**INDIAN SCHOOL MUSCAT**

**HALF YEARLY EXAMINATION**

**SEPTEMBER 2019**

SET A

**CLASS XII**

**Marking Scheme – SUBJECT [THEORY]**

| Q.NO. | Answers | Marks (with split up) |
|---|---|---|
| 1. | d | 1 |
| 2. | c | 1 |
| 3. | d | 1 |
| 4. | d | 1 |
| 5. | a | 1 |
| 6. | c | 1 |
| 7. | d | 1 |
| 8. | b | 1 |
| 9. | c | 1 |
| 10. | a&c | 1 |
| 11. | Na &K ions | 1 |
| 12. | Ammoniated electron | 1 |
| 13. | methemoglobinemia ('blue baby' syndrome | 1 |
| 14. | $90^0$ | 1 |
| 15. | intensity | 1 |
| 16. | **$mvr = nh/2\pi$** | 1 |
| 17. | Li+ | 1 |
| 18. | $NO, NO_2$ | 1 |
| 19. | S Block | 1 |
| 20. | 6 electrons | 1 |
| 21. | a) $\square MgO + Mg_3N_2$ <br> b) $CaSiO_3$ | 1 <br> 1 |
| 22. | Solvay process <br><br> $NH_3 + H_2O + NaCl + CO_2 \rightarrow NaHCO_3 (s) + NH_4Cl$ <br><br> $2 NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$ | ½ <br> 1 <br><br> ½ |
| 23. | • Radiant energy is emitted or absorbed discontinuously in the form of small packets of energy called quanta <br> • The amount of energy associated with each quantum of radiation is proportion to the frequency of radiation <br> • A body can emit or absorb energy only in terms of integral multiples of quantum                    ( any two points) | 1x2 |

| | | |
|---|---|---|
| | OR | |
| | Any 2 points of difference | 2 |
| 24. | a) When the electron is at infinity the energy of the electron is assumed to be zero, because there is no attractive or repulsive interaction . As it enters the atom , it does work to overcome the repulsive interaction and loses its energy. | 1 |
| | b) Sample of $H_2$ contains large number of atoms , hence large number of different types of transition takes place. | 1 |
| | OR | |
| | a) Definition | 1 |
| | b) Represents the orbital/orientation of subshell in magnetic field | 1 |
| 25. | $\Delta v = 0.02$ % of 500 m/s<br>$= 0.02100 \times 500 = 0.1$ m/s<br>$\Delta x = h/4\pi m. \Delta v$<br>$\Delta x = 6.63 \times 10^{-34}/4 \times 3.14 x9 .1 \times 10^{-31} x0.1$<br>$= 5.8 \times 10^{-4}$ m | ½<br>½<br>1 |
| 26. | a) Box diagram<br>b) 9 sigma and 2 pi bonds | 1<br>½ +½ |
| 27. | a) $C_2H_4$ due to sp3 hybridisation<br>b) $CO_2$ due to absence of lp/regular geometry | 1<br>1 |
| 28. | Definitions<br>OR<br>a)<br>• cracking of rubber and extensive damage to plant life. It also causes corrosion of metals, stones,building materials, rubber and painted surfaces<br>• Catalytic converters to convert oxides of nitrogen ,planting trees like pinus which can metabolise nitrogen oxides<br>b)<br>• Any one difference | 1x3<br><br>1<br><br>1<br><br>1 |
| 29. | a) $Na_2CO_3 + H_2O \rightarrow NaHCO_3 + Na^+ + OH^-$<br>b) Hydration energy is low<br>c) Being small in size, $Li^+$ cannot stabilize peroxide ion | 3x1 |
| 30. | a) $Fe[Ar]4s^23d^6$<br>$Fe^{2+} = [Ar]4s^03d^6$<br>$Fe^{3+} = [Ar]4s^03d^5$<br>$Fe^{3+}$ is more stable than $Fe^{2+}$ as $Fe^{3+}$ is half filled due symmetry &exchange energy<br>b) 2s,4p<br>OR<br><br>a) No of wavelengths per unit length<br>b) $[Ar]4s^13d^{10}$ | ½+½<br><br>1<br><br>½ +½<br><br>1x3 |

| | | |
|---|---|---|
| | c) 4-1=3 | |
| 31. | a)<br>i) 5 bps no lps trigonal bipyramidal<br>ii)3 bps 2 lpsT shape<br>    a) Correct structure<br><br>OR<br>    a) Any two factors<br>    b) Due to large size and less electronegativity of Cl<br>    c) Different symmetry | 1<br>1<br>½ +½<br><br>½ +½<br>½ +½<br>1 |
| 32. | a) Na-lesser efective nuclear charge<br>b) Be-given subshell is completely filled/penetrating effect<br>c) Cl-less interelectronic repulsion due to larger size | ½ +½<br>½ +½<br>½ +½ |
| 33. | Definition,<br>$ns^{1-2}$, $(n-1)d^{1-10}$<br>any two properties | 1x3 |
| 34. | $E_n = -2.18 \times 10^{-18}/n^2 \times Z^2$ J/atom $= 0.0872 \times 10^{-18}$ J/atom<br>$r_n = \dfrac{52.9 \times n^2}{Z}$ pm $= 52.9 \times 5^2 = 1322.5$pm | 1½<br>1½ |
| 35. |     a) & b) Statement of the law<br><br>    b) $h\nu = h\nu_o$ h = 6.63 x $10^{-34}$ Js<br><br>K.E. $= = 2.67 \times 10^{-19}$ J atom$^{-1}$<br>K.E. $=$ hv - hv$_o$<br>hv$_o$ $=$ hv $-$ K.E. $= 6.63 \times 10^{-34} \times 3 \times 10^8/2 \times 10^{-7} - 2.67 \times 10^{-19}$<br><br>Minimum energy $= 7.725 \times 10^{-19}$<br>    a) Maximum wavelength $= 2.57 \times 10^{-7}$m<br><br>OR<br><br>    a)                 Any two characteristics<br><br>    b)                 definition<br><br>c)$E = 2.18 \times 10^{-18}(1/n_1^2 - 1/n_2^2)$ J/atom<br><br>  $= 2.18 \times 10^{-18}(1/2^2 - 1/5^2)$     $=$**4.5 x10$^{-19}$ J**<br><br><br>$\nu = \Delta E / h = 4.5 \times 10^{-19}/6.63 \times 10^{-34}$ $=$**6.78 x10$^{14}$ Hz**<br><br>$\lambda = c / \nu = 3 \times 10^8/ 6.91 \times 10^{14} =$ **442** nm | 1x2<br><br><br>1<br>1<br>1<br><br><br><br><br>½+½<br><br><br>1<br><br><br><br>1<br><br>1<br><br><br>1 |

| 36. | a) P is less electronegative and bigger than N , repulsion between bps is less in PH3 | 1 |
| | b) Regular geometry,dipolemoment cancel each other | 1 |
| | c) Sp3 | ½ |
| | Energy level diagram | 1 |
| | Orbital overlapping diagram | 1 |
| | Tetrahedral geometry | ½ |
| | OR | |
| | a) Three resonance strs | 1½ |
| | b) Formal charge on O=0,1 and +1 | 1½ |
| | | ½ |
| | c) MO configuration | 1 |
| | Bond order=2 | ½ |
| | Paramagnetic | |
| 37. | | 1 |
| | a) Same number of valence electrons | 1 |
| | b) Due to half filled configuration | |
| | c) Species with same number of electrons,$Na^+$,$O^{2-}$ | 1+1 |
| | d) Untriquadium,Utq | ½+½ |
| | OR | |
| | a) Cations have more effective nuclear charge,anions have lesser effective nuclear charge than parent atom, | 1 |
| | Na and Na+ | 1 |
| | Cl &Cl- | |
| | b) Preserve the structure & criteria of classification | ½+½ |
| | c) $4^{th}$ pd and $4^{th}$ group | ½+½ |
| | d) Absence of d orbital in Boron | |