# WASSCE / WAEC MAY / JUNE 2013 CHEMISTRY PAPER 2 (THEORY) Visit www.larnedu.com for more WASSCE past questions.

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		By Malin			* William !	
1		$(\gamma)$ $Cl(g) + \epsilon$	$e^- \rightarrow Cl^-(g)$	principal and analysis		[6 marks]
N. hi				A4		[6 marks]
V-10	(d) Pota	assium hydroge	n gas and potassi	um hydride exhibit different	t types of bonds.	
	Cop	y and complete	the following tab	le. emy	(log a real of	
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4.43.		Write chemic	cal equations to s	how that aluminium oxide is	Samphotelic.	
	(ii)	Write chemic	cal equations to s	how that aluminium oxide is	s amphoteric.	[6 marks]
13.	(ii)	Write chemic			6.27eV 11.026	[6 marks]
A Comment	(ii) (b) Wr	Write chemic	nemical equation	for the reaction of dilute hyd	6.27eV 11.026	[6 marks]
A STATE OF THE STA	(ii) (b) Wr	Write chemic ite a balanced ch h <b>each</b> of the fol		for the reaction of dilute hyd	6.27eV 11.026	[6 marks]
	(ii) (b) Wr wit (i)	Write chemic ite a balanced ch h each of the fol Zinc metal;	nemical equation llowing substance	for the reaction of dilute hyd	6.27eV 11.026	[6 marks]
	(ii) (b) Wr	Write chemic ite a balanced ch h each of the fol Zinc metal;	nemical equation	for the reaction of dilute hyd	6.27eV 11.026	[6 marks]
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12 A solution has a pOH of 4.5. Calculate the: (i) number of hydrogen ions present in 300 cm<sup>3</sup> of the solution. (ii)  $[NA = 6.02 \times 10^{23} \text{ particles mol}^{-1}]$ [6 marks] Explain briefly each of the following terms: (a) (i) polymer; polymerization. Give two examples each of the following polymers. natural polymer; synthetic polymer. [8 marks] Give the reagents and conditions needed for each of the following conversions.  $CH_3CH = CH_2 \rightarrow CH_4CH_4CH_4OH_1$ CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub> − OH → CH<sub>3</sub>CH<sub>2</sub>C (ii) [7 marks] An organic compound is known to be unsaturated and monocarboxylic acid. In an experiment, 1.39 g of the compound required 20.0 cm<sup>3</sup> of 0.25 mol dm<sup>-3</sup> NaOH for complete reaction. When  $0.417\,\mathrm{g}$  of the compound was hydrogenated,  $100.8\,\mathrm{cm}^3$ of hydrogen measured at s.t.p was required. Calculate the: molar mass of the compound; number of C = C bonds in a molecule of the compound.  $[Vm = 22.4 \text{ dm}^3]$ [10 marks]

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## SECTION II FOR CANDIDATES IN GHANA ONLY

Answer one question only from this section.

- 5. (a) (i) Define each of the following terms:
  - (α) rate of reaction;
  - (β) rate constant;
  - (γ) rate-determining step.
  - (ii) State two factors that determine the rate of a reaction.

[8 marks]

(b) The following table shows the results obtained for the reaction:

$$P+Q \longrightarrow R+S$$
.

Experiment	Initial conc. of P (mol dm <sup>-3</sup> )	Initial conc. of Q (mol dm <sup>-3</sup> )	Initial rate (mol dm <sup>-3</sup> s <sup>-1</sup> )
1	0.01	0.02	· x
2	у	0.02	0.0010
3	0.01	z	0.0020

If the rate =  $125 [P][Q]^2$ , calculate the

- (i) values of x, y and z;
- (ii) overall order of the reaction.

[10 marks]

- (c) (i) Arrange the following compounds in order of increasing solubility.

  MgCl<sub>2</sub>, NaCl. AlCl<sub>3</sub>.

  Give reasons for your answer.
  - (ii) Explain **briefly** why an aqueous solution of iron (II) tetraoxosulphate (VI) turns brown on standing.

[7 marks]

 (a) Explain briefly why a given mass of sodium hydroxide pellets cannot be used to prepare a standard solution.

[3 marks]

- (b) (i) List **two** chemicals used in the laboratory preparation of hydrogen chloride gas.
  - (ii) Write a balanced equation for the laboratory preparation of hydrogen chloride gas.
  - (iii) Mention a chemical that can be used to dry the gas in (b) (i).
  - (iv) Name the method of collection of the gas. Give a reason for your answer.
  - (v) List two physical properties of hydrogen chloride gas.

[9 marks]

- (c) (i) State Dalton's law of partial pressures.
  - (ii) A mixture of gases with total pressure of 120 k Nm<sup>-2</sup> consists of 0.175 moles of hydrogen, 0.067 moles of of nitrogen and 0.025 moles of oxygen at 25 °C. Calculate the:
    - (α) total volume of the gaseous mixture;
    - (β) partial pressure of hydrogen in the mixture. [R = 8.314 Jk<sup>-1</sup>mol<sup>-1</sup>]

[9 marks]

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(d) (i) Give **two** reasons why real gases deviate from ideal behaviour.
(ii) List the **two** conditions under which a real gas would behave ideally.

[4 marks]

# SECTION III FOR CANDIDATES IN NIGERIA, SIERRA LEONE AND THE GAMBIA.

Answer one question only from this section.

- 7. (a) State **one** industrial application of **each** of the following methods of separation:
  - (i) crystallization;
  - (ii) fractional distillation;
  - (iii) filtration.

[3 marks]

- (b) (i) What is a hydrocarbon?
  - (ii) State the major reaction undergone by alkanes.
  - (iii) Write a chemical equation to illustrate the reaction stated in (b) (ii).
  - (iv) State two principal sources of hydrocarbons.

[7 marks]

- (c) (i) Define the term isomerism.
  - (ii) Draw the structures of **two** isomers **each** of  $C_4H_8$  and  $C_4H_{10}$ .
  - (iii) (α) State the **two** types of bonds formed between the unsaturated carbon atoms in C<sub>5</sub>H<sub>6</sub>.
  - ( $\beta$ ) Describe briefly how the bonds stated in (c) (iii) ( $\alpha$ ) are formed.
  - (iv) Consider the following groups of organic compounds: alkanes and alkenes.
    - (α) Which of the compounds is more reactive?
    - ( $\beta$ ) Give reasons for your answer in (c) (iv) ( $\alpha$ ).

[12 marks]

- (d) Name the precipitate formed in **each** case when aqueous solution of the following pairs of compounds are mixed:
  - (i) BaCl, and ZnSO.;
  - (ii) Na,CO<sub>3</sub> and Pb(NO<sub>3</sub>)<sub>2</sub>;
  - (iii) MgCl, and AgNO.

[3 marks]

- 8. (a) (i) Define the term mole.
  - (ii) The mass spectrum of carbon shows two peaks at masses 12.00 and 13.00. Calculate the relative atomic mass of carbon given that the relative abundance of the two isotopes are 95% and 5%.

[6 marks]

- (b) (i) Give two properties of ammonia.
  - (ii) Name the process by which ammoniacal liquor can be obtained from coal.
  - (iii) List **two** other products of the reaction in (b) (ii).
  - (iv) Sketch and label an energy profile diagram to show the effect of platinum (Pt) on the reaction represented by the following equation:

 $4NH_3 + 5O_2 \xrightarrow{Pt} 6H_2O + 4NO; \Delta H = -905 \text{ kJ mol}^{-1}$ 

[11 marks]

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