Time: 3 Hours   **Parts A and B**   Maximum Marks : 50

Class-10 -   KEY SHEET - PART-A

Section - I
Group -A

1. I would like to ask the following questions:
   * Does boiling of a substance takes place at any temperature?
   * Does evaporation occurs at any temperature or not?
   * Is evaporation a surface phenomenon or bulk phenomenon?
   * At which temperature does water boils?
   * The water in wet clothes dries due to wind. Is wind provides 100^oC ?

2. Water has highest specific heat value. It takes more time to raise its temperature. In summer the water at the surface in well get heated and evaporates. But the heat energy does not transferred to the water under the surface. So the ground water maintained a constant temperature about 10^oC – 20^oC. So well water is cool in summer.

3. If the spherical mirrors are known to human beings then
   (i) Many optical instruments were not invented.
   (ii) We can not solve the problem of inverted images.
   (iii) We can't use spherical mirrors in head lights of vehicles, side mirrors and rear view mirrors.
   (iv) Dentists can not perform their treatment easily with out spherical mirrors.
   (v) Solar cookers were not yet invented.

4. Due to refraction at water and air interface, the fish appears to be raised and seems to be close to the surface. The is called apparent depth. The shooter aims the gun to apparent position of fish instead of real position. Hence it is very difficult to shoot a fish swimming in water.

Group –B

5. When some metals are exposed to moisture, acids, etc., they tarnish due to the formation of respective metal oxide on their surface. This process is called corrosion.
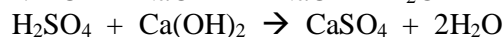Corrosion can be prevented by shielding the metal surface, painting, oiling, greasing, galvanizing, chrome plating or making alloys.

6. Rancidity is an oxidation reaction. When fats and oils are oxidized they become rancid. Their smell and taste changes. Oxidation reactions in food material that were left for a long period are responsible for spoiling of food.

7. Uses of Washing soda (Na_2CO_3) :
   i) Sodium carbonate (washing soda) is used in glass, soap and paper industries.
   ii) It is used in the manufacture of sodium compounds such as borax.
   iii) Washing soda can be used as a cleaning agent for domestic purposes.
   iv) It is used for removing permanent hardness of water.

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

$$Acid + Base \rightarrow Salt + Water$$
$$Ex: HCl + NaOH \rightarrow NaCl + H_2O$$
$$H_2SO_4 + Ca(OH)_2 \rightarrow CaSO_4 + 2H_2O$$

Section - II

9. The process in which a substance in a liquid phase changes to solid phase at constant temperature   by loosing some of its energy is called freezing.

10. $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$
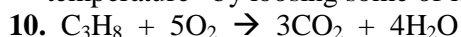
11. Generally oxidation and reduction occur in the same reaction. If one reactant gets oxidized, the other gets reduced. Such reactions are called oxidation-reduction reactions or Redox reactions.
12. Pierre.D.Fermat
13. By mixing of acid to water , the concentration of hydrogen ions per unit volume decreases. This gives diluted acid. Heat is evolved in this process. Hence it is an exothermic process.
14. The incident angle for which the angle of refraction is 90°, is called critical angle.

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 area:
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. (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 lead shots and place them in hot water. Heat them up to temperature (nearly) 100^oC. So measure the temperature of lead shots (T_2^oC).
  (5) Transfer the lead 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 along with water and lead shots (m_3).
$$\text{Heat } (Q) = m.s.\Delta T$$
According to the method of mixtures :
Heat lost by the solid = Heat gained by calorimeter + Heat gained by water
$(m_3-m_2).S_l.(T_2-T_3) \quad = m_1.S_c.(T_3-T_1) + (m_2-m_1).S_w.(T_3-T_1)$
$$S_l = \frac{[m_1 S_c + (m_2 - m_1)S_w][T_3 - T_1]}{(m_3 - m_2)(T_2 - T_3)}$$
This way we can find the specific heat of a solid.
Take $S_w = 1$ cal/gm -^oC
$S_c = 0.095$ cal/gm -^oC

17. (for concave mirror u, f taken with negative sign)
Distance of the object (u) = -30cm
Focal length (f) = -20cm
Radius of curvature (R) = 2f = 40cm
Distance of the image (v) = ?
Formula : $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$
$\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{-20} - \frac{1}{-30} = \frac{-30+20}{600} = \frac{-10}{600} = \frac{-1}{60}$
$v = 60$ cm (Negative sign represents , the image is formed in front of the mirror)
Size of the object $(H_o) = 5$ cm
Size of the image $(H_i) = ?$
Magnification (m) $= \frac{H_i}{H_o} = -\frac{v}{u}$

$$\rightarrow \frac{H_i}{5} = -\frac{-60}{-30}$$
$$\rightarrow H_i = -10 \text{ cm}$$

Negative sign represents that the image is inverted.

Properties of image: Object is placed between "F" and "C" before a concave mirror.
(i) The image is formed beyond "C" (at 60 cm distance)
(ii) The image is enlarged. (size of image is 10 cm.)
(iii) The image is inverted.
(iv) The image is a real image and can be collected on screen.

18. Take a cylindrical transparent vessel of 1 lit. Place a coin at the bottom of the vessel. Now pour water until you get the image of the coin on the water surface (look at the surface of water from a side). This is the phenomenon of total internal reflection. One of that is a mirage which we witness while driving or while walking on a road during a hot summer day.
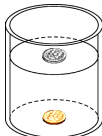

If light ray passes from denser medium to rarer medium then the refractive angle is more than the incident angle. The incident angle for which the angle of refraction is 90°, is called critical angle. If the angle of incidence is more than critical angle, then total internal reflection occurs.

Group -B

19. Chemical reactions are of four types.
They are 1) Chemical combination   2) Chemical decomposition
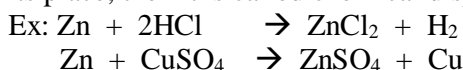   3) Chemical displacement   4) Chemical double displacement

Chemical combination: A reaction which a single product is formed from two or more reactants is known as chemical combination.
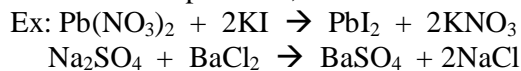Ex: $S + O_2 \rightarrow SO_2$
     $C + O_2 \rightarrow CO_2$
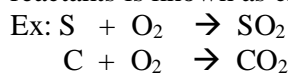
Chemical decomposition: If one substance decomposes into two or more substances, then the reaction is called chemical decomposition.
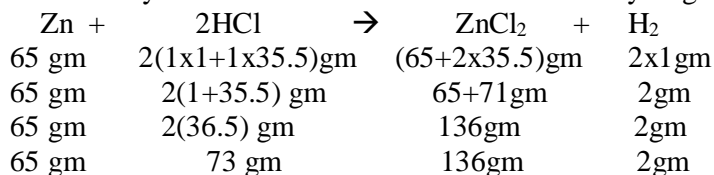Ex: $2H_2O \rightarrow 2H_2 + O_2$
    $CuCO_3 \rightarrow CuO + CO_2$
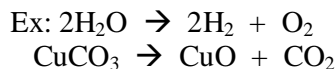
Chemical displacement: If one element displaces another element from its compound and takes its place, then it is called chemical displacement reaction.
Ex: $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
     $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

Chemical double displacement : If two reactants exchange their constituents chemically and form two new products, then it is called chemical double displacement reaction.
Ex: $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$
     $Na_2SO_4 + BaCl_2 \rightarrow BaSO_4 + 2NaCl$

20. Zinc + Hydrochloric acid $\rightarrow$ Zinc chloride + Hydrogen

Zn +	2HCl	$\rightarrow$	ZnCl$_2$	+	H$_2$
65 gm	2(1x1+1x35.5)gm		(65+2x35.5)gm		2x1gm
65 gm	2(1+35.5) gm		65+71gm		2gm
65 gm	2(36.5) gm		136gm		2gm
65 gm	73 gm		136gm		2gm

The weight of Zinc required to get 2gm of Hydrogen = 65gm

The weight of Zinc required to get 20gm of Hydrogen = $\frac{20}{2}$ x 65gm = 10x65gm = 650 gm.

21. (i) The human body fluid which is alkaline nature is blood.
(ii) The food items which are acidic in nature are lemon juice, orange juice, milk.
(iii) $NaHCO_3$ Solution is used as antacid in olden days.
(iv) The salt solutions which are in alkaline nature are Na_2CO_3 solution, $NaHCO_3$ solution.

22. Significance of P^H in every day life:

(i) Living organisms can survive only in a narrow range of P^H change. Aquatic life in rivers can possible only when P^H of water is above 5.6.

(ii) If P^H in mouth is lower than 5.5 , then tooth decay starts. P^H management is essential for our good teeth.

(iii) If P^H less in our stomach due to hydrochloric acid production, the food materials digest freely. P^H is very less in stomach causes pain and acidity. This can be reduced by getting antacid tablet. Antacid tablet reacts with acid and neutralize it.

(iv) Plants requires a specific P^H range for their healthy growth.

Section - IV

23. Ray diagram for the formation of image when an object is placed at centre of curvature of a concave mirror is
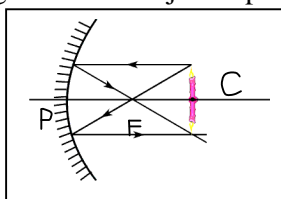
Properties of image : (i) The image is a real image (ii) The image is inverted
(iii) The image size is equal to the object size.

24. Hydrochloric acid conducts electricity and Glucose does not conduct electricity.
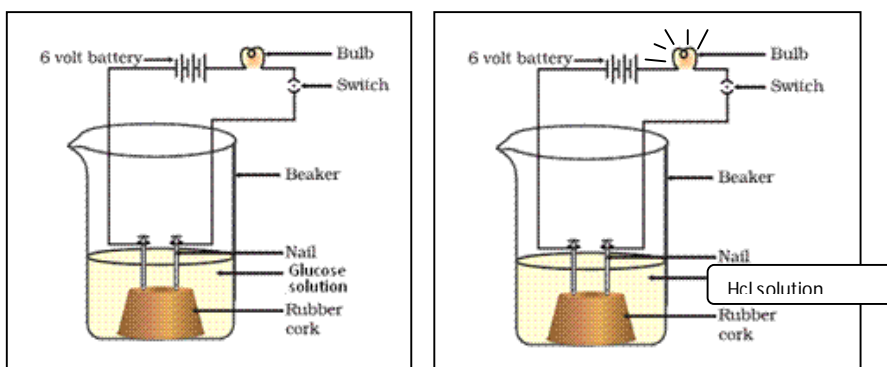
KEY SHEET - PART-B

Sl No.	Ans.	Sl No.	Ans.	Sl No.	Ans.
1	D	11	A	21	Remains constant
2	C	12	C	22	106
3	B	13	A	23	$\frac{v}{u}$
4	A	14	B	24	Red
5	A	15	C	25	2×10^8 m/s
6	B	16	D	26	C
7	C	17	D	27	D
8	D	18	C	28	F
9	B	19	B	29	B
10	D	20	A	30	A