Name	Index.no	Adm. no
Class	Candidate's signature	Date

233/2**CHEMISTRY** Paper 2 THEORY **JULY/AUGUST 2016** 2 Hours

KAMDARA JET - 2016

INSTRUCTIONS:

- Answer ALL the questions in the spaces provided in the question paper.
 All working MUST be clearly shown where necessary
 This paper at

- Mathematical tables and electronic calculators may be used.

QUESTION	MAXIMUM	SCORE		
	SCORE			
1	, ri ^{e®} 11			
2	www. 11			
3 visit	13			
4 65	11			
5.00	13			
⁶ 6	9			
offic 7	12			
Total score	80			

FOR EXAMINER'S USE ONLY

g) Give one use of element M.

1. The grid below represents part of the periodic table. Study it and answer the questions that follow. The letters do not represent the actual symbols of the element.

			Ν	S		
Κ	Q	0		Р	F	М
	R					

a) What name is given to the group of elements to which Q and R belong?

b) Write the formula of the compound formed when Q and P combine.

(1 mark)

(1 mark)

(1 mark)

call.072050247 d) How does the atomic radii of O and P compare? Give a reason.

c) Name the type of bond formed in (b) above.

(2 marks)

w.treekcsepastpat e) Draw a dot (•) and cross (x) diagram for the compound formed between N and F. tor thee past papers visit

(1 mark)

f) Explain how you would obtain a pure sample of the carbonate of K from its mixture with Lead carbonate powder.

(2 marks)

(1 mark)

II.Compounds

(i)

(ii)

2. The list below shows the formulae of some organ	nic compounds. Use letters T1 to T6 to a	answer the
questions that follow.		
$T_1 - CH_3CH_2CH_2CH_2CH_3$		
$T_2 - CH_3CH_2CH_2COOC_2H_5$		
$T_3 - CH_3CH_2CH_2CH_2OH$		
$T_4 - CH_3CH_2CH_2COOH$		
$T5 - CH_3CH_2CHCH_2$		
$T_6 - CH_3CCCH_3$		
(a)Select two compounds which:		1 1 \
(1) Are not hydrocarbons	()	lmk)
	20	
(ii) Would decelourise both bromine water and acidified	notossium mongonite (VIII)	$ \mathbf{m} _{r}$
(ii) would decolourise both bronnine water and actumed		IIIK)
	"·O'	
(iii) Would produce hydrogen gas when reacted with pot	assium metal	1mk)
(iii) would produce ity arogen gas when reacted with pou		THK)
(b) Select a compound which would produce bubbles of	a gas when reacted with sodium carbona	ate.(1mk)
())		
	AR ^{ON}	
\$c.		
(c) (i)Identify the compound that is likely to undergo pol	lymerization. Give a reason for your ans	swer.
Using two molecules show how polymerization occurs.		
I. Compound	(1mk)	
······································		
II. Reasons	(1mk)	
oet ⁵		
, pak		
AS .		
III. Polymerization	(1mk)	
.ot The second s		
Ň		
(iv) Name the groups have high as many and T is formed	and identify the common do that me	ad to form
(1) Name the process by which compound I_2 is formed :	and identify the compounds that were us	sed to form
II. I Drocess	(1 mk)	
1. 1 100055	(1111K)	

h) The melting point of M is -189°C lower than that of F -102°C. Explain this difference in their melting points.

(1mk)

 $C_4H_9OH_{(1)} + O_2(g) \longrightarrow C_3H_7COOH_{(aq)} + H_2O_{(1)}$ Given the following information: ΔH_c for C₄H₉OH = - 4910 kJ/mol ΔH_c for C₃H₇COOH = - 4090 kJ/mol Determine the heat change for the reaction above.

- 3. a) What is meant by the term molar enthalpy of combustion?

 - $C_{(s)}+ O_{2(g)} \longrightarrow CO_{2(g)} \Delta H = -393 k Jmol^{-1}$ $H_{2(g)} + \frac{1}{2} O_{2(g)}$ — \rightarrow H₂O₍₁₎ Δ H = - 286 kJmol⁻¹ Enthalpy of combustion of ethanol $\Delta H = -1369 \text{kJ/mol}$

ii) Determine the enthalpy of formation of ethanol

(1 marks)

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- comor call. 0120502419 b) The enthalpies of combustion of carbon, hydrogen and ethanol are given below. i) Draw an energy cycle diagram that links the enthalpy of formation of ethanol to enthalpies of combustion of Carbon, hydrogen and ethanol. tor the (3 marks)

c) An experiment was carried out where different volumes of dilute nitric acid (v) acid and

(1mks)



aqueous potassium hydroxide both at 25°C were mixed and stirred with a thermometer. The highest temperature reached by each mixture was recorded in the table below.

Volume of nitric (V)									
acid (cm ³)	4	8	12	16	20	24	28	32	36
Volume of potassium									
hydroxide cm ³	36	32	28	24	20	16	12	8	4
Highest temperature									
of mixture	19.8	22.2	24.6	27.0	27.0	25.0	23.0	21.0	19.0

Plot a graph of highest temperature (vertical axis) against volume of nitric acid. (horizontal axis) 3mks



Using your graph, determine the;

- ii) The volume of the acid that reacted when the highest temperature is reached.
- iii) The amount of heat liberated during the neutralization process (Specific heat capacity is 4.2jg⁻¹K⁻¹ and the density of solution is 1.0gcm⁻³

d) The molar enthalpies of neutralization for dilute hydrochloric acid and dilute nitric (v) acid are - 55 KJmol⁻¹.while that of ethanoic acid is -52.2kJ/mol. Explain this observation. (2 mks)



 $(\frac{1}{2} \text{ marks})$

(2 marks)

$Cu^{2+}(aq) + 2e-$	$Cu(s) E \theta = + 0.34V$	
$\operatorname{Zn}^{2+}(\operatorname{aq}) + 2e$ -	$Zn(s) \qquad E \theta = -0.76V$	

(e)The table below shows the electrode potentials.

What is the value of the voltage of the cell?

(f)The switch is kept closed. State and explain the observation expected after sometime on the (i)The zinc rod. (2mks)



(a)Name the raw materials fed into the blast furnace.

(b)Name 3 exhaust gases emitted from the blast furnace.

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 $(1\frac{1}{2}mks)$

(2mks)

(2mks)

	(c)(i)Why is it necessary to convert pig iron into wrought iron	(1mk)
	(ii)State one commercial use of iron.	(1mk)
A	(d)Name substances	(2½mks)
В		
С		
Х		
Y		
(e) (i)]	Write equations for reactions in steps I	
III	(2mks)	
(ii)	Write an ionic equation for the reaction in step I. (1mk)	
(iii I)What observations are made in steps? (2mks)	
Π	i sit.	
	6. Study the flow chart below and answer the questions that follow.	
	Brine Ammoniacal Tower P Filter	
	Gas Q F	



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- b) Name solution F and solid X (1 mark)
 Solution F _______
 Solid X ______
 c) Name the product L formed and give one of its uses (2 marks)
 Product L _______
 Use ______
 Use _______
 d) Write equation of the reaction in the;
 i) tower P _______
 ii) chamber K _______
 e) Name two raw materials required in the manufacture of Sodium carbonate
 (2 marks)
- f) Write an equation of the reaction when solid x is heated.

(1 mark)

7. The table below shows the volume of nitrogen (IV) Oxide produced when different volumes of 1M Nitric (V)acid – were each reacted with 4.14g of lead at room temperature.

Volume of 1 M Nitric (V) acid (cm ³)	Volume of Nitrogen (IV) oxide gas (cm ³)
10	120
30	360
50	600
70	840
90	960
110	960

(a)Explain how the rate of the reaction between lead and nitric (V) acid would be affected if the temperature of the reaction mixture was lowered. (1mks)

(b)On the grid provided below plot a graph of the volume of the gas produced (vertical axis) against volume of acid. (3mks)



- (c) Using the graph, determine the volume of miles (i) Nitrogen (IV) oxide production in the second (i) Nitrogen (IV) oxide produced when 60cm³ of 1M Nitric (V) acid were reacted with 4.14g of lead. (1mk)
- (ii) 1M Nitric (V) acid which would react completely with 4.14g of lead. forth

(1mk)

- (d) Using the answer in d(ii)above, determine
- (i) The volume of 1M Nitric (V) acid that would react completely with one mole of lead. (Pb = 207).(2mks)
- (e) Calculate the number of moles of
- (i) 1M Nitric (IV) acid reacted with one mole of lead.

(1mk)

(ii) Nitrogen (IV) oxide produced when one mole of lead were reacted with excess nitric acid. (Molar gas volume is 24000cm³). (1mk)

(f) Using the answers obtained in e(i) and e(ii) above; write the equation for the reaction between lead and nitric (V) acid given that one mole of lead (II) nitrate and two moles of water were produced. (1mk)

(g) Give a reason why nitric (V) acid is stored in dark bottles.

(1mk)

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