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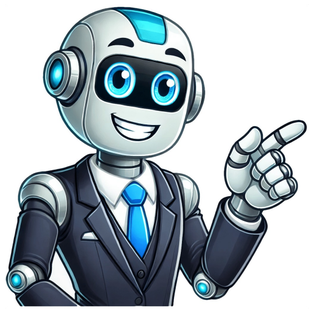

Question 1 What is meant by the concentration of a solution? Question 2 How much water should be added to 15g of salt to obtain 15 per cent salt solution? Question 3 Calculate the concentration of a solution which contains 2.5g of salt dissolved in 50g of water? Question 4 What does a 15% alcohol solution means? Question 5 If 25mL of acetone is present in 150ml of its aqueous solution, calculate the concentration of solution? Question 6 What is a saturated solution. Give example? Question 7 What is an unsaturated solution. Give example? Question 8 What is the effect of heating on a saturated solution? Question 9 Define the term solubility? Question 10 What is the effect of temperature on solubility? Question 11 What is the effect of pressure on solubility ? Question 12 21.5 g of sodium chloride dissolves in 60g of water at 25°C.Calculate the solubility of sodium chloride in water at that temperature? The concentration of a solution is the amount of solute present in a given quantity of the solution. The solution having small amount of solute is called Dilute Solution. The solution having large amount of solute is called Concentrated Solution. The concentration of a solution is defined as mass of solute in grams present in 100 g of the solution. For Example : 10% solution of NaCl (10 g of NaCl + 90 g of water) Concentration of solution = (Mass of Solute / Mass of solution) x 100 Mass of solution = Mass of Solute + Mass of solvent Concentration of solution = (volume of Solute / volume of solution) x 100 A solution in which no more quantity of solute can be dissolved at a given temperature. Saturated solution contains maximum amount of solute which can be dissolved in it at a given temperature. Unsaturated Solution A solution in which more quantity of solute can be dissolved at a given temperature. In order to test whether a given solution is saturated or not,we should add some more solute to this solution and try to dissolve it by stirring.If it does not dissolve,then it will be a saturated solution but if it dissolve,the it will be an unsaturated solution. If a saturated solution at particular temperature is heated to a higher temperature,then it becomes unsaturated. This is because the solubility of solute increases on heating and more of solute can be dissolved on raising the temperature of the solution. If a saturated solution is cooled to lower temperature then some of its dissolved solute will separate out in the form of solid crystals. This is because the solubility of solute in the solution decreases on cooling. Solubility The maximum amount of a solute which can be dissolved in 100 g of a solvent at a specified temperature is known as the solubility of that solute in that solvent. For Example : 36 g of NaCl can be dissolved in 100 g of water at 20°C therefore solubility of NaCl in water is 36 g at 20°C In order to calculate the solubility of a substance, we have to find the mass of substance dissolved in 100g of water. Effect of Temperature and Pressure on Solubility 1) The solubility of solids in liquids usually increases on increasing the temperature and decreases on decreasing the temperature. 2) The solubility of solids in liquid remains unaffected by the changes in pressure. 3) The solubility of gases in liquid usually decreases on increasing the temperature and increases on decreasing the temperature. 4)The solubility of gases in liquid increases on increasing the pressure and decreases on decreasing the pressure. Question 1 What is meant by the concentration of a solution? Question 2 How much water should be added to 15g of salt to obtain 15 per cent salt solution? 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This Living Library is a principal hub of the LibreTexts project, which is a multi-institutional collaborative venture to develop the next generation of open-access texts to improve postsecondary education at all levels of higher learning. The LibreTexts approach is highly collaborative where an Open Access textbook environment is under constant revision by students, faculty, and outside experts to supplant conventional paper-based books. Campus BookshelvesBookshelvesLearning Objects Home is shared under a not declared license and was authored, remixed, and/or curated by LibreTexts. In chemistry, "concentrated" refers to a relatively large quantity of substance present in a unit amount of a mixture. Usually, this means there is a lot of a solute dissolved in a given solvent. A concentrated solution contains the maximum amount of solute that can be dissolved. Because solubility depends on temperature, a solution that is concentrated at one temperature may not be concentrated at a higher temperature. The term may also be used to compare two solutions, as in "this one is more concentrated than that one". 12 M HCl is more concentrated than 1 M HCl or 0.1 M HCl. 12 M hydrochloric acid is also called concentrated sulfuric acid because it contains a minimum amount of water. When you stir salt into water until no more dissolves, you make a concentrated saline solution. Similarly, adding sugar until no more dissolves produces a concentrated sugar solution. While the concept of concentration is straightforward when a solid solute is dissolved into a liquid solvent, it can be confusing when mixing gases or liquids because it's less clear which substance is the solute and which is the solvent. Absolute alcohol is considered to be a concentrated alcohol solution because it contains a minimum amount of water. Oxygen gas is more concentrated in air than carbon dioxide gas. The concentration of both gases could be considered versus the total volume of air or with respect to the "solvent" gas, nitrogen. Extra Questions for Class 9 Science Chapter 2 Is Matter Around Us Pure Is Matter Around Us Pure Class 9 Extra Questions Very Short Answer Questions Question 1. How can you change a saturated solution to an unsaturated solution without adding any more solvent to it? Answer: By heating the saturated solution, it becomes unsaturated. Question 2. Sucrose (sugar) crystals obtained from sugarcane and beetroot are mixed together. Will it be a pure substance or a mixture? Give reasons for the same. [NCERT Exemplar] Answer: It is a pure substance because chemical composition of sugar crystals is same irrespective of its source. Question 3. Based on which factor a solution is said to be diluted, concentrated or saturated? Answer: A solution is said to be diluted, concentrated or saturated on the basis of the amount of solute dissolved in the solution. Question 4. Identify solute and solvent in ‘tincture of iodine’. Answer: Iodine is the solute and alcohol is the solvent. Question 5. What is mass per cent of a solution? Answer: It is defined as the mass in grams of the solute present in one hundred grams of a solution. Question 6. What are the two components of a colloidal solution? Answer: The two components of a colloidal solution are dispersed phase and dispersing medium. Question 7. In what respect does a true solution differ from a colloidal solution? Answer: A true solution is homogeneous whereas a colloidal solution is heterogeneous. Question 8. Two liquids ‘A’ and ‘B’ are miscible with each other at room temperature. Which separation technique will you apply to separate the mixture of ‘A’ and ‘B’ if the difference in their boiling points is 27°C? Answer: We can separate two miscible liquids by fractional distillation, if both the liquids have difference in their boiling points. So, the mixture of liquids ‘A’ and ‘B’ can be separated by fractional distillation. Question 9. Define crystallisation. Answer: It is a process that separates a pure solid in the form of its crystals from a solution. Question 10. Why is crystallisation technique considered better than simple evaporation to purify solids? Answer: Crystallisation is considered better than simple evaporation because some solids decompose or get charred on heating to dryness. some impurities may remain dissolved in the solution even after filtration. On evaporation, these contaminate the solid. Question 11. Why is water called universal solvent? Answer: Water is known as universal solvent because it has the ability to dissolve wide variety of substances. Question 12. Which of the following are physical changes? Melting of iron metal, rusting of iron, bending of iron rod, drawing a wire of iron metal. Answer: Melting of iron metal, bending of iron rod and drawing a wire of iron metal are physical changes because there is no change in the chemical composition of iron, only its form is changing. Question 13. Name two elements which exist in liquid state at room temperature. Answer: Gallium and mercury exist in liquid state at room temperature. Question 14. An unknown substance ‘A’ on thermal decomposition produces ‘B’ and ‘C’. What is ‘A’—an element, a compound or a mixture? Answer: Unknown substance ‘A’ should be a compound because elements and mixture do not decompose. Question 15. Identify the elements from the following substances: sulphur, brine, hydrochloric acid, water, neon, paper, sugar. Answer: The elements are sulphur and neon. Is Matter Around Us Pure Class 9 Extra Questions Short Answer Questions-I Question 1. ‘Sea water can be classified as homogeneous as well as heterogeneous mixture.’ Comment. [NCERT Exemplar] Answer: Sea water is a mixture of salts and water which cannot be separated except by evaporation. Therefore, sea water is considered homogeneous. Sea water also contains mud, decayed plant, etc., other than salts and water, so it is heterogeneous also. Question 2. Why is it not possible to distinguish particles of a solute from the solvent in solution? Answer: A true solution is homogeneous in nature. The solute and solvent particles are very small. They cannot be distinguished even under a microscope. Question 3. Explain why particles of a colloidal solution do not settle down when left undisturbed, while in the case of a suspension they do. [NCERT Exemplar] Answer: Particle size in a suspension is larger than those in a colloidal solution. Also molecular interaction in a suspension is not strong enough to keep the particles suspended and hence they settle down. Question 4. Identify colloids and true solutions from the following: Pond water, fog, aluminium paint, vinegar and glucose solution. Answer: True solutions are vinegar and glucose solution. Colloids are fog, aluminium paint. Question 5. Give two examples each for Answer: Aerosol: Clouds, smoke Emulsion: Milk, face cream. Question 6. Smoke and fog both are aerosols. In what way are they different? [NCERT Exemplar] Answer: Both fog and smoke have gas as the dispersion medium. The only difference is that the dispersed phase in fog is liquid and in smoke it is a solid. Question 7. What do you understand by the term distillation? Give its one application. Answer: Distillation is a process of boiling a liquid and then condensing the vapour obtained into a liquid. This process is used to obtain wines from the sugarcane juice. Question 8. While diluting a solution of salt in water, a student by mistake added acetone (boiling point 56°C). What technique can be employed to get back the acetone? Justify your choice. [NCERTExemplar] Answer: Distillation is used to get back acetone. We know that boiling point of water is 100°C and since acetone is more volatile it will separate out first. Question 9. Define chromatography and give its one application. Answer: Chromatography is a technique used for the separation of a mixture of solutes brought about by distribution of dissolved material between two immiscible phases, one of which is mobile phase and the other part is stationary phase. It is useful in forensic science to detect and identify trace amounts of substances in the contents of bladder or stomach. Question 10. Rain water stored in a tank contains sand grains, unfiltrable clay particles, calcium carbonate, salt, pieces of paper and some air bubbles. Select from amongst these one example each of a solvent, a solute, a colloid and a suspension. Answer: Solvent – water Solute – salt Colloid – air bubbles Suspension – clay particles. Question 11. Classify the following as physical or chemical properties: (a) The composition of a sample of steel is 98% iron, 1.5% carbon and 0.5% other elements. (b) Zinc dissolves in hydrochloric acid with the evolution of hydrogen gas. (c) Metallic sodium is soft enough to be cut with a knife. (d) Most metal oxides form alkalis on interacting with water. [NCERT Exemplar] Answer: Physical properties—(a) and (c) Chemical properties—(b) and (d) Question 12. Give two points of differences between an element and a compound. Answer: Element Compound 1. An element is made up of same kind of atoms. 1. A compound is obtained from different kinds of atoms. 2. An element cannot be split by physical or chemical methods. 2. A compound can be split into new substances by chemical methods. Question 13. Which of the following are not compounds? (a) Chlorine gas (b) Potassium chloride (c) Iron (d) Iron sulphide (e) Aluminium (f) Iodine (g) Carbon (h) Carbon monoxide (i) Sulphur powder Answer: Chlorine gas, iron, aluminium, iodine, carbon, sulphur powder. Question 14. Is water an element or a compound? Give reason in support of your statement Answer: Water is a compound because of the following reasons: It is composed of two different elements, hydrogen and oxygen which cannot be separated by physical methods. They can be separated only by electrolysis. The physical and chemical properties of hydrogen and oxygen are entirely different from the properties of water. Is Matter Around Us Pure Class 9 Extra Questions Short Answer Questions-II Question 1. Identify the dispersed phase and dispersing medium in the following colloids. (a) Fog (b) Cheese (c) Coloured gemstone Answer: (a) Fog—liquid, gas (b) Cheese—liquid, solid (c) Coloured gemstone—solid, solid Question 2. Describe any three properties of colloid. Answer: It is a heterogenous mixture. Size of particles is too small to be seen by naked eye. They scatter light passing through them making its path visible. They do not settle down when left undisturbed. They cannot be separated by the process of filtration, (any three points) Question 3. State the principle of separating two immiscible liquids by separating funnel. Describe an activity with diagram to separate a mixture of water and kerosene oil. Answer: Immiscible layers separate out in layers depending on their densities in separating funnel. Activity to separate kerosene oil from water using a separating funnel: Pour the mixture of kerosene oil and water in separating funnel as shown in figure. Let it stand undisturbed for sometime so that separate layers of oil and water are formed. Open the stopcock of the separating funnel and pour out the lower layer of water carefully. Close the stopcock of the separating funnel as the oil reaches the stopcock. Question 4. What would you observe when (a) a saturated solution of potassium chloride prepared at 60°C is allowed to cool at room temperature? (b) an aqueous sugar solution is heated to dryness? (c) a mixture of iron filings and sulphur powder is heated strongly? [NCERT Exemplar] Answer: (a) Solid potassium chloride will separate out. (b) Initially the water will evaporate and then sugar will get charred. (c) Iron sulphide will be formed. Question 5. Suggest separation technique (s) one would need to employ to separate the following mixtures: (a) Mercury and water (b) Potassium chloride and ammonium chloride (c) Common salt, water and sand (d) Kerosene oil, water and salt. [NCERT Exemplar] Answer: (a) Separation by using separating funnel (b) Sublimation (c) Filtration to separate sand followed by evaporation/distillation (d) Separation by using separating funnel to separate kerosene oil followed by evaporation or distillation. Question 6. Name the process associated with the following: (a) Dry ice is kept at room temperature and at one atmospheric pressure. (b) A potassium permanganate crystal is in a beaker and water is poured into the beaker with stirring. (c) An acetone bottle is left open and the bottle becomes empty. (d) Milk is churned to separate cream from it. (e) Settling of sand when a mixture of sand and water is left undisturbed for some time. (f) Fine beam of light entering through a small hole in a dark room, illuminates the particles in its paths. [NCERT Exemplar] Answer: (a) Sublimation (b) Dissolution/diffusion (c) Evaporation/diffusion (d) Centrifugation (e) Sedimentation (f) Scattering of light (Tyndall effect). Question 7. On heating, calcium carbonate gets converted into calcium oxide and carbon dioxide. (a) Is this a physical or a chemical change? (b) Can you prepare one acidic and one basic solution by using the products formed in the above process? If so, write the chemical equation involved. [NCERT Exemplar] Answer: (a) Chemical change. (b) Acidic and basic solutions can be prepared by dissolving the products of the above process in water. CaO + H2O → Ca(OH)2 (basic solution) CO2 + H2O → H2CO3 (acidic solution) Question 8. Non-metals are usually poor conductors of heat and electricity. They are non-lustrous, non-sonorous, non-malleable and are coloured. (a) Name a lustrous non-metal. (b) Name a non-metal which exists as a liquid at room temperature. (c) The allotropic form of a non-metal is a good conductor of electricity. Name the allotrope. (d) Name a non-metal which is known to form the largest number of compounds. (e) Name a non-metal other than carbon which shows allotropy. (f) Name a non-metal which is required for combustion. [NCERT Exemplar] Answer: (a) Iodine (b) Bromine (c) Graphite (d) Carbon (e) Sulphur (f) Oxygen Question 9. Classify the following into metals, non-metals and metalloids: (i) Germanium (ii) Boron (iii) Diamond (iv) Iodine (v) Copper (vi) Helium. Answer: Metal – Copper Non-metals – Diamond, iodine and helium Metalloids – Germanium, boron. Question 10. Classify the following into elements, compounds and mixtures. (i) Pure sand (ii) Air (iii) Ammonia gas (iv) Ice (v) Glass (vi) CaO. Answer: Elements – Nil Compounds – Pure sand, Ice, CaO, Ammonia gas Mixture – Air, Glass. Is Matter Around Us Pure Class 9 Extra Questions Long Answer Questions Question 1. Differentiate between a true solution and a colloid. Answer: Question 2. Distinguish between physical change and chemical change. Answer: Question 3. Distinguish between metals and non-metals. Answer: Question 4. Distinguish between compounds and mixtures. Answer: Question 5. A group of students took an old shoe box and covered it with a black paper from all sides. They fixed a source of light (a torch) at one end of the box by making a hole in it and made another hole on the other side to view the light. They placed a milk sample contained in a beaker/tumbler in the box as shown in the figure. They were amazed to see that milk taken in the tumbler was illuminated. They tried the same activity by taking a salt solution but found that light simply passed through it. (a) Explain why the milk sample was illuminated. Name the phenomenon involved. (b) Same results were not observed with a salt solution. Explain. (c) Can you suggest two more solutions which would show the same effect as shown by the milk solution? [NCERT Exemplar] Answer: (a) Milk is a colloid. If a beam of light is put on a milk sample contained in a beaker, the path of light beam is illuminated and becomes visible when seen from the other side. This is because the colloidal particles are big enough to scatter light falling on them. This scattered light enters our eyes and we are able to see the path of light beam. The scattering of light by colloidal particles is known as Tyndall effect. (b) Salt solution is a true solution. If a beam of light is put on a salt solution kept in a beaker in a dark room, the path of light beam is not visible inside the solution when seen from the other side. This is because salt particles present in it are so small that they cannot scatter light rays falling on them. (c) Detergent solution, sulphur solution. Question 6. Fractional distillation is suitable for separation of miscible liquids with a boiling point difference of about 25 K or less. What part of fractional distillation apparatus makes it efficient and possess an advantage over a simple distillation process? Explain using a diagram. [NCERT Exemplar] Answer: The fractionating column packed with glass beads provides a surface for the vapours to collide and lose energy so that they can be quickly condensed and distilled. Also, length of the column would increase the efficiency of separation. Question 7. A child wanted to separate the mixture of dyes constituting a sample of ink. He marked a line by the ink on the filter paper and placed the filter paper in a glass containing water as shown in figure. The filter paper was removed when the water moved near the top of the filter paper. (i) What would you expect to see, if the ink contains three different coloured components? (ii) Name the technique used by the child. (iii) Suggest one more application of this technique. [NCERT Exemplar] Answer: (i) The colour component which is more soluble in water dissolves first, rises faster and produces a colour band (spot) on the paper at a higher position. The less soluble colour components dissolve a little later, rise slower and form coloured bands at lower heights. In this way, three different bands will be observed. (ii) Chromatography (iii) To separate the pigments present in chlorophyll. Question 8. You are provided with a mixture containing sand, iron filings, ammonium chloride and sodium chloride. Describe the procedures you would use to separate these constituents from the mixture. [NCERT Exemplar] Answer: Removing iron filings from the mixture by magnetic separation. Take the mixture in a petri dish and roll a bar magnet over it. Iron filings will get attach to the magnet and thus separate from the mixture. Removing ammonium chloride by sublimation Transfer the remaining mixture into China dish and heat it. On heating, ammonium chloride sublimes and solidifies on condensation. The mixture containing sand and sodium chloride left behind in the China dish. Removing sand by filtration Make a solution of sand and sodium chloride in water. Filter the solution. Sodium chloride will dissolve in water and sand is left as residue on the filter paper. Evaporate the filtrate to dryness to get sodium chloride or by crystallisation. Question 9. Classify each of the following as a physical or a chemical change. Give reasons. (a) Drying of a shirt in the sun. (b) Rising of hot air over a radiator. (c) Burning of kerosene in a lantern. (d) Change in the colour of black tea on adding lemon juice to it. (e) Churning of milk cream to get butter. [NCERT Exemplar] Answer: (a) It is a physical change because water is converted from its liquid state to gaseous state because of the sun’s heat. (b) It is a physical change because water in the radiator is converted from a liquid state to gaseous state. (c) It is a chemical change because combustion of kerosene occurs and new products are formed. (d) It is a chemical change because there is a reaction between the citric acid in the lemon and the compounds of tea resulting in formation of new products. (e) It is a physical change because the cream suspended in the milk is separated by churning. Question 10. Show diagrammatically how water is purified in the waterworks system and list the processes involved. Answer: Question 11. Iron filings and sulphur were mixed together and divided into two parts ‘A’ and ‘S’. Part ‘A’ was heated strongly while Part ‘S’ was not heated. Dilute hydrochloric acid was added to both the parts and evolution of gas was seen in both the cases. How will you identify the gases evolved? [NCERT Exemplar] Answer: Part A \(\mathrm{Fe}(s)+\mathrm{S}(s) \quad \stackrel{\mathrm{Heat}}{\longrightarrow} \quad \mathrm{FeS}(s)\) FeS(s) + 2HCl(aq) → FeCl2(aq) + H2S(g) Part B Fe(i) + S(s) → Mixture of iron filings and sulphur When dilute HCl is added to it Fe(s) + S(s) + 2HCl(aq) → FeCl2(aq) + H2(g) Sulphur remains unreacted. H2S gas formed has a foul smell and on passing through lead acetate solution, it turns the solution black. Hydrogen gas burns with a pop sound. Numericals Question 1. 0.5 g of salt is dissolved in 25 g of water. Calculate the percentage amount of the salt in the solution. Solution: Mass of salt present = 0.5 g Mass of water present in solution = 25 g ∴ Percentage amount of the salt = \(\frac{0.5}{0.5+25} \times 100\) = 1.96% Question 2. A solution of urea in water contains 16 grams of it in 120 grams of solution. Find out the mass percentage of the solution. Solution: Mass of urea present in solution = 16 g Mass of solution = 120 g Question 3. A solution has been prepared by mixing 5.6 mL of alcohol with 75 mL of water. Calculate the percentage (by volume) of alcohol in the solution. Solution: Volume of alcohol present in solution = 5.6 mL Volume of water = 75 mL Total volume of solution = (75 + 5.6) mL = 80.6 mL Question 4. A solution contains 30 g of glucose, 20 g of salt in 500 mL of water. Calculate the mass per cent of (a) glucose, (b) salt (density of water = 1 g /mL). Solution: Mass of glucose present in the solution = 30 g Mass of salt present in the solution = 20 g Mass of water = 500 g Total mass of the solution = (30 + 20 + 500)g = 550 g Question 5. During an experiment the students were asked to prepare a 10% (Mass/Mass) solution of sugar in water. Ramesh dissolved 10 g of sugar in 100 g of water while Sarika prepared it by dissolving 10 g of sugar in water to make 100 g of the solution. [NCERT Exemplar] (a) Are the two solutions of the same concentration? (b) Compare the mass % of the two solutions. Solution: (a) No. The solution prepared by Sarika has a higher mass per cent than that prepared by Ramesh. Question 6. Calculate the mass of sodium sulphate required to prepare its 20% (mass per cent) solution in 100 g of water. [NCERT Exemplar] Solution: Let the mass of sodium sulphate required be x g. The mass of solution would be = (x + 100)g So, the mass of sodium sulphate required is 25 g. Question 7. Calculate the mass of water and glucose required to make 250 g of 40% solution of glucose. Solution: Mass of solution = 250g ∴ Mass of glucose = \(\frac{40 \times 250}{100}\) = 100g Mass of solution = Mass of glucose + Mass of water So, Mass of water = Mass of solution – Mass of glucose = 250g – 100g = 150g Question 8. How much water should be mixed with 12 mL of alcohol so as to obtain 12% alcohol solution? Solution: Volume of solute =12 mL Let the volume of water = x mL Volume of solution = (12 + x) mL Concentration of solution = \(\frac{\text { Volume of solute }}{\text { Volume of solution }} \times 100\) \(12=\frac{12}{12+x} \times 100\) 12 + x = 100 x = 100 – 12 = 88mL So, 88 mL of water should be mixed. Is Matter Around Us Pure Class 9 Extra Questions Hots (Higher Order Thinking Skills) Question 1. (a) Under which category of mixtures will you classify alloys and why? (b) A solution is always a liquid. Comment. (c) Can a solution be heterogeneous? [NCERT Exemplar] Answer: (a) Alloys are homogeneous mixture of two or more elements because the constituent elements mix together and give a mixture which is uniform throughout. (b) No, solid solutions and gaseous solutions are also possible. Examples are brass, air. (c) No, a solution cannot be heterogeneous in nature. Question 2. The teacher instructed three students A’, ‘B’ and ‘C’ respectively to prepare a 50% (mass by volume) solution of sodium hydroxide (NaOH). ‘A’ dissolved 50 g of NaOH in 100 mL of water, ‘B’ dissolved 50 g of NaOH in 100 g of water while ‘C’ dissolved 50 g of NaOH in water to make 100 mL of solution. Which one of them has made the desired solution and why? [NCERT Exemplar] Answer: ‘C’ has made the desired solution because 50% (mass by volume) solution means 50g of solute dissolved in 100 mL of solution. Mass by volume per cent = \(\frac{\text { Mass of solute }}{\text { Volume of solution }} \times 100\) = \(\frac{50}{100} \times 100\) = 50% mass by volume. Question 3. Explain why filter paper cannot be used to separate colloids. Answer: The size of colloidal particles is less than lnm, while the size of pores present in an ordinary filter paper is larger than lnm. Hence, a colloidal solution cannot be separated by filtration. Question 4. Three students A, B and C prepared mixtures using chalk powder, common salt and milk respectively in water. Whose mixture: (i) would not leave residue on filter paper after filtration? (ii) would show Tyndall effect? (iii) would give transparent/clear solution? (iv) would settle down at the bottom when left undisturbed? (v) could be filtered by filter paper? Answer: (i) Mixture of common salt and water. Mixture of milk and water. (ii) Mixtures of chalk powder with water and milk with water. (iii) Mixture of common salt and water. (iv) Mixture of chalk powder and water. (v) Mixture of chalk powder and water. Question 5. Can we separate alcohol dissolved in water by using a separating funnel? If yes, then describe the procedure. If not, explain. [NCERT Exemplar] Answer: We cannot separate alcohol dissolved in water by using separating funnel because both the components are highly soluble in each other. They can be separated by fractional distillation. Question 6. What is the reason for running cold water through condenser from lower side to upper side in distillation process? Answer: In distillation process condensation of vapours take place. To absorb more heat, cold water is passed from lower side so that it will stay for longer time and absorb more heat from the vapours to form liquid state of the substance. Question 7. You are given two samples of water labelled as ‘A’ and ‘B’. Sample ‘A’ boils at 100°C and sample ‘B’ boils at 102°C. Which sample of water will not freeze at 0°C? Comment. [NCERT Exemplar] Answer: Sample ‘B’ will not freeze at 0°C because it is not pure water. At 1 atm, the boiling point of pure water is 100°C and the freezing point of pure water is 0°C. Extra Questions for Class 9 Science Science, Tech, Math All Science, Tech, Math Humanities All Humanities Languages All Languages Resources All Resources We can calculate the concentration of a solution in terms of mass percentage of solute by using the following formula – Concentration of Solution = (mass of solute/mass of solution) × 100 The mass of solution is equal to the mass of solute plus the mass of solvent. That is: mass of solution = mass of solute + mass of solvent In the above given example: Mass of solute (salt) = 10 g Mass of solvent (water) = 90 g Mass of solution = mass of solute + mass of solvent = (10 + 90) g = 100 g Concentration of solution = (10/100) × 100 = 10 % (by mass) Thus, the concentration of this salt solution is 10 percent (or 10%) by mass. Please note that if the concentration is in terms of mass, then the words ‘by mass’ are usually not written with it. It is well understood that the concentration of common salt will be expressed by mass as salt solution is a solid dissolved in liquid. The case of a liquid solute dissolved in a liquid solvent – If the solution is of a liquid solute dissolved in a liquid solvent, then we usually consider the ‘volume percentage of solute’ in determining the concentration of solution. So, in the case of a liquid solute dissolved in a liquid solvent: The concentration of a solution is defined as the volume of solute in millilitres present in 100 millilitres of solution. For example – A 20 percent solution of alcohol means that 20 millilitres of alcohol are present in 100 millilitres of solution. 100 millilitres volume of solution also includes 20 millilitres volume of alcohol. This means that the 100 millilitres of alcohol solution contains 100 – 20 = 80 millilitres of water in it. We can calculate the concentration of a solution in terms of percentage of solute by using the formula: Concentration of Solution = (Volume of Solute/Volume of Solution) × 100 In the above example: Volume of solute (alcohol) = 20 mL Volume of solvent (water) = 80 mL So, volume of solution = volume of solute + volume of solvent = (20 + 80) mL = 100 mL Concentration of solution = 20/100 × 100 = 20 % (by volume) Thus, the concentration of this alcohol solution is 20 percent or that it is a 20% alcohol solution (by volume). In the industries, when the concentration of a solution is expressed is ‘percent by mass’ or ‘percent by weight’, it is denoted by the symbol w/w (which means ‘weight by weight’). Please note that the terms mass and weight are used in the same sense here. And when the concentration of a solution is expressed as ‘percent by volume’, then it is denoted by the symbol v/v (which means ‘volume by volume’). We can see the symbols w/w or v/v on the labels of bottles of many liquid medicines. For example – a particular bottle of digestion mixture ‘milk of magnesia’ has these words written on its bottle “contains approximately 8.0 % w/w of hydrated magnesium oxide”. Questions related to the topic “Concentration of a Solution” from NCET textbook – Page 18 Question 3:- To make a saturated solution, 36 grams of sodium chloride is dissolved in 100 grams of water at 293 K. Find its concentration at this temperature. Solution:- Concentration of Solution = (mass of solute/mass of solution) × 100 Here, Mass of solute (sodium chloride) = 36 g And, Mass of solvent (water) = 100 g So, Mass of solution = mass of solute + mass of solvent = 36 + 100 = 136 g Now, putting these values of ‘mass of solute’ and ‘mass of solution’ in the above formula, we get: Concentration of Solution = (36/136) × 100 = 26.47% (by mass) Concentration of a solution is the amount of solute present in a given quantity of the solution. The most common method of expressing concentration is percentage method. In percentage method we express concentration as amount of solute present in 100 grams of solution or volume of solute present in 100 mL of solution. There are two different methods of expressing concentration- ‘by mass’ or ‘by volume’. When solid solutes are dissolved in liquid solvents then concentration is expressed ‘by mass’ and when liquid solutes are dissolved in liquid solvents then the concentration is expressed ‘by volume’. Given below are the Class 9 Science Is matter around us pure extra questions with answers. These are important questions to prepare for examinationIt has below type to practice and excel in examination (a) 1 Mark Questions (b) Very Short questions (c) Short questions (d) Numericals Based on Concentration (e) Long Anwer questions (f) Crossword Puzzl Hope you like them and do not forget to like , social share and comment at the end of the page. Question 1. Salt can be recovered from its solution by evaporation. Can you suggest any other technique also? Solution Crystallisation method. Question 2. Each Part Carry 1 Marks Non-metals are usually poor conductors of heat and electricity. They are non-lustrous, non-sonorous, non-malleable and are coloured. a.Name a lustrous non-metal. b.Name a non-metal which exists as a liquid at room temperature. c.The allotropic form of a non – metal is a good conductor of electricity. Name the allotrope. d.Name a non-metal which is known to form the largest number of compounds. e.Name a non-metal other than carbon which shows allotrophy. f.Name a non-metal which is required for combustion. Solution (a) Iodine is a lustrous non-metal. (b) Bromine is a non-metal which exists as a liquid at room temperature. (c) Graphite is the allotropic form of carbon and it is a good conductor of electricity. (d) Carbon is a non-metal which is known to form the largest number of compounds. (e) Phosphorus is a non-metal other than carbon which shows allotropy. (f) Oxygen is a non-metal which is required for combustion. Question 3. Each Part Carry 1 Marks Name the appropriate methods to separate the following: a.Nitrogen from air b.Dye from blue ink c.Butter cream from milk d.Ammonium chloride from common salt Solution a. Fractional distillation b. Process of evaporation c. Process of centrifugation d. sublimation Question 4. Each Part Carry 1 Marks Identify the physical and chemical changes from the following: (i) Heating the mixture of iron and sulphur (ii) Ripening of fruits (iii) Dissolution of salt in water(iv) Rusting of iron – chair (v) Making egg omelets Solution i) Chemical change ii) Chemical change iii) Physical change iv) Chemical change v) Chemical change Question 5. Each Part Carry 1 Marks Classify the following into physical or chemical change: (i) Burning of a candle (ii) Freezing of water (iii) Mixing of iron filings and sand (iv) Fading of clothes Solution i. Physical and chemical change both ii. Physical change iii. Physical change iv. Chemical change Question 6. Each Part Carry 1 Marks (a) Name the separation technique you would follow to separate (i) Dyes from black ink. (ii) A mixture of salt and ammonium chloride (iii) Cream from milk (iv) Sodium chloride from its solution in water (b) State the principle used in separating a mixture of two immiscible liquids. Solution a) i)chromatography ii)sublimation iii)centrifugation iv) evaporation Question 7. Each Part Carry 1 Marks Give an example for each of following: a)Solid -liquid homogeneous mixture b)Gas- gas homogeneous mixture c)Liquid -liquid heterogeneous misture Solution a) salt in water b) Air c) Water and oil Question 1. State any one difference between pure and impure substances. Solution The constituents, which make up a pure substance cannot be separated by physical means The constituents of an impure substance can be separated by physical means. Question 2. What is meant by concentration of a solution? Solution The concentration of a solution is the amount of solute present per unit volume or per unit massof the solution or solvent. Question 3. List the two conditions essential for using distillation as a method for separation of the components from a mixture. Solution 1. two liquids must be miscible that is they totally mix with each other. 2. the difference between the boiling points of the liquids should be less than 25k. Question 4. Smoke and fog both are aerosols. In what way are they different? Solution They differ by their composition. They both are colloidal mixtures but smoke is consists of air mixed with carbon particles but fog consists of air mixed with water vapour (mostly). Question 5. What do you understand by the statement 'the solubility of NaCl is 36.5 g at room temperature'? Solution It means that, at room temperature 36.5 g of Nacl can be dissolved in 100 g (or 100 ml) of water. Question 6 What is tincture of iodine? Identify the solute and solvent in it. Solution Tincture of iodine means the solution of iodine and alcohol.The solute is iodine and solvent is alcohol. Question 7. Can we separate alcohol dissolved in water by using a separating funnel? If yes, then describe the procedure. Of not, explain. Solution No, being miscible they cannot be separated by using a separating funnel. Question 8. Crystallization is a better technique than sample evaporation. Give one reason to justify the statement. Solution Crystallization is better than evaporation in mainly two ways : 1. In evaporation, the solution needs to be at the boiling point of the solvent, the whole time. This may degrade the solute. 2. In crystallization, the crystals automatically throw away impurities to arrange themselves in a regular manner. Therefore, the degree of purity is higher than the solute left after evaporation. Question 9. Define an element. Solution Element as a basic form of matter that cannot be broken down into simpler substances by chemical reactions. Question 10. What are metalloids? Give two examples. Solution Metalloid, a chemical element with properties intermediate between those of typical metals and nonmetals. Usually considered under this classification are the chemical elements boron, silicon, germanium, arsenic, antimony, and tellurium Question 11. Classify the following as metals, non-metals and metalloids: Copper, silicon, carbon, chlorine, gold, boron.two non – metals from the following elements: Solution Copper,Gold :Metal Silicon,Boron: Metalloids Carbon,Chlorine: Non metals Question 12. (a) Identify two non – metals from the following elements: Carbon, Sodium, Chlorine, Neon, Platinum (b) Name the appropriate method to separate nitrogen from air. (c) Identify dispersed phase and dispersion medium in foam and rubber. Solution a.Carbon,Chlorine: Non metals b.Fractional distillation c. Dispersion phase is Gas and dispersion medium is solid Question 13. Identify the numbers Solution 1. elements 2. Compounds 3. homogenous 3. hetrogenous Question 1. How Tyndall effect can be observed in the canopy of a dense forest. Solution Tyndall effect refers to the process by which light is scattered by colloids or suspension making the path of the light to be visible. In the forests, the air contains mists which acts as the colloids hence when light seeps in through the canopy one clear sees its path. Question 2. How do solultion and gel differ from each other? Give one example for each. Question 3. 'Sea water can be classified as homogeneous as well as heterogeneous mixture.' Comment. Question 4. Explain why particles of a colloidal solution do not settle down when left undisturbed, while in the case of a suspension they do. Question 5. Mention in tabular form any two differences between heterogeneous and homogeneous mixtures. Question 6. What are aerosols? Give any two examples. Question 7. What is meant by an aqueous and non-aqueous solutions? Give one example of each. Question 8. What is a solution? Write two examples. Question 9. When is a solution said to be saturated? How can you change an unsaturated solution to a saturated solution without adding any more solvent to it? Question 10. Smoke and fog are aerosols. How do they differ from each other? Question 11. What is Tyndall effect? Why the solution of copper sulphate does not show Tyndall effect? Solution Tyndall effect refers to the process by which light is scattered by colloids or suspension making the path of the light to be visible Copper sulphate when dissolves in water forms a true solution. True solution does not show tyndall effect. Question 12. You are provided with solution of substance ‘X’. how will you test whether it is saturated or unsaturated with respect to ‘X’ at a given temperature? What happens when a hot saturated solution is allowed to cool? Question 13. What is chromatography? Mention its two applications. Solution Chromatography is a method used to separate mixture that comprises solutes that dissolve in the same solvent.This method gets its name from the Greek word for colour -Kroma, as it was first used for separating colours. Principle: Chromatography is based on differential affinities of compounds towards two phases, i.e stationary and mobile phase. The fraction with greater affinity towards stationary phase travels shorter distance while the fraction with less affinity towards stationary phase travels longer distance. Chromatography is used for separating colors in a dye, pigments from natural colors and drugs from blood. Question 14. Draw a flow diagram showing the process of obtaining gases from air. Solution Question 15. State the separation technique used for the separation of the following: a.Ammonium chloride from a mixture containing sodium chloride and ammonium chloride b.Copper sulphate from its solution in water. Solution a. Sublimation b. Crystallisation Question 16. Classify the substances given in below figure into elements and compounds Solution Elements: N_2,H_2,CL_2,Diamond Compounds: H_20,$CuSO_4$,Carbon dioxide,HCL, Methane,Calcium Carbonate Question 17. Define solubility. How does solubility. How does solubility of a solid in water change with temperature? Solution Solubility is the property of a solid, liquid, or gaseous chemical substance called solute to dissolve in a solid, liquid, or gaseous solvent to form a solution of the solute in the solvent. For many solids dissolved in liquid water, the solubility increases with temperature. The increase in kinetic energy that comes with higher temperatures allows the solvent molecules to more effectively break apart the solute molecules that are held together by intermolecular attractions. Question 18. Two students A and B were given 10 ml of water in a bowl and a plate respectively. They were told to observe the rate of evaporation. Name the student whose water evaporates faster and explain its reason. Solution Student B water will evaporates faster as it has bigger surface area Question 19. Why the inter-conversion of states of matter is considered as a physical change? Give three reasons to justify your answer. Question 20. ‘Colloidal solution appears to be homogeneous but actually it is heterogeneous.’ Give justification for this statement. Question 21. When a fine beam of light enters a room through a small hole, Tyndall effect is observed. Why does this happen? Give one more example where this effect can be observed. Question 22. With the help of a flow diagram, show the process of obtaining different gases from air. if the boiling point of oxygen, argon and nitrogen are 183° C, - 186° C and - 196° C respectively, which gas gets liquefied first as the air is cooled? Solution Since Oxygen has the highest boiling point,it get get liquified first as the air is cooled Question 23. List three differences between a physical change and a chemical change. Solution Physical Change Chemical Change The chemical composition of a substance does not change. Change is only in the state of matter and not in the chemical identity The chemical composition of a substance changes. Change is in chemical identity, but may or may not be in the state of matter. Most changes are reversible Most changes are irreversible. No new substances are formed. For example, Ice → Water → Steam New substances are formed.For example, methane → carbon dioxide and water (on heating) Question 24. Differentiate between, an element and a compound (any two points) with one example each. Solution Question 25. (i) Name the compound formed on heating a mixture of iron filings and sulphur. (ii) If dilute HCI is added to above compound then name the gas evolved and write down its two properties. Solution i. Iron Sulphide(FeS) ii. $FeS + 2HCL \rightarrow FeCl_2 + H_2S$ Question 26. State any three differences between a mixture and a compound. Solution Question 27. How will you separate a mixture of common salt, camphor and iron filings .Describe the process. Question 1. How many litres of 15% (mass/ volume) sugar solution would it take to get 75 g of sugar? Solution We want a liquid which has 15% sugar as it's concentration. Let the volume be x Now Concentration% = Mass of the solute/Volume of the solution 15% =75/x x=500ml =.5 l Question 2. A solution contains 40 g of common salt in 320 g of water. Calculate the concentration in terms of mass by mass percentage of the solution. Solution Mass of solute (salt) = 40 g Mass of solvent (water) = 320 g We know, Mass of solution = Mass of solute + Mass of solvent = 40 g + 320 g = 360 g $\text{mass by mass percentage}= \frac {40}{360} \times 100 = 11.1%$ Question 3. A solution is prepared by adding 40 g of sugar in 100 g of water. Calculate the concentration in terms of mass by mass percentage of solution. Solution Given, mass of sugar= 40g mass of water= 100g To find :- concentration of sugar in water Total mass of solution = mass of sugar + mass of water=100g +40g = 140g percentage of concentration of sugar in solution= $\frac {40}{140} \times 100 =28.57% $approx Question 4. Calculate the mass of water and mass of glucose required to make 250 g of 40% solution of glucose. Solution We know that Mass percent = mass of solute / mass of solution Here mass of solution = 250g Mass of solute = x Mass percent = 40 Hence 40 % = x/ 250 x = 100g Hence amount of solute needed to make 250g of 40 % solution of is 100 g Therefore Mass of Solute = 250g - 100g =150g Question 5. During an experiment the students were asked to prepare a 10 % (Mass/ Mass) solution of sugar in water. Ramesh dissolved 10 g of sugar in 100 g of water while Sarika prepared it by dissolving 10 g of sugar in water to make 100 g of the solution. (a)Are the two solutions of the same concentration? (b)Compare the mass % of the two solutions. Solution 1. No both the solution have different concentration. 2. In case of Ramesh it is 10 gram of solute in total 110 g solution (10 g sugar + 100 g water) So concentration in mass % = 10 / 110 x 100 = 9.09 % But in case of Sarika ?it is 10 gram of solute in total 100 g solution (10 g sugar + 90 g water) So concentration in mass % = 10 / 100 x 100 = 10 % The solution prepared by Ramesh contains less amount of solute than Sarika. Question 6. Calculate the mass of sodium sulphate required to prepare its 20% (mass percent) solution in 100 g of water. Solution Let mass of sodium sulphate required be x grams. Given that the mass of water is 100 g. 20 = [x/(x + 100)] * 100 x = 25 Thus, 25g of sodium sulphate is required. Question 7. What volume of ethyl alcohol and water must be mixed together to prepare 250 ml of 60% by volume of alcohol in water. Solution 60% by volume of alcohol solution means, each 100 ml of solution will have 60 ml ethyl alcohol So, 250 ml of solution will have = (60 /100) x250 = 150 ml of ethyl alcohol Hence, In a 250 ml solution of 60% by volume of alcohol and water, alcohol should be 150 ml and water should be 100ml Question 8. A teacher told three students A, B and C to prepare 25% solution (mass by volume) of KOH. Student A dissolved 25 g of KOH in 100 g of water, student B dissolved 25 g of KOH in 100 mL of water and student C dissolved 25 g KOH in water and made the volume 100 mL. Which one of them has made required 25% solution? Give your answer with reason. Solution Student C Mass of solute = 25g Mass of solution = 100 m concentration % = (25/100)100 =25% Therefore Student C has made 25% of solution(mass by volume) Question 9. A solution contains 50 g of sugar in 350 g of water. Calculate the concentration of solution in terms of mass by mass percent of the solution. Solution ass of solute = 50g mass of solvent = 350g mass of solution = 50 + 350 = 400g $\text {mass by mass%} = \frac {\text{mass of solute}}{\text{mass of solution}} \times 100 $ $\text{mass by mass %} = \frac {50}{400} \times 100$ = 12.5% Question 10. To make a saturated solution, 72 g of sodium chloride is dissolved in 200 g of water at 200C. find its concentration at the same temperature. Solution Concentration is given by = $ \frac {\text{Mass of solute}{\text{Mass of solution}} \times 100$ mass of solute= 72g mass of solution= 72g + 200g $Concentration= \frac {72}{272} \times 100 = 26.47%$ Question 1. Write your observation when the following processes take place: a. An aqueous solution of sugar is heated till it gets dried up. b. A saturated solution of KCL at 60° C is allowed to cool at room temperature. c. A mixture of iron filings and sulphur powder is heated strongly. d. A bean of light is passed through colloidal solution. e. Dilute HCI is added to mixture of iron filings and sulphur powder. Solution a. When an aqueous solution of sugar is heated to dryness, the sugar will be left behind in the container after the vaporization of water. b. we would observe crystals of potassium chloride being formed in the liquid solution c. Iron Sulphide(FeS) will be formed d. The light is scattered and it is called tyndall effect e. It will separate S and Fe, to form H_2S gas and iron chloride($FeCl_2$) Question 2. what is chromatography? How will you separate the components of black ink using chromatography? Write any two applications of chromatography. Question 3. (a) You are given a mixture of sand, water and mustard oil. How will you separate the components of this mixture? Explain it with the help of different separation methods involved in it. (b) Give flow diagram showing the process of obtaining gases from air. Question 4. A.Which of the following are chemical changes and physical change? (i) Decaying of wood (ii) Sawing of wood (iii) Burning of wood (iv) Hammering of a nail into a piece of wood B.We know that Tincture of iodine has antiseptic properties. This solution is made by dissolving (a) iodine in alcohol (b) iodine in vaseline (c) iodine in H_20 (d) iodine in KI Solution A. Chemical change : (i) and (iii) Physical change: (ii) and (iv) B. (d) Question 5. To make a saturated solution 36 g of sodium chloride is dissolved in 100 g of water at 293 K. find its concentration at this temperature. Solution Mass of solute (sodium chloride) =36g Mass of solvent (water) =100g Mass of solution = Mass of Solute + Mass of solvent = 36g +100g = 136g $Conc \; % = \frac {36}{136} \times 100 =26.47%$ Question 6. Give two examples from daily life where Tyndall effect is observed. Question 7. Identify homogeneous and heterogeneous mixtures among the following: Air, salt solution, kerosene in water, muddy water, soil, soda water Question 8. Show diagrammatically how water is purified in the water works system and list the processes involved. Solution Question 9. (i) What is meant by crystallization? How is impure copper sulphate purified by the process? (ii) Differentiate between simple distillation and fractional distillation. Solution Crystallization is the process of slow precipitation of solid crystals of a substance from a concentrated homogeneous solution. It is basically a separation method in which a substance is transferred from the liquid (i.e. solution) phase to the solid state. The substance is thus obtained in pure crystalline form and has no impurity. It is used by chemists for the purification of solid substances. Simple Distillation is the process of distillation used to seperate two substance when the boiling point difference is more than 250 C. No fractionating column is used. fractional distillation is the process of distillation used to seperate two substance when the boiling point difference is less than 250 C.Fractionating column used to separate substance Question 10. (a) Compare metals and non - metals based on their physical properties. (any four points) (b) What are metalloids? Give two examples. (c) Identify metals from the following: Boron, sodium, mercury, carbon. Solution a. b. Elements which show some properties of metals and some other properties of nonmetals are called metalloids. Boron and Silicon c. Sodium and Mercury Question 11. Distinguish between homogeneous and heterogeneous mixtures. Classify the following mixtures as homogeneous and heterogeneous: (i) Tincture of iodine (ii) Smaoke (iii) Brass(iv) Sugar solution Across 1. hydrogen ______ is a color gas with a smell of rotten eggs 5. The major components in solution 6. Melting point and boiling point are _______ properties 7. Two elements are liquid at room temperature are mercury and _______ Down 2. In colliads ,The particles are called the ______ phase and the medium in which they are distributed is called the dispersion medium. 3. amount of solute present per unit volume or mass of the solution or solvent 4. denser particles are forced to the bottom and the lighter particles stay at the top when spun rapidly Solution 1. sulphide 2. dispersed 3. concentration 4.centrifugation 5. solvent 6. physical 7. bromine This Is matter around us pure extra questions with answers is prepared keeping in mind the latest syllabus of CBSE . This has been designed in a way to improve the academic performance of the students. If you find mistakes , please do provide the feedback on the mail. Also Read Books Recommended Class 9 Maths Class 9 Science Share — copy and redistribute the material in any medium or format for any purpose, even commercially. 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