Term- III

Class- X

Subject – History

Ch-12 The Second World War

- I. <u>Short Answer Questions:-</u>
 - 1. Name the countries that formed the allied powers.

Ans. Britain, France and the USA formed the allied powers.

2.What was the issue between Germany and Poland that was the cause of the World War II ?

ANSWER

Following were the major issues between Poland and Germany that caused World War II

1. Germans accused Poland of committing atrocities to the Germans living there.

2. Poland refused to give Danzig Corridor to Germany.

Due to these On 1 September 1939, Poland was invaded by Germany, thus initiating World War II

3.How was the treaty of Versailles responsible for the Second World War?

Answer:

The **Treaty of Versailles** led to **World War II** because its terms punished Germany harshly. The economy collapsed, the government lost power, the military was weak, and the Germans were angry. Because of these factors, Germans became loyal to Hitler and there was the perfect storm in Germany which caused **World war II** and.

4.How did the rise of Fascism and Nazism become the causes of the Second World War?

Ans:

The rise of extreme Nationalism in Italy and Germany in the form of Fascism and Nazism, respectively contributed to the causes which led to the Second World War. Italy wanted to receive the glory of the Old Roman Empire. She joined the Anti-Commitern Pact in 1937 and formed a ten year alliance with Germany in 1939 to strengthen her position. Mussolini established dictatorship in Italy. He opposed the Treaty of Versailles. Italy demonstrated her imperialistic designs by attacking Abyssinia. The league of Nations failed to take any action against Italy, which exhibited the weakness of the League. In Germany, Hitler wanted to reestablish the prestige of Germany in the international field. He flouted the military clauses in the Treaty of Versailles and declared re-armament. In 1938, he annexed Austria and dismembered Czechoslovakia.

Thus, Mussolini and Hitler drove the countries of the world towards another World War.

5. How was the dissatisfaction

of Italy responsible for the Second World War?

ANSWER

Governments were unable to deal with problems of unemployment, strikes, and people there became increasingly dissatisfied with the way Mussolini was running the country. Also, the Italian Army failed in an attempt to invade Greece in 1940 due to all these people were dissatisfied and it led to World war II

6. What was the Berlin Rome Tokyo axis?

Ans:

The Axis powers (German: Achsenmächte; Italian: Potenze dell'Asse; Japanese: 枢軸国 Sūjikukoku), also known as "Rome-Berlin-Tokyo Axis" was a military alliance that fought in World War II against the Allies. The Axis powers agreed on their opposition to the Allies, but did not completely coordinate their activity.

Note: In answer 6 ᠿkindly remove the part which is given in brackets.

7. Why did Italy join the side of Germany and Japan in the Second World War?

Ans:

Italy wanted to gain the territory of Turkey and Africa but they didn't get what they wanted at end of WWI. Also, they were unhappy with the treaty of Versailles, they thought that injustice had been done to them. So it **joined the side** of **Japan** and **Germany** to get its territories back.

8. What was the immediate cause of the Second World War?

Ans:

The Invasion of Poland (Immediate cause): On 1st September, 1939 German Armies marched into Poland. On 3rd September Britain and France declared war on Germany. Thus the invasion of Poland marked the beginning of the Second World War. The German Armies completed the conquest of Poland in less than three weeks as no aid reached Poland. Inspite of the declaration of war however, there was little actual fighting for many months.

Note:-For structured questions do all the topics which are given in syllabus in detail.

Ch-13 UNITED NATIONS

Why did World leaders decide to set up a world organisation to maintain peace? Ans.

After the bitter experience of two World Wars within a span of 25 years, the world leaders realised the necessity for establishing an organisation more powerful than the League of Nations. They held many conferences to discuss the nature and viability of such an organisation. Their efforts finally took shape at <u>San Francisco on October 24</u>, 1945 in the form of the United Nations Organisation.

2. When was the name the United Nations used for the first time? Ans.

1 January 1942

The name "United Nations", coined by United States President Franklin D. Roosevelt was first used in the Declaration by United Nations of **1 January 1942**, during the Second World War, when representatives of 26 nations pledged their Governments to continue fighting together against the Axis Powers.

Where was the UN established? Ans.

24 October 1945, San Francisco, California, United States



4. State the most important reason for the formation of United nation?

The **most important reason** for the formation of the UN was to maintain peace and security in the world. It was established on 24 October 1945 after World War II

Which day is celebrated as the UN day every year?
 Ans.

24 October

Where are the headquarters of the UN? Ans.

New York, New York, United States

7. Who can become the member of the UN?

Membership in the Organization, in accordance with the Charter of the **United Nations**, "is open to all peace-loving States that accept the obligations contained in the **United Nations** Charter and, in the judgment of the Organization, are able to carry out these obligations".

8. Who appoints the Secretary-General of the UN?

the General Assembly

The Secretary-General is appointed by the General Assembly, on the recommendation of the Security Council. The Secretary-General's selection is therefore subject to the veto of any of the five permanent members of the Security Council.

9. Name the six principal organs of the United Nations?

Ans.

The main organs of the UN are the General Assembly, the Security Council, the Economic and Social Council, the Trusteeship Council, the International Court of Justice, and the UN Secretariat.

10. What are functions of General Assembly?

Ans. Page no.140(Any four) 11.What can the general assembly do if the security council failed to act in a case where there appears to be a threat to peace?

Ans.

The Assembly is empowered to consider the matter immediately with a view to making recommendations to members for collective measures, including the use of armed force.

12.How is the Security Council constituted?

UNSC is composed of 15 Members: five permanent members: China, France, Russian Federation, the United Kingdom, and the United States, and ten non-permanent members elected for two-year terms by the General Assembly. Dec 26, 2019

13.Name the permanent members of the security council?

Ans. Answer is already given in 12th answer.

14.State any two functions of security council?

Ans. Page no.141(any two)

15.Name the judicial organ of the United Nations?

The International Court of Justice is the principal **judicial organ** of the **United Nations**.



Its seat is at the Peace Palace in the Hague (Netherlands). It is the only one of the six principal **organs** of the **United Nations** not located in New York (**United** States of America).

16.Where is the permanent headquarters of international Court of justice located?

Ans. Already given in answer 15. 17.What is the composition of international Court of justice?

The International Court of Justice is composed of 15 judges elected to nine-year terms of office by the United Nations General Assembly and the Security Council. These organs vote simultaneously but separately. In order to be elected, a candidate must receive an absolute majority of the votes in both bodies.

18.How are the judges of international Court of justice elected?

Ans. Same as Answer 17. 19.What is the importance of international Court of justice?

Ans.

The **Court's role** is to settle, in accordance with **international** law, legal disputes submitted to it by States and to give advisory opinions on legal questions referred to it by authorized United Nations organs and specialized agencies.

20.What are the functions of international Court of Justice regarding compulsory jurisdiction? Ans. Given at Page no.142 in text book.

<u>Ch-14 Major Agencies of the</u> <u>UN</u>

1.Give the full form of UNESCO WHO, UNICEF.

Ans. United Nations Children's Fund (UNICEF)

- World Health Organization (WHO)
- United Nations Educational,
 Scientific and Cultural
 Organization (UNESCO)
- 2.In which type of countries do the above agencies of the UN work?

Ans. Developing Countries. 3.Which agency of UN looks after the interest of the children in the world? What was the original purpose of setting up this agency?

Ans. UNICEF.

The main objective of UNICEF is to look after children's welfare especially in developing countries by providing people with low cost community-based services in maternal and child-health, nutrition and immunisation, etc.

4.How does UNICEF raise its funds?

For financing its projects, the UNICEF depends on voluntary contributions made by different Governments, donations made by private agencies, sale of greeting cards and through various fund-raising campaigns. Sale of UNICEF

5. Where are the headquarters of UNICEF?

Ans.

HEADQUARTERS Excention The UNICEF has its headquarters in New York, and has more than 200 offices in developing countries.) Apr - 5

6.Name two preventable diseases against which UNICEF organises its programme?

Ans. Tuberculosis, malaria, eye diseases, skin diseases, etc.

7. Give any three functions of UNICEF?

Ans. Given at Page no.147 in text book.

8. What is the role of UNICEF in Modern Times?

Ans. Same as Answer 3.

9. Which day is celebrated as the World Health day every year?

Ans. April 7 10.When was WHO established?

Ans.

2. WORLD HEALTH ORGANISATION (WHO)

The World Health Organisation (WHO) is the United Nations specialised agency for health. It was established on April 7, 1948 when 26 members of the United Nations ratified its Constitution. April 7 is celebrated as the World Health Day every year.

11.What has been the objective of WHO?

WHO's objective is the attainment of the highest possible level of health by all people. Health is defined in WHO's Constitution as a state of complete well-being and not merely the absence of disease or infirmity.

12.Where are the headquarters of WHO located?

Ans.

Geneva, Switzerland

13.What methods does WHO adopt to fulfil its objectives?

Ans. Brite the required number of points which are given under the functions of WHO from text book at page no 149.

14.Mention any two functions of WHO?

Ans. Functions Any two from book given at Page no.149.

15.Mention some

achievements of WHO?

Ans. Page no.149 of text book.

16. Why was UNESCO established?

Ans.

OBJECTIVES AND HEADQUARTERS

The main objective of UNESCO is to contribute to peace and security in the world by promoting collaboration among nations through education, science, culture and communication. This is undertaken to further respect for justice, for the rule of law and for the human rights for all human beings. Pop - 16

The headquarters of the UNESCO are in Paris.

17.Where are the headquarters of UNESCO?

Paris, France

18.Describe any two of the functions of UNESCO in the field of scientific development.

Ans. Page no. 150,151(any two points from scientific activities)

Note:-For the structured questions kindly revise the given topics in detail.
X (ICSE) PANORMA

<u>GEOGRAPHY</u>

EXERCISE ANSWER KEY

Ch- 14 Manufacturing Industry

- 1. The electronic goods include:- television sets, computers, cellular equipments, telephone equipments, transistors etc.
- 2. Leading centers of software in India are Bangaluru and Hyderabad.
- 3. NRSA stands for National Remote Sensing Agency, it is located in Hyderabad. Remote sensing is a technique to acquire information about objects from the measurements made from a distance in space without any contact.
- 4. Petrochemical is a chemical substance obtained from petroleum or natural gas, gasoline, kerosene or petroleum.
- 5. Petroleum, LPG and coal.
- 6. Synthetic fiber, Synthetic rubber, PVC, Polythene, Plastic and chemical fertilizers etc.
- Petrochemical industry is very important because the industry is these advantages:- cost effective, economically stable, cheaper as produced on large scale, raw material is easily available and it is not dependent on agriculture for its raw material.
- 8. The main important petrochemical industries are:- 1) Union carbide India LTD 2) The Indian Petrochemicals Corporation LTD 3) Petrofils Cooperative TLD.
- Classify industry:- 1) Source of raw material:- Agro based, Mineral based, Forest based and Animal based. 2) Size:- Large scale, small scale and medium scale industry. 3) Management:- Public, private and cooperative industry.
- 10. Some mineral based industries are:- Iron and steel industry and Petrochemical industry etc.
- 11. Location factors are:- 1) Availability of raw material. 2) Supply of water. 3) Topography. 4)
 Availability of labour 5) Market. 6) Capital and 7) Govt policy.
- 12. An integrated steel plant is one where all the three processes from melting of iron ore in the blast furnace to steel making followed by shaping of the metal by rolling is carried out under one complex.
- 13. The raw materials required for Iron and steel industry are:- Iron ore, Coal, Limestone, Dolomite, and Manganese etc.
- 14. A small steel manufacturing unit is called mini steel plant. A mini steel plant can be located on decentralized locations and work on electricity. These plants use scrap iron and sponge iron to make rolling steel. The main advantages are:- 1)They do not use heavy capital investment. 2) They use scrap iron, which is easily available and cheap raw material. 3) They do no cause pollution. 4) They can be setup on any convenient location.
- 15. The various steel plants in India are:- 1) TISCO in Jamshedpur set up by Tata sons. 2) Bhilai iron & steel plant set up by collaboration with USSR. 3) Rourkela Steel plant set up by collaboration with West Germany.
- 16. Not in syllabus.
- 17. Iron and steel industry is called key industry because other industries depend on Iron and steel industry for their raw material directly or indirectly.
- 18. Forest are grown around the Iron and steel industry areas because this industry use coal as its energy resource, which pollute environment. Hence forest need to be grown around to reduce pollution level.

- 19. 1) Bhilai iron & steel plant set up by collaboration with USSR and it get its coal from Korba and Kargati coal fields. 2) Rourkela Steel plant set up by collaboration with West Germany and it get its coal from Jharia, Korba and Talcher coal fields.
- 20. a) Noamundi mines of Jharkhand and Mayurbhanj in Odisha. b) Subarnarekha. c) Jharkhand. d) Kolkata.
- 21. Not in syllabus.
- 22. Not in syllabus.
- 23. Iron and steel industry is the largest mineral based industry in India. Iron and steel industry is called key industry because other industries depend on Iron and steel industry for their raw material directly or indirectly.
- 24. Because Chotanagpur plateau has largest deposits of minerals. TISCO.
- 25. Industries depend upon iron and steel industry are:- Automobile, shipbuilding and railway.
- 26. **Give reason:-** a) Because it is most important industry, other industries directly or indirectly depends upon iron and steel industry for their raw material such as automobile, shipbuilding, machine and defence equipment manufacturing industry etc. b) Because products produced by petrochemical industry are more cheap and reliable.

EXERCISE ANSWER KEY

CH- 18 WASTE GENERATION & MANAGEMENT

- The waste from residential areas, hotels, restaurants, office complex and commercial areas must be segregated at source into different categories because it consists of biodegradable and nonbiodegradable waste. The biodegradable waste can send for natural degradation or composting where as non-biodegradable waste can be sent for recycling. By segregation we can save environment from accumulation of waste as well as it also save our money by recycling waste products.
- 2. The precautions must be taken during waste accumulation are:- 1) It must be segregated at source into different categories according to biodegradable and non-biodegradable waste. 2) The collection bins must be covered so that the waste is not exposed to the atmosphere and stray cattle. 3) Manual handling of waste must be avoided so as to prevent people from exposure to dreadful diseases and infections.
- The waste bins must be covered so that the waste is not exposed to the atmosphere and stray cattle.
- Manual handling of waste must be avoided so as to prevent people from exposure to dreadful diseases and infections.
- The waste is transported in waste transportation vehicles. These vehicles are especially designed to transfer waste. The vehicles used to transport waste must be covered to prevent the pollution of environment spread and litter on the roads.
- 6. The large areas on the outskirts of cities where the waste is deposited on or in the ground and covered with earth. The factors we need to keep in mind while planning a land fill are:- 1) Topography of that area. 2) It must be away from city. 3) Accessibility of the area. 4) Climate of that area.
- The problems associated with landfills are:- 1) Leachate is formed when rainwater leaks into landfill, which pollute water and soil. 2) Landfills create harmful methane gas. When gas leak into surrounding areas it may damage plants.
- 8. Leachate is formed when rainwater leaks into landfill. As the water percolates through the landfill, chemical processes turn it acidic. This acidic water then dissolves toxic chemical from common hazardous waste products. When this toxic water come into contact with soil and ground water, it pollute it up to hazardous level.
- 9. Composting is method of waste disposal. It is the process of deposition of biodegradable waste. A compost pit is dug in the ground, where waste is thrown and decomposes to form compost. Compost can be used as manure for plants.

10. Refer book page 304 process of composting.

11. The main advantages of composting are:- 1) Conversion of organic waste into valuable fertilizer 2) Reduction of the quantity of waste to be disposed by householder. 3) Recycling of organic materials return nutrients back to the soil. 4) It is a economical method of decomposing waste.

THIRD TERM SUBJECT NAME: PHYSICS CHAPTER: RADIOACTIVITY

Question: 1

Name the three constituents of an atom and state mass and charge of each. How are they distributed in an atom?

Solution:

The three constituents of an atom are electrons, protons and neutrons. The mass of electrons is 9.1×10^{-31} kg and charge is -1.6×10^{-19} C. The mass of protons is 1.6726×10^{-27} kg and charge is $+ 1.6 \times 10^{-19}$ C and the mass of neutrons is 1.6749×10^{-27} kg and charge is zero.

Question: 2

Define the following terms: (a)Atomic number and (b) mass number.

Solution:

(a) The atomic number of an atom is equal to the number of protons in its nucleus.

(b) The mass number of an atom is equal to the total number of nucleons in its nucleus.

Question: 3

What is nucleus of an atom? Compare its size with that of the atom. Name its constitutents. How is the number of these constituents determined by the atomic number and mass number of an atom? Solution:

The centre of an atom whose size is of the order of 10^{-15} m to 10^{-14} m is known as the nucleus of an atom. The size of the nucleus is 10^{-5} to 10^{-4} times the size of the atom. Nucleus consists of protons and neutrons. If Z is the atomic number and A is the mass number of an atom, then the atom contains

Number of electrons = Z

Number of protons = Z

Number of neutrons = A - Z

The atom is specified by the symbol Z^{A} where X is the chemical symbol for the element.

Question: 4

State the atomic number and mass number $23 \\ 11$ Naofand draw its atomicmodel.11Naofand draw its atomicSolution:The atomic number Z = 11The mass number A = 2323

Number of neutrons A - Z = 12Its atomic model is



Question: 5 What are isotopes? Give one example. Solution:

The atoms of the same element, having same atomic number Z, but different mass number A, are called isotopes.

Examples: Hydrogen has three isotopes namely protium ${}^{1}_{1}H$ deuterium ${}^{2}_{1}H$ and tritium ${}^{3}_{1}H$

Question: 6 What are isobars? Give one example. Solution:

Isobars are the atoms of different elements which have the same mass number A, but different atomic number Z

Example: ${}^{23}_{11}$ Na ${}^{23}_{12}$ Mg are isobars.

Question: 7

Name the atoms of a substance having same atomic number, but different mass numbers. Give one example of such a substance. How do the structures of such atoms differ?

Solution:

The atoms of a substance having same atomic number, but different mass number are known as isotopes.

Example: Hydrogen has three isotopes namely protium, deuterium and tritium. Each

isotope structure differs by the number of neutrons in its nuclei.

Question: 8

What is meant by radioactivity? Name two radioactive substances. Solution:

Radioactivity is a nuclear phenomenon. It is the process of spontaneous emission of α or β and γ radiations from the nucleus of atoms during their decay. Uranium and radium are the two radioactive substances.

Question: 9

A radioactive substance is oxidized. What changes would you expect to take place in the nature of radioactivity? Explain your answer.

Solution:

As radioactivity is a nuclear phenomenon. Hence there will be no change in the nature of radioactivity.

Question: 10

A radioactive source emits three types of radiations.

- (a) Name the three radiations.
- (b) Name the radiations which are deflected by the electric field.
- (c) Name the radiation which is most penetrating.
- (d) Name the radiation which travels with the speed of light.
- (e) Name the radiation which has the highest ionizing power.

(f) Name the radiation consisting of the same kind of particles as the cathode rays. Solution:

- (a) Alpha, beta and gamma are the three types of radiations
- (b) The radiations which are deflected by the electric field are alpha and beta radiations.
- (c) Gamma radiations are the most penetrating radiations
- (d) Gamma radiations travels with the speed of light
- (e) Alpha radiations has the highest ionizing power

(f) The radiations consisting of the same kind of particles as the cathode rays are beta radiations

Question: 11

A radioactive source emits three type of radiations.

- (a) Name the radiation of zero mass.
- (b) Name the radiation which has the lowest ionising power.
- (c) Name the radiation which has the lowest penetrating power.
- (d) Give the charge and mass of particles composing the radiation in part (c).
- (e) When the particle referred to in part (c) becomes neutral, it is found to be the

atom of model of its neutral atom.

(f) From which part of the atom do these radiations come? Solution:

(a) The radiation which has zero mass are gamma radiations

(b) Gamma radiations has the lowest ionizing power

(c) Alpha radiation has the lowest penetrating power

(d) Alpha particles has positive charge = 3.2×10^{-19} C and rest mass = 4 times the mass of proton i.e., 6.68×10^{-27} kg

(e) The name of the gas is helium



(f) These radiations come from the nucleus of an atom

Question: 12

The diagram in figure shows a radioactive source S placed in a thick lead walled container. The radiations given out are allowed to pass through a magnetic field. The magnetic field (shown as x) acts perpendicular to the plane of paper inwards. Arrows shows the paths of the radiation A, B and C.



(a) Name the radiations labelled A, B and C.

(b) Explain clearly how you used the diagram to arrive at the answer in part (a). Solution:

(a) The radiations labelled as A, B and C are γ , α and β respectively

(b) The radiation labelled as A is gamma radiation as they have no charge and thus under the action of magnetic field they go undeflected

The radiation labelled as B is alpha radiation since its mass is large and it would be deflected less in comparison to beta radiation. Fleming's left hand rule determines the direction of deflection. As the alpha and beta have opposite charges, hence the direction of deflection of alpha and beta radiations are also opposite

Question: 13

Fig. shows a mixed source R of alpha and beta particles in a thick lead walled container. The particles pass through a magnetic field in a direction perpendicular to the plane of paper inwards as shown by x.

(a) Show in the diagram how the particles get affected.

(b) Name the law used in part (a)



Solution: (a)



(b) The name of the law is Fleming's left hand rule

Question: 14

Fig. shows a radioactive source S in a thick lead walled container having a narrow opening. The radiations pass through an electric field between the plates A and B.



(a) Complete the diagram to show the paths of α , β and γ radiations.

(b) Why is the source S kept in a thick lead walled container with a narrow opening?

(c) Name the radiation which is unaffected by the electrostatic field.

(d) Which radiation is deflected the most. Give reason.

(e) Which among the three radiations causes the least biological damage?

Solution:

(a)



(b) The radiation coming out from other directions may cause biological damage. Hence to stop these radiations the radioactive substances are kept in thick lead containers with a very narrow opening.

(c) The radiation unaffected by the electrostatic field is gamma radiations

(d) The radiation which deflect the most is beta radiations. This is because the deflection of a beta particle is in a direction opposite to that of an alpha particle since the charge on beta particle is negative, while the charge on alpha particle is positive. Hence beta particle is much lighter than an alpha particle

(e) Alpha radiations causes the least biological damage

Question: 15

Explain why alpha and beta particles are deflected in an electric or a magnetic field, but gamma rays are not deflected in such a field.

Solution:

Alpha and beta radiations are charged particles. Alpha is positively charged and beta is negatively charged. Hence these are deflected in an electric or magnetic field whereas gamma radiations uncharged particles or neutral and therefore cannot deflect in an electric or magnetic field.

Question: 16

Is it possible to deflect γ radiations in a way similar to α and β particles, using the electric or magnetic field? Give reasons.

Solution:

No, gamma radiations cannot deflect in a way similar to alpha and beta particles using electric or magnetic field because they are uncharged or neutral. Thus they do not deflect under the action of electric or magnetic field.

Question: 17

State following four properties each of α , β and γ radiations: (a) nature, (b) charge,

(c) mass, and (d) effect of electric field. Solution:

| Property | α - particle | β - particle | γ - particle | |
|--------------------|----------------------------------|--|---------------------|--|
| Nature | Stream of positively | Stream of | Highly energetic | |
| | charged particles | negatively charged | electromagnetic | |
| | i.e., helium nucleus. | particles, i.e., | radiation. | |
| | | energetic electrons | | |
| Charge | Positive charge | Negative charge = - | No charge | |
| | (two times that of a | $1.6 \times 10^{-19} \text{ C} (\text{or} - \text{e})$ | | |
| | proton) = $+3.2 \times 10^{-10}$ | | | |
| | 19 C (or +2e) | | | |
| Mass | Four times the mass | Equal to the mass of | No mass (rest mass | |
| | of proton i.e., 6.68 | electron i.e., $9.1 \times$ | is zero) | |
| | $\times 10^{-27}$ kg | 10 ⁻³¹ kg | | |
| Effect of electric | Less deflected | More deflected than | Unaffected | |
| field | | alpha particles, but | | |
| | | in a direction | | |
| | | opposite to those of | | |
| | | α-particles | | |

Question: 18

Arrange the α , β and γ radiations in ascending order of their (i) ionizing power, and (ii) penetrating power.

Solution:

(i) Gamma radiation have least ionizing power, beta radiations have lesser ionizing power i.e., 100 times of gamma radiation and alpha radiations have maximum ionizing power

i.e., 1000 times of gamma radiation.

Thus the ascending order of their ionizing power is

 $\gamma < \beta < \alpha$

(ii) Penetrating power is least for alpha particle, large for beta particles and very large for gamma particles.

Hence, the ascending order of penetrating power is

 $\alpha < \beta < \gamma$

Question: 19

State the speed of each of $\alpha,\,\beta$ and γ radiations.

Solution:

The speed of α radiations is of the order of 10^7 m s⁻¹, speed of β radiations is of the order of 10^8 m s⁻¹ and the speed of γ radiations is same as the speed of light i.e., 3×10^8 m s⁻¹ in

vacuum or air.

Ouestion: 20

(a) What is the composition of α , β and γ radiations?

(b) Which one α , β and γ radiation has the least penetrating power?

Solution:

(a) Alpha radiations are composed of two protons and two neutrons, α radiation carries a double positive charge. Beta radiations are composed of fast moving electrons and are negatively charged. Gamma radiations are composed of photons or electromagnetic waves like X rays.

(b) Radiations which have the least penetrating power are alpha radiations.

Question: 21

How are γ radiations produced? Mention two common properties of the gamma radiations and visible light.

Solution:

When a nucleus is in a state of excitation i.e., when it has an excess of energy then the gamma radiations are produced. Hence, this extra energy is released in the form of gamma radiation.

Like X-rays and light, gamma radiations are not deflected by the electric and magnetic fields since they are uncharged particles. The speed of gamma radiations is same as the speed of light.

Question: 22

An α particle captures (i) one electron, (ii) two electrons. In each case, what does it change to?

Solution:

When an α particle captures one electron it becomes a singly ionized helium He⁺ and when it captures two electrons it changes to neutral helium atom.

Question: 23

'Radioactivity is a nuclear phenomenon'. Comment on this statement. Solution:

Any physical change (such as change in pressure and temperature) or chemical change (such as excessive heating, freezing, action of strong electric and magnetic fields, chemical treatment, oxidation etc.) does not change the rate of decay and the nature of radiation emitted by the substance. This shows clearly that the phenomenon of radioactivity cannot be due to the orbital electrons which could easily be affected by such changes. Therefore the radioactivity should be the property of the nucleus. Thus the

radioactivity is a nuclear phenomenon.

Question: 24

What kind of change takes place in a nucleus when a β particle is emitted? Express it by an equation. State whether (a) atomic number, and (b) mass number are conserved in a radioactive β -decay?

Solution:

Due to the emission of β particle, the number of nucleons in the nucleus remains same, but the number of neutrons is decreased by one and the number of protons is increased by one.

If a radioactive nucleus P with mass number A and atomic number Z emits a beta-particle to form a daughter nucleus Q with mass number A and atomic number Z + 1, the change can be represented as follows:

 $\begin{array}{c} {}^{A}_{Z}P & {}^{A}_{Z+1}Q & {}^{0}_{-1}e \\ \\ Parent nucleus \longrightarrow Daughter nucleus + Beta-particle \\ (a) Atomic number Z is increased by 1 \end{array}$

(b) Mass number remains unchanged

Question: 25

A certain radioactive nucleus emits a particle that leaves its mass number unchanged, but increases its atomic number by one. Identify the particle and write its symbol.

Solution:

A particle that leaves its mass number unchanged, but increases its atomic number by one is beta particle. The symbol of β particle is given by

$${}^{0}_{-1}e {}^{0}_{\text{or}}{}^{-1}\beta$$

Question: 26

What happens to the (i) atomic number, (ii) mass number of the nucleus of an element when (a) an α particle, (b) a β particle, and (c) γ radiation, is emitted? Solution:

(a) When an α particle is emitted atomic number decreases by 2 and mass number decreases by 4

(b) When a β particle is emitted atomic number increases by 1 and mass number remains unchanged

(c) When γ radiation is emitted there is no change in atomic number and mass number

Question: 27

What happens to the position of an element in the periodic table when its nucleus emits (a) an α particle, (b) a β particle and (c) γ radiation? Give reason for your answer.

Solution:

When an α particle is emitted, the daughter element occupies two places to the left of the parent element in the periodic table

Reason: If a parent nucleus X becomes a new daughter nucleus Y as a result of α decay, then the change can be expressed in the form of reaction as follows:



Thus due to emission of an alpha particle, atomic number Z decreases by 2 units and therefore it shifts two places to the left of the parent element in the periodic table (b) When β particle is emitted, the daughter element occupies one place to the right of the parent element in the periodic table.

Reason: As a result of β decay, if a parent nucleus X becomes a new daughter nucleus Y then the β decay can be represented as follows:

 $\begin{array}{c} {}^{A}_{Z}P & {}^{A}_{Z+1}Q & {}^{0}_{-1}e \\ \end{array}$ Parent nucleus \longrightarrow Daughter nucleus $_{+}$ (Beta particle)

Thus it shifts one place to the right of the parent element in the periodic table as the resulting nucleus has an atomic number equal to (Z+1).

(c) By the emission of γ radiation, the element occupies the same position in the periodic table

Reason: As a result of γ decay, if a parent nucleus X becomes a new daughter nucleus Y then the γ decay can be represented as follows:



Therefore since the resulting nucleus has atomic number equal to Z so, it occupies the same position as the parent element in the periodic table

Question: 28

What changes occur in a nucleus of a radioactive element when it emits (a) an alpha particle, (b) a beta particle, (c) gamma radiation? Give one example, in each case (a) and (b) in support of your answer. Solution: The following are the changes which occur when an atom emits

(a) When alpha particle emits, the atomic number decreases by 2 units and mass number decreases by 4 units

Example:

$$^{238}_{92}$$
U $\xrightarrow{^{234}}_{90}$ Th $^{4}_{+}$ He

(b) When beta particle emits, the atomic number increases by 1 and the mass number remains unchanged

Example:

$$_{0}^{1}$$
 $\xrightarrow{1}_{1}$ P $_{+}^{0}$ e

(c) When gamma particle emits, the atomic number and mass number does not change. Hence, the energy of the nucleus decreases



Question: 29

(a) An atomic nucleus A is composed of 84 protons and 128 neutrons. The nucleus A emits an α particle and is transformed into a nucleus B. What is the composition of B?

(b) The nucleus B emits a β particle and is transformed into a nucleus C. What is the composition of C?

(c) What is the mass number of the nucleus A?

(d) Does the composition of nucleus C change if it emits the γ radiation? Solution:

(a) The composition of B becomes 82 protons and 126 neutrons

(b) The composition of C becomes 83 protons and 125 neutrons

(c) The mass number of nucleus A = number of protons + number of neutrons 84 + 128 = 212

Thus the mass number of nucleus A = 212

(d) The composition of nucleus C does not change if it emits the γ radiation

Question: 30

A certain nucleus A (mass number 238 and atomic number 92) is radioactive and becomes a nucleus B (mass number 234 and atomic number 90) by the emission of a particle.

- (a) Name the particle emitted.
- (b) Explain how you arrived at your answer.

(c) State the change in the form of a reaction. Solution:

(a) The particle emitted is alpha particle

(b) The atomic number is decreased by 2 and mass number is decreased by 4. This happens when alpha particle is emitted.

(c) ${}^{238}_{92}P \longrightarrow {}^{234}_{90}Q + {}^{4}_{2}\alpha$

MULTIPLE CHOICE TYPE

Question: 1

A radioactive substance emits radiations:

(a) α , β and γ simultaneously

(b) in the order α,β and γ one by one

(c) X-rays and γ-rays

(d) α or β .

Solution:

A radioactive substance emits radiations α or β .

Question: 2

In β -emission from a radioactive substance, an electron is ejected. This electron comes from:

(a) the outermost orbit of atom

- (b) the inner orbits of atom
- (c) the surface of substance
- (d) the nucleus of atom

Solution:

The electron comes from the nucleus of an atom

Question: 3

The least penetrating radiation is: (a) α-particles (b) β-particles (c) X-rays (d) γ-radiations Solution: The least penetrating radiation is α-particles **Question: 4 The radiation suffering the maximum deflection in a magnetic field is:** (a) α-particles
(b) β-particles
(c) X-rays
(d) γ-radiations
Solution:

The radiation suffering the maximum deflection in a magnetic field is β -particles.

Chapter 12 - Organic Chemistry Exercise Intext 1

Question 12

Give the name of one member of each of the following:

(a) Saturated hydrocarbons

(b) Unsaturated hydrocarbons

Solution 12

The member of each of the following is:

(a) Saturated Hydrocarbon: Hexane (C6H14)

(b) Unsaturated Hydrocarbon: Hexene (C6H12)

Question 1

(a) What are organic compounds?(b) What is the Vital force theory? Why was it discarded?

Solution 1

(a) Organic chemistry may be defined as the chemistry of hydrocarbons and its derivatives.
(b) Vital Force Theory is a theory made by the Scientist Berzelius in 1809 which assumed that organic compounds are only formed in living cells and it is impossible to prepare them in laboratories. It was discarded because Friedrich Wohler showed that it was possible to obtain an organic compound(urea) in the laboratory.

Question 2

(a) Name a few sources of organic compounds(b) Give the various applications of organic chemistry

Solution 2

- (a) Few sources of organic compounds are: Plants Animals Coal Petroleum Wood
- (b) The various applications of organic chemistry is: It is used in the production of soaps, shampoos, powders and perfumes. Various fuels like natural gas, petroleum are also organic compounds. The fabrics that we use to make various dresses are also made from organic compounds.

Question 3

Organic chemistry plays a key role in all walks of life. Discuss

Solution 3

Organic compounds are present everywhere. They are present in:

It is present in the production of soaps, shampoos, powders and perfumes.

It is present in the food we eat like carbohydrates, proteins, fats, vitamins etc.

Fuel like natural gas, petroleum are also organic compounds.

Medicines, explosives, dyes, insecticides are all organic compounds.

Thus we can say that organic compounds play a key role in all walks of life.

Question 4

Carbon shows some unique properties, name them.

Solution 4

The unique properties shown by carbon are: Tetravalency of carbon Catenation Isomerism

Question 5

Explain the following:

(a) Tetravalency (b) Catenation

Solution 5

(a) Tetravalency: Carbon can neither lose nor gain electrons to attain octet. Thus it shares four electrons with other atoms. This characteristics of carbon by virtue of which it forms four covalent bonds, is called Tetravalency of carbon. In structural form :

(b) Catenation: The property of self -linking of atoms of an element through covalent bonds in order to form straight chains, branched chains and cyclic chains of different sizes is known as catenation.

Carbon- carbon bond is strong so carbon can combine with other carbon atoms to form chains or rings and can involve single, double and triple bonds.



Question 6

Write any four properties of organic compounds that distinguish them from inorganic compounds.

Solution 6

Four properties of organic compound that distinguish them from inorganic compounds are:

- (i) Presence of carbon.
- (ii) Solubility in the organic solvents.
- (iii) Forming of covalent bonds.
- (iv) Having low melting and boiling points.

Question 7

Why are organic compounds studied as a separate branch of chemistry?

Solution 7

Due to the unique nature of carbon atom, it gives rise to formation of large number of compounds. Thus this demands a separate branch of chemistry.

Question 8

What are Hydrocarbons? Compare saturated and unsaturated hydrocarbons?

Solution 8

Hydrocarbons are compounds that are made up of only carbon and hydrogen.

Comparison of saturated and Unsaturated hydrocarbons:

| Saturated Hydrocarbon | Unsaturated Hydrocarbon | |
|---|---|--|
| 1. Carbon atoms are joined only by single bonds. | Carbon atoms are joined by double or by triple bonds. | |
| 2. They are less reactive due to the non-availability of electrons in the single covalent bond. | They are more reactive due to presence of electrons in the double or the triple bond. | |
| 3. They undergo substitution reaction. | They undergo addition reaction. | |

Question 9

Give reason for the existence of large numbers of organic compounds

Solution 9

Due to presence of unique properties of carbon like Tetravalency, catenation and Isomerism large number of organic compounds are formed.

Question 10

Give at least one example in each case to show structure of isomers of

(a) Single bond compound(b) Double bond compound

(c) Triple bond Compound

Solution 10

(a) Single Bond compound: For example: In pentane



Question 11

Name a compound of each type and draw the figure.

(a) Cyclic compound with single bond

Solution 11

(a) Cyclic compound with single bond: cyclopentane Structure:



(b) Cyclic compound with triple bond: cyclopentyne Structure:



Question 13

Define substitution and addition reaction. Give an example for each.

Solution 13

Substitution reaction: A reaction in which one atom of a molecule is replaced by another atom (or group of atoms) is called a substitution reaction.

Addition reaction: A reaction involving addition of atom(s) or molecules(s) to the double or the triple bond of an unsaturated compound so as to yield a saturated product is known as addition reaction.

Question 14

Define or explain chain isomerism and position isomerism with examples in each case.

Solution 14

Chain isomerism

Chain isomerism arises due to the difference in arrangement of C atoms in the chain. For example, there are two isomers of butane, C_4H_{10} . In one of them, the carbon atoms lie in a "straight chain" whereas in the other the chain is branched.



Position isomerism

It is due to the difference in position of functional groups.

For example, there are two structural isomers with the molecular formula C_3H_7Br . In one of them, the bromine atom is on the end of the chain, whereas in the other it is attached in the middle. $CH_3-CH_2-CH_2-Br$ $CH_3-CH-CH_3$

| CH3—CH2—CH2—Br | CH3—CH—CH3 Br |
|----------------|-----------------------|
| 1-bromopropane | 2-bromopropane |

Question 15

(a)Define the term isomerism. State two main causes of isomerism?

(b) (b) Draw the chain isomers of hexane (C_6H_{12}).

(c) Draw position isomers of butene (C₄H₈)

Solution 15

(a)Isomerism: Compounds having the same molecular formula but different structural formula are known as isomers and the phenomenon as isomerism.

Two main causes of isomerism are:

Difference in mode of linking of atoms.

Difference in the arrangement of atoms or groups in space.

(b)



Question 16

Define a functional group and give the structural formula of the following functional group:

(a) Ketons(b) Alcohols(c) Aldehydes

Solution 16

A functional group is an atom or a group of atoms that defines the structure (or the properties of a particular family) of organic compounds.

The structural formula of

(a) Halides :-R-X Example:



(b)Alcohols:- R-OH Example:



Question 17

Write the name and formula of the fourth member of the following homologous series:

a. Alkyne

b. Alcohol

Solution 17

- a. Butyne; its formula is C_4H_6 .
- b. Butanol; its formula is C_4H_9OH .

Question 18

Which part of an organic compound determines

(i) Physical properties

(ii) Chemical properties

Solution 18

- (i) Physical properties: The alkyl group determines the physical properties.
- (ii) Chemical properties: The functional group is responsible for the chemical properties.

Question 19

Name the alkyl radical and the functional group of the following organic compounds:

(a) CH₃OH (b) C₂H₅OH (c) C₃H₇CHO (d) C₄H₉COOH

Solution 19

The alkyl radical and the functional group are:

| Sr.No | Formula | Name of alkyl radical | Name of Functional group |
|-------|----------------------------------|-----------------------|--------------------------|
| а | CH₃OH | Methyl | Alcohol |
| b | C ₂ H ₅ OH | Ethyl | Alcohol |
| с | C₃H7CHO | Propyl | Aldehyde |
| d | C₄H ₉ COOH | Butyl | Carboxyl |
| е | CH₃COOH | CH ₃ | СООН |
| f | НСНО | Н | СНО |

Question 20

(a) What is an alkyl group?

(b) Give the names of any three alkyl radicals. How are they formed?

Solution 20

(a) An alkyl group is obtained by removing one atom of hydrogen from an alkane molecule. Alkyl group is named by replacing the suffix 'ane' of the alkane with the suffix -yl.(b) The name of three alkyl radicals are: Methyl

Ethyl

Propyl

They are formed by removing 1 hydrogen from an alkane.

 $CH_4 \xrightarrow{\longrightarrow} -CH_3 + H^+$

```
Methyl

CH_3-CH_3 \longrightarrow CH_3-CH_2-+ H^+

Ethyl

CH_3-CH_2-CH_3 \longrightarrow CH_3-CH_2-CH_2-+ H^+

Propyl
```

Question 21

Give the names and the structural formula of the first three members of the homologous series of alkanes

Solution 21

The names and the structural formula of first three members of the homologous series of alkane are:

(i)



 $CH_4Methane$ (CH₄)

(ii)



 C_2H_6E thane (C_2H_6)

(iii)



Question 22

(a) What is a Homologous series?

(b) What is the difference in the molecular formula of any two adjacent homologues:

(i) In terms of molecular mass

(ii) In terms of number and kind of atoms per molecule?

Solution 22

(a) A homologous series is a group of organic compounds having a similar structure and similar chemical properties in which the successive compounds differ by a CH₂ group.

(b) The difference in molecular formula of any two adjacent homologues is

(i) It differs by 14 a.m.u in terms of molecular mass.

(ii) It differs by three atoms. The kind of atoms it differs is one carbon and two hydrogen.

Chapter 12 - Organic Chemistry Exercise Ex. 12A



Question 1(a)

Solution 1(a)

2,2 dimethyl propane

Question 1(b)

Write the IUPAC name of the following:

$$CH_3 - CH - Ch_2 - CH_3$$

|
 CH_3

Solution 1(b)

2-methyl butane

Question 1(c)

Write the IUPAC name of the following:

Solution 1(c)

Propene

Question 1(d)

Solution 1(d)

2,2-dimethyl pentane

Question 1(e)

Write the IUPAC name of the following:

 $CH_3 - C = C - CH_2CH_2$

Solution 1(e)

Pent-2-ene

Question 1(f)

Write the IUPAC name of the following:



Solution 1(f)

3-methyl but-1-yne

Question 1(g)

Write the IUPAC name of the following:

Solution 1(g) 2,3-dimethyl pentane

Question 1(h)

Write the IUPAC name of the following:

Solution 1(h)

3-methyl heptane



Question 1(j)

Write the IUPAC name of the following:

$${}_{H_3C} \underline{\qquad} c \underline{=} c \underline{=} c \underline{-} \overset{H_2}{c} \underline{-} \overset{H_2}{c} \underline{-} \overset{H_2}{c} \underline{-} c {}_{H_3}$$

Solution 1(j)

Hept-2-yne

Question 1(k)

Solution 1(k)

5,5-dimethyl hexan-1-al

Question 1(I)

Write the IUPAC name of the following:

Solution 1(I)

Pentan-2-ol

Question 1(m)

Write the IUPAC name of the following:

Solution 1(m)

4-methyl pentan-1-oic acid

Question 1(n)

Solution 1(n)

2-bromo-2-methyl butane

Question 1(o)

Write the IUPAC name of the following:

$$CH_3$$

|
 $CH_3 - CH - CH_2 - CH_2Br$

Solution 1(o)

1-bromo-3-methyl butane

Question 1(p)

Write the IUPAC name of the following:

Solution 1(p)

Prop-1-yne

Question 1(s)
Solution 1(s)

Ethanoic acid

Question 1(t)

Write the IUPAC name of the following:

н н | | н-с-с-н | | с а

Solution 1(t)

1,2-dichloroethane

Question 2

Write the structures of the following compounds:

(a) Prop-1-ene
(b) 2,3-dimethylbutane
(c) 2-methylpropane
(d) 3-hexene
(e) Prop-1-yne
(f) 2-methylprop-1-ene
(g) Alcohol with molecular formula C₄H₁₀O

Solution 2

The structure of the following compounds are:

(a) Prop-1-ene CH_3 - $CH=CH_2$

(b) 2,3-dimethylbutane CH₃-CH(CH₃)-CH(CH₃)-CH₃ (c) 2-methylpropane CH₃-CH(CH₃)-CH₃

(d) 3-hexene CH₃-CH₂-CH=CH-CH₂-CH₃

(e) Prop-1-yne CH₃-C?CH

(f) 2-methylprop-1-ene CH₃-C(CH₃)=CH₂

(g) Alcohol with molecular formula $C_4H_{10}O$ CH_3 - CH_2 - CH_2 - CH_2 -OH

Question 3

Choose the correct answer:

(a) C₅H₁₁ is an
(i) Alkane (ii) Alkene (iii) Alkyne (iv) Alkyl group

(b) A hydrocarbon of the general C_nH_{2n} is (i) $C_{15}H_{30}$ (ii) $C_{12}H_{26}$ (iii) C_8H_{20} (iv) C_6H_{14}

(c) A hydrocarbon with molecular mass 72 is(i) An alkane(ii) an alkene (iii) an alkyne

(d) The total number of different carbon chains that four carbon atoms form in alkane is (i) 5 (ii) 4 (iii) 3 (iv) 2

(e) CH₃-CH₂-OH and CH₃-O-CH₃ are (i) Position isomers (ii) chain isomers (iii) homologous (iv) functional group isomers

(f) The IUPAC name of the compound is

(i) 3-trimethylhexane (ii) 3-methyl hexane (iii) 4-methyl hexane

Solution 3

(a) Correct answer: (iv) C_nH_{2n+1} is the formula for alkyl group. Hence it is $C_5H_{11.}$

(b) Correct answer: (i) A hydrocarbon of general C_nH_{2n} is C₁₅H₃₀.

(c) Correct answer: (ii) As the formula of Alkene is C_nH_{2n}. Thus n+2n=72

3n=72

n=24

By filling value we get the molecular mass 72.

(d) (iv)

The total number of carbon chains that four carbon atoms form in alkane is 2. They are:



(e) Correct answer: (iv) Alcohol and ether are functional isomers as they have same molecular formula but different functional groups.

(f) Correct answer: (ii) СH3-CH2-CH-CH2-CH2-CH3 CH3

The IUPAC name of this compound is: 3-methyl hexane.

Question 4

Fill in the blanks using the appropriate words given in the brackets :

(a) Propane and ethane are_____. (Homologues, isomers)

(a) Propane and ethane are_____. (Homologues, isomers)
(b) A saturated hydrocarbon does not participate in a/an ______ reaction.(substitution, addition)
(c) Succeeding members of a homologous series differ by_____. (CH,CH₂,CH₃)

(d) As the molecular masses of hydrocarbons increase, their boiling points _____ and melting point ____. (increase, decrease)

(e) $C_{25}H_{52}$ and $C_{50}H_{102}$ belong to _____ homologous series.(the same, different)

(f) CO is an _____Compound.(organic, inorganic)

(g) The chemical properties of an organic compound are largely decided by the and the physical properties of an organic compound are largely decided by the _____. (functional group, number of carbon atoms)

(h) CHO is the functional group of an_____. (alcohol, aldehyde)

(i) The root in the IUPAC name of an organic compound depends upon the number of carbon atoms in_____. (any chain, principal chain)

(j) But-1-ene and but-2-ene are examples of _____ isomerism. (Chain , position , functional)

Solution 4

(a) Propane and ethane are homologues.

(b) A saturated hydrocarbon does not participate in a/an addition reaction.

(c) Succeeding members of a homologous series differ by \underline{CH}_2 .

(d) As the molecular masses of hydrocarbons increase, their boiling points <u>Increase</u> and melting point <u>increase</u>.

(e) $C_{25}H_{52}$ and $C_{50}H_{102}$ belong to <u>the same</u> homologous series.

(f) CO is an <u>organic</u> Compound.

(g) The chemical properties of an organic compound are largely decided by the <u>functional group</u> and the physical properties of an organic compound are largely decided by the <u>number of carbon atoms</u>. (h) CHO is the functional group of an aldehyde.

(i) The root in the IUPAC name of an organic compound depends upon the number of carbon atoms in <u>Principal Chain</u>.

(j) But-1-ene and but-2-ene are examples of position isomerism.

Question 5

Draw the structural formula for each of the following compounds:

a. isomer of n-butane

- b. vinegar
- c. 2-propanol
- d. ethanol
- e. acetone

f. diethyl ether

What is used to describe these compounds taken together?

Solution 5

a.

H₃C-C-CH₃

b.



a. What is the special feature of the structure of

i. C_2H_4

 $ii. \ C_2H_2$

b. What type of reaction is common to both these compounds? Why does methane not undergo this type of reaction?

(c) What is IUPAC name of dimethyl ether.

Solution 6

a.
i. H₂C CH₂ (Ethene)
In the above structure, both carbons are bonded with double bonds.
ii. HC CH (Ethyne)
In the above structure, both carbons are bonded

with triple bonds.

b. Addition reactions are common to both these compounds. Methane does not undergo this type of reaction because it is bounded with four hydrogen atoms, while in ethane, double bonds break and provide a site for addition.

(c) Methoxymethane

Question 7

Which type of reaction will (i) ethane and (II) ethane undergo?

Solution 7

(i) Ethane undergoes substitution reactions.

(ii) Ethene undergoes addition reactions.

Question 8

Choosing only words from the following list, write down appropriate words to fill in the blanks from (a) to (e) given below. Addition, carbohydrates, C_nH_{2n-2} , C_nH_{2n} , C_nH_{2n+2} , electrochemical homologous, hydrocarbon, saturated, substitution, unsaturated.

The alkanes form an (a) series with the general formula (b) The alkanes are (c) (d) which generally undergo (e) reactions.

Solution 8

The alkanes form an (a) <u>electrochemical homologous</u> series with the general formula (b) $\underline{C_n}\underline{H_{2n+2}}$. The alkanes are (c) <u>saturated</u> (d) <u>hydrocarbons</u> which generally undergo (e) <u>substitution</u> reactions.

Question 9

Draw the structural formula of a compound with two carbon atoms in each of the following cases.

a. An alkane with a carbon to carbon single bond

b. An alcohol containing two carbon atoms

c. An unsaturated hydrocarbon with a carbon to carbon triple bond

Solution 9

a.

 $H_3C - CH_3$



Ethane, Ethanoic acid, Ethyne, Ethanol From the above, name

a. The compound with -OH as the part of its structure.

b. The compound with -COOH as the part of its structure.

c. Homologue of the homologous series with the general formula C_nH_{2n} .

Solution 10

- a. Ethanol
- b. Ethanoic acid
- c. Ethene

Question 11

Give the correct IUPAC name and the functional group for each of the compounds whose structural formulae are given below:

а.

b.

Solution 11

a. Propanal b. Propanol

Chapter 12 - Organic Chemistry Exercise Ex. 12C

Question 1

Write : (a) molecular formula , (b) electron dot formula and (c) structural formula of ethene .(Ethylene)

Solution 1

- (a) The molecular formula of ethene is $\mathsf{C}_2\mathsf{H}_4$
- (b) Electron dot formula of ethene is:



(c) Structural formula of ethene:



Question 2

The molecules of alkene family are represented by a general formula $C_n H_{2n}. Answer$ The following :

- (a) What do n and 2n signify?
- (b) What is the name of alkene when n=4?
- (c) What is the molecular formula of alkene when n=4?
- (d) What is the molecular formula of the alkene if there are ten H atoms in it?
- (e) What is the structural formula of the third member of the alkene family?

(f) Write the molecular formula of lower and higher homologus of an alkene which contains four carbon atoms.

Solution 2

- (a) n signifies the number of carbon atoms and 2n signifies the number of hydrogen atoms.
- (b) The name of alkene when n=4 is Butene.
- (c) The molecular formula of alkene when n=4 is C_4H_8 .
- (d) The molecular formula of alkene when there are 10 H atom in it C_5H_{10} .
- (e) The structural formula of the third member of alkene is

$$\begin{array}{ccc} H & H & H \\ H - C = C - C - H \\ H \end{array}$$

(f) Lower homologus of alkene which contain four carbons is $C_3H_{6.}$ Higher homologus of alkene which contain four carbons is C_5H_{10} .

Question 3(a)

Distinguish between the saturated hydrocarbon ethane and the unsaturated hydrocarbon ethene by drawing their structural formulae.

Solution 3(a)

| Ethane | Ethene |
|----------------------------------|---------------------------------|
| нн н-с-с-н нн | |
| It has carbon - carbon single | It has carbon- carbon double |
| bond. | bond |
| It is saturated. | It is unsaturated |
| Alkanes undergo | Alkenes undergo |
| substitution | addition |
| reaction. | reaction. |

Question 3(b)

Draw the structure of isomers of butane and write their IUPAC names.

Solution 3(b)

There are two isomers are possible for butane:

 H_2 CH₃ H₃C Ĥ2

H₃C H CH₃

1-Butane

2-methyl propane

Question 4

Give a balanced equation for the lab. Preparation of ethylene. How is the gas collected?

Solution 4

Balanced Equation of ethylene:

 $\begin{array}{c} CH_3-CH_2OH\ +\ H_2SO_4 & \longrightarrow \\ e \times @sssH_2SO_4 & \longrightarrow \\ CH_3-CH_2HSO_4 & 160^{\circ}C & CH_2=CH_2 \\ \end{array}$ The gas is collected by downward displacement of water.

Question 5

How is ethene prepared by:

(a) Dehydrohalogenation reaction?

(b) Dehydration reaction?

Give equations and name the products formed.

Solution 5

(a) Dehydrohalogenation reaction:

 $C_2H_5CI + KOH(alc.and hot) \xrightarrow{} C_2H_4 + KCI + H_2O$

Ethene

(b) Dehydration reaction: Ab₂O₃

C₂H₅OH 300°C C₂H₄+H₂O

Ethene

Question 6(a)

Ethylene when reacts with halogens (chlorine and bromine) form saturated products. Name them and write balanced equations.

Solution 6(a)

Chlorine and bromine are added to the double bond of ethene to form saturated ethylene chloride and ethylene bromide respectively.

 $CH_2 = CH_2 + CI_2 \longrightarrow CH_2(CI) - CH_2(CI)$

1,2-dichloro ethane

 $CH_2 = CH_2 + Br_2 \longrightarrow CH_2(Br)-CH_2(Br)$

1,2-dibromo ethane

Question 6(b)

Give the conditions and the main product formed by hydrogenation of ethylene.

Solution 6(b)

When ethene and hydrogen are passed over finely divided catalyst such as platinum or palladium at ordinary temperature or nickel at 200° C, the two atom of hydrogen molecule are added to the unsaturated molecule, which thus becomes a saturated one.

Question 7

Convert ethanol into ethene using

(a) Solid dehydrating agent

(b) Hot conc. H₂SO₄

Give only balanced equations.

Solution 7

Conversion of ethanol to ethene by using (a) Solid dehydrating agent:

 $C_2H_4OH \xrightarrow{Al_2O_5.350^{\circ}C} C_2H_4 + H_2O$

(b) Hot conc. H₂SO₄:

 $C_2H_5OH + con c.H_2SO_4 \xrightarrow{170\%} CH_2 = CH_2 + H_2O_2$

Question 8

Write the following properties of ethene:

(a) Physical state(b) Odour(c) Density as compared to air(d) Solubility

Solution 8

(a) Physical state: Ethene is a colourless and inflammable gas.

(b) Odour: It has faint sweetish odour.

(c) Density as compared to air: It has density less than one hence it is lighter than air.

(d) Solubility: It is sparingly soluble in water but highly soluble in organic solvents like alcohol, ether and chloroform.

Question 9

How would you convert:

(a) Ethene into 1,2-dibromoethane(b) Ethene into ethyl bromide

Solution 9

(a) Ethene into 1, 2 -dibromoethane: Ethene reacts with bromine at room temperature to form saturated ethylene chloride.

 $CH_2=CH_2 + Br_2 \longrightarrow CH_2(Br)-CH_2(Br)$

1,2-dibromo ethane

(b) Ethene into ethyl bromide: When ethene is treated with HBr bromoethane is formed.

 $CH_2=CH_2 + HBr \longrightarrow CH_3-CH_2Br$

Ethyl bromide

Give balanced equation when:

(a) Ethene is burnt in excess of oxygen

(b) Ethene reacts with chlorine

(c) Ethene combines with Hydrogen chloride

(d) A mixture of ethene and hydrogen is passed over nickel at 200°C.

Solution 10

(a) $C_2H_4+3O_2 \xrightarrow{2CO_2} +2H_2O$ + heat (b) $CH_2=CH_2+CI_2 \xrightarrow{CH_2(CI)-CH_2(CI)}$ (c) $CH_2=CH_2$ + HCl $\xrightarrow{CH_3-CH_2-CI}$ (d) C_2H_4 + $H_2 \xrightarrow{Ni} C_2H_6$

Question 11

Give the formula and names of A, B ,C and D in the following equations:



Solution 11



(c)
$$C_2H_4 + H_2 \xrightarrow{200^{\circ}C} C_2H_6$$

B= hydrogen

| Question 12 |
|---|
| Write the name and formula of the productformed in each case below: |
| (a) $C_2H_4 + CI_2 \longrightarrow \underline{\qquad}$ (b) $C_2H_5Br + KOH$ (alc.) $\xrightarrow{\mu}$ $\underline{\qquad}$ (c) $CH_2=CH_2 \xrightarrow{alk.KMnO_4}$ $\underline{\qquad}$ (d) $CH_2=CH_2+HBr \longrightarrow \underline{\qquad}$ |
| Solution 12 |
| (a) $C_2H_4 + CI_2 \longrightarrow CH_2(CI)-CH_2(CI)$ 1,2- dichloro ethane |
| (b) $C_2H_5Br + KOH$ (alc.) $\xrightarrow{a} C_2H_4 + KBr + H_2O$ Ethane |
| (c) $CH_2 = CH_2 \xrightarrow{alk.KMn \circ_4} CH_2(OH) - CH_2(OH)$ |
| 1,2- Ethanediol |
| (d) $CH_2=CH_2+HBr \longrightarrow CH_3-CH_2CI$ |
| chloroethane |

Question 13

What do you observe when ethylene is passed through alkaline KMnO₄ solution?

Solution 13

When ethylene is passed through alkaline KMnO₄ solution 1, 2-Ethanediol is formed. The Purple color of KMnO₄ decolorizes.

 $CH_2=CH_2+H-O-H+[O] \longrightarrow CH_2(OH)-CH_2(OH)$

Cold alkaline

Name three compounds formed by ethylene and give the use of these compounds.

Solution 14

Three compounds formed by ethylene are:

Polythene Ethanol Epoxyethane

Uses of above compounds:

Polythene is used as carry bags. Ethanol is used as a starting material for other products, mainly cosmetics and toiletry preparation. Epoxyethane is used in the manufacture of detergents.

Chapter 12 - Organic Chemistry Exercise Ex. 12D

Question 1

What are the sources for alkynes? Give the general formula of alkynes.

Solution 1

Natural gas and Petroleum are sources for alkynes.

The general formula of alkynes are:

 C_nH_{2n-2}

Question 2

Give an example of isomers shown by triple bond hydrocarbon (alkynes) and write its IUPAC name.

Solution 2

Butyne is an example, its isomers are:

IUPAC name: But-2-yne But-1-yne

Question 3

How is acetylene prepared in the laboratory?

(a) Draw diagram

(b) Give equation

(c) How is pure dry gas collected?

Solution 3

(a) Diagram of acetylene preparation:



(b) $CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$

(c) The pure dry gas is collected by downward displacement of water, since it is insoluble in water.

Question 4

Give the method of preparation of ethyne by 1,2-dibromoethene.

Solution 4

When 1,2 -dibromoethane is boiled with alcoholic potassium hydroxide ,ethyne is formed. $CH_2Br - CH_2Br + KOH \xrightarrow{Boiling} CH \equiv CH + 2KBr + 2H_2O$

Name the hydrocarbon which:

(a) Is a tetrahedral molecule

(b) Is a planar molecule

(c) Is a linear molecule

(d) Forms a red precipitate with ammoniacal solution of copper (I) chloride

(e) Is known as paraffin

(f) Is known as olefin

(g) A compound which will give acetylene (ethene) gas when treated with water.

Solution 5

(a) The hydrocarbon which is tetrahedral is Methane.

(b) The hydrocarbon which is planar molecule is ethene.

(c) The hydrocarbon which is a linear molecule is Ethyne.

(d) The hydrocarbon which forms a red precipitate with ammoniacal solution of copper chloride is acetylene.

(e) Alkanes are also called as paraffin.

(f) Alkenes are also called olefin.

(g) Calcium carbide

Question 6

Classify the following compounds as alkanes, alkenes and alkynes.

 $C_{3}H_{4}, C_{3}H_{8}, C_{5}H_{8}, C_{3}H_{6}$

Solution 6

The following compounds can be classified as: C_3H_4 :- Alkynes C_3H_8 :- Alkanes C_5H_8 :- Alkynes C_3H_6 :- Alkenes

Question 7

Give a chemical test to distinguish between

(a) Saturated and unsaturated compounds.

(b) Ethane and ethene

(c) Ethene (ethylene) and ethyne (acetylene)

Solution 7

Chemical test to distinguish : (b) Ethane and ethene:

| S.No. | Test | Ethane | Ethene |
|-------|---|-----------------------------|--|
| 1. | On adding a few drops of bromine solution in carbon tetrachloride to the hydrocarbon | No change is observed | The reddish brown colour gets decolorized |
| 2. | On adding a few drops of alkaline potassium permanganate (purple colour) to the hydrocarbon | No change is observed | The purple colour fades. |

(c) Ethene and ethyne:

| S.No. | Test | Ethene | Ethyne |
|-------|---|--------------------------|--|
| 1. | On adding a few drops of ammonical cuprous chloride to the hydrocarbon | No change is observed | Red precipitate of copper acetylide is formed |
| 2. | On adding ammonical silver nitrate | No observation | White precipitate of silver acetylide is formed. |

Question 8

Compound X bubbled through bromine dissolved in CCl₄

$$\begin{array}{cccccccc} X & & & & \mathsf{Br_2/CCl_4} & & \mathsf{H_2C} & & \mathsf{Br} \\ & & & & & & & \\ & & & & & & \\ & & & \mathsf{H_2C} & & \mathsf{Br} \end{array}$$

(a) Draw the structure of X.

(b) State your observation during the reaction.

Solution 8

(a) HC≡CH

(b) Brown colour of CCl₄ disappeared due to formation of addition product, i.e. 1, 2-dibromo ethane.

Question 9

Give balanced equations for the following conversations.

(a) An alkene to an alkane

- (b) An alkene to an alcohol
- (c) An alkyne to a alkene

Solution 9

(a) An alkene to an alkane

$$\begin{array}{c} \text{CH}_2 = \text{CH}_2 + \text{H}_2 \xrightarrow{\text{Ni}} \text{CH}_3 - \text{CH}_3 \\ \text{Ethene} \end{array}$$

(b) An alkene to an alcohol

 $\begin{array}{c} \mathrm{CH}_2 = \mathrm{CH}_2 + \mathrm{H}_2 \mathrm{O} \xrightarrow{H^*} \mathrm{CH}_3 - \mathrm{CH}_2 - \mathrm{OH} \\ \text{Ethene} \end{array}$

(c) An alkyne to an alkene

$$\begin{array}{c} \mathsf{CH} \equiv \mathsf{CH} & +\mathsf{H}_2 \xrightarrow[]{\mathsf{Ni}} \mathsf{CH}_2 = \mathsf{CH}_2 \\ \mathsf{Ethyne} & \mathsf{Ethene} \end{array}$$

Question 10

Name the products formed and write an equation when ethyne is added to the following in an inert solvent:

- (a) Chlorine
- (b) Bromine
- (c) Iodine
- (d) hydrogen
- (e) excess of hydrochloric acid

Solution 10

(a) Ethyne in an inert solvent of carbon tetrachloride adds chlorine to change into 1,2-dichloro ethene with carbon-carbon double bond, and then to an 1,1,2,2-tetrachloro ethane with carbon-carbon single bond.

$$C_2H_2 \xrightarrow{Cl_2} C_2H_2Cl_2 \xrightarrow{Cl_2} C_2H_2Cl_4$$

1,2-dichloro ethene1,1,2,2 -tetrachloro ethane

(b) Ethyne in an inert solvent of carbon tetrachloride adds bromine to change into 1,2-dibromo ethene and then to 1,1,2,2 -tetrabromo ethane .

$$C_2H_2 \xrightarrow{Br_2} C_2H_2Br_2 \xrightarrow{Br_2} C_2H_2Br_4$$

(c) lodine reacts slowly in the presence of alcohol to form di-iodo ethene

1,2-di-iodoethene

(d) In the presence of nickel, platinum or palladium ethyne change to ethene and then to ethane.

$$CH \stackrel{H_2}{=} CH \xrightarrow{H_2} CH_2 = CH_2 \xrightarrow{H_2} CH_3 - CH_3$$

$$C_2H_2 + HCI \longrightarrow CH_2CHCI \xrightarrow{+HCI} CH_3CHCI_2$$
(e) ethyne Chloro ethane 1,1 - dichloro ethane

Chapter 12 - Organic Chemistry Exercise Ex. 12E

Question 1

(a) What are alcohols? State their sources.

(b) Give general formulae of monohydric alcohol.

Solution 1

(a) Alcohols are the hydroxyl derivatives of alkanes and are formed by replacing one or more hydrogen atoms of the alkane with OH group. Methanol is obtained from destructive distillation of wood while ethanol is obtained from

fermentation of sugar.

(b) General formula of monohydric alcohol: $C_nH_{2n+1}OH$

Question 2

Give the

(a) Dot diagram of first member of alcohol,

(b) Abbreviated formula of third member of alcohol

(c) Structure of second member of the alcohol group

(d) Structure of alcohol with 4 carbon atoms

Solution 2

(a) Dot diagram



(b) Abbreviated formula

 C_2H_5OH

(c) Structure:



Question 3

State the method of preparation of ethanol:

(a) By hydrolysis of ethene(b) By hydrolysis of ethyl bromide

Solution 3

(a) By hydrolysis of ethene: When concentrated sulphuric acid is added to ethene at a temperature of 80°C and pressure of 30 atm. ethyl hydrogen sulphate is produced. Ethyl hydrogen sulphate on hydrolysis with boiling water gives ethanol.

 $\begin{array}{c} \xrightarrow{80^{o}\, \text{C}} \\ C_{2}H_{4} + H_{2}SO_{4} \xrightarrow{30_{a} \text{tm}} C_{2}H_{5}HSO_{4} \end{array}$

 $C_2H_5HSO_4 + H_2O \xrightarrow{} C_2H_5OH + H_2SO_4$

(b) By hydrolysis of alkyl halide: Alcohols can be prepared by the hydrolysis of alkyl halide with a hot dilute alkali.

 $C_2H_5CI + KOH \xrightarrow{\quad boil \quad} C_2H_5OH + KCI$

Halo alkanes react with alkalies to produce alcohol. Give the equation for the preparation of the second member of the homologous series of alcohol. State under what condition the reaction occurs.

Solution 4

When an aqueous solution of a strong alkali like NaOH is treated with chloroethane, it gives ethyl alcohol.

C₂H₅Cl + NaOH → C₂H₅OH+ NaCl

Question 5

(a)How do the boiling point and melting point change in the homologous series of alcohols?

(b) Name the product formed when ethanol reacts with acetic acid. Give an equation (c) What is the name given to this type of reaction?

Solution 5

(a)The melting and boiling point of the successive members of the homologous series of alcohols increase with the increase in molecular mass.

(b)When ethanol reacts with acetic acid ethyl acetate is formed.

 $C_{2}H_{5}OH + CH_{3}COOH \xrightarrow{Conc.H_{2}SO_{4}} CH_{3}COOC_{2}H_{5} + H_{2}O$ (c) This reaction is known as esterification reaction.

Question 6

Complete and balance the following equations. State the conditions wherever necessary.

| (a) $CH^{\equiv}CH + H_2 \longrightarrow+ H_2 \longrightarrow$ |
|--|
| (b) $C_2H_4 + CI_2 $ |
| (c) $C_2H_4 + HCI \longrightarrow$ |
| (d) CaC₂ + H₂O → |
| (e) $C_2H_2 + Br_2 \xrightarrow{IQ}$ |
| (f) C ₂ H ₅ OH K ₂ Cr ₂ O7 |
| Solution 6 |
| (a) $CH \equiv CH + H_2 \xrightarrow{N_1} CH_2 = CH_2 + H_2 \xrightarrow{N_2} CH_3 - CH_3$ |

(b) $C_2H_4 + CI_2 \longrightarrow CH_2(CI)-CH_2(CI)$ (c) $C_2H_4 + HCI \longrightarrow CH_3-CH_2CI$ (d) $CaC_2 + 2H_2O \longrightarrow C_2H_2+Ca(OH)_2$ (e) $C_2H_2 + Br_2 \longrightarrow H(Br)C=C(Br)H$ (f) $C_2H_5OH \xrightarrow{K_2Cr_2O_7} CH_3CHO$

Question 7

What is the effect of ethanol on human body?

Solution 7

Ethanol affects that part of the brain which controls our muscular movements and then gives temporary relief from tiredness. But it damages the liver and kidney too.

Question 8

How are the following obtained

- (a) Absolute alcohol
- (b) Spurious alcohol
- (c) Methylated spirit?

Solution 8

(a) Absolute alcohol: Absolute alcohol may be obtained by distilling moist alcohol with benzene. The mixture of water and benzene distills off and anhydrous alcohol is left behind.(b) Spurious alcohol: It is made by improper distillation. It contains large portions of methanol in a mixture of alcohols.

(c) Methylated spirit: Methylated spirit or denatured alcohol is ethyl alcohol with 5% methyl alcohol, a coloured dye and some pyridine.

Question 9

Name the products formed and give appropriate chemical equations for the following:

(a) Sodium reacting with ethyl alcohol(b) Ethanol oxidized by acidified potassium dichromate

Solution 9

(a) Sodium reacting with ethyl alcohol:

 $2C_2H_5OH + 2Na \longrightarrow 2C_2H_5ONa + H_2$

When sodium reacts with ethyl alcohol hydrogen is evolved with formation of sodium ethoxide.

(b) Ethanol oxidized by $K_2Cr_2O_7$: $C_2H_5OH \longrightarrow CH_3CHO+H_2O \longrightarrow CH_3COOH$

Alcohols gets oxidized and get converted into ethanal and then into acetic acid.

Question 10

Give the trivial (common) names and IUPAC names of the following:

(a) C₃H₆
(b) C₂H₄
(c) C₂H₂
(d) CH₃OH
(e) C₂H₅OH

Solution 10

| S No | Formula | Common Name | IUPAC |
|------|----------------------------------|----------------|----------|
| 1 | C ₃ H ₆ | Propylene | Propene |
| 2 | C_2H_4 | Ethylene | Ethene |
| 3 | C ₂ H ₂ | Acetylene | Ethyne |
| 4 | CH₃OH | Methyl alcohol | Methanol |
| 5 | C ₂ H ₅ OH | Ethyl alcohol | Ethanol |

Question 11

Ethanol can be oxidized to Ethanoic acid. Write the equation and name the oxidizing agent.

Solution 11

 $C_2H_5OH \xrightarrow{[O]} CH_3CHO + H_2O \xrightarrow{[O]} CH_3COOH$

The oxidizing agents that can be used are potassium dichromate and potassium permanganate.

Name an Organic compound which is:

- (a) Used for illuminating country houses
- (b) Used for making a household plastic material

(c) Called 'wood spirit'

(d) Poisonous and contain OH group

(e) Consumed as a drink

(f) Made from water gas

(g) solvent for ethanol.

Solution 12

(a) Used for illuminating country houses : Ethyne

(b) Used for making a household plastic material: ethyne

(c) Called 'wood spirit' : Methanol

(d) Poisonous: Methanol

- (e) Consumed as a drink: Ethanol
- (f) Made from water gas: Methanol

(g) Methanol

Chapter 12 - Organic Chemistry Exercise Ex. 12F

Question 1

What are carboxylic acids? Give their general formula?

Solution 1

An organic compound containing the carboxyl group(COOH) is known as carboxylic acid. The general formula: $C_nH_{2n+1}COOH$

Question 2

Write the names of:

(a) First three members of carboxylic acid series(b) Three compounds which can be oxidized directly, or in stages to produce acetic acid

Solution 2

(a) First three members of carboxylic acids are: Methanoic acid

Ethanoic acid

Propanoic acid

(b) Three compounds that can be oxidized directly or in stages to produce acetic acid are:

Ethanol

Acetylene

Ethanal

Question 3

Give the structural formula and IUPAC name of acetic acid. What is glacial acetic acid?

Solution 3

Structural formula of acetic acid:

```
H
H-C-C-OH
H
H
O
IUPAC name of acetic acid is:
Ethanoic acid
Glacial acetic acid is the pure form of acetic acid. It does not contain water.
```

Question 4

Vinegar is greyish in colour with particular taste. Explain.

Solution 4

Vinegar commonly called Sirka is a dilute solution of acetic acid. The presence of colouring matter gives it a greyish colour while the presence of some other organic acids and organic compounds impart it the usual taste and flavour.

Question 5

Complete:

(a) Vinegar is prepared by the bacterial oxidation of _____.

(b) The organic acid present in vinegar is _____.

(c) The next higher homologue of Ethanoic acid is _____.

Solution 5

- (a) Ethanol
- (b) Acetic acid
- (c) Propanoic acid

Question 6

How is acetic acid prepared from (a) ethanol (b) acetylene?

Solution 6

(a)It is prepared in the lab by the oxidation of ethanol with acidified potassium dichromate.

 $C_2H_5OH \xrightarrow{[O]} CH_3CHO \xrightarrow{[O]} CH_3COOH$

(b)Acetylene is first converted to acetaldehyde by passing through 40% H_2SO_4 at 60°C in the presence of 1% HgSO₄.

The acetaldehyde is then oxidised to acetic acid in the presence of catalyst manganous acetate at 70°C.

 $C_{2}H_{2} + H_{2}O \xrightarrow{H_{2}SO_{4}} CH_{3}CHO + O_{2} \xrightarrow{C_{a}talyst} 2CH_{3}COOH$

Question 7

What do you notice when acetic acid reacts with

- (a) Litmus
- (b) Metals
- (c) Alkalies
- (d) alcohol

Solution 7

(a) When acetic acid reacts with litmus it turns blue litmus red.

(b) When acetic acid reacts with metals hydrogen is evolved.

 $2CH_3COOH + Zn \xrightarrow{\rightarrow} (CH_3COO)_2Zn + H_2$

(c) When acetic acid reacts with alkalies it forms salt

 $CH_3COOH + NaOH \longrightarrow CH_3COONa + H_2O$

(d) Acetic acid reacts with alcohols forming esters

 $CH_{3}COOH + C_{2}H_{5}OH \xrightarrow{H_{2}SO_{4}} CH_{3}COOC_{2}H_{5} + H_{2}O$

Question 8

Acetic acid is a typical acid. Write the equation in each case for its reaction with

(a) Metal

(b) A base/alkali

(c) A carbonate

(d) A bicarbonate

Solution 8

(a) $2CH_3COOH + Zn \longrightarrow (CH_3COO)_2Zn + H_2$

(b) $CH_3COOH + NaOH \longrightarrow CH_3COONa + H_2O$

- (c) $2CH_3COOH + Na_2CO_3 \longrightarrow 2CH_3COONa + H_2O + CO_2$
- (d) $CH_3COOH + NaHCO_3 \longrightarrow CH_3COONa + H_2O + CO_2$

Question 9

What do you observe when acetic acid is added to:

(a) Sodium bicarbonate

- (b) Ethyl alcohol in the presence of sulphuric acid
- (c) Neutral FeCl₃ solution

Solution 9

(a) When acetic acid is added to sodium bicarbonate, carbondioxide is liberated.

 $CH_3COOH + NaHCO_3 \longrightarrow CH_3COONa + H_2O + CO_2$

(b) When acetic acid is added to ethyl alcohol in presence of sulphuric acid ester (ethyl acetate) is formed.

 $CH_{3}COOH + C_{2}H_{5}OH \xrightarrow{H_{2} \otimes \circ_{4}} CH_{3}COOC_{2}H_{5} + H_{2}O$

(c) When acetic acid is added to neutral FeCl₃, wine red color is produced.

Question 10

Name :

- (a) Compound formed when acetic acid and ethanol react together
- (b) Reducing agent used to convert acetic acid into ethanol
- (c) Substance used to change acetic acid to acetic anhydride

Solution 10

- (a) When acetic acid and ethanol react it results in the formation of ethyl acetate.
- (b) Lithum aluminium hydride(LiAIH₄) is used to convert acetic acid to ethanol.
- (c) Phosphorous pentoxide (P_2O_5) is heated along with acetic acid to form acetic anhydride.

Chapter 12 - Organic Chemistry Exercise Ex. 12B

Question 1

State the sources of alkanes.

Solution 1

Sources of alkane:

The principal sources of alkanes are Natural gas and petroleum.

Question 2

Methane is a green house gas. Comment.

Solution 2

Methane is a primary constituent of natural gas. It absorbs outgoing heat radiation from the earth, and thus contributes to the green house effect and so it is considered as a green house gas.

Question 3

Give the general formula of alkanes.

Solution 3

The general formula of alkane is :

 C_nH_{2n+2}

Draw the structures of isomers of

(a) Butane (b) Pentane Write the IUPAC and common names of these isomers

Solution 4

(a)The structures of isomers of butane are:

(i)



Common name:- n-Butane

IUPAC name:- Butane

(ii)



Common name:-iso butane

IUPAC name: - 2-methyl propane

(b) The structures of isomers of Pentane are: (i)



Common name: n-pentane

IUPAC name:- Pentane

(ii)



Common name:- iso pentane IUPAC name:- 2-methyl butane

(iii)



Common name- neo pentane

IUPAC name: - 2,2-dimethyl propane

Question 5

Write the

(a) Molecular formula

(b) Electron dot formula and

(c) Structural formula of methane and ethane

Solution 5

For methane:

(a) Molecular formula is CH₄

(b) Electron dot formula

(c) Structural formula



For ethane:

(a) Molecular formula is :- C_2H_6

(b) Electron dot formula:



How is

(a) Methane and(b) Ethane prepared in the laboratory

Solution 6

(a) Laboratory preparation of methane: When the mixture of sodium ethanoate and soda lime is taken in a hard glass test tube and heated, the gas evolved is methane. It is collected by downward displacement of water.

CH₃COONa+NaOH → Na₂CO₃+CH₄

(b) Laboratory preparation of ethane: When the mixture of sodium propionate and soda lime is taken in the boiling tube and heated the ethane gas is evolved. It is also collected by downward displacement of water.

 $C_2H_5COONa + NaOH \xrightarrow{CaO,300°C} Na_2CO_3 + C_2H_6$

Question 7

How are methane and ethane prepared from methyl iodide and ethyl bromide?

Solution 7

When methyl iodide is reduced by nascent hydrogen at ordinary room temperature then methane is formed.

$CH_3I+2[H] \longrightarrow CH_4+HI$

When bromoethane is reduced by nascent hydrogen at ordinary room temperature then ethane is produced.

 $C_2H_5Br+2[H] \longrightarrow C_2H_6+HBr$

Question 8

What is substitution reaction? Give the reaction of chlorine with ethane and name the product formed?

Solution 8

A reaction in which one atom of a molecule is replaced by another atom (or group of atoms) is called a substitution reaction.

When ethane reacts with chlorine

 $C_2H_6 + Cl_2 \longrightarrow C_2H_5Cl + HCl$

Chloroethane

 $C_2H_5CI + CI_2 \xrightarrow{\longrightarrow} C_2H_4CI_2 + HCI$

Dichloroethane

 $C_2H_4Cl_2 + Cl_2 \longrightarrow C_2H_3Cl_3 + HCl$

Trichloroethane

 $C_2H_3CI_3 + CI_2 \longrightarrow C_2H_2CI_4 + HCI$

Tetrachloroethane

 $C_2H_2CI_4 + CI_2 \xrightarrow{} C_2HCI_5 + HCI$

Pentachloroethane

 $C_2HCI_5 + CI_2 \longrightarrow C_2CI_6 + HCI$

Hexachloroethane

Question 9

Name the compounds formed when methane burns in

(a) Sufficient air(b) insufficient air Give a balanced equation

Solution 9

(a) Sufficient air: When methane burns in sufficient air, then carbon dioxide and water vapors are formed.

 $CH_4 + 2O_2 \xrightarrow{\longrightarrow} CO_2 + 2H_2O$

(b) Insufficient air: When methane burns in insufficient air , then carbon monoxide and water is formed.

 $2CH_4 + 3O_2 \longrightarrow 2CO + 4H_2O$

Question 10

Write the names and formula of the products formed when

```
(a) Methane and (b) ethane , reacts with :(i) Chlorine (ii) bromineWrite the chemical equations.
```

Solution 10

(a)

(i) When methane reacts with chlorine in the presence of sunlight or UV light, it undergoes substitution reaction to form Tetrachloromethane.

 $CH_4 + Cl_2 \xrightarrow{h\nu} CH_3Cl + HCl$

Chloromethane

 $CH_3Cl + Cl_2 \xrightarrow{hv} CH_2Cl_2 + HCl$ Dichloromethane

 $CH_2Cl_2 + Cl_2 \xrightarrow{h_0} CHCl_3 + HCl$ Trichloromethane

 $CHCl_3 + Cl_2 \xrightarrow{h\nu} CCl_4 + HCl$ Tetrachloromethane

(ii) When it reacts with bromine it forms Tetrabromomethane

 $CH_4 + Br_2 \xrightarrow{\rightarrow} CH_3Br + HCl$

 $CH_3Br + Br_2 \xrightarrow{\rightarrow} CH_2Br_2 + HCl$

Dibromomethane

 $CH_2Br_2 + Br_2 \longrightarrow CHBr_3 + HCl$

Tribromo methane

 $CHBr_3 + Br_2 \longrightarrow CBr_4 + HCl$

Tetrabromomethane

(b)

(i) When ethane reacts with chlorine it forms hexachoroethane.

 $C_2H_6 + Cl_2 \longrightarrow C_2H_5Cl + HCl$

Chloroethane

 $C_2H_5CI + CI_2 \xrightarrow{\longrightarrow} C_2H_4CI_2 + HCI$

Dichloroethane

 $C_2H_4Cl_2 + Cl_2 \xrightarrow{\longrightarrow} C_2H_3Cl_3 + HCl$

Trichloroethane

 $C_2H_3CI_3 + CI_2 \xrightarrow{\longrightarrow} C_2H_2CI_4 + HCI$

Tetrachloroethane

 $C_2H_2CI_4 + CI_2 \longrightarrow C_2HCI_5 + HCI$

Pentachloroethane

 $C_2HCl_5 + Cl_2 \longrightarrow C_2Cl_6 + HCl$

Hexachloroethane

(ii) When ethane reacts with bromine it forms Hexabromoethane

 $C_2H_6 + Br_2 \longrightarrow C_2H_5Br + HBr$

Bromoethane

 $C_2H_5B_r + Br_2 \xrightarrow{\longrightarrow} C_2H_4Br_2 + HBr$

Dibromoethane

 $C_2H_4Br_2 + Br_2 \longrightarrow C_2H_3Br_3 + HBr$

Tribromoethane

 $C_2H_3Br_3 + Br_2 \xrightarrow{\longrightarrow} C_2H_2Br_4 + HBr$

Tetrabromoethane

 $C_2H_2Br_4 + Br_2 \longrightarrow C_2HBr_5 + HBr$

Pentabromoethane

 $C_2HBr_5 + Br_2 \longrightarrow C_2Br_6 + HBr$

HexaBromoethane

Name the compound prepared from

(a) Sodium propionate(b) Methyl iodide(c) Ethyl bromideWrite the balanced equation for the same

Solution 11

(a) Ethane is prepared from sodium propionate. $C_{2}H_{5}COONa+NaOH \xrightarrow{C_{a}O,300^{\circ}C} Na_{2}CO_{3}+C_{2}H_{6}$ (b) Methane is prepared from methyl iodide. $CH_{3}I+2[H] \xrightarrow{} CH_{4}+HI$ (c) Ethane is prepared from ethyl bromide. $C_{2}H_{5}Br+2[H] \xrightarrow{} C_{2}H_{6}+HBr$

Question 12(a)

Write the equation for the complete combustion of

(i) methane (ii) ethane.

Solution 12(a)

(i)
$$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$$

(ii) $2C_2H_6 + 7O_2 \longrightarrow 4CO_2 + 6H_2O$

Question 12(b)

What is pyrolysis or cracking? Explain with an example.

Solution 12(b)

The decomposition of a compound by heat in the absence of air is called Pyrolysis. When pyrolysis occurs in alkanes, the process is termed cracking.

For example:

Alkanes on heating under high temperature or in the presence of a catalyst in absence of air broken down into lower alkanes, alkenes and hydrogen.
| | 1500°C | | | |
|------------------|--------|---------|---|--------|
| 2CH ₄ | | → HC?CH | + | $3H_2$ |

Convert

(a) Methane into chloroform

(b) Sodium acetate into methane

(c) Methyl iodide into ethane

(d) Aluminium carbide into methane

Solution 13

(a) Methane into chloroform $CH_4+Cl_2 \rightarrow CH_3Cl+HCl$

 $CH_3CI+CI_2 \rightarrow CH_2CI_2+HCI$

 $CH_2Cl_2+Cl_2 \rightarrow CHCl_3+HCl$

(b) Sodium acetate into methane

CH₃COONa+NaOH Ca⊙,300°C Na₂CO₃+CH₄

(c) Methyl iodide into ethane

2CH₃I +2Na CH₃-CH₃+2NaI

(d) Aluminium carbide into methane

 $AI_4C_3 + 12H_2O \longrightarrow 3CH_4 + 4AI(OH)_3$

Question 14

Give three uses of:

(a) Methane(b) ethane

Solution 14

(a) Methane: Three uses of methane are:

- (i) Methane is a source of carbon monoxide and hydrogen
- (ii) It is used in the preparation of ethyne, methanal, chloromethane, carbon tetrachloride.
- (iii) It is employed as a domestic fuel.

(b) Ethane:

- Three uses of ethane are:
- (i) It is used in the preparation of ethene, ethanol, and ethanol.

(ii) It forms ethyl chloride, which is used to make tetraethyllead.

(iii) It is also a good fuel.

Question 15

Under what conditions does ethane get converted to:

(a) Ethyl alcohol

- (b) Acetaldehyde
- (c) Acetic acid

Solution 15

(a) When a mixture of ethane and oxygen is compressed to about 120atm pressure and passed over copper tubes at 475K, ethyl alcohol is formed.

 $2C_2H_6 + O_2 \xrightarrow{120atm} 2C_2H_5OH$

(b) When mixture of ethane and oxygen is passed through heated molybdenum oxide, the mixture is oxidized to Acetaldehyde.

 $C_2H_6 + O_2 \xrightarrow{M_0 \bigcirc} CH_3CHO + H_2O$

(c) Ethanol formed from ethane gets oxidized to acetic acid.

 $2C_2H_6 + O_2 \xrightarrow{120atm} 2C_2H_5OH$

 $C_{2}H_{5}OH + O_{2} \xrightarrow{Pt} CH_{3}COOH + H_{2}O$

Question 16

Using appropriate catalysts, ethane can be oxidized to an alcohol, an aldehyde and an acid. Name the alcohol, aldehyde and acid formed when ethane is oxidized.

Solution 16

Ethane can be oxidized as follows:

When a mixture of ethane and oxygen in the ratio 9:1 by volume is compressed to about 120 atm pressure and passed over copper tubes at 475K, ethyl alcohol is formed.

2C₂H₆ + O₂ Cutubes 475K 2C₂H₅OH

When a mixture of ethane and oxygen is passed through heated MoO, the mixture is oxidized to ethanal.

MoO

 $C_2H_6+O_2 \longrightarrow CH_3CHO + H_2O$

When a manganese based catalyst is used 100°C, ethane can be oxidized to ethanoic acid.

Chapter 12 - Organic Chemistry Exercise Misc. Ex.

Question 1

(a) Write an equation for the laboratory preparation of

- An unsaturated hydrocarbon from calcium carbide. i.
- ii. An alcohol from ethyl bromide.

(b) What would you see, when ethyne is bubbled through a solution of bromine in carbon tetrachloride? (c) Name the addition product formed between ethene and water

Solution 1

 $CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2H^{\uparrow}$

Calcium Calcium acetylene hydroxide

(a) i. **carbide** C₂H₅Br + NaOH → C₂H₅OH + NaBr Ethyl (aq.) ethvl alcohol

, bromide

(b) When bromine in carbon tetrachloride is added to ethyne, the orange colour of the bromine disappears due to the formation of the colourless ethylene bromide. (c) Water reacts with ethene to form ethanol.

$$CH_2=CH_2 + H_2O \xrightarrow{H^+} C_2H_5OH$$

Question 2

Ethanol can be converted into ethene which can be changed into ethane. Choose the correct word or phrase from the brackets to complete the following sentences.

(a) The conversion of ethanol into ethene is an example of (Dehydration, dehydrogenation) (b) Converting ethanol into ethene requires the use of ____ (Conc.HCl, Conc. HNO₃, conc. H₂SO₄).

(c) The conversion of ethene into ethane is an example of _____ (hydration, hydrogenation).

(d) The catalyst used in the conversion of ethene into ethane is commonly _____ (iron, nickel, cobalt).

Solution 2

(a) The conversion of ethanol into ethene is an example of Dehydration.

- (b) Converting ethanol into ethene requires the use of Conc. H_2SO_4 .
- (c) The conversion of ethene into ethane is an example of hydrogenation.
- (d) The catalyst used in the conversion of ethene into ethane is commonly nickel.

Give reasons:

- (a) Ethyne is more reactive than ethene.
- (b) Ethene is more reactive then ethane.
- (c) Hydrocarbons are excellent fuels.

Solution 3

(a) Ethyne is a highly reactive compound than ethene because of the presence of a triple bond between its two carbon atoms.

(b) Ethene is a highly reactive compound than ethane because of the presence of a double bond between its two carbon atoms.

(c) Hydrocarbons such as alkanes undergo combustion reactions with oxygen to produce carbon dioxide and water vapour. Alkanes are flammable which makes them excellent fuels. Methane for example is the principal component of natural gas.

 $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

Question 4

a. Write balanced equations:

- i. When butane is burnt in oxygen.
- ii. Preparation of ethylene from ethyl alcohol.

b.

i. Convert ethane to acetic acid

- ii. Convert acetylene to ethane
- iii. Convert acetic acid to ethyl alcohol
- iv. Convert acetic acid to ethyl acetate

Solution 4

a.
i.
$$2C_4H_{1D} + 13O_2 \xrightarrow{\text{neal}} 8CO_2 \uparrow + 10H_2O$$

ii. $C_2H_5OH \xrightarrow{\text{excessof}H_2O_4} C_2H_4 + H_2O$
b.
 $2C_2H_6 + O_2 \xrightarrow{475KOutube} 2C_2H_5OH \xrightarrow{\text{Pt}} CH_3COOH + H_2O$
i. Ethane Ethyl alcohol Acetic acid

ii.

$$\begin{array}{ccc} C_2H_4 & \xrightarrow{+H_4} & \to C_2H_4 & \xrightarrow{+H_4} & \to CH_3CH_3\\ \text{Acetylene} & \text{Ethene} & \text{Ethane} \end{array}$$

iii.

iv.

Question 5

Write the equations for the following lab preparations:

(a) Ethane from sodium propionate(b) Ethene from lodoethane(a)Ethyne from Calcium carbide(b)Methanol from lodoethane

Solution 5

(a)Ethane from sodium propionate $C_{2}H_{5}COONa + NaOH \xrightarrow{C_{4}O} Na_{2}CO_{3} + C_{2}H_{6}$

(b)Ethene from iodoethane $C_2H_5 I + KOH(alcoholic) \rightarrow C_2H_4 + KI + H_2O$

(c)Ethyne from calcium carbide CaC₂ +2H₂O \rightarrow Ca(OH)₂ + C₂H₂

(d)Methanolfrom iodoethane $CH_3I + NaOH \rightarrow CH_3OH + NaI$

Question 6

(a) Write the equation for the preparation of carbon tetrachloride from methane.

(b) Draw the structure formula of ethyne.

(c) How is the structure of alkynes different from that of alkenes?

Solution 6

(a)Preparation of carbon tetrachloride from methane:

CH₄+Cl₂ Or 600K CH₃Cl +HCl

 $CH_3CI + CI_2 \longrightarrow CH_2CI_2 + HCI$

 $CH_2CI_2 + CI_2 \longrightarrow CHCI_3 + HCI$

 $CHCl_3 + Cl_2 \longrightarrow CCl_4 + HCl$

(b)Structural formula of ethyne:

H-C≡C-H

(c)Alkynes contain triple bond where as alkenes contain double bond.

Question 7(a)

Fill in the blanks with correct words from the brackets:

Alkenes are the (a) _____ (analogous/homologous) series of (b) _____ (saturated /unsaturated) hydrocarbons. They differ from alkanes due to presence of (c) _____ (double/ single) bonds. Alkenes mainly undergo (d) _____ (addition/ substitution) reactions.

Solution 7(a)

Alkenes are the (a) <u>homologous</u> series of (b) <u>unsaturated</u> hydrocarbons. They differ from alkanes due to presence of (c)<u>single</u> bonds. Alkenes mainly undergo (d) <u>addition</u> reactions.

Question 7(b)

The organic compound which undergoes substitution reaction is (v).... $(C_2H_2, C_2H_4, C_{10}H_{18}, C_2H_6)$

Solution 7(b)

The organic compound which undergoes substitution reaction is $\underline{C_2H_6}$.

Question 8

(a) Draw the structural formulae of the two isomers of Butane. Give the correct IUPAC name of each of the isomer.

(b) State one use of acetylene.

Solution 8

(a) Structural formulae of isomers of Butane are:



Butane2-methyl propane

(b) Use of acetylene:

For Oxy-acetylene welding at very high temperatures.

Question 9

Copy and complete the following table which relates to three homologous series of hydrocarbons:

| General Formula | C_nH_{2n} | C_nH_{2n-2} | C_nH_{2n+2} |
|-----------------------------------|-------------|---------------|---------------|
| IUPAC name of the | | | |
| homologous series | | | |
| Characteristics bond type | | | Single bonds |
| IUPAC name of the first | | | |
| member of the series | | | |
| Type of reaction with chlorine | | Addition | |

Solution 9

The homologous series of hydrocarbons are:

| General Formula | C _n H _{2n} | C _n H _{2n-2} | C _n H _{2n+2} |
|---|--------------------------------|----------------------------------|----------------------------------|
| IUPAC name of the homologous series | Alkenes | Alkynes | Alkanes |
| Characteristics bond type | Double bond | Triple Bond | Single Bond |
| IUPAC name of the first member of the series | Ethene | Ethyne | Methane |
| Type of reaction with chlorine | Addition | Addition | Substitution |

Question 10

- (a) Name the organic compound prepared by each of the following reactions:
- (i) C₂H₅COONa +NaOH →
- (ii) $CH_3I + 2H \longrightarrow$
- (iii) $C_2H_5Br + KOH$ (alcoholic solution) \longrightarrow
- (iv) CO + 2H₂ (Zinc oxide catalyst) \longrightarrow
- (v) $CaC_2 + 2H_2O \longrightarrow$

Solution 10

____CaO

- (i) C₂H₅COONa +NaOH ^{300°C} Na₂CO₃ + C₂H₆
- (ii) $CH_3I + 2[H] \longrightarrow CH_4 + HI$
- (iii) $C_2H_5Br + KOH \longrightarrow C_2H_4 + KBr + H_2O$
- (iv) CO + $2H_2 \xrightarrow{\longrightarrow} CH_3OH$
- (v) $CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$

Write the equations for the following reactions:

(a) Calcium carbide and water

(b) Ethene and water (steam)

(c) Bromoethane and an aqueous solution of sodium hydroxide

Solution 11

(a) Calcium carbide and water: CaC₂ + 2H₂O \rightarrow Ca(OH)₂ + C₂H₂

(b) Ethene and water:

 $CH_2 = CH_2 + H_2O \xrightarrow{\quad H^{\bullet}} C_2H_5OH$

(c) Bromoethane and aqueous solution of sodium hydroxide

 $C_2H_5Br + NaOH \longrightarrow C_2H_5OH + NaBr$

Question 12

A compound X when treated with an organic acid Y (having vinegar like smell) in the presence of the acid Z, forms a compound P which has fruity smell.

(a) Identify X, Y and Z

(b) Write structural formula of X and Y.

(c) What type of compound P is?

(d)Name the above reaction.

(e) If compound X and Y both have 2 carbon atoms. Write the reaction.

Solution 12

- (a) X = Ethanol, C₂H₅OH
- $Y = Acetic acid, CH_3COOH$
- $Z = Conc. H_2SO_4$

(b)



- a. Which of the following statements is wrong about alkanes?
- i. They are all saturated hydrocarbons.
- ii. They can undergo addition as well as substitution reactions.
- iii. They are almost non-polar in nature.
- iv. On complete combustion, they give out carbon dioxide and water.
- b. The organic compound obtained as the end product of the fermentation of sugar solution is
- i. Methanol
- ii. Ethanol
- iii. Ethane
- iv. Methanoic acid
- c. Find the odd one out and explain:

 $C_{3}H_{8},\,C_{5}H_{10},\,C_{2}H_{6},\,CH_{4}$

- d. Give chemical equations for
- i. The laboratory preparation of methane from sodium acetate.
- ii. The industrial preparation of methanol from water gas.
- iii. The reaction of one mole of ethene with one mole of chlorine gas.
- iv. The preparation of ethyne from 1, 2-dibromoethane.
- e. State how the following conversions can be carried out:
- i. Ethyl chloride to ethyl alcohol

ii. Ethyl chloride to ethene

iii. Ethene to ethyl alcohol

iv. Ethyl alcohol to ethene

f.

i. Define isomerism.

ii. Give the IUPAC name of the isomer C_4H_{10} which has a branched chain.

Solution 2009

a. ii. They can undergo addition as well as substitution reactions.

b. ii. Ethanol.

c. C_5H_{10} is an alkene, while the rest are alkanes.

d.

;
$$CH_3COONa + NaOH \xrightarrow{CaO}{300^{\circ}C} Na_2CO_3 + CH_4$$

$$\begin{array}{l} & \operatorname{CO} + 2\operatorname{H}_2 & \xrightarrow{2\operatorname{nO}'\operatorname{O'Q}} & \to \operatorname{CH}_3\operatorname{OH} \\ & & & \\ &$$

e. i. By treating ethyl chloride with aqueous KOH

ii. By heating ethyl chloride with alcoholic KOH

iii. By passing ethene into conc. H_2SO_4 at 80°C and high pressure

iv. By heating ethyl alcohol with conc. H₂SO₄ at 170°C

f.

i. Isomerism: Compounds having the same molecular formula but different structural formulae are known as isomers, and the phenomenon is known as isomerism.

ii. The IUPAC name of the branched isomer of butane is 2-methyl propane L

Question 2010

a. An organic compound undergoes addition reactions and gives a red precipitate with ammoniacal cuprous chloride. Therefore, the organic compound could be

- i. Ethane
- ii. Ethene
- iii. Ethyne
- iv. Ethanol
- b. An organic weak acid is
- i. Formic acid
- ii. Sulphuric acid
- iii. Nitric acid
- iv. Hydrochloric acid
- c. The organic compound mixed with ethanol to make it spurious is
- i. Methanol
- ii. Methanoic acid
- iii. Methanal
- iv. Ethanoic acid
- d. Draw the structural formula for each of the following:
- i. Ethanoic acid
- ii. But-2-yne

e. Compound A is bubbled through bromine dissolved in carbon tetrachloride and the product is CH_2Br - CH_2Br .

- i. Draw the structural formula of A.
- ii. What type of reaction has A undergone?
- iii. What is your observation?

iv. Name (not formula) the compound formed when steam reacts with A in the presence of phosphoric acid.

v. What is the procedure for converting the product of (e) (iv) back to A?

Solution 2010

a. iii. Ethyne b. i. Formic acid c. i. Methanol н о H-C-C-O-H Н _{d. i.} Ethanoic acid Н Н $H-C-C \equiv C-C-H$ Н Н _{ii} But-2-yne e. $H_2C = CH_2$ ii. Addition reaction iii. Bromine solution gets decolourised iv. Ethanol v. By heating it (ethanol) with concentrated sulphuric acid at 170°C

Question 2011

- a. The functional group present in acetic acid is
- i. Ketonic =C=O
- ii. Hydroxyl OH
- iii. Aldehydic CHO
- iv. Carboxyl COOH
- b. The unsaturated hydrocarbons undergo
- i. a substitution reaction

ii. an oxidation reaction

iii. an addition reaction

iv. none of the above

c. The number of C-H bonds in ethane molecule is

i. Four

ii. Six

iii. Eight

iv. Ten

d. Choose the correct word/phrase from within the brackets to complete the following sentences:

i. The catalyst used for conversion of ethene to ethane is commonly (nickel /iron/cobalt)

ii. When acetaldehyde is oxidised with acidified potassium dichromate, it forms (ester/ethanol/ acetic acid)

iii. Ethanoic acid reacts with ethanol in the presence of concentrated H₂SO₄ so as to form a compound and water. The chemical reaction which takes place is called (dehydration/hydrogenation/ esterification)

iv. Write the equation for the reaction taking place between 1, 2-dibromoethane and alcoholic potassium hydroxide.

v. The product formed when ethene gas reacts with water in the presence of sulphuric acid (ethanol/ethanol/ethanoic acid)

e. Write balanced chemical equations for the following:

i. Monochloroethane is hydrolysed with aqueous KOH.

ii. A mixture of sodalime and sodium acetate is heated.

iii. Ethanol under high pressure and low temperature is treated with acidified potassium dichromate.

iv. Water is added to calcium carbide.

v. Ethanol reacts with sodium at room temperature.

Solution 2011

a. iv. Carboxyl - COOH
b. iii. An addition reaction
c. iii Six
d.
i. Nickel
ii. Acetic acid
iii. Esterification
iv.

$$\begin{array}{l} CH_2Br - CH_2Br + 2KOH \longrightarrow CH_2CH_2 + 2KBr \\ (Alco.) \end{array}$$
v. Ethanol
e.
$$\begin{array}{l} c_2H_5Cl + KOH_{(aq)} \xrightarrow{boil} C_2H_5OH + KCl \\ \vdots \\ CH_3COONa + NaOH \xrightarrow{CaO} CH_4 + Na_2CO_3 \\ \vdots \\ c_2H_5OH \xrightarrow{Aciai < K_2C_2O, [O]} CH_3CHO + H_2O \xrightarrow{[O]} CH_3COOH \\ iv. CaC_2 + 2H_2O \rightarrow Ca(OH)_2 + C_2H_2 \\ v. 2C_2H_5OH + 2Na \rightarrow 2C_2H_5ONa + H_2 \end{array}$$

- a. Give the structural formula for the following:
- i. Methanoic acid
- ii. Ethanol
- iii. Ethyne
- iv. Acetone
- v. 2-methyl propane

b. From the following organic compounds given below, choose one compound in each case which relates to the description [i] to [iv]:

[Ethyne, ethanol, acetic acid, ethene, methane]

- i. An unsaturated hydrocarbon used for welding purposes.
- ii. An organic compound whose functional group is carboxyl.
- iii. A hydrocarbon which on catalytic hydrogenation gives a saturated hydrocarbon.
- iv. An organic compound used as a thermometric liquid.

C.

i. Why is pure acetic acid known as glacial acetic acid?

ii. Give a chemical equation for the reaction between ethyl alcohol and acetic acid.

Solution 2012



c. i. Pure acetic acid is called glacial acid because it forms an ice-like solid when cooled. ii. $C_2H_5OH+CH_3COOH \xrightarrow{ConcH_2SQ} CH_3COOC_2H_5+H_2O$

Question 2013

a.

- i. Give a chemical test to distinguish ethene gas and ethane gas.
- ii. Identify the statement that is incorrect about alkanes:
- A. They are hydrocarbons.
- B. There is a single covalent bond between carbon and hydrogen.
- C. They can undergo both substitution as well as addition reactions.
- D. On complete combustion, they produce carbon dioxide and water.
- b. Give the structural formulae for the following:

i. An isomer of n-butane

ii. 2-propanol

Solution 2013

a.

i. Ethene gas decolourises the purple colour of $KMnO_4,$ whereas ethane does not decolourise $KMnO_4$ solution.

ii. They can undergo both substitution as well as addition reactions.

b.

i. Isomer of n-butane: Isobutane

ii. 2-propanol

Question 2014

a. The IUPAC name of acetylene is

i. propane

ii. propyne

- iii. ethane
- iv. ethyne

0 ||

- b. Name the hydrocarbons containing the a C functional group.
- c. Give preparation of ethane from sodium propionate.
- d. Distinguish ethane and ethene (using alkaline potassium permanganate solution).
- e. Give the structural formula of the following:
- i. ethanol
- ii. 1-propanal

iii. ethanoic acid

iv. 1, 2, dichloroethane

f. Give preparation of ethanol from monochloroethane and aq. sodium hydroxide.

Solution 2014

```
a. (iv) ethyne
b. Ketones
c.
C_2H_sCOONa + NaOH \xrightarrow{CaO}{HEAT} C_2H_6 + Na_2CO_3
```

d. Ethene gas decolourises the purple colour of $KMnO_4,$ whereas ethane does not decolourise $KMnO_4$ solution.

e. i. Ethanol: CH₃-CH₂-OH ii. 1-propanal: CH, - CH, - C - H 0 iii. Ethanoic acid: CH, - C- OH 0 iv. 1, 2-dichloroethane: CH, - CH, Cl CL f. The balanced chemical equation for the preparation of ethanol from monochloroethane and aqueous sodium hydroxide: C_2H_5 -CI + NaOH (aq.) $\xrightarrow{\text{wl}} C_2H_5$ OH + NaCI

Question 2015

(a) Give balanced chemical equations for the following conversions:

(i) Ethanoic acid to ethyl ethanoate

(ii) Calcium carbide to ethylene

(iii) Sodium ethanoate to methane

(b) Using their structural formula, identify the functional group by circling them:

(i) Dimethyl ether

(ii) Propanone

(c) Name the following:

(i) Process by which ethane is obtained from ethane

(ii) A hydrocarbon which contributes towards the greenhouse effect

(iii) Distinctive reaction that takes place when ethanol is treated with acetic acid

(iv) The property of elements by virtue of which atoms of the element can link to each other in the form of a long chain or ring structure

(v) Reaction when an alkyl halide is treated with alcoholic potassium hydroxide

Solution 2015

(a) (i) Ethanoic acid to ethyl ethanoate $\xrightarrow{\text{Conc. H}_2\text{SO}_4} \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$ $CH_3COOH + C_2H_5OH$ (ii) Calcium carbide to ethylene $CaC_2 + 2 H_2O \rightarrow Ca(OH)_2 + CH \circ CH$ (iii) Sodium ethanoate to methane Ca0CH₃COONa + NaOH 300°C Na₂CO₃ + CH₄ (b) (i) Dimethyl ether н (ii) Propanone H_3 (c) Name the following: (i) Hydrogenation (ii) Methane (iii) Esterification

(iv) Catenation(v) Dehydrohalogenation