

There are 50 questions in this paper. Choose the best answer for each question.

1. Which of the following pairs of elements in Groups I and VII of the Periodic Table would react with each other most vigorously ?

Group I

Group VII

- |              |          |
|--------------|----------|
| A. lithium   | fluorine |
| B. lithium   | iodine   |
| C. potassium | fluorine |
| D. potassium | iodine   |

2. Which of the following substances, upon heating in a test tube, would undergo a chemical change ?

- A. water  
B. calcium oxide  
C. sodium chloride  
D. hydrated copper(II) sulphate

3. When a small piece of calcium metal is put into a trough of water, a reaction occurs. Which of the following statements concerning this reaction is correct ?

- A. It is an endothermic reaction.  
B. It is a redox reaction.  
C. A slight explosion occurs.  
D. The calcium metal burns spontaneously in water.

4. Which of the following statements concerning nitric acid is INCORRECT ?

- A. It is manufactured from ammonia.  
B. It is used to make explosives.  
C. It is used to make fertilisers.  
D. It is a dehydrating agent.

5. Which of the following methods can be used to obtain aluminium from aluminium oxide ?

- A. reducing the oxide with carbon  
B. heating the oxide strongly  
C. electrolysis of the molten oxide  
D. heating the oxide with iron powder

6. Sodium azide,  $\text{NaN}_3$ , is used in air bags in cars. When there is a serious collision, the azide will decompose to give nitrogen. The decomposition can be represented by the equation :



What is the mass of sodium azide required to produce  $72 \text{ dm}^3$  of nitrogen at room temperature and pressure ?

(Relative atomic masses :  $\text{N} = 14.0$ ,  $\text{Na} = 23.0$ ;  
molar volume of gas at room temperature and pressure =  $24 \text{ dm}^3$ )

- A. 65.0 g  
B. 130.0 g  
C. 195.0 g  
D. 292.5 g


7. Which of the following statements concerning halogens is INCORRECT ?

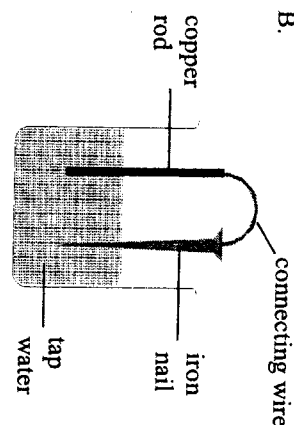
- A. Compounds of fluorine are added to tap water to help prevent tooth decay.  
B. Chlorine is used as a sterilising agent.  
C. Bromine is a volatile liquid.  
D. Iodine vapour is brown in colour.

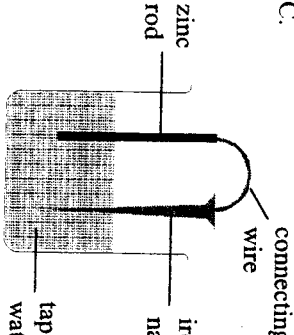
8. Which of the following combinations is correct ?

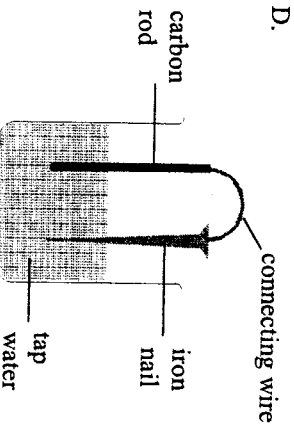
<u>Homologous series</u>	<u>General formula</u>
A. alkanes	$\text{C}_n\text{H}_{2n}$
B. alkenes	$\text{C}_n\text{H}_{2n+2}$
C. alkanols	$\text{C}_n\text{H}_{2n}\text{OH}$
D. alkanotic acids	$\text{C}_n\text{H}_{2n+1}\text{CO}_2\text{H}$

9. Which iron nail in the beakers shown below would undergo corrosion most readily?

A. 

B. 

C. 

D. 

10. Which of the following combinations is correct?

Chemical	Hazardous nature
A. sodium	oxidising
B. mercury	toxic
C. ethyl ethanoate	irritant
D. potassium dichromate	explosive

11. A sample of  $\text{MgSO}_4 \cdot x\text{H}_2\text{O}(\text{s})$  of mass 123.2 g contains 63.0 g of water of crystallisation. What is the value of  $x$ ?

(Relative atomic masses :  $\text{H} = 1.0$ ,  $\text{O} = 16.0$ ,  $\text{Mg} = 24.3$ ,  $\text{S} = 32.1$ )

- A. 4  
B. 5  
C. 6  
D. 7

12. Gallium (Ga) occurs naturally in two isotopic forms,  $^{69}\text{Ga}$  and  $^{71}\text{Ga}$ . The table below lists the relative abundance of each isotope.

Isotope	Relative abundance
$^{69}\text{Ga}$	60.2%
$^{71}\text{Ga}$	39.8%

What is the relative atomic mass of gallium?

- A. 69.6  
B. 69.8  
C. 70.0  
D. 70.2

13. Which of the following substances will NOT react with bromine water?

- A. propene  
B. sulphur dioxide  
C. potassium iodide solution  
D. ammonium chloride solution

14. Which of the following statements about carbon dioxide is correct?

- A. Solid carbon dioxide has a covalent network structure.  
B. Carbon dioxide is used to put out electrical fire.  
C. Carbon dioxide is used in filling weather balloons.  
D. Carbon dioxide dissolves in water to give a solution which is slightly alkaline.

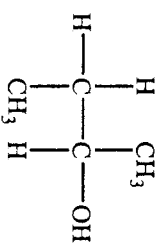
15. In the electrolysis of a copper(II) sulphate solution, copper is used as the anode and carbon as the cathode. Which of the following statements concerning this electrolysis is correct?

- A. The concentration of  $\text{Cu}^{2+}(\text{aq})$  ions in the solution remains unchanged.  
B. The concentration of  $\text{H}^+(\text{aq})$  ions in the solution increases.  
C.  $\text{O}_2(\text{g})$  is liberated at the anode.  
D.  $\text{H}_2(\text{g})$  is liberated at the cathode.

16. Which of the following conversions is NOT a reduction ?

- A.  $\text{Fe}_2\text{O}_3 \rightarrow \text{Fe}$  ✓  
 B.  $\text{Cu}(\text{OH})_2 \rightarrow \text{CuO}$  ✓  
 C.  $\text{CH}_3\text{CO}_2\text{H} \rightarrow \text{CH}_3\text{CH}_2\text{OH}$   
 D.  $\text{H}_2\text{SO}_4 \rightarrow \text{SO}_2$

17. An organic compound has the following structure:



The systematic name of this compound is

- A. 1,2-dimethylethanol.  
 B. 1-methylpropan-1-ol.  
 C. 1-methylpropan-2-ol.  
 D. butan-2-ol.

18. Consider the following information about three elements, X, Y and Z.

Element	Atomic number
X	12
Y	16
Z	17

Which of the following statements concerning X, Y and Z is correct ?

- A. X reacts with Z to form an ionic compound.  
 B. Y is a stronger oxidising agent than Z.  
 C. X has a simple molecular structure.  
 D. Y can conduct electricity in the molten state.

19.

Soap was prepared by heating fat with sodium hydroxide solution for some time. Concentrated sodium chloride solution was then added to the resulting mixture. The purpose of adding concentrated sodium chloride solution is

- A. to help the precipitation of the soap.  
 B. to enhance the cleansing power of the soap.  
 C. to reduce the alkalinity of the soap.  
 D. to act as a preservative for the soap.

20.

A sample of zinc granules of mass 1.8 g was added to 100 cm<sup>3</sup> of 0.25 M hydrochloric acid. What is the theoretical volume of hydrogen produced at room temperature and pressure ?

(Relative atomic mass : Zn = 65.4;  
 molar volume of gas at room temperature and pressure = 24 dm<sup>3</sup>)

- A. 0.30 dm<sup>3</sup>  
 B. 0.33 dm<sup>3</sup>  
 C. 0.60 dm<sup>3</sup>  
 D. 0.66 dm<sup>3</sup>

21.

Which of the following solutions would NOT undergo a colour change when mixed with sodium sulphite solution ?

- A. iodine solution  
 B. acidified potassium permanganate solution  
 C. chromium(III) sulphate solution  
 D. iron(III) sulphate solution

22.

X is a bleaching agent. X bleaches a dye by oxidation and becomes Y at the end of the reaction. Which of the following combinations is correct ?

- |    |                          |                               |
|----|--------------------------|-------------------------------|
|    | X                        | Y                             |
| A. | $\text{Cl}_2(\text{aq})$ | $\text{Cl}(\text{aq})$        |
| B. | $\text{Cl}_2(\text{aq})$ | $\text{OCl}^-(\text{aq})$     |
| C. | $\text{SO}_2(\text{aq})$ | $\text{SO}_3^{2-}(\text{aq})$ |
| D. | $\text{SO}_2(\text{aq})$ | $\text{SO}_4^{2-}(\text{aq})$ |

23. Consider the following equation:



Which of the following combinations is correct ?

$\underline{\text{x}} \quad \underline{\text{y}} \quad \underline{\text{z}}$

- A. s aq aq  
B. s l aq  
C. aq aq s  
D. aq l s

24. What is the oxidation number of sulphur in  $\text{H}_2\text{S}_2\text{O}_7$  ?

- A. +2  
B. +4  
C. +6  
D. +8

25. An atom of element X has 20 protons while an atom of element Y has 7 electrons. What is the formula of the compound formed from X and Y ?

- A.  $\text{XY}_2$   
B.  $\text{X}_2\text{Y}_3$   
C.  $\text{X}_2\text{Y}_5$   
D.  $\text{X}_3\text{Y}_2$

26.  $20.0 \text{ cm}^3$  of  $2.0 \text{ M}$  aqueous ammonia required  $16.0 \text{ cm}^3$  of sulphuric acid for complete neutralisation. What is the concentration of the sulphuric acid ?

(Relative atomic masses : H = 1.0, O = 16.0, S = 32.1)

- A.  $61.3 \text{ g dm}^{-3}$   
B.  $122.6 \text{ g dm}^{-3}$   
C.  $183.9 \text{ g dm}^{-3}$   
D.  $245.2 \text{ g dm}^{-3}$

27. Which of the following pairs of substances can be distinguished by using dilute hydrochloric acid ?

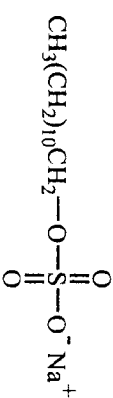
- A. NaCl and NaOCl  
B.  $\text{NH}_4\text{Br}$  and  $\text{NH}_4\text{I}$   
C.  $\text{K}_2\text{CO}_3$  and  $\text{KHCO}_3$   
D. CaO and  $\text{Ca}(\text{OH})_2$

28. Which of the following gases contains the greatest number of molecules ?

(Relative atomic masses : H = 1.0, C = 12.0, O = 16.0, Ne = 20.2, Cl = 35.5)

- A. 50.0 g of neon  
B. 50.0 g of oxygen  
C. 50.0 g of hydrogen chloride  
D. 50.0 g of carbon monoxide

29. A detergent has the structure shown below:



Which of the following statements concerning this detergent is correct ?

- A. It is non-biodegradable.  
B. It functions well in hard water.  
C. It can be manufactured from vegetable oils.  
D. The portion,  $\text{CH}_3(\text{CH}_2)_{10}\text{CH}_2-$ , is hydrophilic.

30. 40 cm<sup>3</sup> of 2M hydrochloric acid was mixed with 40 cm<sup>3</sup> of 2M sodium hydroxide solution in a polystyrene cup and the maximum rise in temperature was recorded. Which of the following pairs of solutions, upon mixing, would produce a similar rise in temperature?

A. 40 cm<sup>3</sup> of 2M ethanoic acid and 40 cm<sup>3</sup> of 2M potassium hydroxide solution  
B. 40 cm<sup>3</sup> of 2M ethanoic acid and 40 cm<sup>3</sup> of 2M ammonia solution  
C. 40 cm<sup>3</sup> of 2M nitric acid and 40 cm<sup>3</sup> of 2M potassium hydroxide solution  
D. 40 cm<sup>3</sup> of 2M nitric acid and 40 cm<sup>3</sup> of 2M ammonia solution

31. Propene is an unsaturated hydrocarbon. Which of the following reactions is/are characteristic of the unsaturated nature of propene?

(1) It undergoes incomplete combustion to give carbon monoxide.  
(2) It decolourises acidified potassium permanganate solution.  
(3) It undergoes polymerisation to give polypropene.

A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only

32. Which of the following processes is/are physical change(s)?

(1) rusting of iron  
(2) formation of dry ice from carbon dioxide gas  
(3) removal of particulates in an incinerator using an electrostatic precipitator

A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only

33. Ethane reacts with bromine under suitable conditions. Which of the following statements concerning this reaction is/are correct?

(1) The reaction occurs readily in the dark.  
(2) The reaction is a substitution.  
(3) The reaction gives a mixture of organic products.

A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only

34. The reaction of ammonia with oxygen can be catalysed by red-hot platinum. Which of the following statements concerning this reaction is/are correct?

(1) The reaction gives nitrogen monoxide and water as the major products.  
(2) The reaction gives nitrogen dioxide and water as the major products.  
(3) The reaction is exothermic.

A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only

35. Which of the following is/are advantage(s) of using alkaline manganese cells over zinc-carbon cells in cassette players?

(1) Alkaline manganese cells have longer life time.  
(2) Alkaline manganese cells are rechargeable.  
(3) Alkaline manganese cells give a more steady voltage over discharge.

A. (1) only  
B. (2) only  
C. (1) and (3) only  
D. (2) and (3) only

36. Which of the following statements concerning thermoplastics is/are correct ?

- (1) They soften upon heating.
- (2) They are cross-linked polymers.
- (3) They are addition polymers.

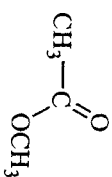
- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

37. Which of the following statements concerning the manufacture of town gas in Hong Kong is/are correct ?

- (1) Town gas is produced from coal.
- (2) Town gas contains hydrogen as the major component.
- (3) Oxygen is added to enhance the flammability of town gas prior to its delivery to consumers.

- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

38. The structures of two organic compounds are shown below :



Which of the following statements concerning these two compounds is/are correct ?

- (1) They have the same relative molecular mass.
- (2) They have the same chemical properties.
- (3) They are both soluble in water.

- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

39. Which of the following statements concerning sulphur is/are correct ?

- (1) It is yellow in colour.
- (2) It dissolves in water to give an acidic solution.
- (3) It is used as a raw material in the Contact process.

- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

40. Which of the following substances is/are alloy(s) ?

- (1) stainless steel
- (2) anodised aluminium
- (3) 24-carat gold

- A. (1) only
- B. (2) only
- C. (1) and (3) only
- D. (2) and (3) only

41. Which of the following health problems are related to the excessive drinking of alcoholic beverages ?

- (1) depression
- (2) hepatitis
- (3) stomach ulcer

- A. (1) and (2) only
- B. (1) and (3) only
- C. (2) and (3) only
- D. (1), (2) and (3)

42. Iron pyrite ( $\text{FeS}_2$ ) looks like gold and its common name is "fool's gold". Which of the following methods can be used to distinguish iron pyrite from gold?

- (1) comparing their densities
- (2) comparing their electrical conductivity
- (3) comparing the effect of heat on them

- A. (1) and (2) only
- B. (1) and (3) only
- C. (2) and (3) only
- D. (1), (2) and (3)

43. Which of the following pairs of solutions would form a precipitate when they are mixed?

- (1)  $\text{NH}_4\text{Cl}(\text{aq})$  and  $\text{K}_2\text{SO}_4(\text{aq})$
- (2)  $\text{NH}_3(\text{aq})$  and  $\text{Pb}(\text{NO}_3)_2(\text{aq})$
- (3)  $(\text{NH}_4)_2\text{CO}_3(\text{aq})$  and  $\text{CaCl}_2(\text{aq})$

- A. (1) and (2) only
- B. (1) and (3) only
- C. (2) and (3) only
- D. (1), (2) and (3)

44. Which of the following statements concerning chlorine are correct?

- (1) It turns blue litmus solution red and then colourless.
- (2) It is used to manufacture sodium chloride.
- (3) It is denser than air.

- A. (1) and (2) only
- B. (1) and (3) only
- C. (2) and (3) only
- D. (1), (2) and (3)

**Directions :** Each question below (Question Nos. 45 to 50) consists of two separate statements. Decide whether each of the two statements is true or false; if both are true, then decide whether or not the second statement is a *correct* explanation of the first statement. Then select one option from A to D according to the following table :

A. Both statements are true and the 2nd statement is a correct explanation of the 1st statement.
B. Both statements are true but the 2nd statement is NOT a correct explanation of the 1st statement.
C. The 1st statement is false but the 2nd statement is true.
D. Both statements are false.

**1st statement**

**2nd statement**

- |  |  |
|--|--|
| 45. Sodium hydroxide is an active ingredient in anti-acid tablets.                 | Sodium hydroxide is a strong alkali.   |
| 46. $^{35}\text{Cl}$ and $^{37}\text{Cl}$ have the same chemical properties.       | The number of electrons in the outermost shell of a $^{35}\text{Cl}$ atom is equal to that of a $^{37}\text{Cl}$ atom. |
| 47. Benzoic acid is commonly used as a preservative for canned meats.              | Benzoic acid is toxic to bacteria.   |
| 48. Polyethene is used for making the handle of frying pans.                       | The shape of the polyethene handle remains unchanged during the frying process.  |
| 49. Sodium carbonate can be used to soften hard water which contains calcium ions. | Sodium carbonate reacts with calcium ions in hard water to form a precipitate.   |
| 50. Mild steel is less malleable than iron.  | Carbon atoms cause a distortion to the regular arrangement of the iron atoms in mild steel.                            |

**END OF PAPER**