



ALEXANDER ROAD HIGH SCHOOL
PHYSICAL SCIENCE CONTROL TEST

SEPTEMBER 2016
CO, KB, MH

1 HOUR
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.
- Formulas and a periodic table have been included at the end of the question paper

SECTION A

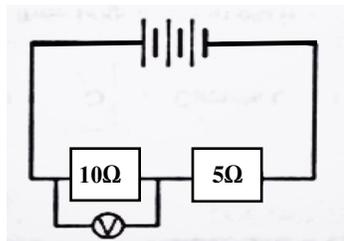
- Answer on the answer sheet -

QUESTION 1: Multiple choice

Four possible options are provided as answers to the following questions. Each question has only 1 correct answer. Choose the correct answer and write the letter (A – D) next to the relevant question number (1.1 – 1.6) on the answer sheet.

1.1 The voltmeter V reads 4V. The emf of the battery is therefore

- A 12 V
- B 8V
- C 6V
- D 4V



1.2 The gradient of a P vs V^2 graph is equal to:

- A R
- B I
- C I^2
- D $1/R$

1.3 Which one of the following is true for SO₂?

	Name of molecular shape	Bonding angle
A	Linear	180°
B	Angular	104.5°
C	Bent	120°
D	Trigonal Planar	120°

1.4 Which of the following is true for PF₅ ?

	Bond	Molecule
A	Polar	Polar
B	Non-Polar	Non-Polar
C	Polar	Non-Polar
D	Non-Polar	Polar

1.5 CO and H₂S is an example of which type of intermolecular force?

- A Ion-dipole forces
- B London dispersion forces
- C Ion-induced dipole forces
- D Dipole-dipole forces

1.6 Mercury has a convex meniscus due to the fact that..

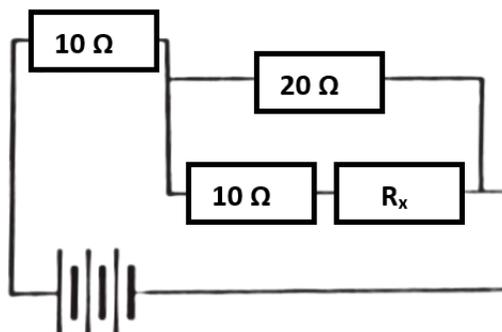
- A the forces of cohesion are stronger than the forces of adhesion
- B the forces of adhesion are stronger than the forces of cohesion
- C the forces of cohesion and adhesion are equal
- D mercury actually has a concave meniscus.

[2 x 6 = 12]

SECTION B

QUESTION 2

- 2.1 A 12 V battery, of negligible internal resistance, is connected in this circuit, with an arrangement of resistors:



- 2.1.1 Calculate the resistance of R_x if the total resistance is $20\ \Omega$. (4)
- 2.1.2 Calculate the current through the $20\ \Omega$ resistor. (4)
- 2.1.3 If the $20\ \Omega$ resistor is removed, how will the current strength in the circuit change? Only write INCREASE, DECREASE or REMAIN THE SAME. Briefly explain your answer. (2)
- 2.2 The circuit in a car that powers the two 50W speakers at the back, delivers acceptable sound. Assume that the speakers are the only things working from the battery at this moment. If these speakers are connected in series, and the car has a 12 volt battery, calculate the resistance of **each** speakers. (3)
- 2.3 Calculate the unit cost of electricity, if it costs 11c to operate a $1800\ \text{W}$ kettle for 2 minutes. (3)

[16]

FORMULAS:

$R = \frac{V}{I}$	emf (ϵ) = $I(R + r)$ emk (ϵ) = $I(R + r)$
$R_s = R_1 + R_2 + \dots$ $\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$	$q = I\Delta t$
$W = Vq$ $W = VI\Delta t$ $W = I^2R\Delta t$ $W = \frac{V^2\Delta t}{R}$	$P = \frac{W}{\Delta t}$ $P = VI$ $P = I^2R$ $P = \frac{V^2}{R}$

QUESTION 3

- 3.1.1 Draw the Lewis structure for NH_3 . (2)
- 3.1.2 Using a sketch, indicate whether the bonds for NH_3 is polar or non-polar.
(show electronegativity and indicate dipoles) (3)
- 3.1.3 Is the NH_3 -molecule polar or non-polar? (1)
- 3.2 Draw the Lewis structure for AlCl_3 . (2)
- 3.2.1 Give the name of the molecular shape for AlCl_3 . (1)
- 3.2.2 Give the bonding angle for an AlCl_3 -molecule. (1)
- 3.2.3 Will an AlCl_3 -molecule be polar or non-polar? (1)
- 3.3.1 Define bond energy. (2)
- 3.3.2 Arrange the following bonds from highest to lowest bond energy.
 $\text{N}\equiv\text{N}$, $\text{C}\equiv\text{C}$, N-N (3)

[16]

QUESTION 4

- 4.1 Arrange the following substances in order of increasing boiling point:
 HCl , N_2 , Br_2 , HF (4)
- 4.2 During an experiment a learner uses **water** as a solvent to dissolve certain solutes.
The learner finds that **KMnO_4 dissolves** in the solvent but **I_2 does not**.
Explain why this is the case. (5)
- 4.3 Explain, by referring to intermolecular forces, why the boiling point of chlorine (Cl_2)
is much lower than the boiling point of water. (5)
- 4.4 Which one of the following substances, BF_3 or NH_3 , will have a higher vapour pressure?
Give a reason for your answer. (2)

[16]

TOTAL 60 MARKS