PRAKASAM DISTRICT COMMON EXAMINATION BOARD

PRE PUBLIC EXAMINATIONS-MARCH-2016

GENERAL SCIENCE , Paper – I

(Physical Sciences)

(English Version)

Time: $2\frac{1}{2}$ Hours **Parts A and B** **Maximum Marks : 50**

Class-10 - KEY SHEET - PART-A

Section - I

Group -A

1. If a small glass bottle with full of water and tight lid is placed in a deep freezer for a few hours. After that time the bottle will be broken. Because Water freezes in to ice and water expands on freezing. The volume of ice is more than water for same mass.

2. For which incident angle, the angle of refraction is 90^o ; that incident angle is called critical angle.
When light travels from denser medium to rarer medium, if the incident angle is more than the critical angle then Total internal reflection occurs.

3. The ability of accommodation of eye usually decreases with ageing. This is called as Presbyopia.
To correct this type of eye defect, we use bi focal lens. It has concave lens in its upper portion and convex lens in its lower portion.

4. Television works on the motion of electrons, charged particles. When a bar magnet is brought close to the screen of a television, magnetic field exerts a force on the moving charge. So the picture appears as distorted.

Group –B

5. Test tube 'A' contains Magnesium ribbon and Hydrochloric acid. So fizzing occurs vigorously as Hcl is a strong acid.
Test tube 'B' contains Magnesium ribbon and Acetic acid. So fizzing occurs slowly as CH_3COOH is a weak acid.

6. The orbit which is nearer to the nucleus has less energy. K (n=1) is the closest orbit to the nucleus.
So Shell L (n=2) is at higher energy level.

7. Variation of atomic radius:
(i) In periods, even the atomic number increases the atomic radius decreases from left to right.
(ii) In groups, as the atomic number increases the atomic radius increases from top to bottom.

8. (i) The common name of ethanol is alcohol.
(ii) Consumption of small quantity of ethanol causes drunkenness.
(iii) Large quantity of ethanol consumption effect the nervous system.
(iv) Ethanol consumption leads to slow down the metabolic processes.
(v) Driving vehicles when taken alcohol causes accidents.
So, I condemn the use of alcohol as a social practice.

Section - II

9. I may the ask the teacher the following questions.
(i) From which place , we can take measurements?
(ii) Where should we keep the screen?
(iii) ……

10. The splitting of white light in to different colours (VIBGYOR) is called dispersion.

11. 1 unit of current = 1 KWH = 3.6×10^6 Joule = 3.6×10^{13} erg

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12. The balanced chemical equation is : $Fe_2O_3 + 3\,CO \rightarrow 2\,Fe + 3\,CO_2$

13. Electricity passes through a solution when ions present in it. Distilled water does not contain any ionic substance that can dissociate hydronium ion. That's why It does not conduct electricity.

14. Slag: In the process of smelting, ore is mixed with flux and then strongly heated with fuel. The gangue reacts with flux and form a feasible material called slag.

Section - III

Group -A

15. Experiment to prove that Evaporation depends upon the surface area of the liquid:

Take 5ml of spirit in a small plate And take 5ml of spirit in another big plate (without lid). Keep them some time.

Observation : The spirit in the big dish that disappears quickly, where we find some spirit in the other dish which is small. This means that Evaporation depends upon the surface area of the liquid. If surface area increases the rate of evaporation also increases.

Experiment to prove that Evaporation depends upon the vapour already present in surrounding :

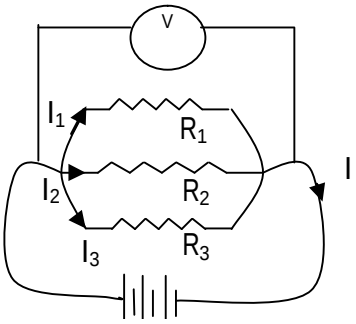
Take 5ml of spirit in two small cups. Put one cup in the A.C. room and put another in the normal room. Measure the time taken for disappear the spirit from the cups.

Observation: The spirit in the normal room disappears quickly.This means that the rate of evaporation depends upon the vapour already present in surrounding area. If the vapour in atmosphere increases then the rate of evaporation decreases.

16. The atmosphere molecules and atoms scatter light of different wavelengths which are comparable to their size. Molecules having a size that is comparable to the wavelength of red light are less in the atmosphere. Hence scattering of red light is less when compared to the other colours of light. The light from the sun needs to travel more distance in atmosphere during sunrise and sunset to reach our eye. Since scattering of redlight is very small, it reaches us. As a result sun appears red in colour during sunrise and sunset.

17. Parallel combination of resistors :

Consider three resistors R_1, R_2 and R_3 are connected in parallel.
I_1, I_2 and I_3 are the flow of current through the resistors
R_1, R_2 and R_3 respectively.
Let 'V' is the potential difference between the ends of each resistor.



Ohm's law : $V = I\,R \rightarrow I = \frac{V}{R}$

Apply this ohm's law for R_1, R_2 and R_3.

Then $I_1 = \frac{V}{R_1}$ $I_2 = \frac{V}{R_2}$ $I_3 = \frac{V}{R_3}$

Let the resultant flow of current is 'I' and R is the resultant resistance.

Then $I = \frac{V}{R}$

In parallel arrangement $I = I_1 + I_2 + I_3$

$$\frac{V}{R} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$

$$\frac{V}{R} = V\left(\frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}\right)$$

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

If resistors connected in parallel combination then the reciprocal of the resultant resistance is equal to the sum of the reciprocals of the individual resistances of resistors.

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18. Apply Kirchhoff's loop law for ABCDA loop : $-5 - 2I_1 - (I_1+I_2)3 + 12 = 0$

$-5 - 2I_1 - 3I_1 - 3I_2 + 12 = 0$

$5I_1 + 3I_2 = 7$ --------(i)

Apply Kirchhoff's loop law for AFEDA loop : $-4I_2 - (I_1+I_2)3 + 12 = 0$

$-4I_2 - 3I_1 - 3I_2 + 12 = 0$

$3I_1 + 7I_2 = 12$ --------(ii)

Do (ii) x 5 then $15I_1 + 35I_2 = 60$ ------(iii)

Do (i) x 3 then $15I_1 + 9I_2 = 21$ ------(iv)

Do (iii) – (iv) $26I_2 = 39 \rightarrow I_2 = \frac{39}{26} = \frac{3}{2} = 1.5$ A

From (i) $5I_1 + 3I_2 = 7 \rightarrow 5I_1 + 3(1.5) = 7 \rightarrow 5I_1 + 4.5 = 7 \rightarrow 5I_1 = 2.5 \rightarrow I_1 = 0.5$ A

The current drawn from the battery having 12 V e.m.f. is $I_1 + I_2 = 1.5 + 0.5 = 2$ A

Group -B

19. Aufbau Principle: The electron occupies the orbital having the least energy first.

In terms of Quantum numbers the energy of the orbital depends upon the value of (**n** + ***l***). The electron goes to an orbital whose (**n** + ***l***) value is minimum.

Ex:

Orbital	**n**	***l***	**n** + ***l***
2s	2	0	2
2p	2	1	3

The electron occupies 2s orbital first and then 2p will be occupied.

If two orbitals have the same (**n** + ***l***) value, the orbital having lower n' value will be occupied first.

Ex:

Orbital	**n**	***l***	**n** + ***l***
3p	3	1	4
3d	3	2	5
4s	4	0	4

The electron occupies 3p, 4s and 3d respectively.

The electronic configuration of Scandium(z=21) is $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^1$

20. Valence bond theory:

To describe covalent bonding, a quantum mechanical model called valence bond theoryhas been suggested by Linus Pauling (1954). It is explained as follows:

1. A covalent bond between two atoms is formed when the two atoms approach each other closely and one atom overlaps its valence orbital containing unpaired electron, the valence orbital of the other atom that contains the unpaired electron of opposite spin. The so formed paired electrons in the overlapping orbitals are attracted to the nuclei of both the atoms. This bonds the two atoms together.
2. The greater the overlapping of the orbitals that form the bond, the stronger will be the bond. This gives a directional character to the bond when other than 's' orbitals are involved.
3. Each bonded atom maintains its own atomic orbitals but the electron pair in the overlapping orbitals is shared by both the atoms involved in the overlapping.
4. If two atoms form multiple bonds between them the first bond is due to the overlap of orbitals along the inter-nuclear axis giving a stronger sigma(σ) bond. After formation of (σ) bond the other bonds are formed due to the overlap of orbitals side wise or laterally giving weaker π bonds.

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21. (i) We use hand picking in separating stones from rice and dal in our daily life. This method is adopted to separate the impurities from ore.

Hand picking: If the ore particles and the impurities are different in one of the properties like colour, size etc., Using that property either ore particles or impurities are handpicked to separate them.

(ii) We use washing to separate dust from vegetables, rice and dal in our daily life. This method is adopted to separate the impurities from ore.

Washing: Ore particles are crushed and kept on a slopy surface. They are washed with controlled flow of water. Less densive impurities are carried away by water flow, leaving the more densive ore particles behind.

22. The chemical reaction in which an atom or a group of atoms in a given compound is replaced by other atom or group of atoms is called a substitution reaction.

Generally saturated hydrocarbons like alkanes participate in substitution reactions.

Ex: If Methane (CH_4) reacts with chlorine in the presence of sunlight, the hydrogen atoms substituted with chlorine atoms.

(i) CH_4 (Methane) + Cl_2 (Chlorine) $\xrightarrow{\text{Sun light}}$ CH_3Cl (Methyl chloride) + HCl (Hydrogen chloride)

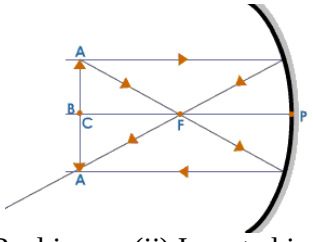
(ii) CH_3Cl (Methyl chloride) + Cl_2 (Chlorine) $\xrightarrow{\text{Sun light}}$ CH_2Cl_2 (Methylene chloride) + HCl (Hydrogen chloride)

(iii) CH_2Cl_2 (Methylene chloride) + Cl_2 (Chlorine) $\xrightarrow{\text{Sun light}}$ $CHCl_3$ (Chloroform) + HCl (Hydrogen chloride)

(iv) $CHCl_3$ (Chloroform) + Cl_2 (Chlorine) $\xrightarrow{\text{Sun light}}$ CCl_4 (Carbon tetra chloride) + HCl (Hydrogen chloride)

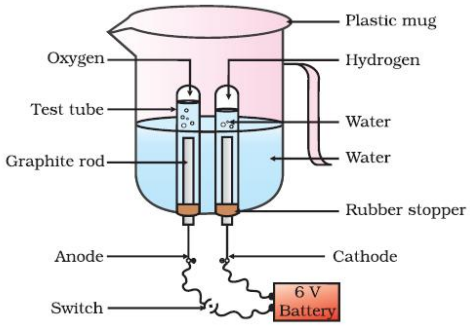
Section - IV

23. Formation of image if object is placed before a concave mirror at "C" :

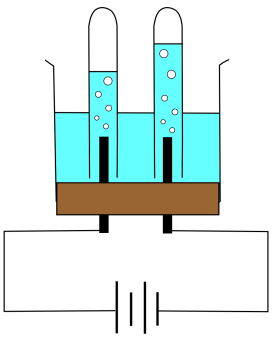


Properties of image : (i) Real image (ii) Inverted image (iii) Same size image

24. Electrolysis of water:



(OR)



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KEY SHEET - PART-B

Sl No.	Ans.	Sl No.	Ans.	Sl No.	Ans.
1	D	**11**	A	**21**	Specific heat
2	*	**12**	C	**22**	Critical angle
3	B	**13**	A	**23**	70 cm
4	A	**14**	C	**24**	4 D
5	A	**15**	B	**25**	0
6	B	**16**	D	**26**	B
7	C	**17**	A	**27**	E
8	*	**18**	B	**28**	D
9	B	**19**	C	**29**	A
10	*	**20**	D	**30**	C

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