CHEMISTRY

BOOKS - PEARSON IIT JEE FOUNDATION

Water

Test Your Concepts

1. _____% of the total water available on the earth is saline water.

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2. Drinking water mainly contains small amounts of salts of _____, _____ and _____ metals.

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3. Carbon dioxide on dissolution in water forms _____.

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4. 1 g of water at $100^{\circ}C$ on heating forms 1g of steam at the same temperature by absorbing _____ cal of energy.

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5. 1g of pure water at $4^{\circ}C$ occupies a volume of _____.

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6. Water containing calcium bicarbonate produces _____ with soap.

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7. _____ volume(s) of hydrogen and _____ volume(s) of oxygen under similar conditions of temperature and pressure combine to give two volumes of water.

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8. _____ hardness is removed by Clark's method.

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9. _____ is added to prevent the evaporation of water.

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10. Watering plants by using narrow tubes is called _____.

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11. Which of the following chemicals leads to water pollution?

A. Fertilizers

B. Insecticides

C. Pesticides

D. All the above

Answer: D

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12. Freezing point of water is $0^{\circ} C$ at _____

A. 76 cm of Hg

B. 760 cm of Hg

C. 76 mm of Hg

D. 7.6 mm of Hg

Answer: A

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13. The salts of which among the pairs of metals cause greater water pollution?

A. Calcium, aluminium

B. Mercury, cadmium

C. Calcium, cadmium

D. Calcium, mercury

Answer: B

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14. Identify the set of pure and impure water among the following

A. Rain water, sea water

B. Rain water, distilled water

C. Sea water, river water

D. River water, ground water

Answer: A

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15. Chemical treatment of surface water can be carried out by the addition of

A. bleaching power

B. alum

C. oxygen

D. carbon dioxide

Answer: A

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16. Density of water is less than 1g/c.c _____

A. at $4^{\circ} C$

B. above $4^{\circ} C$

C. below $4^{\circ} C$

D. Both (2) and (3)

Answer: D

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17. Latent heat of vapourisation of water is _____

A. 270 cal/g

B. 540 cal/g

C. 80 cal/g

D. 180 cal/g

Answer: B

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18. Which of the following processes can be used to remove both temporary and permanent hardness?

A. Clark's method

B. Addition of washing soda

C. Boiling

D. All the above

Answer: B

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19. Which of the following terms is not related to underground water?

A. Infiltration

B. Aquifer

C. Water table

D. Potable water

Answer: D

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20. Which of the following water is suitable for drinking?

A. Soft water

B. Demineralized water

C. Potable water

D. Distilled water

Answer: C

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21. When the water gets converted to ice, its volume

A. decrease

B. increases

C. remains the same

D. initially decreases and then increases

Answer: B

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22. Which of the following dissolved gases are present in drinking water?

A. Oxygen, nitric oxide

B. Oxygen, carbon monoxide

C. Oxygen, carbon dioxide

D. Oxygen, nitrogen

Answer: C

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23. Which of the following salts is responsible for temporary and permanent hardness of water respectively?

A. $Mg(HCO_3)_2$ and Na_2SO_4

B. $Ca(HCO_3)_2$ and $MgCl_2$

C. $MgSO_4$ and $Mg(HCO_3)_2$

D. $CaCl_2$ and $CaSO_4$

Answer: B

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24. Arrange the following terms in sequence from source to supply.

(a) Chlorination

(b) Sedimentation

(c) Filtration

(d) Storage water tank

(e) Lakes

A. ecadb

B. acbde

C. ebcad

D. bcade

Answer: C

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25. Arrange the terms in sequence of water cycle starting from water bodies.

Precipitation

(b) Condensation

(c) Water vapour

(d) Infiltration

(e) Ground water table

A. edbca

B. cbade

C. cedab

D. ebcad

Answer: B

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26.

	Column A			Column B
$A.$	Hard water	( )	$a.$	Reverse osmosis
$B.$	Soft water	( )	$b.$	Rain water
$C.$	Desalinated water	( )	$c.$	Presence of Ca^{+2} and Mg^{2+}
$D.$	Lake water	( )	$d.$	Scum formation
		( )	$e.$	Lather formation

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27.

	Column A			Column B
$A.$	Potable water	( )	$a.$	Electrolysis
$B.$	Distilled water	( )	$b.$	Irrigation
$C.$	Acidulated water	( )	$c.$	Pure water
$D.$	River water	( )	$d.$	Laboratory purpose
		( )	$e.$	Human consumption

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28.

	Column A			Column B
$A.$	Sedimentation	( )	$a.$	Softened water
$B.$	Filtration	( )	$b.$	Additional of alum
$C.$	Chlorination	( )	$c.$	Removal of suspended impurities
$D.$	Permutit	( )	$d.$	Purification of drinking water

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Very Short Answer Type Questions

1. Why does river water contain lot of impurities?

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2. What is the volumetric composition of water?

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3. What is the role of water in the evolution of aquatic life?

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4. Name the most vital process where water takes part in the reaction in which one of the products is a supporter of life.

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5. What is an aquifer?

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6. Underground water does not contain suspended impurities. Why?

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7. What is meant by rain water harvesting?

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8. Distinguish between hard water and soft water.

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9. What is the advantage of distillation by using continuous water still over distillation by using Lebig's condenser?

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10. Compare the density of water at $4^{\circ} C$ with that below and above $4^{\circ} C$.

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11. What are the values of latent heat of fusion of ice and latent heat of vapourisation for water?

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12. Why is spring water used for medicinal purpose?

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13. Name the substance added to water stored in reservoirs in regions with scanty rainfall. Give reason.

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14. What is permutit? Give its formula?

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15. Why is ordinary water a good conductor of electricity?

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16. Why is water called universal solvent?

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17. How are springs formed?

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18. What is desalination?

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19. Define electrolysis.

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20. What is depletion of water table?

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21. Distinguish between temporary hardness and permanent hardness.

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22. Why is rain water considered as the purest form of natural water?

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Short Answer Type Questions

1. State and explain the anomalous expansion of water.

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2. What is meant by infiltration? Explain the role of infiltration in water management.

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3. Explain the factors responsible for the depletion of water table.

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4. Name some agricultural practices which help in water management.

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5. How are bicarbonates added to water? How can they be removed by boiling? Give equations.

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6. Explain the removal of temporary hardness of water by Clark's method. Give equations.

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7. Give the characteristics of potable water.

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8. Explain the role of alum in the purification of water.

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9. Why is distilled water not suitable for drinking?

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10. Describe the various stages of purification of drinking water

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11. Draw a neat labelled diagram for the electrolysis of water.

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12. Explain the process by which both removal of temporary hardness and permanent hardness is possible.

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13. Write a short note on water management.

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14. Draw a neat line sketch of water cycle.

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15. What is depletion of water table?

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16. How can you harvest water in household?

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17. Draw a line sketch of distribution of water on earth's surface.

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18. List important uses of water.

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19. Discuss five important physical properties of water.

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20. Describe various sources of water.

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Essay Type Questions

1. Explain the electrolysis of water to determine the volumetric composition of water with diagram

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2. Give reasons for the following:

(a) Sea water is unfit for usage and consumption

(b) River water is considered as fresh water.

(c) Underground water does not contain suspended impurities.

(d) Distilled water is used for laboratory processes.

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3. Explain water cycle and its role in rising the ground water table.

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4. What are the disadvantages of hard water? Explain the various methods of removal of permanent hardness of water with diagrams.

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5. Describe the various steps involved in getting clear water from wastewater.

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6. (a) Mention the causes for water pollution.

(b) Mention different types of pollution.

(c) Mention the control measures for water pollution.

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7. (a) Explain the different causes of depletion of water table.

(b) What steps should be taken in day to day life to prevent depletion of water table?

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8. Mention suitable terms for the following statements.

(a) Decrease in density of water on decreasing temperature from $4^{\circ} C$ to $0^{\circ} C$ which is opposite to the normal trend.

(b) The underground layer of water bearing permeable rock present below the water table

(c) The natural process of adding water to atmospheric air and its subsequent condensation to rain water.

(d) Type of chemical reaction carried out when electricity is passed through water.

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Level 1

1. Underground water does not contain suspended impurities. Why?

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2. Saline water contains large amounts of dissolved salts.

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3. 1g of pure water at $4^{\circ} C$ occupies a volume of _____.

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4. Water containing calcium bicarbonate produces _____ with soap.

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5. Hard water is fit for dyeing clothes.

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6. Cation exchange resin is regenerated by passing HCl solution.

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7. Salt is added to pure water to increase its electrical conductivity.

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8. Two volumes of hydrogen and one volume of oxygen compose one volume of water.

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9. _____ hardness is removed by Clark's method.

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10. Specific heat of water is 1 cal $g^{-1}.^{\circ} C^{-1}$

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11. _____ and _____ are two types of underground water.

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12. Hydrated sodium aluminium silicate is called _____.

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13. The exhausted permutit contains _____ and _____ ions in place of Na^+ ions.

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14. In sedimentation process, alum _____ the process of precipitation of suspended impurities.

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15. Addition of _____ releases _____ which helps in killing the harmful bacteria present in water.

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16. Addition of acid to water, _____ the conductivity.

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17. In electrolysis of water _____ gas is liberated at cathode.

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18. The change of water into water vapour at $30^{\circ} C$ at slow rate is called _____.

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19. Small water droplets associated with dust particles to form larger aggregates called _____

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20. Percentage of water in animals varies from _____ to _____.

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21. Which of the following processes is not involved in the purification of drinking water?

A. Sedimentation

B. Filtration

C. Chlorination

D. Distillation

Answer: D

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22. Which of the following sources of water is not used for drinking purpose due to dissolved salts present in them?

A. Rain water

B. Sea water

C. Spring water

D. River water

Answer: B

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23. Density of water is maximum

A. at $0^\circ C$

B. at $4^\circ C$

C. above $4^\circ C$

D. below $4^\circ C$

Answer: B

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24. Which of the following substances used in agriculture does not cause water pollution to large extent?

A. Manures

B. Pesticides

C. Fertilizers

D. Insecticides

Answer: A

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25. Metals present in permutit are

A. Na and K

B. Na and Al

C. Al and K

D. K and Al

Answer: B

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26. Which of the following has the highest specific heat?

A. Petrol

B. Mercury

C. Oil

D. Water

Answer: D

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27. Which of the following types of water is a bad conductor of electricity?

A. Saline water

B. Tap water

C. River water

D. Distilled water

Answer: D

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28. Which of the following is not the control measure of water pollution?

A. Usage of natural manure

B. Usage of drip irrigation

C. Usage of fertilizers

D. Usage of natural pesticides

Answer: C

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29. The pair of ions which does not cause hardness of water is

A. sulphate, chloride

B. bicarbonate, chloride

C. bicarbonate, sulphate

D. nitrate, phosphate

Answer: D

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30. Regeneration of anion exchange resin is carried out by passing

A. sodium hydroxide solution

B. sodium chloride solution

C. sodium bicarbonate solution

D. All the above

Answer: A

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31. Spring water usually contains

A. dissolved salts

B. minerals

C. suspended impurities

D. both 1 and 2

Answer: D

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32. Which of the following types of water does not contain dissolved gases such as oxygen and carbon dioxide?

A. Potable water

B. Distilled water

C. Saline water

D. Soft water

Answer: B

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33. Which of the following chemical substances can be used for removing permanent hardness of water by precipitation reaction?

A. Baking soda

B. Washing soda

C. Alum

D. Quick lime

Answer: B

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34. When the temperature of water rises from $0^\circ C$ to $10^\circ C$,the density of water

A. decreases gradually.

B. decreases up to $4^\circ C$ and then increases.

C. increases up to $4^\circ C$ and then decreases.

D. increases gradually.

Answer: C

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35. The volumetric composition of water is

A. $1:2$ ratio of hydrogen and oxygen respectively

B. $1:8$ ratio of hydrogen and oxygen respectively

C. $1:1$ ratio of hydrogen and oxygen

D. $2:1$ ratio of hydrogen and oxygen respectively

Answer: A

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36. Arrange the process in sequence for the purification of drinking water

(a) Lime feeder, alum feeder (b) Filtration

(c) Mechanical mixing (d) Chlorination

A. abcd

B. abdc

C. bcde

D. bcda

Answer: A

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37. Arrange statements in sequence of increasing order of heat content.

(a) Ice of 10 g mass at $10^{\circ} C$ (b) water of 10 g mass at $10^{\circ} C$

(c) Ice of 10 g mass at $40^{\circ} C$ (d) Water of 10 g mass at $40^{\circ} C$

(e) Steam of 10 g mass at $10^{\circ} C$

A. acbde

B. edcab

C. abecd

D. abedc

Answer: A

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38.

	Column A			Column B
A.	Defecation by living being	( )	*a.*	Arsenic, mercury etc
B.	Industrial operation	( )	*b.*	Intesecticides, fungicides etc
C.	Thermal pollution	( )	*c.*	Amoeba, fungicides etc
D.	Agricultural activities	( )	*d.*	Favourable for growth of algae

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39.

	Column A			Column B
A.	Removal of hardness by boiling	( )	*a.*	Resins
B.	Clark's method	( )	*b.*	Can remove temporary and
C.	Addition of washing soda	( )	*c.*	Decomposition reaction
D.	Ion exchange method	( )	*d.*	Addition of slaked lime

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40.

	Column A
$A.$	Specific heat of water
$B.$	Latent heat of fusion of ice
$C.$	Latent heat of vapourisation of Water
$D.$	Temperature at which melting of ice starts under normal atmospheric
$E.$	Temperature at which boiling of water starts under normal atmosphe

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Level 2

1. What is the latent heat of fusion and latent heat of vapourisation of 10 g of ice and water respectively?

A. 800 cal, 800 cal

B. 540 cal, 540 cal

C. 800 cal, 5400 cal

D. 540 cal, 800 cal

Answer: C

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2. Which of the following properties of iceberg led to the sinking of the titanic ship?

A. Heavy water currents

B. Relatively higher density of ice

C. $9/10$ of iceberg submerged below sea water and $1/10$ above the sea water

D. None of the above

Answer: C

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3. Which of the following processes is not involved in making surface water potable?

A. Sedimentation

B. Chlorination

C. Filtration

D. Distillation

Answer: D

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4. The solvent water is used in the car radiators. Which of the following properties of water is exploited?

A. High solubility

B. Poor conductivity

C. Maximum density

D. High specific heat

Answer: D

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5. A divalent metal salt X, which contributes to hardness of water, combines with washing soda and forms an insoluble salt Y and common salt. Salt Y is also used for the laboratory preparation of CO_2. Identify X and Y, respectively.

A. $CaSO_4, CaCO_3$

B. $MgSO_4, MgCO_3$

C. $CaCl_2, CaCO_3$

D. $MgCl_2, MgCO_3$

Answer: C

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6. The amount of heat energy required to increase the temperature of 20 g of water by $1^{\circ}C$ is _____.

A. 10 cal

B. 20 cal

C. 15 cal

D. 2 cal.

Answer: B

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7. On passing electricity through acidulated water, the gaseous products obtained are collected in two separate test tubes A and B. The volume of the gas collected in test tube A is double the volume of gas collected in test tube B. Identify the two gases in test tubes A and B respectively.

A. Hydrogen and oxygen

B. Oxygen and hydrogen

C. Hydrogen peroxide and oxygen

D. Oxygen and water vapour

Answer: A

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8. Which of the following types of water is a bad conductor of electricity?

A. Distilled water

B. Water obtained in ion-exchange process

C. Mineral water

D. Both 1 and 2

Answer: D

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9. A pressure cooker reduces cooking time because

A. increase in the boiling point of water

B. high specific heat of water

C. decrease in the boiling point of water

D. high latent heat of vapourization

Answer: A

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10. Wealthy but not healthy agriculture can be achieved by

A. introducing biogas plants

B. using natural pesticides

C. using drip irrigation

D. introducing artificial fertilizers

Answer: D

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11. Two persons A and B got burns one with boiling water at $100^\circ C$ and other due to steam at $100^\circ C$ respectivley. Which person is affected more?

A. A

B. B

C. Both A and B to the same extent

D. None of the above

Answer: B

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12. Aquatic animals are able to survive in water bodies like rivers and oceans during winter when the atmospheric temperature is $-10^{\circ}C$. This is because

A. density of ice is less than water.

B. density of water is minimum at $4^{\circ}C$.

C. ice is a poor conductor of heat.

D. both 1 and 3.

Answer: D

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13. Which of the following elements is used for the purification of surface water to make it free from germs so that it can be used for drinking purpose?

A. Oxygen

B. Flourine

C. Chlorine

D. Carbon

Answer: C

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14. Which of the following is the application of the highest specific heat capacity of water?

A. Cooling of softdrink bottles in ice

B. Cooling of earth's atmosphere after hail storm

C. Cool breeze from air coolers

D. Bursting of water pipes during winter in cold countries

Answer: C

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15. Water-containing salt X, of a divalent metal, when treated with a compound Y gives much lather with soap. Further, an insoluble compound $MgCO_3$ and salt of a monovalent metal sulphate are formed. Identify X and Y, respectively.

A. $CaCl_2$, Na_2CO_3

B. $MgSO_4$, Na_2CO_3

C. $MgCl_2$, $NaHCO_3$

D. $CaSO_4$, $Mg(HCO_3)_2$

Answer: B

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16. The amount of heat energy required to increase the temperature of 'X' g of water by $10.^\circ C$ is found to be 15 cal. Calculate 'X'.

A. 0.5 g

B. 15 g

C. 1.5 g

D. 7.5 g

Answer: C

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17. The water obtained in ion-exchange process is

A. devoid of dissolved salts and minerals

B. devoid of only minerals

C. potable

D. called mineral water.

Answer: A

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18. Which among the following is based on the principle that boiling point decreases with decrease in atmosphere pressure?

A. Cooking food at sea-level takes longer period of time

B. Cooking food at higher altitudes takes longer period of time

C. Working principle of air coolers

D. Working of pressure cooker.

Answer: B

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19. A group of students accompanied by their science teacher went trekking. After reaching the top of the hill they felt hungry. The Teacher told them that they would have to bear the hunger as cooking of food is slow and takes a longer time at the top of the hill. The students wanted to known the reason for the above fact. The Teacher explained the reason

for the above fact till the food was cooked. Can you predict the explanation given by the teacher?

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20. In a science exhibition, a student called Rishi performed the following experiment. She took two containers of the same dimensions and filled one of them with wax and the other one with ice. She placed both of them in a boiling water bath. What difference could she observe during the melting of these two substances? Also predict the reason for the observed difference.

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21. Why is sea water not suitable for drinking? How is it made potable?

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22. Hot water bags are generally used for reducing body pain. Can they also be used to keep us warm in winter? Explain.

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23. Ice floats on the surface of water because

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24. Calculate the amount of heat energy required to increase the temperature of 10 g of water through $12^{\circ} C$.

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25. During the summer vacations, Aryan went for a trip to Tirupathi in an old car along with his family. During the journey, the driver stopped the car beside a hotel and brought a can full of water and poured it into the

radiator of the car. Aryan's son, Mouryan wanted to know the reason for pouring water into the radiator and asked his father who is a mechanial engineer by profession the reason. Aryan explained the role of water in the radiator of the car engine. Can you predict the explanation given by Aryan?

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26. Calculate the ratio of the amount of heat energy lost during the conversion of 20 g of water at $0^{\circ}C$ to ice at $0^{\circ}C$ to heat energy gained during the conversion of same amount of water at $100^{\circ}C$ to steam at $100^{\circ}C$.

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27. Two open containers A and B are filled with water and in container A, cetyl alcohol is added. Both the containers are placed at $40^{\circ}C$. Predict the level of water in the two containers after some time and give reasons.

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28. The electronic configurations of two metals X and Y are 2, 8, 2 and 2, 8, 8, 2 respectively. What is the effect of the presence of hydrogen carbonate and sulphates of these metals in water?

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29. A group of students went for an excursion to Shimla in the month of November. A science teacher also accompanied them. There the temperature fell to $-10^{\circ}C$. They took some ice cubes and subjected them to heating while keeping a thermometer in the container. The students monitored the readings of thermometer till the entire ice melted into water. All of them went to their science teacher and showed him their observations. He asked them to discuss among themselves and give a proper justification for the observations on the readings at various stages.

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30. An element with electronic configuration 2, 8, 1 forms a compound with carbonate. How does this compound remove both temporary and permanent hardness of water?

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31. In permutit process, what is the role of the addition of the concentrated solution of the solid compound obtained due to the reaction between NaOH with HCl? Explain.

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32. Master Vishnu and his sister Jishnu went to their uncle's village to spend their summer vacation. One day, Jishnu was pestering her uncle for a soft drink. Vishnu's uncle took both of them to a shop where soft drink bottles were kept in an insulated box containing ice. Vishnu's uncle who is a physical science teacher, with an intention of testing Vishnu, posed a

question to him regarding the concept involved in cooling of soft drinks by keeping them in ice. Vishnu who is a student of Time, IITF impressed his uncle by explaining the above phenomenon with respect to the concept of latent heat of fusion of ice. Can you also explain the concept like Vishnu?

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33. Jini took a container completely filled with some ice cubes floating on it. He observed the container expecting that water to overflow after the ice melted. Can you predict what he would finally see?

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Level 3

1. Why is ion exchange process preffered over permutit process for the purification of water?

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2. In cold countries, water pipes sometimes burst, because

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3. Generally when a person jumps into water in any water body, he is expected to sink. But he tends to float in the Dead Sea. How do you account for this?

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4. During the conversion of surface water to potable water, chlorination is an important step. Give reasons.

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5. Thermal pollution of water leads to the death of biotic life. Explain.

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Assessment Test 1

1. Which of the following is used for removing permanent hardness of water?

A. Baking soda

B. Washing soda

C. Alum

D. Quick lime

Answer: B

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2. Wealthy but not healthy agriculture can be achieved by

A. introducing biogas plants

B. using natural pesticides such as neem oil.

C. using drip irrigation

D. using artifical fertilizers.

Answer: D

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3. Match the following

	Column - A			Column - B
(A)	Rain water	( )	(a)	Free of suspended impurities.
(B)	Rivers and lakes	( )	(b)	Purest form of natural water.
(C)	Underground water	( )	(c)	Water obtained after reverse osmos
(D)	Demineralized water	( )	(d)	Water coming out of an ion exchang
		( )	(e)	Fresh water for consumption for va

A. A $\rightarrow$ c, B $\rightarrow$ b, C $\rightarrow$ a, D $\rightarrow$ d, e

B. A $\rightarrow$ b, B $\rightarrow$ e, C $\rightarrow$ a, D $\rightarrow$ d

C. A $\rightarrow$ b, B $\rightarrow$ a, C $\rightarrow$ d, D $\rightarrow$ e

D. A $\rightarrow$ b, B $\rightarrow$ a, e, C $\rightarrow$ c D $\rightarrow$ d

Answer: B

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4. The amount of heat energy required to increase the temperature of 20 g of water by $1^{\circ} C$ is _____.

A. 10 cal

B. 20 cal

C. 15 cal

D. 2 cal.

Answer: B

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5. Arrange the steps in a sequence for the formation of rainfall.

(a) Formation of micelles (b) Condensation

(c) Evaporation (d) Formation of clouds

(e) Precipitation

A. c e d b a

B. c b d a e

C. c b a d e

D. a b c e d

Answer: C

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6. A divalent metal salt X, which contributes to hardness of water, combines with washing soda and forms an insoluble salt Y and common salt. Salt Y is also used for the laboratory preparation of CO_2. Identify X and Y, respectively.

A. $CaSO_4, CaCO_3$

B. $MgSO_4, MgCO_3$

C. $CaCl_2, CaCO_3$

D. $MgCl_2, MgCO_3$

Answer: C

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7. Arrange the general steps for the purification of water in a sequence.

(a) Filtration

(b) Chlorination

(c) Sedimentation

(d) Addition of chemicals

A. a c b d

B. c a b d

C. c d a b

D. a b d c

Answer: C

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8. Two persons A and B got burns one with boiling water at $100^\circ C$ and other due to steam at $100^\circ C$ respectivley. Which person is affected more?

A. A

B. B

C. Both A and B to the same extent

D. None of the above

Answer: B

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9. Which of the following dissolved gases are present in drinking water?

A. Oxygen, nitric oxide

B. Oxygen, carbon monoxide

C. Oxygen, carbon dioxide

D. Oxygen, nitrogen

Answer: C

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10. On passing electricity through acidulated water, the gaseous products obtained are collected in two separate test tubes A and B. The volume of the gas collected in test tube A is double the volume of gas collected in test tube B. Identify the two gases in test tubes A and B respectively.

A. Hydrogen and oxygen

B. Oxygen and hydrogen

C. Hydrogen peroxide and oxygen

D. Oxygen and water vapour

Answer: A

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11. Which of the following is the application of the highest specific heat capacity of water?

A. Cooling of softdrink bottles in ice

B. Cooling of earth's atmosphere after hail storm

C. Usage of water as coolant

D. Bursting of water pipes during winter in cold countries

Answer: C

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12. Assertion (A): Boiling removes both temporary and permanent hardness from water.

Reason (R): Bicarbonates of calcium and magnesium undergo decomposition on heating.

A. Both (A) and (R) are true and (R) is the correct reason for (A).

B. Both (A) and (R) are true but (R) is not the correct reason for (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: D

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13. A pressure cooker reduces cooking time because

A. increase in the boiling point of water

B. high specific heat of water

C. decrease in the boiling point of water

D. high latent heat of vapourization

Answer: A

Watch Video Solution

14. Assertion (A): Electrolysis of water results in liberation of hydrogen at anode and oxygen at cathode.

Reason (R): When burning splinter is introduced in a test tube at cathode, it is put off with a pop sound.

A. Both (A) and (R) are true and (R) is the correct reason for (A).

B. Both (A) and (R) are true but (R) is not the correct reason for (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: D

Watch Video Solution

15. When the water gets converted to ice, its volume

A. decreases

B. increases

C. remains the same

D. initially decreases and then increases

Answer: B

Watch Video Solution

Assessment Test 2

1. Which of the following salts is responsible for temporary and permanent hardness of water respectively?

A. $Mg(HCO_3)_2$ and Na_2SO_4

B. $Ca(HCO_3)_2$ and $MgCl_2$

C. $MgSO_4$ and $Mg(HCO_3)_2$

D. $CaCl_2$ and $CaSO_4$

Answer: B

Watch Video Solution

Assessment Test 3

1. Which of the following is a biodegradable substance?

A. Detergent

B. Pesticides

C. Polythene

D. Waste obtained from biogas plant

Answer: D

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Assessment Test 4

1. Match the Following

	Column - A			Column - B
(A)	Distilled water	( )	(a)	Drinking purpose
(B)	Potable water	( )	(b)	Laboratory work
(C)	Spring water	( )	(c)	Dissolved salts and rare minerals
(D)	Acidulated water	( )	(d)	Medicinal purposes
		( )	(e)	Electrolysis

A. A $\rightarrow$ b, B $\rightarrow$ a, C $\rightarrow$ d, c, D $\rightarrow$ e

B. A $\rightarrow$ c, B $\rightarrow$ b, C $\rightarrow$ c, e, D $\rightarrow$ d

C. A $\rightarrow$ b, B $\rightarrow$ c, C $\rightarrow$ d, D $\rightarrow$ e

D. A $\rightarrow$ a, B $\rightarrow$ c, e, C $\rightarrow$ d, e, D $\rightarrow$ d

Answer: A

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Assessment Test 5

1. The amount of heat energy required to increase the temperature of 'X' g of water by $10.^{\circ}\ C$ is found to be 15 cal. Calculate 'X'.

A. 0.5 g

B. 15 g

C. 1.5 g

D. 7.5 g

Answer: C

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Assessment Test 6

1. Arrange the steps in a sequence for the conversion of atmospheric water vapour into underground water.

(a) Infiltration in recharge area

(b) Water table

(c) Infiltration in zone of aeration

(d) Precipitation

(e) Aquifer

A. d a c b e

B. d c a b e

C. d c a e b

D. d a c e b

Answer: B

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Assessment Test 7

1. Water-containing salt X, of a divalent metal, when treated with a compound Y gives much lather with soap. Further, an insoluble

compound $MgCO_3$ and salt of a monovalent metal sulphate are formed. Identify X and Y, respectively.

A. $CaCl_2$, Na_2CO_3

B. $MgSO_4$, Na_2CO_3

C. $MgCl_2$, $NaHCO_3$

D. $CaSO_4$, $Mg(HCO_3)_2$

Answer: B

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Assessment Test 8

1. Arrange the steps in a sequence for the removal of microorganisms during the purification of drinking water.

(a) Lime feeder

(b) Mechanical mixing

(c) Alum feeder

(d) Sedimentation tank

(e) Passing through gravel and sand

(f) Chlorine feeder

A. c a b d e f

B. c b a d e f

C. e a b c f d

D. a b d c e f

Answer: A

Watch Video Solution

Assessment Test 9

1. What is the latent heat of fusion and latent heat of vapourisation of 10 g of ice and water respectively?

A. 800 cal, 800 cal

B. 540 cal, 540 cal

C. 800 cal, 5400 cal

D. 540 cal, 800 cal

Answer: C

Watch Video Solution

Assessment Test 10

1. Which of the following types of water does not contain dissolved gases such as oxygen and carbon dioxide?

A. Potable water

B. Distilled water

C. Saline water

D. Soft water

Answer: B

Watch Video Solution

Assessment Test 11

1. The volumetric composition of water is

A. $1:2$ ratio of hydrogen and oxygen respectively

B. $1:8$ ratio of hydrogen and oxygen respectively

C. $1:1$ ratio of hydrogen and oxygen

D. $2:1$ ratio of hydrogen and oxygen respectively

Answer: D

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Assessment Test 12

1. The solvent water is used in the car radiators. Which of the following properties of water is exploited?

A. High solubility

B. Poor conductivity

C. Maximum density

D. High specific heat

Answer: D

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Assessment Test 13

1. Assertion (A): The Clark's method involves removal of permanent hardness.

Reason (R): The Clark's method involves the addition of slaked lime which results in the removal of bicarbonates as insoluble carbonates.

A. Both (A) and (R) are true and (R) is the correct reason for (A).

B. Both (A) and (R) are true but (R) is not the correct reason for (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: D

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Assessment Test 14

1. Which among the following is based on the principle that boiling point decreases with decrease in atmosphere pressure?

A. Cooking food at sea-level takes longer period of time

B. Cooking food at higher altitudes takes longer period of time

C. Working principle of air coolers

D. Working of pressure cooker.

Answer: B

Watch Video Solution

Assessment Test 15

1. Assertion (A): The products of electrolysis of water are hydrogen and oxygen.

Reason (R): In electrolysis process of water, hydrogen ions are attracted to anode and hydroxyl ions are attracted to cathode.

A. Both (A) and (R) are true and (R) is the correct reason for (A).

B. Both (A) and (R) are true but (R) is not the correct reason for (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true.

Answer: C

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Assessment Test 16

1. When the temperature of water rises from $0^\circ C$ to $10^\circ C$,the density of water

A. decreases gradually.

B. decreases up to $4^\circ C$ and then increases.

C. increases up to $4^\circ C$ and then decreases.

D. increases gradually.

Answer: C

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Example

1. State and explain the anomalous expansion of water.

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2. What is meant by infiltration? Explain the role of infiltration in water management.

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3. The electronic configurations of two metals X and Y are 2, 8, 2 and 2, 8, 8, 2 respectively. What is the effect of the presence of hydrogen carbonate and sulphates of these metals in water?

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4. In permutit process, what is the role of the addition of the concentrated solution of the solid compound obtained due to the reaction between NaOH with HCl? Explain.

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5. Jini took a container completely filled with some ice cubes floating on it. He observed the container expecting that water to overflow after the ice melted. Can you predict what he would finally see?

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6. Why is water called universal solvent?

Watch Video Solution

7. What is the advantage of distillation by using continuous water still over distillation by using Lebig's condenser?

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8. Why is distilled water not suitable for drinking?

Watch Video Solution

Watch Video Solution

Test Your Concepts Fill In The Blanks

1. _____% of the total water available on the earth is saline water.

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2. Drinking water mainly contains small amounts of salts of _____, _____ and _____ metals.

Watch Video Solution

3. Carbon dioxide on dissolution in water forms _____.

Watch Video Solution

4. 1 g of water at $100^{\circ}C$ on heating forms 1g of steam at the same temperature by absorbing _____ cal of energy.

Watch Video Solution

5. 1g of pure water at $4^{\circ}C$ occupies a volume of _____.

Watch Video Solution

6. Water containing calcium bicarbonate produces _____ with soap.

Watch Video Solution

7. _____ volume(s) of hydrogen and _____ volume(s) of oxygen under similar conditions of temperature and pressure combine to give two volumes of water.

Watch Video Solution

8. _____ hardness is removed by Clark's method.

Watch Video Solution

9. _____ is added to prevent the evaporation of water.

Watch Video Solution

10. Watering plants by using narrow tubes is called _____.

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Test Your Concepts For Each Of The Questions Four Choices Have Been Provided Select The Correct Alternative

1. Which of the following chemicals leads to water pollution?

A. fertilisers

B. insecticides

C. pesticides

D. all the above

Answer: D

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2. Freezing point of water is $0^{\circ} C$ at _____

A. 76 cm of Hg

B. 760 cm of Hg

C. 76 mm of Hg

D. 7.6 mm of Hg

Answer: A

Watch Video Solution

3. The salts of which among the pairs of metals cause greater water pollution?

A. calcium, aluminium

B. mercury, cadmium

C. calcium, cadmium

D. calcium, mercury

Answer: B

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4. Identify the set of pure and impure water among the following

A. rain water and sea water

B. rain water and distilled water

C. sea water and river water

D. river water and ground water

Answer: A

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5. Chemical treatment of surface water can be carried out by the addition of

A. bleaching power

B. alum

C. oxygen

D. carbon dioxide

Answer: A

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6. Density of water is less than 1g/c.c _____

A. at $4^{\circ} C$

B. above $4^{\circ} C$

C. below $4^{\circ} C$

D. both (b) and (c)

Answer: D

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7. Latent heat of vaporisation of water,

A. 270 cal/g

B. 540 cal/g

C. 80 cal/g

D. 180 cal/g

Answer: B

Watch Video Solution

8. Which of the following processes can be used to remove both temporary and permanent hardness?

A. Clark's method

B. addition of washing soda

C. boiling

D. all the above

Answer: B

Watch Video Solution

9. Which of the following terms is not related to underground water?

A. infiltration

B. aquifer

C. water table

D. potable water

Answer: D

Watch Video Solution

10. Which of the following water is suitable for drinking?

A. soft water

B. demineralised water

C. potable water

D. distilled water

Answer: C

Watch Video Solution

11. When the water gets converted to ice, its volume

A. decreases

B. increases

C. remains the same

D. initially decreases and then increases

Answer: B

Watch Video Solution

12. Which of the following dissolved gases are present in drinking water?

A. oxygen and nitric oxide

B. oxygen and carbon monoxide

C. oxygen and carbon dioxide

D. oxygen and nitrogen

Answer: C

Watch Video Solution

13. Which of the following salts is responsible for temporary and permanent hardness of water, respectively?

A. $Mg(HCO_3)_2$ and Na_2SO_4

B. $Ca(HCO_3)_2$ and $MgCl_2$

C. $MgSO_4$ and $Mg(HCO_3)_2$

D. $CaCl_2$ and $CaSO_4$

Answer: B

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14. Arrange the following terms in sequence from source to supply.

(a) Chlorination

(b) Sedimentation

(c) Filtration

(d) Storage water tank

(e) Lakes

A. 53142

B. 13425

C. 52314

D. 23145

Answer: C

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15. Arrange the terms in sequence of water cycle starting from water bodies.

Precipitation

(b) Condensation

(c) Water vapour

(d) Infiltration

(e) Ground water table

A. 54231

B. 32145

C. 35412

D. 52314

Answer: B

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Test Your Concepts Match The Column A And Column B

1. Match the following columns

Column A	Column B
A. Hard water	( ) a. Reverse osmosis
B. Soft water	( ) b. Rain water
C. Desalinated water	( ) c. Presence of Ca^{+2} and Mg^{+2}
D. Lake water	( ) d. Scum formation
	( ) e. Lather formation

Watch Video Solution

2. Match the following columns

Column A	Column B
A. Potable water	( ) a. Electrolysis
B. Distilled water	( ) b. Irrigation
C. Acidulated water	( ) c. Pure water
D. River water	( ) d. Laboratory purpose
	( ) e. Human consumption

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Column A	Column B
A. Sedimentation	( ) a. Softened water
B. Filtration	( ) b. Addition of alum
C. Chlorination	( ) c. Removal of suspended impurities
D. Permutit	( ) d. Purification of drinking water

3.

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4. Why does river water contain lot of impurities?

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5. What is the volumetric composition of water?

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Test Your Concepts Very Short Answer Type Questions

1. What is the role of water in the evolution of aquatic life?

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2. Name the most vital process where water takes part in the reaction in which one of the products is a supporter of life.

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3. What is an aquifer?

Watch Video Solution

4. Underground water does not contain suspended impurities. Why?

Watch Video Solution

5. What is meant by rain water harvesting?

Watch Video Solution

6. Distinguish between hard water and soft water.

Watch Video Solution

7. Compare the density of water at $4^{\circ} C$ with that below and above $4^{\circ} C$.

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8. What are the values of latent heat of fusion of ice and latent heat of vapourisation for water?

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9. Why is spring water used for medicinal purpose?

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10. Name the substance added to water stored in reservoirs in regions with scanty rainfall. Give reason.

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11. What is permutit? Give its formula?

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12. Why is ordinary water a good conductor of electricity?

Watch Video Solution

13. How are springs formed?

Watch Video Solution

14. What is desalination?

Watch Video Solution

15. Define electrolysis.

Watch Video Solution

16. Explain the factors responsible for the depletion of water table.

Watch Video Solution

17. Distinguish between temporary hardness and permanent hardness.

Watch Video Solution

18. Why is rain water considered as the purest form of natural water?

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Test Your Concepts Short Answer Type Questions

1. What is meant by infiltration? Explain the role of infiltration in water management.

Watch Video Solution

2. Explain the factors responsible for the depletion of water table.

Watch Video Solution

3. Name some agricultural practices which help in water management.

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4. How are bicarbonates added to water? How can they be removed by boiling? Give equations.

Watch Video Solution

5. Explain the removal of temporary hardness of water by Clark's method. Give equations.

Watch Video Solution

6. Give the characteristics of potable water.

Watch Video Solution

7. Explain the role of alum in the purification of water.

Watch Video Solution

8. Describe the various stages of purification of drinking water

Watch Video Solution

9. Explain the process by which both removal of temporary hardness and permanent hardness is possible.

Watch Video Solution

10. Write a short note on water management.

Watch Video Solution

11. Draw a neat line sketch of water cycle.

Watch Video Solution

12. What is depletion of water table?

Watch Video Solution

13. How can you harvest water in household?

Watch Video Solution

14. Draw a line sketch of distribution of water on earth's surface.

Watch Video Solution

15. List important uses of water.

Watch Video Solution

16. Discuss five important physical properties of water.

Watch Video Solution

17. Describe various sources of water.

Watch Video Solution

Test Your Concepts Essay Type Questions

1. Give reasons for the following:

(a) Sea water is unfit for usage and consumption

(b) River water is considered as fresh water.

(c) Underground water does not contain suspended impurities.

(d) Distilled water is used for laboratory processes.

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2. Explain water cycle in detail.

Watch Video Solution

3. Describe the various steps involved in getting clear water from wastewater.

Watch Video Solution

4. Causes of water pollution are

Watch Video Solution

5. Explain the factors responsible for the depletion of water table.

Watch Video Solution

6. Mention suitable terms for the following statements.

(a) Decrease in density of water on decreasing temperature from $4^{\circ} C$ to $0^{\circ} C$ which is opposite to the normal trend.

(b) The underground layer of water bearing permeable rock present below the water table

(c) The natural process of adding water to atmospheric air and its subsequent condensation to rain water.

(d) Type of chemical reaction carried out when electricity is passed through water.

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Concept Application Level 1 True Or False

1. Underground water does not contain suspended impurities. Why?

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2. Saline water contains large amounts of dissolved salts.

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3. 1g of pure water at $4^{\circ} C$ occupies a volume of _____.

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4. Water containing calcium bicarbonate produces _____ with soap.

Watch Video Solution

5. Hard water is fit for dyeing clothes.

Watch Video Solution

6. Cation exchange resin is regenerated by passing HCl solution.

Watch Video Solution

7. Salt is added to pure water to increase its electrical conductivity.

Watch Video Solution

8. Two volumes of hydrogen and one volume of oxygen compose one volume of water.

Watch Video Solution

9. _____ hardness is removed by Clark's method.

Watch Video Solution

10. Specific heat of water is 1 cal $g^{-1}.^{\circ} C^{-1}$

Watch Video Solution

Concept Application Level 1 Fill In The Blanks

1. _____ and _____ are two types of underground water.

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2. Hydrated sodium aluminium silicate is called _____.

Watch Video Solution

3. The exhausted permutit contains _____ and _____ ions in place of Na^+ ions.

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4. In sedimentation process, alum _____ the process of precipitation of suspended impurities.

Watch Video Solution

5. Addition of _____ releases _____ which helps in killing the harmful bacteria present in water.

Watch Video Solution

6. Addition of acid to water, _____ the conductivity.

Watch Video Solution

7. In electrolysis of water _____ gas is liberated at cathode.

Watch Video Solution

8. The change of water into water vapour at $30^{\circ}C$ at slow rate is called _____.

Watch Video Solution

9. Small water droplets associated with dust particles to form larger aggregates called _____

Watch Video Solution

10. Percentage of water in animals varies from _____ to _____.

Watch Video Solution

Concept Application Level 1 Select The Correct Alternative

1. Which of the following processes is not involved in the purification of drinking water?

A. sedimentation

B. filtration

C. chlorination

D. distillation

Answer: D

Watch Video Solution

2. Which of the following sources of water is not used for drinking purpose due to dissolved salts present in them?

A. rain water

B. sea water

C. spring water

D. river water

Answer: B

Watch Video Solution

3. Density of water is maximum

A. at $0^\circ C$

B. at $4^\circ C$

C. above $4^\circ C$

D. below $4^\circ C$

Answer: B

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4. Which of the following substances used in agriculture does not cause water pollution to large extent?

A. manures

B. pesticides

C. fertilisers

D. insecticides

Answer: A

Watch Video Solution

5. Metals present in permutit are

A. Na and K

B. Na and Al

C. Al and K

D. K and Al

Answer: B

Watch Video Solution

6. Which of the following has the highest specific heat?

A. petrol

B. mercury

C. oil

D. water

Answer: D

Watch Video Solution

7. Which of the following types of water is a bad conductor of electricity?

A. saline water

B. tap water

C. river water

D. distilled water

Answer: D

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8. Which of the following is not the control measure of water pollution?

A. usage of natural manure

B. usage of drip irrigation

C. usage of fertilisers

D. usage of natural pesticides

Answer: C

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9. The pair of ions which does not cause hardness of water is

A. sulphate, chloride

B. bicarbonate, chloride

C. bicarbonate, sulphate

D. nitrate, phosphate

Answer: D

Watch Video Solution

10. Regeneration of anion exchange resin is carried out by passing

A. sodium hydroxide solution

B. sodium chloride solution

C. sodium bicarbonate solution

D. All the above

Answer: A

Watch Video Solution

11. Spring water usually contains

A. dissolved salts

B. minerals

C. suspended impurities

D. both 1 and 2

Answer: D

Watch Video Solution

12. Which of the following types of water does not contain dissolved gases such as oxygen and carbon dioxide?

A. potable water

B. distilled water

C. saline water

D. soft water

Answer: B

Watch Video Solution

13. Which of the following chemical substances can be used for removing permanent hardness of water by precipitation reaction?

A. baking soda

B. washing soda

C. alum

D. quick lime

Answer: B

Watch Video Solution

14. When the temperature of water rises from $0^\circ C$ to $10^\circ C$, the density of water

A. decreases gradually

B. decreases up to $4^\circ C$ and then increases

C. increases up to $4^{\circ C}$ and then decreases

D. increases gradually

Answer: C

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15. The volumetric composition of water is

A. 1 : 2 ratio of hydrogen and oxygen, respectively

B. 1 : 8 ratio of hydrogen and oxygen, respectively

C. 1 : 1 ratio of hydrogen and oxygen, respectively

D. 2 : 1 ratio of hydrogen and oxygen, respectively

Answer: A

Watch Video Solution

16. Arrange the steps in a sequence for the removal of microorganisms during the purification of drinking water.

(a) Lime feeder

(b) Mechanical mixing

(c) Alum feeder

(d) Sedimentation tank

(e) Passing through gravel and sand

(f) Chlorine feeder

A. 1324

B. 1243

C. 2345

D. 2341

Answer: A

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17. Arrange statements in sequence of increasing order of heat content.

(a) Ice of 10 g mass at $10^\circ C$ (b) water of 10 g mass at $10^\circ C$

(c) Ice of 10 g mass at $40^\circ C$ (d) Water of 10 g mass at $40^\circ C$

(e) Steam of 10 g mass at $10^\circ C$

A. 13245

B. 54312

C. 12534

D. 12543

Answer: A

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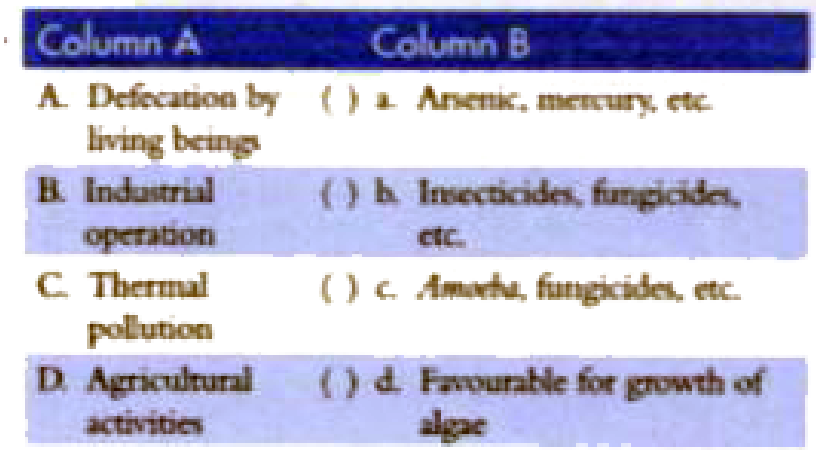
Concept Application Level 1 Match The Column

1. Match the following columns



Column A		Column B
A. Defecation by living beings	( ) a.	Arsenic, mercury, etc.
B. Industrial operation	( ) b.	Insecticides, fungicides, etc.
C. Thermal pollution	( ) c.	*Amoeba*, fungicides, etc.
D. Agricultural activities	( ) d.	Favourable for growth of algae

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2. Match the following columns

Column A	Column B
A. Removal of hardness by boiling	( ) a. Resins
B. Clark's method	( ) b. Can remove temporary and permanent hardness
C. Addition of washing soda	( ) c. Decomposition reaction
D. Ion exchange method	( ) d. Addition of slaked lime

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3.

Column A	Column B
A. Specific heat of water	( ) a. 250 cal/g°C
B. Latent heat of fusion of ice	( ) b. 0°C
C. Latent heat of vaporisation of water	( ) c. 100°C
D. Temperature at which melting of ice starts under normal atmospheric pressure	( ) d. 1 cal/g°C
E. Temperature at which boiling of water starts under normal atmospheric pressure	( ) e. 80 cal/g°C
	( ) f. 540 cal/g°C

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Concept Application Level 2 Select The Correct Alternative

1. What is the latent heat of fusion and latent heat of vapourisation of 10 g of ice and water respectively?

A. 800 cal and 800 cal

B. 540 cal and 540 cal

C. 800 cal and 5400 cal

D. 540 cal and 800 cal

Answer: C

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2. Which of the following properties of iceberg led to the sinking of the titanic ship?

A. heavy water currents

B. relatively higher density of ice

C. 9/10 of iceberg submerged below sea water and 1/10 above the sea water

D. none of the above

Answer: C

Watch Video Solution

3. Which of the following processes is not involved in making surface water potable?

A. sedimentation

B. chlorination

C. filtration

D. distillation

Answer: D

Watch Video Solution

4. The solvent water is used in the car radiators. Which of the following properties of water is exploited?

A. high solubility

B. poor conductivity

C. maximum density

D. high specific heat

Answer: D

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5. A divalent metal salt X, which contributes to hardness of water, combines with washing soda and forms an insoluble salt Y and common salt. Salt Y is also used for the laboratory preparation of CO_2. Identify X and Y, respectively.

A. $CaSO_4, CaCO_3$

B. $MgSO_4, MgCO_3$

C. $CaCl_2, CaCO_3$

D. $MgCl_2, MgCO_3$

Answer: C

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6. The amount of heat energy required to increase the temperature of 20 g of water by $1^{\circ} C$ is _____.

A. 10 cal

B. 20 cal

C. 15 cal

D. 2 cal

Answer: B

Watch Video Solution

7. On passing electricity through acidulated water, the gaseous products obtained are collected in two separate test tubes A and B. The volume of the gas collected in test tube A is double the volume of gas collected in test tube B. Identify the two gases in test tubes A and B respectively.

A. hydrogen and oxygen

B. oxygen and hydrogen

C. hydrogen peroxide and oxygen

D. oxygen and water vapour

Answer: A

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8. Which of the following types of water is a bad conductor of electricity?

A. distilled water

B. water obtained in ion-exchange process

C. mineral water

D. Both (a) and (b)

Answer: D

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9. A pressure cooker reduces cooking time because

A. increase in the boiling point of water

B. high specific heat of water

C. decrease in the boiling point of water

D. high latent heat of vaporisation

Answer: A

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10. Wealthy but not healthy agriculture can be achieved by

A. introducing biogas plants

B. using natural pesticides

C. using drip irrigation

D. introducing artificial fertilisers

Answer: D

Watch Video Solution

11. Two persons A and B got burns, one with boiling water at $100^\circ C$ and other due to steam at $100^\circ C$, respectively. Which person is affected more?

A. A

B. B

C. Both A and B to the same extent

D. none of the above

Answer: B

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12. Aquatic animals are able to survive in water bodies like rivers and oceans during winter when the atmospheric temperature is $-10^{\circ}C$. This is because

A. density of ice is less than water

B. density of water is minimum at $4^{\circ}C$

C. ice is a poor conductor of heat

D. both 1 and 3

Answer: D

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13. Which of the following elements is used for the purification of surface water to make it free from germs so that it can be used for drinking purpose?

A. oxygen

B. fluorine

C. chlorine

D. carbon

Answer: C

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14. Which of the following is the application of the highest specific heat capacity of water?

A. cooling of soft drink bottles in ice

B. cooling of earth's atmosphere after a hail storm

C. cool breeze from air coolers

D. bursting of water pipes during winter in cold countries

Answer: C

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15. Water-containing salt X, of a divalent metal, when treated with a compound Y gives much lather with soap. Further, an insoluble compound $MgCO_3$ and salt of a monovalent metal sulphate are formed. Identify X and Y, respectively.

A. $CaCl_2$, Na_2CO_3

B. $MgSO_4$, Na_2CO_3

C. $MgClNaHCO_3$

D. $CaSO_4$, $Mg(HCO_3)_2$

Answer: B

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16. The amount of heat energy required to increase the temperature of 'X' g of water by $10.^\circ C$ is found to be 15 cal. Calculate 'X'.

A. 0.5 g

B. 15 g

C. 1.5 g

D. 7.5 g

Answer: C

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Concept Application Level 2

1. The water obtained in ion-exchange process is

A. devoid of dissolved salts and minerals

B. devoid of only minerals

C. potable

D. called mineral water

Answer: A

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2. Which among the following is based on the principle that boiling point decreases with decrease in atmosphere pressure?

A. Cooking food at sea level takes longer period of time.

B. Cooking food at higher altitudes takes longer period of time.

C. Working principle of air coolers.

D. Working principle of pressure cooker.

Answer: B

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3. A group of students accompanied by their science teacher went trekking. After reaching the top of the hill they felt hungry. The Teacher told them that they would have to bear the hunger as cooking of food is slow and takes a longer time at the top of the hill. The students wanted

to known the reason for the above fact. The Teacher explained the reason for the above fact till the food was cooked. Can you predict the explanation given by the teacher?

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4. In a science exhibition, a student called Rishi performed the following experiment. She took two containers of the same dimensions and filled one of them with wax and the other one with ice. She placed both of them in a boiling water bath. What difference could she observe during the melting of these two substances? Also predict the reason for the observed difference.

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5. Why is sea water not suitable for drinking? How is it made potable?

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6. Hot water bags are generally used for reducing body pain. Can they also be used to keep us warm in winter? Explain.

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7. Though ice is the solid form of water, it floats on the surface of water. Justify.

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8. Calculate the amount of heat energy required to increase the temperature of 10 g of water through $12^{\circ} C$.

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9. During summer vacations, Aryan went for a trip to Tirupathi in an old car along with his family. During the journey, the driver stopped the car beside a hotel and brought a can full of water and poured it into the

radiator of the car. Aryan's son, Mouryan wanted to know the reason for pouring water into the radiator and asked his father who is a mechanical engineer by profession the reason. Aryan explained the role of water in the radiator of the car engine. Can you predict the explanation given by Aryan?

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10. Calculate the ratio of the amount of heat energy lost during the conversion of 20 g of water at $0^{\circ}C$ to ice at $0^{\circ}C$ to heat energy gained during the conversion of same amount of water at $100^{\circ}C$ to steam at $100^{\circ}C$.

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11. Two open containers A and B are filled with water and in container A, cetyl alcohol is added. Both the containers are placed at $40^{\circ}C$. Predict the level of water in the two containers after some time and give reasons.

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12. The electronic configurations of two metals X and Y are 2, 8, 2 and 2, 8, 8, 2, respectively. What is the effect of the presence of hydrogen carbonate and sulphates of these metals in water?

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13. A group of students went for an excursion to Shimla in the month of November. A science teacher also accompanied them. There the temperature fell to $-10^{\circ}C$. They took some ice cubes and subjected them to heating while keeping a thermometer in the container. The students monitored the readings of thermometer till the entire ice melted into water. All of them went to their science teacher and showed him their observations. He asked them to discuss among themselves and give a proper justification for the observations on the readings at various stages.

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14. An element with electronic configuration 2, 8, 1 forms a compound with carbonate. How does this compound remove both temporary and permanent hardness of water?

View Text Solution

15. In permutit process, what is the role of the addition of the concentrated solution of the solid compound obtained due to the reaction between NaOH with HCl? Explain.

View Text Solution

16. Master Vishnu and his sister Jishnu went to their uncle's village to spend their summer vacation. One day, Jishnu was pestering her uncle for a soft drink. Vishnu's uncle took both of them to a shop where soft drink bottles were kept in an insulated box containing ice. Vishnu's uncle who is a physical science teacher, with an intention of testing Vishnu, posed a

question to him regarding the concept involved in cooling of soft drinks by keeping them in ice. Vishnu who is a student of TIME, IITF impressed his uncle by explaining the above phenomenon with respect to the concept of latent heat of fusion of ice. Can you also explain the concept like Vishnu?

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Concept Application Level 3

1. Why is ion exchange process preferred over permutit process for the purification of water?

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2. In cold countries, water pipes burst in winter. Explain.

View Text Solution

3. Generally when a person jumps into water in any water body, he is expected to sink. But he tends to float in the Dead Sea. How do you account for this?

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4. During the conversion of surface water to potable water, chlorination is an important step. Give reasons.

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5. Thermal pollution of water leads to the death of biotic life. Explain.

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Assesment Test Test 1 Select The Correct Alternative From The Given Choices

1. Which of the following chemical substances can be used for removing permanent hardness of water by precipitation reaction?

A. baking soda

B. washing soda

C. alum

D. quick lime

Answer: B

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2. Wealthy but not healthy agriculture can be achieved by

A. introducing biogas plants

B. using natural pesticides such as neem oil

C. using drip irrigation

D. using artificial fertilisers

Answer: D

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3. Match the following:

Column A	Column B
(A) Rain water	( ) (a) Free of suspended impurities
(B) Rivers and lakes	( ) (b) Purest form of natural water

Column A	Column B
(C) Underground water	( ) (c) Water obtained after reverse osmosis
(D) Demineralised water	( ) (d) Water coming out of an ion exchange apparatus
	( ) (e) Fresh water for consumption for various activities

A. $A \to e, B \to b, C \to a, D \to d, e$

B. $A \to b, B \to e, C \to a, D \to d$

C. $A \to b, B \to a, C \to d, D \to e$

D. $A \to b, B \to a, C \to b, D \to d$

Answer: B

View Text Solution

4. The amount of heat energy required to increase the temperature of 20 g of water by $1^\circ C$ is ____.

A. 10 cal

B. 20 cal

C. 15 cal

D. 2 cal

Answer: B

View Text Solution

5. Arrange the steps in a sequence for the formation of rainfall

(1) formation of micelles

(2) condensation

(3) evaporation

(4) formation of clouds

(5) precipitation

A. 3 5 4 2 1

B. 3 2 4 1 5

C. 3 2 1 4 5

D. 1 2 3 5 4

Answer: C

View Text Solution

6. A divalent metal salt X, which contributes to hardness of water, combines with washing soda and forms an insoluble salt Y and common

salt. Salt Y is also used for the laboratory preparation of CO_2. Identify X and Y, respectively.

A. $CaSO_4$, $CaCO_3$

B. $MgSO_4$, $MgCO_3$

C. $CaCl_2$, $CaCO_3$

D. $MgCl_2$, $MgCO_3$

Answer: C

Watch Video Solution

7. Arrange the general steps for the purification of water in a sequence.

(1) filtration

(2) chlorination

(3) sedimentation

(4) addition of chemicals

A. 1 3 2 4

B. 3 1 2 4

C. 3 4 1 2

D. 1 2 4 3

Answer: C

View Text Solution

8. Two persons A and B got burns: one with boiling water at $100^\circ C$ and other due to steam at $100^\circ C$, respectively. Which person is affected more?

A. A

B. B

C. Both A and B to the same extent

D. none of the above

Answer: B

View Text Solution

9. Which of the following dissolved gases are present in drinking water?

A. oxygen and nitric oxide

B. oxygen and carbon monoxide

C. oxygen and carbon dioxide

D. oxygen and nitrogen

Answer: C

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10. On passing electricity through acidulated water, the gaseous products obtained are collected in two separate test tubes A and B. The volume of the gas collected in test tube A is double the volume of gas collected in test tube B. Identify the two gases in test tubes A and B, respectively.

A. hydrogen and oxygen

B. oxygen and hydrogen

C. hydrogen peroxide and oxygen

D. oxygen and water vapour

Answer: A

View Text Solution

11. Which of the following is the application of the high specific heat capacity of water?

A. cooling of soft drink bottles in ice

B. cooling of the earth's atmosphere after a hail storm

C. Usage of water as a coolant

D. bursting of water pipes during winter in cold countries

Answer: C

View Text Solution

12. Assertion (A): Boiling removes both temporary and permanent hardness from water.

Reason (R): Bicarbonates of calcium and magnesium undergo decomposition on heating.

A. Both (A) and (R) are true and (R) is the correct reason for (A).

B. Both (A) and (R) are true but (R) is not the correct reason for (A).

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: D

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13. The pressure cooker reduces the cooking time because of

A. increase in the boiling point of water

B. high specific heat of water

C. decrease in the boiling point of water

D. high latent heat of vaporisation

Answer: A

View Text Solution

14. Assertion (A): Electrolysis of water results in liberation of hydrogen at anode and oxygen at cathode.

Reason (R): When burning splinter is introduced in a test tube at cathode, it is put off with a pop sound.

A. Both (A) and (R) are true and (R) is the correct reason for (A).

B. Both (A) and (R) are true but (R) is not the correct reason for (A).

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: D

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15. When water gets converted into ice, its volume

A. decreases

B. increases

C. remains the same

D. initially decreases and then increases

Answer: B

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Assesment Test Test 2 Select The Correct Alternative From The Given Choices

1. Which of the following salts is responsible for temporary and permanent hardness of water, respectively?

A. $Mg(HCO_3)_2$ and Na_2SO_4

B. $Ca(HCO_3)_2$ and $MgCl_2$

C. $MgSO_4$ and $Mg(HCO_3)_2$

D. $CaCl_2$ and $CaSO_4$

Answer: B

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2. Which of the following is a biodegradable substance?

A. detergent

B. pesticide

C. polythene

D. waste obtained from a biogas plant

Answer: D

Watch Video Solution

3. Match the following:

Column A	Column B
(A) Distilled water	( ) (a) Drinking purpose
(B) Potable water	( ) (b) Laboratory work
(C) Spring water	( ) (c) Dissolved salts and rare minerals
(D) Acidulated water	( ) (d) Medicinal purposes
	( ) (e) Electrolysis

A. $A \to b, B \to a, C \to d, D \to e$

B. $A \to c, B \to b, C \to c, D \to d$

C. $A \to b, B \to c, C \to d, D \to e$

D. $A \to a, B \to c, C \to d, D \to b$

Answer: A

View Text Solution

4. The amount of heat energy required to increase the temperature of X g of water by $10^{\circ} C$ is found to be 15 cal. Calculate X.

A. 0.5 g

B. 15 g

C. 1.5 g

D. 7.5

Answer: C

View Text Solution

5. Arrange the steps in a sequence for the conversion of atmospheric water vapour into underground water.

(1) infiltration in recharge area

(2) water table

(3) infiltration in zone of aeration

(4) precipitation

(5) Aquifer

A. 4 1 3 2 5

B. 4 3 1 2 5

C. 4 3 1 5 2

D. 4 1 3 5 2

Answer: B

View Text Solution

6. Water-containing salt X, of a divalent metal, when treated with a compound Y gives much lather with soap. Further, an insoluble compound $MgCO_3$ and salt of a monovalent metal sulphate are formed. Identify X and Y, respectively.

A. $CaCl_2$, Na_2CO_3

B. $MgSO_4$, Na_2CO_3

C. $MgCl_2, NaHCO_3$

D. $CaSO_4, Mg(HCO_3)_2$

Answer: B

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7. Arrange the steps in a sequence for the removal of microorganisms during the purification of drinking water.

(1) lime feeder

(2) mechanical mixing

(3) alum feeder

(4) sedimentation tank

(5) passing through gravel and sand

(6) chlorine feeder

A. 3 1 2 4 5 6

B. 3 2 1 4 5 6

C. 5 1 2 3 6 4

D. 1 2 4 3 5 6

Answer: A

View Text Solution

8. What is the latent heat of fusion and latent heat of vaporisation of 10 g of ice and water, respectively?

A. 800 cal, 800 cal

B. 540 cal, 540 cal

C. 800 cal, 5400 cal

D. 540 cal, 800 cal

Answer: C

View Text Solution

9. Which of the following types of water does not contain dissolved gases such as oxygen and carbon dioxide?

A. potable water

B. distilled water

C. saline water

D. soft water

Answer: B

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10. The volumetric composition of water is

A. 1 : 2 ratio of hydrogen and oxygen, respectively

B. 1 : 8 ratio of hydrogen and oxygen, respectively

C. 1 : 1 ratio of hydrogen and oxygen, respectively

D. 2 : 1 ratio of hydrogen and oxygen, respectively

Answer: D

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11. The solvent water is used in car radiators. Which of the following properties of water is exploited?

A. high solubility

B. poor conductivity

C. maximum density

D. high specific heat

Answer: D

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12. Assertion (A): The Clark's method involves removal of permanent hardness.

Reason (R): The Clark's method involves the addition of slaked lime which results in the removal of bicarbonates as insoluble carbonates.

A. Both (A) and (R) are true and (R) is the correct reason for (A).

B. Both (A) and (R) are true but (R) is not the correct reason for (A).

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: D

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13. Which among the following is based on the principle that boiling point decreases with decrease in atmospheric pressure?

A. Cooking food at sea level takes longer period of time.

B. Cooking food at higher altitudes takes longer period of time.

C. Working principle of air coolers.

D. Working principle of a pressure cooker.

Answer: B

View Text Solution

14. Assertion (A): The products of electrolysis of water are hydrogen and oxygen.

Reason (R): In electrolysis process of water, hydrogen ions are attracted to anode and hydroxyl ions are attracted to cathode.

A. Both (A) and (R) are true and (R) is the correct reason for (A).

B. Both (A) and (R) are true but (R) is not the correct reason for (A).

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: C

View Text Solution

15. When the temperature of water rises from $0^\circ C$ to $10^\circ C$, the density of water

A. decreases gradually

B. decreases up to $4^\circ C$ and then increases

C. increases up to $4^\circ C$ and then decreases

D. increases gradually

Answer: C

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