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FOR GOD AND COUNTRY

ST. LAWRENCE HIGH SCHOOL

A Jesuit Christian Minority Institution

Pre Test Examination – 2019

Subject: Physical Science **CLASS – 10 A,B,C,D** **F.M:75**

Time Allotted: 2 hrs. 30 mins **Date: 03/08/2019**

GROUP A

(1) Choose the correct option (MCQ): **[1×13=13]**

(i) An air bubble in water behaves like a:
Answer: (a) Divergent lens

(ii) The average kinetic energy of the molecules of a gas is proportional to the:
Answer: (b) Temperature

(iii) Thermal conduction through a conductor does not depend on its:
Answer: (c) Average temperature

(iv) For an ideal conductor, the thermal conductivity:
Answer: (b) K= ∞

(v) What is the percentage composition of hydrogen in H_2O?
Answer: (a) 11.1%

(vi) In presence of H_2S gas, alkaline sodium nitroprusside solution turns:
Answer: (d) violet

(vii) Arrangement of O, Cl, F, I in descending order of oxidising property is:
Answer: (d) F>O>Cl>I

(viii)Which statement is not true for a covalent compound?
Answer: (a) Solid

(ix) During extraction of aluminium from fused alumina, it is used:
Answer: (b) Graphite

(x) Which element of Group I has maximum metallic character?
Answer: Cs

(xi) Angle of deviation by a triangular prism does not depend on:
Answer: (d) intensity of incident light

(xii) Volumetric expansion of a gas does not depend on its:
Answer: (a) Mass

(xiii) If the volume of a sample of a gas at 0°C be 273 mL, then the volume of the gas -30°C will be:
Answer: (b) 243 mL

GROUP – B

2)Very short Answer type Questions (All questions are compulsory): **[1 X 16=16]**

2.1Group 2 contains elements known as_____ elements.
Ans. **Alkaline Earth Metal**

2.2 Mention the unit of resistivity.
Ans. **Ohm - m**

2.3 Keeping the resistance constant, the potential difference applied across the ends of a component is halved. By how much does the current change?
Ans. **Current will be halved.**

2.4 What do you mean by principal section of a prism?
Ans. **Any section of a prism, perpendicular to refracting edge is called principal section of prism.**

2.5 Hypermetropia is rectified by which type of lens?
Ans. **Convex lens.**

2.6 **24g** carbon on complete combustion produces how much volume of CO_2 at STP?
Ans. **44.8L**

2.7 What is meant by magnification of lens?
Ans. **It is defined as the ratio of the height of image to the height of object.**

2.8 What is spectrum?

Ans. **A collection of dispersed light giving its wavelength composition is called a spectrum.**

2.9 What is coefficient of real or absolute expansion of a liquid?

Ans. **It is defined as the expansion of a liquid that is the fraction of its volume by which it expands Per degree rise in temperature.**

2.10 Draw Lewis dot structure of C_2H_2.

Ans. **C_6: 2, 4**

H_1: 1

H:C:::C:H

2.11 Name a compound containing Covalent, Dative and Ionic bonds.

Ans. **NH_4Cl** or **$(NH_4)_2SO_4$**

2.12 Mention the increasing order of radius:Covalent radius, Ionic radius and V.D.W. radius

Ans. **Covalent radius< Ionic radius< V.D.W. radius**

2.13 What is the chemical formula of Nessler's reagent?

Ans. **$K_2[HgI_4]$**

2.14 Write down the electronic configuration of Mg^{2+}, N^{3-}

Ans. Mg^{2+}: **2(K), 8(L)**

N^{3-}: **2(K), 8(L)**

2.15 Place the following element in increasing order of electronegativity:**F, Br, I, Cl**

Ans., **I<Br <Cl<F**

2.16 Define electroplating.

Ans. **It is a process that involves application of electric current to reduce dissolved metal cations so that they form a thin coherent metal coating on an electrode.**

GROUP C

3. Answer the following questions: **[2×8=16]**

(i) The volume of a fixed mass of a gas at t°C is V mL at a pressure of p atm. Keeping pressure constant, the temperature is increased so that the volume increases to 2V mL. What is the temperature of the gas now?

Ans: Applying Charles law: $V_1/T_1 = V_2/T_2$

Given $V_1=V$, $T_1=t°C=(273+t)K$

$V_2=2V$, Let $T_2=t_2°C=(273+t_2)K$

$V/2V=(273+t)/(273+t_2)$

$t_2= 273+2t$

(ii) Show that ammonia contains Nitrogen.

Ans: $3CuO+2NH_3=3Cu+3H_2O+N_2$

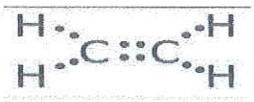
(iii) Which mirror is called diverging mirror and why?

Ans: A convex mirror is called a diverging miror. Because, all the rays parallel to the principal axis, after being reflected, diverge from a point situated behind the convex mirror.

(iv) How does electronegativity vary across a period and down a group?

Ans: The elctronegativity of elements increases across a period and decreases down a group.

(v) Show the Lewis dot diagram of C_2H_4.



(vi) Define 1 ampere.

Ans: One ampere is the current that flows through a conductor when one coulomb of charge passes in one second.

(vii) Calculate the percentage of water in washing soda crystals. [Na=23, C=12, 0=16, H=1]

Ans: Molecular weight of washing soda=286

Weight of water in one gram molecule of the srystal=180

Required percentage of water= 180/286 ×100%=62. 94%

(viii) At what temperature the volume of 28g of N_2 gas at 2.56 atm pressure will be 10 L?

Ans: PV=nRT

2.56 ×10=1×0. 0821×T

T=311. 8K

GROUP D

4. Answer the following questions: [Any Ten] **[3×10=30]**

1. **Why N_2 (g) is not prepared by heating NH_4NO_2(s) directly. Explain with equation.**

Ans: On heating aqueous solution of ammonium nitrite nitrogen is produced. But this decomposition of ammonium nitrite is very quick and there is a chance of explosion, if it is heated alone. To reduce the speed of this reaction a mixture of aqueous solution of sodium nitrite and ammonium chloride is heated to prepare nitrogen.

$NaNO_2 + NH_4Cl = NH_4NO_2 + NaCl$

$NH_4NO_2 = N_2 + 2H_2O$

2. **Discuss the industrial manufacture of a) HCl b) HNO_3 c) H_2SO_4.**

HCl: Syntetic Process, HNO_3 : Ostwald Process, H_2SO_4: Contact Process.

3. **How $(NH_2)_2CO$ is industrially prepared. Write one use of that.**

In an autoclave ammonia and carbon dioxide are taken in 3:1 molar proportion, the mixture is heated to 170◦C -190 ◦C at a pressure 100-200 at, to give ammonium carbamate on reducing pressure this compound gives up water to produce urea.

Use: Urea is a good nitrogen containing fertilizer.

4. **How much volume of SO_2 at N.T.P will be obtained by completely burning of 10g of pure S(s)**

Ans: The required chemical reaction will be $S + O_2 = SO_2$ [S = 32, O = 16]

So, 32g pure S will produce 22.4 lit of SO_2.

Then, 10g pure S will produce $\frac{22.4}{32} \times 10$ lit of SO_2 = 7 Litre.

5. **Why in solid state ionic compounds do not conduct electricity. Write the electronic arrangement of Al^{+2}.**

Ans: In solid state they do not dissociate into ions.

K shell: 2 electrons, L shell: 8 electrons, M shell: 1 electron.

6. **How the ionic radii vary along the group of a periodic table. What are the drawbacks of modern periodic table ?**

Ans: Increases moving down the group in the periodic table.

Drawbacks: (a) Position of hydrogen controversial (b) Position of lanthanides and actinides, which do not have an individual place in periodic table.

7. **What are the applications of electrolysis and what do you mean by anode mud.**

Ans: Applications of electrolysis: (a) Extraction of metals (b) Electrolytic refining of metals (c) Electroplating on metal surface etc.

Anode Mud: During purification of copper, a cloth bag is tied around the anode, the impurities like Ag, Au, Pt etc present in this impure copper anode are deposited in this bag as mud containing this precious metals, this mud is called anode mud..

8. **An object is placed at a distance of 16 cm from the pole of a concave mirror. The focal length of the mirror is 10 cm. What will be the nature of the image formed?**

Ans: Nature: Real, Inverted and Magnified.

9. **State Coulomb's law and define Ampere.**
The force between two point cahrges at rest is directly proportional to the product of the charges and inversely proportional to the square of the distance between them. The force acts along the line joining the charges and its value depends on the nature of the intervening medium.
One ampere is the current that flows through a conductor when one coulomb of charge passes in one second.

10. **The coefficient of volume expansion of a metal is $8.4\times10^{-5}{}^{\circ}C^{-1}$. Find its coefficient of superficial expansion.**
Ans: We know, $\alpha = \frac{\beta}{2} = \frac{\gamma}{3}$ so, $\frac{\beta}{2} = \frac{\gamma}{3}$ or $\beta = \frac{2}{3}\gamma = \frac{2}{3}\times 8.4 \times 10^{-5}{}^{\circ}C^{-1} = 5.6\times10^{-5}{}^{\circ}C^{-1}$

11. **Calculate the volume of 1 mole of H_2 at 27°C and 6atm pressure.**
Ans: Method –1: we know, PV = nRT here P = 6atm, n = 1, $R = 0.082\ lit - atm - K^{-1}mole^{-1}$ and T = (273+27) K = 300K
Now , $V = \frac{nRT}{P} = \frac{1\times0.082\times300}{6} = 4.1\ lit$.(Ans)

Method –2: we know, 1mole H_2 will occupy 22.4 lit at STP.
So, $P_1 = 1atm,\ V_1 = 22.4\ lit,\ T_1 = 273\ K$
and
$P_2 = 6atm,\ T_2 = (273+27)K = 300K\ and\ V_2 = unknown.$

Then, $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ gives, $V_2 = \frac{T_2}{P_2}\times\frac{P_1V_1}{T_1} = \frac{300}{6}\times\frac{1\times22.4}{273} = 4.1026\ lit\ (Ans).$