# Shri Shantadurga Higher Secondary School, Bicholim-Goa.
## Final Examination March-2020

**Std: XI Science**                                                                                                      **Max Marks: 55**

**Date: 07/03/2020**                                        # Chemistry                                        **Duration: 150 Minutes**

*Instructions:-*
*1. All questions are compulsory; however question **23, 26**, and **27** has internal choice.*
*2. Use of **calculator** is **not permitted**, however logarithmic table will be provided on request.*
*3. Every Question should be attempted only once.*

*Section-A consists of 9 questions of 1 mark each.*
*Section-B consists of 10 questions of 2 marks each.*
*Section-C consists of 6 questions of 3 marks each.*
*Section-D consists of 2 questions of 4 marks each.*

## Section-A

Q.1.    The mathematical expression for the **first law** of **thermodynamics** when heat is                    (1)
supplied to the system and work is done by the system is _____.
        # $\Delta U = q + w$        # $\Delta U = -q + w$        # $\Delta U = q-w$        # $\Delta U = -q-w$

Q.2    The oxidation state of **Mn** is **+7** in _____ .                                           (1)

        # $MnO_2$            # $KMnO_4$            # $Mn_3O_4$            # $K_2MnO_4$

Q.3.    The conjugate base of  $HSO_3^-$  is _____ .                                                            (1)

        # $H_2SO_4$        # $SO_3^{2-}$        # $HSO_4^-$        # $H_2SO_3$

Q.4.    The most thermally unstable **metal carbonate** which decomposes to give metal oxide                    (1)
and $CO_2$ amongst the following is_____.

        # $MgCO_3$        # $CaCO_3$            # $SrCO_3$            # $BaCO_3$.

Q.5.    **Boric acid** is an acid because its molecule_____                                      (1)

# contains replaceable $H^+$ ion                    # combines with proton from water molecule

#  accepts $OH^-$ from water releasing proton         # gives up a proton

Q.6.    Write a mathematical expression showing relation between **standard Gibbs free**                        (1)
**energy change** and **equilibrium constant K**

Q.7    Draw a neat labelled diagram of **Daniel Cell**.                                                         (1)

Q.8    Write a point of distinction between **oxidation** and **reduction** with respect to the                 (1)
oxidation number.

Q.9    Write the IUPAC **name** and **symbol** for the element having atomic number **107**.                    (1)

## Section-B

Q.10    An aqueous solution of copper sulphate appeared blue in colour. When zinc powder                        (2)
was added to the same blue solution, its colour started fading and it slowly turned
colourless.
(a) Name the type of **redox reaction** taking place in the above process.
(b) Identify and write the substance undergoing **oxidation** and **reduction** in the same.

Q.11    Answer the following using the given standard electrode potential values.                               (2)
$$E^\circ{}_{Cr^{3+}/Cr} = -0.75V \quad and \quad E^\circ{}_{Fe^{2+}/Fe} = -0.45V$$
(a) Calculate **e.m.f.** of the cell.
(b) Name the **oxidising** agent.

Q.12    With respect to **group 2 elements** explain the following:                                             (2)
        a) Trends in **ionization enthalpy** down the group
        b) Any two **diagonal relationships** between lithium and magnesium.

Q.13    a) Write the preparation of **$NaHCO_3$** with a balanced Chemical reaction.                            (2)
        b) State any two uses of **Caustic Soda**.

Q.14    Give reason for the following.                                                                          (2)

        a)  **Carbon** shows anomalous behaviour.

        b)  **Diamond** is the hardest substance on the earth.

Q.15    Write the chemical reaction for each of the following:                                                  (2)
        a) **Wurtz reaction**
        b) **Friedal-Craft's alkylation reaction**

Q.16. Answer the following: (2)
        (a) State **Pauli's exclusion** principle.
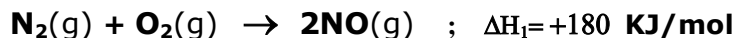        (b) Write the **designation** of the orbital with the following quantum number:
                $n = 3, l = 2$   and   $n = 2, l = 1$

Q.17   Calculate $\Delta H$ for the following reaction (2)

$$N_2(g) + 2\,O_2(g) \rightarrow 2NO_2(g)\ ;\ \Delta H = \underline{\ \ ?\ \ }\ KJ/mol$$

This reaction takes place in two steps as follows :

In the first step **Nitrogen** reacts with **oxygen** to produce **Nitric oxide**

$$N_2(g) + O_2(g) \rightarrow 2NO(g)\ ;\ \Delta H_1 = +180\ KJ/mol$$

In the second step **NO** formed reacts with more oxygen to produce $NO_2$

$$2NO(g) + O_2(g) \rightarrow 2NO_2(g)\ ;\ \Delta H_2 = -112\ KJ/mol$$

Q.18   On the basis of **Le Chatelier's** Principle explain, (2)

a )How the temperature and pressure can be adjusted to increase the yield of ammonia in the following reaction?

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$
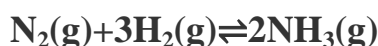
b) What will be the effect of addition of argon to the above reaction mixture at constant volume?

Q.19   A balloon is blown up at **5 °C** has a volume of **480 mL**. The maximum volume capacity (2) of the balloon is **548.6 mL**, will the balloon burst if it is brought to a room having temperature of **30˚C**?

## Section-C

Q.20   a) Distinguish between **saturated** and **unsaturated** hydrocarbons. (3)
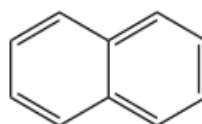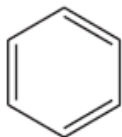        b) Draw the following:
             i) **Newmann projection** for **staggered** and **eclipsed** conformation of **ethane** molecule.
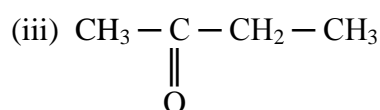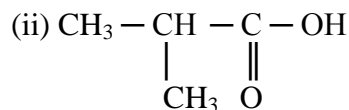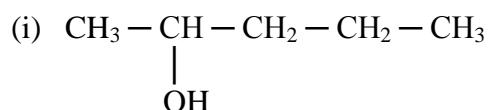             ii) Geometrical isomers of **But-2-ene.**

Q.21   a) Why does branched chain alkanes have **lower** boiling point than straight chain (3) alkanes?
        b) Name the major product obtained on reaction of **hydrogen bromide** with **butene** in presence **of peroxide**.
        c)  Identify which of the following is **not** an aromatic compound and write its **name**.

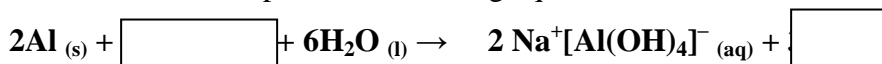Q.22   Write the **IUPAC nomenclature** for the following compounds: (3)

(i) $CH_3 - CH - CH_2 - CH_2 - CH_3$
           $|$
          $OH$

(ii) $CH_3 - CH - C - OH$
           $|$    $\|$
         $CH_3$  $O$

(iii) $CH_3 - C - CH_2 - CH_3$
             $\|$
             $O$

Q.23   With respect to **Boron family** answer the following questions. (3)

        a.  Why $BF_3$ behaves as a lewis acid

        b.  Draw the dimeric structure of **Aluminum chloride**.

        c.  Complete the following equation

$2Al_{(s)} + \boxed{\phantom{xxxx}} + 6H_2O_{(l)} \rightarrow 2\,Na^+[Al(OH)_4]^-_{(aq)} + \boxed{\phantom{xxxx}}$

**OR**

Q.23　With respect to **Carbon family** answer the following questions　(3)
　　　　　a. Write a point of difference between Graphite and Diamond with respect to type of **hybridisation** the carbon atom has undergone.
　　　　　b. Draw the basic structural unit of silicates $SiO_4^{4-}$
　　　　　c. Complete <u>the following</u> equation
　　　　　$CaCO_3 +$ ▭ $\rightarrow CaCl_2 +$ ▭ $+ H_2O$

Q.24　**Define** the following　(3)
　　　　　a) Isolated System.
　　　　　b) Standard enthalpy of sublimation
　　　　　c) Entropy of the system

Q.25　(a) Write the **hybridisation** of **sulphur** in $SF_6$ and comment on its geometry.　(3)

　　　　(b) Draw the **Molecular Orbital** diagram for $O_2$ molecule.

　　　　　Also find its **bond order** and comment on its **magnetic character**.

## Section-D

Q.26　a)Define **Buffer solutions**　(4)
　　　　b) Give a point of difference between **homogenous** equilibrium and **heterogenous** equilibrium.
　　　　c) $N_2(g)+O_2(g) \rightleftharpoons 2NO(g)$

　　　　For the above reaction, **Kc** = $4.8 \times 10^{-31}$ and **Qc** = $3.8 \times 10^{-38}$ at **298K**.
　　　　Predict the direction of the reaction.
　　　　d) Write the reaction showing the **amphoteric nature** of water.

### OR

　　　　a) Define **ionic equilibrium**.
Q.26
　　　　b) Give a point of difference between lewis acid and lewis base.　(4)

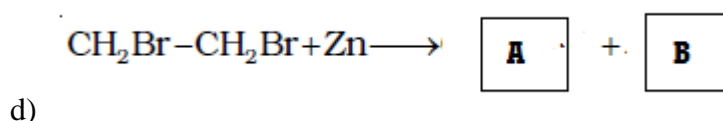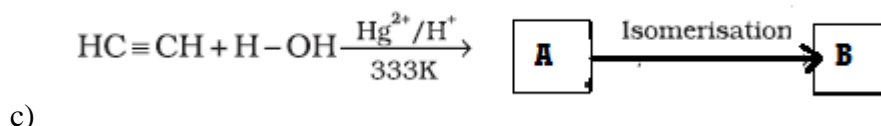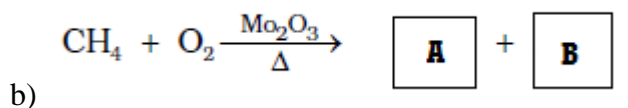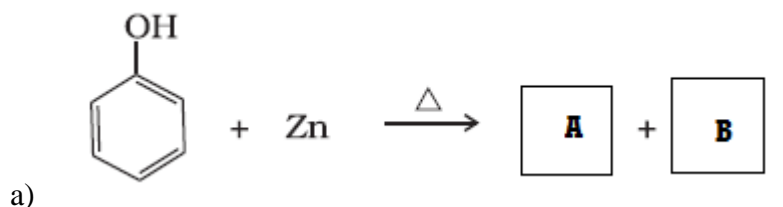　　　　c) $I_2(g)+H_2(g) \rightleftharpoons 2HI(g)$

　　　　For the **above** reaction, Kc = **57.0**, at **500** K. predict the **extent** of the reaction.

　　　　d) Write the formula for the **ionic product of water**.

Q.27　Write the **chemical equation** for each of the following:　(4)
　　　　a) Nitration of Benzene
　　　　b) Decarboxylation of Sodium acetate
　　　　c) Aromatisation of n-Hexane
　　　　d) Ozonolysis of Propene

### OR

Q.27　Complete the following equations and write product **A** and **B**.　(4)

a) 

b) $CH_4 + O_2 \xrightarrow[\Delta]{Mo_2O_3}$ | A | + | B |

c) $HC \equiv CH + H-OH \xrightarrow[333K]{Hg^{2+}/H^+}$ | A | $\xrightarrow{\text{Isomerisation}}$ | B |

d) $CH_2Br-CH_2Br+Zn \longrightarrow$ | A | + | B |

*----------------------THE END----------------------*