PRAKASAM DISTRICT COMMON EXAMINATION BOARD
HALF YEARLY EXAMINATIONS-JANUARY-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. Mass (m_1) = 50 gm

Temperature (T_1) = 20^oC

Mass (m_2) = 50 gm

Temperature(T_2) = 40^oC

Final temperature as per Method of mixtures (T) = $\frac{m_1T_1+m_2T_2}{m_1+m_2} = \frac{50X20+50X40}{50+50} = \frac{1000+2000}{100}$

$= \frac{3000}{100} = 30^oC$

2. The polish applied on the shoes behaves like a mirror. When light rays fall on the polished shoes, they shines more. Where as unpolished shoes appears dull.

3. Uses of concave mirror :

(i) We can get different sizes of images and at desired distances by concave mirrors.

(ii) Concave mirrors, which converges light at a point used in solar appliances.

(iii) Concave mirrors are used by ENT doctors to see the effected parts more visible.

(iv) Concave mirrors are used in wars in olden days to destroy the ships.

(v) Concave mirrors are used to see celestial bodies.

Uses of convex mirror :

(i) We can get diminished images and at less distance.

(ii) Convex mirrors are used as rear view mirrors.

(iii) Convex mirrors are used in ATM centers to see the back view of operator.

(iv) Convex mirrors are used in telescopes.

4. At camp fire, heat is transformed to the surroundings by convection. Due to this process, the density of surrounding air changes continuously. The refractive index continuously changes slightly. As a result the objects beyond the fire are seen swaying.

Group –B

5. The reaction between an acid and a base to produce salt and water is called neutralization .

Acid + Base → Salt + Water

Ex: $HCl + NaOH \rightarrow NaCl + H_2O$

$H_2SO_4 + Ca(OH)_2 \rightarrow CaSO_4 + 2H_2O$

6. Electronic configuration of copper : $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,4s^1\,3d^{10}$ (or) $[Ar]\,4s^1\,3d^{10}$

Electronic configuration of chromium : $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,4s^1\,3d^5$ (or) $[Ar]\,4s^1\,3d^5$

7. Sodium (Na) atomic number is Z=11. Electronic configuration is $1s^2\,2s^2\,2p^6\,3s^1$

Sodium can lose one electron and forms sodium ion (cation) to get octet configuration like Neon.

$Na \rightarrow Na^+ + e^-$

Fluorine (Cl) atomic number is Z=17. Electronic configuration is $1s^2\,2s^2\,2p^6\,3s^2\,3p^5$

Fluorine can gain one electron and forms Fluoride ion (anion) to get octet configuration like Neon.

$Cl + e^- \rightarrow Cl^-$

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8. The force of attraction among atoms in covalent molecule is weak compared with ionic compounds. Electrostatic forces are present among atoms in ionic molecules. So covalent compounds have low melting point where as ionic compounds have high melting points.

Section - II

9. The water in a pot becomes cool because pot has small pores in it. The water evaporates from the pores. As the result the water gets cooled.

10. If the light ray incident along the normal drawn to the interface then angle of incidence is equal to the angle of refraction. (or)

If the refractive indices of two media are equal then the angle of incidence is equal to the angle of refraction.

11. Lens maker's formula : $\frac{1}{f} = (n_{ba}-1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ (or) $\frac{1}{f} = (n-1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$

12. He has to take antacid tablet. (or)

He has to take Zintac / gelusil / rantac / histac EVT / ENO / Milk of magnesia ....

(or)

He can drink a cup of dilute baking soda (Sodium bicarbonate) solution.

13. $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

14. The general electronic configuration of inert gases is $ns^2\ np^6$ except for Helium. The configuration of Helium is $1s^2$.

Section - III

Group -A

15. Specific heat of a solid can be measured by using calorimeter. To perform this experiment we need calorimeter, water, hot water, thermometer and solid shots (aluminium and copper shots).

Procedure:(1) First we have to find the mass of the calorimeter vessel (m_1).

(2) Fill half of the calorimeter with water and find the mass of calorimeter with water (m_2).

(3) Measure the initial temperature with laboratory thermometer ($T_1{}^oC$). This is the temperature of both water and also calorimeter.

(4) Take a few aluminium shots and place them in hot water. Heat them nearly 100^oC. So measure the temperature of aluminium shots ($T_2{}^oC$).

(5) Transfer the aluminium shots into calorimeter quickly with minimum loss of heat.

(6) Stir the mixture well.

(7) Note the final temperature ($T_3{}^oC$).

(8) Measure the final mass of calorimeter vessel along with water and aluminium shots (m_3).

Heat (Q) = $m.s.\Delta T$

According to the method of mixtures :

Heat lost by the solid =Heat gained by calorimeter + Heat gained by water

$(m_3-m_2).S_{alu}.(T_2-T_3) = m_1.S_c.(T_3-T_1) + (m_2-m_1).S_w.(T_3-T_1)$

$$S_{alu} = \frac{[m_1\ S_c+(m_2-m_1)S_W\ ][T_3-T_1]}{(m_3-m_2)(T_2-T_3)}$$

This way we can find the specific heat of a solid.

Take S_w = 1 cal/gm -^oC

S_c = specific heat of the material of calorimeter vessel

Similarly we can find the specific heat of copper.

16. (A) Phani can give a Bi convex lens to his grand father.

(B) Eye lens can form a clear image on the retina when any object is placed beyond near point. To correct the defect of hypermetropia, we need to use a lens which forms an image of an object beyond near point, when the object is between near point (H) and least distance of distinct vision (L).

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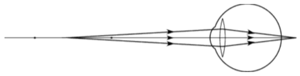
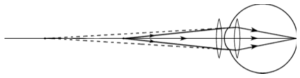




This is possible only when a double convex lens is used.

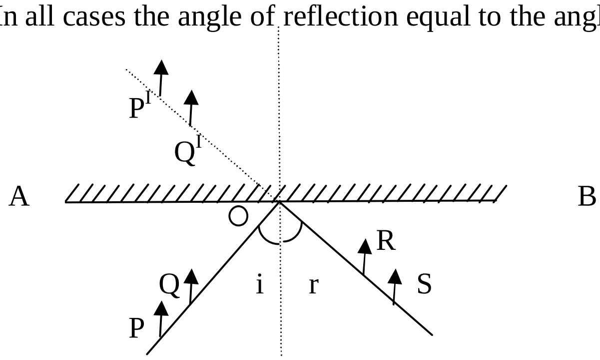
17. **Verification of first law of reflection:**

Fix a white paper on a drawing board with the help of clamps. Draw a straight line AB at the centre of the paper and a normal (ON) to AB at 'O'. Draw a straight line PQ making certain angle ($\hat{i}$) with ON. Fix two pins at P and Q on the paper vertically. Observe the images P^I and Q^I of the pins P and Q, in the mirror kept along the line AB. Fix two more pins R and S such that they are in the same line as that of P^I and Q^I. Join R, S and O Measure the angle between RS and ON (angle of reflection).

We find that angle of incidence = angle of reflection.

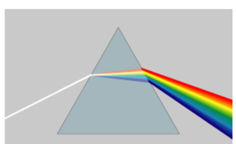
Repeat the experiment for different angles of incidence.

In all cases the angle of reflection equal to the angle of incidence.



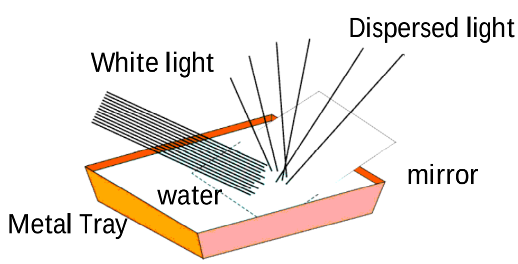
18. . :Formation of artificial rainbow:

Activity-1: Take a prism before a white wall. Keep a light source such that the light rays fall on the prism through a narrow slit which was arranged. Adjust the prism such that the colours (VIBGYOR) fall on the wall.



(or)

Activity-2: Take a metal tray and fill it with water. Place a mirror in water such that it makes an angle to the water surface. Keep a white card board screen/sheet above the water surface. Now focus white light on the mirror through water. Try to obtain the colours on the screen. We can see the seven colours (VIBGYOR) of rainbow on the screen.



We can place the water tray with mirror inside in sunlight to produce rainbow on the wall.

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Group -B

19. Oxidation : Adding oxygen is called oxidation. (or) Removing oxygen is oxidation (or) Loss of electrons is oxidation.

Combustion : Burning of a substance in air with oxygen is called combustion.

Ex: $C + O_2 \rightarrow CO_2$ -----(1)

$H_2 + CO_2 \rightarrow H_2O + CO$ -----(2)

In equation (1) Carbon added with oxygen. So it is oxidation reaction. Carbon burns with oxygen. So it is combustion reaction.

In equation (2) Hydrogen is added with oxygen. So it is oxidation reaction. But hydrogen does not burns. So it is not a combustion reaction.

We conclude that all oxidation reactions are not combustion reactions. But all combustion reactions must oxidation reactions.

20. Atomic number of Lithium is 3. Electronic configuration is $1s^2 2s^1$.

Differentiating electron enters into 2s orbital.

The four quantum numbers for the differentiating electron are

n	l	m_l	m_s
2	0	0	+½

Quantum numbers : There are four quantum numbers.

(i) Principal quantum number (ii) Azimuthal quantum number

(iii) Magnetic quantum number (iv) Spin quantum number.

(i) Principal quantum number :

i) It was proposed by Neils bohr.

ii) It is denoted by 'n'.

iii) It gives the size and energy of an orbit.

iv) The values are given as per the number of the orbit.

v) The values are from 1 to n and the values 1,2,3,4,5,… again designated by K,L,M,N,O,…

(ii) Azimuthal quantum number:

i) It was proposed by Sommer feld.

ii) It is denoted by 'l''.

iii) It gives the shape of the sub shell(orbitals).

iv) The values of l depends on the value of 'n'.

v) The values are from 0 to (n-1) and the values 0,1,2,3,4,… again designated by s,p,d,f,g,… orbitals.

(iii)(a) Magnetic quantum number :

i) It was proposed by Lande.

ii) It is denoted by 'm_l'.

iii) It indicates the orientations of the orbitals in the presence of magnetic field.

iv)The value of 'm' depends on the value of 'l'.

v) 'm_l' can have $(2l+1)$ values and the values are from $-l$ to $+l$.

(iii)(b) Spin quantum number:

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i) It was proposed by Uhlenbeck and Goud smit.

ii) It is denoted by 'm_s'.

iii) It indicates the direction of the spin of electrons.

iv)'m_s' has only two values..

v) The values of 'm_s' are $+^1/_2$ and $-^1/_2$. Also $+^1/_2$ represents the clock wise direction and $-^1/_2$represents the anti clock wise direction.

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21. The data organized as ..

Element	Configuration	Atomic number	Nearest inert gas	Valency
A	2,8,3	13	Ne (10)	3
B	2,6	8	Ne (10)	2

(i) Atom 'B' forms negative ion.

(ii) Atom 'A' forms positive ion.

(iii) Valency of atom 'A' is 3.

(iv) If 'A' reacts with 'B' then A_2B_3 molecule is formed.

22. (a) Variation of atomic radius:

(i) In periods, as 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.

(b) Variation of Ionization potential:

(i) In periods, Ionization potential do not follow any regular trend from left to right. But finally it increases.

(ii) In groups, Ionization potential decreases from top to bottom.

(c) Variation of Electron affinity:

(i) In periods, as the atomic number increases electron affinity increases.

(ii) In groups, as the atomic number increases electron affinity decreases.

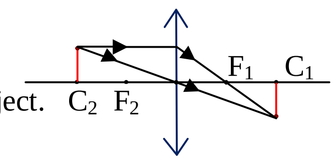
(d) Variation of Electro Negativity:

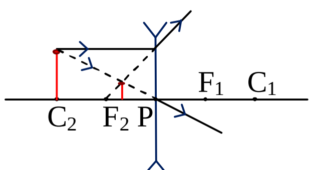
(i) In periods, Electro Negativity increases from left to right.

(ii) In groups, Electro Negativity decreases from top to bottom.

Section - IV

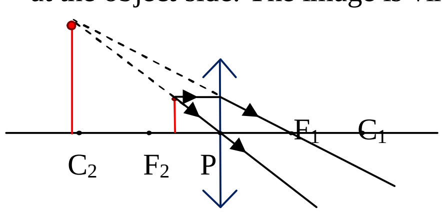
23. Case(i): When object is placed at C_2 of a convex lens, the image formed at C_1. The image is real, inverted and same size as object.



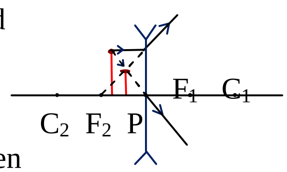


When object is placed at C_2 of a concave lens, the image is formed at the object side between Focus and optic centre. The image is virtual, erect and diminished.

Case(ii): When object is placed between F_2 of P of a convex lens, the image is formed at the object side. The image is virtual, erect and enlarged.



When object is placed between F_2 of P of a concave lens, the image is formed at the object side between focus and optic centre. The image is virtual, erect and diminished.



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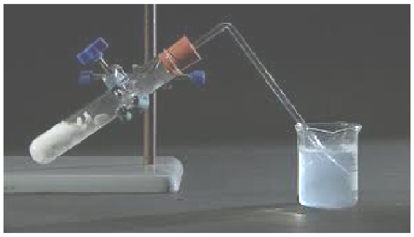
24. The gas liberated is carbon dioxide (CO_2).
Required apparatus : Test tube, $CaCO_3$, one holed rubber cork, Delivery tube, Spirit lamp, Lime water, Stand, beaker



KEY SHEET - PART-B

S. No	Ans.	S. No	Ans.	S. No	Ans.
1	B	**11**	A	**21**	Oiling/greasing/painting/galvanizing/chrome plating or any related
2	C	**12**	D	**22**	acidic
3	D	**13**	D	**23**	Germanium (Ge)
4	C	**14**	D	**24**	s-s
5	C	**15**	A	**25**	1.54
6	C	**16**	B	**26**	C
7	B	**17**	D	**27**	D
8	C	**18**	D	**28**	A
9	B	**19**	C	**29**	G
10	*	**20**	C	**30**	F

Note : * means allot full marks.

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