

UNIT PEPERIKSAAN  
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Chemistry  
Paper 1  
September 2012

4541 / 1

1 ¼ hour

TRIAL EXAMINATION  
SIJIL PELAJARAN MALAYSIA 2012

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CHEMISTRY

Paper 1

One hour 15 minutes

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INFORMATION FOR CANDIDATES

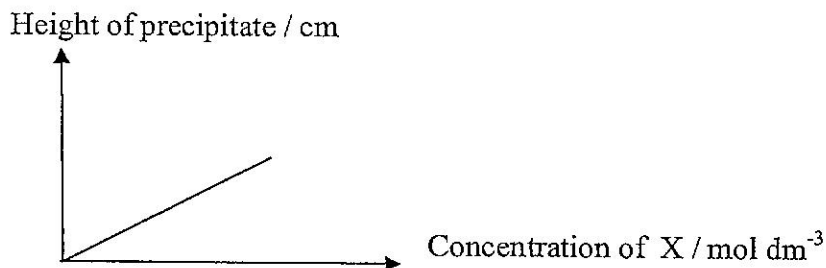
1. *This question paper consists of 50 questions.*
2. *Answer all questions.*
3. *Answer each question by blackening the correct space on the answer sheet.*
4. *Blacken only one space for each question.*
5. *If you wish to change your answer, erase the blackened mark that you have made. Then blacken 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.*

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This question paper consists of 14 printed pages.

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

1. The figure below shows the graph of the height of precipitate against the concentration of X.



What can be said about the relationship between the height of the precipitate and the concentration of X ?

- I. the height of the precipitate increases as the concentration of X decreases.
  - II. the height of the precipitate increases as the concentration of X increases.
  - III. the height of the precipitate is not dependent on the concentration of X.
  - IV. the height of the precipitate is directly proportional to the concentration of X.
- A. II only      B. I and III      C. I, II and III      D. II and IV

2. Which of the following is a use of iodine -131 ?

- A. To determine the age of fossil
- B. To generate electricity
- C. To kill cancer cells
- D. To diagnose thyroid problems

3. The symbols below shows the representation for the atoms of four elements.



Which of the following pairs of elements have the same number of valence electrons in their atoms ?

- A. E and G
- B. E and M
- C. G and J
- D. J and M

4. Gas X is passed into water containing phenolphthalein indicator. The colour of the indicator turns from colourless to pink. Gas X could be

- A. Sulphur dioxide
- B. Ammonia
- C. Sulphur trioxide
- D. Chlorine.

5. What is the number of atoms in 1.5 moles of nitrogen dioxide,  $\text{NO}_2$ ?  
[ Avogadro's constant =  $6.0 \times 10^{23} \text{ mol}^{-1}$  ]

- A.  $6.0 \times 10^{23}$       B.  $18 \times 10^{23}$       C.  $27 \times 10^{23}$       D.  $12.15 \times 10^{23}$

6. One mole of a substance is defined as the quantity of a substance that contains the same number of particles as in m grams of element X.  
What is the value of m and X?

	m	X
A	2	Hydrogen-1
B	16	Oxygen-16
C	24	Magnesium-24
D	12	Carbon-12

7. The table below shows the properties of element P, Q and R which are located in the same period in the Period Table.

Element	Property of oxides
P	Acidic
Q	Basic
R	amphoteric

Arrange the three elements based on decreasing size.

- A. P, Q, R
- B. Q, R, P
- C. R, Q, P
- D. Q, R, P

8. Which of the following absorbs heat from the surrounding?

- A. Adding an alkali to an acid
- B. Adding concentrated sulphuric acid to water
- C. Adding ammonium nitrate to water
- D. Adding quick lime to water.

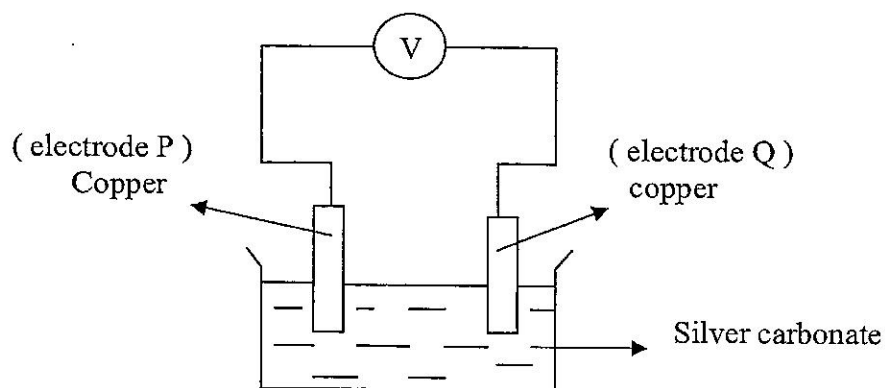
9. Which of the following contains the most number of atoms ?  
[ r.a.m. : Mg = 24 ; Cl = 35.5 ; I = 127 ; 1 mol of gas occupies 24 dm<sup>3</sup> at r.t.p.]

- A. 36 g magnesium                      B. 71 g chlorine gas  
C. 127 g iodine                          D. 60 dm<sup>3</sup> argon gas

10. 7.8 g of element X reacts with oxygen to produce 9.4 g of oxide, X<sub>2</sub>O. The Relative atomic mass of X is

- A. 7.8              B. 9.4              C. 39              D. 78

11. The diagram below shows the apparatus for a simple chemical cell. The reading of the voltmeter shows 0.0 v.



Which of the following steps must be taken for the voltmeter to show a reading ?

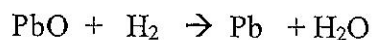
- I. Change copper as electrode Q to magnesium  
II. Insert dry cells into the circuit  
III. Change silver carbonate to silver nitrate solution  
IV. Change both electrode P and Q to carbon electrodes.

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

12. Which of the following acids will produce the highest concentration of hydrogen ions when dissolved in water ?

- A. 0.2 mol dm<sup>-3</sup> hydrochloric acid  
B. 0.3 mol dm<sup>-3</sup> acetic acid  
C. 0.3 mol dm<sup>-3</sup> nitric acid  
D. 0.2 mol dm<sup>-3</sup> sulphuric acid.

13. The following equation shows the reaction between hot lead(II) oxide and hydrogen gas.



Which of the following statement is true about the reaction ?

- I. Hydrogen is oxidised to water
- II. Hydrogen is the reducing agent
- III. The oxidation number of lead changes from +2 to 0.
- IV. Hydrogen is less reactive than lead.

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

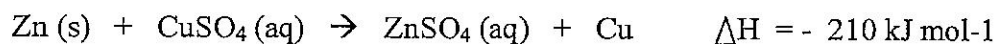
14. The information given below are those of a chemical cell.

- Has an aqueous electrolyte
- Is rechargeable
- Produce a large current
- Is heavy

The type of chemical cell describe above is that of :

- A. a lead acid- accumulator
- B. an alkaline battery
- C. a nickel-cadmium battery
- D. a zinc-carbon battery

15. The equation below shows a displacement reaction between zinc and copper (II) sulphate solution.



Which of the statements below is / are true about the reaction ?

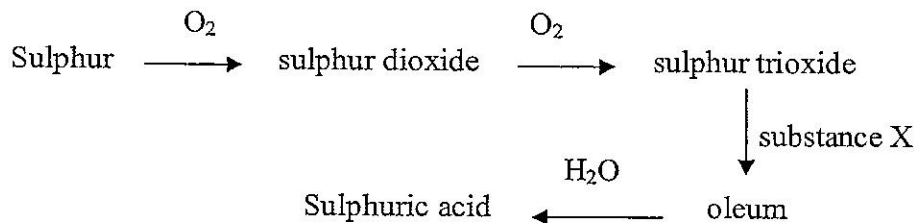
- I. the reaction is exothermic
- II. zinc is reduced to zinc sulphate
- III. a brown solid is formed
- IV. the blue colour of solution is decolourised.

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

16. Which of the following does not conduct an electric current when in solid state but conducts an electric current when molten ?

- A. White sugar      B. Naphthalene      C. lead      D. aluminium oxide

17. The diagram shows the stages in the production of sulphuric using the Contact process.



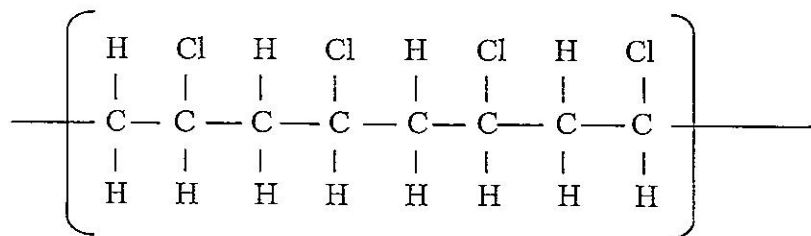
What is substance X ?

- A. vanadium(V) oxide      B. concentrated sulphuric acid  
 C. sulphur dioxide      D. dilute sulphuric acid

18. Which of the following can undergo a dehydration reaction ?

- A. butanol      B. methanol  
 C. ethanoic acid      D. propane

19. The diagram below shows the structural formula of a polymer.



What is the structural formula of its monomer ?

- A.  $\begin{array}{c} \text{H} & \text{H} \\ | & | \\ \text{C} = & \text{C} \\ | & | \\ \text{H} & \text{H} \end{array}$       B.  $\begin{array}{c} \text{H} & \text{Cl} \\ | & | \\ \text{C} = & \text{C} \\ | & | \\ \text{H} & \text{H} \end{array}$
- C.  $\begin{array}{c} \text{Cl} & \text{Cl} \\ | & | \\ \text{H---C---C---H} \\ | & | \\ \text{H} & \text{H} \end{array}$       D.  $\begin{array}{c} \text{Cl} & \text{H} \\ | & | \\ \text{C} = & \text{C} \\ | & | \\ \text{H} & \text{Cl} \end{array}$

20. The table below shows the mass and relative atomic mass of element E and Cl in a chloride compound.

Element	E	Cl
Mass / g	6.75	26.625
Relative atomic mass	27	35.5

If the molecular mass of E chloride is 267, which of the following is the molecular formula of E chloride.

- A.  $\text{ECl}_3$       B.  $\text{E}_3\text{Cl}$       C.  $\text{E}_2\text{Cl}_6$       D.  $\text{E}_6\text{Cl}_2$

21. What is the mass of hydrogen chloride, HCl that contains  $1.2 \times 10^{24}$  molecules ?  
[ r.a.m. : H = 1 ; Cl = 35.5 ; Avogadro's constant =  $6 \times 10^{23} \text{ mol}^{-1}$  ]

- A. 18.0 g      B. 36.5 g      C. 38.0 g      D. 73.0 g

22. The atom of Cesium has one valence electron. It can be predicted that cesium

- I. Burns in chlorine gas to form a compound with the formula CsCl.  
II. It conducts electricity  
III. Cannot react with water  
IV. Has a higher density than iron

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

23. Argon is a colourless gas. Which is **not** true about argon ?

- A. Argon is used to fill electric bulb  
B. Argon is insoluble in water  
C. Argon reacts with sodium to form an ionic compound  
D. Argon exists as a monoatomic gas

24. Element J reacts with sodium hydroxide solution according to the equation below :



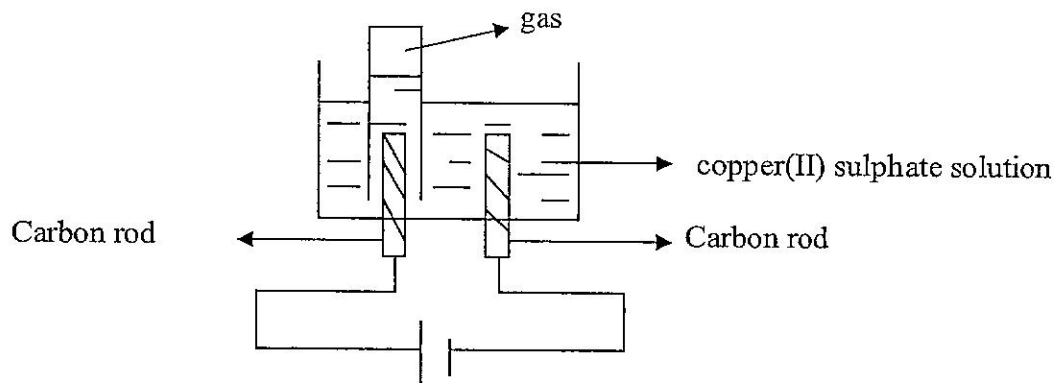
Which of the following could be element J ?

- A. Bromine  
B. Sulphur  
C. Carbon  
D. Nitrogen

25. The relative atomic mass of element Q is 56. The number of electrons in ion  $Q^{3+}$  is 23. How many neutrons are there in an atom of element Q ?

- A. 33      B. 30      C. 26      D. 23.

26. The diagram below shows the apparatus set-up for the electrolysis of copper (II) sulphate solution.



Which of the following statements are true about the electrolysis ?

- I. the gas formed at the anode burns with a 'pop' sound when it is tested with a lighted splinter
- II. a brown solid is deposited at the cathode
- III. the acidity of the electrolyte decreases
- IV. the blue colour of the electrolyte fades.

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

27.  $20.0 \text{ cm}^3$  of  $0.2 \text{ mol dm}^{-3}$  potassium hydroxide solution is titrated with  $0.5 \text{ mol dm}^{-3}$  sulphuric acid. If the initial burette reading is  $3.40 \text{ cm}^3$ , what is the final burette reading ?

- A.  $7.40 \text{ cm}^3$       B.  $9.80 \text{ cm}^3$   
C.  $11.60 \text{ cm}^3$       D.  $13.20 \text{ cm}^3$

28. Which of the following are the properties of aluminium oxide ?

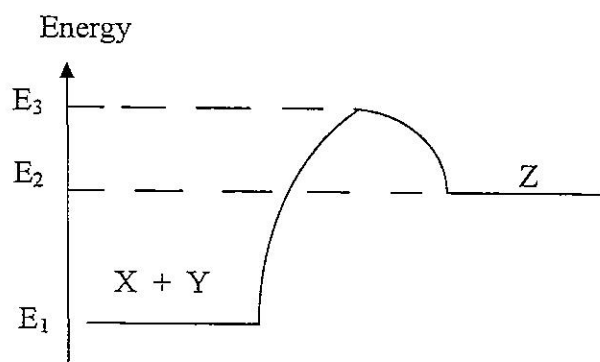
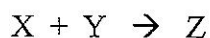
- I. It reacts with nitric acid to form a colourless solution
- II. It reacts with sodium hydroxide solution to form a colourless solution.
- III. It has a high melting point
- IV. It dissolves in water

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



29. Which of the following pairs of chemicals will **not** produce copper (II) nitrate ?
- A. Copper and dilute nitric acid
  - B. Copper(II) oxide and dilute nitric acid
  - C. Copper (II) carbonate and dilute nitric acid
  - D. copper and silver nitrate solution
30. In the manufacture of sulphuric acid, which of the following is required to convert sulphur to sulphur dioxide ?
- A. Use vanadium (V) oxide as catalyst
  - B. Burning sulphur in excess air
  - C. Passing steam in sulphur
  - D. Add concentrated sulphuric acid to sulphur
31. Which of the following is **not** a property of ammonia gas ?
- A. Soluble in water
  - B. Denser than air
  - C. Produces white fumes when in contact with hydrogen chloride gas.
  - D. odourless
32. The following statements are related to the collision theory used to explain the rate of a chemical reaction.
- I. the total surface area of the reactant particles increases
  - II. the kinetic energy of the reactant particles increases
  - III. the frequency of effective collisions between the reactant particles increases
  - IV. the concentration of reactant particles increases.
- Which of the following combinations is true if the size of reactant particles is decreased.
- A. I and II
  - B. I, II and III
  - C. I and III
  - D. II and IV
33. Coal miners face many dangers working deep underground. One of them is from coal dust. Which of the following statements best explains why coal dust forms an explosive mixture with air.
- A. Coal dust acts as a catalyst for the explosion
  - B. Coal dust has a very large total surface area
  - C. Coal dust increases the concentration of carbon dioxide in the air
  - D. The chemical bonds in coal dust are very weak.

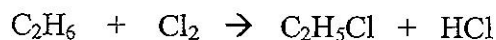
34. The diagram below shows the energy profile diagram for the following reaction.



$E_1$ ,  $E_2$  and  $E_3$  represent different energy levels respectively. If a catalyst was used in the above reaction, the rate of reaction will be increased because the catalyst

- A. increases  $E_1$
- B. decreases  $E_2$
- C. increases  $E_3$
- D. decreases  $E_3$

35. The equation below represents the equation between ethane and chlorine.



Which of the following is true about the given reaction ?

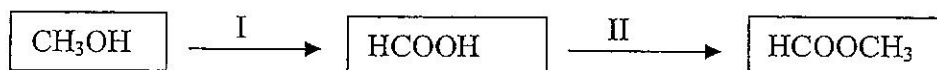
- A. the presence of sunlight is necessary for the reaction to occur
- B. an addition reaction occurs.
- C. a white precipitate is formed
- D. the reaction is catalysed by concentrated sulphuric acid.

36. Which of the following can be used to prepare ethanol by fermentation ?

- I. sugar cane juice
- II. palm oil
- III. rice
- IV. propanoic acid

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

37. The figure below shows the process in the preparation of methyl methanoate from methanol.



Which of the following represents the reactions in process I and process II ?

	Process I	Process II
A.	Dehydration	Oxidation
B.	Hydrolysis	Dehydration
C.	Esterification	Hydrolysis
D.	oxidation	Esterification

38. Fats are esters produced from the reaction between three molecules of fatty acids and a molecule of

- A. propanone      B. glycerol      C. butane      D. propanol

39. Which of the following statements are true about fats ?

- I. fats can be broken down into fatty acids and glycerol.  
 II. fats are naturally occurring carboxylic acids  
 III. unsaturated fats have lower melting and boiling points than saturated fats.  
 IV. saturated fats can react with bromine water.

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

40. Coagulation of rubber latex can be prevented by adding

- A. formic acid      B. methanol      C. ester      D. ammonis solution

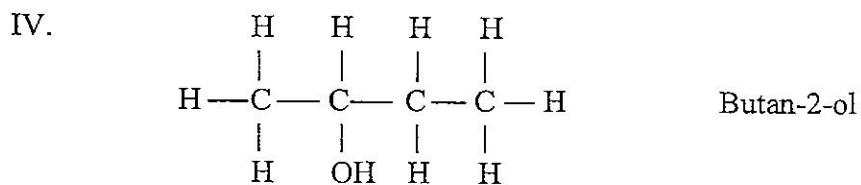
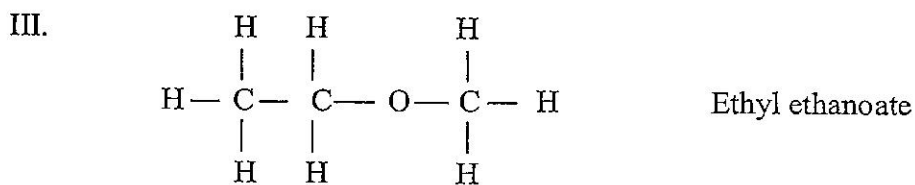
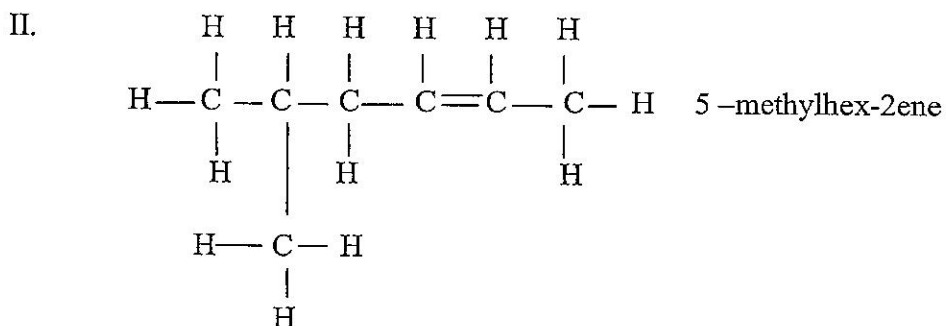
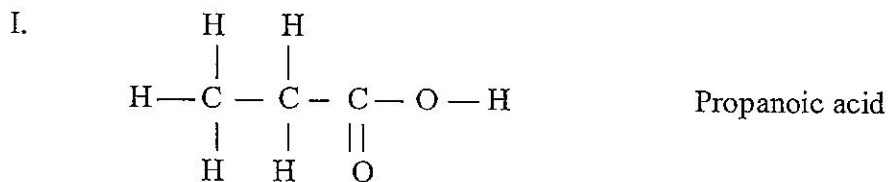
41. The chemical equation shows the preparation of sulphuric acid by the Contact process.



Which of the following shows the oxidation number of sulphur at each stage of the processes ?

	S	SO <sub>2</sub>	SO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>
A.	0	+6	+6	+8
B.	0	+4	+6	+6
C.	-2	+2	+3	+4
D.	-2	+2	+4	+2

42. Which of the following compounds are named correctly according to the IUPAC system ?



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

43. Metal X is placed between zinc and tin in the electrochemical series. Which of the following metal will be able to protect X from corrosion ?

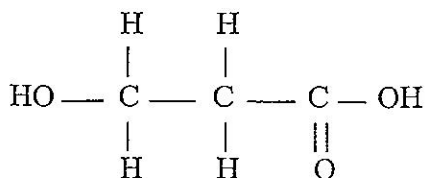
- A. Copper
- B. Lead
- C. Magnesium
- D. silver

44. Which of the following salts are insoluble ?

- I. Barium sulphate
- II. silver nitrate
- III. lead(II) carbonate
- IV. zinc chloride

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

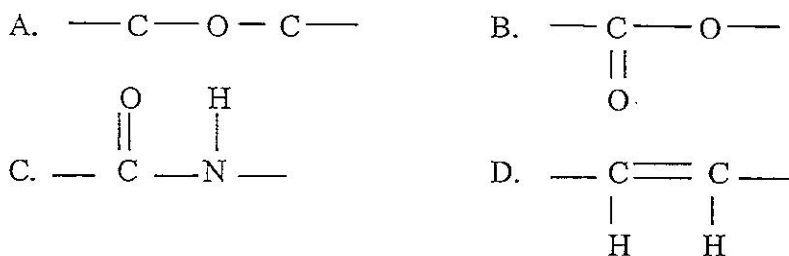
45. The diagram below shows the structural formula of Compound R.



Q can be classified as

- A. an alcohol
- B. an alcohol and as an ester
- C. a diol
- D. an alcohol and as a carboxylic acid

46. Which of the following is a peptide link ?



47. Which of the elements shown below, exhibits variable oxidation states, can act as a catalyst and forms coloured compounds ?

- A. Iron
- B. carbon
- C. Sulphur
- D. Chlorine

48. In which one of the following reactions does a redox reaction occur ?

- A. Sodium hydroxide + nitric acid
- B. Lead (II) nitrate + sodium carbonate
- C. Chlorine water and sodium iodide
- D. Zinc carbonate + sulphuric acid

49. A student wants to convert aqueous iron (II) ions to iron (III) ions in the laboratory. Which of the following solutions can the student use ?

- I. Zinc powder
- II. Bromine water
- III. Copper strip
- IV. Acidified potassium dichromat (VI) solution.

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

50. Why is the reaction given below exothermic ?



- A. The energy absorbed in bond breaking is greater than the energy released during bond formation.
- B. The total energy content of the products is greater than the total energy content of the reactants
- C. The total energy content of the products is lower than the total energy content of the reactants
- D. Heat is absorbed during the reaction

- End of Question Paper -

Prepared by

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( Mr. Tan Thwan Hoa )