SULIT
4541/1
Kimia
Kertas 1
September
2005
1¼ jam

PEPERIKSAAN PERCUBAAN SPM 2005
MAKTAB RENDAH SAINS MARA

KIMIA

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. *Kertas soalan ini adalah dalam dwibahasa.*

2. *Soalan di halaman kiri adalah dalam bahasa Melayu. Soalan di halaman kanan adalah yang sepadan dalam bahasa Inggeris.*

3. *Calon dikehendaki membaca maklumat di halaman 2 atau halaman 3*

Kertas soalan ini mempunyai 53 halaman bercetak

INFORMATION FOR CANDIDATES

1. *This question paper consists of 50 questions.*

2. *Answer* **all** *questions.*

3. *Answer each question by blackening the correct space on the answer sheet.*

4. *Blacken only* **one** *space for each question.*

5. *If you wish to change your answer, erase the blackened mark that you have made. Then blacken the space for the new answer.*

6. *The diagrams in the questions provided are not drawn to scale unless stated.*

7. *You may use a non-programmable scientific calculator.*

Question 1 *to* **Question 50***, are followed by four options* **A, B, C,** *and* **D.** *Choose* **the best option** *for each question and* **blacken** *the corresponding space on the objective answer sheet.*

1 Atom X has a proton number 9 and the nucleon number is 19. Which of the following symbols is for atom X?

A $^{10}_{9}X$

B $^{19}_{9}X$

C $^{19}_{10}X$

D $^{9}_{10}X$

2 Which of the following electron arrangement of an atom has eight electrons valence?

A 2.6

B 2.8.2

C 2.8.8

D 2.8.8.2

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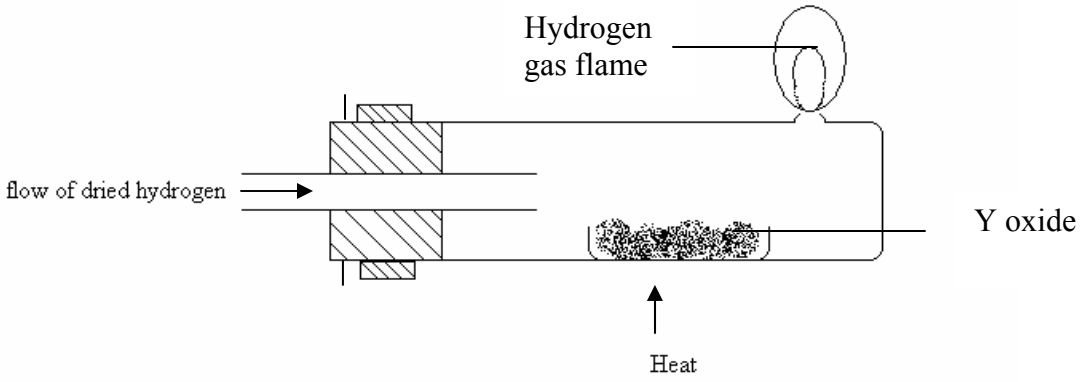
3 The diagram shows the method used to determine the empirical formula of a metal oxide Y.



Which of the following oxide is possible for metal oxide Y?

A Zinc oxide

B Sodium oxide

C Magnesium oxide

D Copper(II) oxide

4 Which of the following gases is a monoatom gas?

A Fluorine

B Helium

C Oxygen

D Nitrogen

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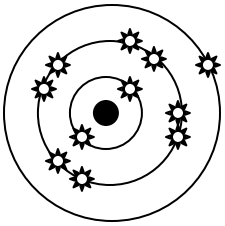
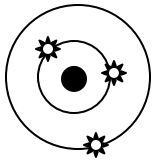
5 The diagram shows the electron configuration of lithium atom and sodium atom.



Sodium



Lithium

Both atoms are in Group 1 of the Periodic Table. Which of the following statements are true about lithium and sodium element?

I The size of lithium atom is smaller than sodium atom
II The density of sodium is less than lithium
III The hardness of sodium is higher than lithium
IV The melting point of lithium is higher than sodium

A I and II only
B II and III only
C I and IV only
D I,II,III and IV

6 In liquid state oxygen molecules are held together by

A Van der Waals forces
B electrostatic force
C covalent bonding
D hydrogen bonding

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7 Chlorine gas reacts with water to form a

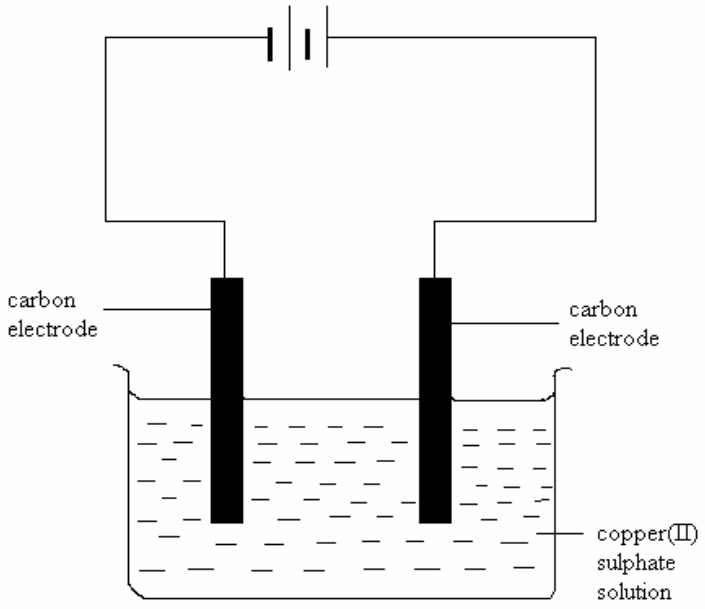
A brown coloured solution

B yellow coloured solution

C solution of pH 12

D solution that bleaches the colour of litmus paper.

8 The diagram shows the set-up of the apparatus for an electrolytic cell.



Which of the following ions are attracted to anode and cathode?

	Anode	Cathode
A	SO_4^{2-}	Cu^{2+}
B	Cu^{2+}	OH^-
C	SO_4^{2-}, OH^-	Cu^{2+}, H^+
D	Cu^{2+}, H^+	SO_4^{2-}, OH^-

[Lihat sebelah

9 Which of the following statements are true about dry cell?

I The cell is rechargeable

II Zinc is the negative electrode

III Sodium hydroxide is the electrolyte in the cell

IV The presence of manganese(IV) oxide reduces cell polarization

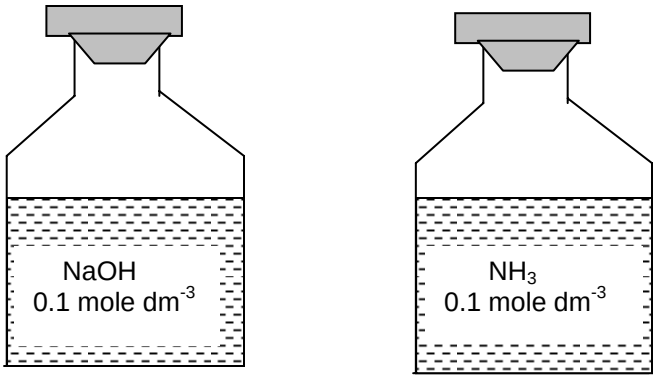
A I and II only

B II and IV only

C I, II and III only

D I, II, III and IV

10 The figures show two aqueous solutions.



Which of the following statements is true?

A Both solutions are strong alkaline

B The pH of both solutions are equal

C Both solutions are strong electrolyte

D 25.0 cm^3 of each solution requires 25.0 cm^3 of 0.1 mole dm^{-3} hydrochloric acid to be neutralized

[Lihat sebelah

11 Which of the following facts is matched correctly?

	Acid formula	Types of acid	Basicity of acid
A	HNO_3	Weak acid	3
B	H_2CO_3	Strong acid	2
C	HCl	Weak acid	1
D	H_2SO_4	Strong acid	2

12 Which of the following salts is water soluble?

A Calcium sulphate

B Silver chloride

C Sodium carbonate

D Lead(II) sulphate

13 The table shows industrial products and their usage.

	Industrial product	Usage
I	Photochromic glass	Boiling tube
II	Ceramic	Heat resistant kitchen ware
III	Concrete	Railway track base
IV	Fiber glass plastic	Water storage tank

Which of the following are true?

A I and III only

B II and III only

C II and IV only

D II, III and IV only

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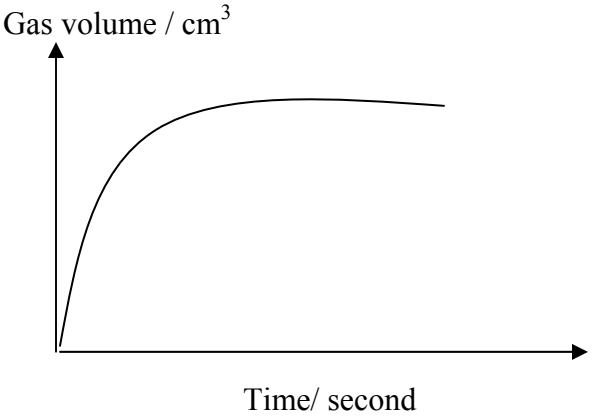
14 The graph shows the volume of gas produced against time for the reaction of sodium carbonate and hydrochloric acid.



The gradient of the graph decreases with time because

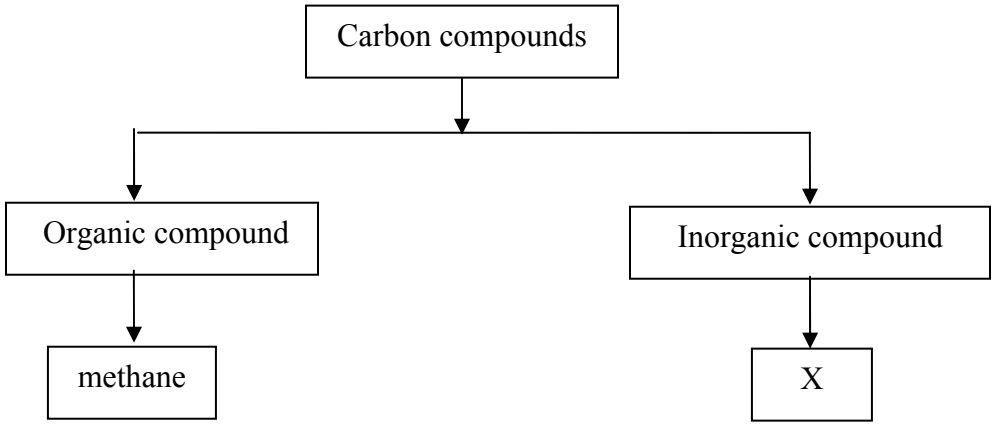
A catalyst is not used

B temperature of reaction decreases

C volume of mixture decreases

D concentration of hydrochloric acid decreases

15 The chart shows the classification of carbon compounds.



X is

A carbon dioxide

B ethanoic acid

C methanol

D glucose

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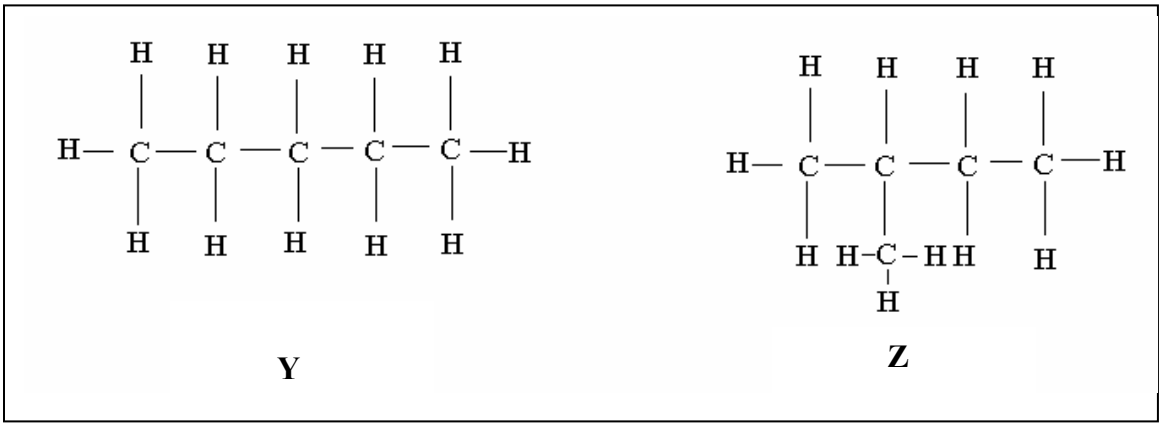
16 The diagram shows structural formulae of substances Y and Z.



Substances Y and Z have similar

A boiling points

B molecular formulae

C structural formulae

D IUPAC names

17 Which of the following statements refer to oxidation?

I Process of losing oxygen

II Process of gaining hydrogen

III Process of losing electrons

IV Process of increasing oxidation number.

A I and II only

B III and IV only

C I, II and III only

D I, II , III and IV.

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18 The following ionic equation represents a redox reaction

$$2\,Fe^{2+} + Br_2 \rightarrow 2\,Fe^{3+} + 2\,Br^-$$

Which of the following statements is true?

A Iron(II) ion , Fe^{2+} has been oxidized

B Iron(III) ion , Fe^{3+} has been reduced

C Bromine is the reducing agent

D Oxidation number of bromine increases from +1 to +2

19 The following thermochemical equation represents the formation of hydrogen chloride gas.

$$H_{2\,(g)} + Cl_{2\,(g)} \rightarrow 2\,HCl_{(g)} \qquad \Delta H = -x\ kJ\ mole^{-1}$$

Which of the following statements are true for the reaction?

I It is an endothermic reaction.

II Heat energy is absorbed during bond breaking of hydrogen and chlorine molecules

III Heat energy is released during the formation of hydrogen chloride molecules

IV x kJ of heat is liberated when 1 mole of hydrogen chloride produced.

A I and III only

B II and IV only

C I , II and III only

D II , III and IV only

[Lihat sebelah

20 Which of the following medicine and its usage have been matched correctly?

	Medicine	Usage
I	Streptomycin	Pneumonia treatment
II	Aspirin	Releasing pain
III	Amphetamine	Controlling depression
IV	Insulin	Diabetes mellitus treatment

A I and III only

B II and IV only

C I , II and IV only

D I , II , III and IV

21 The melting point and boiling point of substance M is $-37\,^{0}$C and $5\,^{0}$C respectively.

The physical state of substance M at room temperature is

A gas

B liquid

C solid

D gas and liquid

22 The table shows atoms with their respective proton number.

Atom	Proton Number
W	7
X	9
Y	17
Z	19

Which of the following pairs have the same chemical properties?

A W and Y

B W and X

C X and Y

D X and Z

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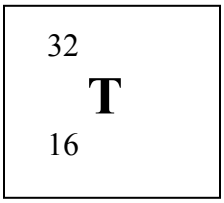
23 The diagram shows the atomic symbol of element T.



Which of the following combination represents the ionic formula and electron arrangement of ion T?

	Ionic Formula	Electron arrangement
A	T^{2-}	2.8.8
B	T^{2+}	2.8.8
C	T^{2-}	2.8.6
D	T^{2+}	2.8.4

24 The number of valence electrons for atoms X and Y are 5 and 7 respectively. Which of the following chemical formula and type of bonding are true for the compound formed between X and Y?

	Chemical Formula	Type of bonding
A	XY_2	ionic
B	XY_2	covalent
C	XY_3	covalent
D	XY_3	ionic

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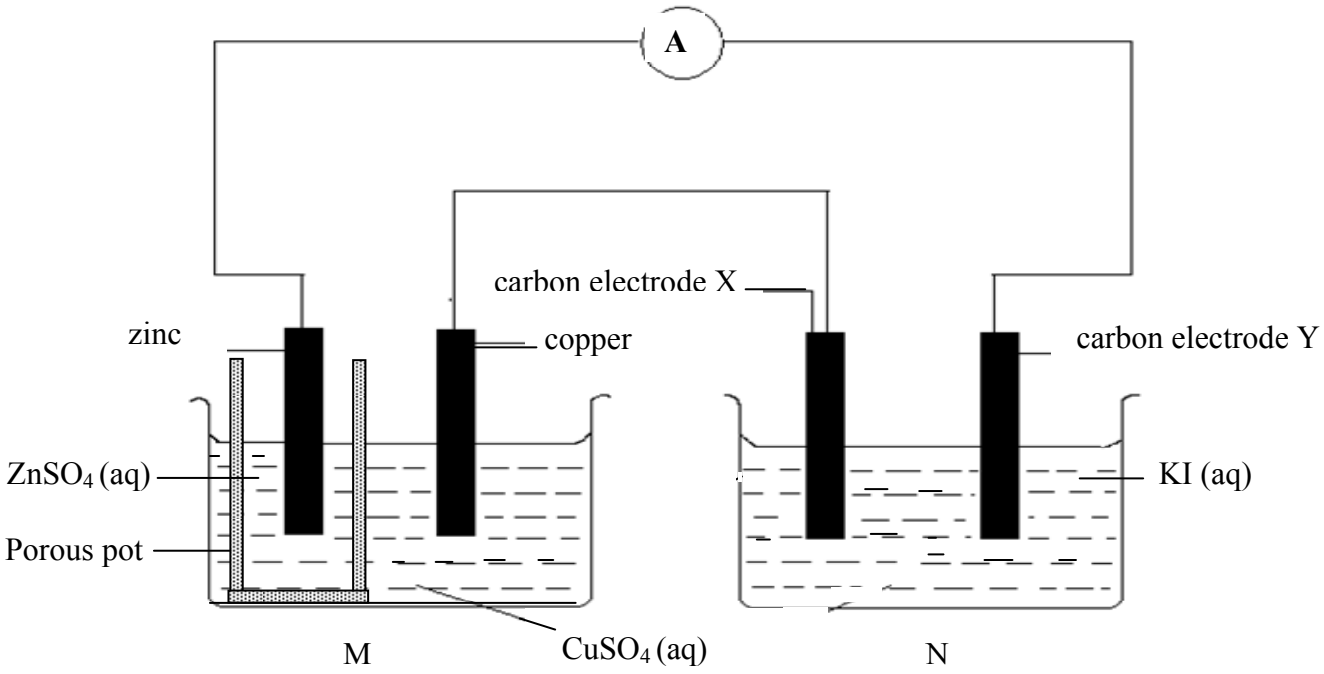
25 The diagram shows the set up of the apparatus for an electrochemical cell



What is the observation expected for this experiment?

A Brown gas is released at electrode X

B Zinc electrode becomes thinner

C Gray deposit is formed at electrode Y

D Intensity of blue colour in beaker M does not change

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26 The table shows the observation of the experiment on solution P.

Experiment	Observation
Add sodium hydroxide solution gradually until in excess	White precipitate formed and dissolved in excess sodium hydroxide solution
Add ammonia aqueous gradually until in excess	White precipitate formed and does not dissolved in excess ammonia aqueous

Possible cations for solution P are

I Mg^{2+}

II Zn^{2+}

III Al^{3+}

IV Pb^{2+}

A I and II only

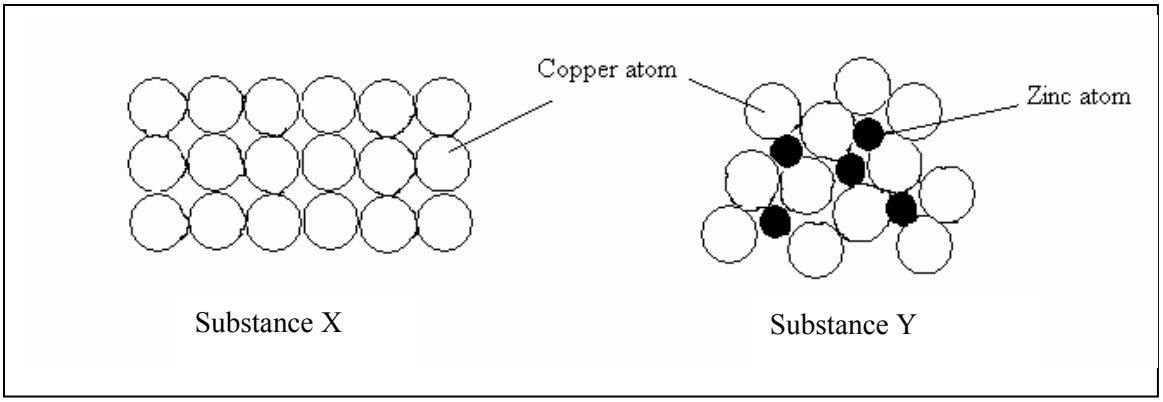
B I and IV only

C II and III only

D III and IV only

[Lihat sebelah

27 Diagram shows the atomic arrangements of substances X and Y.



Substance Y is harder than substance X because atoms in Y

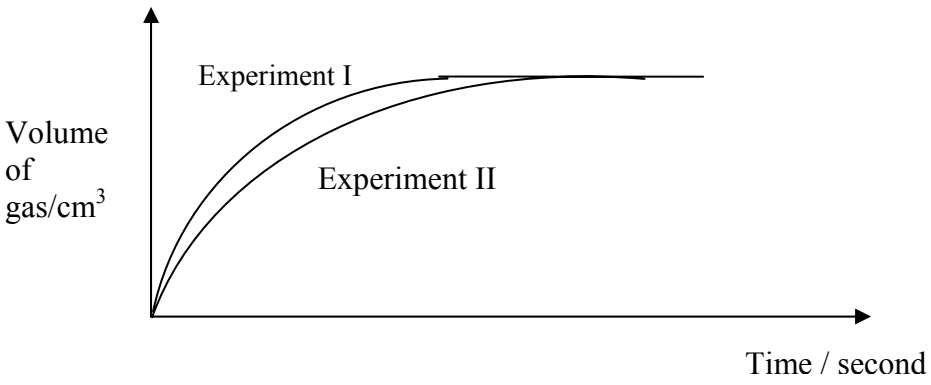
A are strongly bonded to each other

B are closer to each other

C do not slip easily

D are properly arranged

28 The graph shows the total volume of carbon dioxide against time for the reaction between calcium carbonate and excess hydrochloric acid.



Which of the following will produce the curves shown?

A Both experiments conducted in different temperature

B Both experiment conducted by using the same acid concentration

C Smaller size of calcium carbonate granules is used in experiment II

D Mass of calcium carbonate used in experiment I is greater.

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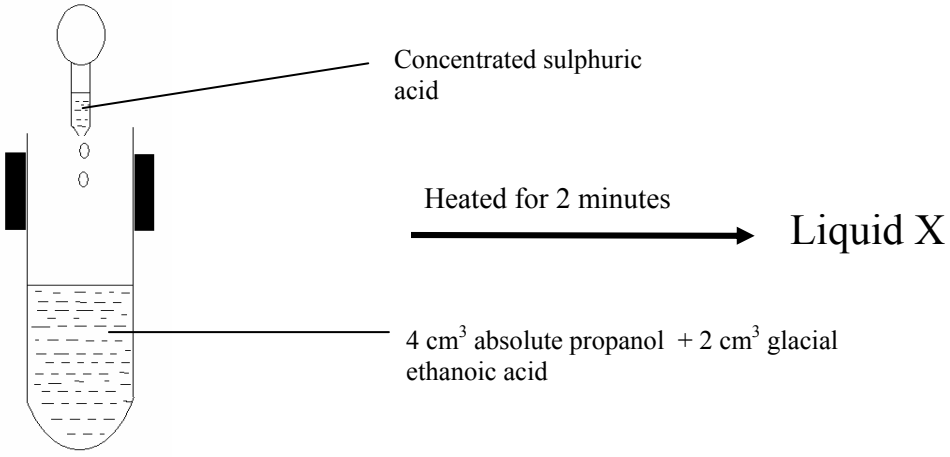
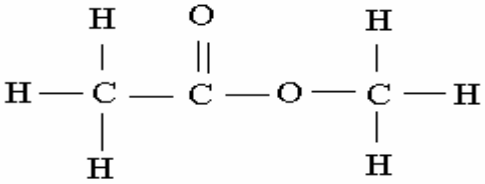
29 The diagram shows a chemical reaction to form a sweet scented liquid X.

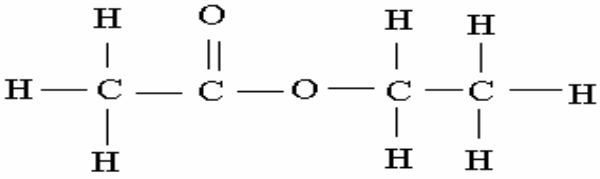


Which of the following structural formulae represents liquid X?

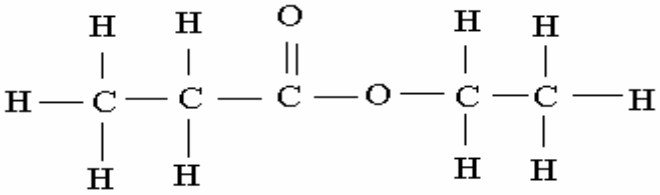
A



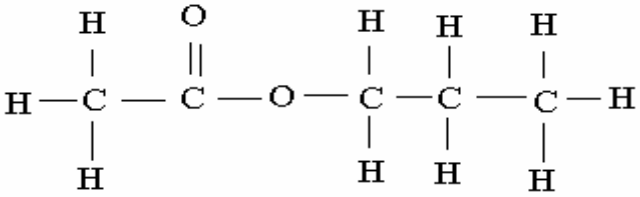
B



C



D



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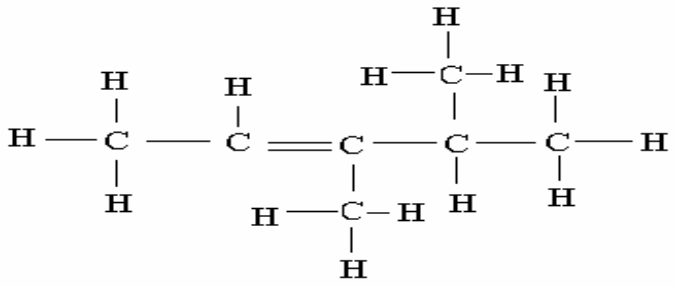
30 The diagram shows structural formula of a carbon compound.



IUPAC name for this compound is

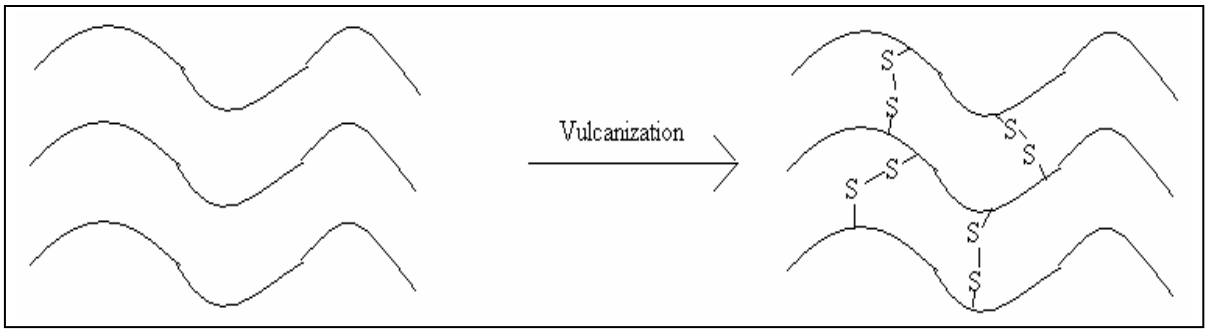
A 3,4-methylpent-3-ene

B 2,3-dimethylpent-2-ene

C 2,3-dimethylpent-3-ene

D 3,4-dimethylpent-2-ene

31 The diagram shows the structural change caused by the vulcanization of material P.



Material P **Material Q**

Which of the following statements are true about the diagram?

I Q is harder than P

II Q is easily oxidized compared to P

III Q is more elastic than P

IV Q is more heat resistible than P

A I and III only

B II and IV only

C I, III and IV only

D I, II, III and IV

[Lihat sebelah

32 The oxidation number of copper increases when

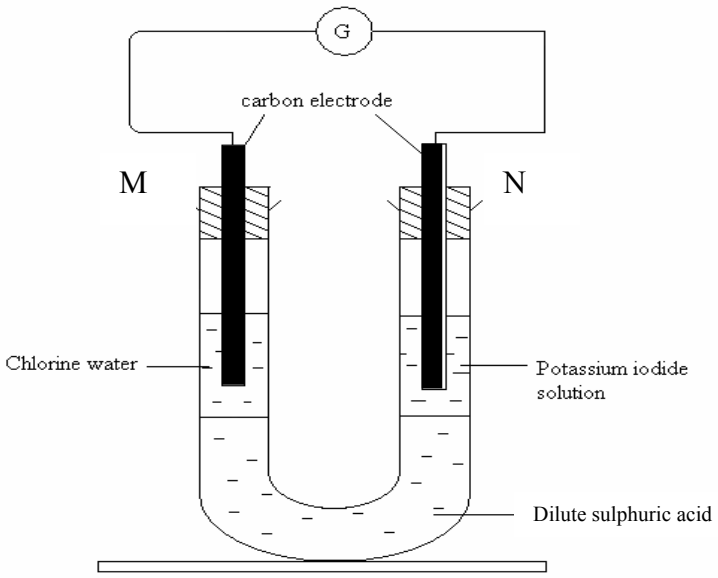
A copper(II) carbonate powder is strongly heated

B copper(II) oxide reacts with dilute sulphuric acid

C a piece of zinc strip reacts with copper(II) nitrate solution

D a piece of copper strip reacts with silver nitrate solution

33 The diagram shows an experiment of transferring electron at a distance.



Which of the following statements are true?

I Iodide ions act as a reducing agent

II A yellow-brownish solution is formed at N electrode

III Electrons transfer through the sulphuric acid solution

IV Yellow-greenish bubbles is released at M electrode

A I and II only

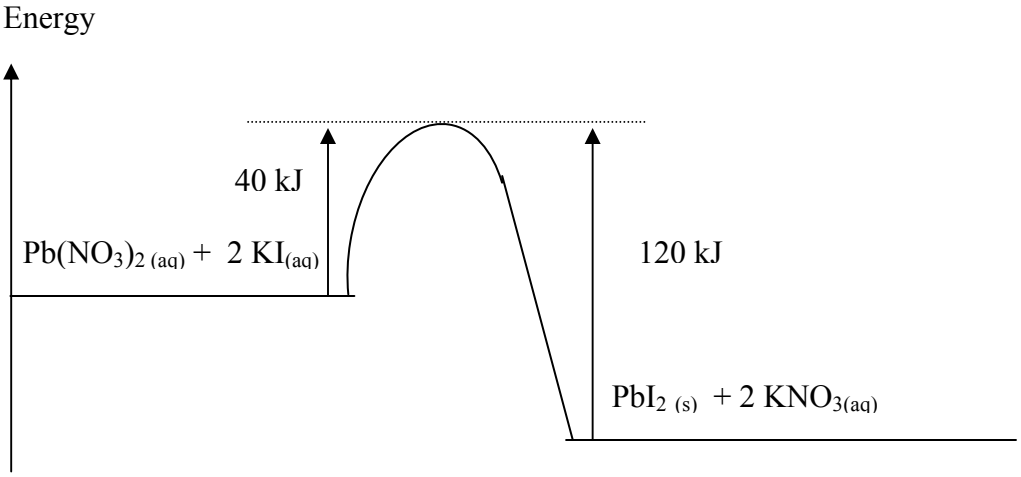
B II and III only

C I, III and IV only

D I, II, III and IV

[Lihat sebelah

34 The diagram shows the energy level of a chemical reaction



Which of the following statements can be inferred from the diagram?

I Formation of 1 mole of lead(II) iodide releases 80 kJ of heat.

II Activation energy for the reaction is 120 kJmole^{-1} of heat.

III 80 kJ of heat energy is released when 1 mole of lead(II) nitrate reacts with 2 moles of potassium iodide.

IV Ionic equation for the reaction is $K^{+}_{(ak)} + NO_3^{-}{}_{(ak)} \rightarrow KNO_{3\,(ak)}$

A I only

B I and III only

C III and IV only

D I , II , III and IV

35 The cleansing effect of detergent is more effective in hard water compared to soap because detergent

A forms a soluble salt with metal ion in hard water

B has hydrophobic part which is more soluble in hard water.

C has hydrophilic part which is more soluble in water

D has hydrocarbon chain which makes detergent dissociate less in hard water

[Lihat sebelah

36 Ion M^{3-} has 16 neutrons and the electron arrangement is 2.8.8
What is the nucleon number of element M?

A 15
B 16
C 31
D 34

37 An oil tanker ship collided with a barrier reef and spilled 8×10^{7} m^3 of oil. If the size of one molecule of oil is 2×10^{-9} m estimate the area covered by the spilled oil?

A 2.5×10^{15} m^2
B 2.5×10^{16} m^2
C 4.0×10^{15} m^2
D 4.0×10^{16} m^2

38 Which of the following amount of substances contains the same number of atom as in 0.69 g of sodium?
Use the information that the relative atomic mass of C = 12, O = 16, Na = 23, Ca = 40 and the Avogadro constant = 6×10^{23} $mole^{-1}$

A 0.06 g hydrogen gas
B 0.12 g calcium
C 0.48 g oxygen gas
D 0.69 g carbon

[Lihat sebelah

39 The following equation represents the reaction between hydrochloric acid with excess powdered zinc.

$$Zn + 2\,HCl \rightarrow ZnCl_2 + H_2$$

If 19.50 g of powdered zinc reacts with 100 cm^3 of 2.0 mol dm^{-3} hydrochloric acid, what is the mass of the unreacted zinc?
Use the information that the relative atomic mass of Zn = 65.

A 13.0 g
B 6.5 g
C 0.4 g
D 0.3 g

40 The equation shows a precipitation reaction of potassium phosphate

$$\boldsymbol{a}\ K_3PO_{4\,(aq)} + \boldsymbol{b}\ Ca(NO_3)_{2\,(aq)} \rightarrow \boldsymbol{c}\ KNO_{3\,(aq)} + \boldsymbol{d}\ Ca_3(PO_4)_{2(s)}$$

The corresponding values of ***a*** , ***b***, ***c***, and ***d*** are

A 1 , 6 , 3 , 2
B 2 , 3 , 6 , 1
C 6 , 2 , 1 , 3
D 3 , 1 , 2 , 6

[Lihat sebelah

41 The table shows the proton number of five atoms U, V, W , X and Y.

Atom	Proton number
U	10
V	12
W	14
X	17
Y	19

Which of the following pairs formed a compound with high melting and boiling points?

A U and W

B V and Y

C X and Y

D W and X

42 The table shows the results of an experiment on chemical cell using different pairs of metal electrodes immersed in a copper(II) sulphate solution.

Electrodes		Voltmeter reading/ V
Positive	Negative	
P	Q	0.5
P	S	2.7
Q	R	1.0
R	S	1.2

The ascending arrangement according to the tendency of releasing electrons is

A S, R, Q, P

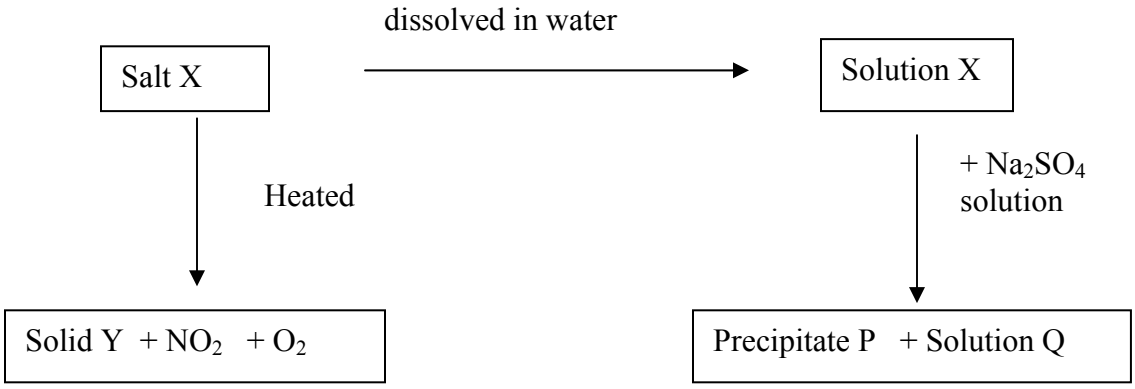
B P, Q, S , R

C P, R, Q, S

D P, Q, R , S

[Lihat sebelah

43 The flow chart shows the analysis process of salt X. The heating of salt X yields residue Y that is brown when hot and turns yellow when cold.



Which of the following pairs represent solid Y and precipitate P?

	Solid Y	**Precipitate P**
A	Lead(II) oxide	Lead(II) sulphate
B	Zinc oxide	Zinc nitrate
C	Zinc oxide	Zinc sulphate
D	Lead(II) oxide	Lead(II) nitrate

44 The table shows the total volume of hydrogen gas collected at regular time interval for the reaction between magnesium and nitric acid.

Time/ s	0	30	60	90	120
Gas volume / cm^3	0	15	25	30	30

What is the average rate of the reaction.

A 0.25 $cm^3 s^{-1}$

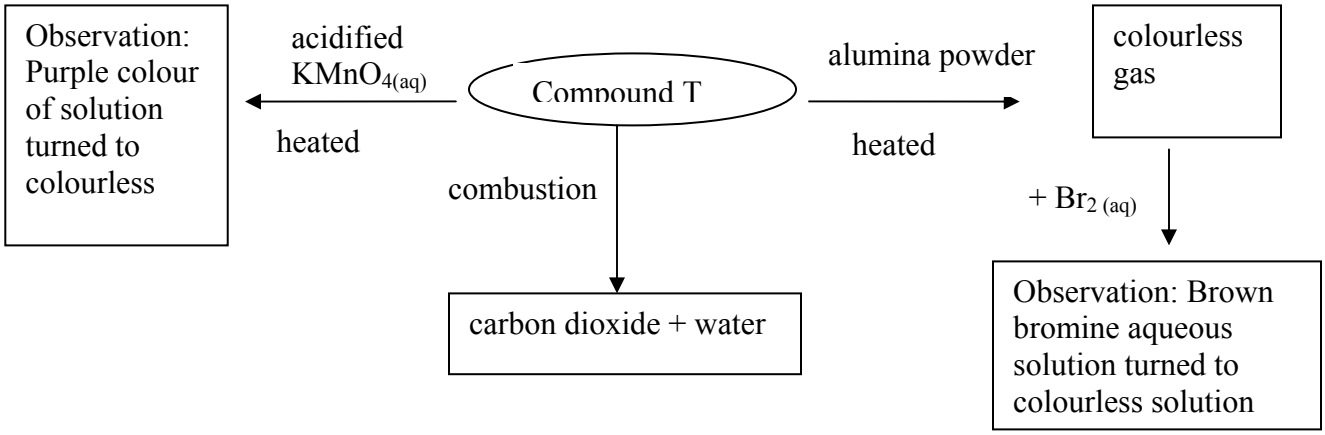
B 0.33 $cm^3 s^{-1}$

C 0.83 $cm^3 s^{-1}$

D 1.11 $cm^3 s^{-1}$

[Lihat sebelah

45 The flow chart shows the chemical properties of a compound T.



Which of the following compounds have similar chemical properties as compound T?

I Ethanol
II Ethene
III Propanol
IV Ethanoic acid

A I and II only
B I and III only
C III and IV only
D I, III and IV only

46 What is the oxidation number of sulphur in $Na_2S_2O_3$?

A +2
B +3
C +4
D +6

[Lihat sebelah

47 The following ionic equation shows the reaction between iron(II) sulphate solution and acidified potassium dichromate(VI) solution .

$$Cr_2O_7^{2-} + 14\,H^+ + 6\,Fe^{2+} \rightarrow 2\,Cr^{3+} + 6\,Fe^{3+} + 7\,H_2O$$

Which of the following statements are true about this reaction?

I Orange coloured acidified potassium dichromate(VI) solution is decolourized

II Dichromate(VI) ion is reduced to chromium(III) ion

III Oxidation number of iron increased from +2 to +3

IV Electrons are transferred from dichromate(VI) ions to iron(II) ions

A I and II only

B II and III only

C I , II and III only

D II , III and IV only

48 When 100 cm^3 of 1.0 mol dm^{-3} hydrochloric acid reacts with 100 cm^3 of 1.0 mol dm^{-3} potassium hydrogen carbonate solution the temperature decreased by $y\,^0C$. What is the decrease in temperature for the reaction when 50 cm^3 of 1.0 mol dm^{-3} hydrochloric acid reacts with 50 cm^3 of 1.0 mol dm^{-3} potassium hydrogen carbonate solution ?

A $0.1\,y\,^0C$

B $0.5\,y\,^0C$

C $y\,^0C$

D $2\,y\,^0C$

[Lihat sebelah

49 In a neutralization reaction , 50 cm^3 of 1.0 mole dm^{-3} nitric acid reacted with 50 cm^3 of 1.0 mole dm^{-3} sodium hydroxide solution . Which of the following acids can replace 50 cm^3 of 1.0 mole dm^{-3} nitric acid to release the same quantity of heat?

I 25 cm^3 of 2.0 mole dm^{-3} hydrochloric acid

II 25 cm^3 of 2.0 mole dm^{-3} sulphuric acid

III 20 cm^3 of 2.5 mole dm^{-3} nitric acid

IV 25 cm^3 of 1.0 mole dm^{-3} sulphuric acid

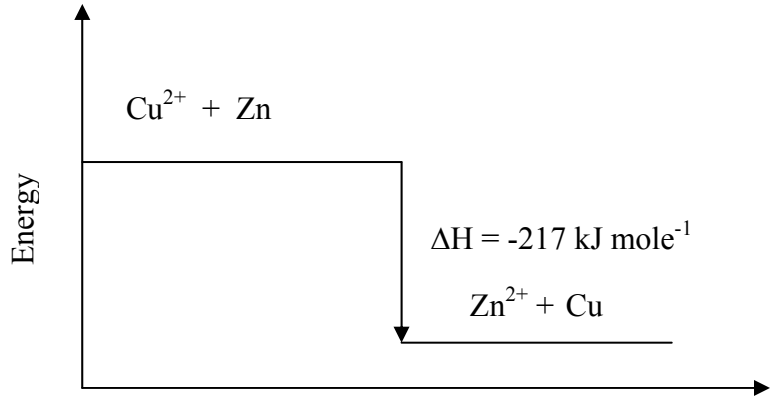
A I and II only

B III and IV only

C I , II and III only

D I , II, III and IV

50 The diagram shows the energy level for the displacement reaction of copper by zinc.



What is the total amount of heat released when 50.0 cm^3 of 0.5 mol dm^{-3} copper (II) sulphate solution reacts in access zinc.

A 5.4 kJ

B 10.8 kJ

C 21.6 kJ

D 54.0 kJ

END OF QUESTION PAPER