



पुर्णा International School

Shree Swaminarayan Gurukul, Zundal

Class -X

Science(Chemistry)

Specimen Copy Year-

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1	Metals and Non- Metals
2	Carbon and its Compound



Chapter 3 (Metals and Non -Metals)

Notes

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Question 1

Give an example of a metal which :

- (i) is a liquid at room temperature.
- (ii) can be easily cut with a knife.
- (iii) is the best conductor of heat.
- (iv) is a poor conductor of heat.

Answer:

- (i) Mercury
- (ii) Sodium
- (iii) Silver
- (iv) Lead

Question 2

Explain the meanings of malleable and ductile.

Answer:

Malleable : A metal that can be beaten into thin sheets on hammering is called malleable.

Ductile : A metal which can be drawn into thin wires is called ductile.

Class 10 Metals and Non Metals NCERT Book Page Number: 46

Question 1

Why is sodium kept immersed in kerosene oil ?

Answer:

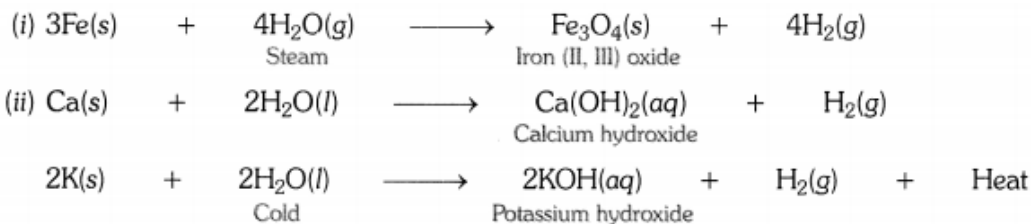
Sodium is highly reactive. So it is kept immersed in kerosene oil to prevent its reaction with oxygen, moisture and carbon dioxide of air to prevent accidental fires.

Question 2

Write equations for the reactions of

- (i) iron with steam.
- (ii) calcium and potassium with water.

Answer:



Question 3

Samples of four metals A, B, C and D were taken and added to the following solution one by one. The results obtained have been tabulated as follows :

Metal	Iron (II) sulphate	Copper (II) sulphate	Zinc sulphate	Silver nitrate
A	No reaction	Displacement		
B	Displacement		No reaction	
C	No reaction	No reaction	No reaction	Displacement
D	No reaction	No reaction	No reaction	No reaction

Use the Table above to answer the following questions about metals A, B, C and D.

(i) Which is the most reactive metal ?

(ii) What would you observe if B is added to a solution of copper (II) sulphate?

(iii) Arrange the metals A, B, C and D in the order of decreasing reactivity.

Answer:

(i) B is the most reactive metal because it gives displacement reaction with iron (II) sulphate.

(ii) When metal B is added to copper (II) sulphate solution, a displacement reaction will take place due to which the blue colour of copper (II) sulphate solution will fade and a red-brown deposit of copper will be formed on metal B.

(iii) Metal B is the most reactive because it displaces iron from its salt solution. Metal A is less reactive because it displaces copper from its salt solution. Metal C is still less reactive because it can displace only silver from its salt solution and metal D is the least reactive because it cannot displace any metal from its salt solution. Hence, the decreasing order of reactivity of the metals is $B > A > C > D$.

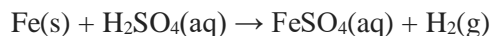
Question 4

Which gas is produced when dilute hydrochloric acid is added to a reactive metal ? Write the chemical reaction when iron reacts with dilute H_2SO_4 .

Answer:

Hydrogen gas is produced when dilute hydrochloric acid is added to a reactive metal.

Chemical reaction when iron reacts with dilute H_2SO_4 :



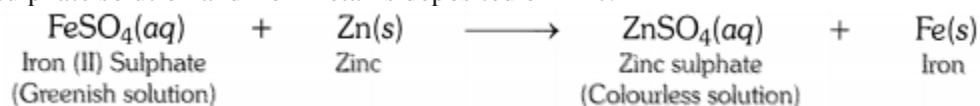
Question 5

What would you observe when zinc is added to a solution of iron (II) sulphate ? Write the chemical reaction that takes place.

Answer:

Zinc is more reactive than iron. Therefore, when zinc is added to a solution of iron (II) sulphate, then the greenish colour of iron (II) sulphate solution fades gradually due to the formation of colourless zinc

sulphate solution and iron metal is deposited on zinc.



Class 10 Metals and Non Metals NCERT Book Page Number: 49

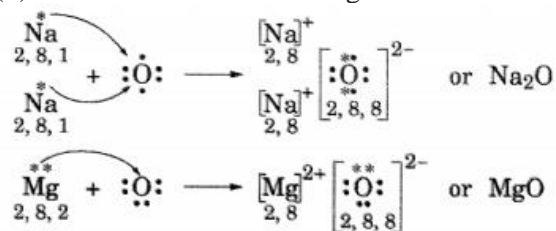
Question 1

- Write the electron dot structures for sodium, oxygen and magnesium.
- Show the formation of Na_2O and MgO by the transfer of electrons.
- What are ions present in these compounds?

Answer:

Element	Sodium (Na)	Oxygen (O)	Magnesium (Mg)
Electron dot structure	Na 2, 8, 1	O 2, 8, 6	Mg 2, 8, 2

(ii) Formation of Na_2O and MgO



- In Na_2O , ions present are Na^+ and O^{2-} .
In MgO , ions present are Mg^{2+} and O^{2-} .

Question 2

Why do ionic compounds have high melting points ?

- What are ions present in these compounds?

Answer:

The ionic compounds are made up of positive and negative ions. There is a strong force of attraction between the oppositely charged ions, so a lot of heat energy is required to break this force of attraction and melt the ionic compound. Due to this, ionic compounds have high melting points.

Class 10 Metals and Non Metals NCERT Book Page Number: 53

Question 1

Define the following terms : (i) Mineral, (ii) Ore and (iii) Gangue.

Answer:

- Mineral : The natural materials in which the metals or their compounds are found in earth are called minerals.
- Ore : Those minerals from which the metals can be extracted conveniently and profitably are called ores.
- Gangue : The unwanted impurities like sand, rocky material, earth particles, lime stone, mica, etc in an ore are called gangue.

Question 2

Name two metals which are found in nature in the free state.

Answer:

Gold and platinum

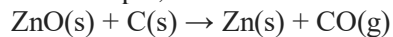
Question 3

What chemical process is used for obtaining a metal from its oxide.

Answer:

Reduction process is used for obtaining a metal from its oxide.

For example, zinc oxide is reduced to metallic zinc by heating with carbon.



Besides carbon, highly reactive metals like sodium, calcium, aluminium etc. are used as reducing agents.

These displace metals of low reactivity from their oxides.

For example,



Gold is Metal or Nonmetal ?

Gold is a metal found in nature in the free state

Class 10 Metals and Non Metals NCERT Book Page Number: 55

Question 1

Metallic oxides of zinc, magnesium and copper were heated with the following metals :

	Metal	Zinc	Magnesium	Copper
1.	Zinc oxide			
2.	Magnesium oxide			
3.	Copper oxide			

In which cases will you find displacement reactions taking place ?

Answer:

A more reactive metal can displace a less reactive metal from its oxide. But out of zinc, magnesium, and copper metals, magnesium is the most reactive, zinc is less reactive whereas copper is the least reactive metal.

The displacement will take place in the following cases :

	Metal	Zinc	Magnesium	Copper
1.	Zinc oxide	—	Displacement	—
2.	Magnesium oxide	—	—	—
3.	Copper oxide	Displacement	Displacement	—

Question 2

Which metals do not corrode easily ?

Answer:

Gold and Platinum.

Question 3

What are alloys ?

Answer:

An alloy is a homogeneous mixture of two or more metals, or a metal and a non-metal. For example, bronze is an alloy of copper and tin.

NCERT Solutions for Class 10 Science Chapter 3 Textbook Chapter End Questions

Metals and Nonmetals Class 10 Question 1.

Which of the following pairs will give displacement reactions ?

- (a) NaCl solution and copper metal.
- (b) MgCl_2 solution and aluminium metal.
- (c) FeSO_4 solution and silver metal.
- (d) AgNO_3 solution and copper metal.

Answer:

- (d) AgNO_3 solution and copper metal.

Question 2.

Which of the following methods is suitable for preventing an iron frying pan from rusting ?

- (a) Applying grease
- (b) Applying paint.
- (c) Applying a coating of zinc
- (d) All the above.

Answer:

- (c) Applying a coating of zinc.

Question 3.

An element reacts with oxygen to give a compound with a high melting point. This compound is also soluble in water. The element is likely to be

- (a) calcium
- (b) carbon
- (c) silicon
- (d) iron

Answer:

- (a) Calcium.

Question 4.

Food cans are coated with tin and not with zinc because

- (a) zinc is costlier than tin
- (b) zinc has a higher melting point than tin
- (c) zinc is less reactive than tin
- (d) zinc is more reactive than tin.

Answer:

- (d) Zinc is more reactive than tin.

Metals and Non metals Class 10 Question 5.

You are given a hammer, a battery, a bulb, wires and a switch.

- (a) How could you use them to distinguish between samples of metals and non-metals?
- (b) Assess the usefulness of these tests in distinguishing between metals and non-metals.

Answer:

(a) Metals can be beaten into thin sheets with a hammer without breaking. Non-metals cannot be beaten with a hammer to form thin sheets. Non-metals break into pieces when hammered. Metals are malleable, while non-metals are non-malleable. When metals are connected into circuit using a battery, bulb, wires and switch, current passes through the circuit and the bulb glows. When non-metals (like sulphur) are connected, the bulb does not light up at all. Metals are good conductors of electricity.

(b) Because of malleability, metals can be casted into sheets. Metals are good conductors of electricity so these can be used for electrical cables.

Question 6.

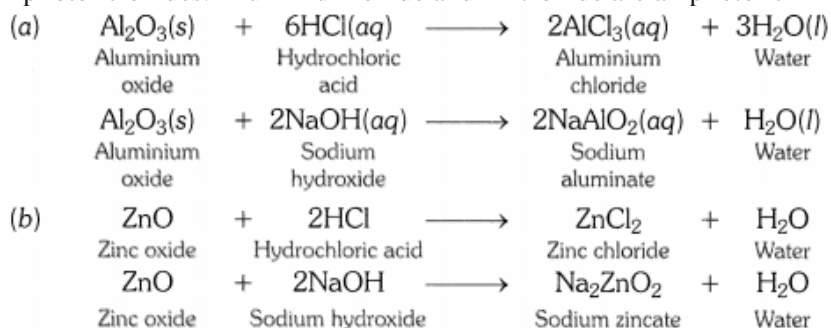
What are amphoteric oxides ? Give two examples of amphoteric oxides ?

OR

Write chemical equations that show aluminium oxide reacts with acid as well as base. [CBSE2011]

Answer:

Those metal oxides which show basic as well as acidic behaviour are known as amphoteric oxides. In other words, metal oxides that react with both acids and bases to form salt and water are called amphoteric oxides. Aluminium oxide and zinc oxide are amphoteric in nature.



Question 7.

Name two metals which will displace hydrogen from dilute acids and two metals which will not.

Answer:

- (i) Metals above hydrogen in the activity series like sodium and magnesium displace hydrogen from dilute acids.
- (ii) Metals below hydrogen in the activity series like copper, silver do not displace hydrogen from dilute acids.

Question 8.

In the electrolytic refining of a metal M, what would you take as the anode, the cathode and the electrolyte ?

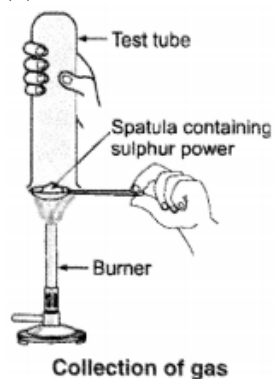
Answer:

- Cathode – Pure metal
- Anode – Impure metal
- Electrolyte – Metal salt solution

Question 9.

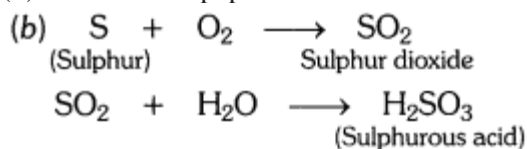
Pratyush took sulphur powder on a spatula and heated it. He collected the gas evolved by inverting a test tube over it, as shown in the figure.

- (a) What will be the action of gas on
 - (i) dry litmus paper ?
 - (ii) moist litmus paper ?
- (b) Write a balanced chemical equation for the reaction taking place.



Answer

- (i) Dry litmus paper – no action.
- (ii) Moist litmus paper – becomes red.



Question 10.

State two ways to prevent the rusting of iron.

Answer:

Ways to prevent rusting of iron are :

- (a) By painting
- (b) By galvanizing

Question 11.

What type of oxides are formed when non-metals combine with oxygen ?

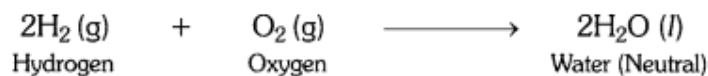
Answer:

Non-metals combine with oxygen to form acidic oxides or neutral oxides.

Acidic oxide as sulphur dioxide



Neutral oxide as water



Question 12.

Give reasons :

- (a) Platinum, gold and silver are used to make jewellery.
- (b) Sodium, potassium and lithium are stored under oil.
- (c) Aluminium is a highly reactive metal, yet it is used to make utensils for cooking.
- (d) Carbonate and sulphide ores are usually converted into oxides during the process of extraction.

Answer:

- (a) Platinum, gold and silver are used to make jewellery because these are malleable and ductile. These are highly resistant to corrosion.
- (b) Sodium, potassium and lithium are very reactive and catch fire when exposed to air. This is due to their low ignition temperature and high reactivity.
- (c) Aluminium forms a non-reactive layer of aluminium oxide on its surface. This layer prevents aluminium to react with other substances. That's why aluminium is used to make cooking utensils.
- (d) It is easier to reduce a metal oxide into free metal. Since it is easier to obtain metals from their oxides than from their carbonates or sulphides directly, therefore, the carbonate and sulphide ores are first converted to oxides for extracting the metals.

Question 13.

You must have seen tarnished copper vessels being cleaned with lemon or tamarind juice. Explain why these sour substances are effective in cleaning the vessels.

Answer:

The sour substances such as lemon or tamarind juice contain acids. These acids dissolve the coating of copper oxide or basic copper carbonate present on the surface of tarnished copper vessels and makes them shining red-brown again.

Question 14.

Differentiate between metal and non-metal on the basis of their chemical properties. [CBSE 2017 (Delhi)]

Answer:

Difference between metals and non-metals

Metals	Non-metals

(i) Metals form basic oxides or amphoteric oxides.	(i) Non-metals form acidic or neutral oxides.
(ii) Metals replace hydrogen from acids and form salts.	(ii) Non-metals do not replace hydrogen from acids.
(iii) With chlorine, metals form chlorides which are electrovalent.	(iii) With chlorine, non-metals form chlorides which are covalent.
(iv) With hydrogen few metals form hydrides which are electrovalent.	(iv) With hydrogen, non-metals form many stable hydrides which are covalent.

Question 15.

A man went door-to-door posing as a goldsmith. He promised to bring back the glitter of old and dull gold ornaments. An unsuspecting lady gave a set of gold bangles to him which he dipped in a particular solution. The bangles sparkled like new but their weight was reduced drastically. The lady was upset but after a futile argument the man beat a hasty retreat. Can you play the detective to find out the nature of the solution he has used ?

Answer:

The dishonest goldsmith dipped the gold bangles in aqua-regia (which contains 1 part of concentrated nitric acid and 3 parts of concentrated hydrochloric acid, by volume). Aqua-regia dissolved a considerable amount of gold from gold bangles and hence reduced their weight drastically. The dishonest goldsmith can recover the dissolved gold from aqua-regia by a suitable treatment.

Question 16.

Give reasons why copper is used to make hot water tanks and not steel (an alloy of iron).

Answer:

- (i) Copper is a better conductor of heat than steel.
- (ii) Copper does not corrode easily. But steel corrodes easily.
- (iii) Copper does not react with water at any temperature, whereas iron reacts with water on heating.

NCERT Solutions for Class 10 Science Chapter 3 Metals and Non-metals

Metals and non metals: Properties of metals and non-metals, reactivity series, Formation and properties of ionic compounds, Basic metallurgical processes, corrosion and its prevention.

Question 1

What are amphoteric oxides? Give two examples of amphoteric oxides.

Solution:

Amphoteric oxides are the oxides, which react with both acids and bases to form salt and water. E.g. ZnO and Al_2O_3 .

Question 2

Name two metals, which will displace hydrogen from dilute acids, and two metals which will not.

Solution:

Very reactive metals like Zn and Mg displace hydrogen from dilute acids. On the other hand less reactive metals like Cu , Ag , etc. do not displace hydrogen from dilute acids.

Question 3

In the electrolytic refining of a metal M , what would you take as the anode, the cathode and the electrolyte?

Solution:

Anode is impure, thick block of metal M .

Cathode is a thin strip/wire of pure metal M .

Electrolyte is a suitable salt solution of metal M .

Question 4

State two ways to prevent the rusting of iron.

Solution:

By coating the surface of iron by rust proof paints.

By applying oil or grease to the surface of iron objects so that supply of air consisting of moisture is cut off from the surface.

Question 5

What types of oxides are formed when non-metals combine with oxygen?

Solution:

When non-metals combine with oxygen it forms either neutral or acidic oxides. CO is a neutral oxide; N_2O_5 or N_2O_3 is an acidic oxide.

extraction of metals from ores class 10 Question 6

Give reason

i. Metals replace hydrogen from dilute acids, where as non-metals do not.

ii. Carbonate and sulphide ores are usually converted into oxides during the process of extraction.

Solution:

i. Metals are electropositive in nature. They readily lose electrons. These electrons reduce the protons liberated from the acid to liberate hydrogen gas, where as non-metals possess a tendency to gain electrons and hence they do not furnish electrons to protons liberated from acids. Hence H_2 gas is not liberated.

ii. As it is easier to reduce metal oxides to metal, prior to reduction, metal sulphides and carbonates must be converted to oxides.

Question 7

Differentiate between metals and non-metals on the basis of their chemical properties.

Solution:

Metals	Non-metals
Metals on heating with oxygen form ionic oxides, which are basic in nature and which dissolve in water to form bases, which turn red litmus blue.	Non-metals on heating with oxygen form covalent oxides which are acidic in nature and dissolve in water to form acids, which turn blue litmus red.
Lustrous	Non-lustrous except graphite
Conductor of electricity and heat	Non-conductor of heat and electricity, except graphite
All are solid except mercury	Solid-liquid-gaseous
Electro positive. Loses electrons readily and becomes a positive ion	Electro negative: gain electrons and become negative ions.
Metals are reducing agents	Non-metals are good oxidizing agents

Question 8

Explain why the surface of some metals acquires a dull appearance when exposed to air for a long time.

Solution:

This is due to the surface oxidation of metals when exposed to moist air. For e.g. copper turns green on its surface due to the formation of basic copper carbonate $\text{Cu}(\text{OH})_2 \cdot \text{CuCO}_3$. Similarly silver becomes black due to the formation of black Ag_2S and Aluminium forms a white coating of Al_2O_3 on its surface.

Question 9

State which of the following metals would give hydrogen when added to dilute hydrochloric acid. i. Iron, ii. Copper iii. Magnesium

Copper does not react with dilute hydrochloric acid at all. This shows that copper is even less reactive than iron.



Question 10

Name a non-metallic element, which conducts electricity.

Solution:

Carbon in the form of graphite conducts electricity, as there is a free electron in each carbon atom, which moves freely in between the hexagonal layers.

Question 11

Which metals do not corrode easily?

Solution:

Gold and platinum and other noble metals do not corrode in air.

Question 12

What are alloys?

Solution:

Alloys are homogeneous mixtures of two or more metals, or a metal and a non-metal. E.g. steel, brass, bronze, etc.

Question 13

Define the following terms.

(i) Minerals

(ii) Ores

(iii) Gangue

Solution:

(i) Minerals

All compounds or elements, which occur naturally in the earth's crust, are called minerals. Example:

Alums, $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24 H_2O$, Bauxite $Al_2O_3 \cdot 2H_2O$

(ii) Ores

Those minerals from which a metal can be profitably extracted are called ores. Bauxite ($Al_2O_3 \cdot 2H_2O$) is the ore of Al, copper pyrite $CuFeS_2$. All minerals are not ores but all ores are minerals.

(iii) Gangue

When an ore is mined from the earth, it is always found to be contaminated with sand rocky materials.

The impurity of sand and rock materials present in the ore is known as gangue.

Question 14

Name two metals that are found in nature in the free state.

Solution:

Gold and platinum are found in the free state in nature.

Question 15

What is chemical process used for obtaining a metal from its oxide?



Question 16

Name two metals, which can form hydrides with metals.

Solution:

Sodium and calcium form stable hydrides on reacting with hydrogen.

Question 17

Does every mineral have a definite and a fixed composition? Explain.

Solution:

Yes, every mineral has a definite and a fixed composition. Minerals are widely distributed in the earth's crust in the form of oxides, carbonates, sulphides, sulphates, nitrates, etc. These minerals are formed as a result of chemical changes taking place during the formation of earth.

Class 10 metals and nonmetals Question 18

Explain the meaning of malleable and ductile.

Solution:

Malleable is being able to be beaten/hammered into thin sheets.

Ductile is being able to be drawn into thin wires.

Question 19

i. Write the electron dot structures for sodium, oxygen and magnesium.

ii. Show the formation of MgO and Na_2O by the transfer of electrons.

iii. What are the ions present in these compounds?

Solution:

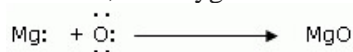
i. Sodium: Na^\bullet

Oxygen: $\text{:}\ddot{\text{O}}\text{:}$

Magnesium: Mg^\bullet

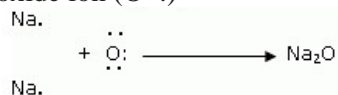
ii. Formation of Magnesium oxide

When magnesium reacts with oxygen, the magnesium atom transfers its two outermost electrons to an oxygen atom. By losing 2 electrons, the magnesium atoms form a magnesium ion (Mg^{2+}) and by gaining 2 electrons, the oxygen atom forms an oxide ion (O^{2-}).



Formation of Sodium oxide

Two sodium atoms transfer their 2 outermost electrons to an oxygen atom. By losing two electrons, the two sodium atoms form two sodium ions (2Na^+). And by gaining two electrons, the oxygen atom forms an oxide ion (O^{2-}).



iii. The ions present in sodium oxide compound (Na_2O) are sodium ions (2Na^+) and oxide ions (O^{2-}). The ions present in Magnesium oxide compound (MgO) are magnesium ions Mg^{2+} and oxide ions (O^{2-}).

Question 20

You must have seen tarnished copper vessels being cleaned with lemon or tamarind juice. Explain why these sour substances are effective in cleaning the vessels.

Solution:

The sour substances such as lemon (or tamarind juice) contain acids. These acids dissolve the coating of copper oxide or basic copper carbonate present on the surface of tarnished copper vessels and make them shining red-brown again.

Question 21

Give an example of a metal which

- is a liquid at room temperature.
- can be easily cut with a knife.
- is the best conductor of heat.
- is a poor conductor of heat.

Solution:

- Mercury is in liquid state at room temperature.
- Sodium and potassium are soft metals which can be easily cut with a knife.
- Silver is the best conductor of electricity.
- Mercury is a poor conductor of heat.

Question 22

Why is sodium kept immersed in kerosene?

Solution:

Sodium metal is kept immersed in kerosene to prevent their reaction with oxygen, moisture and carbon dioxide of air.

Question 23

Why do ionic compounds have high melting points?

Solution:

These compounds are made up of positive and negative ions. There is a strong force of attraction between the oppositely charged ions, so a lot of heat energy is required to break this force of attraction and melt the ionic compounds. This is why ionic compounds have high melting points.

Question 24

A man went door to door posing as a goldsmith. He promised to bring back the glitter of old and dull gold ornaments. An unsuspecting lady gave a set of gold bangles to him which he dipped in a particular solution. The bangles sparkled like new but their weight was reduced drastically. The lady was upset but after a futile argument the man beat a hasty retreat. Can you play the detective to find out the nature of the solution he had used?

Solution:

Aqua regia (By volume, this contains 3 parts of concentrated hydrochloric acid and 1 part of concentrated nitric acid) is the solution, which is used to sparkle the bangles like new, but their weight will be reduced drastically.

Question 25

Write equations for the reactions of

(i) iron with water

(ii) calcium and potassium with water

Solution:

(i) Iron reacts with steam to form magnetic oxide of Fe with the liberation of H_2 .



(ii) Calcium reacts with water to form calcium hydroxide and hydrogen.



Potassium reacts with cold water violently immediately with evolution of H_2 which catches fire.



Question 26

What would you observe when zinc is added to a solution of iron(II) sulphate? Write the chemical reaction that takes place?

Solution:

Zinc is more reactive (more electro positive) than iron. Therefore it displaces iron from its salt solution. The colour of ferrous sulphate is pale green which becomes colourless.



Light green Zinc sulphate

Metals and nonmetals class 10 Question 27

Pratyush took sulphur powder on a spatula and heated it. He collected the gas evolved by inverting a test-tube over the burning sulphur.

What will be the action of this gas on:

Dry litmus paper?

Moist litmus paper?

Write a balanced chemical equation for the reaction taking place.

Solution:

a) When sulphur is burnt in air then sulphur dioxide gas is formed.

(i) Sulphur dioxide gas has no action on dry litmus paper.

(ii) Sulphur dioxide gas turns moist blue litmus paper to red.

(b) $S_{(s)} + O_{2(g)} \longrightarrow SO_{2(g)}$

Multiple Choice Questions (MCQs) [1 Mark each]

Metals and nonmetals class 10 Question 1.

What is the colour of aqueous solution of $CuSO_4$ and $FeSO_4$ as observed in the laboratory?

(a) $CuSO_4$ – blue; $FeSO_4$ – light green

(b) $CuSO_4$ – blue; $FeSO_4$ – dark green

(c) $CuSO_4$ – green; $FeSO_4$ – blue

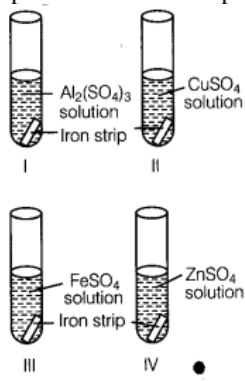
(d) $CuSO_4$ – green; $FeSO_4$ – colourless

Answer:

(a) Colour of $CuSO_4$ solution is blue and $FeSO_4$ solution is light green.

Metals and nonmetals class 10 Question 2.

A student took four test tubes I, II, III and IV containing aluminium sulphate, copper sulphate, ferrous sulphate and zinc sulphate solutions respectively. He placed an iron strip in each of them.



In which test tube, he found a brown deposit?

(a) I

(b) II

(c) III

(d) IV

Answer:

(b) In test tube II, because Fe is more reactive than copper but less reactive than Al and Zn.

Metals and nonmetals class 10 Question 3.

Aluminium sulphate and copper sulphate solutions were taken in two test tubes I and II respectively. A

few pieces of iron filings were then added to both the solutions. The four students A, B, C and D recorded their observations in the form of a table as given below:

Student	$\text{Al}_2(\text{SO}_4)_3$ solution (I)	CuSO_4 solution (II)
A	Colourless solution \rightarrow Light green	Blue colour is retained
B	Colourless solution \rightarrow No change	Blue colour solution \rightarrow Green
C	Colourless solution \rightarrow Light blue	Blue colour solution \rightarrow Green
D	No change in colour	Blue colour of solution fades

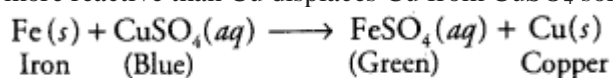
Which student has recorded the correct observation?

- (a) D
- (b) C
- (c) B
- (d) A

Answer:

(c) Student B

Iron does not react with $\text{Al}_2(\text{SO}_4)_3$ solution because iron is less reactive than aluminium. But Fe being more reactive than Cu displaces Cu from CuSO_4 solution.



Metals and nonmetals class 10 Question 4.

Aqueous solutions of zinc sulphate and iron sulphate were taken in test tubes I and II by four students A, B, C and D. Metal pieces of iron and zinc were dropped in the two solutions and observations made after several hours were recorded in the form of table as given below:

Student	Metal	Solution	Colour change Deposit/coating of solution	Deposit/coating obtained
A	Fe	ZnSO_4	Turned green	Silvery grey deposit
	Zn	FeSO_4	No change	No change

B	Fe	ZnSO ₄	No change	Black deposit
	Zn	FeSO ₄	Colour faded	Grey coating
C	Fe	ZnSO ₄	No change	No change
	Zn	FeSO ₄	Turned colourless	Black deposit
D	Fe	ZnSO ₄	No change	Grey deposit
	Zn	FeSO ₄	No change.	Black deposit

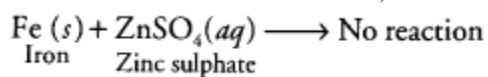
Which student has given the correct report?

- (a) B
- (b) D
- (c) A
- (d) C

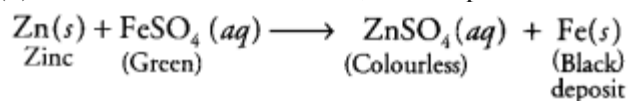
Answer:

- (d) Student C

(i) Fe is less reactive than zinc. So,



(ii) Zn is more reactive than Fe, so it displaces iron as follows:



Metals and nonmetals class 10 Question 5.

2 mL each of cone. HCl, cone. HNO₃ and a mixture of cone. HCl and cone. HNO₃ in the ratio of 3 : 1 were taken in test tubes labelled as A, B and C. A small piece of metal was put in each test tube. No change occurred in test tubes A and B but the metal got dissolved in test tube C. The metal could be [NCERT Exemplar]

- (a) Al
- (b) Au
- (c) Cu
- (d) Pt

Answer:

(b, d) A mixture of cone. HCl and cone. HNO₃ in the ratio of 3 : 1 is known as aqua-regia. Gold (Au) and platinum (Pt) dissolve only in aqua-regia as these metals are very less reactive.

Metals and nonmetals class 10 Question 6.

When an aluminium strip is kept (a) Green solution of FeSO₄ slowly turns brown

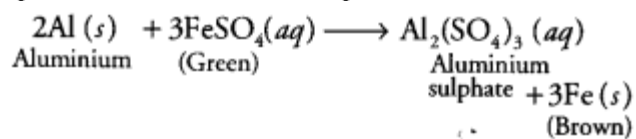
(b) Green solution of FeSO₄ rapidly turns brown

(c) No change in colour of FeSO₄

(d) Green solution of FeSO₄ slowly turns colourless

Answer:

(a) The green solution of ferrous sulphate slowly turns brown. As aluminium is more reactive than iron, it displaces iron from ferrous sulphate solution.



Metals and nonmetals class 10 Question 7.

Aluminium is used for making cooking utensils. Which of the following properties of aluminium are responsible for the same?

(i) Good thermal conductivity

(ii) Good electrical conductivity

(iii) Ductility

(iv) High melting point [NCERT Exemplar]

(a) (i) and (ii)

(b) (i) and (iii)

(c) (ii) and (iii)

(d) (i) and (iv)

Answer:

(d) Good thermal conductivity, malleability, light weight and high melting point are the properties/of aluminium due to which it is used for making cooking utensils.

Metals and nonmetals class 10 Question 8.

If copper is kept open in air, it slowly loses its shining brown surface and gains a green coating. It is due to the formation of [NCERT Exemplar]

(a) CuSO₄

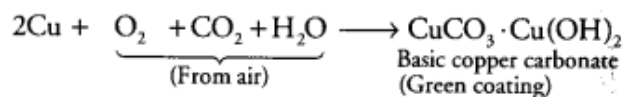
(b) CuCO₃

(c) Cu(NO₃)₂

(d) CuO

Answer:

(b) Copper reacts with CO₂ present in air and forms a green coating on its surface due to the formation of basic copper carbonate [CuCO₃·Cu(OH)₂] as:



Chapter 4 (Carbon and its Compound)

Notes

NCERT Solutions for Class 10 Science Chapter 4 Intext Questions

Page Number: 61

Question 1

What would be the electron dot structure of carbon dioxide which has the formula CO_2 ?

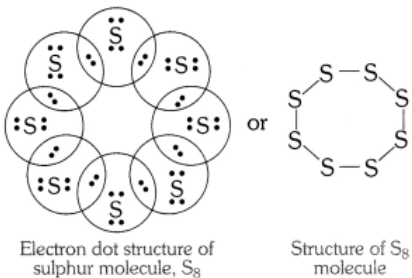
Answer:



Question 2

What would be electron dot structure of sulphur which is made up of eight atoms of sulphur.

Answer:



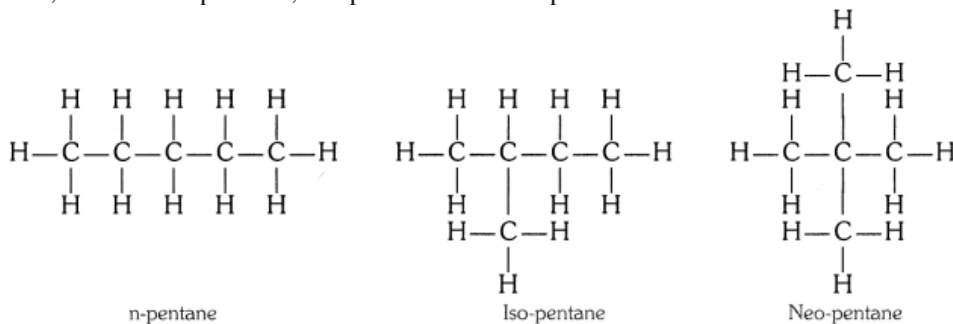
Page Number: 68 – 69

Question 1

How many structural isomers can you draw for pentane ?

Answer:

Three, these are n-pentane, iso-pentane and neo-pentane.



Question 2

What are the two properties of carbon which lead to the huge number of carbon compounds we see around us ?

Answer:

- (i) Tetravalency
- (ii) Catenation.

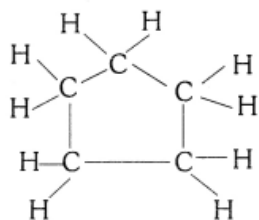
Question 3

What will be the formula and electron dot structure of cyclopentane ?

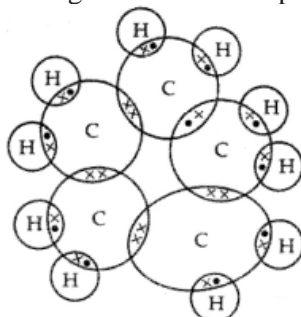
Answer:

The molecular formula of cyclopentane is C_5H_{10} .

The electron dot structure of cyclopentane is given on the next page.



Structure of cyclopentane



Electron dot structure of cyclopentane

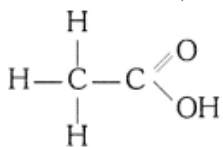
Question 4

Draw the structures for the following compounds :

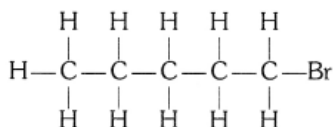
- (i) Ethanoic acid
- (ii) Bromopentane
- (iii) Butanone
- (iv) Hexanal

Answer:

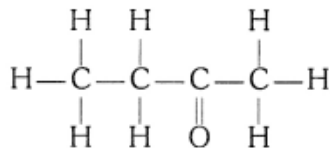
- (i) Ethanoic acid (CH_3COOH)



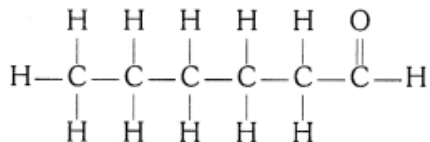
- (ii) Bromopentane ($C_5H_{11}Br$)



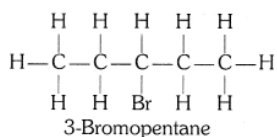
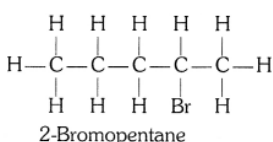
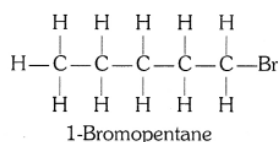
- (iii) Butanone ($CH_3 - CH_2 - COCH_3$)



- (iv) Hexanal ($C_5H_{11}CHO$)



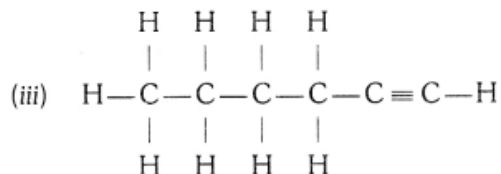
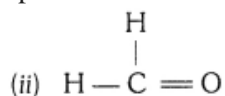
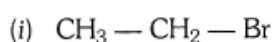
Structural isomers for bromopentane: There are three structural isomers for bromopentane depending on the position of Br at carbon 1, 2, 3.



Positions 4 and 5 are same as 1, 2.

Question 5

How would you name the following compounds ?



Answer:

(i) Bromoethane

(ii) Methanal

(iii) 1 - Hexyne

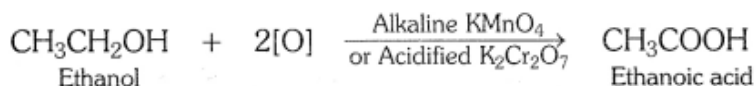
Page Number: 71

Question 1

Why is the conversion of ethanol to ethanoic acid an oxidation reaction ?

Answer:

Conversion of ethanol into ethanoic acid is an oxidation reaction because addition of oxygen to a substance is called oxidation. Here, oxygen is added to ethanol by oxidising agent like alkaline potassium permanganate or acidified potassium dichromate and it is converted into acid.



Question 2

A mixture of oxygen and ethyne is burnt for welding. Can you tell why a mixture of ethyne and air is not used ?

Answer:

A mixture of ethyne and air is not used for welding because burning of ethyne in air produces a sooty flame due to incomplete combustion, which is not enough to melt metals for welding.

Page Number: 74

Question 1

How would you distinguish experimentally between an alcohol and a carboxylic acid ?

Answer:

Differences between alcohol and carboxylic acid

Test	Alcohol	Carboxylic acid
(i) Litmus test	No change in colour.	Blue litmus solution turns red.
(ii) Sodium hydrogen carbonate test	$C_2H_5OH + NaHCO_3 \rightarrow$ No reaction No brisk effervescence.	$CH_3COOH + NaHCO_3 \rightarrow$ $CH_3COONa + H_2O + CO_2$ Brisk effervescence due to evolution of CO_2 .
(iii) Alkaline potassium permanganate	On heating, pink colour disappears.	Does not happen so.

Question 2

What are oxidising agents ?

Answer:

Oxidising agents are the substances which give oxygen to another substances or which remove hydrogen from a substance.

For example, acidic $K_2Cr_2O_7$ is an oxidising agent, that converts (oxidises) ethanol into ethanoic acid.

Page Number: 76

Question 1

Would you be able to check if water is hard by using a detergent ?

Answer:

No, because detergents can lather well even in hard water. They do not form insoluble calcium or magnesium salts (scum). On reacting with the calcium ions and magnesium ions present in the hard water.

Question 2

People use a variety of methods to wash clothes. Usually after adding the soap, they 'beat' the clothes on a stone, or beat it with a paddle, scrub with a brush or the mixture is agitated in a washing machine. Why is agitation necessary to get clean clothes ?

Answer:

It is necessary to agitate to get clean clothes because the soap micelles which entrap oily or greasy particles on the surface of dirty cloth have to be removed from its surface. When the cloth wetted in soap

solution is agitated or beaten, the micelles containing oily or greasy dirt get removed from the surface of dirty cloth and go into water and the dirty cloth gets cleaned.

NCERT Solutions for Class 10 Science Chapter 4 Textbook Chapter End Questions

Question 1

Ethane, with the molecular formula C_2H_6 has

- (a) 6 covalent bonds
- (b) 7 covalent bonds
- (c) 8 covalent bonds
- (d) 9 covalent bonds

Answer:

- (b) 7 covalent bonds.

Question 2

Butanone is a four-carbon compound with the functional group

- (a) carboxylic acid
- (b) aldehyde
- (c) ketone
- (d) alcohol

Answer:

- (c) Ketone.

Question 3

While cooking, if the bottom of the vessel is getting blackened on the outside, it means that

- (a) the food is not cooked completely.
- (b) the fuel is not burning completely.
- (c) the fuel is wet.
- (d) the fuel is burning completely.

Answer:

- (b) The fuel is not burning completely.

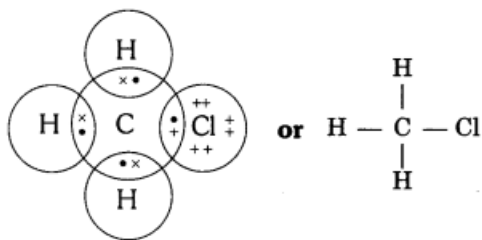
Question 4

Explain the nature of the covalent bond using the bond formation in CH_3Cl .

Answer:

Covalent bond is formed by sharing of electrons so that the combining atoms complete their outermost shell.

In CH_3Cl : C = 6, H = 1 and Cl = 17 And their electronic configuration is C – 2,4, H – 1 and Cl – 2, 8, 7



Three hydrogen atoms complete their shells by sharing three electrons (one electron each) of carbon atom. Chlorine completes its outer shell by sharing its one out of seven electrons with one electron of carbon atom.

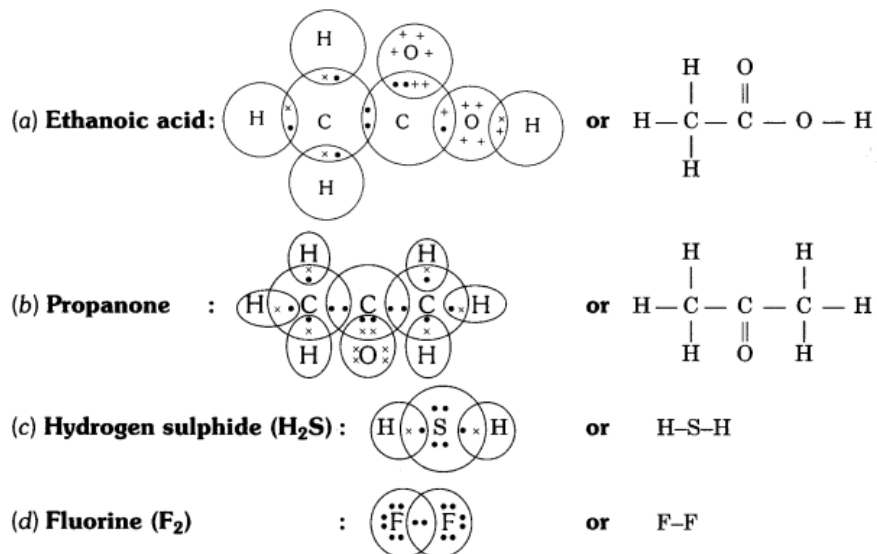
Thus carbon atom shares all its four electrons with three hydrogen atoms and one of chlorine atom and completes its outermost shell and single covalent bonds are formed in CH_3Cl .

Question 5

Draw the electron dot structures for

- ethanoic acid
- propanone
- H_2S
- F_2 .

Answer:



Question 6

What is a homologous series ? Explain with an example.

Answer:

Homologous series : A homologous series is a group of organic compounds having similar structures and similar chemical properties in which the successive compounds differ by - CH_2 group.

Characteristics of homologous series :

- All members of a homologous series can be represented by the same general formula. For example, the general formula of the homologous series of alkanes is $\text{C}_n\text{H}_{2n+2}$, in which 'n' denotes number of carbon and hydrogen atoms in one molecule of alkane.
- Any two adjacent homologues differ by one carbon atom and two hydrogen atoms in their molecular formulae.
- The difference in the molecular masses of any two adjacent homologues is 14u.
- All the compounds of a homologous series show similar chemical properties.
- The members of a homologous series show a gradual change in their physical properties with increase in molecular mass.

For example, general formula of the homologous series of alkanes is $\text{C}_n\text{H}_{2n+2}$, in which 'n' denotes number of carbon atoms in one molecule of alkane. Following are the first five members of the homologous series of alkanes (general formula $\text{C}_n\text{H}_{2n+2}$).

Value of n	Molecular formula	Name of compound
1	CH ₄	Methane
2	C ₂ H ₆	Ethane
3	C ₃ H ₈	Propane
4	C ₄ H ₁₀	Butane
5	C ₅ H ₁₂	Pentane

Question 7

How can ethanol and ethanoic acid be differentiated on the basis of their physical and chemical properties ?

Answer:

Difference on the basis of physical properties

Property	Ethanol	Ethanoic acid
(i) State	Liquid	Liquid
(ii) Odour	Sweet smell	Pungent vinegar-like smell
(iii) Melting point	156 K	290 K

(iv) Boiling point	351 K	391 K
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Difference on the basis of chemical properties

Test	Ethanol	Ethanoic acid
(i) Litmus test	No change in the colour of litmus solution.	Blue litmus solution turns red.
(ii) Sodium hydrogen carbonate test	$\text{C}_2\text{H}_5\text{OH} + \text{NaHCO}_3 \rightarrow$ No reaction No brisk effervescence.	$\text{CH}_3\text{COOH} + \text{NaHCO}_3 \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O} + \text{CO}_2$ Brisk effervescence due to evolution of CO_2 .
(iii) Alkaline potassium permanganate	On heating, pink colour disappears.	Does not happen so.

Question 8

Why does micelle formation take place when soap is added to water ? Will a micell be formed in other solvents such as ethanol also ?

Answer:

Micelle formation takes place when soap is added to water because the hydrocarbon chains of soap molecules are hydrophobic (water repelling) which are insoluble in water, but the ionic ends of soap molecules are hydrophilic (water attracting) and hence soluble in water.

Such micelle formation will not be possible in other solvents like ethanol in which sodium salt of fatty acids do not dissolve.

Question 9

Why are carbon and its compounds used as fuels for most applications ?

Answer:

Carbon and its compounds give a large amount of heat per unit weight and are therefore, used as fuels for most applications.

Question 10

Explain the formation of scum when hard water is treated with soap.

Answer:

Hard water contains salts of calcium and magnesium. Calcium and magnesium on reacting with soap form insoluble precipitate called scum. The scum formation lessens the cleansing property of soaps in hard water.

Question 11

What change will you observe if you test soap with litmus paper (red and blue)?

Answer:

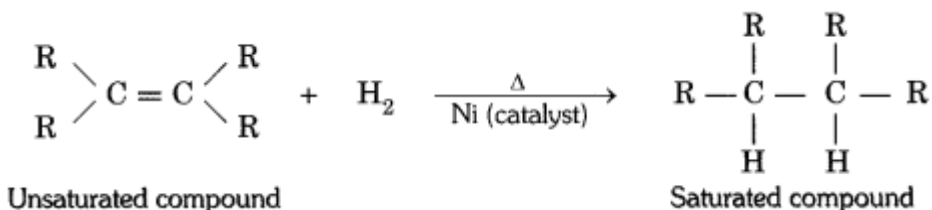
Red litmus will turn blue because soap is alkaline in nature. Blue litmus remains blue in soap solution.

Question 12

What is hydrogenation ? What is its industrial application ?

Answer:

The addition of hydrogen to an unsaturated hydrocarbon to obtain a saturated hydro-carbon is called hydrogenation. The process of hydrogenation takes place in the presence of nickel (Ni) or palladium (Pd) metals as catalyst.



Application : The process of hydrogenation has an important industrial application. It is used to prepare vegetable ghee (or vanaspati ghee) from vegetable oils.

Question 13

Which of the following hydrocarbons undergo addition reactions :

C_2H_6 , C_3H_8 , C_3H_6 , C_2H_2 and CH_4

Answer:

Addition reactions take place only in unsaturated hydrocarbons. So addition reaction take place only in C_3H_6 and C_2H_2 .

Question 14

Give a test that can be used to differentiate chemically between butter and cooking oil.

Answer:

Butter is a saturated carbon compound while cooking oil is an unsaturated carbon compound. An unsaturated compound decolourises bromine water, while a saturated compound cannot decolourise it. So we can distinguish chemically between a cooking oil and butter by the bromine water. Add bromine water to a little of cooking oil and butter taken in separate test-tubes.

- Cooking oil decolourises bromine water showing that it is an unsaturated compound.
- Butter does not decolourise bromine water showing that it is a saturated compound.

Question 15

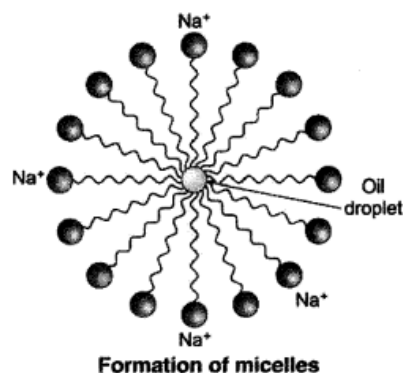
Explain the mechanism of the cleaning action of soaps.

OR

Explain the cleansing action of soaps.

Answer:

When a dirty cloth is put in water containing dissolved soap, then the hydrocarbon end of the soap molecules in micelle attach to the oil or grease particles present on the surface of dirty cloth. In this way the soap micelle entraps the oily or greasy particles by using its hydrocarbon ends. The ionic ends of the soap molecules in the micelles, however, remain attached to water. When the dirty cloth is agitated in soap solution, the oily and greasy particles present on its surface and entrapped by soap micelles get dispersed in water due to which the soap water becomes dirty but the cloth gets cleaned. The cloth is cleaned thoroughly by rinsing in clean water a number of times.

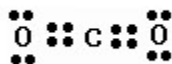


NCERT Solutions for Class 10 Science Chapter 4 Carbon and its Compounds

Question 1

What would be the electron dot structure of carbon dioxide which has the formula CO_2 ?

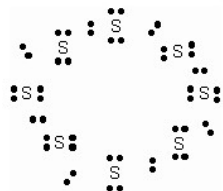
Solution:



Question 2

What would be the electron dot structure of a molecule of sulphur, which is made up of eight atoms of sulphur? (Hint – The eight atoms of sulphur are joined together in the form of a ring.)

Solution:



Question 3

How many structural isomers can you draw for pentane?

Solution:

We can draw 3 structural isomers for pentane.

Question 4

What are the two properties of carbon that lead to the huge number of carbon compounds we see around us?

Solution:

Due to its large valency, carbon atoms can form covalent bonds with a number of carbon atoms as well as with a large number of other atoms such as hydrogen, oxygen, nitrogen, sulphur, chlorine and many more atoms. This leads to the formation of a large number of organic compounds.

Question 5

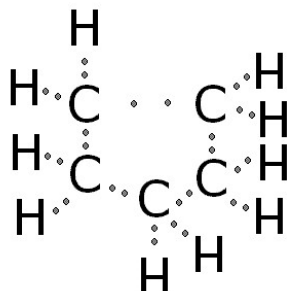
What will be the formula and electron dot structure of Cyclopentane?

Solution:

Formula of Cyclopentane

C_5H_{10}

Dot structure

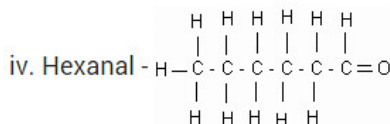
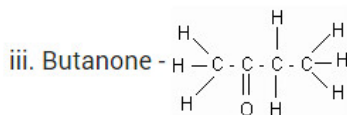
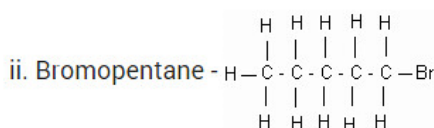
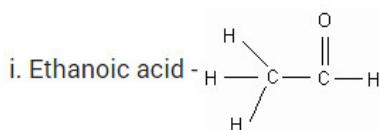


Question 6

Draw the structures for the following compounds.

- Ethanoic acid
- Bromopentane
- Butanone
- Hexanal

Solution:



Question 7

How would you name the following compounds?

Solution:

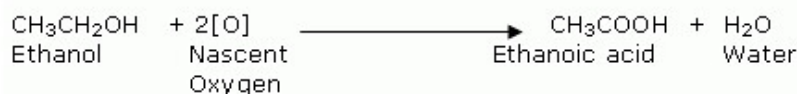
- i. Ethyl bromide
- ii. Formaldehyde
- iii. Hexyne

Question 8

Why is the conversion of ethanol to Ethanoic acid an oxidation reaction?

Solution:

The conversion of ethanol into ethanoic acid is called an oxidation reaction because oxygen is added to it during this conversion.



Question 9

A mixture of oxygen and ethyne is burnt for welding. Can you tell why a mixture of ethyne and air is not used?

Solution:

When a mixture of oxygen and ethyne is burnt, it burns completely producing a blue flame. This blue flame is extremely hot which produced a very high temperature which is used for welding metals. But the mixture of ethyne and air is not used for welding purposes because burning of ethyne in air produces a sooty flame, which is not enough to melt metals for welding.

Question 10

What are oxidizing agents?

Solution:

Oxidizing agents are the substances that gain electrons in an redox reaction and whose oxidation number is reduced.

Question 11

Explain the nature of the covalent bond using the bond formation of CH_3Cl .

Solution:

CH_3Cl (methyl chloride) is made up of one carbon atom, three hydrogen atoms and one chlorine atom. Carbon atom has 4 valence electrons, each hydrogen atom has one valence electron, and a chlorine atom has 7 valence electrons. Carbon atom shares its four valence electrons with three hydrogen atoms and 1 chlorine atom to form methyl chloride as follows:

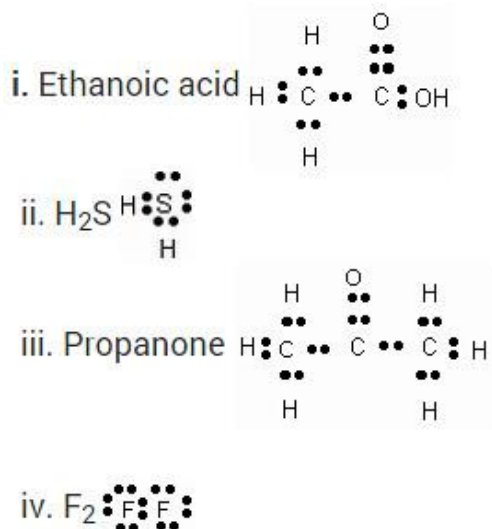


From the above reaction, in the dot structure of methyl chloride (CH_3Cl) there are four pairs of shared electrons between carbon and other atoms. Each pair of shared electrons constitutes one single covalent bond. So, methyl chloride has four single covalent bonds.

Question 12

Draw the electron dot structures for-

Solution:



Question 13

What is a homologous series? Explain with an example.

Solution:

Homologous series is a series of compounds with a similar general formula, possessing similar chemical properties due to the presence of the same functional group, and shows a gradation in physical properties as a result of increase in molecular size and mass. For example, methane has a lower boiling point than ethane since it has more intermolecular forces with neighbouring molecules. This is because of the increase in the number of atoms making up the molecule.

Question 14

How can ethanol and Ethanoic acid be differentiated on the basis of their physical and chemical properties?

Solution:

- (i) Ethanol has a pleasant smell whereas ethanoic acid has the smell of vinegar.
- (ii) Ethanol has a burning taste whereas ethanoic acid has a sour taste.
- (iii) Ethanol has no action on litmus paper whereas ethanoic acid turns blue litmus paper red.
- (iv) Ethanol has no reaction with sodium hydrogencarbonate but Ethanoic acid gives brisk effervescence with sodium hydrogencarbonate.

Question 15

Why does micelle formation take place when soap is added to water? Will a micelle be formed in other solvents such as ethanol also?

Solution:

Micelle formation takes place when soap is added to water. This is because when soap is added to water in which dirty clothes are soaked, the two parts of the soap molecule dissolves in two different mediums. The organic tail dissolves in the dirt, grime or grease and the ionic head dissolves in water. When the clothes are rinsed or agitated, the dirt gets pulled out of the clothes in the water by the soap molecule. In this way the soap does its cleaning work on dirty and grimy clothes or hands.

The soap molecules actually form a closed structure because of mutual repulsion of the positively charged heads. This structure is called a micelle.

Question 16

Why are carbon and its compounds used as fuels for most applications?

Solution:

Carbon and its compounds are used as fuels for most of the applications because they burn in air releasing a lot of heat energy.

Question 17

Explain the formation of scum when hard water is treated with soap.

Solution:

The precipitate form of scum is formed when soap is used for washing clothes. With hard water, a large amount of soap is wasted in reacting with the calcium and magnesium ions of hard water to form an insoluble precipitate. The precipitate formed by the action of hard water on soap, sticks to the clothes being washed and interferes with the cleaning ability of the additional soap. This makes the cleaning of clothes difficult.

Question 18

What change will you observe if you test soap with litmus paper (red and blue)?

Solution:

Soap is the salt of a strong base (NaOH) and a weak acid (carboxylic acid), so a solution of soap in water is basic in nature. Being basic, a soap solution turns red litmus paper blue.

Question 19

What is hydrogenation? What is its industrial application?

Solution:

It is a class of chemical reactions in which the net result is addition of hydrogen (H_2) to unsaturated organic compounds such as alkenes, alkynes, etc. Hydrogenation is widely applied to the processing of vegetable oils and fats. Complete hydrogenation converts unsaturated fatty acids to saturated ones.

Question 20

C_2H_5 , C_3H_8 , C_3H_6 , C_2H_2 and CH_4

Solution:

Alkenes and alkynes (unsaturated hydrocarbons) undergo addition reactions. From the above hydrocarbons C_2H_2 is an alkyne, whereas C_3H_6 is an alkene. So, C_3H_6 and C_2H_2 will undergo addition reactions.

Question 21

Give a test that can be used to differentiate chemically between butter and cooking oil.

Solution:

Bromine water test can be used to differentiate chemically between butter and cooking oil. Add bromine water to a little of cooking oil and butter taken in separate test tubes.

- Decolourising of bromine water by cooking oil (unsaturated compound)
- Butter (saturated compound) does not decolourise bromine water

Question 22

Explain the mechanism of the cleaning action of soaps.

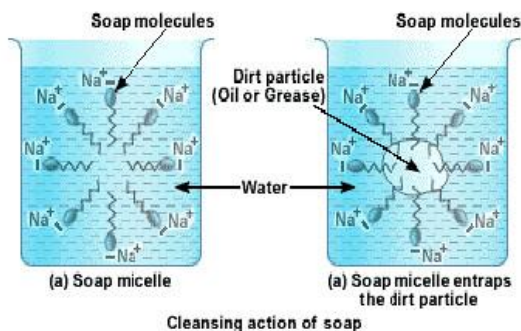
Solution:

We all know that soap is used to remove dirt and grime from substances. Generally dirt and grime get stuck because they have an oily component, which is difficult to remove, by plain brushing or washing by water. A soap molecule has two parts, a head and a tail i.e. the long chain organic part and the functional

group $\text{COO}^- \text{Na}^+$.

A soap molecule has a tadpole like structure shown below.

The organic part is water insoluble but is soluble in organic solvents or in oil or grease. The ionic part is soluble in water, as water is a polar solvent. When soap is added to water in which dirty clothes are soaked, the two parts of the soap molecule dissolve in two different mediums. The organic tail dissolves in the dirt, grime or grease and the ionic head dissolves in water. When the clothes are rinsed or agitated, the dirt gets pulled out of the clothes, by the soap molecule. In this way soap does its cleaning work on dirty and grimy clothes or hands.



The soap molecules actually form a closed structure because of mutual repulsion of the positively charged heads. This structure is called a micelle. The micelle pulls out the dirt and grime more efficiently.

Question 23

Would you be able to check if water is hard by using a detergent?

Solution:

We would not be able to check whether a sample of water is hard by using a detergent, this is because a detergent forms lather easily even with hard water.

Question 24

People use a variety of methods to wash clothes. Usually after adding the soap, they 'beat' the clothes on a stone, or beat it with a paddle, scrub with a brush or the mixture is agitated in a washing machine. Why is agitation necessary to get clean clothes?

Solution:

It is necessary to shake to get clean clothes because the soap micelles, which entrap oily or greasy particles on the surface of dirty clothes, have to be removed from their surface. When the clothes which are wet by soap solution are beaten, the micelles containing oil or greasy dirt particles get removed from the surface of dirty clothes and go into water and the dirty cloth gets cleaned.

Multiple Choice Questions (MCQs) [1 Mark each]

Question 1.

Buckminster fullerene is an allotropic form of [NCERT Exemplar]

- (a) phosphorus
- (b) sulphur
- (c) carbon
- (d) tin

Answer:

(c) Buckminster fullerene is an allotrope of carbon containing clusters of 60 carbon atoms joined together to form spherical molecules. Its formula is C_{60} (C-sixty). It is a dark solid at room temperature and as compared to another allotropic form of carbon (diamond and graphite), it is neither very hard nor soft.

Question 2.

The hetero atoms present in

$\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_2 - \text{CH}_2\text{Cl}$ are [NCERT Exemplar]

- (i) oxygen
- (ii) carbon
- (iii) hydrogen
- (iv) chlorine
- (a) (i) and (ii)
- (b) (ii) and (iii)
- (c) (iii) and (iv)
- (d) (i) and (iv)

Answer:

(d) Atoms other than C and H, if present in organic compound, are called heteroatoms.

Question 3.

In which of the following compounds -OH is the functional group? [NCERT Exemplar]

- (a) Butanone
- (b) Butanol
- (c) Butanoic
- (d) Butanal

Answer:

(b) Butanol, $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{OH}$

The general formula of alcohols is $\text{C}_n\text{H}_{2n+1} - \text{OH}$.

For butanol, $n = 4$. So, formula is

$\text{C}_4\text{H}_9 - \text{OH}$ or $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{OH}$

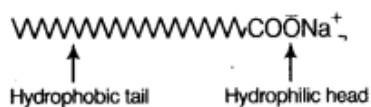
Question 4.

The soap molecule has a [NCERT Exemplar]

- (a) hydrophilic head and a hydrophobic tail
- (b) hydrophobic head and a hydrophilic tail
- (c) hydrophobic head and a hydrophobic tail
- (d) hydrophilic head and a hydrophilic tail

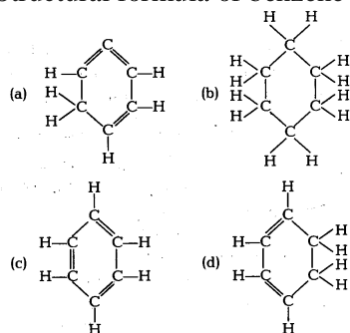
Answer:

(a) A soap molecule is made up of two parts- a long hydrocarbon part and a short ionic part — COONa^+ group. The long hydrocarbon chain is hydrophobic (water repelling) and ionic portion is hydrophilic (water attracting).



Question 5.

Structural formula of benzene is

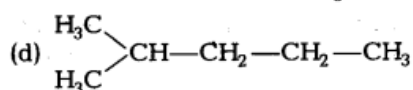
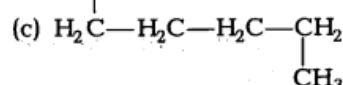
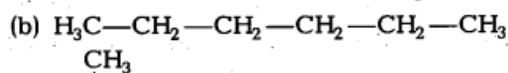
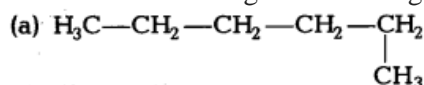


Answer

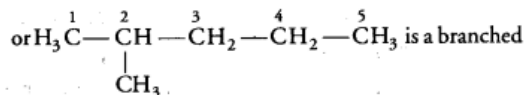
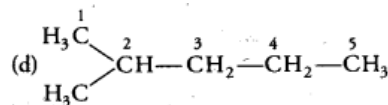
(c) Benzene molecule contains alternate single and double bonds. Its formula is C_6H_6 . In structure (b) formula is C_6H_{12} . In structure (a) double bond is not at alternate position. In (d) formula is C_6H_8 .

Question 6.

Which of the following is not a straight chain hydrocarbon? [NCERT Exemplar]



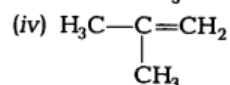
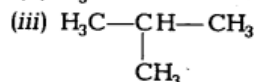
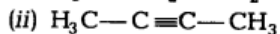
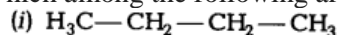
Answer:



chain hydrocarbon not straight chain hydrocarbon. Rest three are straight chain hydrocarbons.

Question 7.

Which among the following are unsaturated hydrocarbons? [NCERT Exemplar]



(a) (i) and (iii)

(b) (ii) and (iii)

(c) (ii) and (iv)

(d) (iii) and (iv)

Answer:

(c) Unsaturated hydrocarbons have double or triple bond in the structure. Both (ii) and (iv) structures have triple and double carbon-carbon bonds respectively.

Question 8.

Chlorine reacts with saturated hydrocarbons at room temperature in the [NCERT Exemplar]

(a) absence of sunlight

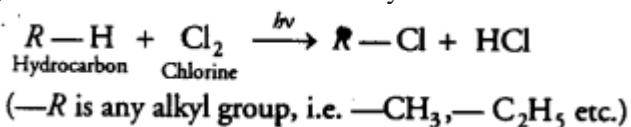
(b) presence of sunlight

(c) presence of water

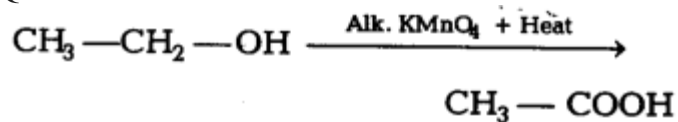
(d) presence of hydrochloric acid

Answer:

(b) Chlorine reacts with saturated hydrocarbon at room temperature in the presence of sunlight.



Question 9.



In the above given reaction, alk.KMnO₄ acts as [NCERT Exemplar]

- (a) reducing agent
- (b) oxidising agent
- (c) catalyst agent
- (d) dehydrating

Answer:

(b) KMnO₄ acts as oxidising agent, because it removes hydrogen from CH₃CH₂OH and adds one oxygen to it.

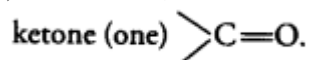
Question 10.

Butanone is a four carbon compound with functional group [NCERT Exemplar]

- (a) carboxylic acid
- (b) aldehyde
- (c) ketone
- (d) alcohol

Answer:

(c) In butanone, the functional group is



Question 11.

Identify the unsaturated compounds from the following [NCERT Exemplar]

- (i) Propane
 - (ii) Propene
 - (iii) Propyne
 - (iv) Chloropropane
- (a) (i) and (ii)
 - (b) (ii) and (iv)
 - (c) (iii) and (iv)
 - (d) (ii) and (iii)

Answer:

(d) Propene, CH₃CH=CH₂ (ii) and propyne, CH₃—C≡CH (iii) both have double and triple bonds, respectively, hence are unsaturated compounds.

Question 12.

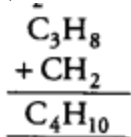
Which of the following does not belong to the same homologous series? [NCERT Exemplar]

- (a) CH₄
- (b) C₂H₆
- (c) C₃H₈

(d) C_4H_8

Answer:

(d) Because successive members of a homologous series differ by $—CH_2$ unit.



Thus, C_4H_{10} is the next member of this series. So, homologous series of alkanes is: methane (CH_4), ethane (C_2H_6), propane (C_3H_8) and butane (C_4H_{10}).

So, C_4H_8 does not belong to the homologous series.

Question 13.

Ethane with molecular formula C_2H_6 has [NCERT Exemplar]

(a) 6 covalent bonds

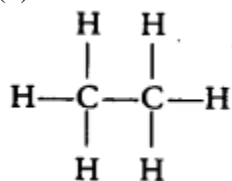
(b) 7 covalent bonds

(c) 8 covalent bonds

(d) 9 covalent bonds

Answer:

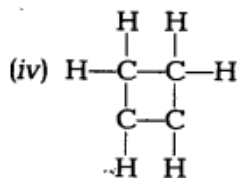
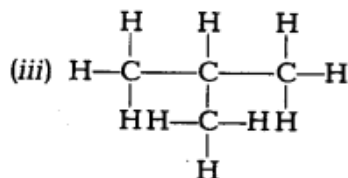
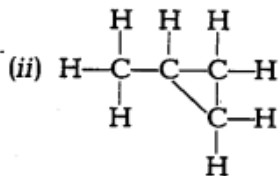
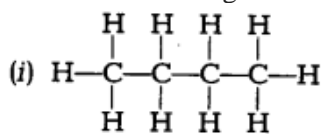
(b) Structure formula of ethane (C_2H_6) is



It is clear that it has 7 covalent bonds.

Question 14.

Which of the following are correct structural isomers of butane? [NCERT Exemplar]



- (a) (i) and (iii)
- (b) (ii) and (iv)
- (c) (i) and (ii)
- (d) (iii) and (iv)

Answer:

(a) Structure (i) is n-butane and structure (iii) is iso-butane. Since, molecular formula is same, only structures are different. So, (i) and (iii) are isomers while structures (ii) and (iv) have molecular formula C_4H_8 .

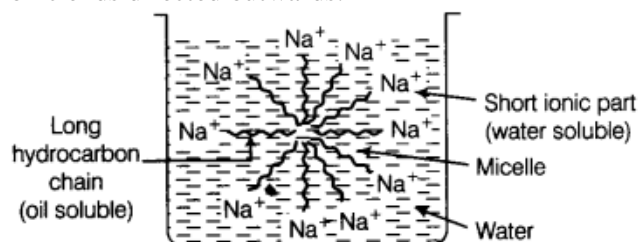
Question 15.

In the soap micelles, [NCERT Exemplar]

- (a) the ionic end of soap is on the surface of the cluster while the carbon chain is in the interior of the cluster
- (b) ionic end of soap is in the interior of the cluster and the carbon chain is out of the cluster
- (c) Both ionic end and carbon chain are in the interior of the cluster
- (d) Both ionic end and carbon chain are on the exterior of the cluster

Answer:

(a) A 'spherical aggregate of soap molecules' in the soap solution in water is called a 'micelle'. In a soap micelle, the soap molecules are arranged readily with hydrocarbon ends directed towards the centre and ionic ends directed outwards.



Question 16.

Vinegar is a solution of [NCERT Exemplar]

- (a) 50% – 60% acetic acid in alcohol
- (b) 5% – 8% acetic acid in alcohol
- (c) 5% – 8% acetic acid in water
- (d) 50% – 60% acetic acid in water

Answer:

(c) A 5%-8% solution of acetic acid in water is called vinegar.

Question 17.

Oils on treating with hydrogen in the presence of palladium or nickel catalyst form fats. This is an example of [NCERT Exemplar]

- (a) addition reaction
- (b) substitution reaction
- (c) displacement reaction
- (d) oxidation reaction

Answer:

(a) Oils are unsaturated compounds containing double bonds. Addition reactions are characteristic property of unsaturated hydrocarbons. The given reaction is an example of addition reaction.

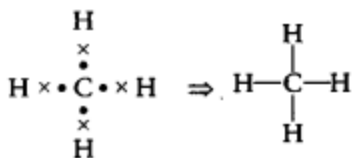
Question 18.

Carbon forms four covalent bonds by sharing its four valence electrons with four univalent atoms, e.g. hydrogen. After the formation of four bonds, carbon attains the electronic configuration of [NCERT Exemplar]

- (a) helium
- (b) neon
- (c) argon
- (d) krypton

Answer:

(b) Electronic configuration of carbon (C) = 2, 4 when it forms four covalent bonds by sharing its four valence electrons with hydrogen, it forms CH_4 molecule like this



Now, electronic configuration of C in CH_4

$4 = 2, 8.$

Atomic number of Ne is 10. Its electronic K L configuration is 2,8. Therefore, after the formation of four bonds, carbon attains the electronic configuration of neon.

Question 19.

Mineral acids are stronger acids than carboxylic acids because

- (i) mineral acids are completely ionised.
- (ii) carboxylic acids are completely ionised.
- (iii) mineral acids are partially ionised.
- (iv) carboxylic acids are partially ionised.

- (a) (i) and (iv)
- (b) (ii) and (iii)
- (c) (i) and (ii)
- (d) (iii) and (iv)

Answer:

(a) Mineral acids are strong acids which ionise almost completely and carboxylic acids are weak acids which ionise only partially.

Question 20.

While cooking, if the bottom of the vessel is getting blackened on the outside, it means that [NCERT Exemplar]

- (a) food is not cooked completely
- (b) the fuel is not burning completely
- (c) fuel is wet
- (d) fuel is burning completely

Answer:

(b) The unburnt particles of the fuel present in smoke blacken the vessel from outside.

Question 21.

The reaction in which a reagent (partially or completely) replaces atom or group of atoms from saturated compounds or A are called B reaction.

Here, A and B respectively refers to

- (a) unsaturated compounds, addition
- (b) unsaturated compounds, substitution
- (c) benzene, substitution
- (d) alkene, addition

Answer:

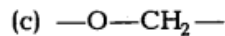
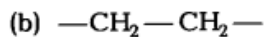
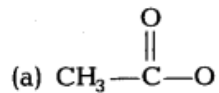
(c) Substitution reaction is usually given by saturated compounds and benzene. Unsaturated compounds usually give addition reactions.

Question 22.

The table gives information about some esters and the fragrance they produce.

Ester	Fragrance
Ethyl methanoate	Rum
Methyl butanoate	Apple
Ethyl butanoate	Pineapple
Propyl ethanoate	Pear

Which structure do the ester compounds in the table have in common?



Answer:

(d) All esters have the common structure of carboxylic group represented by the suffix date.