Competency Based Question bank (2023-2024)

Class-X

Subject- Science(Chemistry)

Chapter	Question type	Question	Marks
Chapter-1 Chemical reactions and equations	MCQ	1.Balance the following chemical equation: $CH_4 + 0_2 \rightarrow C0_2 + H_2O$ a) 1,2,2,1 b) 1,1,1,1 c) 1.2,1,2 d) 2.12.2 2.In the double displacement reaction between aqueous solution of Potassium iodide and aqueous solution of Lead nitrate, a yellow precipitate of Lead iodide is formed. While performing the activity if Lead nitrate is not available which of the following can be used in place of Lead nitrate? a) Lead Sulphate (insoluble) b) Lead Acetate c) Ammonium Nitrate d) Potassium Sulphate 3.When solid potassium iodide is added to solid Lead Nitrate taken in a test tube a) A yellow precipitate is formed. b) A white precipitate and colourless solution is formed. c) A yellow precipitate and colourless solution is formed d) No reaction takes place.	1
	Assertion/Reason	1.Assertion: When magnesium metal is burned in oxygen, magnesium oxide is formed Reason: A combination reaction involves the union of two or more substances to form a single product. 2.Assertion: In the reaction : ZnO + C ----------> Zn + CO Zinc oxide is reduced and Carbon is oxidized Reason: Zinc loses Oxygen and Carbon gains oxygen 3.Assertion: Decomposition of vegetable matter into compost is an endothermic reaction. Reason: Decomposition reaction involves breaking down of a single reactant into simple products.	1
	Short Answer Question	1.Is the reaction of quicklime with water exothermic or endothermic?	2 or 3 marks

		2.Name the term used to indicate the development of unpleasant smell and taste in fat and oil containing foods due to oxidation. 3. Why do you think chemical substance such as BHA or BHT is added to fat and oil containing foods? 4.What is the role of these chemical substances? 5.Chemical equation in each case: (i) The reaction which occurs on passing electric current. (ii) The reaction which occurs in the presence of Sunlight. (iii) the reaction which occurs on heating of a substance.	
	Long Answer Question	1.Displacement reactions are a fundamental concept in chemistry. Analyze and explain how displacement reactions occur. Provide examples of displacement reactions involving metals,and discuss the factors that influence the reactivity of metals in these reactions. Additionally,describe the practical applications of displacement reactions in real-world scenarios. 2.a] $Fe_2O_3 + CO$ ---------> $Fe + CO_2$ (i) Balance the given chemical equation. (ii) Identify the type of reaction and justify your answer. b] Which among the two is the correct representation of double displacement reaction: (i) AB +CD ---------> AD + CB (ii) AB + CD ---------> AC + BD Explain your answer with an example	5
	Case Based Question	1.Case Scenario: Tom and Jerry were conducting a simple chemistry experiment in their school laboratory. Copper sulphate ($CuS0_4$) solution, iron sulphate solution ($FeS0_4$), copper turnings,and iron nails were all contained in four test tubes. They made the decision to observe whether two chemicals would react. (a) Predict the outcome Of adding iron nails to the copper sulphate solution. (b) What happens to an iron sulphate solution when copper is added to it? (c) Write the balanced chemical equation for the reaction taking place in the laboratory. Create OR (d) Define Displacement reaction. Is it exothermic or endothermic in nature?	4
	Answer key	**MCQ** 1.C 2. b) Lead acetate 3. d) No reaction takes place. **Assertion/Reason**	

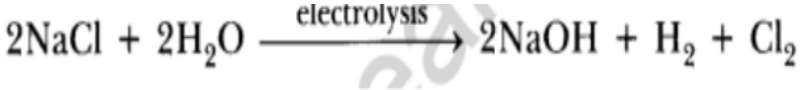
		1.Both assertion and reason correct and reason is the correct explanation 2. Assertion is correct but reason is wrong statement. 3. Assertion is wrong but reason is correct statement. **Short Answer Question** 1.The reaction of quicklime (calcium oxide, CaO) with water (1-120) is highly exothermic. When quicklime is added to water, a chemical reaction occurs, and a significant amount of heat is released in the process. 2.Rancidity 3. The antioxidant butylated hydroxyanisole (BHA) has been used since 1947 to prevent rancidity in edible fats and oils and in fat-containing foods. 4. To prevent rancidity 5. Solution Decomposition reaction: When the reactants break down in the presence of heat, light, and electricity into two or more products, this reaction is termed a decomposition reaction. The general decomposition reaction can be depicted as: Decomposition reaction can be categorized into three types which are as follows: 1. Thermal decomposition reaction: The decomposition reaction that takes place in the presence of thermal energy or heat is known as a thermal decomposition reaction. An example of a thermal decomposition reaction is as follows: 2. Photo decomposition: The decomposition reaction that takes place in the presence of light is known as a photodecomposition reaction. An example of a photodecomposition reaction is as follows: 3. Electrolytic decomposition: The decomposition reaction that requires activation energy for decomposition which is provided by the thermal energy, is known as electrolytic decomposition. An example of electrolytic decomposition is as follows: **Long Answer Question** 1.Displacement reactions are a type of chemical reaction where a more reactive metal displaces a less reactive metal from its salt solution. This results in formation of a new compound with the displaced metal. Examples of Displacement Reactions Involving Metals: a. Zinc displacing copper from copper sulphate: Reaction: Zn(s) + CuS04(aq) —Y ZnS04(aq) + Cu(s) In this reaction, zinc (Zn) displaces copper (Cu) from copper sulphate (CuS04). b. Iron displacing copper from copper sulphate: Reaction: Fe(s) + CuS04(aq) —+ FeS04(aq) + Cu(s)	

		In this reaction, iron (Fe) displaces copper (Cu) from copper sulphate (CuS04). Factors Influencinq Reactivity of Metals in Displacement Reactions: Reactivity Series: Metals higher in the series are more reactive and can displace metals that are lower in the series. For example, in the reactivity series, potassium is more reactive than sodium, sodium is more reactive than calcium, and so on. Practical Applications of Displacement Reactions in Real-World Scenarios: Metal Extraction: Displacement reactions play a crucial role in the extraction of metals from their ores. For example, in the extraction of iron from iron ore, carbon (in the form of coke) displaces iron from iron oxide to produce iron metal. Corrosion Prevention: Sacrificial anodes in ships and pipelines are used to prevent corrosion. A more reactive metal (e.g. zinc) is attached to a less reactive metal structure (e.g., iron). The zinc corrodes in preference to the iron, protecting the iron structure. Galvanization: Galvanization involves coating iron or steel with a layer of zinc to protect the iron or steel from corrosion. 2. a] i Fe2O3 + 3 CO ---------> 2 Fe + 3 CO2 Ii Redox reaction The chemical reaction you are describing is a reduction-oxidation (redox) reaction. In this reaction, iron (III) oxide acts as the oxidizing agent, while carbon monoxide acts as the reducing agent. The iron (III) oxide is reduced to iron, while the carbon monoxide is oxidized to carbon dioxide. b. double-replacement reaction The double-replacement reaction generally takes the form of AB + CD → AD + CB where A and C are positively-charged cations, while B and D are negatively-charged anions. In a double replacement reactions, typically one of the products is a precipitate, a gas, or a molecular compound. **Case Based Question** **Ans :** (a) When iron nails are added to the copper sulphate (CuS04) solution, iron displaces copper from its salt solution forming iron sulphate and copper gets deposited. (b) Copper being less reactive than Iron cannot displace iron from its salt solution. (c) The balanced chemical equation for the reaction is as follows: Fe(s) + CuS04(aq) -9 FeS04(aq) + cu(s) (d) The type of reaction in which more reactive metal displaces less reactive metal from its salt solution is called displacement reaction. It's generally exothermic in nature.	
Chapter-2	MCQ	1.Which one of the following salts does not contain the water of crystallization? (a) Blue vitriol	1

Acids, Bases and Salts		(b) Baking soda (c) Washing soda (d) Gypsum 2.Baking powder is a mixture of: a) Sodium carbonate and sodium hydroxide b) Sodium carbonate and tartaric acid. c) Sodium hydrogen carbonate and tartaric acid d) Sodium hydrogen carbonate and sodium hydroxide.	
	Assertion/Reason	1.Assertion (A): During the electrolysis of concentrated aqueous solution of sodium chloride, hydrogen is produced at anode and chlorine gas is produced at the cathode. Reason(R): Ions get attracted to the oppositely charged electrodes. 2.Assertion: Tartaric acid or citric acid is added to baking soda in the preparation of baking powder. Reason: Baking soda on heating produces washing soda which is bitter in taste and injurious to health.	1
	Short Answer Question	1.Write the chemical formula of hydrated copper sulphate and anhydrous copper sulphate. Give an activity to illustrate how these are inter convertible. 2.A white powder X is used by doctors to support fractured bones. a) Write the name and chemical formula of the powder. b) When X is mixed with water a solid mass is obtained. Name the product formed and write a balanced chemical equation for the change. c) Why is this name given to the white powder X? 3.Salt 'P'commonly used in bakery products ,on heating gets converted into another salt 'Q' which itself is used for the removal of hardness of water and a gas 'R' is evolved . The gas 'R ' when passed through freshly prepared line water ,it turns milky.Identify P,Q and R giving chemical equation for the justification of your answer.Mention the role of the gas R in the preparation of cakes.Also enlist any two uses of the salt Q	2 or 3 marks
	Case Based Questions	1.Sodium chloride obtained from sea water or from lakes contains many impurities such as sulphates of sodium and magnesium along with chlorides of calcium and magnesium. The chlorides of calcium and magnesium are particularly undesirable on account of their deliquescent nature. For its purification, common salt is dissolved in a minimum quantity of water to get a saturated solution from which insoluble impurities are filtered off. Then hydrogen chloride gas is passed through the saturated solution and the crystals of pure NaCl separate out. The soluble impurities remain in the mother liquor. The crystals are filtered, washed and dried. (i) Nature of aqueous solution of common salt is	4

		(a)Acidic (b) Alkaline (c) Neutral (d) Amphoteric (ii) Identify the acid and the base whose combination forms the common salt that you use in your food. (iii)What happens when electricity is passed through the brine solution? Give a balanced chemical equation. 2.Bleaching powder is a pale yellowish powder. It is soluble in water but due to the presence of impurities, we never observe a clear solution. Its chemical formula is CaOCl2 with its chemical name as Calcium oxychloride. Bleaching powder is also called calcium chloro hypochlorite because it is considered as a mixed salt of hydrochloric acid and hypochlorous acid. (i) The compound lime water that is used in the manufacture of bleaching powder is (a) Dry form of Ca(OH)2. (b)Milky Suspension of Ca(OH)2. (c)Clear solution of CaCl2. (d)Clear solution of CaCO3. (ii) One of the products obtained during the electrolysis of aqueous Sodium Chloride(brine) used in the preparation of Bleaching powder is. (a)Sodium metal at cathode (b) Hydrogen gas (c)Chlorine gas (d)Slaked lime. (iii) One of the following cannot be considered as the use of bleaching powder is- (a)Sodium metal at cathode (b) Hydrogen gas (c)Chlorine gas (d)Slaked lime. (iii) One of the following cannot be considered as the use of bleaching powder. (a) It is an oxidising agent. (b) it is used for disinfecting water. (c)it bleaches cotton and linen in the textile industry. (d) It releases Oxygen gas on heating which can be used for aeration of water bodies. 3.Read the following passage and answer the questions given below	

		Plaster of Paris is a well known chemical compound that is widely used in sculpturing materials and gauze bandages.It is a white powdered chemical compound typically produced by calcining gypsum. The chemical formula of pop is $CaSO_4 \cdot \frac{1}{2} H_2O$. a) Mention the difference of water of crystallization in POP and gypsum. b) List any two properties of POP c) Mention the use of POP in the modern world. d) Why does POP have half molecule of water of crystallization?	
	Answer key	**MCQ** 1.(b) Baking soda 2. c :Sodium hydrogen carbonate and tartaric acid. **Assertion/Reason** 1.(d) A is false but R is true 2.Both A and R are true and R is the correct explanation of A. **Short Answer Question** 1.Hydrated copper sulphate $CuSO_4.5 H_2O$ Anhydrous copper sulphate $CuSO_4$ On heating hydrated copper sulphate which is blue in colour , it looses its water of crystallisation , turns colourless and gets converted to anhydrous copper sulphate. This anhydrous form on absorption of moisture from the atmosphere turns back to blue coloured hydrated copper sulphate. 2. a.Plaster of paris, $CaSO_4 \cdot \frac{1}{2} H_2O$ b.Gypsum, $CaSO_4 \cdot \frac{1}{2} H_2O + 1\ 1/2\ H_2O$_____$CaSO_4 .2H_2O$ c.Because it is was first produced from abundant gypsum found in Paris. 3. Answer:P:sodium bicarbonate Q:Sodium carbonate R : Carbon dioxide $2NaHCO_3$-------heat------ $Na_2CO_3 + H_2O + CO_2$ P Q $Ca(OH)_2 + CO_2$---------- $CaCO_3 + H_2O$	

		R. In the fermentation process ,Carbondioxide formed during the heating of baking soda makes the dough rise and helps in the preparation of cakes which are soft and fluffy. Washing soda or sodium carbonate is used to remove stain,remove permanent hardness of water . **Case Based Question** 1.(i) (c) Neutral (ii) Sodium hydroxide and hydrochloric acid (iii) Hydrogen at cathode, chlorine at anode and sodium hydroxide is obtained near to the cathode  2. (i) (a)Dry form of Ca(OH)2. (ii) (c)Chlorine gas (iii)(d) It releases Oxygen gas on heating which can be used foraeration of water bodies 3. Answer -:a) The difference of water of crystallization between POP and gypsum is 3/2 water molecules b) It does not cause cracking of surfaces It expands slowly on setting hence highly fire resistant. c)it is used in 3D printing It is used in architecture and decorations d)Two formula units of calcium sulphate share one molecule of water during crystallization.	