

SULIT  
4541/1  
Chemistry  
Paper 1  
Mei  
2007  
1¼ jam

4541/1



**BAHAGIAN SEKOLAH  
KEMENTERIAN PELAJARAN MALAYSIA**

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**PEPERIKSAAN PERTENGAHAN TAHUN 2007**

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**FORM 5 CHEMISTRY**

Paper 1

Satu jam lima belas minit

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**JANGAN BUKA KERTAS SOALAN INI HINGGA DIBERITAHU**

1. *Kertas soalan ini mengandungi 50 soalan.*
2. *Jawab semua soalan*
3. *Jawab dengan menghitamkan ruangan yang betul pada kertas jawapan*
4. *Bagi setiap soalan hitamkan satu ruangan sahaja*
5. *Sekiranya anda hendak menukar jawapan, padamkan tanda yang telah dibuat. Kemudian hitamkan jawapan yang baru.*
6. *Rajah yang mengiringi soalan tidak dilukiskan mengikut skala.*
7. *Anda dibenarkan menggunakan kalkulator saintifik yang tidak boleh diprogramkan.*

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Kertas soalan ini mengandungi 22 halaman bercetak

**1** A student wants to study the relationship between the concentration of hydrochloric acid and time of reaction by reacting the acid with magnesium ribbon.

What should be the responding variable ?

- A** Concentration of acid
- B** Time taken for reaction
- C** Amount of magnesium ribbon
- D** Length of magnesium ribbon

**2** Which of the following atomic models was proposed by Ernest Rutherford?

- A** The atom is the smallest particle
- B** The atom is a positively charged sphere
- C** The atom contains a nucleus that is surrounded by electrons moving at random
- D** The atom contains a nucleus that is surrounded by electrons that move in certain orbitals.

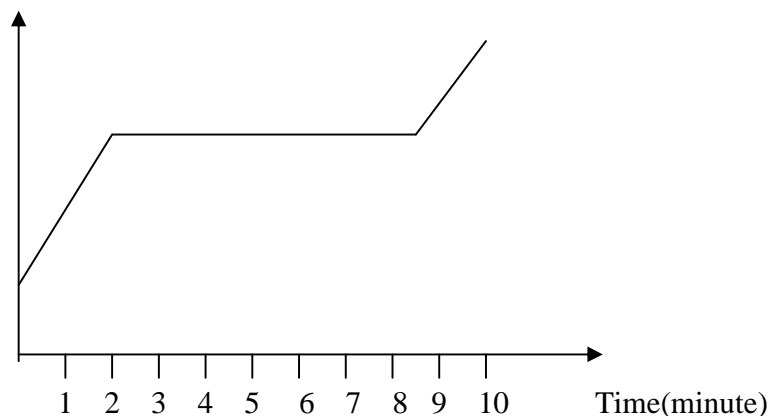
**3** Avogadro number is the number of

Use the information relative atomic mass for He =4, C=12, Cl =35.5 and Ca=40

- A** atoms in 12 g of carbon-12
- B** atoms in 8 g of helium
- C** molecules in 35.5 g of chlorine
- D** chloride ions in 11 g of calcium chloride

- 4 The diagram shows a graph of temperature against time for the heating of substance X

Temperature ( $^{\circ}\text{C}$ )



Which of the following is true about substance X at the sixth minute?

- A All the molecules move freely
  - B Molecules are closely packed and atoms move freely
  - C Molecules and atoms move freely
  - D Some molecules are closely packed while some molecules move freely
- 5 Among the following compounds, which one contains particles bonded by strong electrostatic forces?
- A Ammonia
  - B Naphthalene
  - C Carbon dioxide
  - D Potassium oxide

- 6 The table shows the proton numbers for elements X, Y and Z.

Element	Proton Number
X	13
Y	15
Z	11

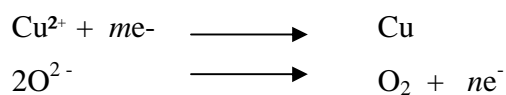
What type of oxides are formed by X, Y and Z?

	X oxide	Y oxide	Z oxide
A	Amphoteric	Acidic	Basic
B	Amphoteric	Basic	Acidic
C	Acidic	Amphoteric	Basic
D	Acidic	Acidic	Basic

- 7 Which of the following conducts electricity but does not undergo chemical changes?

- A Molten lead ( II ) chloride
- B Molten sulphur
- C Molten magnesium
- D Molten Aluminium nitrate

- 8 The following equation represents changes that occur during the electrolysis of molten copper( II ) oxide.



Which set of numbers correctly represent the value of m and n?

	<i>m</i>	<i>n</i>
<b>A</b>	1	1
<b>B</b>	2	4
<b>C</b>	2	1
<b>D</b>	2	2

- 9 Which of the following substance is acidic ?
- A Sodium hydroxide
  - B Sulphur dioxide
  - C Potassium oxide
  - D Ammonia
- 10 Which of the following is not true about the properties of alkali?
- A Undergoes neutralisation with acid.
  - B Has a pH value greater than 7.
  - C Reacts with ammonium salt when heated to produce ammonia gas.
  - D Reacts with metal carbonates to produce carbon dioxide
- 11 What is precipitation reaction?
- A One aqueous soluble salt and one insoluble salt are mixed to form an insoluble salt.
  - B One aqueous soluble salt and one insoluble salt are mixed to form soluble salt.
  - C Two different aqueous soluble salts are mixed to form an insoluble salt
  - D Two different aqueous soluble salts are mixed to form soluble salt.

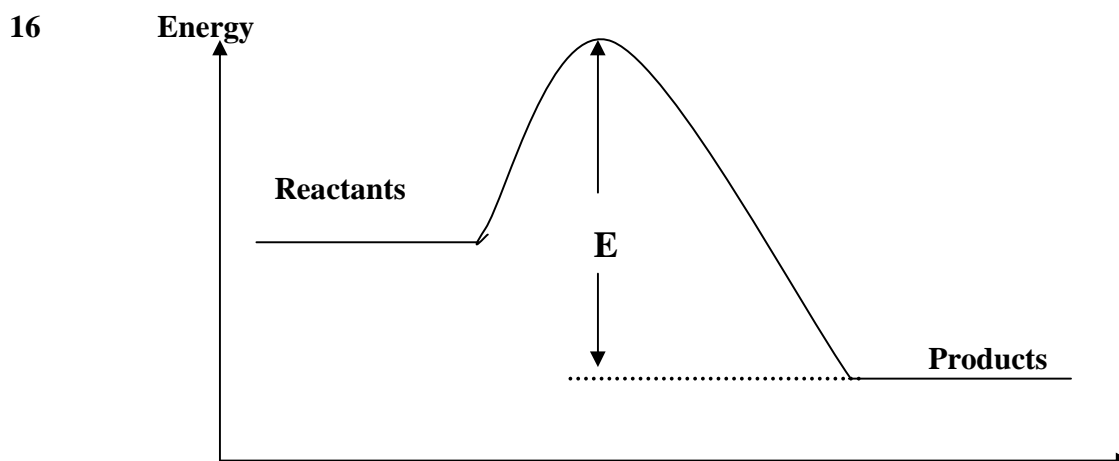
- 12** What substance is embedded into glass to make a photochromic glass?
- A** Silver chloride
  - B** Sodium chloride
  - C** Copper(II) nitrate
  - D** Silicon dioxide
- 13** Which of the following reactions, vanadium(V) oxide and the temperature of 450°C are required in the Contact Process?
- A**  $\text{S(l)} + \text{O}_2(\text{g}) \rightarrow \text{SO}_2(\text{g})$
  - B**  $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$
  - C**  $\text{SO}_3(\text{g}) + \text{H}_2\text{SO}_4(\text{l}) \rightarrow \text{H}_2\text{S}_2\text{O}_7(\text{l})$
  - D**  $\text{H}_2\text{S}_2\text{O}_7(\text{l}) + \text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{SO}_4(\text{l})$
- 14** Aluminium powder reacts faster with hydrochloric acid than an aluminium strip because
- A** the particles in the aluminium strip are packed closely
  - B** the particles of aluminium powder have more kinetic energy
  - C** the aluminium powder has a larger total surface area
  - D** there is a layer of aluminium oxide on the aluminium

- 15 The table shows the total volume of gas collected at regular intervals in a reaction

<b>Time (s)</b>	0	30	60	90	120	150	180	210
<b>Volume of gas (cm<sup>3</sup>)</b>	0	2.0	3.7	5.2	6.4	7.3	8.6	8.6

What is the average rate of reaction in this experiment ?

- A 0.041 cm<sup>3</sup>/s  
B 0.048 cm<sup>3</sup>/s  
C 0.049 cm<sup>3</sup>/s  
D 0.053 cm<sup>3</sup>/s



From the diagram above, it can be concluded that

- A heat is required to start the reaction.  
B the activation energy for the reaction is E.  
C the reaction is exothermic.  
D the reactants are higher in concentration than the products.
- 17 Which of the chemical substance can prevent the coagulation of latex?

- A Aqueous ammonia solution.  
B Aqueous ethanoic acid solution  
C Aqueous sodium chloride solution  
D Vinegar

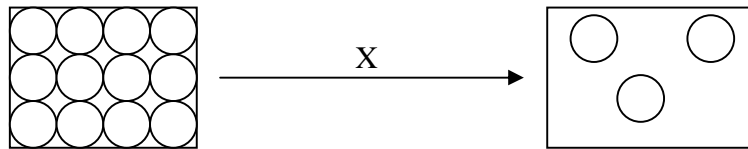
- 18** Which of the following is not grouped in the same homologous series ?
- A** Propane, butane, hexane
  - B** Ethanol, methyl propanol, 1-butanol
  - C** Acetic acid, propanoic acid, sulphuric acid
  - D** Heptene, ethene, pentene
- 19** The electron arrangements of atoms of elements P and Q are 2.8.4 and 2.6 respectively.
- Which of the following statements about the formation of a compound of P and Q is true ?
- A** Each atom of Q receives an electron from an atom of P
  - B** Each atom of P receives four electrons from an atom of Q
  - C** Each atom of P combines with two atoms of Q by sharing of electrons
  - D** Each atom of P combines with one atom of Q by transfer of electrons
- 20** What is the main purpose of using superconductors?
- A** Devices made from superconductors are very cheap.
  - B** To minimize the electrical resistance.
  - C** To produce durable devices.
  - D** To prevent the devices from corrosion.



**21** Which of the following is an insoluble salt?

- A** Silver nitrate
- B** Ammonium chloride
- C** Magnesium carbonate
- D** Zinc sulphate

**22** The diagram shows the arrangement of particles for a type of matter that undergoes a change in physical state through process X.



What is process X?

- A** Melting
- B** Boiling
- C** Freezing
- D** Sublimation

- 23 The table shows the melting points and boiling points of substances S, T, U, V and W.

Substance	Melting point/ $^{\circ}\text{C}$	Boiling point/ $^{\circ}\text{C}$
S	- 182	- 162
T	- 23	77
U	- 97	65
V	41	182
W	132	290

Which substance exists as a gas at room temperature?

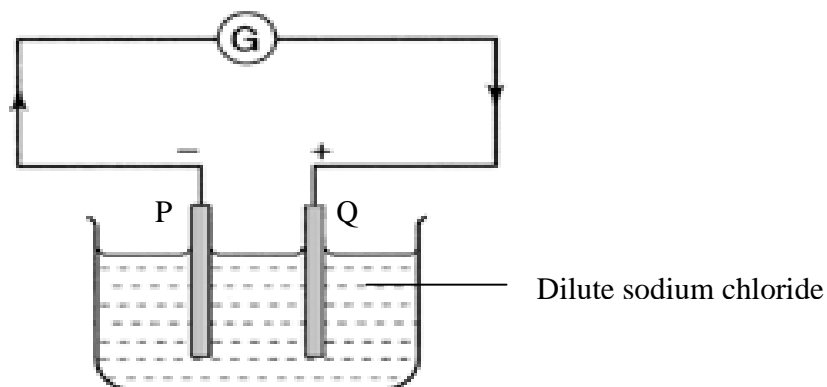
- A S only  
B S and T only  
C T and U only  
D V and W only
- 24 The table below shows the proton number of elements M and N

Element	Proton number
M	3
N	17

Which is true of the compound formed between elements M and N?

- |   | <i>Compound formula</i> | <i>Type of bond</i> |
|---|-------------------------|---------------------|
| A | MN                      | Ionic bond          |
| B | MN                      | Covalent bond       |
| C | $\text{M}_2\text{N}_3$  | Ionic bond          |
| D | $\text{M}_3\text{N}_2$  | Covalent bond       |

25



In which set of the following pair of metals would electron flow in the direction as in the diagram?

	<b>P</b>	<b>Q</b>
<b>A</b>	Copper	magnesium
<b>B</b>	Zinc	Magnesium
<b>C</b>	Copper	Iron
<b>D</b>	Zinc	Lead

26 What is the number of atoms in 1 mole of ammonia,  $\text{NH}_3$ ?

Use the information that the Avogadro Constant  $6.02 \times 10^{23} \text{ mol}^{-1}$

- A**  $6.02 \times 10^{23}$
- B**  $2.408 \times 10^{24}$
- C**  $1.806 \times 10^{23}$
- D**  $1.2 \times 10^{24}$

**27** The chemical formula for glucose is  $C_6H_{12}O_6$ . This shows that

- I the empirical formula for glucose is  $CH_2O$
- II each glucose molecule is made up of 6 carbon atoms, 12 hydrogen atoms and 6 oxygen atoms.
- III 1 mol of glucose contains a total of  $144 \times 10^{23}$  atoms
- IV One glucose molecule has a mass of 180 times higher than the mass of 1 hydrogen atom

Use the information relative atomic mass for  $H = 1, C = 12$  and  $O = 16$

Avogadro Constant =  $6.02 \times 10^{23} \text{ mol}^{-1}$

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

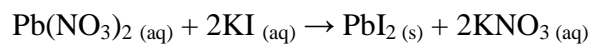
**28** What is the percentage by mass of nitrogen content in urea,  $CO(NH_2)_2$  ?

Use the information that the relative atomic mass of  $C = 12$ ,  $N = 14$ ,  $H = 1$  and  $O = 16$

- A 23.3 %
- B 31.8 %
- C 46.7 %
- D 63.6 %



- 32** The reaction between lead (II) nitrate and potassium iodide solution is represented by the equation below



25.0 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> potassium iodide solution is mixed with 25.0 cm<sup>3</sup> of 1.0 mol dm<sup>-3</sup> lead (II) nitrate solution. What is the maximum mass of lead(II) iodide produced in this reaction?

Use the information relative atomic mass for I = 127 and Pb = 207

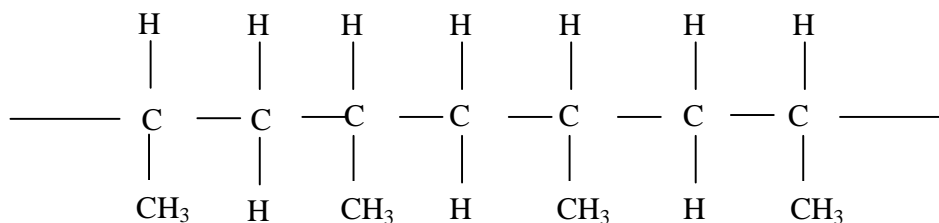
- A** 4.175 g
  - B** 5.76 g
  - C** 8.35 g
  - D** 11.52 g
- 33** Which of the following is **NOT** a characteristic of ammonia?
- A** Very soluble in water.
  - B** Has a pungent smell.
  - C** A white fume gas.
  - D** Alkaline gas.

- 34 1g of magnesium was allowed to react with 50 cm<sup>3</sup> of sulphuric acid, 1 mol dm<sup>-3</sup>. Three experiments were conducted using three different sizes of magnesium. The time taken to collect 20cm<sup>3</sup> of hydrogen gas is as below.

Experiment	I	II	III
Time / s	16	7	25

Which of the following experiments show the arrangement of the size of magnesium in decreasing order?

- A I, II, III  
 B II, I, III  
 C III, II, I  
 D III, I, II
- 35 The diagram below is a structural formula of a polymer.



What is the structural formula of the monomer for the above polymer?

- A 
$$\begin{array}{cccc}
 & \text{H} & & \text{H} & & \text{H} & & \text{H} \\
 & | & & | & & | & & | \\
 \text{H} & \text{---} & \text{C} & \text{---} & \text{C} & \text{---} & \text{C} & \text{=} & \text{C} \\
 & | & & | & & & & | \\
 & \text{H} & & \text{H} & & & & \text{H}
 \end{array}$$
- B 
$$\begin{array}{cccc}
 & \text{H} & & \text{H} & & \text{H} & & \text{H} \\
 & | & & | & & | & & | \\
 \text{H} & \text{---} & \text{C} & \text{---} & \text{C} & \text{=} & \text{C} & \text{---} & \text{C} & \text{---} & \text{H} \\
 & | & & & & & & | \\
 & \text{H} & & & & & & \text{H}
 \end{array}$$
- C 
$$\begin{array}{ccc}
 & \text{H} & & & & \text{H} \\
 & | & & & & | \\
 \text{H} & \text{---} & \text{C} & \text{---} & \text{C} & \text{=} & \text{C} \\
 & | & & & & & | \\
 & \text{H} & & & & & \text{H} \\
 & & & & & & & & & & \text{H} \\
 & & & & & & & & & & | \\
 & & & & & & & & & & \text{H}
 \end{array}$$
- D 
$$\begin{array}{ccc}
 & \text{H} & & \text{H} & & \text{H} \\
 & | & & | & & | \\
 \text{H} & \text{---} & \text{C} & \text{---} & \text{C} & \text{=} & \text{C} \\
 & | & & & & & | \\
 & \text{H} & & & & & \text{H}
 \end{array}$$

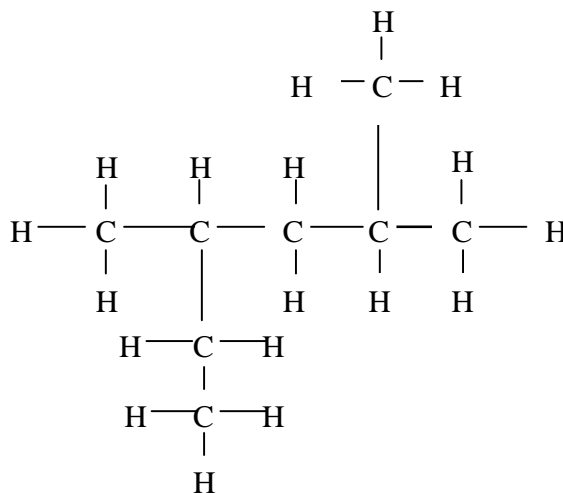
36 A compound with formula  $M_2CO_3$  has a relative formula mass of 138.

What is the relative atomic mass of M ?

Use the information that the relative atomic mass of C = 12 and O = 16

- A 39
- B 69
- C 78
- D 110

37 Study the structural formula below:



Based on the IUPAC system, what is the name of the compound having this structural formula?

- A 2,4,4- trimethylpentane
- B 2,4,4- trimethyloctane
- C 2-ethyl-4-methylpentane
- D 2,4-dimethylhexane

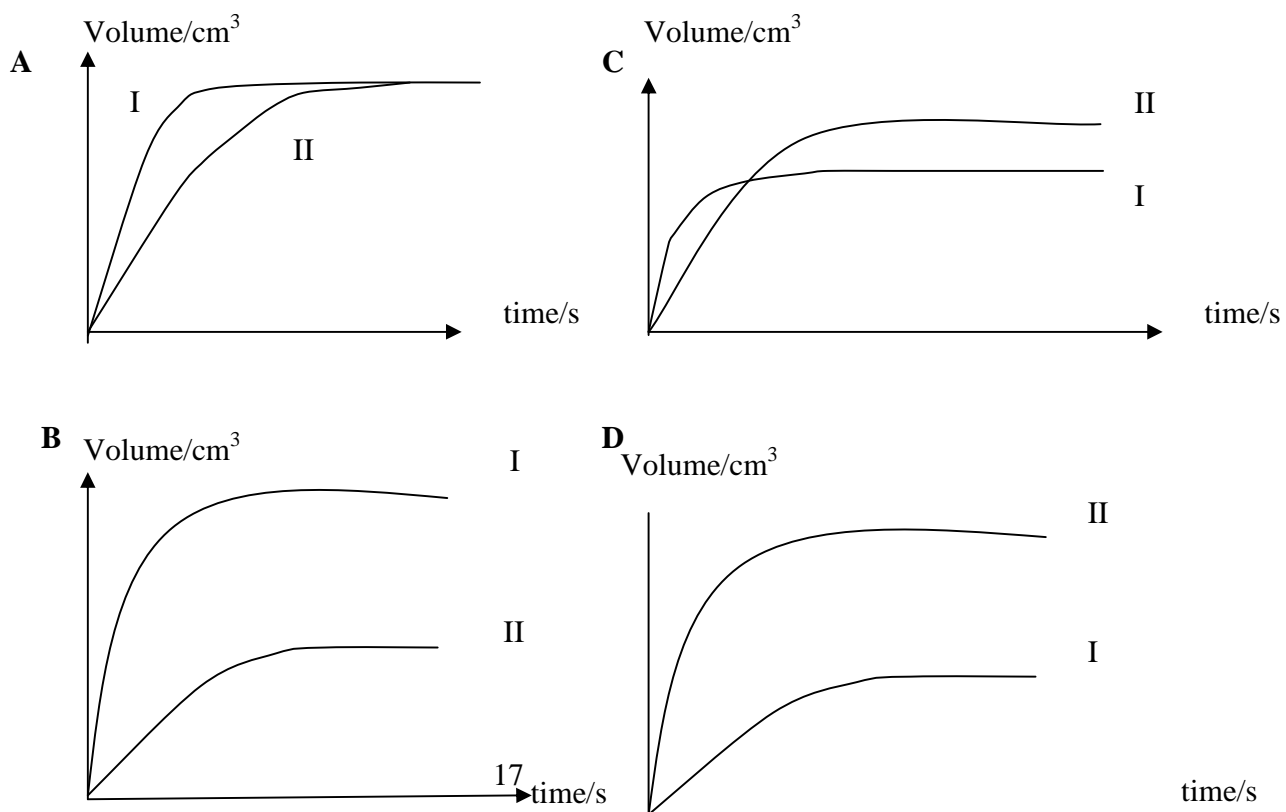


- 38** Butane has some similar characteristics with butene. The characteristics are
- I Exist as gas at room temperature.
  - II Decolourise the purple colour of acidified potassium manganate(VII).
  - III Cannot dissolve in water.
  - IV Burn in excess air to produce a gas that turns limewater cloudy.
- A** I and III only  
**B** II and IV only  
**C** I, III and IV only  
**D** I, II, III and IV

- 39** Two experiments were conducted to study the rate of reaction between excess calcium carbonate and sulphuric acid as shown below.

Experiment	Sulphuric acid
I	25cm <sup>3</sup> H <sub>2</sub> SO <sub>4</sub> , 1 mol dm <sup>-3</sup>
II	50cm <sup>3</sup> H <sub>2</sub> SO <sub>4</sub> , 0.5 mol dm <sup>-3</sup>

Which of the following graphs best describes the results of the above experiments?



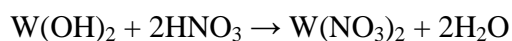
40

The relative atomic mass of metal Q is 7 and the relative atomic mass of the metal W is 56

Which of the following conclusions can be drawn from the above statement?

- I 1 mol of W has 8 times more atoms than 1 mol of Q
  - II 1 atom of W is 8 times heavier than 1 atom of Q
  - III 1 atom of W has the same number of protons with 8 atoms of Q
  - IV 56 g of W has the same number of atoms as in 7 g of Q
- 
- A I and III only
  - B II and IV only
  - C I, II and III only
  - D I, II, III and IV

- 41 The equation shows neutralization reaction between W hydroxide solution and nitric acid.

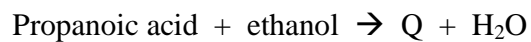


20 cm<sup>3</sup> of W hydroxide solution 0.5 mol dm<sup>-3</sup> neutralized 20 cm<sup>3</sup> of nitric acid.

What is the concentration of the nitric acid needed?

- A 0.25 mol dm<sup>-3</sup>
- B 0.50 mol dm<sup>-3</sup>
- C 1.00 mol dm<sup>-3</sup>
- D 2.00 mol dm<sup>-3</sup>

- 42 An esterification reaction is given as follows:



What is the molecular formula of ester Q?

- A  $\text{C}_3\text{H}_7\text{COOC}_2\text{H}_5$
- B  $\text{C}_2\text{H}_5\text{COOC}_3\text{H}_7$
- C  $\text{C}_2\text{H}_5\text{COOC}_2\text{H}_5$
- D  $\text{C}_5\text{H}_{11}\text{COOH}$

- 43 Below are the symbols of element X and Z.



If elements X and Z combine together to form an alloy Q, what is the arrangement of atoms in alloy Q?

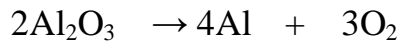
**A**

**B**

**C**

**D**

- 44 The equation below represents the reaction to extract aluminium from aluminium oxide.



What is the mass of aluminium that can be extracted from 51 g of aluminium oxide ?

Given that relative atomic mass of Al = 27 and O = 16

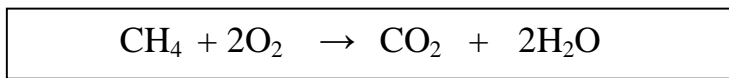
- A 6.75 g  
B 13.5 g  
C 27.0 g  
D 54.0 g
- 45 Between these aqueous solutions, which will give the increasing number in pH value?
- A  $\text{CH}_3\text{COOH}$ , HCl, NaOH, NaCl  
B HCl, NaCl,  $\text{CH}_3\text{COOH}$ , NaOH  
C NaOH, NaCl,  $\text{CH}_3\text{COOH}$ , HCl  
D HCl,  $\text{CH}_3\text{COOH}$ , NaCl, NaOH
- 46 The table shows the number of electrons, proton number and number of neutrons for particles X and Y.

Particle	Number of electrons	Proton number	Number of neutrons
X	10	8	8
Y	7	7	8

Which of the following conclusions is correct for X and Y?

- A X is a positive ion  
B X and Y are isotopes  
C The mass of 1 mol of X is equals to 16g  
D Both X and Y are charged particles

- 47 The combustion of methane is as follows:



If  $100 \text{ cm}^3$  of methane is burnt in excess air, what is the volume of carbon dioxide gas given off at room conditions?

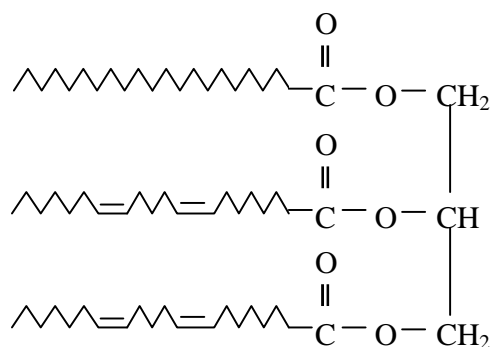
Given that 1 mol of gas occupies  $24 \text{ dm}^3$  at room conditions.

- A  $100 \text{ cm}^3$   
B  $150 \text{ cm}^3$   
C  $200 \text{ cm}^3$   
D  $300 \text{ cm}^3$
- 48 Which of the following are the properties of acid?
- I Changes the blue litmus paper to red  
II Reacts with metal to produce salt and hydrogen gas only  
III Reacts with metal oxide to produce salt and water only  
IV Reacts with metal carbonate to produce salt and carbon dioxide only
- A I and II only  
B II and III only  
C I, II and III only  
D I, II, III and IV
- 49 You were asked by your teacher to verify the cation and anion in a sample of iron ( II ) chloride salt solution.

What substance can you use to verify the cation and anion?

	<b>Cation</b>	<b>Anion</b>
A	Nessler reagent	Dilute nitric acid and silver nitrate
B	Nessler reagent	Dilute hydrochloric acid and barium chloride
C	Sodium hydroxide	Dilute nitric acid and silver nitrate
D	Sodium hydroxide	Dilute hydrochloric acid and barium chloride

- 50 The figure below shows the structural formula of a molecule of fat X.



Which of the following is true about fat X?

- I Fat X can undergo hydrogenation reaction.
  - II Fat X could be found much in plants or vegetables.
  - III Increases the amount of cholesterol in blood.
  - IV Fat X is an ester.
- A** I and II  
**B** III and IV  
**C** I, II and IV  
**D** I, II, III and IV

**END OF QUESTION PAPER**