



ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

Second Term Examination - 2018

Class :10



Sub :Physical Science

F.M.:75

DURATION:2 Hrs30Mins

DATE:02.08.2018

GROUP -A

I. Answer the following questions (Multiple Choice Questions)

(1x15=15)

(1.1) Keeping the resistance of a circuit same, if the voltage is halved the current will be:

- (a) Halved. (b) Doubled
(c) Four times. (d) One fourth

(1.2) In red light, a green leaf appears:

- (a) Red (b) Green
(c) Blue (d) Black

(1.3) When a cell is in use its emf E and terminal voltage V are related as :

- (a) $E = V$ (b) $E > V$
(c) $E < V$ (d) None of these

(1.4) The collision between the molecules give rise to the:

- (a) Pressure in gas (b) Temperature
(c) Volume (d) Surface area

(1.5) The unit of α depends on the unit of:

- (a) Length (b) Temperature
(c) Area (d) Both length and temperature

(1.6) In electrolytic solution electricity is conducted by:

- (a) Electrons. (b) atoms
(c) Ions (d) molecules

(1.7) In Haber's process ,the catalyst used is:

- (a) Iron (b) Platinum
(c) Nickel. (d) Manganese dioxide

(1.8) Ionic compounds :

- (a) Do not conduct electricity (b) Conduct electricity in solid state
(c) Conduct electricity in molten or aqueous state (d) None of these

(1.9) On moving left to right across a period of the periodic table the atomic size :

- (a) Decreases (b) Increases
(c) Remains unchanged (d) Sometimes increases and sometimes decreases

(1.10) Linear magnification $m > 1$ refers to the fact that the image is:

(a) Enlarged

(b) Diminished

(c) Of the same size as the object

(d) None of the above

GROUP B.

Answer the following questions in one sentence or one in word: (1x22=22)

(2.1) Which type of spherical mirror has a real focus?

(2.2) Which offers less resistance?--- a thin wire or a thick wire.

(2.3) What is the value of lateral displacement of light through a rectangular glass slab for normal incidence?

(2.4) When liquids and gases are heated, they have only ----- expansion.

(2.5) The volume occupied by 1 mole of a gas at a given temperature is called it's -----.

(2.6) State true/false

For real gases there exists intermolecular forces between the gas molecules.

(2.7) During electrolysis, which source of electricity is employed?

(2.8) Which one of the noble gases have 2 electrons in the outermost shell?

(2.9) Which of the elements have the greatest electron affinity amongst halogens?

(2.10) Name one inorganic fertilizer which is prepared by using ammonia.

(2.11) Match the right column with the left column: 1x4

2.11.1 Unit of electric charge.	(a) Superconductor
2.11.2 Ohm's law	(b) 1joule/coloumb
2.11.3 Slope of V-I graph	(c) Relates current and potential difference
2.11.4 1 volt is equal to	(d) Ampere-sec/coloumb

(2.12) Which light is scattered the most and why?

(2.13) With the increase in cross sectional area, how does the thermal conductivity gets affected?

(2.14) What are the variable quantities in Boyles' law?.

(2.15) How does the resistance of an electrolyte change with temperature?

(2.16) How is H_2S gas collected?

(2.17) How are the Valence electrons related to the group number of the representative elements?

(2.18) What is a superconductor?

(2.19) What is the volume of 4 moles of O_2 at STP?

Group C

3. Answer the following questions. $2 \times 9 = 18$

- (3.1) A bulb is connected to a cell. How is the resistance of the circuit affected if another identical bulb is connected (i) in series (ii) in parallel, with the first bulb?
- (3.2) Why is light considered as an electromagnetic wave?
- (3.3) What are the electrolyte, cathode and anode used in silver plating?
- (3.4) A circuit consists of 1Ω resistor in series with a parallel arrangement of 6Ω and 3Ω resistor. Calculate the total resistance of the circuit. Draw the circuit.
- (3.5) Define ionization energy.
- (3.6) What is a Nessler's reagent? Mention its use.
- (3.7) The wavelength of X rays is 0.01\AA . Calculate its frequency.
- (3.8) What is meant by anode mud in the electrorefining of copper?
- (3.9) Why do solid ionic compounds not conduct electricity but their molten or dissolved states do?

Group -D

4. Answer the following questions (Alternatives are to be noted) $5 \times 5 = 25$

- (4.1) Two resistors of 4Ω and 6Ω are connected in parallel. The combination is connected across a 6V battery of negligible resistance
- (a) Draw the circuit diagram using above data. (1)
- (b) Calculate (i) the current in the circuit (2)
- (ii) the current through each resistor (2)
- (4.2) (a) Establish the relation $f = R/2$ for a concave mirror, where f is the focal length and R is the radius of curvature. (3)
- (b) Write down two factors affecting the angle of deviation by a prism. (2)
- (4.3) Give three physical properties of covalent compounds.
- (4.4) (a) How potential difference is related to temperature gradient in case of conduction of heat through a conducting slab? (3)
- (b) Define thermal conductivity of a substance. (2)
- (4.5) Explain the process of extraction of Al by electrolysis. Mention the electrode reactions.

OR

State the conditions and relevant equations for the preparation of H_2SO_4 by the contact process.



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MODEL ANSWER PRE TEST -2018

Nandini - Karim (11)



Sub:Physical Science
Exam held on:02.08.2018

Class:X

F.M :75
Duration:2hrs30min

GROUP -A

1. Answer the following questions (Multiple Choice Questions) (1x10=10)

1.1 Ans: (a) Halved.

1.6 Ans: (c)Ions

1.2 Ans:(d) Black

1.7 Ans :(a)Iron

1.3 Ans:(b) $E > V$

1.8 Ans:(c) Conduct electricity in molten or aqueous state

1.4 Ans:(a)Pressure in gas

1.9 Ans :(a) Decreases

1.5 Ans: (b) Temperature

1.10 Ans: (a)Enlarged

GROUP B.

2.1 Ans: concave mirror

2.6 true

2.2 Ans: A thick wire offers less resistance ,since it's area is more

2.7 Ans : Direct current/ battery.

2.3 Ans: lateral displacement is zero.

2.8 Ans : Helium

2.4 cubical expansion.

2.9 Ans: Fluorine

2.5 molar volume

2.10 Ans: Ammonium sulphate

(2.11) Match the right column with the left column: 1x4

2.11.1 Unit of electric charge.	(d)
2.11.2 Ohm's law	(c)
2.11.3 Slope of V-I graph	(a)
2.11.4 1 volt is equal to	(b)

2.12 Ans: violet light since it's wavelength is least.

2.13 Ans: Decreases

2.14 Ans: Pressure and volume .

2.15 Ans: By increasing temperature ,the resistance of an electrolyte decreases.

2.16 Ans: H_2S is collected in a gas jar by upward displacement of air.

2.17 Ans: The number of Valence electrons is the same as the group number of the representative elements.

2.18 Ans: Conductors having zero resistance below 1K.

2.19 Ans: Volume of 4 miles of O_2 at STP is $4 \times 22.4 = 89.6$ lit

Group C

(3.1) A bulb is connected to a cell.How is the resistance of the circuit affected if another identical bulb is connected (i) in series (ii) in parallel,with the first bulb?

Ans: (i) Resistance is doubled.

(ii) Resistance is halved.

(3.2) Why is light considered as an electromagnetic wave?

Ans:(a)Light waves are considered to be electromagnetic waves since it doesn't require any material medium for its propagation.

(b) It is transverse in nature and are not deflected by electric and magnetic fields.(or any other properties of electromagnetic waves)

(3.3)What are the electrolyte, cathode and anode used in silver plating?

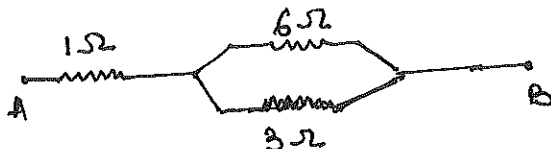
Ans: Electrolyte: sodium or potassium argentocyanide solution. [AgNO₃ solution may be used.]

Cathode: the object to be electroplated.

Anode: A block of metal to be deposited is made the anode(here Ag)

(3.4)A circuit consists of 1Ω resistor in series with a parallel arrangement of 6Ω and 3Ωresistor.Calculate the total resistance of the circuit.Draw the circuit.

Ans:



Equivalent resistance = $1 + \frac{6 \times 3}{6+3} = 1+2 = 3\Omega$

(3.5) Define ionization energy.

Ans: Energy required to remove a most loosely bound electron from the outermost or valence shell of an isolated gaseous atom in ground state to form a cation in gaseous state.

(3.6) What is a Nessler's reagent ? Mention its use.

Ans: Nessler's reagent is the alkaline solution of potassium mercuric iodide. It is used to detect the presence of ammonia.

(3.7) The wavelength of X rays is 0.01Å . Calculate it's frequency.

Ans: wavelength = velocity of light in vacuum/frequency

Therefore frequency = $3 \times 10^8 / 0.01 \times 10^{-10} = 3 \times 10^{20} \text{Hz}$.

(3.8) What is meant by anode mud in the electro refining of copper?

Ans: During electrolysis of aqueous CuSO₄, the impurities of the cathode (Au,Ag,Pt) get dissolved or precipitated at the bottom.This is called anode mud.

(3.9)Why the solid ionic compounds do not conduct electricity but their molten or dissolved states do?

Ans: The solid ionic compounds dissolve in water and then the water molecules weaken the forces existing between the oppositely charged ions. Thus the ions come out of the crystalline structure and conduct electricity, whereas due to the absence of ions in solid state, the ionic solids do not conduct electricity.

Group –D

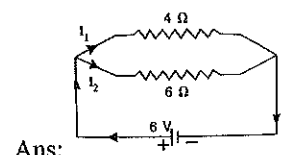
4. Answer the following questions (Alternatives are to be noted)

5x5=25

(4.1) Two resistors of 4Ωand 6Ω are connected in parallel. The combination is connected across a 6V battery of negligible resistance

(a) Draw the circuit diagram using above data.

(1)



Ans:

(b) Calculate (i) the current in the circuit

(2)

Ans: If the resistance of the parallel combination is R_p,then

$$1/R_p = 1/4 + 1/6 = 5/12$$

$$\text{Or, } R_p = 12/5 = 2.4\Omega$$

Let the current through the battery be I, then $I = V/R_p = 2.5 \text{ Amp}$

(ii) the current through each resistor (2)

Ans: Current through $4\Omega = 6/4 = 1.5 \text{ A}$

Current through 6Ω is $6/6 = 1 \text{ A}$

(4.2) (a) Establish the relation $f = R/2$ for a concave mirror, where f is the focal length and R is the radius of curvature. (3)

Ans: Refer any standard text

(b) Write down two factors affecting the angle of deviation by a prism. (2)

Ans: (i) Colour or wavelength of light

(ii) Angle of the prism

(4.3) Give three physical properties of covalent compounds.

Ans: Refer any standard text

(4.4) (a) How potential difference is related to temperature gradient in case of conduction of heat through a conducting slab? (3)

Ans: For conduction of heat through a conducting slab: $Q/t = (\theta_2 - \theta_1) / (l/k \cdot d/A)$ --- (1), where Q/t is heat current, $(\theta_2 - \theta_1)$ = change in temperature,

And from Ohm's law $I = V/R$ --- (2), where I is the electric current, V is the potential difference and R is the resistance

From eq (1) and (2) V is equivalent to $(\theta_2 - \theta_1)$

(b) Define thermal conductivity of a substance.

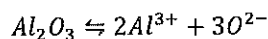
Ans Refer any standard text

(2)

(4.5) Explain the process of extraction of Al by electrolysis. Mention the electrode reactions.

Ans: Aluminium is extracted from pure alumina (Al_2O_3) prepared from ore bauxite. The melting point of alumina is high (2050°C), this high melting point of alumina creates some trouble during electrolysis. To reduce the melting point of the electrolyte a mixture of 60% cryolite ($AlF_3, 3NaF$), 20% alumina (Al_2O_3), 20% fluorospea (CaF_2) is used as electrolyte. The melting point of this electrolytic mixture is about 868°C . Electrolysis of this molten mass, deposits Al at the cathode.

Electrode reactions: Graphite rods are used as electrodes.



Cathode reaction: $2Al^{3+} + 6e \rightarrow 2Al$ (reduction)

Anode reaction: $3O^{2-} - 6e \rightarrow \frac{3}{2} O_2$ (Oxidation)

OR

State the conditions and relevant equations for the preparation of H_2SO_4 by the contact process.

Ans: Conditions – i) **Effect of temperature** – The reaction is exothermic. Lowering of the temperature favours forward reaction. Optimum temperature used is $450 - 500^\circ\text{C}$ which gives maximum yield at the highest rate of reaction.

ii) **Effect of pressure:** The reaction proceeds with the decrease in volume. So, high pressure will favour the forward reaction. In practice optimum pressure 2-atmospheres is used.

iii) **Catalyst:** Use of catalyst favours forward reaction. In contact process platinised asbestos or vanadium pentoxide is used as catalyst.

