01. Could be explained by the Bohr Model is?
   1. Atomic spectrum of H only.  
   2. Spectrum of atom or ion having an electron.  
   3. Atomic spectrum of He.  
   4. Rutherford's model.  
   5. Gold foil experiment.

02. Incorrect statement regarding the modern periodic table is?
   1. There is only one very short period.  
   2. There are three long periods.  
   3. There are 32 elements in the 6th period.  
   4. It was arranged according to the periodic law.  
   5. Spaces allocated for undiscovered elements.

03. Type (s) of bond (s) in N₂O₄ molecule is?
   1. Ionic bonds only.  
   2. Covalent and dative bonds.  
   3. Covalent bonds only.  
   4. Covalent and ionic bonds.  
   5. Dative and Vanderwaals only.

04. IUPAC homenclature following compound is?

\[
\text{H}_2\text{N} - \text{CH}_2 - \text{CH} \quad \text{C} \quad \text{CH} = \text{CH}_2
\]

   1. 5 - amino - 4 - methylepent - 1 - en - 3 - ol  
   2. 1 - amino - 2 - methylpent - 4 - en - 3 - ol  
   3. 5 - amino - 3 - hydraxy - 4 - methylpent - ene  
   4. 5 - amino - 4 - methylpent - 1 - ene - 3 - ol  
   5. 5 - amino - 4 - methylpent - 1 - ene - 3 - ol
05. Molecule without dipole moment is?
1. CH₂Cl₂  2. CHCl₃  3. H₂S  4. NH₃  5. CCl₄

06. The Concentration of Mn²⁺ in moldm⁻³, if there is no change in volume when 50.00 cm³ of 0.08 moldm⁻³ Na₂C₅O₄ solution is mixed with 50.00 cm³ of 0.12 moldm⁻³ H⁺ / KMnO₄ is?
1. 0.008  2. 0.0016  3. 0.016  4. 0.06  5. 0.015

07. Which of the following aqueous solutions do not give a precipitate by mixing them, is?
1. Acidified BaCl₂ / Na₂CO₃  2. Acidified AgNO₃ / BaCl₂  3. Acidified Ba(NO₃)₂ / Na₂SO₄ / H₂O  4. BaCl₂ / K₂Cr₂O₇  5. Non of the above gives a precipitate.

08. In which of the following reaction at constant temperature decreases the entropy of the system?
1. C₅H₁₂(ℓ) → C₅H₁₂(ℓ)  2. 2H₂O(ℓ) → O₂(ℓ) + 2H₂O(ℓ)  3. 2NH₃(ℓ) → N₂(ℓ) + 3H₂(ℓ)  4. 2H₂(ℓ) + O₂(ℓ) → 2H₂O(ℓ)  5. Zn(ℓ) + 2HCl(aq) → ZnCl₂(aq) + H₂(ℓ)

09. Dissociation constant of a weak acid HA is 4.0 x 10⁻⁴ moldm⁻³. What is the pH value of 0.1 moldm⁻³ acid solutions?
1. 2.0  2. 4.7  3. 5.0  4. 5.3  5. 9.4

10. Reaction of Mg with aqueous NH₄Cl could be formed?
1. Mg(OH)₂ + NH₃ + HCl  2. MgCl₂ + NH₃  3. MgCl₂ + NH₃ + H₂  4. Mg(OH)₂ + NH₃ + Cl₂  5. Mg(OH)₂ + NH₃ + H₂ + Cl₂

11. \[
\text{CH₃COCH₃} \rightarrow \text{CH₃ - C - CH₂ - CH - CH₃}
\]

Which of the following order of reactions is the most suitable for the above translation?
1. CH₃MgBr / H₂O dil H₂SO₄ CH₃COOH
2. NaOH(aq) dil H₂SO₄ CH₃COCl
3. Li₄AlH₁₂ / H₂O Mg dry ether CH₃COCH₁ CH₃COOH
4. NaOH(aq) Li₄AlH₁₂ / H₂O CH₃COOH
5. NaCN/HCl Li₄AlH₁₂ / H₂O CH₃COOH CH₃CH₂OH

12. Which of the following would not be an electron acceptor in a dative bond?

13. Which of the following has the highest basicity?

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14. Main products of solvay process are?
1. CaCO$_3$ and Ca(HCO$_3$)$_2$
2. Na$_2$CO$_3$ and NaHCO$_3$
3. Na$_2$SO$_4$ and NaHSO$_4$
4. CaCl$_2$ and Ca(NO$_3$)$_2$
5. CaCl$_3$ and CaO

15. False statement regarding Lithium or Lithium containing compounds is?
1. Heat dissociation of hydroxides, carbonates and nitrates dissociated to their oxides.
2. Lithium is the most electronegative element in group I.
3. Lithium carbonate does not exist as stable compound in solid state.
4. It gives peroxides but not superoxides.
5. Chemistry of the salts of Lithium is similar to that at the salts of Magnesium.

16. Which of the following species has equal distances among all carbon - carbon atoms and all carbon - hydrogen atoms.
   a. C$_6$H$_6$
   b. CH$_2$ = CH - CH$_2$
   c. CH$_3$CH = CH$_2$
   d. CH$_2$ = CH - CH$_3$
1. a only
2. a, b, d
3. b and d
4. a and c
5. a, b and c

17. Which of them the following set of compounds are soluble in water?
1. Na$_2$SO$_4$, BaSO$_4$, CaSO$_4$
2. NaOH, Ba(OH)$_2$, Na$_2$O
3. NaOH, Be(OH)$_2$, Ba(OH)$_2$
4. BaCO$_3$, Na$_2$CO$_3$, ZnCO$_3$
5. Na$_2$O, MgO, Al$_2$O$_3$

18. Water solubility of Mg(OH)$_2$ at 298 K is 2.0 x 10$^{-4}$ moldm$^{-3}$ solubility of Mg(OH)$_2$ in 0.08 moldm$^{-3}$ MgSO$_4$ aqueous solution is?
   1. 1.0 x 10$^{-4}$ moldm$^{-3}$
   2. a. 1 x 10$^{-5}$ moldm$^{-3}$
   3. 2.0 x 10$^{-4}$ moldm$^{-3}$
   4. 1.0 x 10$^{-2}$ moldm$^{-3}$
   5. non of the above.

19. Nitrobenzene subjected for reactions with following reagents and finally gives the organic product A.

```
\text{NO}_2
```

Which of the following is A.
1. 
2. 
3. 
4. 
5. 

20. Write crystalline solid releases brown coloured vapour when heated with conc $\text{H}_2\text{SO}_4$. It gives the
smell of Ammonia when heated with Al powder and NaOH. This compound would be.
1. KNO₃  2. KBr  3. NH₃NO₂  4. NaCl  5. KI

21. RMM of a dimethyl easter of dicarboxylic acid M is 200. RAM of M would be.
1. 172  2. 148  3. 186  4. 132  5. 170

22. Which of the following could be used to distinguish Mg(NO₃)₂ and Ba(NO₃)₂?
1. aqueous Na₂CO₃  2. aqueous NaHCO₃  3. aqueous NH₃  4. aqueous KI  5. None of the above.

23. Which of the following pair of compounds would be distinguished by using aqueous KOH solution as the only reagent?
1. CH₃CH₂Cl and CH₃COCl  
2. CH₃CONH₂ and CH₃COONH₄  
3. CH₃COOCH₂CH₃ and C₆H₅COOCH₂CH₃  
4. CH₃COOCH₂C₆H₅ and C₆H₅COOCH₂CH₃  
5. CH₂CH₂-N-CH₃ and C₆H₅-NHCOCH₃

24. The equilibrium A(s) + B(s) → C(g) is at 1100K temperature. Which of the following is true regarding \( \Delta H \) and \( \Delta S \) values for the forward reaction.
1. \( \Delta H = \Delta S = 0 \)  
2. \( \Delta H > 0, \Delta S > 0 \)  
3. \( \Delta H < 0, \Delta S > 0 \)  
4. \( \Delta H > \Delta S < 0 \)  
5. \( \Delta H < 0, \Delta S < 0 \)

25. If particular solid compound is heated, releases a gas which does not help for the combustion of Magnesium and Phosphorous. This solid compound would be?
1. NH₄NO₃  2. NaNO₃  3. NH₄NO₃  4. Pb(NO₃)₂  5. AgNO₃


27. The order with respect to B in the reaction A + B → Products, is zero. Which of the Following graph represents the variation of the concentration of B with time during the reaction while other
factors kept constant?
1. 2. 3.

28. X, Y and Z are three colourless aqueous solutions. There is no change observed when X and Y are mixed. When small amounts of solutions Z is added to solutions X and Y separately evolved a gas with unpleasant odour and white precipitate was given. The gas evolved with unpleasant smell gives brown colour with $K\text{Hgl}_2$. The white precipitate observed from X dissolves in dil HNO$_3$ releasing a gas. White precipitate observed from Y not dissolves in dil HNO$_3$. The solutions X, Y, and Z contains respectively are?

1. $\text{NH}_4\text{NO}_3, (\text{NH}_4)_2\text{SO}_3, \text{NaOH}$
2. $\text{(NH}_4)_2\text{CO}_3, \text{NH}_4\text{NO}_3, \text{Ba(OH)}_2$
3. $\text{(NH}_4)_2\text{CO}_3, (\text{NH}_4)_2\text{SO}_3, \text{Ba(OH)}_2$
4. $\text{(NH}_4)_2\text{CO}_3, (\text{NH}_4)_2\text{SO}_4, \text{Ba(OH)}_2$
5. $\text{(NH}_4)_2\text{CO}_3, (\text{NH}_4)_2\text{SO}_4, \text{Mg(OH)}_2$

29. Consider the mechanisms of following reactions?

(a) Only a nucleophilic substitution. ($S_n$).
(b) Only a nucleophilic addition. ($A_n$).
(c) Nucleophilic substitution and Elimination reaction ($S_n$ and $E$) only.
(d) Nucleophilic addition and Elimination reaction ($A_n$ and $E$) only.

The correct order of the mechanisms of P, Q, R, and S.
1. b, a, d, a 2. d, a, d, a 3. d, c, d, a 4. b, c, d, a 5. d, a, c, a

30. Equilibrium constant for the system $\text{N}_2\text{O}_4(g) \rightleftharpoons 2\text{NO}_2(g)$ at particular temperature is 6.0 barr. If mole fraction of $\text{N}_2\text{O}_4(g)$ at the same temperature in a equilibrium mixture containing $\text{N}_2\text{O}_4(g)$ and $\text{NO}_2(g)$ only is 2/3, what is the total pressure inside the vessel.
1. 1.0 bar 2. 4.0 bar 3. 6.0 bar
4. 36 bar 5. Data given are not enough for the calculation.

For each of the questions 31 to 40, one or more responses out of the four responses (a), (b), (c) and (d) given is / are correct. Select the correct response / responses. In accordance with the instructions given on your answer sheet, mark.
(1) If only (a) and (b) are correct  
(2) If only (b) and (c) are correct  
(3) If only (c) and (d) are correct  
(4) If only (d) and (a) are correct  
(5) If only other number or combination of responses is correct.

Summary of above Instructions.

31. Acceptable set(s) of quantum numbers are?
   (a) $3, 2, 0, +\frac{1}{2}$
   (b) $2, 2, 0, +\frac{1}{2}$
   (c) $3, 2, +3, -\frac{1}{2}$
   (d) $3, 2, -2, -\frac{3}{2}$

32. Which of the following statement(s) is/are true regarding the isotope?
   (a) Contains 92 neutrons.
   (b) Charge of is $36 \times 96490 \times 6.022 \times 10^{23}.$
   (c) Neucleus contains 92 neutrons.
   (d) Neucleus contains $^{92}_{36}$prons.

33. Which of the following pair(s) of compound(s) reacted to obtained an organic product which gives natural aqueous solutions?
   a. CH$_3$COOH and PCl$_3$
   b. C$_6$H$_5$NH$_2$ and HCl
   c. CH$_3$COCH$_3$ and NABH$_4$
   d. CH$_3$COOH and KOH

34. Uses obtained from an emission spectrum of an atom would be?
   (a) Existence of sub energy levels.
   (b) Large area of an atom is empty.
   (c) Calculation of ionization energies.
   (d) Existence of isotopes.
   1. only a, b  
   2. only a,b,c  
   3. only a,c  
   4. only a,d  
   5. a,b,c,d

35. Which of the following pair(s) is/are distinguished using conc NaOH Solution?
   (a) Al$^{3+}$ and Cr$^{3+}$
   (b) Cu$^{2+}$ and Co$^{2+}$
   (c) Al$^{3+}$ and Zn$^{2+}$
   (d) Zn$^{2+}$ and Pb$^{2+}$

36. Which of the following is/are true?
   a. Always the reduction takes place in the negative electrode during an electrolysis.
   b. In an electro chemical cell oxidation takes place in the anode and in the electrolysis, reduction take place in the anode.
   c. During the all electrode chemical oxidation neutral atoms convert to positive ions.
   d. Equilibrium electrode reactions not happens on the electrode during electrolysis.

37. Gree house gas(es) which is/are not effected to make acid rains.
   a. SO$_2$
   b. NO$_2$
   c. CO$_2$
   d. CH$_4$

38. Types of products obtained by electrolysis process is depend on?
   a. Concentration of the electrolyte
   b. Volume of the electrolyte.
   c. Surface area of electrodes.
   d. nature (type) of electrodes.
39. Which of the following statement / (s) is / (are) true regarding the Galvanic cell represents by
A(s) | A^{2+} (aq) || B^{2+} (aq) | B(s)
a. Electrons are travelled from Electrode A to Electrode B.
b. Standard current is traveled from Electrode B to Electrode A.
c. Electrode A is positively charged.
d. Electrode B is negatively charged.

40. Different metals are combined with iron in a medium of agar gel containing potassium ferri cyanide, Sodium Chloride and Phenolphthaline as follows. The set / (s) give pink colour around iron is / are?

In question Nos. 41 to 50, two statements are given in respect of each questions. From the Table given below, select the response out of the responses (1), (2), (3), (4) and (5) that best fits the statements and mark appropriately on your answer sheet.

<table>
<thead>
<tr>
<th>Response</th>
<th>First Statement</th>
<th>First Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>True</td>
<td>True and correctly explains the first statement.</td>
</tr>
<tr>
<td>(2)</td>
<td>True</td>
<td>True, but does not explains the first statement correctly.</td>
</tr>
<tr>
<td>(3)</td>
<td>True</td>
<td>False</td>
</tr>
<tr>
<td>(4)</td>
<td>False</td>
<td>True</td>
</tr>
<tr>
<td>(5)</td>
<td>False</td>
<td>False</td>
</tr>
</tbody>
</table>

42. First Statement | Second Statement |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H - C = O from Ag</td>
<td>O</td>
</tr>
<tr>
<td>OH precipitate with tollen's reagent.</td>
<td>Reaction between - C = H and tollen's reagent is nucleophillic addition reaction.</td>
</tr>
</tbody>
</table>

43. Pure Br₂ gas is released by adding small amount of conc. HNO₃ to a sample of Solid MgBr₂ | Any solid bromid form HBr gas with conc. H₂SO₄ |
| 44. If aqueous solution of a simple salt is reacted with BaCl₂ and gives a white precipitate, that salt should be a sulphate. | BaSO₄ is insoluble in water. |
| 45. Ca(OH)₂ can be used to remove temporarily hardness of water. | Industries of lime production causes to increase the hardness of water in related, areas. |
| 46. CH₂Cl₂ give a precipitate with aqueous AgNO₃. | Stability of Cl⁻CH₂⁺ is very high. |
| 47. NaOH can be used to distinguished a mixture of Al(OH)₃ and Fe(OH)₃. | NaOH react with Fe(OH)₃. |
| 48. NaOCl is a good bleaching agent. | Cl atoms are given by NaOCl. |
| 49. If phenolphthalein is added to an aqueous solution of pH value 7.5 at room temperature turns pink. | Acidic solutions are colourless with phenolphthalein while basic solutions are pink. |
| 50. Ability of hydrolysis of BiCl₃ is lower than that of NCl₃. | BiCl₃ shows acidic properties than NCl₃. |

The amount of A in the system is increased by adding an inert gas to the equilibrium A (g) ⇌ B(g) + 2C (g) in closed system of constant volume. Partial pressures of gases A, B and C is changed by adding an inert gas to the equilibrium system A (g) ⇌ B(g) + 2C (g) when the volume is constant.