



CHEMISTRY

BOOKS - PEARSON IIT JEE

FOUNDATION

WATER, SOLUTION, SOLUBILITY AND HYDROGEN

Very Short Answer Types Questions

1. Why does ice float in water ?



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2. What do you mean by hydrated salt ? Give an example.



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3. What do you mean by solubility ?



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4. What is the difference between surface water and underground water ?



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5. In alloys constituent metals retain their _____ properties .



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6. Name some compounds where the presence of water molecules provides colour of those substance.



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7. How is fractional crystallization process related to solubility curve ?



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8. What do you mean by desiccating agent ?



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9. Differentiate between dilute and concentrated solutions.



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10. The number of water molecules present in a molecule of copper sulphate crystal is



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11. Solubility of copper sulphate in water is 20.7 grams at $20^{\circ}C$. What do you mean by this statement ?



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12. How does freezing point changes due to the presence of impurities ?



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13. Name two metals which react with moisture.



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14. How is hydrogen gas used in metallurgy?

Give an example.



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15. What is the value of specific heat capacity of water ? How much heat energy is required to increase the temperature of 5 grams of water to $1^{\circ}C$?



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16. When phosphorus pentoxide reacts with water, the product is _____ .



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17. What is meant by hardening is oils ? How is it done ?



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18. How is water gas formed ?



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19. _____ can catalyse the reaction between dry chlorine and hydrogen.





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20. What is the difference between latent heat of fusion and latent heat of vapourisation ?

Discuss the difference taking water as an example.



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21. What is unit cell of a crystal ?



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22. Will there be any change in the boiling point of water if we go to the top of a hill ?

Give reasons.



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23. Complete the following table :

| Solution | Solvent | Solute |
|--|---------|--------|
| 1. Sugar solution | | |
| 2. Solution of alcohol and water (5% alcohol, 95% water) | | |
| 3. Blue vitriol | | |
| 4. Brass | | |
| 5. Hydrogen adsorbed by platinum | | |



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24. Name the acid formed by the reaction between SO_2 gas and water . Also write the reaction involved.



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25. Why is granulated zinc used for the preparation of hydrogen gas ?



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26. Hydrated copper sulphate is not considered an efflorescent substance . Give reason.



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27. What happens when steam is passed over hot magnesium metal /



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28. Differentiate between efflorescent and deliquescent substances.



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29. What is meant by occlusion ? Give one example.



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30. State whether the solution is a mixture or a compound . Justify your answer,



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Short Answer Type Questions

1. Define specific heat capacity .



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2. A piece of red litmus paper is dipped into the water kept in beaker A and B.

(a) In beaker 'A' some amount of CaO was poured.

(b) SO_2 gas was passed through beaker 'B'

Write the observation made in both the cases.



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3. What is the difference between deliquescent substance and hygroscopic substance ?





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4. How are fog and mist formed ?



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5. Water obtained from which source contains more minerals and why ?



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6. What are the different factors on which solubility of a solid in a liquid depend ? Explain with reason.



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7. In which way is water useful for generating electricity ?



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8. Establish logically that water is a compound.



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9. Explain the principle of atomic hydrogen torch.



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10. How can hydrogen be prepared from natural gas ?



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11. Why is pure water a bad conductor of electricity ?



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12. Give some examples of reactions where metal oxides react with hydrogen.



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13. Differentiate solvent and solute with an example each when

(a) both are in the same physical state and

(b) the physical state of the solute and the solvent is different .



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Essay Type Questions

1. Discuss in detail Bosch process of preparation of hydrogen gas.



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2. Discuss the different physical properties of water with respect to the various uses.



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3. What are solubility curves ? Explain different areas of applications of solubility curves.



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4. Explain the general methods of preparation of hydrogen giving one example each . Among these, which method is preferred for laboratory preparation and why ?



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5. Write the effect of impurities and external pressure on the freezing point and boiling point of water. Explain with examples.



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Concept Application Level 1

1. Aqueous solutions are good conductors in comparison to its corresponding pure solvent.

True or False



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2. Soluble impurities present in water increase the freezing point of water. True or False?



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3. Solubility curves can be used for comparing the solubility of different substances at a given temperature .



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4. The freezing point of water decreases with a decrease in pressure . True or False



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5. The density of water is maximum at 4 K.



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6. Blue coloured $CuSO_4$ can act a dehydrating agent. Yes or No?



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7. Alloys are homogeneous mixtures. Give examples



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8. _____ substance when exposed to moisture dissolve in it.



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9. Metallic oxides on reaction with water give _____.



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10. A solution that contains more solute than the saturated solution at a given temperature _____ solution .



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11. Due to its high _____, water is called as universal solvent.



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12. the number of oxygen atoms present in five molecules of ferrosferric oxide is _____.



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13. The formula for glauber salt is _____.



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14. Salts with water of crystallization are called _____ salts.



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15. Which among the following is not a suspension ?

A. Iodine in potassium iodide

B. Fog

C. Paints

D. Aerosol sprays

Answer: A::C



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16. The solubility of $CaSO_4$

A. increase with increase in temperature

B. decrease with increase in temperature

C. increase and then decrease with
increase in temperature

D. decrease and then increase with
increase in temperature

Answer: C



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17. If Glauber salt, anhydrous calcium chloride, calcium oxide and concentrated H_2SO_4 are kept in air tight container A,B, C,D respectively , in which container pressure becomes more ?

A. A

B. B

C. C

D. D

Answer: A



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18. Which among the following elements does not float on water /

A. Na

B. K

C. Ca

D. Ca,K

Answer: C



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19. 50 g of oil 'A' and 100 g of oil 'B' are taken in separate containers at same temperature. Specific heat of oil 'B' is double to that of oil 'A'. Both are heated in such a way that increase in temperature is also same. Calculate the ratio of heat required to be supplied for increasing the temperature.

A. 1 : 2

B. 1 : 1

C. 4 : 1

D. 1 : 4

Answer: C::D



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20. Anhydride of sulphurous acid is

A. Sulphur dioxide

B. sulphate ion

C. sulphur trioxide

D. Sulphite ion

Answer: A::C



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21. Which of the following compounds is not associated with water molecules ?

A. Blue vitrol

B. Nitre

C. Washing soda

D. Epsom salt

Answer: B::C



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22. When two substance A and B of same mass are heated under similar conditions number of free surfaces have been found to reduce to zero from one. If A maintains constancy in the

temperature for a longer time than B during heating , then

A. Latent heat of fusion of A is more than that of B.

B. latent heat of vapourisation of A is more than that of B

C. latent heat of fusion of B is more than that of A.

D. latent heat of vapourisation of B is more than that of A.

Answer: B



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23. The specific heat capacity of water is

A. more than petrol and kerosene

B. less than oil and petrol

C. less than kerosene

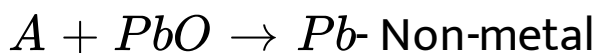
D. less than honey and oil

Answer: A::C



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24. Reaction: Non-metal + H_2A



If 'A' formed in the above reaction has rotten egg smell, identify the non-metal

A. N

B. P

C. S

D. O

Answer: C



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25. Identify the binary solution among the following .

A. Steel

B. Bronze

C. Nichrome

D. Gun metal

Answer: C



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26. Hydrogen acts as an oxidizing agent when it

A. reacts with highly electropositive metals

B. burns in the presence of O_2

C. forms ammonia when it reacts with nitrogen

D. passes through boiling sulphur and
forms H_2S gas

Answer: A::C



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27. Tyndal effect cannot be shown by

A. smoke

B. dust particles present in air

C. fog

D. iron powder in hydrochloric acid.

Answer: C::D



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28. Sodium catches fire and burns with a

A. lilac flame

B. golden yellow flame

C. blue flame

D. green flame

Answer: B::C



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29. Which of the following metals on reaction with steam provides a coating over the metal and prevents further reaction ?

A. Al

B. Ca

C. Mg

D. K

Answer: A::C



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30. The brown coloured substance formed when steam is passed over red hot iron is

- A. Ferric oxide
- B. rust
- C. ferrosferric oxide
- D. ferrous oxide

Answer: C



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31. Which among the following metals react only with steam ?

A. K

B. Ca

C. Mg

D. Al

Answer: C::D



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32. Crystals can be made

- A. by cooling hot saturated solution
- B. by evaporating unsaturated solution slowly
- C. by cooling a fused mass
- D. All of the above

Answer: C::D



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33. Washing soda is an example of a/an _____ substance .

- A. efflorescent
- B. deliquescent
- C. hygroscopic
- D. Both (1) and (2)

Answer: A::C



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34. Which among the following substance acts as a desiccating agent ?

A. Anhydrous calcium chloride

B. Calcium oxide

C. Hydrated copper sulphate

D. Anhydrous sodium chloride

Answer: B::C



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35. Which of the following metals is unsuitable for the preparation of hydratioi due to reversible reaction ?

A. Sodium

B. Magnesium

C. Copper

D. Iron

Answer: C::D



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36. The reaction between perfectly dry hydrogen and chlorine take place in the presence of direct sunlight only by the addition of a few drops of water. In this process water behaves as a/an

A. catalyst

B. solvent

C. dehydrating agent

D. efflorescent substance

Answer: A::C



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37. Which of the following metals on treatment with concentrated alkali gives hydrogen gas?

A. Na

B. Mg

C. Cu

D. Al

Answer: C::D



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38. Arrange the chemicals in sequence for the removal of impurities H_2S , SO_2 , PH_3 and H_2O respectively in the purification of hydration gas.

(a) Phosphorus pentoxide (b) Lead nitrate

solution

(c) Silver nitrate solution (d) Caustic potash

A. a b c d

B. b c a d

C. b d c a

D. a d b c

Answer: C



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39. The specific heat capacity of water is

A. $4.2Jkg^{-1}^{\circ}C^{-1}$

B. $4.2Jg^{-1}^{\circ}C^{-1}$

C. $1Jg^{-1}^{\circ}C^{-1}$

D. $1Jkg^{-1}^{\circ}C^{-1}$

Answer: B::C



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40. Colour changes observed during the reaction between metal oxides and hydrogen are given below

(a) White \rightarrow Bluish white (b) Brown \rightarrow Grey

(c) Yellow \rightarrow Grey (d) Black \rightarrow Red

Arrange the above colour changes as PbO to Pb, Fe_2O_3 , to Fe, CuO to Cu and ZnO to Zn

A. c b d a

B. c d a b

C. c b a d

D. b c d a

Answer: A::C



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41. Amount of solutes A,B,C,D and E in 1500 g of water at $25^{\circ}C$, $50^{\circ}C$ and $75^{\circ}C$ in their saturated solutions are given below

| | $25^{\circ}C$ | $50^{\circ}C$ | $75^{\circ}C$ |
|----------|---------------|---------------|---------------|
| <i>A</i> | $235g$ | $280g$ | $240g$ |
| <i>B</i> | $180g$ | $190g$ | $220g$ |
| <i>C</i> | $160g$ | $170g$ | $180g$ |
| <i>D</i> | $175g$ | $220g$ | $200g$ |

Arrange the solutes in the increasing order of the amount of solutes that crystallises out by cooling from $75^{\circ}C$ to $25^{\circ}C$

A. ABDC

B. ACDB

C. CABD

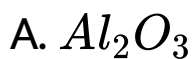
D. ACBD

Answer: B::C



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42. Among the following oxides which one is converted to metal by treated with hydrogen ?



Answer: C



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Concept Application Level 2

1. Two containers contain two liquids A and B. The mass of liquid A is half the mass of liquid B. Both of them are heated to that extent so that the increase in the temperatures of the liquids is the same. The heat supplied for this purpose in liquid A is double that in the case of liquid B. Find out the ratio of the specific heat of A and B.



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2. When sodium or potassium is dropped in water, we can observe a golden yellow or a lilac coloured flame respectively whereas when calcium is dropped , no flame is observed . Why is there a difference in observation in the above two cases?



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3. When water, containing equal amounts of CO_2 , O_2 , NO_2 , N_2O_3 gases respectively ,

subjected to heating, which gas is evolved out in maximum percentage ? Give reason.



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4. Amount of solutes A, B and C in 500 g of water at $30^{\circ}C$, $60^{\circ}C$, $100^{\circ}C$ in their saturated solutions are given below.

| | $30^{\circ}C$ | $60^{\circ}C$ | $100^{\circ}C$ |
|---|---------------|---------------|----------------|
| A | 140g | 135g | 131g |
| B | 160g | 175g | 182g |
| C | 152g | 170g | 161g |

When the hot saturated solutions of A, B and C are cooled slowly, identify the order in which

they crystallize out of a solution. Give reason in support of your answer.



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5. "Steam at $100^{\circ}C$ causes more burns when exposed to skin than water at $100^{\circ}C$ ". Justify.



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6. Rain water and tap water are boiled in metallic containers A and B . The containers

are emptied and then rain water samples are subjected to boiling in the same containers. In which case boiling gets delayed ? Give reason in support of your answer.



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7. A small crystal of solute is added to unsaturated, saturated and supersaturated solutions, what observations do you find ?
Justify



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8. Why is pure water a bad conductor of electricity ?



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9. Why do the solubilities of most of the solids in water increase with an increase in temperature ?



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10. Explain why $CuSO_4 \cdot 5H_2O$ can be dehydrated by reducing the external pressure at room temperature .



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11. Explain why cobalt chloride acts as a humidity indicator.



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12. The boiling point of a solution is more than that of the pure solvent. Justify.



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13. With respect to the saturation of a solution, what type of solution is aerated water ? Give reason in support of answer.



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14. What are the change that take place in lead nitrate solution by passing impure hydrogen through it ?



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15. What makes the use of hydrogen as a fuel difficult ? Give reasons in support of your answer.



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16. Why is water used widely in cooling systems ?



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17. $Na_2CO_3 \cdot 10H_2O$ on exposure to air loses some water of crystallization and the rest on heating . How do you account for the above phenomenon ?



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18. What do you observe when CaO and CaCl_2 are exposed to moisture separately ?



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19. A china dish weighs 25 g when empty. When saturated solution of potassium chloride is poured into it at 40°C , the weight of the dish is 63 g. When the solution is evaporated to dryness, the china dish along with crystals weighs 40 g. Find the solubility of potassium chloride at 40°C .



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20. The reaction of sodium and potassium with humid air is violent and explosive. However, when these metals are kept in an air tight container having silica gel, no reaction has been observed. Give reason.



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21. A deliquescent substance does not become sticky in an air tight container . Justify.



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22. Rain water does not leave any scales on boiling . Give reason.



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23. Potassium chloride has solubility of 32 g at room temperature in water. However its solubility decreases to 2.4 g in alcohol at the same temperature . It becomes completely

insoluble in benzene . How do you account for this variation ?



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24. Why does boiling of water expel the dissolved gases ?



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25. Two samples each of substance A and B are kept in an open container and air tight

container . Sample A in first container became sticky and in second container remained as such. Sample B in both the containers remained without any change. Comment on the above observation.



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Concept Application Level 3

1. How do we explain the survival of aquatic animals in the deep sea, during winter in the

cold region ?



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2. Water remains as drops on the polythene surface but, it forms a thin layer on the surface of a properly cleaned glass plate. Explain.



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3. Two containers A and B contain same kind of matter and kinetic energy of molecules in A is more than that of B. Explain in which container the specific heat of matter is more. Give reason.



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4. Why does water appear blue in deep waters, but transparent in shallow waters ?

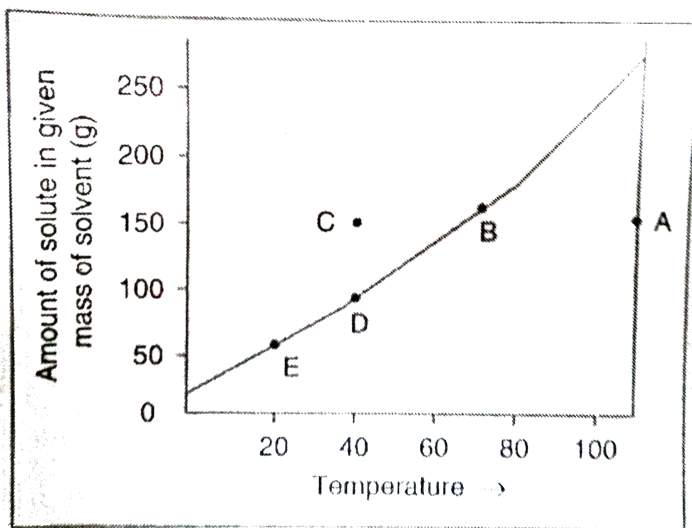


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5. Impure granulated zinc is preferred to pure zinc for the preparation of hydrogen . How do you account for this ?



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6.

In the above graph, identify the states of solution at the various point A, B,C,D,E. If the solution is cooled from point A at which temperature , precipitation normally starts ?

Also find out the amount of solute precipitated at 40° C and the amount of solute in the solution at point 'E'.

What would be the maximum amount of solute that can be precipitated in the process ?



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7. A sample of common salt obtained from sea water contain 39 g of NaCl and 1 g KCl. If it is dissolved in 100 g of water and then 90 g water is evaporated, what observation do you find at $0^{\circ}C$? What is the maximum amount of pure NaCl that can be obtained by the above

method ? (Solubilities of NaCl and KCl are 40 g, 55 g at $100^{\circ}C$ and 35 g 28 g at $0^{\circ}C$ respectively)



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8. Explain why temperature in the coastal region is moderate throughout the year.



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9. Desiccating material is used as dehumidifying agent for absorbing moisture from highly humid air and again it is made reusable by low humid air. What is the principle involved in this process ?



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10. Some of the hydrated crystals are efflorescent . How do you account for this ?



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Examples

1. Two containers A and B contain 30 g and 20 g of water, respectively. If the rate of supply of heat is same and their initial temperature is also same, then water in which container starts boiling first?



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2. Hydrated copper sulphate is not considered an efflorescent substance . Give reason.



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3. Explain the principle of atomic hydrogen torch.



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4. What makes the use of hydrogen as a fuel difficult? Give reasons in support of your answer.



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Test Your Concepts Very Short Answer Type Questions

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Give reasons.



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| 4. Brass | | |
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(a) In beaker 'A' some amount of CaO was poured.

(b) SO_2 gas was passed through beaker 'B'

Write the observation made in both the cases.



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6. Establish logically that water is a compound.



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7. How can hydrogen be prepared from natural gas ?





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8. Why is pure water a bad conductor of electricity ?



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9. Why is distilled water not suitable for drinking?



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10. Give some examples of reactions where metal oxides react with hydrogen.



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Test Your Concepts Essay Type Questions

1. Discuss in detail Bosch process of preparation of hydrogen gas.



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2. Discuss the different physical properties of water with respect to the various uses.



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3. What are solubility curves ? Explain different areas of applications of solubility curves.



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4. Write the effect of impurities and external pressure on the freezing point and boiling point of water. Explain with examples.



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Concept Application Level 1 True Or False

1. Aqueous solutions are good conductors in comparison to its corresponding pure solvent.

True or False



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2. Soluble impurities present in water increase the freezing point of water. True or False?



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3. Solubility curves can be used for comparing the solubility of different substances at a given temperature .



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4. The freezing point of water decreases with a decrease in pressure . True or False



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5. Blue coloured $CuSO_4$ can act a dehydrating agent. Yes or No?



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Concept Application Level 1 Fill In The Blanks

1. _____ substance when exposed to moisture dissolve in it.



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2. Metallic oxides on reaction with water give _____.



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3. _____ solution is more concentrated than a saturated solution.



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4. Due to its high _____, water is called as universal solvent.



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5. the number of oxygen atoms present in five molecules of ferrosferric oxide is _____.



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6. The formula for glauber salt is _____.



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7. Salts with water of crystallization are called _____ salts.



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Concept Application Level 1

1. Match the entries given in Column A with appropriate ones in Column B.

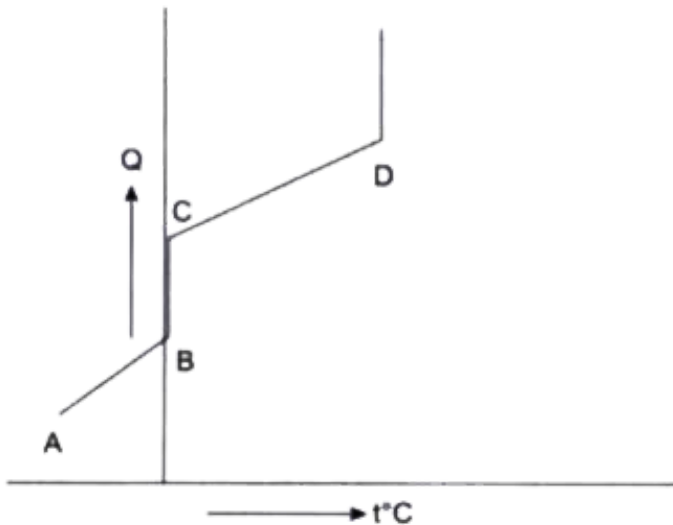
| Column A | | Column B |
|------------------------------|-----|---|
| A. Alloy | () | a. Deliquescent |
| B. Copper sulphate | () | b. Hygroscopic |
| C. Washing soda | () | c. Particles settle down on long standing |
| D. Hydrated calcium chloride | () | d. Efflorescent |
| E. Calcium oxide | () | e. Solid–solid solution |
| F. Suspensions | () | f. Water of crystallization is 5 |



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Concept Application Level 1 Multiple Choice Questions

1. The graph given below represents the interconversion of ice to water vapour. Identify the point in the curve which indicates the boiling point of water.



A. B

B. A

C. C

D. D

Answer: D



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2. Which among the following is not a suspension?

A. iodine in potassium iodide

B. fog

C. paints

D. aerosol sprays

Answer: A



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3. The solubility of $CaSO_4$

A. increases with increase in temperature

B. decreases with increase in temperature

C. increases and then decreases with
increase in temperature

D. decreases and then increases with
increase in temperature

Answer: C



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4. If Glauber salt, anhydrous calcium chloride, calcium oxide and concentrated H_2SO_4 are kept in air tight container A,B, C,D respectively , in which container pressure becomes more ?

A. A

B. B

C. C

D. D

Answer: A



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5. Which among the following elements does not float on water /

A. Na

B. K

C. Ca

D. Ca, K

Answer: C



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6. 50 g of oil 'A' and 100 g of oil 'B' are taken in separate containers at same temperature. Specific heat of oil 'B' is double to that of oil 'A'. Both are heated in such a way that increase in temperature is also same. Calculate the ratio of heat required to be supplied for increasing the temperature .

A. 1 : 2

B. 1 : 1

C. 4 : 1

D. 1 : 4

Answer: D



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7. Anhydride of sulphurous acid is

A. sulphur dioxide

B. sulphate ion

C. sulphur trioxide

D. sulphite ion

Answer: A



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8. Which of the following compounds is not associated with water molecules ?

A. blue vitriol

B. nitre

C. washing soda

D. Epsom salt

Answer: B



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9. When two substance A and B of same mass are heated under similar conditions number of free surfaces have been found to reduce to zero from one. If A maintains constancy in the temperature for a longer time than B during heating , then

A. latent heat of fusion of A is more than that of B

B. latent heat of vaporization of A is more than that of B

C. latent heat of fusion of B is more than that of A

D. latent heat of vaporization of B is more than that of A

Answer: B



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10. The specific heat capacity of water is

A. more than petrol and kerosene

B. less than oil and petrol

C. less than kerosene

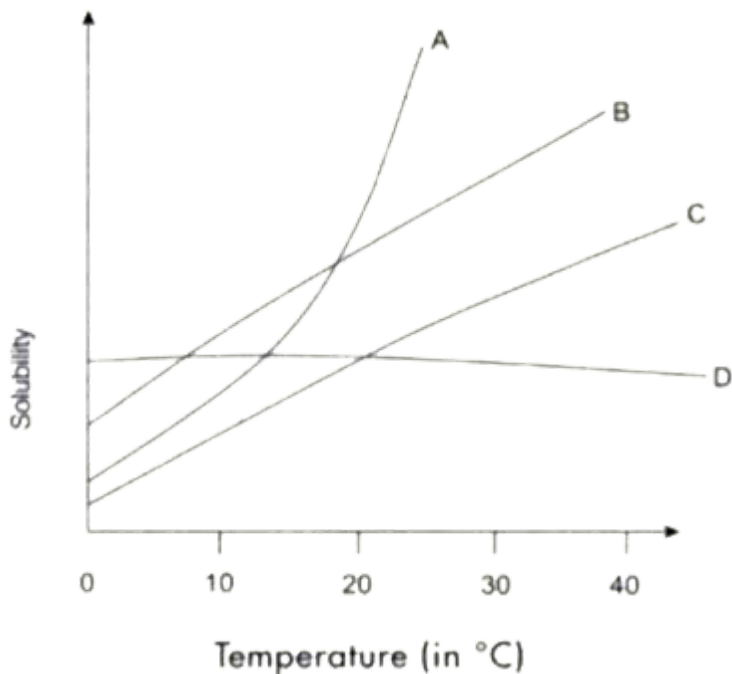
D. less than honey and oil

Answer: A



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11. In the given graph, identify the substance associated with the highest solubility at 10°C.



A. A

B. B

C. C

D. D

Answer: B



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12. Reaction: Non-metal + H_2A



If A formed in the above reaction has a rotten egg smell, identify the non-metal.

A. N

B. P

C. S

D. O

Answer: C



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13. Identify the binary solution among the following .

A. steel

B. bronze

C. nichrome

D. gunmetal

Answer: C



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14. Hydrogen acts as an oxidizing agent when it

A. reacts with highly electropositive metals

B. burns in the presence of O_2

C. forms ammonia when it reacts with
nitrogen

D. passes through boiling sulphur and
forms H_2S gas

Answer: A



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15. Tyndal effect cannot be shown by

A. smoke

B. dust particles present in air

C. fog

D. iron powder in hydrochloric acid

Answer: D



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16. Sodium catches fire and burns with a

A. lilac flame

B. golden yellow flame

C. blue flame

D. green flame

Answer:



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17. Which of the following metals on reaction with steam provides a coating over the metal and prevents further reaction ?

A. Al

B. Ca

C. Mg

D. K

Answer:



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18. The brown coloured substance formed when steam is passed over red hot iron is

A. ferric oxide

B. rust

C. ferrosferric oxide

D. ferrous oxide

Answer:



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19. Which among the following metals react only with steam ?

A. K

B. Ca

C. Mg

D. Al

Answer:



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20. Crystals can be made

A. by cooling hot saturated solution

B. by evaporating unsaturated solution

slowly

C. by cooling a fused mass

D. all of the above

Answer:



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21. Washing soda is an example of a/an _____ substance .

- A. efflorescent
- B. deliquescent
- C. hygroscopic
- D. Both (1) and (2)

Answer:



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22. Which among the following substance acts as a desiccating agent ?

A. anhydrous calcium chloride

B. calcium oxide

C. hydrated copper sulphate

D. anhydrous sodium chloride

Answer:



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23. Which of the following metals is unsuitable for the preparation of hydrogen due to reversible reaction?

A. sodium

B. magnesium

C. copper

D. iron

Answer:



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24. The reaction between perfectly dry hydrogen and chlorine take place in the presence of direct sunlight only by the

addition of a few drops of water. In this process water behaves as a/an

A. catalyst

B. solvent

C. dehydrating agent

D. efflorescent substance

Answer:



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25. Which of the following metals on treatment with concentrated alkali gives hydrogen gas?

A. Na

B. Mg

C. Cu

D. Al

Answer:



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26. Arrange the chemicals in sequence for the removal of impurities H_2S , SO_2 , PH_3 and H_2O , respectively, in the purification of hydrogen gas.

(1) phosphorus pentoxide (2) lead nitrate solution

(3) silver nitrate solution (4) caustic potash

A. 1 2 3 4

B. 2 3 1 4

C. 2 4 3 1

D. 1 4 2 3

Answer:



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27. The specific heat capacity of water is

A. $4.2Jkg^{-1}^{\circ}C^{-1}$

B. $4.2Jg^{-1}^{\circ}C^{-1}$

C. $1Jg^{-1}^{\circ}C^{-1}$

D. $1Jkg^{-1}^{\circ}C^{-1}$

Answer:



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28. Colour changes observed during the reaction between metal oxides and hydrogen are given below

(a) White \rightarrow Bluish white (b) Brown \rightarrow Grey

(c) Yellow \rightarrow Grey (d) Black \rightarrow Red

Arrange the above colour changes as PbO to Pb, Fe_2O_3 , to Fe, CuO to Cu and ZnO to Zn

A. 3 2 4 1

B. 3 4 1 2

C. 3 2 t 4

D. 2 3 4 1

Answer:



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29. Amount of solutes A, B, C, D and E in 1500 g of water at 25°C, 50°C and 75°C in their saturated solutions are given below:

| | 25°C | 50°C | 75°C |
|---|-------|-------|-------|
| A | 235 g | 280 g | 240 g |
| B | 180 g | 190 g | 220 g |
| C | 160 g | 170 g | 180 g |
| D | 175 g | 220 g | 200 g |

Arrange the solutes in the increasing order of the amount of solutes that crystallizes out by cooling from 75°C to 25°C:

A. ABDC

B. ACDB

C. CABD

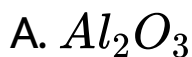
D. ACBD

Answer:



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30. Among the following oxides which one is converted to metal by treating with hydrogen?



Answer:



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Concept Application Level 2

1. Two containers contain two liquids A and B. The mass of liquid A is half the mass of liquid B. Both of them are heated to that extent so that the increase in the temperatures of the liquids is the same. The heat supplied for this purpose in liquid A is double that in the case

of liquid B. Find out the ratio of the specific heat of A and B.



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2. When sodium or potassium is dropped in water, we can observe a golden yellow or a lilac coloured flame, respectively, whereas when calcium is dropped, no flame is observed. Why is there a difference in observation in the above two cases?



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3. When water, containing equal amounts of CO_2 , O_2 , NO_2 , N_2O_3 gases respectively, subjected to heating, which gas is evolved out in maximum percentage? Give reason.



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4. Amount of solutes A, B and C in 500 g of water at $30^\circ C$, $60^\circ C$, $100^\circ C$ in their saturated solutions are given below.

$30^{\circ}C$ $60^{\circ}C$ $100^{\circ}C$

A $140g$ $135g$ $131g$

B $160g$ $175g$ $182g$

C $152g$ $170g$ $161g$

When the hot saturated solutions of A, B and C are cooled slowly, identify the order in which they crystallize out of a solution. Give reason in support of your answer.



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5. "Steam at $100^{\circ}C$ causes more burns when exposed to skin than water at $100^{\circ}C$ ". Justify.



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6. Rain water and tap water are boiled in metallic containers A and B . The containers are emptied and then rain water samples are subjected to boiling in the same containers. In which case boiling gets delayed ? Give reason in support of your answer.



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7. A small crystal of solute is added to unsaturated, saturated and supersaturated solutions, what observations do you find ?

Justify



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8. Why is pure water a bad conductor of electricity ?



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9. Why do the solubilities of most of the solids in water increase with an increase in temperature ?



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10. Explain why $CuSO_4 \cdot 5H_2O$ can be dehydrated by reducing the external pressure at room temperature .



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11. Explain why cobalt chloride acts as a humidity indicator.



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12. The boiling point of a solution is more than that of the pure solvent. Justify.



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13. With respect to the saturation of a solution, what type of solution is aerated

water ? Give reason in support of answer.



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14. What are the change that take place in lead nitrate solution by passing impure hydrogen through it ?



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15. Why is water used widely in cooling systems?



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16. $Na_2CO_3 \cdot 10H_2O$ on exposure to air loses some water of crystallization and the rest on heating . How do you account for the above phenomenon ?



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17. What do you observe when CaO and $CaCl_2$ are exposed to moisture separately?



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18. A china dish weighs 25 g when empty. When saturated solution of potassium chloride is poured into it at $40^{\circ} C$, the weight of the dish is 63 g. When the solution is evaporated to dryness, the china dish along with crystals weighs 40 g. Find the solubility of potassium chloride at $40^{\circ} C$.



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19. The reaction of sodium and potassium with humid air is violent and explosive. However, when these metals are kept in an air-tight container having silica gel, no reaction has been observed. Give a reason.



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20. A deliquescent substance does not become sticky in an air-tight container. Justify.



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21. Rain water does not leave any scales on boiling. Give a reason.



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22. Potassium chloride has solubility of 32 g at room temperature in water. However, its solubility decreases to 2.4 g in alcohol at the same temperature. It becomes completely insoluble in benzene. How do you account for this variation?



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23. Why does boiling of water expel the dissolved gases?



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24. Two samples each of substances A and B are kept in an open container and air-tight container. Sample A in the first container became sticky and in the second container

remained as such. Sample B in both the containers remained without any change. Conunent on the above observations.



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Concept Application Level 3

1. How do we explain the survival of aquatic animals in the deep sea, during winter in the cold region ?



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2. Water remains as drops on the polythene surface but, it forms a thin layer on the surface of a properly cleaned glass plate. Explain.



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3. Two containers A and B contain same kind of matter and kinetic energy of molecules in A is more than that of B. Explain in which

container the specific heat of matter is more.

Give a reason.



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4. Why does water appear blue in deep waters, but transparent in shallow waters ?



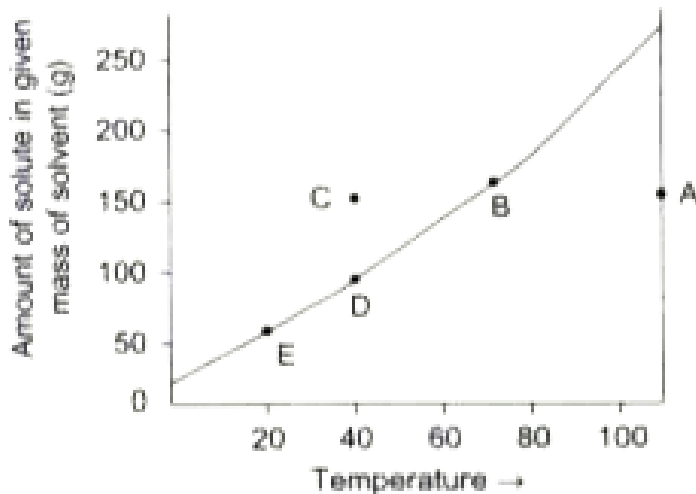
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5. Impure granulated zinc is preferred to pure zinc for the preparation of hydrogen . How do

you account for this ?



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6.

In the above graph, identify the states of solution at the various points A, B, C, D, E. If the solution is cooled from point A, at which

temperature precipitation normally starts?

Also find out the amount of solute precipitated at 40°C and the amount of solute in the solution at point E. What would be the maximum amount of solute that can be precipitated in the process?



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7. A sample of common salt obtained from sea water contain 39 g of NaCl and 1 g KCl. If it is dissolved in 100 g of water and then 90 g

water is evaporated, what observation do you find at $0^{\circ}C$? What is the maximum amount of pure NaCl that can be obtained by the above method ? (Solubilities of NaCl and KCl are 40 g, 55 g at $100^{\circ}C$ and 35 g 28 g at $0^{\circ}C$ respectively)



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8. Explain why temperature in the coastal region is moderate throughout the year.



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9. Desiccating material is used as dehumidifying agent for absorbing moisture from highly humid air and again it is made reusable by low humid air. What is the principle involved in this process ?



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10. Some of the hydrated crystals are efflorescent . How do you account for this ?



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