# SHRI VIDHYABHARATHI MATRIC HR.SEC.SCHOOL

SAKKARAMPALAYAM , AGARAM (PO) ELACHIPALAYAM
TIRUCHENGODE(TK), NAMAKKAL (DT) PIN-637202
Cell : 99655-31727, 94432-31727

## COMMON QUARTERLY EXAMINATION 2018 (17.09.2018)

**STD: XI**

**SUBJECT: CHEMISTRY** **CHEMISTRY ANSWER KEY** **MARKS : 70**

| Q.NO | SECTION-I | MARKS |
|---|---|---|
| 1 | c) $CO + H_2$ | 1 |
| 2 | b) 2 1 4 3 | 1 |
| 3 | a) Sum of molar heat of fusion and vaporisation | 1 |
| 4 | a)4,6 | 1 |
| 5 | b)$NH_3$ | 1 |
| 6 | b)+6 | 1 |
| 7 | d)-9E | 1 |
| 8 | c)+3 KJ | 1 |
| 9 | a)iv < ii < iii<i | 1 |
| 10 | b)Both assertion and reasons are correct, but reason is not the correct explanation of the assertion | 1 |
| 11 | a)Sodium Aluminium Silicate | 1 |
| 12 | c) Argon | 1 |
| 13 | b) Li and Mg (or) d)Be and Al | 1 |
| 14 | b)negative | 1 |
| 15 | c)kerosene | 1 |

<table>
<tr><th>Q.NO</th><th>SECTION-II</th><th>MARKS</th></tr>
<tr><td>16</td><td>The equivalent mass of an element, compound or ion is the number of parts of mass of an element which combines with or displaces 1.008 parts of hydrogen or 8 parts of oxygen or 35.5 parts of chlorine.<br><br>Gram equi</td><td>2M</td></tr>
<tr><td>17</td><td><table>
<tr><td>Orbital</td><td>n</td><td>l</td><td>Radial node n-l-1</td><td>Angular node l</td><td>Total Nodes</td></tr>
<tr><td>3d</td><td>3</td><td>2</td><td>0</td><td>2</td><td>2</td></tr>
<tr><td>4f</td><td>4</td><td>3</td><td>0</td><td>3</td><td>3</td></tr>
</table></td><td>2M</td></tr>
<tr><td>18</td><td>$MgCl_2 + Ca(OH)_2 \longrightarrow Mg(OH)_2 + CaCl_2$<br>Removal of permanent hardness means (Mg & Ca) chlorides and sulphates are converted to insoluble carbonates but we can use $Ca(OH)_2$<br>means formed calcium chlorides only does not form insoluble carbonates</td><td>2M</td></tr>
<tr><td>19</td><td>$Z_{eff} = Z-S$<br>$Z_{eff} = 2-0.30$ (for 1s $e^-$ = 0.30)<br>$Z_{eff} = 1.70$</td><td>1M<br><br>1M</td></tr>
<tr><td>20</td><td>1. Hydrogen molecule in which protons in the nuclei of both H-atoms are known to spin in same direction is termed as ortho hydrogen.<br>2. Hydrogen molecule in which protons in the nuclei of both H-atoms spin in opposite direction is termed as para hydrogen</td><td>1M<br><br>1M</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td></tr>
<tr><td>21</td><td>Baking soda - Sodium bicarbonate ($NaHCO_3$) (Any one use)<br>(i) Sodium hydrogen carbonate is used as an ingredient in baking<br>(ii) It is a mild antiseptic for skin infections<br>(iii) It is also used in fire extinguishers.</td><td>1M<br><br>1M</td></tr>
<tr><td>22</td><td>Plaster of paris is obtained when gypsum, $CaSO_4.2H_2O$, is heated to 393K<br>$2(CaSO_4.2H_2O) \rightarrow 2CaSO_4.\ H_2O + 3H_2O$</td><td>2M</td></tr>
<tr><td>23</td><td>At room temperature, vapour pressure of liquid ammonia is very high and so will evaporate. If the bottle is opened, the sudden decrease in pressure will lead to increase in volume of the gas and cause breakage of the bottle. Cooling decreases the vapour pressure and maintains the liquid in the same state. Hence, the bottle is cooled before opening.</td><td>2M</td></tr>
<tr><td>24</td><td>(i) The third law of thermodynamics states that the entropy of pure crystalline substance at absolute zero is zero.<br>(ii) It can also be stated as it is impossible to lower the temperature of an object to absolute zero in a finite number of steps.<br>(iii) Mathematically $\lim_{T\rightarrow 0} S = 0$ for a perfectly ordered crystalline</td><td>2M</td></tr>
<tr><td>Q.NO</td><td>SECTION-III</td><td>MARKS</td></tr>
<tr><td>25</td><td>The electro-negativity generally increases across a period from left to right. As discussed earlier, the atomic radius decreases in a period, as the attraction between the valence electron and the nucleus increases. Hence the tendency to attract shared pair of electrons increases. Therefore, electro-negativity also increases in a period<br>The electro-negativity generally decreases down a group. As we move down a group the atomic radius increases and the nuclear attractive force on the valence electron decreases. Hence, the electro-negativity decreases.</td><td>1 ½ M<br><br>1 ½ M</td></tr>
<tr><td>26</td><td><table><tr><th>Ions</th><th>No. of electrons</th><th>Electronic configuration</th></tr><tr><td>$Mn^{2+}$</td><td>23</td><td>$1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^5$</td></tr><tr><td>$Cr^{3+}$</td><td>21</td><td>$1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^3$</td></tr></table></td><td>1½ M<br>1½ M</td></tr>
<tr><td>27</td><td>$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$<br>As per the stoichiometric equation,<br>Combustion of 1 mole (16 g) CH4 produces 2 moles (2 × 18 = 36 g) of water.<br>$CH_4 = (12) + (4 \times 1) = 16\ g\ mol^{-1}$<br>$H_2O\ (2\times1) + (1 \times16) = 18\ g\ mol^{-1}$<br>Combustion of 32 g $CH_4$ produces<br>$\frac{36\ g\ H}{16\ g\ C}$</td><td>1M<br><br>1M<br><br>1M</td></tr>
<tr><td>28</td><td>There are two types of Hydrogen bonding<br>(i) Intramolecular hydrogen bonding<br>(ii) Intermolecular hydrogen bonding<br>Intramolecular hydrogen bonds are those which occur within a single molecule.<br>Example: Ortho nitrophenol, Salicilaldehyde</td><td>1M<br><br>1M</td></tr>
</table>

Intermolecular hydrogen bonds occur between two separate molecules. For example, intermolecular hydrogen bonds can occur between ammonia molecule themselves or between water molecules themselves or between ammonia and water. — 1M

**29**

The last electron enters in ns orbitals known as s block elements. — 1M

The elements belonging to the group 1 and 2 in the modern periodic table are called s-block elements. The elements belonging to these two groups are commonly known as alkali and alkaline earth metals respectively. — 2M

**30**

**Charles law**

For a fixed mass of a at constant pressure, the volume is directly proportional to its temperature (K). Mathematically it can be represented as (at constant P and n) — 1 ½ M

or V = kT

$$\frac{V}{T} = Constant$$

**Boyle's law**

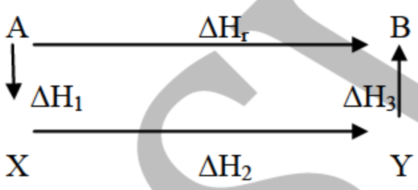
At a given temperature the volume occupied by a fixed mass of a gas is inversely proportional to its pressure.

Mathematially, the Boyle's law can be written as — 1 ½ M

$$V \alpha \frac{1}{P} .........(1)$$

**31**

The enthalpy change of a reaction either at constant volume or constant pressure is the same whether it takes place in a single or multiple steps provided the initial and final states are same. — 2M




$$\Delta H_r = \Delta H_1 + \Delta H_2 + \Delta H_3$$ — 1M

**32**

| Compound | Molecular formula | Empirical formula |
|---|---|---|
| Fructose | $C_6H_{12}O_6$ | $CH_2O$ |
| Caffeine | $C_8H_{10}N_4O_2$ | $C_4H_5N_2O$ |

1 ½ M
1 ½ M

**33**

| Atomic Number | IUPAC Name |
|---|---|
| 102 | Unnilbium |
| 108 | Unniloctium |
| 111 | Unununium |

1M
1M
1M

| Q.NO | SECTION-IV | MARKS |
|---|---|---|

**34**

**i)** when a reaction is carried out using non-stoichiometric quantities of the reactants, the product yield will be determined by the reactant that is completely consumed. It limits the further reaction from taking place and is called as the limiting reagent — 2M

**ii)** The process can be explained on the basis of electrons. — 1 ½ M

The reaction involving loss of electron is termed oxidation

$Fe^{2+} \rightarrow Fe^{3+} + e^-$ (loss of electron-oxidation).

The reaction involving gain of electron is termed reduction.

$Cu^{2+} + 2e^- \rightarrow Cu$ (gain of electron-reduction) — 1 ½ M

| | | |
|---|---|---|
| | **(OR)**<br>Planck's quantum hypothesis:<br>**$E = h\nu$ -------- (1)**<br>(ii) Einsteins mass-energy relationship<br>**$E = mc^2$ ---------(2)**<br>From (1) and (2)<br>$h\nu = mc^2$ here $\nu = c/\lambda$<br>$hc/\lambda = mc^2$<br>**$\lambda = h / mc$ ------------(3)**<br>The equation 3 represents the wavelength of photons whose momentum is given by mc (Photons have zero rest mass)<br>For a particle of matter with mass m and moving with a velocity v, the equation 3 can be written as<br>**$\lambda = h / mv$**<br>This is valid only when the particle travels at speeds much less than the speed of Light. For a microscopic particle such as an electron and it becomes significant. | 1M<br>1M<br>1M<br>1M<br>1M |
| 35 | **i)** An orbital is the region of space around the nucleus within which the probability of finding an electron of given energy is maximum. | 2M |
| | **ii)** $Ni^{2+}$[Ar] $3d^8$<br>$Fe^{3+}$ [Ar] $3d^5$<br>**Half filled and completely filled orbitals are more stable** compared to partially filled orbitals.<br>therefore $Fe^{3+}$ is more stable compared to $Ni^{2+}$ | 1M<br>1M<br>1M |
| | **(OR)**<br>**i)** The modern periodic law states that, **"the physical and chemical properties of the element are periodic functions of their atomic numbers".** | 2M |
| | **ii)** The total number of electrons are less in the cation than the neutral atom while the nuclear charge remains the same. Therefore the effective nuclear charge of the cation is higher than the corresponding neutral atom. Thus the successive ionization energies, always increase in the following order<br>$IE_1 < IE_2 < IE_3 <$ ...... | 3M |
| 36 | **i)** Beryllium - $1s^2, 2s^2$<br>Nitrogen ($1s^2, 2s^2, 2p^3$)<br>The addition of extra electron will disturb their stable electronic configuration(Half filled & completely filled ) and they have almost zero electron affinity. | 1M<br>1M |
| | **ii)** Beryllium hydroxide is amphoteric in nature as it reacts with both acid and alkali.<br>$Be(OH)_2 + 2\ NaOH \rightarrow Na_2BeO_2 + 2H_2O$<br>$Be(OH)_2 + 2HCl \rightarrow BeCl_2 + 2H_2O$ | 3M |
| | **(OR)**<br>**Covalent (Molecular) hydrides:** They are compounds in which hydrogen is attached to another element by sharing of electrons.<br>The most common examples of covalent hydrides of non-metals are methane, ammonia, water and hydrogen chloride.<br>Covalent hydrides are further divided into three categories, viz.,<br>• electron precise ($CH_4$, $C_2H_6$, $SiH_4$, $GeH_4$),<br>• electron-deficient ($B_2H_6$) and<br>• electron-rich hydrides ($NH_3$, $H_2O$).<br>Since most of the covalent hydrides consist of discrete, small molecules that have relatively weak intermolecular forces, they are generally gases or volatile liquids. | 1M<br>1M<br>2M<br>1M |

| | | |
|---|---|---|
| 37 | **i)** Deuterium can replace reversibly hydrogen in compounds either partially or completely depending upon the reaction conditions.<br>$CH_4 + 2D_2 \rightarrow CD_4 + 2H_2$<br>$2NH_3 + 3D_2 \rightarrow 2ND_3 + 3H_2$ | 1M<br>1M |
| | **ii)** 1.Heavy water is widely used as moderator in nuclear reactors as it can lower the energies of fast neutrons<br>2. It is commonly used as a tracer to study organic reaction mechanisms and mechanism of metabolic reactions<br>3. It is also used as a coolant in nuclear reactors as it absorbs the heat generated. | 1M<br>1M<br>1M |
| | **(OR)**<br>**i) H=U + PV**<br>**ΔH=ΔU + PΔV**<br>**ΔH = ΔU +Δn(g) RT** | 2M |
| | **ii)** Lattice energy is defined as the amount of energy required to completely remove the constituent ions from its crystal lattice to an infinite distance. It is also referred as lattice enthalpy.<br>$NaCl(s) \rightarrow Na^+(g) + Cl^-(g)$ $\Delta H_{lattice} = + 788$ kJ $mol^{-1}$ | 3M |
| 38 | 1 Beryllium chloride forms a dimeric structure like aluminium chloride with chloride bridges. Beryllium chloride also forms polymeric chain structure in addition to dimer. Both are soluble in organic solvents and are strong Lewis acids.<br>2 Beryllium hydroxide dissolves in excess of alkali and gives beryllate ion and $[Be(OH)_4]^{2-}$ and hydrogen as aluminium hydroxide which gives aluminate ion, $[Al(OH)_4]^-$.<br>3 Beryllium and aluminum ions have strong tendency to form complexes, $BeF_4^{2-}$, $AlF_6^{3-}$.<br>4 Both beryllium and aluminium hydroxides are amphoteric in nature.<br>5 Carbides of beryllium ($Be_2C$) like aluminum carbide ($Al_4C_3$) give methane on hydrolysis.<br>6 Both beryllium and aluminium are rendered passive by nitric acid. | 5M |
| | **(OR)**<br>**i)**The deviation of real gases from ideal behaviour is measured in terms of a ratio of PV to nRT. This is termed as compressibility factor. Mathematically,<br>**Z= PV/nRT**<br>For ideal gases PV = nRT, hence the compressibility factor, Z = 1 at all temperatures and pressures. | 2M |
| | **ii)**This phenomenon of lowering of temperature when a gas is made to expand adiabatically from a region of high pressure into a region of low pressure is known as Joule- Thomson effect. | 3M |

*********


**R. PRAKASH M.Sc., B.Ed.,**

**DEPARTMENT OF CHEMISTRY**

**SHRI VIDHYABHARATHI MATRIC HR.SEC.SCHOOL**

**SAKKARAMPALAYAM , AGARAM (PO) ELACHIPALAYAM**

**TIRUCHENGODE(TK), NAMAKKAL (DT) PIN-637202**

**Cell : 8883130833, 9486263513**


*********