

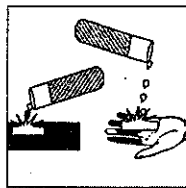
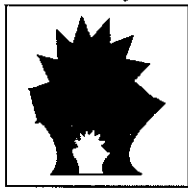
CHEMISTRY PRACTICALS

MULTIPLE CHOICE QUESTIONS ON PRACTICAL SKILLS

Select the correct option out of the four possible options given after the statement of the question :

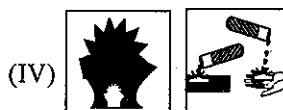
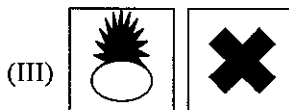
1. The vinegar like odour is given by :
 (a) $\text{CH}_3\text{COOC}_2\text{H}_5$ (b) $\text{C}_2\text{H}_5\text{OH}$ (c) CH_3COOH (d) $\text{C}_2\text{H}_5\text{COOH}$.
2. The chemical formula of acetic acid (ethanoic acid) is :
 (a) CH_3COOH (b) $\text{C}_2\text{H}_5\text{COOH}$ (c) $\text{C}_3\text{H}_7\text{COOH}$ (d) HCOOH .
3. The IUPAC name of acetic acid is :
 (a) Methanoic acid (b) Ethanoic acid (c) Carbonic acid (d) Propanoic acid.
4. The odour of acetic acid is :
 (a) Pungent (b) Suffocating (c) Fruity (d) Vinegar like.
5. Glacial acetic acid is :
 (a) 3 to 10% acetic acid (b) 100% acetic acid (c) 50% acetic acid (d) None of these.
6. A blue litmus paper is turned red by :
 (a) NaHCO_3 (b) Na_2CO_3 (c) CH_3COOH (d) $\text{C}_2\text{H}_5\text{OH}$.
7. The gas liberated by the action of acetic acid on a substance X turns lime water milky. The substance X is :
 (a) Sodium bicarbonate (b) Sodium hydroxide
 (c) Sodium acetate (d) Calcium hydroxide.
8. When acetic acid and sodium bicarbonate are mixed, it is observed that :
 (a) a colourless and odourless gas is liberated with effervescence.
 (b) a colourless gas liberated turns moist blue litmus paper red.
 (c) a colourless gas liberated turns lime water milky.
 (d) Each one.
9. The carboxylic group is :
 (a) $-\text{CHO}$ (b) $>\text{C}=\text{O}$ (c) $-\text{COOH}$ (d) $-\text{OH}$.
10. The group responsible for acidic behaviour of acetic acid is :
 (a) $-\text{CHO}$ (b) $-\text{COOH}$ (c) $-\text{OH}$ (d) $-\text{O}-$.
11. Two test tubes A and B contain acetic acid and ethanol separately. The tube which contains acetic acid will react with NaHCO_3 to liberate a gas X which turns lime water milky. The gas X is :
 (a) CO_2 (b) SO_2 (c) NO_2 (d) NH_3
12. Acetic acid turns blue litmus red. When a few drops of dilute HCl are added to it, the colour will become :
 (a) Blue (b) Colourless (c) Red (d) None of these.
13. Ethanoic acid turns blue litmus red. When an excess of NaOH solution is added to it, the colour will change to :
 (a) Blue (b) Colourless (c) Pink (d) Orange.
14. When acetic acid is heated with ethanol in presence of concentrated sulphuric acid, the compound formed is :
 (a) Vinegar (b) Glacial acetic acid (c) Ether (d) Ethyl acetate (ester).
15. Acetic acid reacts with sodium hydroxide to form a salt. This salt on heating with soda lime ($\text{NaOH} + \text{CaO}$) forms a hydrocarbon X. The compound X is :
 (a) Methane (b) Ethane (c) Propane (d) Butane.

16. Which one of the following is not in liquid state at 10 °C ?
 (a) Ethanol (b) Ethyl acetate (c) Glacial acetic acid (d) Water.
17. The following symbols are usually shown on the bottles of commercial acetic acid.

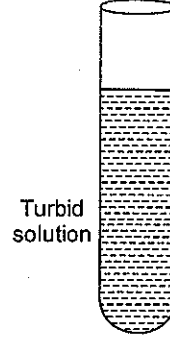
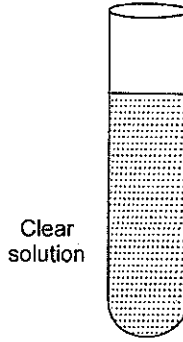
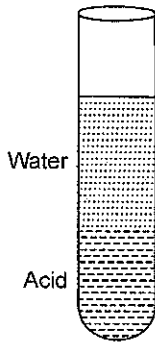
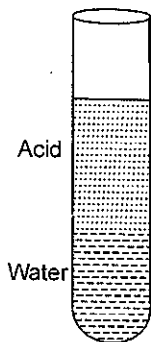


The symbols indicate that acetic acid is

- (a) corrosive and flammable (b) radioactive and flammable
 (c) oxidizing and corrosive (d) flammable and explosive.
- [C.B.S.E. Sample Paper Question]
18. The pair of safety symbols you notice on the bottle of commercial acetic acid available in the laboratory is shown in

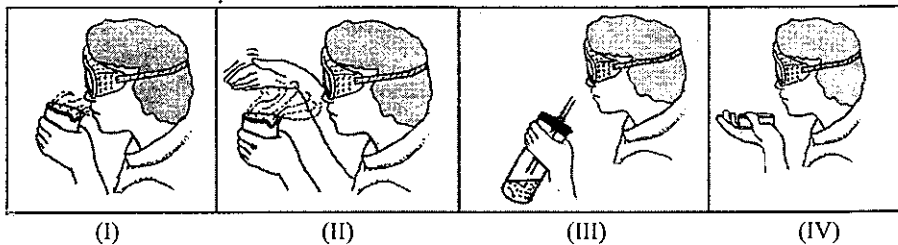


- (a) I (b) II
 (c) III (d) IV.
- [C.B.S.E. Sample Paper Question]
19. Amount of 5 mL each of acetic acid and water are mixed together and shaken well.



- (a) I (b) II
 (c) III (d) IV.
- [C.B.S.E. Sample Paper Question]
20. On adding sodium bicarbonate to acetic acid, you immediately
- (a) observe strong effervescence (b) hear hissing sound
 (c) get pungent smell (d) notice formation of bubbles.
- [C.B.S.E. Sample Paper Question]

21. The most appropriate method of testing the odour of a given liquid is

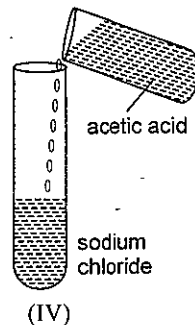
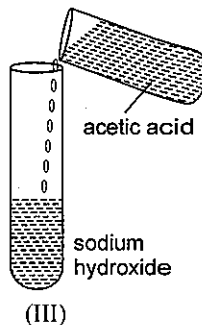
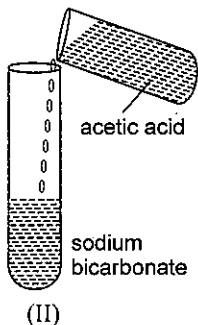
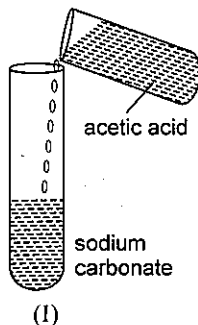


- (a) I
(c) II

- (b) II
(d) IV.

[C.B.S.E. Sample Paper Question]

22. A student added acetic acid to test tubes I, II, III and IV and then introduced a burning candle near the mouth of each test tube. In which cases the candle will get extinguished?



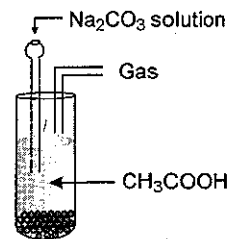
- (a) I and II
(c) III and IV

- (b) II and III
(d) I and IV.

[C.B.S.E. Sample Paper Question]

23. The gas formed in the given reaction is :

- (a) O_2
(b) CO_2
(c) CO
(d) CH_4



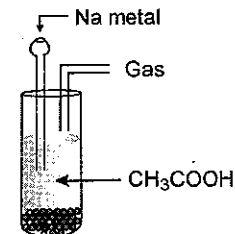
24. The gas evolved in the experiment shown here is :

- (a) O_2
(b) H_2
(c) CO_2
(d) Cl_2

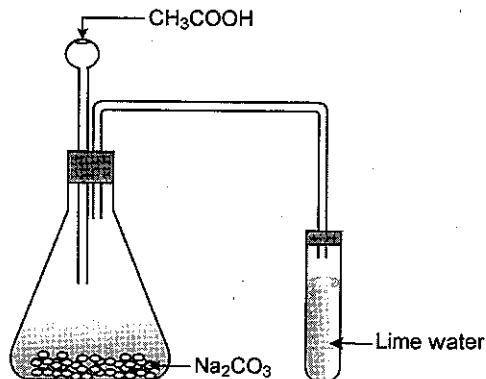
25. If we put blue litmus into acetic acid solution :

- (a) it change to red.
(c) it get discoloured.

- (b) it remains blue.
(d) it becomes green.

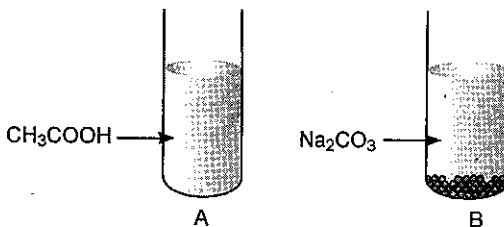


26. What is wrong in the given set up if lime water does not turn milky ?

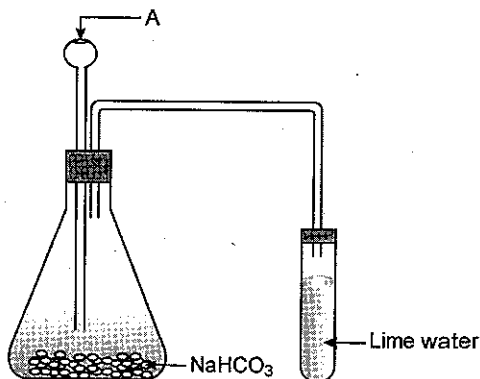


- (a) Thistle funnel is not dipping in acetic acid solution and CO_2 gas escapes.
- (b) Sodium carbonate should be taken in solution form.
- (c) Solid acetic acid should be added.
- (d) Apparatus is not air tight.

27. If we put red litmus paper in both A and B, the observation will be :

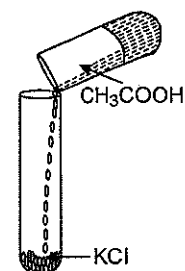
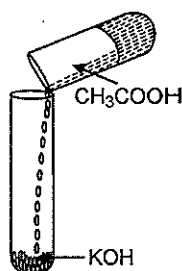
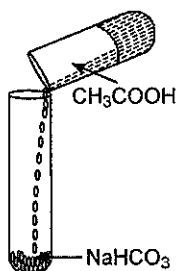
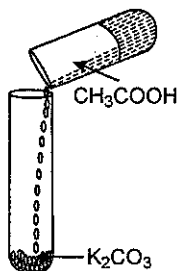


- (a) In A red litmus turns blue, in B it remains red.
 - (b) In A red litmus remains red, in B it becomes blue.
 - (c) In both A, B, it remains red.
 - (d) In both A, B, it changes to blue.
28. In the experiment shown, the gas evolved is passed through lime water, which turns milky. The A is :

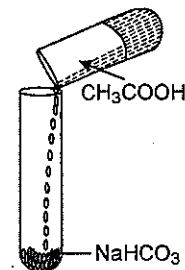
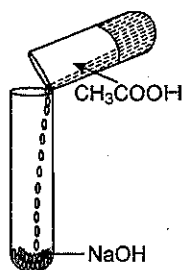
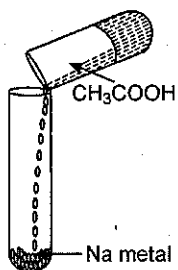
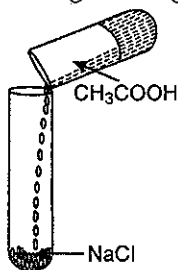


- (a) NaOH
- (b) Na metal
- (c) CH_3COOH
- (d) Na_2CO_3

29. In which of the following, gas evolved will burn explosively ?



- (a) I and III (b) I and II (c) II only (d) I, III and IV
30. Which of the following is called vinegar and is used in pickles ?
(a) 5 – 10% Acetic acid (b) 100% Acetic acid
(c) 10 – 20% Acetic acid (d) 50% Acetic acid
31. If pH paper is dipped into acetic acid solution, it will become :
(a) orangish red (b) green (c) blue (d) violet
32. If burning candle is brought near each of the following test tube, in which of the following candle will get extinguished ?



- (a) I and III (b) II and III (c) III and IV (d) I and II
33. Three students performed experiment by adding Na metal, Na_2CO_3 and NaHCO_3 solution in acetic acid in test tube A, B, C. The gases evolved are :
(a) H_2 , CO_2 , CO_2 (b) CO_2 , H_2 , CO_2 (c) CO_2 , CO_2 , H_2 (d) CO_2 , CO , H_2
34. Which of the following has the lowest pH ?
(a) CH_3COONa (b) CH_3COOH (c) NaOH (d) Na_2CO_3
35. A mixture of sodium carbonate solution and vinegar extinguishes the burning candle, which statement is correct ?
(a) No reaction takes place.
(b) Brisk effervescence due to colourless, odourless gas.
(c) Brisk effervescence due to pungent smelling gas.
(d) Brisk effervescence due to gas which catches fire and burns explosively.

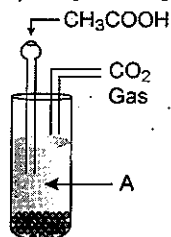
[C.B.S.E. Sample Paper Question]

36. The physical state of pure acetic acid is :
(a) Solid (b) Liquid (c) Aq. solution (d) Gaseous state
37. We should not inhale vapours of acetic acid because they are ;
(a) harmful (b) highly reactive (c) pleasant smelling (d) pungent smelling

38. Glacial acetic acid is :
 (a) 10% acetic acid (b) 50% acetic acid (c) 100% acetic acid (d) 5% acetic acid
39. A student is asked to add a tea spoon full of solid sodium bicarbonate to a test tube containing approximately 3 mL of acetic acid. He observed that the solid sodium bicarbonate
 (a) floats on the surface of acetic acid.
 (b) remains suspended in the acetic acid.
 (c) settles down in the test tube.
 (d) reacts with acetic acid and a clear solution is obtained. [C.B.S.E. Sample Paper Question]

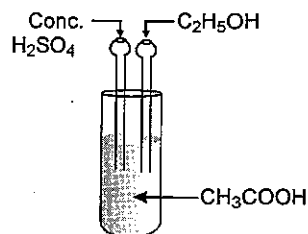
40. Look at the adjoining figure A is :

- (a) NaOH
 (b) Na_2CO_3
 (c) NaHCO_3
 (d) Na_2CO_3 or NaHCO_3



41. What will be observation in the experiment shown in the Fig. ?

- (a) No reaction takes place.
 (b) Pleasant fruity smelling compound is formed.
 (c) Vinegar like smell is observed.
 (d) Pungent smelling compound is formed.



42. The functional group present in acetic acid is :

- (a) Carboxylic (b) Alcohol (c) Aldehyde (d) Ketone

43. Acetic acid, when dissolved in water, dissociates into ions reversibly because :

- (a) it is a weak acid. (b) it is a strong acid.
 (c) it is a weak base. (d) it is a strong base.

44. When the stopper of a bottle containing a colourless liquid was removed, the bottle gave out a smell like that of vinegar. The liquid in the bottle could be

- (a) hydrochloric acid (b) sodium hydroxide solution
 (c) acetic acid (d) saturated sodium bicarbonate solution

[Delhi 2007]

45. When sodium bicarbonate powder is added to acetic acid, a gas evolves. Which one of the following statements is not true for this gas ? It

- (a) turns lime water milky.
 (b) extinguishes a burning splinter.
 (c) dissolves in a solution of sodium hydroxide.
 (d) turns acidified potassium dichromate solution green.

[Delhi 2007]

46. Sodium bicarbonate solution is added to dilute ethanoic acid. It is observed that

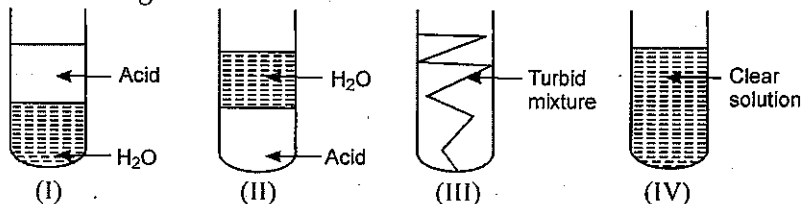
- (a) a gas evolves.
 (b) a solid settles at the bottom.
 (c) the mixture becomes warm.
 (d) the colour of the mixture becomes light yellow.

[A.I. 2007]

47. The odour of a acetic acid resembles that of

- (a) rose (b) burning plastic (c) vinegar (d) kerosene [A.I. 2007]

48. 5 mL of acetic acid was added to 5 mL of water in a test tube. The resulting mixture is correctly represented in the diagram



- (a) I (b) II (c) III (d) IV [Delhi 2007(C)]
49. 2 mL of acetic acid was added in drops to 5 mL of water and it was noticed that
(a) the acid formed a separate layer on the top of water.
(b) water formed a separate layer on top of the acid.
(c) a clear and homogeneous solution was formed.
(d) a pink and clear solution was formed. [Delhi 2008]
50. Ethanoic acid was added to sodium bicarbonate solution and the gas evolved was tested with a burning splinter. The following observations were reported. Which of them is correct?
(a) The gas burns with a pop sound and the flame gets extinguished.
(b) The gas does not burn but the splinter burns with a pop sound.
(c) The flame extinguishes and the gas goes not burn.
(d) The gas burns with a blue flame and the splinter burns brightly. [Delhi 2008]
51. The odour of ethanoic acid resembles with
(a) tomato juice (b) kerosene (c) orange juice (d) vinegar [A.I. 2008]
52. 5 mL of dilute acetic acid were added to 5 mL of water and the mixture was shaken for one minute. It was observed that
(a) the turbidity appeared in the test tube.
(b) the acid formed a separate layer at the bottom.
(c) water formed a separate layer at the bottom.
(d) a clear solution was formed. [A.I. 2008]

ANSWERS AND EXPLANATIONS

- (c) Acetic acid (CH_3COOH) has vinegar like smell.
- (a) CH_3COOH is the formula of acetic acid.
- (b) IUPAC name of acetic acid is ethanoic acid.
- (d) Acetic acid has vinegar like smell.
- (b) 100% acetic acid is known as glacial acetic acid.
- (c) CH_3COOH being an acid turns blue litmus red.
- (a) Acetic acid decomposes sodium bicarbonate to liberate CO_2 which turns lime water milky.
- (d) All the three observations made are correct. An effervescence takes place with the liberation of CO_2 . This gas being acidic turns blue litmus red and also turns lime water milky.
- (c) Carboxylic group has the formula — COOH .
- (b) The group responsible for acidic behaviour of acetic acid is — COOH called carboxylic group.
- (a) Acetic acid decomposes NaHCO_3 to liberate CO_2 which turns lime water milky.
- (c) In acidic medium, the colour of litmus paper will remain red.
- (a) In alkaline medium, the colour of litmus paper will change to blue.

14. (d) acetic acid reacts with ethyl alcohol in the presence of concentrated sulphuric acid to form the ester (ethyl acetate).
15. (a) Methane gas is formed when sodium acetate is heated with soda lime.
16. (c) Glacial acetic acid solidifies at 10 °C.
17. (a) Acetic acid is corrosive and flammable.
18. (d) Acetic acid is corrosive and flammable. This is indicated by the symbols IV.
19. (c) Acetic acid is highly soluble in water. Hence, a clear solution is obtained.
20. (a) On adding sodium bicarbonate to acetic acid, a strong effervescence due to evolution of CO₂.
21. (b) The figure (II) in which we wave the fumes of the liquid is the safest and correct method for testing the odour of a liquid.
22. (a) Carbon dioxide, which extinguishes the candle, is produced in test tubes I and II.
23. (b) CO₂ is produced by the action of Na₂CO₃ on acetic acid.
24. (b) Metals react with acids to liberate hydrogen gas.
25. (a) Acids change blue litmus into red.
26. (a) Thistle funnel should dip into the solution, otherwise carbon dioxide will escape through it.
27. (b) CH₃COOH is an acid while Na₂CO₃ is a base. Acids change blue litmus into red and base changes red litmus into blue.
28. (c) Acetic acid decomposes NaHCO₃ liberating CO₂ which turns lime water milky.
29. (c) Acetic acid reacts with sodium metal to evolve hydrogen gas which burns explosively.
30. (a) 5-10% acetic acid is called vinegar and is used in pickles.
31. (a) Acetic acid (a weak acid) turns pH paper orangish red.
32. (d) Carbon dioxide which extinguishes the candle is produced in test tubes I and II.
33. (a) Acetic acid reacts with sodium to produce hydrogen gas, with Na₂CO₃ to produce CO₂ gas and with NaHCO₃ to produce CO₂ gas.
34. (b) Acids have the lowest pH values.
35. (b) Sodium carbonate reacts with vinegar to liberate carbon dioxide which is colourless, odourless and extinguishes candle.
36. (b) Pure acetic acid is a liquid at room temperature.
37. (a) Acetic acid vapours are harmful.
38. (c) Glacial acetic acid is 100% acetic acid.
39. (d) Sodium bicarbonate reacts with acetic acid to liberate carbon dioxide.
40. (d) Both Na₂CO₃ and NaHCO₃ separately react with acetic acid to liberate carbon dioxide gas.
41. (b) Acetic acid and ethyl alcohol react in the presence of conc. H₂SO₄ to produce ethyl acetate which is a pleasant fruity smelling compound.
42. (a) Acetic acid contains carboxylic (— COOH) group.
43. (a) Acetic acid is a weak acid. Dissolution in water is represented as under :

$$\text{CH}_3\text{COOH} + \text{H}_2\text{O} \longrightarrow \text{CH}_3\text{COO}^- + \text{H}_3\text{O}^+$$
44. (c) Acetic acid has vinegar like smell.
45. (d) Carbon dioxide produced in the reaction turns lime water milky, extinguishes a burning candle and dissolves in NaOH. But there is no reaction between CO₂ and acidified potassium dichromate solution.
46. (a) Sodium bicarbonate reacts with dilute ethanoic acid to liberate the gas, carbon dioxide.
47. (c) Acetic acid possesses the odour of vinegar.
48. (d) Acetic acid is highly soluble in water. We get a clear solution.
49. (c) Acetic acid is freely soluble in water. A clear and homogeneous solution is formed.

MULTIPLE CHOICE QUESTIONS ON PRACTICAL SKILLS

Select the correct option out of the four possible options given after the statement of the question :

1. What will you observe after the saponification reaction is complete in a vessel ?
 - (a) Blue litmus paper changes into red.
 - (b) Red litmus paper changes into blue.
 - (c) Both the blue and red litmus papers are bleached.
 - (d) Neither of them is affected.
2. To facilitate the precipitation of soap in the saponification experiment, we add
 - (a) water
 - (b) acetic acid
 - (c) hydrochloric acid
 - (d) sodium chloride solution
3. On stirring an oil with sodium hydroxide solution,
 - (a) evolution of heat takes place.
 - (b) absorption of heat takes place.

(c) depends upon the oil taken.

(d) no heat change happens.

4. Tick the correct statement :

(i) Sodium hydroxide is used in the preparation of washing soap.

(ii) Sodium carbonate is used in the preparation of washing soap.

(iii) Potassium hydroxide is used in the preparation of toilet soap.

(iv) Potassium carbonate is used in the preparation of toilet soap.

(a) (i) and (ii)

(b) (i) and (iv)

(c) (i) and (iii)

(d) (iii) and (iv)

5. Which of the following cannot be a soap ?

(a) Sodium stearate

(b) Sodium oleate

(c) Sodium palmitate

(d) Sodium oxalate

6. The side product formed in the saponification is

(a) glycol

(b) glycine

(c) glycerol

(d) none of the above

7. Which of the following cannot be used for the preparation of soap ?

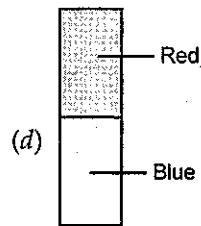
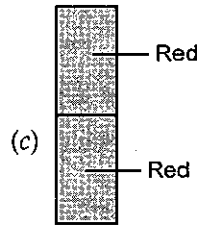
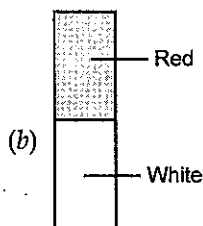
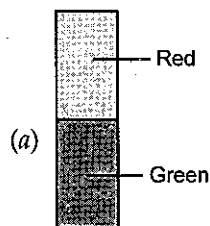
(a) Castor oil

(b) Mobil oil

(c) Groundnut oil

(d) Linseed oil

8. A red litmus paper was half dipped in the mixture after the saponification reaction was complete. Which of the following observations is correct ?



9. A saponification reaction was performed in a test tube by taking oil and sodium hydroxide solution. The mixture was stirred. After sometime, soap settled down at the bottom of the test tube.

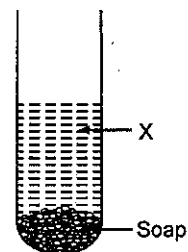
The supernatant liquid X is

(a) Sodium hydroxide

(b) Oil

(c) Glycine

(d) Glycerol



10. Castor oil was taken in a test tube and agitated alongwith aqueous sodium hydroxide solution, but there was a difficulty in precipitating the soap. Then a substance X was added and after sometime, complete precipitation of soap was achieved. The substance X is

(a) oxalic acid

(b) citric acid

(c) sodium chloride

(d) depends upon the oil

11. Sodium hydroxide solution was added to a liquid X. The mixture was stirred for sometime. A lot of heat was produced. Among the products formed were glycerol and a solid Y. The substances X and Y respectively are

(a) soap, oil

(b) oil, soap

(c) sugar, soap

(d) vinegar, soap

12. In the preparation of soap, filler performs the function of
 (a) making soap soft to skin. (b) making soap soft to clothes.
 (c) making soap hard and easy to cut. (d) increasing the efficiency of soap.

ANSWERS AND EXPLANATIONS

1. (b) When the reaction is complete, there is slight excess of sodium hydroxide. Hence, red litmus paper turns blue.
2. (d) Sodium chloride brings about the precipitation of soap due to common-ion effect.
3. (a) It is an exothermic reaction.
4. (c) Statements (i) and (iii) are correct. Precipitation of soap does not take place in the presence of carbonates.
5. (d) Oxalic acid is not a fatty acid.
6. (c) Oils and fats are glyceryl esters of fatty acids.
7. (b) Mobil oil is a mineral oil. It does not form soap.
8. (d) The solution becomes alkaline after the saponification reaction. Hence the red litmus paper becomes blue.
9. (d) Glycerol is formed as the by-product in saponification reaction.
10. (c) Sodium chloride helps in the precipitation of soap due to common-ion effect.
11. (b) Oil on treatment with sodium hydroxide gives soap along with glycerol.
12. (c) Fillers perform the function of making soap hard so that it can be cut smoothly into soap cakes.

EXPERIMENT 3

Aim : To study the comparative cleansing capacity of a sample of soap in soft and hard water.

Main Points :

1. Hard water contains hydrogencarbonates, chlorides and sulphates of calcium and magnesium. These salts are soluble in water.
2. Soft water is free from such salts.
3. When soap is added to hard water, it reacts with these salts to form scum which is insoluble in water and floats on the top of the water surface.
4. The scum is formed due to the formation of insoluble calcium or magnesium salts of fatty acids used in soap formation.

Calcium hydrogencarbonate + Sodium stearate

→ Calcium stearate + Sodium hydrogencarbonate
(scum)

Calcium sulphate + Sodium stearate → Calcium stearate + Sodium sulphate
(scum)

Magnesium chloride + Sodium stearate → Magnesium stearate + Sodium chloride
(scum)

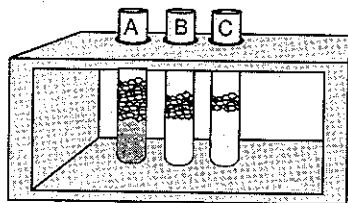
Under these conditions, the soap becomes ineffective.

5. Presence of calcium and magnesium salts in water precipitates the soap thereby reducing its cleansing power and foaming capacity.
6. Cleansing capacity of a sample of soap in soft and hard water may be compared by shaking the soap solution in soft and hard water and noting the length of the foam formed in the test tube.
7. It is observed that more foam is formed by soap in soft water than in hard water.

MULTIPLE CHOICE QUESTIONS ON PRACTICAL SKILLS

Select the correct option out of the four possible options given after the statement of the question :

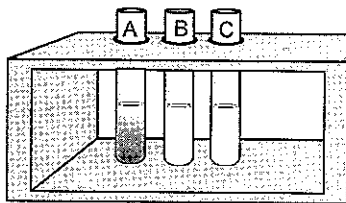
1. Which of the following is not present in hard water ?
(a) Calcium hydrogencarbonate (b) Calcium sulphate
(c) Calcium phosphate (d) Calcium chloride
2. Soft water is free from
(a) hydrogencarbonates, chlorides and sulphates of Ca and Mg.
(b) hydrogencarbonates, chlorides and sulphates of Na and K.
(c) hydrogensulphites, sulphites and sulphates of Ca and Mg.
(d) chlorides, sulphites and phosphates of Na and K.
3. When soap is added to hard water, we observe that
(a) soap does not react.
(b) soap disappears immediately.
(c) a scum is formed which floats on the surface of water.
(d) none of the above happens.
4. Sodium stearate (soap) is added to hard water containing calcium sulphate. The reaction leads to the formation of
(a) Calcium oxide (b) Calcium stearate
(c) Calcium hydrogensulphate (d) Calcium carbonate
5. Presence of calcium and magnesium salts in water precipitates the soap and
(a) reduces its cleansing power and foaming capacity.
(b) reduces its cleansing power but foaming capacity remains unchanged.
(c) does not reduce cleansing power but reduces foaming capacity.
(d) neither cleansing power nor foaming capacity is reduced.
6. Tick the correct statement :
(a) More foam is formed by hard water than soft water.
(b) More foam is formed by soft water than hard water.
(c) Hardness of water is due to the presence of calcium hydrogencarbonate only.
(d) Greater the amount of calcium sulphate in water, greater will be the cleansing capacity of soap.
7. 10 mL of distilled water, underground water and water mixed with calcium chloride were taken in 3 test tubes and 2 mL of soap solution was added to each. After closing the mouth of the test tube, each tube was shaken for 2 minutes. The observation is shown in the Fig. below.



The tube containing the maximum length of foam contains

- (a) underground water (b) distilled water
- (c) water mixed with calcium chloride (d) depends upon the quality of soap

8. Three tubes marked A, B and C were filled with 10 mL of water. 1, 2 and 3 g of calcium hydrogencarbonate respectively were added to tubes A, B and C. The solid was completely dissolved by stirring. 2 mL of soap solution was added to each test tube and the tubes were shaken vigorously for 2 minutes each.



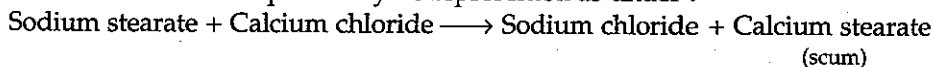
The tube that contains the minimum length of foam is

- (a) A (b) B
(c) C (d) A and B will contain equal length of foam
9. Foaming capacity of different samples of water can be compared by :
- (a) adding equal volumes of soap solution to equal volumes of water samples.
(b) adding different volumes of soap solution to equal volumes of water samples.
(c) adding equal volumes of soap solution to different volumes of water samples.
(d) adding different volumes of soap solution to different volumes of water sample.
10. Soap is
- (a) sodium oxalate (b) sodium citrate
(c) sodium maleate (d) none of the above.
11. Which of the following do you think will give the maximum foam ?
- (a) Aqua-guarded water (b) Distilled water
(c) Water from the river (d) Sea water
12. What type of reaction takes place when soap reacts with hard water ?
- (a) Addition reaction (b) Decomposition reaction
(c) Displacement reaction (d) Double displacement reaction

ANSWERS AND EXPLANATIONS

1. (c) Hard water does not contain calcium phosphate.
2. (a) Hardness of water is due to the presence of hydrogencarbonates, chlorides and sulphates of Ca and Mg.
3. (c) A scum (calcium or magnesium stearate) is formed when soap is added to hard water and floats on the surface of water.
4. (b) Calcium sulphate reacts with sodium stearate to form calcium stearate.
5. (a) Precipitation of soap reduces the cleansing power as well as foaming capacity.
6. (b) Calcium and magnesium salts are missing in soft water. Therefore, soft water forms more foam.
7. (b) Distilled water is completely free from salts of calcium and magnesium salts. Therefore, we get maximum foam. Underground water contains traces of Ca and Mg salts.
8. (c) Greater the amount of calcium hydrogencarbonate, greater is the hardness of water. Water in tube C contains maximum concentration of the salt and hence its hardness is maximum. Therefore, the length of foam formed will be minimum.

9. (a) Foaming capacity of different samples of water can be compared when we add equal volumes of soap solutions to equal volumes of water.
10. (d) Soap is sodium stearate.
11. (b) Sea water contains maximum salts followed by river water. Aqua-guarded water contains traces of salts for the taste. Distilled water is completely free from salts. Therefore, it gives the maximum foam.
12. (d) The reaction that takes place may be represented as under :



Thus, it is double displacement reaction.