

LN1. INTRODUCTION TO CHEMISTRY

Exercise: 1 ANSWERS

1. Give two examples for each of the following substances.

(a) Food preservatives :

- | | |
|--------------------|--------------------------|
| 1. Sodium Benzoate | 2. Sodium metabisulphate |
| 3. Sugar | 4. Common salt |

(b) Fuel:

- | | | |
|-----------|-----------|---------|
| 1. L.P.G. | 2. Petrol | 3. Coal |
|-----------|-----------|---------|

(c) Fungicides :

- | | |
|------------|---------------------|
| 1. Sulphur | 2. Bordeaux mixture |
|------------|---------------------|

(d) Medicines :

- | | | |
|---------------|----------------|----------------|
| 1. Penicillin | 2. Painkillers | 3. Antibiotics |
|---------------|----------------|----------------|

(e) Building materials :

- | | | |
|-----------|----------|----------|
| 1. Cement | 2. Steel | 3. Glass |
|-----------|----------|----------|

(f) Chemical war weapons :

- | | |
|--------|--------|
| 1. TNT | 2. RDX |
|--------|--------|

2. Give short answers :

(a) What is science?

(a) SCIENCE is the systematic effort by human beings to control nature through experiments and observation for their own use. OR

SCIENCE is the systematic ongoing effort by human beings to study understands and utilise nature for meaningful purposes. This understanding is slowly developed by careful observations and experiment.

b) What is chemistry?

“The branch of science that deals with the study of the composition and the physical and chemical properties of various forms of matter is called Chemistry.”

(c) What is a fuel?

The substances which on burning produce heat energy are called fuels.

(d) How is chemistry helpful in improving the health of human beings?

Chemistry is very helpful in improving the health of human beings by providing Antibiotics, Pain killers, Pencillin, Tetracycline etc. It has provided us with Vitamins, Enzymes, Minerals and Anesthesia (chloroform, formalene etc.)

(e) What is alchemy?

The word “Alchemy” has its origin in a Greek word ‘Khemeia’ means “art of transmuting metals”. It was partly based on experimentations and partly on spiritual discipline

(f) What kind of experiments did Alchemists do?

Alchemists’ considered being early chemists. They used all general techniques of chemistry in healing humans. Their contribution proved valuable to the society and in the advancement of civilization. They had contributed to an incredible number of future uses of chemicals, metals, ink, paints, cosmetic, medicines, porcelain, etc.

(g) What is ‘Philosopher’s stone’?

The goal of alchemy was to find a mythical and magical substance called “philosopher’s stone” not a literal stone but wax, liquid or powder with magical power, which on heating with a base, iron and copper metals would turn into gold, the purest form of matter which would bring wealth, health and immortality.

(h) What is the main difference between alchemy and chemistry?

Alchemy was both scientific and spiritual. Alchemists never separated them. It also lacked a common language for its concepts and processes i.e. there was no standardized scientific practice.

Chemistry was completely separated from ancient traditional alchemy. Still modern chemistry in general owes a great deal to alchemy. Alloys are formed by mixing metals with other metals and substances.

(i) Name the chemicals which help in increasing food production.

Chemicals which help in increasing food production are fertilisers like urea, sodium nitrate, potash, ammonium phosphate, calcium nitrate etc. Pesticides like aldrin, malathion which are used to kill pests. Insecticides like D.D.T.,

(j) Name six such products, which we use daily.

Six products of daily use are soap, paints, pen, tooth-paste, cooking oil, potable water.

(k) How is the knowledge of chemistry important to mankind?

Importance of chemistry to mankind chemistry plays an important role to provide us with things of daily use like toothpaste, soap, detergents, paints, clothes, medicines, fertilisers, pesticides, plastics, in preparing fuels, consumer products like glass, paper, pencils, pens, in substances used in defence like gunpowder, T.N.T. etc.

Question 3.

What is the contribution of chemistry in the following fields?

a) Industry

To improve efficiency and production of metals, paints, paper, plastics, alloys, textile, pharmaceuticals, electroplating, cosmetics, synthetic fibres etc.

(b) Clothing's

Chemistry is widely used in textile industry which manufactures clothing . Clothes guard our body from external environment. Formation of clothing begins with the knowledge of conversion of fibres into fabrics. Fibres can be natural or synthetic. Earlier only natural fibres were known to man such as cotton, jute, silk, wool, et c. which were used to produce dress materials, sarees, bags, sweaters, shawls, etc. With more development, synthetic fibres were also made such as nylon, terylene etc. These fibres are strong, wrinkle resistant and dry quickly. They are used to make towels , bed sheets, bags, curtains, carpets, blankets, dress materials, etc.

(c) Cosmetics

The use of talcum powder, skincare creams, lipsticks, eyes and facial make up, deodorants, lotions, perfumes, bathing oil, body butter, baby products, etc. It is

possible to convert various ingredients into usable cosmetics due to knowledge of chemistry.

(d) National Defence

Substances like gunpowder, T.N.T. (trinitrotoluene), phosgene, chemical weapons, laughing gas, etc., are all products of chemistry which contribute the national defence.

(e) Medicines:

Extensive researches by chemists have led to the discovery of number of medicinal drugs. These drugs help in fighting diseases and have thus increased the life span of human beings. Examples : Aspirin, paracetamol, antibiotics like penicillin, tetracycline, antiseptics and various other medicines used to kill germs and cure diseases and their symptoms.

Question 4.

Who is known as Father of chemistry? Why?

Robert William Boyle is known as 'Father of Modern Chemistry'. He was an Anglo Irish scientist born in Ireland. He was the first to perform experiments under controlled conditions and publish his researches with elaborate details of procedure, apparatus and observations. Robert Boyle put chemistry on a firm scientific footing transforming it

Question 5.

Name the scientists who discovered the following.

(a) Atoms

John Dalton was a British chemist and physicist. He proved that matter consists of small indivisible called 'atoms'. For this he proposed the atomic theory which was later on called "Dalton's atomic theory"

(b) Oxygen : Joseph Priestly.

(c) Safety lamp : Joseph Priestly.

(d) Elements Answer:

Antoine Lavoisier was a French nobleman. He revolutionized chemistry. Lavoisier named the elements carbon, hydrogen and oxygen and discovered the role of oxygen in combustion and respiration for which he is most noted. He established that water is a compound and helped to continue the transformation of chemistry from a qualitative science to a quantitative one.

Objective Type Questions

Question 1.

Fill in the blanks:

- (a) **Chemistry** deals with the study of matter and the changes it undergoes.
- (b) **Fertilizers** help to increase the production of food.
- (c) Food items like jams and pickles are protected by using **preservatives** (salt and sugar).
- (d) L.P.G. is used for **fuel**.
- (e) Inert gases were discovered by **William Ramsay**.

Question 2. Match the following words in

Column A

- 1. Clothing
- 2. Green revolution
- 3. Building materials
- 4. Commodities of daily use

Column B

- tooth paste, cosmetics
- nylon, wool
- agricultural
- mortar, cement

Question 3. Write "True" or "False" against each of the following statements.

- (a) Chemistry plays an important role in national economy: **True**
- (b) Antibiotics are used as preservatives : **False**
- (c) D.D.T. is an important fertilizer: **False**
- (d) Gunpowder is an insecticide: **False**
- (e) Enzymes secreted by our body are chemicals : **True**

5. Match the following:

Column A

- 1. Marie curie
- 2. John Dalton
- 3. William ramsey
- 4. Sir Humphry

Column B

- safety lamp
- helium
- Noble prize winner
- Davy atomic theory

Give reasons for the following :

- 1. Alchemy was considered a pseudoscience.**
- 2. Preservatives are added to food or beverages .**
- 3. Titanium dioxide is an important ingredient in cosmetics.**
- 4. Aspirin is one of the most widely used medication - globally.**
- 5. Ordinary soap is wasted in hard water.**
- 6. A philosopher's stone is not exactly a stone.**
- 7. Food processing is an important procedure for obtaining marketable food products .**
- 8. Cosmetics may contain preservatives , as one of their ingredients.**
- 9. Polyester is added to natural fibre cotton, to give terylene.**
- 10. All medicines must be taken under proper doctors supervision and in the correct dose.**

Answer:

Solution :

1. Towards the end of the 17th century the scientific processes involving modern chemistry started paving paths and alchemy today is considered a pseudoscience and chemistry regains its rightful position as a serious scientific field.
2. Preventars are added to food or beverages because of the following reasons:
 - Prevent decomposition by bacteria or microbes
 - Reduce risk of foodborne infections
 - Preserve nutritional quality of food.
3. It is a natural pigment powder which provides a base for mineral makeup. It provides mild sun protection and as a pigment gives a white colouration to coloured ingredients.
4. Aspirin is one of the most widely used medication- globally because of following reasons:
 - It is a medicine to treat pain, fever & inflammation.
 - Aspirin given shortly after a heart attack, may decrease the risk of death.
 - As long term use it may reduce blood clots in people who are at a high risk.

5. Hard water is one which does not lather with soap and thus ordinary soap is wasted in hard water.
6. Philosopher's stone is a legendary substance, capable of turning inexpensive metals like lead or mercury into- gold and silver.
7. Food processing- involves physical or chemical processes, to transform or change the raw ingredients in food into easy usable forms of food available in markets. Raw materials- in food to marketable food products.

Food Processing	Processes
(i) Mincing	Cooking ,Pickling
(ii) Preservative addition	Canning, Packaging

8. They extend the shelf life of a cosmetic and may prevent the growth of microorganisms.
9. Polyester is added to natural fibre cotton, to give terylene because this combination makes the fabric easy to clean and create resistant.
10. Some medicines have side effects as aspirin not taken in proper dose may cause stomach ulcers similarly paracetamol if taken in high dose may cause liver problems. Thus all medicines must be taken under proper doctors supervision and in the correct dose.

