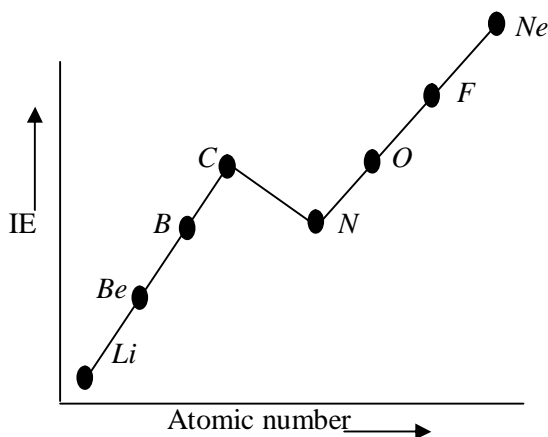


**CHEMISTRY**  
Maximum : 60 Scores

Time:2 Hours  
Cool off time : 15 minutes

- There is a 'cool off time' of 15 minutes in addition to the writing time of 2 hours.
- Read questions carefully during the 'cool off time'
- You are not allowed to write your answers nor to discuss anything with others during the 'cool off time'

1. The laws of chemical combination governs the formation of compounds from elements.
  - a) State the Law of Conservation of Mass. Who put forward this law ? (1  $\frac{1}{2}$ )
  - b) Determine the empirical formula of an oxide of Iron which contain 69.9% Iron and 30.1% Oxygen by mass. (2  $\frac{1}{2}$ )
2. Quantum numbers are a set of four numbers used to designate each electron in an atom.
  - a) What are the values of  $n, l$  and  $m$  for valence electron of Magnesium ? (1  $\frac{1}{2}$ )
  - b) How many orbitals are possible when  $l = 3$  ? (1)
  - c) Calculate the wavelength of electron moving with a velocity of  $2.05 \times 10^7 \text{ mS}^{-1}$  (2  $\frac{1}{2}$ )
3. Ionization enthalpy variation of second period elements is given below :
  - a) Is the graph correct? Justify your answer. (2)
  - b) Resketch the graph (2)



4. Give reason :
  - a) (i)  $\text{CCl}_4$  is not hydrolyzed but  $\text{SiCl}_4$  is hydrolyzed (1)
  - (ii) Graphite conduct electricity but Diamond does not (1)
  - b) What is borax bead test? (2)

5. Based on VSEPR theory, complete the following table:

a)

No. of $e^-$ pair	Bond angle	Geometry of molecule	Example
-----	$180^\circ$	Linear	-----
3	-----	-----	$BF_3$
6	-----	-----	$SF_6$
5	$120^\circ$ $90^\circ$	-----	-----

(4)

b)  $HF$  has higher boiling point than  $HCl$ , why ?

(1)

6. A science student doing an experiment with an ideal gas at constant temperature obtained the following graph.

a) Name the law he is trying to verify

(1)

b) What do you understand from the graph ?

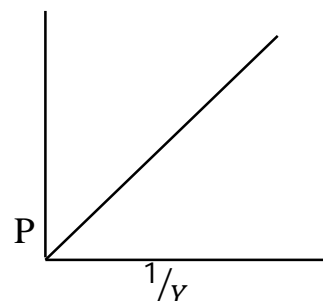
Write the mathematical expression and statement of the law.

(1)

c) Critical temperature of  $CO_2$  is  $30.98^\circ C$  and that of  $NH_3$

is  $132.5^\circ C$ . Which one is easily liquefiable?

(1)



7. a) Predict the sign of  $\Delta S$  in the following process:

i) Sublimation of Iodine

ii) Conversion of graphite into diamond

iii)  $HCl + AgNO_3 \rightarrow AgCl + HNO_3$

iv) Melting of ice

(2)

b) Calculate the work done for the reversible isothermal expansion of 1 mole of an ideal gas at  $27^\circ C$  from a volume of  $10 \text{ dm}^3$  to a volume of  $20 \text{ dm}^3$

(2)

**OR**

Calculate the enthalpy of formation of Methane, given that the enthalpies of combustion of Methane, Graphite and Hydrogen are  $-890.2 \text{ KJ}$ ,  $-393.4 \text{ KJ}$  and  $-285.7 \text{ KJ}$  respectively

(2)

8. a) Predict the change of  $p^H$  in the following cases. Explain the reason

i)  $0.1N \text{ HCl}$  is diluted with water

(1)

ii)  $0.1N \text{ NaOH}$  is diluted with water

(1)

iii) Two drops of dil  $HCl$  is added to Ammonium acetate

(1)

iv) Few crystals of Sodium acetate are dissolved in a sample of Ammonium acetate

(1)

b) State Le-Chatlier's principle

(1)

9. When a  $Zn$  rod is dipped in  $CuSO_4$  solution,

a) What are the observations ?

(1)

b) What is the chemistry behind it ?

(1)

c) To fill a balloon with hydrogen gas, you are given Hydrochloric Acid and the following metals :  $Cu$ ,  $Ag$  and  $Zn$ . Which are the chemicals selected to produce Hydrogen ? Write down the chemical equation.

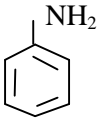
(1)

10. (a) Dalda available in the market is prepared from vegetable oil. Write down the chemistry behind it. (1/2)
- (b)  $D_2O$  is generally called \_\_\_\_\_ (1/2)
- (c) Draw the structure of  $H_2O_2$  (1)
- (d) A sample of river water does not form lather with soap. But on heating it forms lather with soap. Account for the observation and give the chemical equation. (2)
11. *Li* and *Mg* belonging to first and second group resemble each other.
- a) Name the relationship (1/2)
- b) Give any three similarities between *Li* and *Mg* (1 1/2)
- c) Explain Solvay process (2)

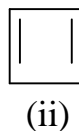
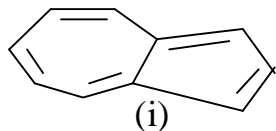
**OR**

- d) Explain why Cs and K are used in photoelectric cells? (2)
12. a) Write the IUPAC names of the following :
- i)  $(CH_3)_2 - CH - CH_2 - COOH$     ii)  $CH_3 - CH_2 - \underset{\substack{| \\ C_2H_5}}{CH} - CH_3$  (2)

b) Match the following:

Electron Displacement Effect	Organic Molecule
1. Inductive effect	a) $CH_3 - CH = CH_2$
2. Electromeric effect	b) $CH_2 = CH - CH = CH - CHO$
3. Mesomeric effect	c) 
4. Hyperconjugation	d) $CH_3 - CH_2 - COOH$

- c) Explain Lassayne's test for Nitrogen. (2)
13. a) Which of the following molecule is aromatic, why? (2)



- b) When HCl is added to Propene two alkyl chlorides are obtained. Which is the major product? Explain the rule behind it. (2)

**OR**

- c) Explain peroxide effect with example. (2)
14. What is acid rain and what are its consequences? (3)

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