decelerates in a positive direction
 - D both B and C

SUB -TOTAL: 12

SECTION B

QUESTION 2 (GASES)

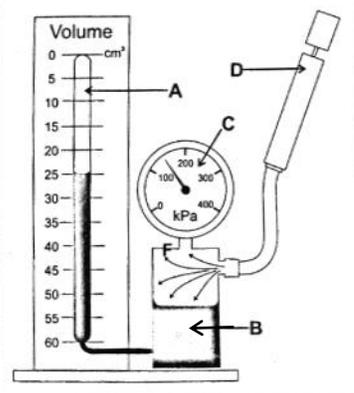
2.1 Two learners, A and B, investigate the relationship between the temperature and pressure of an enclosed gas. The learners used different samples of $\text{SO}_2(\text{g})$ in two identical containers with a fixed volume of 1000 cm^3 . Their results (A and B) were plotted on the same set of axes, as indicated.



- 2.1.1 Write down the mathematical relationship between p and T that can be deduced from the graph. (1)
- 2.1.2 Make use of the relationship in question 2.1.1 and determine the value of the temperature at X on the graph. (4)
- 2.1.3 Determine the mass of $\text{SO}_2(\text{g})$ used by learner **A**. (6)
- 2.1.4 Give a possible reason why the graph obtained by learner B has a smaller gradient than the graph obtained by learner A. (1)

2.2 By referring to the sketch of an apparatus used in investigation relationships in gases, answer the questions:

- 2.2.1 Provide (very) specific labels for A and B. (2)
- 2.2.2 What is the independent variable in this investigation? (1)
- 2.2.3 Name one factor that must remain constant during this investigation. (1)

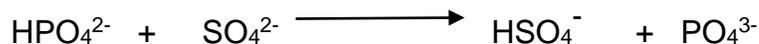


[16]

QUESTION 3 (REDOX AND ACIDS AND BASES)

3.1 Define an acid and base according to the Lowry-Bronsted theory (2)

3.2 Consider the following reaction:



Identify:

3.2.1 The acid

3.2.2 The base

3.2.3 The conjugate acid

3.2.4 The conjugate base (4)

3.3 What is an Ampholyte? (1)

3.4 Lead (Pb) was placed in a solution of silver nitrate (AgNO_3) and the following redox reaction occurred



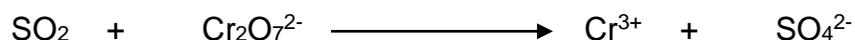
3.4.1 Define **reduction**. (2)

3.4.2 Give the value of the oxidation number of the underlined element (1)

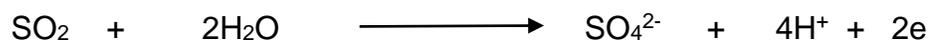
3.4.3 Identify the oxidising agent in the above-mentioned reaction.

Justify your answer by referring to oxidation numbers. (2)

3.5 Consider the following reaction:



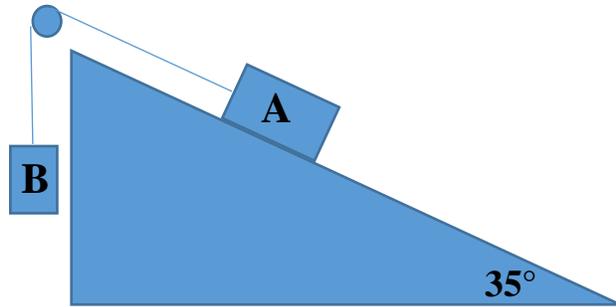
This redox reaction produced the following two half reactions



3.5.1 **Balance** the reaction using the ion – electron method. (4)

[16]

QUESTION 4 (NEWTON)



Consider a block of wood lying on an inclined plane with a *rough* surface. The angle of inclination is 35° . The block has a mass of 6kg. A mass piece with a mass of 4kg is attached to the block of wood by a light, strong string that runs over a pulley in such a way that the string is parallel to the inclined plane as per the diagram. The system is in equilibrium.

- 4.1 Draw a free body diagram of the forces acting on block A. (4)
- 4.2 Draw a force diagram of the forces acting on mass piece B. (2)
- 4.3 Calculate the magnitude of the tension in the string. (2)
- 4.4 Calculate the coefficient of static friction for block A on the inclined surface. (8)

[16]

TOTAL 60 MARKS

