

Substances in Common Use

Exercises

Q. 1. Fill in the blanks.

- A.** The number of molecules of water of crystallization in washing soda is _____.
B. The chemical name of baking soda is _____.
C. _____ is used in treatment of hyperthyroidism.
D. The chemical name of Teflon is _____.

Answer : **A.** The number of molecules of water of crystallization in washing soda is One

(Formula of washing soda is $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$ which shows that it has 1 water of crystallization.)

B. The chemical name of baking soda is Sodium Bicarbonate.

(Baking soda – NaHCO_3 which stands for Sodium bicarbonate)

C. Iodine-123 is used in treatment of hyperthyroidism.

(Hyperthyroidism occurs due to overproduction of hormones by the thyroid gland. Iodine-123 is used in the treatment of hyperthyroidism.)

D. The chemical name of Teflon is tetrafluoroethylene.

(Teflon is used for coating cooking utensils and industrial equipment to avoid sticking. It is the polymer of tetrafluoroethylene)

Q. 2. Match the pairs

Group A	Group B
Saturated brine	sodium metal freed
Fused salt	crystallization of salt
CaOCl_2	oxidation of color
NaHCO_3	Basic salt

Answer :

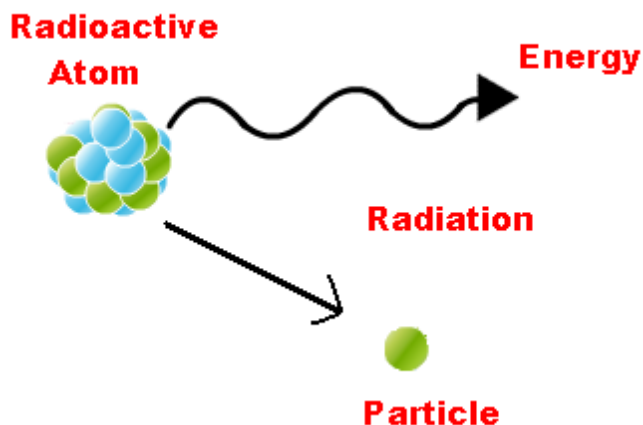


Group A	Group B	Explanation
Saturated brine	sodium metal freed	$\text{NaCl} = \text{brine}$
Fused salt	crystallization of salt	
CaOCl_2	oxidation of color	Cl_2 is a strong oxidizing agent.
NaHCO_3	Basic salt	It turns red litmus blue

Q. 3 A. Write answers to the following

What is meant by radioactivity?

Answer : Elements with a high atomic number such as uranium, thorium, radium have a property of spontaneously emitting invisible, highly penetrating and high energy radiation. This property is called radioactivity.



Q. 3 B. Write answers to the following

When is said to be the nucleus unstable?

Answer : Nucleus is said to be unstable when the element has the radioactive property as the radiation occurs from the unstable nuclei only.

Example:

An unstable nucleus, like uranium, can stretch so far that the strong nuclear force is no longer strong enough to hold the nucleus together-and the electric force breaks the nucleus apart in a process called fission.

Q. 3 C. Write answers to the following

Which diseases are caused by artificial food colours?

Answer : ADHD (Attention Deficit Hyperactivity Disorder) is caused by artificial food colours.

- (i) Tourette syndrome has been found to occur more commonly in the ADHD population.
- (ii) People with ADHD have an increased risk of persistent bed wetting.
- (iii) Restless legs syndrome has been found to be more common in those with ADHD and is often due to iron deficiency anaemia.

Q. 3 D. Write answers to the following

Where in the industrial field is radioactivity used?

Answer : (i) Use in Ceramic articles – Luminous colours are used to decorate ceramic tiles, utensils, plates, etc. Earlier uranium oxide was used in these paints.

(ii) Measurement of thickness, density and level- It is necessary to maintain the required thickness in the manufacture of aluminium, plastic, iron sheets of differing thickness. In the manufacturing process, a radioactive substance is placed on one side and an instrument to measure radiation on the other. The radiation read by the measuring instrument varies with the thickness of the sheet. Material inside a packing can also be examined by the same technique.

(iii) Luminescent paint and radio luminescence – The radioactive substances radium, promethium, tritium with some phosphor are used to make certain objects visible in the dark, for example, the hands of a clock, and certain other objects. Krypton-85 is used in HID (High Intensity Discharge) lamps while promethium-147 is used in portable X-ray units as the source of beta rays.

Q. 3 E. Write answers to the following

Write down properties of teflon.

Answer : Properties:-

- (i) The atmosphere and chemical substances have no effect on Teflon.
- (ii) Neither water nor oil will stick to Teflon coated articles.
- (iii) High temperatures do not affect Teflon as its melting point is 327 °C.



(iv) Teflon coated articles are easy to clean.

Q. 3 F. Write answers to the following

What type of colours will you use to celebrate ecofriendly Rang Panchami? Why?

Answer : Natural colours should be used to celebrate ecofriendly rang panchami.

Natural colors we not only save our skins but also help save our environment and conserve our biodiversity. When these colors percolate into the soil and water they do not add toxicity to our blue planet and cause no harm to the myriad life forms that live in the soil and water.

Q. 3 G. Write answers to the following

Why has the use of methods like Teflon coating become more common?

Answer : Teflon coating is more common because of the following reasons:

(i) Since it is a poor conductor of electricity it is preferred to be used in high technology electronic instruments.

(ii) Because of its non-stick property it is generally seen in kitchen nowadays as kitchenware.

Q. 4 A. Give scientific explanation

Bleaching powder has the odour of chlorine.

Answer : Bleaching powder undergoes slow decomposition due to the carbon dioxide in air and chlorine gas is released. Bleaching powder gets its property because of this release of chlorine gas and hence has the odour of chlorine.



Q. 4 B. Give scientific explanation

The hard water of a well becomes soft on adding washing soda to it.

Answer : Hard water contain calcium and magnesium sulphide .When we add washing soda in hard water ,it form a precipitate of calcium and magnesium ion and hard water become soft water.

Q. 4 C. Give scientific explanation

Soap forms a precipitate in hard water.



Answer : When soap is mixed with hard water calcium and magnesium salts of fatty acids are formed. These being water insoluble they form a precipitate and that is why lather is not formed.

Q. 4 D. Give scientific explanation

The particles of powder are given an electric charge while spraying them to form the powder coating.

Answer : The particles of the powder are given an electrostatic charge due to which a uniform layer of the powder sticks to the metal surface. Then the object is heated in the oven along with the coating. A chemical reaction occurs in the layer, resulting in the formation of long cross-linked polymeric chains. This powder coating is highly durable, hard and attractive.

Q. 4 E. Give scientific explanation

The aluminium article is used as an anode in the anodising process.

Answer : Dilute acid is taken in the electrolytic cell and the aluminium article is dipped in it as the anode. When an electric current is passed hydrogen gas is released at the cathode and oxygen gas at the anode. A reaction with oxygen occurs and a layer of hydrated aluminium oxide is formed on the anode, i.e. the iron article..This layer can be made attractive by adding colour in the cell during electrolysis.

Q. 4 F. Give scientific explanation

When the radiation coming out from certain radioactive substance is passed through an electric field, marks are found at three places on the photographic plate placed in its path.

Answer : the rays were allowed to pass through an electrical field and a photographic plate was held in their path. It was found that the radiation was divided into three types. One type of radiation deviated slightly towards the negatively charged plate,

while the second type of radiation deviated substantially towards the positively charged plate. However, the third type of radiation did not deviate at all in the electrical field. The rays which deviated slightly toward negatively charged plate are called alpha rays, those which deviate substantially towards the positively charged plate are called beta rays and those which do not deviate at all are called gamma rays.

Q. 4 G. Give scientific explanation

A certain type of ceramic tiles are fixed on the outer layer of a space shuttle.



Answer : Ceramics can withstand high temperatures without decomposing. Ceramic is brittle, water resistant and an electrical insulator. Therefore, it is used in electrical instruments, for coating the interior of a kiln, the outer surfaces of ships and blades of jet engines. A certain type of ceramic tiles are fixed on the outer layer of a space shuttle.

Q. 5 A. Write answers to the following

Write about artificial food colours, the substances used in them and their harmful effects.

Answer : Food colours are mixed in most soft drinks and foodstuffs available in the market. These food colours are in the form of powders, gels and pastes. Food colours are used in domestic as well as commercial products. Certain colours and essences are added to ice cream, ice candies, sauce, fruit juices, cold drinks, pickles, jams and jelly. Food colors are often found to be added to packaged meat (chicken, mutton), chilli powder, turmeric, sweets and other similar substances so as to give them a good colour.

The food colours prepared from seeds, beetroot, flowers and fruit concentrate are natural. Tetrazene, sunset yellow are artificial food colours used extensively.

Harmful effects:- (i) Food colours added to pickles, jam and sauce contain small quantities of lead and mercury. These can be harmful for those who consume these products on a regular basis.

(ii) Diseases like ADHD (Attention Deficit Hyperactivity Disorder) can affect children due to excessive consumption of foods with added food colours.

Q. 5 B. Write answers to the following

What is meant by water of crystallization? Give examples of salts with water of crystallization, and their uses.

Answer : Examples: (i)Epsom salt (Magnesium sulphate $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$)

Use:- Used to soften skin, soothe tired feet, and relieve muscle aches.

(ii) Barium chloride ($\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$)

Use:- Used in the purification of brine solution in caustic chlorine plants and also in the manufacture of heat treatment salts, case hardening of steel.

Q. 5 C. Write answers to the following

Write briefly about the three methods of electrolysis of sodium chloride.



Answer :

(i) When an electric current is passed through a saturated solution of sodium chloride (brine) it is electrolysed and hydrogen gas is released at the cathode while chlorine gas is released at the anode. This method is used for production of chlorine gas. In this method an important basic compound NaOH is formed in the cell.



(ii) When salt is heated to a high temperature (about

800°C) it melts. This is called the fused state of the salt.

(iii) When fused salt is electrolysed, chlorine gas is released at the anode and liquid sodium metal, at the cathode

Q. 6 A. Write the uses.

Anodizing

Answer : Uses:- (i) It gives the surface a more appealing look with multicolor effects.

(ii) Also provides a surface that is smooth and less prone to friction.

Q. 6 B. Write the uses.

Powder coating

Answer : Uses:- (i) Powder coatings can produce much thicker coatings than conventional liquid coatings without running or sagging.

(ii) Powder coated items generally have fewer appearance differences between horizontally coated surfaces and vertically coated surfaces than liquid coated items.

(iii) Used as applying a layer harder than paint on the surface of an iron object to prevent rusting.

Q. 6 C. Write the uses.

Radioactive substances

Answer : Uses:- (i) Radioactive isotopes are used in various fields such as scientific research, agriculture, industry, medicine, etc.

(ii) Radioactive substances are used in two ways.



- a. By using the radiation alone.
- b. By using the radioactive element itself.
- (iii) Also used in making of atom bombs.

Q. 6 D. Write the uses.

Ceramic

Answer : Uses:- (i) It is used in electrical instruments, for coating the interior of a kiln, the outer surfaces of ships and blades of jet engines.

(ii) They are used to make pottery, bricks, tiles, cements, and glass.

(iii) Ceramics are also used at many places in gas turbine engines.

Q. 7 A. Write the harmful effects

Artificial dye

Answer : Harmful effects

(i) Dyeing hair can have adverse effects like hair fall, damage to hair texture, burning of skin, adverse effect on eyes, etc.

(ii) Lipstick contains a dye named carmine. It does not affect lips but causes stomach disorders.

(iii) Excessive use of plants for making natural dyes results in deterioration of the environment

Q. 7 B. Write the harmful effects

Artificial food colour

Answer : Harmful effects

(i) Food colours added to pickles, jam and sauce contain small quantities of lead and mercury. These can be harmful for those who consume these products on a regular basis.

(ii) Diseases like ADHD (Attention Deficit Hyperactivity Disorder) can affect children due to excessive consumption of foods with added food colours.

Q. 7 C. Write the harmful effects

Radioactive substances

Answer : Harmful effects

- (i) The central nervous system is affected by radioactive radiations.
- (ii) Hereditary defects are generated by bombardment of radiation on D.N.A in the body.
- (iii) Radioactive radiation can penetrate the skin, and causes diseases like skin cancer, leukemia.
- (iv) The radiative pollutants created due to explosions enter the body through air and it is difficult to control them.
- (v) The radioactive pollutants released in the sea enter the bodies of fishes and through them enter the human body.

Q. 7 D. Write the harmful effects

Deodorant

Answer : Harmful effects

- (i) Aluminium–Zirconium compounds are the most harmful chemicals in the deodorant. Disorders like headache, asthma, respiratory disorders, heart disease are likely to occur without our knowledge.
- (ii) There is a possibility of various skin disorders and also skin cancer due to the aluminium chlorohydrates.

Q. 8. Write the chemical formula

Bleaching powder, common salt, baking soda, washing soda

Answer : (a) Bleaching powder: -CaOCl_2

Uses:- It is used for disinfection of drinking water at the water works and the water in the swimming pool.

(b) Common salt: -NaCl

Uses:- It gives a salty taste to food and is the most used of all salts.

(c) Baking soda: -NaHCO_3



Uses:- Being basic in nature it is used to reduce acidity in the stomach.

(d) Washing soda:- $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$

Uses:- It is used mainly for washing clothes.

Q. 9. Explain what you see in the following picture



Answer : The picture depicts of the powder coating i.e. powder is sprayed on the polished metal surface by electrostatic spray deposition.

Powder coating is a type of coating that is applied as a free-flowing, dry powder. The coating is typically applied electrostatically and is then cured under heat to allow it to flow and form a "skin". The powder may be a thermoplastic or a thermoset polymer. It is usually used to create a hard finish that is tougher than conventional paint. Powder coating is mainly used for coating of metals, such as household appliances, aluminum extrusions, drum hardware and automobile and bicycle parts.